STATE BOARD OF TECHNICAL EDUCATION, BIHAR

Scheme of Teaching and Examinations for

V SEMESTER DIPLOMA IN AGRICULTURAL ENGINEERING

(Effective from Session 2016-17 Batch)

THEORY

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME							Credits
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks (A)	Class Test(CT) Marks (B)	End Semester Exam. (ESE) Marks (C)	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	
1.	Farm Structure & Estimation	1611501	04	03	10	20	70	100	28	40	03
2.	Irrigation & Drainage Engineering	1611502	03	03	10	20	70	100	28	40	03
3.	Farm & Land Development machinery	1611503	03	03	10	20	70	100	28	40	03
4.	Farm Structural Drawing	1611504	04	04	10	20	70	100	28	40	04
5.	Soil & Water Conservation Engg.	1611505	03	03	10	20	70	100	28	40	03
		Total:- 17					**350**	**500**			

PRACTICAL

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME					Credits
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	
					Internal (A)	External (B)			
6.	Irrigation & Drainage Engineering Lab.	1611506	04	03	15	35	50	20	02
7.	Farm & Land Development machinery Lab.	1611507	06	03	15	35	50	20	02
		Total:- 10					**100**		

TERM WORK

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME				Credits
			Periods per week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	
8.	Farm Structural Drawing (TW)	1611508	06	15	35	50	20	02
9.	In Plant Training and Visit to Work	1611509	4 Weeks Continuous	30	70	100	40	02
		Total:- 06				**150**		
Total Periods per week Each of duration One Hours = **33**						**Total Marks = 750**		**24**

FARM STRUCTURE AND ESTIMATION

Subject Code 1611501	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	04	—	—	TA	:	10	
				CT	:	20	

RATIONALE: One of the Basic responsibilities of an Agricultural Engineer is to construct the structures needed by farmer, which are mostly made of local available materials, well furnished building structures of various use. Thus know-how of details of structures and its estimation concept is must.

Objectives: The present curriculum is designed in such a way so that idea of different types completely known. Calculations of the detailed quantities of materials and working out their costs as a estimation or execution can be done.

Contents : Theory		Hrs/week	Marks
Unit -1	**Rural Building** 01.01 Poultry house, grains bins and godowns, silos, Bunker (in brief) 01.02 Their constructional details, capacity & functional requirements.	[03]	[04]
Unit -2	**Rural Sanitation** 02.01 Septic Tank, soak pit, PRAI Channels 02.02 Bore hole, latrines, trench latrine, PRAI Latrine	[03]	[04]
Unit -3	**Agricultural Workshop** 03.01 Brief idea of machine foundation. 03.02 Installation of machine on platform. 03.03 Pump house 03.04 Threshing floor 03.05 Implement sheds	[03]	[04]
Unit -4	**Farm Road** 04.01 Kachacha Road, W.B.M. Road and Pukka Road and Bituminous Road & P.C.C. Road.	[03]	[03]
Unit -5	**Rural Drainage** 05.01 Specification as per B.I.S. Standards and detail estimation of different components of structures.	[03]	[02]
Unit--6	**Gobar Gas Plants** 06.01 Type of Gobar Gas Plant, Movable dome, Fixed dome. 06.02 Janta Bio Gas Plant and its specification.	[03]	[04]
Unit-7	**Building Construction** 07.01 Foundation, construction details of spread footing 7 Pile foundation. 07.02 Different types of soils and its bearing capacity Estimation of material in spread footing, by long wall, short wall & centre line method. Earth work and layout of centre to centre line of building.	[03]	[04]
Unit -8	**Stone and Brick Masonry** 08.01 Study of various types of bricks with special emphasis on English bond, L, T and + junctions. 08.02 Estimation of bricks for brick wall and masonry.	[03]	[04]
Unit -9	**Damp proof Course** 09.01 Methods of providing DPC materials used and its estimation.	[02]	[02]
Unit -10	**Doors and Windows** 10.01 Doors and windows, types and used sections. 10.02 Windows and lights as ventilators 10.03 Their position on building sizes and estimation of materials for this and deduction in building for it.	[03]	[04]
Unit -11	**Plastering and Pointing.** 11.01 Plastering and pointing, methods of doing. 11.02 Estimation of plastering and pointing.	[03]	[03]

Unit--12	**Preparation** 12.01 Laying 12.02 Compaction and curing of concrete. 12.03 Use of local materials for farm work. 12.04 Application of various type of cement.	[02]	[04]
Unit-13	**Lintels and Arches** 13.01 Classification of lintels by materials 13.02 Materials of constructions 13.03 Methods of arch construction.	[03]	[04]
Unit -14	**Floor** 14.01 Types of flooring 14.02 Drainage and cleaning of floors.	[03]	[04]
Unit -15	**Roof** 15.01 Type of roof 15.02 Pitched roof 15.03 Lean to roof 15.04 King post truss 15.05 Queen post trusses	[04]	[04]
Unit -16	**Item Estimation** 16.01 Abstract and details estimate 16.02 Earth work for ditch cum bund 16.03 Estimate of a masonry well 16.04 Estimate of earth work in irrigation channels 16.05 Estimate of septic tank 16.06 Estimate of two room residential building	[06]	[16]
	Total	**50**	**70**

BOOKS RECOMMENTDED

1. Estimating and Costing – by B.N. Dutta
2. Estimating and Costing – by G.S. Birdi
3. Estimating and Costing – by M. Chakraberti
4. Soil Mechanics and Foundation – by B.C. Punamia
5. Farm Building Design – by Now powr L.W. & Walker H.B.
6. Treasures of R.C.C. Design – by Sushil Kumar
7. Planning Farm Building – by Wooly
8. Farm Structures – by Barrey & Sommet
9. Principle of Agricultural Engineering Vol – I – by M.A. Michel.
10. A Text Book of Estimating Costing
    Publisher: Standard Publisher Distributors.

IRRIGATION AND DRAINAGE ENGINEERING

Subject Code 1611502	Theory			No of Period in one session : 42			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

RATIONALE :- Agricultural Production to meet the requirement with time cannot be imagined without Irrigation and Drainage Engg. Resources. Diploma holder in Agricultural Engineering have to Performa his job not only in the supervision of irrigation sources its development methods command & water management planning but has to give provision for the excess waste from the agricultural field with suitable drainage system. He has to acquaint with from structural parameters to the soil water plant relationship. He has to develop and execute at he efficient system performer in different situation to get the objectives of modern & scientific Agricultural systems.

OBJECTIVES : The present course is designed in such a way so that one can get know how and ability regarding irrigation and drainage Engineering related to farmers need from source of irrigation to the latest development with time so that he can give the actual stress as desired and thus lead our agricultural production with time.

Following Topics can fulfill the objectives:

	Topics	Lecture
01.	Introduction	02
02.	Ground water	03
03.	Source of irrigation	02
04.	Storage structure	03
05.	Measurement of Irrigation parameters	02
06.	Infiltration	02
07.	Soil moisture Retention & Movement	03
08.	Soil water plant Relationship	03
09.	Irrigation Efficiency	02
10.	Methods of Irrigation	03
11.	Irrigation & Channels	03
12.	Silt Theory & Design parameter	02
13.	Drainage, Drainage system	03
14.	Minor Irrigation	03
15.	Tube well Engineering	03
16.	Pumps	03
	Total Period: -	**42**

Contents : Theory		Hrs/week	Marks
Unit -1	**Introduction** 01.01 Definition of Irrigation necessity and scope of irrigation 01.02 Irrigation potency in India 01.03 Different types of Irrigation	[02]	[03]
Unit -2	**Ground water** 02.01 Water bearing formations 02.02 Confined and unconfined aquifers. Cavity well, shallow & Deep well 02.03 State water level, peizo metric surface 02.04 Pumping water level draw-down 02.05 Area of influence interference 02.06 Predicting well yield in confined and unconfined aquifers	[03]	[05]
Unit -3	**Sources of Irrigation**: 03.01 Source of Irrigation 03.02 Type of irrigation sources	[02]	[03]
Unit -4	**Storage structure** 04.01 Storage structures & Head works 04.01.01 Brief introduction of different types of dams 04.01.02 Ear than dam, Rack fill dam, hydraulic fill 04.02.01 Different types of spillways & outlets 04.02.02 Cross section of Earthen dam 04.02.03 Courses of failure of storage structures specially the Earthen dam.	[03]	[06]

Unit -5	**Measurement Irrigation Parameters**: 05.01 Measurement of volume. 05.02 Measurement of velocity-Area. 05.03 Measurement of discharge 05.04 Weirs & Notches, parallel flumes	[02]	[04]
Unit--6	**Infiltration** 06.01 Definition Measurement and factors affecting it. 06.02 Infiltration curve and its characteristics index	[02]	[03]
Unit-7	**Soil moisture Retention & movement:** 07.01 Soil moisture and its measurement 07.02 Soil moisture tension, soil moisture characteristics 07.03 Saturation, Field capacity moisture equipment	[03]	[03]
Unit -8	**Soil- water- plant relationship**: 08.01 Measurement of soil water 08.02 Transpiration, Evaporation Evapo-transpiration consumptive use 08.03 Seasonal & Periodic measurement of consumptive use by Lysimer and Field experimental Plant methods 08.04 Command Areas, Gross Command Area, Culturable Command Area. 08.05 Duty of water, Delta, base period, water requirement related numerical problems 08.06 Irrigation scheduling of major corps monga factors	[03]	[06]
Unit -9	**Irrigation Efficiency**: 09.01 Irrigation Efficiency its definition and types 09.02 Related Numerical problems	[02]	[03]
Unit -10	**Methods of Irrigation**: 10.01 Methods of irrigation 10.02 Surface Irrigation system 10.03 Sub. Surface Irrigation system 10.04 Drip Irrigation system 10.05 Sprinklers Irrigation system	[03]	[05]
Unit -11	**Irrigation & channels**: 11.01 Irrigation channel and its types 11.02 Non erodible channels, Design of open channels, Regulatory works 11.03 Maximum permissible velocity channel slopes, free board 11.04 Hydraulic sections Economical and Efficient sections	[03]	[03]
Unit--12	**Silt theories & Parameter** 12.01 Kennedy's & Lacy's theory with correction in channel design in brief 12.02 Their comparisons 12.03 Lining of open and underground channel	[02]	[03]
Unit-13	**Drainage & Drainage system** 13.01 Definition of Drainage its necessity 13.02 Water logging condition its demerits and control of water logging 13.03 Inter relationship of drainage with irrigation 13.04 Drainage co efficient, types surfaces and sub surface 13.05 Design & layout of drainage systems for agricultural purposes and related numerical problems 13.06 Special method of drainage, vertical model drainage.	[03]	[06]
Unit -14	**Minor Irrigation:** 14.01 Land survey for Leveling for minor irrigation works duty of well 14.02 Planning layout & Installation of minor irrigation channels and equipments in plain and hill areas e.g. swinging basket moth, rahat, charasa, dhekuli, Persian screw 14.03 Low head lift pump, chain pumps, wind mill, development of well and aquifer connection of well	[03]	[06]

Unit -15	**Tube well Engineering** 15.01 Selection of site for tube well 15.02 Rigs, Types of rotary and percussion tools used for drilling 15.03 Tube well construction, installation & working 15.04 Drilling of tube wells and construction of open wells 15.05 Preparation of well-log, types of strainers and its advantages 15.06 Cavity tube well and bamboo tube well	[03]	[06
Unit -16	**Pumps** 16.01 Reciprocating pumps, Principle and operation 16.02 Centrifugal pump, Principle and operation 16.03 Types of impellors, installation of horizontal/ Centrifugal pump 16.04 Turbine pumps deep well submersible jet pumps 16.05 Lift pumps, single acting and double acting, criteria and procedure for selection of irrigation pumps	[03]	[06
	Total	**42**	~~70~~

BOOKS:

1. Irrigation Engineering and Water Power by B.C. Punamia, Standard Publishers Distributors, New Delhi.
2. Drainage Engineering Luthin, John wally & Co.
3. Irrigation A.M. Miche, Vikas publishers.
4. Tube well and Pumps A.M. Michel, Water Technology center IART, New Delhi.
5. APOLY – 12 PU-500 wind mill for pumping water-Energy center, IERT, Allahabad – 2.
6. Engg. For Agricultural Drainage ROE & Ayres, McGraw Hill.
7. Irrigation Engg. S.K. Garg.

FARM AND LAND DEVELOPMENT MACHINERY

Subject Code 1611503	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

RATIONALE: To adopt the modern and scientific Agriculture a farm engineer has to know about complete idea of new concept based land development for successful operation is essential.

OBJECTIVES: The present curriculum is designed to give complete concept of modern and scientific system and its necessity as well as familiarization of Land development and farm machinery from its constructional detail to the working for objectives. Following course contents can build the ability in Diploma holder to fulfill the objective.

Sl. No.	Topic	Lectures/periods
1.	Tillage	04
2.	Primary Tillage equipments	05
3.	Secondary Tillage Equipments	04
4.	Sowing & Planning Equipments	04
5.	Cultivator & weed control Equipments	04
6.	Fertilizer Equipments	04
7.	Harvesting equipments	04
8.	Threshing Equipments	04
9.	Processing Equipments	03
10.	Land Development Equipments	03
11.	Economic Equipments	03
	Total	**42**

Contents : Theory		Hrs/week	Marks
Unit -1	**Tillage** 01.01 Definition and function id Tillage 01.02 Tillage system, types of tillage 01.03 Tillage implements	[04]	[06]
Unit -2	**Primary Tillage Equipments** 02.01.1 Mould Board Plough. Type of mould board. 02.01.2 Construction, Types of share mould board and material of construction. 02.01.3 Concept of suction, plough size. Hitch of plough point of bearing. 02.02.1 Draft, Side draft, unit draft, factors affecting draft. 02.02.2 Force acting on plough (introduction only). Horse Power requirement and related numerical Problems. 02.03.1 Disc plough, purpose, principles types and constructions and adjustment. 02.03.2 Ploughing, concept of tools related with ploughing methods of ploughing. 02.04.1 Coulter plough, chiset, Plough subsurface, rotary plough.	[05]	[08]
Unit -3	**Secondary Tillage Equipments**: 03.01.1 Harrow, its type construction. 03.01.2 Adjustment of Animal and Tractor driven harrow. 03.02.1 Land rollers packers & pulveriser.	[04]	[06]
Unit -4	**Sowing & Planting Equipments:** 04.01.1 Seed drill. Functions, types and constructional detail. 04.01.2 Size and material devices, Burrow opener, sand covering devices. 04.01.3 Calibration of seed drill and related numerical problems. 04.02.1 Planters, Function, Types. 04.02.2 Its motoring devices , methods of planting.	[04]	[08]
Unit -5	**Cultivator and weed control Equipments:** 05.01.1 Cultivators and its types. 05.01.2 Constructions and its adjustments. 05.02.1 Rotary hoe, its construction and working. 05.03.2 Flame weed control, its construction and working. 05.03.1 Sprayer & dusters, its types. 05.03.2 Their construction and working.	[04]	[08]

Unit--6	**Fertilizer Equipments:** 06.01.1 Manure spreaders, its construction and working. 06.02.1 Fertilizer distributors, its construction and working. 06.02.2 Liquid fertilizer application.	[04]	[06]
Unit-7	**Harvesting Equipments:** 07.01.1 Mower and Reaper principle of culling. 07.01.2 Types, construction, working, adjustments, trouble and reasons. 07.02.1 Field forage Harvester, its types and working advantage.	[04]	[06]
Unit -8	**Threshing Equipments:** 08.01.1 Olpad Thresher, its construction and working. 08.02.1 Power wheat thresher, terminology connected with power thresher. 08.02.2 Its function, constructional detail and working. 08.02.3 Paddy power thresher manual and power operated, its construction and working details. 08.02.4 Multi crops thresher, its construction and working. 08.02.5 Trouble shooting and adjustment in wheat, paddy and multi crop thresher. 08.02.6 Combine its types functions, principle units and their construction and working.	[04]	[08]
Unit -9	**Processing Equipments:** 09.01.1 Chaff cutter, in silage cutter their construction, working and capacity. 09.02.1 Sugarcane crusher, types construction and working. 09.03.1 Corn Sheller, construction and working. 09.04.1 Winower , types construction and working.	[03]	[06]
Unit -10	**Land Development Equipments:** 10.01.1 Dozer, its adjustment of blade operation and output. 10.01.2 Concept of land leveling, cutting and filling. 10.02.1 Scrapper, construction and output. 10.03.1 Excavating Equipments, construction and working. 10.03.2 Power Shovel, drag outs and draft line and its working.	[03]	[04]
Unit -11	**Economic and Management of Farm Equipments:** 11.01.1 Matching equipments to farm needs. 11.02.1 Calculation of cost of operation of machines. 11.03.1 Field Capacity and Field efficiency. 11.04.1 Repairing and maintenance of farm machinery. 11.05.1 Customer use of farm equipments, advantages and disadvantages.	[03]	[04]
	Total	**42**	**70**

BOOKS RECOMMENTDED

Sl. No.	Name of Books	Writer's Name	Publisher's Name
1.	Principles of Agricultural Engineering Volume-I	T.P. Ojha A.M.Michael	Jain Brothers, New Delhi
2.	Elements of Agricultural Engineering	Dr. Jagdishwar Sahay.	Standard Publishers & Distributors, Delhi_110006

FARM STRUCTURAL DRAWING

Subject Code 1611504	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	04
	L	T	P/S	ESE	:	70	
	04	—	—	TA	:	10	
				CT	:	20	

RATIONALE: As we know that drawing is the language of technician. Hence in order to make a technician per effect he should have the concept of the drawing of farm structure. He should be able to prepare detailed drawing of structures. Through these drawing he will come across during service.

Objective :- The course is designed in such a way so that a Diploma holder can develop the idea of farm structure drawing. He can read, under stand and execute the correct Structure drawing.

Sl.No. Topics

1. Foundation
2. Buildings.
3. Door and window.
4. Stair & Stair Case
5. Roof & Roof truss.
6. Irrigation Structure
7. Plants Drawing
8. Contents.

Contents : Theory		Hrs/week	Marks
Unit -1	**Foundation** 01.01 Plan and section of the following foundations. 01.01.01 Strip Foundation 01.01.02 Spread Footing	[04]	
Unit -2	**Buildings** 02.01 Plan, elevation and section of single storey building with flat roof 02.02 Plan elevation and section of a godown with inclined roof over truss. (span 10 meter) 02.03 Plan elevation and section of a cattle barn (Starvhan or loone housing for 50 cows) 02.04 Plan elevation and section of poultry farm deep litter system	[12]	
Unit -3	**Door and Window** Plan-elevation and section of the following 03.01 Battened and ledged door & window. 03.02 Framed and paneled door & window. 03.03 Glazed or Sash door & window. 03.04 Dormer window	[06]	
Unit -4	**Stair & Stair Case** 04.01 Plan and cross section of Dog legged or newel half turn stair. 04.02 Plan and cross section of newel quarter turn stair. 04.03 Plan and cross section of Bifurcated stair.	[06]	
Unit -5	**Roof & Roof Truss** 05.01 Section and elevation of lean to roof. 05.02 Section and elevation of cable roof. 05.03 Section and elevation of king post truss. 05.04 Section and elevation of queen post truss. 05.05 Steel roof truss.	[08]	
Unit--6	**Irrigation Structure** 06.01 Sectional plan, half elevation and half cross section of cross drainage work of siphon aqueduct. 06.02 Sectional plan half elevation of half cross section of sarda type fall. 06.03 Section plan, half elevation and half cross section of single span R.C.C. slab, culvert.	[08]	
Unit-7	**Plant Drawings** 07.01 Drawing of gobar gas plant, fixed dome as per KVIC specification. 07.02 Drawing of rain water harvesting plant.	[06]	

Unit -8	**Distribution of marks** **08.01 Farm building :** (a) Plan 10 marks (b) Section 10 marks (c) Elevation 10 marks Irrigation Structure: (a) Half foundation plan 10 marks (b) Half cross section & half elevation – 10 marks **Total- 50 Marks** **08.02 Any two of the following** 1. Door & Window. 2. Stair 02x10= 20Marks 3. Roof Truss. 4. Gobar Gas plant & Rain water harvesting plant.		

BOOKS :

1. Civil Engineering Drawing. By Sah and Kale
2. Civil Engineering Drawing. By B.N. Verma.
3. Irrigation and Water power Engg. By B.C. Punamia.
4. Principle of Agriculture Engg. By A.M. Michol & J. P. Ojha.
5. I. S. Code 696 & 062
6. Booklet Biogas plant I.E.R.T. Allahabad.

SOIL AND WATER CONSERVATION ENGINEERING

Subject Code 1611505	Theory			No of Period in one session : 42			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

RATIONALE:

A Diploma holder is a first line supervisor. He/she has to plan soil and water conservation engineering project as well as have to execute the plan mainly at field, so that objective of the project can be fulfill. He/she has the skill to adopt and can execute the actual plan of the soil and water conservation measures. Technical know how is must for the successful implementation.

OBJECTIVES:

Present curriculum is designed to develop theknow how from hydrology and different runoff characteristics like estimation, measurement to the surface hazard due to it and its controlling measures. Successful, modern and scientific agricultural practices can be adopted only when our land with its existence and fertility can be maintained with time. Following contents can fulfill the objectives:

Sl.No.	Topic	Lectures/periods
01.	Hydrology	04
02.	Recurrence Interval	03
03.	Estimation of Runoff	03
04.	Measurement of Runoff	03
05.	Pollution and Control	03
06.	Soil Erosion	03
07.	Soil and Water Conservation	03
08.	Land Capability classification	04
09.	Bunding and Terracing	04
10.	Temporary Structures	03
11.	Gully erosion control	03
12.	Ravine Reclamation	03
13.	Wind Erosion and Control	03
		Total 42

Contents : Theory			Hrs/week	Marks
Unit -1	**01.**	**Hydrology:**	[04]	[04]
	01.01.1	Hydrologic cycles.		
	01.02.1	Water Budget of India.		
	01.03.1	Rainfall, variation of rainfall.		
	01.03.2	Characteristics of rainfall in India.		
	01.03.3	Rainfall intensity and rain gauges.		
	01.03.4	The average rainfall methods of computation.		
	01.03.5	The Arithmetic rainfall, the Theisson's polygon method, Isohytal method of computation of mean annual rainfall.		
	01.03.6	Storm pattern.		
	01.04.1	Humidity, measurement of humidity.		
	01.04.2	Temperature, its measurement.		
Unit -2	**02.**	**Recurrence Interval**	[03]	[04]
	02.01.1	Probability of Occurrence of Rain.		
	02.01.2	Analysis of precipitation data.		
	02.01.3	Rainfall Map of India for different return period.		
	02.01.4	Type of Rainfall, intensity and storm duration.		
Unit -3	**03.**	**Estimation of Runoff.**	[03]	[04]
	03.01.1	Estimation of Runoff by infiltration method.		
	03.01.2	Rational method of Runoff estimation.		
	03.01.3	Cook's Method.		
	03.01.4	Hydrological Soil group method.		
	03.01.5	Estimation of flood discharge.		
	03.02.1	Runoff hydrograph.		
	03.02.2	Unit hydrograph and calculation of runoff.		

Unit -4	**04. Measurement of Runoff:** 04.01.1 Measurement of Runoff from small agricultural watershed. 04.01.2 Installation and maintenance of runoff measuring devices. 04.01.3 Use of stage recorders. 04.01.4 Stream gauging	[03]	[04]
Unit -5	**05. Pollution Control:** 05.01.1 Pollution and its types. 05.01.2 Air Pollution, its causes and controlling measures. 05.01.3 Water Pollution, its causes and controlling measures. 05.01.4 Land Pollution, its causes and controlling measures. 05.01.5 Radio Active Pollution and its control.	[03]	[04]
Unit--6	**06. Soil Erosion:** 06.01.1 Erosion, types and causes of erosion and extent of erosion by various agencies. 06.01.2 Factors affecting erosion. 06.01.3 Process of soil detachment, transportation, sampling. 06.01.4 Installation of soil erosion measuring devices	[03]	[08]
Unit-7	**Soil and Water Conservation:** 07.01.1 Necessity of soil conservation. 07.01.2 Changing concept of erosion. 07.01.3 Damage caused by erosion and its estimation. 07.01.4 Factors affecting runoff & factors affecting the	[03]	[08]
Unit -8	**08. Land Capability Classification:** 08.01.1 Land capability classification. 08.01.2 Healthy soil and problem soil with its remedy. 08.01.3 Agronomical soil conservation practices in alluvial tract and hills. 08.01.4 Crop rotation from soil conservation point of view. Strip cropping pattern. 08.02.1 Vegetative control of gullies, vegetated waterways. 08.02.2 Green manuring mulching. 08.02.3 Posture grassland management, use of posture land with control grazing arrangement. 08.02.4 Control use of shrubs, vanes and other plants forestry in soil and water conservation. 08.02.5 Tree planting management, wind break and shelter belts.	[04]	[06]
Unit -9	**09. Bunding and Terracing:** 09.01.1 Bunding and terracing, its types. 09.01.2 Broad base and narrow base bund, contour and graded bunds and terraces. 09.01.3 Bench terraces its types design planning by direct methods. 09.01.4 Contouring field layout construction and cost estimation of bunding	[04]	[06]
Unit -10	**10. Temporary Structures:** 10.01.1 Temporary structures, Earthen check dam. 10.01.2 Drop spillway, chute spillway and drop inlet spillway 10.01.3 Their different types of inter conduit and inlet & out let suitability. 10.01.4 Hydrological hydraulic and structural design of their different structures to suit various drop and discharge.	[03]	[04]
Unit -11	**12. Gully erosion control:** 12.01.1 Gully and its types 12.01.2 Stages of gully and its stabilization by vegetation and mechanical measures	[03]	[06]
Unit--12	**14. Ravine Reclamation:** 14.01.1 Ravine Reclamation classification of ravines 14.01.3 Measure for Ravines reclamation 14.01.4 River straightening.	[03]	[06]

Unit-13	**Wind Erosion & control:** 15.01.1 Wind characteristics 15.01.2 Wind pattern in India & wind erosion 15.01.3 Wind erosion causes factors affecting & control	[03]	[06]
	Total	**42**	**70**

REF. BOOKS:

1. Soil and water conservation Engineering By Schwab, GP, Fravert, R.K., Edminister T.W. and Barners K.K., Publisher : John Wiley & Sons.
2. Soil Water Conservation Engineering By R. Suresh, Publisher: Standard Publishers Distributors New Delhi
3. Principles of Agrill. Engg. Vol. I & II By A.M. Michel & T.P. Ojha, Publisher : Jain Brothers, New Delhi.
4. Land and water management By V.V.N. Mruty, Kalyani, Publisher.
5. Objective Soil & Water Engineering By R. Suresh, Publisher: Standard Publishers Distributors New Delhi

IRRIGATION AND DRAINAGE ENGINEERING LAB

Subject Code 1611506	Practical			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	04	Internal	:	15	
				External	:	35	

RATIONALE:
A diploma in Agriculture Engineer adequate facilities to provide adequate facilities to the farmers field so that modern and scientific to the farmers field so that modern and scientific methods of agriculture can he adopted. Irrigation and drainage is the must importance aspect of and agricultural field and thus being how to solve the each phase of technical problem regarding irrigation and drainage.

Objectives:
The present curriculum of practical is fabricated in such a way so that one can get the clear conception of as well as practical aspect of the subject theoretical.

The following topics are covering the practical perfect ness and make expert to the students.

	Contents : Practical	Hrs/week	Marks
Unit-1	Study and sketch of spill ways and out lets.	[03]	
Unit-2	Study of different type of methods of irrigation adopted for different crops at farmers fields.	[03]	
Unit-3	Study and sketch of infiltration and actual determination of infiltration a rate of said in the field.	[03]	
Unit-4	Study and sketch of different works notches orifices and flumes and flow measurement in channel.	[04]	
Unit-5	Determination of discharge of a channel by (a) float method (b) current meter methods.	[06]	
Unit-6	Study sketch of tensiometer and its use in determination of soil moisture.	[03]	
Unit-7	To measure pressure head in saturated soil by pizo meter.	[03]	
Unit-8	To determine permeability of soil by constant head permeometer.	[03]	
Unit-9	To determine permeability of soil by variable head permeometer.	[03]	
Unit-10	Land leveling for irrigation determination of cuts and field.	[03]	
Unit-11	Layout of water carriage and field drains.	[03]	
Unit-12	Study of different types of control structures like gates value in irrigation channels.	[04]	
Unit-13	Practices of irrigation from planning and its layout in the field.	[06]	
Unit-14	Preparation of drainage plans and its layout in the field.	[03]	
	Total	**50**	

FARM AND LAND DEVELOPMENT MACHINERY LAB

Subject Code 1611507	Practical			No of Period in one session : 84			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	06	Internal	:	15	
				External	:	35	

RATIONALE: An agricultural Engineering Diploma holder has to implement the modern and scientific agricultural method as per the time demand for the above purpose he has to prepare utilized idea of construction its working principles and its purposed by utilizing it.

Objectives: The present practical curriculum is designed in such a way so that there should not be more gap between theory & Practical. To make him more confident and more perfect in his job.

Contents : Practical		Hrs/week	Marks
Minimum ten experiments have to do by the students. Dismantling, assembly and attachments of bullock drawn and tractors draw Equipment of the following:			
Unit-1	Mould board plough.	[06]	
Unit-2	Disc plough	[06]	
Unit-3	Harrow	[06]	
Unit-4	Cultivator	[06]	
Unit-5	Study of rotary tillers.	[06]	
Unit-6	Field operation of above implements.	[14]	
Unit-7	Study of various type of seed drill their metering devices and operation in the field.	[04]	
Unit-8	Seed drill calibration.	[06]	
Unit-9	Study of planters and Trans planters.	[04]	
Unit-10	Study of manure spreader and fertilizer applicator.	[04]	
Unit-11	Study of sprayers and dusters their field operation demonstration of sprayers by various types of nozzles.	[04]	
Unit-12	Study of mowers and reapers.	[04]	
Unit-13	Study of thresher and winnower, various adjustments.	[04]	
Unit-14	Study of combine with trailer.	[04]	
Unit-15	Study of chaff cutters & sugar cane crushers and adjustments.	[04]	
Unit-16	Study of corn Sheller.	[04]	
Unit-17	Study of power harrow.	[04]	
	Total	**84**	

FARM STRUCTURAL DRAWING -TW

Subject Code 1611508	Term Work			No of Period in one session : 84			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	Internal	:	15	
	—	—	06	External	:	35	

RATIONALE: To under stand the proper drawing practical aspects is must. As we know the drawing is the language of engineer and one can learn the language through theory as well as practical aspects.

Objectives : The theoretical class can be kept for the sessional classes. The present curriculum is designed to develop more confidence in drawing.

Minimum ten plates have to do in the session.

Sl.No. Topics

Contents : Term Work		Hrs/week	Marks
Unit-1	Plan, elevation and section of a single storey residential building having Bedrooms, Kitchen, Bath, Verandah etc with its foundation detail – one plate	[12]	
Unit-2	Plan elevation and sectional drawing dairy farm for 50 cows – one plate	[06]	
Unit-3	Plan elevation and section of a poultry farm for 400 birds – one plate	[06]	
Unit-4	Plan elevation and section of a godown with inclined roof over truss (span 10m)- one plate	[06]	
Unit-5	Plan elevation and section of septic tank, and open surface drain – one plate	[06]	
Unit-6	Plan and detail information regarding Agricultural workshop in 80 hectare land. – one plate	[06]	
Unit-7	Plan, half elevation and half section of single span R.C.C. slab culvert	[06]	
Unit-8	Plan, elevation and section of fully paneled and glazed door and window. – one plate	[06]	
Unit-9	Plan, half elevation and cross section of a siphon Aqueduct – one plate.	[06]	
Unit-10	Section elevation of (a) King post truss, (b) Queen post truss and steel truss – one plate	[12]	
Unit-11	Plan, elevation and section of a gobar gas plant.	[06]	
Unit-12	Plan, elevation and section of a rain water harvesting plant.	[06]	
	Total	**84**	

BOOKS :- Same as given in theory.

IN PLANT TRAINING AND VISIT TO WORK -TW

Subject Code 1611509	Term Work			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	100	02
	L	T	P/S	Internal	:	30	
	—	—	4 weeks Continues	External	:	70	

	Contents : Term Work	Hrs/week	Marks
Unit-1	**IN PLANT TRAINING**. The training of the students should be in any organization which is involved in - Farms production - Landscape & gardening - Dairy Technology - Soil and water conservation Engineering. - Irrigation and Drainage Engineering. - Land Development Machinery. - Post harvest technology. - Seed production. - Any other which is relevant to Agricultural Engineering.		
Unit-2	**PROJECT STUDIES (VISIT TO WORK)**: Submission of report of any one of the following Visit to study work. 01. An Agricultural College or Krishi Vigyan Kendra. - Study of Agricultural farm. - Package practices of crops. - Modern technology related to crop production. 02. A developed dairy. - Live stock keeping. - Maintenance of live stock. - Milk preservation, processing, pasteurization and its packaging. - Utility of milk and its product. 03. A Dam / Barrages. - Study of different elements of Dam/Barrages. - Silt excluder. - Divide wall. - Sluice gate. - Intake of main canal. - Cross drainage work, etc. - Treated soil conservation watershed. 04. Any Agricultural Equipment manufacturing unit. - Study of manufacturing unit like Thresher, Cultivator, Harrow, Fertilizer cum Seed drill etc. 05. Any seed production unit. - Study to seed production unit. - Techniques related to seed production. - Types of seeds. - Grading, processing and its packaging. 06. Any place which is relevant to Agricultural Engineering as suggested by respective guide/guides. **Report writing**: The report shall include sketches wherever necessary of all works studied with relevant data.		
	Total	Four Weeks Continuously	

BOOKS RECOMMENDED

1. Entrepreneurship by M.K. Jain; Deepak Prakashan, Delhi, Chennai, kanpur, Bhopal.
2. Hand book on project appraisal and follow up by D.P. Sarda.
3. Farm Management by S.P. Dhondyal; Achal Prakashan Mandir, Kanpur.

STATE BOARD OF TECHNICAL EDUCATION, BIHAR

Scheme of Teaching and Examinations for

V SEMESTER DIPLOMA IN ARCHITECTURAL ASSISTANTSHIP

(Effective from Session 2016-17Batch)

THEORY

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME							Credits
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks (A)	Class Test(CT) Marks (B)	End Semester Exam. (ESE) Marks (C)	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	
1.	Building Construction-II	1637501	04	04	10	20	70	100	28	40	03
2.	Computer Aided Design & Drafting (CADD)	1637502	03	03	10	20	70	100	28	40	03
3.	Architecture & Town Planning	1637503	04	03	10	20	70	100	28	40	03
4.	Contemporary Architecture	1637504	03	03	10	20	70	100	28	40	03
5.	Quantity Surveying and Valuation	1637505	03	04	10	20	70	100	28	40	03
		Total:- 17					**350**	**500**			

PRACTICAL

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME					Credits
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	
					Internal (A)	External (B)			
6.	CADD Lab	1637506	06	04	15	35	50	20	03
7.	Model Making Lab - II	1637507	06	06	15	35	50	20	02
		Total:- 12					**100**		

TERM WORK

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME				Credits
			Periods per week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	
8.	Building Construction (TW)	1637508	04	30	70	100	40	02
9.	In Plant Training (TW)	1637509	4 Weeks continuous	15	35	50	20	02
		Total:- 04				**150**		
Total Periods per week Each of duration one Hours = **33**						**Total Marks = 750**		**24**

BUILDING CONSTRUCTION-II

Subject Code 1637501	Theory			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	04	—	—	TA	:	10	
				CT	:	20	

Rational: - To develop understanding of the behaviors and function of various components of buildings.

Objective: - able to draw and understand the drawings of building construction.

Contents :Theory

	Name of the Topic	Hrs/week	Marks
UNIT-1	**Type of foundation: -** Brick stepped footing, Grillage foundation, RCC foundation, Raft foundation. Pile foundation, group of piles, and Foundation consideration on types of soil. Black cotton soil, Rocky soil, Sandy soil, bearing capacity of soil	10	12
UNIT-2	**Type of Stair Cases:-** Dog legged staircase, tread and riser, relation between tread and riser. Fine escape staircase. Ramp- width and slope of ramp. Balustrade, handrail	10	12
UNIT-3	**Lift and Escalator: -** Lift shaft and position of lift in a building. Machine room of lift. Escalator & travelator.	10	11
UNIT-4	**Load Bearing and Framed Structure: -** Load bearing structure, Minimum width of load bearing wall. Framed RCC Structure. Partition wall in framed structure.	10	11
UNIT-5	**Roofing: -** Flat and pitched root. Flat roof in RCC. Slope of roof. Water proofing of RCC root- types of pitched roof. A/C Sheet, PVC Sheet and clay tiles. Gutter of pitched roof.	10	12
UNIT-6	**Trusses: -** Wooden and Steel truss system. - Wooden roof truss system- Kingpost truss and Queen post truss. - Steel post truss- different type of truss for various span length, Advantage of truss roof system.	10	12
	Total	**60**	**70**

COMPUTER AIDED DESIGN AND DRAFTING (CADD)

Subject Code 1637502	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale & Objective:

To equip students with latest software used in Architecture drawing in 2D and 3D.

Topics		Periods
01	Basic application of Auto Cad in architectural drawing	(08)
02	2-D and 3-D drawings	(22)
03	Rendering and Perspective drawing	(10)
04	Exterior drawings	(05)
05	Interior drawings	(05)
	Total :	**(50)**

Contents :Theory

Name of the Topic		Hrs/week	Marks
Unit-1	1. Drawing of plan, Elevation, Section and Perspective using Auto Cad Software.	**08**	**12**
Unit-2	2. Setting of Drawing limits, Units and drafting settings. Creating dimensions, style, using hatch, fills and gradients. Using text in drawing, layers in AutoCAD.	**22**	**30**
Unit-3	3. Rendering of Drawing using, Google sketch up and Revit Software.	**10**	**14**
Unit-4	4. Elevation and Perspective drawing. Creation of trees, roads, furniture etc. Use of landscape in drawing.	**05**	**07**
Unit-5	5. Interior drawings	**05**	**07**
	Total-	**50**	**70**

ARCHITECTURE & TOWN PLANNING

Subject Code 1637503	Theory			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	04	—	—	TA	:	10	
				CT	:	20	

Rationale & Objective: - Knowledge of town planning to assist Architect and Town Planner in larger Residential having projects. Objective of town planning, principles of town planning and necessity of town planning,

Contents :Theory

Name of the Topic		Hrs/week	Marks
Unit-1	1. Site selection of Indus valley town of Mohanjodaro and Harappa. Road layout, Drainage system and Civic amenities.	**06**	**7**
Unit-2	2. Garden City movement Eberiezev Howard. Blending of environment and natural habitat with built environment. Garden city of Lentchworth.	**06**	**7**
Unit-3	3. Road Pattern- Grid Iron Pattern, Redial, Axial. Grid iron with radial pattern. Ring road system, Hierarchy of Road, Hierarchy of road network in a town.	**06**	**7**
Unit-4	4. Satellite town- Definition of satellite town. Advantage of satellite town. Dependence on mother city. Transportation system.	**06**	**7**
Unit-5	5. Zoning- Definition, principle, type of zoning, land use, Different types of Density- Net and Gross density.	**12**	**14**
Unit-6	6. Master Plan- Definition aims and objective, plan derived town growth development plan, origin of town, merits and demerits of master plan.	**12**	**14**
Unit-7	7. Neighborhood- Principle of Neighborhood function of Neighborhood, population, size and lay out with respect to chandigarh sector.	**12**	**14**
	Totel-	**60**	**70**

CONTEMPORARY ARCHITECTURE

Subject Code 1637504	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

S.No.	Topics	Periods
01	Important Work of Contemporary Architects- F.L. Wright, Mies Van dev Rohe, Le Corbusier, B.V.Doshi, Raj Rawal, Charles Corea.	(25)
02	Industrial Revolution in Europe	(25)
	Total :	**(50)**

Contents :Theory

Name of the Topic		Hrs/week	Marks
Unit-1	**1. F.L. Wright**- Falling water Pennsylvania, Guggein heium Museum etc. Philosophy of his design. Important work of F.L. Wright in USA and Europe. **Mies- Van-der Rohe**- Important work and philosophy of design. **Le Corbusier**- Five principles of design. Introduction of RCC Construction in Design. Use of base concrete. Chandigarh- Sectoral development. High Court, Assembly building. **B.V.Doshi**- Important work of B.V.Doshi in India. Raj rewal, Charles Correa – Philosophy and important work. **Laurie Baker** – Low cost building technique of Laurie Baker.	**25**	**35**
Unit-2	**2. Industrial Revolution** – Development of iron construction. Use of machinery in mass production. Steam Engine, Spinning mill. Great Exhibition of London. Eiffel Tower of Paris. Use of Elevator in high rise building.	**25**	**35**
	Total-	**50**	**70**

QUANTITY SURVEYING, VALUATION AND SPECIFICATINS

Subject Code 1637505	Theory			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

RATIONALE:

Diploma holders in Architectural Assistantship are supposed to prepare material estimates for various civil works namely; buildings, irrigation works, public health works and roads etc. In addition, they must have basic knowledge regarding analysis of rates, contracting principles of valuation. Therefore, this subject has great importance for diploma holders in Architecture Assistantship.

Contents :Theory

Name of the Topic		Hrs/week	Marks
Unit-1	1. Introduction to quantity surveying and its importance. Duties of quantity surveyor	02	**3**
Unit-2	**Types of estimates** 2.1 Preliminary estimates - Plinth area estimate - Cubic rate estimate - Estimate per unit base 2.2 Detailed estimates - Definition - Stages of preparation – details of measurement and calculation of quantities and abstract	06 10	**6** **12**
Unit-3	**Measurement** 3.1 Units of measurement for various items of work as per BIS:1200 3.2 Rules for measurements 3.3 Different methods of taking out quantities – centre line method and long wall and short wall method	10	**12**
Unit-4	**Preparation of Detailed and Abstract Estimates from Drawings** 4.1 A small residential building with a flat roof 4.6 RCC work in beams, slab, column and lintel	10	**12**
Unit-5	**Calculation of quantities of materials for** 5.1 Cement mortars of different proportion 5.2 Cement concrete of different proportion 5.3 Brick masonry in cement mortar 5.4 Plastering and pointing 5.5 Painting and polishing 5.6 Cement concrete flooring 5.7 Terrazo flooring 5.8 Steel reinforcement of RCC elements – Beam, lintels, slab and column	06	**7**

Unit-6	**Analysis of Rates** 6.1 Steps involved in the analysis of rates. Requirement of material, labour, sundries, contractor's profit and overheads 6.2 Analysis of rates for finished items when data regarding labour, rates of material and labour is given: - Earthwork in excavation hard/ordinary soil and filling with a concept of lead and lift - Cement concrete in foundation - RCC in roof slab - Brick masonry in cement mortar - Cement Plaster - Painting and polishing	08	**8**
Unit-7	**Measurement Book and Billing** Entries in measurement book, standard measurement book, checking of measurement, preparation of bill, first and final bill, running account bill, advance payment, secured advance payment, refund of security money	04	**5**
Unit-8	**Valuation** 8.1. Purpose of valuation, principles of valuation 8.2. Definition of various terms related to valuation like – depreciation sinking fund, salvage and scrap value, market value, fair rent, year's purchase etc 8.3. Method of valuation - Replacement cost method - Rental return method	04	**5**
	Total-	**60**	**70**

INSTRUCTIONAL STRATEGY

This is an applied engineering subject. Teachers are expected to provide working drawings for various civil works and students be asked to calculate the qauantities of materials required for execution of such works. Teachers should conceptualise making analysis of rates for different items of works. It will be advantageous if students are given valuation reports for reading.

RECOMMENDED BOOKS

1. Pasrija, HD; Arora, CL and S. Inderjit Singh, "Estimating, Costing and Valuation (Civil)", Delhi, New Asian Publishers
2. Rangwala, BS; Estimating and Costing". Anand, Charotar Book Stall
3. Kohli, D; and Kohli, RC; "A Text Book on Estimating and Costing (Civil) with Drawings", Ambala Ramesh Publications
4. Chakraborti, M; "Estimating, Costing and Specification in Civil Engineering", Calcutta
5. Dutta, BN; "Estimating and Costing

CADD LAB

Subject Code 1637506	Practical			No of Period in one session :60			Credits
	No. of Periods Per Week			Full Marks	:	50	03
	L	T	P/S	ESE	:	50	
	—	—	06	Internal	:	15	
				External	:	35	

Rationale: able to create drawing using AutoCAD Software.

Contents : Practical

List of Experiments :-		Hrs/week	Marks
Unit-1	Drawing of plan, Elevation and section of residential, commercial and Institutional building using AutoCAD, Use of layers and various units, Use of Blocks in drawing.	**12**	**15**
Unit-2	Prepare layout plans of interiors of Bed Room, Kitchen, Drawing and Tailets.	**12**	**10**
Unit-3	Creating hatch pattern, fills and gradients.	**12**	**8**
Unit-4	Print setting of drawing and taking out print on various sizes of paper.	**12**	**7**
Unit-5	Development of key plan and site plan. (Two projects)	**12**	**10**
	Total	**60**	**50**

MODEL MAKING LAB -II

Subject Code 1637507	Practical			No. of Period in one Session: 60			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	06	Internal	:	15	
				External	:	35	

Rationale: able to create 3-D model

Contents :Practical

List of Experiments :-		Hrs/week	Marks
Unit-1	3-D model of building using blackboard and mount board of simple residential building.	**20**	**20**
Unit-2	Block model of group of buildings.	**20**	**15**
Unit-3	Design of gateways with surrounding landscaping. (One Model Making related to Project)	**20**	**15**
	Total	**60**	**50**

CONSTRUCTION PRACTICE II - TW

Subject Code 1637508	Term work						Credits
	No. of Periods Per Week			Full Marks	:	100	02
	L	T	P/S	Internal	:	30	
	—	—	04	External	:	70	

Rational:- Drawing skill in Building Construction

Objective:- able to draw structural drawing.

Contents :Term Work

	List of Term Work:-	Hrs/week	Marks
Unit-1	Foundation- Piles, Grillage & brick footing (3 sheets).	20	20
Unit-2	Staircase- Dog legged (1 sheet)	10	10
Unit-3	RCC Roof and Truss System (2 sheets).	20	20
	Total	**50**	**50**

IN PLANT TRAINING -TW

Subject Code 1637509	Term Work			No. of Periods in one Session:			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	Internal	:	15	
	—	—	4 Week Continues	External	:	35	

Contents :Term Work

	List of Training office :-
	One month professional training in Architecture's office Training Report with supporting drawings done by the Candidates One month training Certificate

One month summer training in Architects office, assisting the architect in preparation of plan. Elevation & Section of building. Site visit and site supervision.

STATE BOARD OF TECHNICAL EDUCATION, BIHAR

Scheme of Teaching and Examinations for

V SEMESTER DIPLOMA IN AUTOMOBILE ENGINEERING / MECH. ENGG.(AUTO)

(Effective from Session 2016-17 Batch)

THEORY

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEMI							
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks A	Class Test (CT) Marks B	End Semester Exam.(ESE) Marks C	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	Credits
1.	Automobile Component Design	1633501	03	03	10	20	70	100	28	40	03
2.	Advanced Automobile Engines	1633502	03	03	10	20	70	100	28	40	03
3.	Environmental Pollution and Control	1625503	03	03	10	20	70	100	28	40	03
4.	Automobile Manufacturing Process	1633504	03	03	10	20	70	100	28	40	03
5.	Basic Electrical & Electronics	1633505	03	03	10	20	70	100	28	40	03
		Total :- 15					**350**	**500**			

PRACTICAL

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME					
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	Credits
					Internal(A)	External(B)			
6.	Advanced Automobile Engines Lab	1633506	04	03	15	35	50	20	02
7.	Basic Electrical & Electronics Lab	1633507	04	03	15	35	50	20	02
	Total :- 08						**100**		

TERM WORK

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME				
			Periods per Week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	Credits
8.	Industrial Project & Entrepreneurship Development (TW)	1625508	04	15	35	50	10	02
9.	Professional Practices-V -(TW)	1625509	03	15	35	50	10	02
10.	Automobile Component Design (TW)	1633510	03	15	35	50	20	01
	Total :- 10					**150**		
Total Periods per week Each of duration One Hour 33				Total Marks = **750**				**24**

AUTOMOBILE COMPONENT DESIGN

(AUTOMOBILE ENGINEERING GROUP)

Subject Code 1633501	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS: THEORY

	Name of the Topic	Hrs/week	Marks
Unit -1	**Basic concepts of Design:-** 1.1 Introduction to design 1.2 Classification of design 1.3 Design consideration 1.4 Design procedure 1.5 Stress analysis: 1.5.1 Types of external loads 1.5.2 Types of induced stresses: tensile, compressive, shear, Crushing and bearing pressure, bending, torsion, thermal stresses, creep, proof stresses, resilience, principal stresses 1.5.3 Stress – strain diagram for ductile & brittle material & it's importance 1.5.4 Variable stresses in machine parts, fatigue & endurance limit, stress – time diagrams for variable stresses 1.5.5 Working stresses for static load, variable or fatigue load 1.5.6 Factor of safety, selection of factor of safety. 1.5.7 Stress concentration causes and remedies 1.5.8 Introduction to theories of failure –Maximum principle stress theory, Maximum shear stress theory, Distortion energy theory. 1.5.9 Selection of material and justifications for Automobile components. Advanced Materials for automotive components 1.6.1 Concept of standardization , Preferred numbers & interchangeability in design practice. 1.6.2 Common types of fasteners with their applications - Through Bolts, tap bolts, studs, cap screws , and machine screws ,designation of screw thread according to I.S., stresses in screw fasteners , Bolts of uniform strength. 1.6.3 Bearings-Classification ,location in Automobiles systems & selection of bearings 1.6.4 Post design aspects - Ergonomic aspect, Aesthetic consideration (shape, color, surface finish) for Automobile	**16**	**14**
Unit -2	**Design of machine elements:-** 2.1 Design of socket & spigot type cotter joint. 2.2 Design of knuckle joint 2.3 Design of Turn buckle 2.4 Applications of above machine elements in an automobile.	**06**	**08**
Unit - 3	**Design of shafts, keys & Couplings**:- 3.1 Conceptual understanding of shaft, axles & spindles. 3.2 Design of shaft for torsion, rigidity, bending, combined Torsion & bending. 3.3 Comparison of solid & hollow shafts. 3.4 Design of propeller shaft, whirling & critical speed. 3.5 Design of rear axle. 3.6 Types of keys, design of sunk rectangular key, woodruff key. 3.7 Effect of keyways on shaft. 3.8 Design of couplings- muff, flange, and bush pin type flexible.	**10**	**10**

Unit - 4	**Design of levers:-** 4.1 Types of levers 4.2 Design of 4.2.1 rocker arm, 4.2.2 bell crank lever, 4.2.3 hand lever 4.2.4 Pedals for rectangular cross-section & fulcrum pin only.	**06**	**06**
Unit - 5	**Design of Chassis Component:-** 5.1 Design of clutch- Single plate & Multi plate. 5.2 Teeth calculation of gears for sliding mesh/constant mesh gear box for given data. 5.3 Design of semi elliptical leaf spring , helical spring - torsion &compression	**10**	**12**
Unit - 6	**Design of engine components:-** 6.1 Data of engine specifications and calculations of cylinder dimensions for given power 6.2 Design of cylinder head thickness and bolts 6.3 Design of valve seat & valve lift 6.4 Design of piston crown by bending strength and thermal considerations. 6.5 Design of piston rings and skirt length 6.6 Design of piston pin for bearing, bending & shear considerations 6.7 Design of connecting rod cross -section (I section). 6.8 Design of big end, cap and bolts. 6.9 Design of overhung crank shaft.	**16**	**20**
	Total	**64**	**70**

Text/ Reference Books:		
Titles of the Book	**Name of Authors**	**Name of the Publisher**
Machine Design	R.K.Jain	Khanna publication
Machine Design	R.S.Khurmi & J.K.Gupta	Eurasia Publication House .
Machine Design	Pandya & shah	Dhanpat rai & sons
Machine Design	P C Sharma D K Aggarwal	S K KATARIA & sons
Auto design	R B Gupta	Satya prakashan
Problems in Automobile Engineering	N.K Giri.	Khanna publication
Auto design problems	K M Aggarwal	Satya prakashan
Automobile Design Vol,2,3	Griles	--
Machine Design	J.E. Shigley	McGraw Hill
Machine tool design Handbook	--	CMTI
--	Design data Book	P S G Coimbatore
Machine Design An integrated approach	Robert L. Norton	Prentice-Hall.
A text book pf Automobile Engineering	R.K Rajput	
Advanced Engine technology	Heinz Heisler	

ADVANCED AUTOMOBILE ENGINES

(AUTOMOBILE ENGINEERING GROUP)

Subject Code 1633502	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS: THEORY

	Name of the Topic	Hrs/ week	Marks
Unit -1	***Engine Selection:-*** 1.1 Comparison of SI and CI engines on the basis Thermal efficiency and fuel consumption 1.2 Comparison of SI and CI engines on the basis of thermodynamic and operating variables. 1.3 Comparison of performance characteristics. 1.4 S.I. and C.I. Engine application- with purpose of selection. Note: - assignment on comparative study of engine specification and it rating on basis of various parameters.	**04**	**06**
Unit -2	***Fuels and Alternative Energy Options for Auto Engines:-*** 2.1 Different types of fuels, calorific value 2.2 Properties of S.I. Engine fuel 2.3 Properties of C.I. Engine fuel 2.4 Fuel additives and their effects 2.5 LPG as SI engine fuel. 2.6 Alcohol as gasoline fuel blends. 2.7 Alcohol as CI engine fuel. 2.8 Natural gas as a Transport fuel. 2.9 Electric cars and hybrid vehicles.	**08**	**14**
Unit – 3	**Theory Of Combustion:-** 3.1 Ignition limits 3.2 Stages of combustion in SI engine 3.3 Effect of engine variables on Ignition lag. 3.4 Effects of engine variables on flame propagation 3.5 Abnormal combustion- Detonation, pre-ignition, surface ignition, Effects of detonation. 3.6 Control of detonation. 3.7 SI engine combustion Chambers 3.8 Stages of combustion in CI engine 3.9 Air Fuel ratio in Diesel engines 3.10 Delay period and variables affecting delay period. 3.11 Diesel knock and its control. 3.12 CI engine combustion chambers.	**08**	**12**
	Computer Controlled Fuel-Injection System:- **Part A** 4.1 Throttle body injection (TBI) system, comparison with carbureted engine fuel supply system. 4.2 Multi-Point fuel Injection system (MPFI)/ Port fuel injection (PFI) system. Types of injection- sequential, grouped and simultaneous injections. Comparison of MPFI and TBI systems. 4.3 Electronic control module (ECM) control functions. 4.4 Inputs and outputs of electronic control module (ECM). 4.5 Output control functions- Fuel Injection control, Spark advance control, Idle speed control, Exhaust gas recirculation control and other controls.		

	Part B 4.6 Construction and working of fuel Injector and fuel pump. 4.7 Electronically controlled diesel Injection pump. 4.7.1 Electronic control system 4.7.2 Fuel system 4.7.3 Glow plug circuits 4.7.4 Injection pump timing 4.7.5 Electronic Injection advance. 4.8 Common rail direct injection system.	**08**	**12**
	Fuel Economy, Air pollution and Emission Control:- 5.1 Fuel Economy standards. 5.2 Methods of improving fuel economy. 5.3 Pollutants from gasoline engines. 5.4 Effect of engine maintenance on exhaust emission 5.5 Gasoline engine emission control, Catalytic Converters. 5.6 Diesel emission, Diesel smoke and control 5.7 Exhaust-Gas recirculation (EGR) – EGR Valve and control 5.8 Early fuel evaporation system 5.9 Positive crankcase ventilation (PCV) system 5.10 Electric assist choke system 5.11 Evaporation emission control system 5.12 Euro Norms and Bharat stage Norms. Equipment for checking Exhaust emission from vehicles. 5.13 Comparison of diesel and gasoline emission	**10**	**12**
	Total	**48**	**70**

Text / Reference Books:		
Titles of the Book	**Name of Authors**	**Name of the Publisher**
Motor Automotive Technology	Anthony Schwaller	Delmar Publisher Inc.
Automotive Service	Tim Gills	Delmar Publisher Inc.
A Course in Internal Combustion engine	M.L Mathur R.P.Sharma	Dhanpat Rai Publication
Santro & Accent Basic training Book	Identified Experts	Hyundai Motors India Ltd.
Service Manuals of all Euro –II vehicles.	Identified Experts	Maruti motors India Ltd.
Automobile Engg. Vol.-2	Dr. Kirpal Singh	Standard Publishers.
Automobile Engineering Vol.i – Engines.	Anil Chikara	Satya Prakashan, New Delhi
Automobile Mechanics	Crouse / Anglin.	TATA McGRAW – HILL
Advanced Engine Technology	Heinz Heisler	
Advanced Automobile Fault Dignosis	Tom Denton	

ENVIRONMENTAL POLLUTION & CONTROL

(MECHANICAL ENGINEERING GROUP)

Subject Code 1625503	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS: THEORY

Name of the Topic		Hrs/we	Marks
Unit -1	**Introduction** 1.1 Environment 1.2 Ecosystem 1.3 Classification of pollution & pollutants 1.4 Environment & pollution control acts 1.5 ISO 14OOO standards, 1.6 Kyoto treaty / protocol, carbon units.	**04**	**06**
Unit -2	**Air Pollution** **Part A** 2.1 Sources & classification of air pollution 2.2 Effects of air pollution on human health 2.3 Effects of air pollution on economy 2.4 Photochemical air pollution Air pollution from major Industrial operations e.g. Fertilizer industries aluminum manufacturing plants, Acid plants, Cement industries, Coal & tar industries, paper industries, Refinery & petrochemical industries	**10**	**14**
	Part B Air pollution due to Automobiles-design and operating parameters and methods of control 2.6 Pollution due to S. I. Engines. Design & operating parameters responsible for emission and methods of pollution control. 2.7 Pollution due to C. I. Engines. Design & operating parameters responsible for emission and methods of pollution control. 2.8 Air quality & emission standards of India & Europe 2.9 Air pollution in Indian metro cities- Delhi, Mumbai, Chennai, Kolkata	**14**	**18**
Unit – 3	**Water Pollution** 3.1 Sources of water pollution. 3.2 Effects of water pollution. 3.3 Water pollution analysis 3.3.1 Physical examination of water 3.3.2 Chemical characteristics of water 3.3.3 Biological investigation of water 3.4 Definitions of Important terms used in water pollution – Dissolved O_2 , Chemical O_2 demand, Biological O2 demand, Theoretical O2 demand, Total solids, Total suspended solids, Total dissolved solids, Turbidity, Alkalinity, Acidity. 3.5 Water quality standards 3.6 Steps in Water treatment 3.7 Sampling & analysis of water pollution	**06**	**10**

Unit – 4	**Noise Pollution** 4.1 Definition of noise 4.2 Sources of noise 4.3 Types of noise – Impulsive & sonic noise 4.4 Effects of noise on health 4.5 Noise measurement 4.6 Noise mapping	**04**	**08**
Unit – 5	**Other Types Of Pollution** 5.1 Solid waste 5.1.1 Classification of solids 5.1.2 Solid waste management 5.1.3 Method of solid waste disposal 5.1.4 Reuse, Recycling & recovery of materials from refuse 5.2 Soil pollution 5.2.1 Chemistry of soil 5.2.2 Soil irrigation by effluents 5.2.3 Agricultural pollution 5.3 Radiation pollution 5.3.1 Sources & effects of radiation 5.3.2 Radiation exposure standards 5.3.3 Radiation protection 5.3.4 Treatment & disposal of radiation waste 5.4 Global pollution 5.4.1 Green house effect 5.4.2 Acid rain 5.4.3 Ozone depletion problem	**10**	**14**
	Total	**48**	**70**

Text/ Reference Books:

Titles of the Book	**Name of Authors**	**Name of the Publisher**
Air pollution	M.N. Rao & H.V.N. Rao	Tata McGraw Hill
Automotive Mechanics	William H. Course & Donald L. Anglin	Tata McGraw Hill
Internal Combustion Engines	K.K. Ramlingam	Scitech
Water Supply and Sanitary Engineering	G.S. Bilgi	Dhanpat Rai and Sons.
Elements of Environment Science & Engineering	P. Meenakshi	Prentice-Hall
A basic course in environmental studies	S.Deswal & A. Deswal	Dhanpat Rai and Sons.
Introduction to Environmental Engineering.	P. Aarne Vesilind & Susan M. Morgan	Thomson
Environmental Pollution Control Engineering	C.S Rao	
Environmental pollution control microbiology	McKinney	

AUTOMOBILE MANUFACTURING PROCESSES
(AUTOMOBILE ENGINEERING GROUP)

Subject Code 1633504	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

CONTENTS: THEORY

Name of the Topic		Hrs/week	Marks
Unit -1	**Forging:-** 1.1 Forgeable materials and forgeability. 1.2 Advantages and limitations of forging process. 1.3 Classification of forging processes. 1.4 Forging by open and close dies. 1.5 Forging sequences for connecting rods, crankshafts, camshafts, spanners and gears.	**08**	**14**
Unit -2	**Press and press work:-** Materials used in press work. 2.2 Classification of presses. 2.3 Major parts of mechanical press and their functions . 2.4 Drive mechanisms used on presses. 2.5 Parts of standard die set. 2.6 Operations which can be performed on presses like Punching, piercing, blanking, forming, drawing. Press components used in automobiles.	**10**	**14**
Unit – 3	**Welding processes:-** 3.1 Classification of welding process. 3.2 Working principle of Gas welding and types of flames. 3.3 Arc welding process like metal arc, TIG. MIG. 3.4 Resistance welding (spot, projection, seam, butt) 3.5 Alluminium and Cast iron welding. 3.6 Brazing and soldering. 3.7 Introduction to Plasma arc welding. Specific applications pertaining to auto industry.	**10**	**14**
Unit – 4	**Surface Treatment and finishing processes:-** 4.1 Selection and use of surface treatment and finishing process. 4.2 Surface cleaning processes: blasting, tumbling, alkaline, acid and electrolytic cleaning. 4.3 Surface coating processes : electroplating, galvanizing, Metal Spraying, painting. 4.4 Surface finishing processes : Lapping, honing, Super finishing, buffing, burnishing. (Applications from auto industry to be given).	**10**	**14**
Unit – 5	**Introduction to CNC machines:-** 5.1 NC and CNC machines. 5.2 Classifications of CNC machines. 5.3 Advantages and disadvantages of CNC machines. 5.4 Working principle of CNC machines. 5.5 Principle of Computer aided part programming. 5.6 Part programming – Do loop, Subroutine, Canned cycle.	**10**	**14**
	Total	**48**	**70**

Text / Reference Books:		
Titles of the Book	**Name of Authors**	**Name of the Publisher**
Elements of Workshop Technology. Vol. – I & II	S. K. Hajra Choudhury. A. K. Hajra Choudhury.	Media Promoters & Publishers Pvt. Ltd. Mumbai.
Workshop Technology Vol. – I & II.	H. S. Bawa	Tata McGraw-Hill Publishing Co. Ltd. New Delhi.
Workshop Technology Part- I, II & III	Dr. W. A. J. Chapman	ELBS & Edward Arnold (Publishers) Ltd., London.
Manufacturing Processes	B. H. Amstead, Phillip Ostwald, Myronl Begeman.	John Wiley & Sons (Eighth Edition)
CNC machines programming & applications.	Aditan, Pabla	Willey Estarn Ltd.
Production Technology	H.M.T.	H.M.T.

R. **Video Cassettes and CDs**:

Video cassettes developed by:
-- Electronics Trades and Technology Development Corporation (A Govt. of India undertaking), Akbar Hotel Annex , Chanakyapuri , New Delhi – 110 02.

Learning Materials – CBT Packages developed by N.I.T.T.T.R, Bhopal.

Composites for Automotives	Uday Vaidya	
Textiles in automotive engineering	Walter Fung	

BASIC ELECTRICAL & ELECTRONICS

(AUTOMOBILE ENGG.GROUP)

Subject Code	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	
1633505	L	T	P/S	ESE	:	70	03
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS : THEORY

Name of the Topic		Hrs/week	Marks
Unit -1	***Basic concepts & principles of Electrical Engineering*** 1.1 Voltage, Current, Resistance, Ohm's law 1.2 Magnetism, Electromagnetism, Law of Electromagnetic Induction 1.3 AC fundamentals, Concept of active and reactive power 1.4 Application of measuring Instruments – volt meter, ammeter, inductive/ tongue tester and multimeters. 1.5 Principles of transformers. Ampere turns ratio. 1.6 Construction of transformer. 1.7 Core and shell type transformer. 1.8 Auto transformer-types and comparison.	**12**	**16**
Unit -2	**Electric Motors and Generators** 2.1 DC motors:-Principle, Construction, types and applications 2.2 AC motors:-Principle, Construction and applications 2.3 Stepper motor-Types of stepper motor, principle, construction, applications and specifications. 2.5 Concept and working principle of D.C. generator and alternator.	**06**	**10**
Unit - 3	**Wiring and Lighting Circuit** 3.1 Symbols of electrical circuits and wiring colour code, size, comparison of insulated & ground return system, Positive & negative return system, their comparison. 3.2 Need of wiring Harness, Wiring diagram of :- Head light, Turn indicator, Horn, Windshield wiper, Power window, Power seat, Battery ignition, Magneto ignition.	**06**	**10**
Unit -4	***Basic Electronics*** 4.1 Semiconductors, 4.2 Diode :-PN junction, zener diode symbol, Characteristics and application. 4.3 Rectifier-half, full, Bridge type with filters(C,LC,Π type). 4.4 Transistor:- BJT:-NPN, PNP transistor, symbol, working. 4.5 TRIAC, DIAC, , Silicon control rectifier(SCR):-Symbol, working . Comparison between Transistor and SCR. 4.6 Amplifier:-Common emitter configuration only 4.7 Power device:-photodiode, LED, LDR, phototransistor working 4.8 TRIAC,DIAC, Silicon control rectifier(SCR):-Symbol, working 4.9 Concept of Oscillators	**10**	**10**

Unit -5	**Transducers/Sensors and their applications** 5.1 Electromechanical type transducers: -Potentiometric resistances type, Inductive (LVDT), Capacitive, Piezoelectric. 5.2 Photoelectric type transducers: Photoemissive ,Photovoltaic, Photoconductive 5.3 AC/DC Electronic timer block diagram study 5.4 Concept of General measurement system & difference between mechanical and electrical/electronic instruments 5.5 Measurement of Pressure:- Working of thermocouple vacuum gauge, Pirani vacuum gauge, Varying pressure measurement; 5.6 Measurement of Flow:- Hot wire anemometer, Ultrasonic flow meter; 5.7 Measurement of Temperature:- Working of Thermopiles, Thermister ; 5.8 Measurement of Speed:- contactless electrical tachometer:- Inductive, Capacity type tachometer, Stroboscope; 5.9 Measurement of Force:- Strain gauge load cell; 5.10 Electrical method for moisture measurement	**10**	**18**
Unit -6	**Digital Electronics** 6.1 Define analog signal and digital signal 6.2 Study of logic gates(NOT,OR, NOR, AND, NAND) symbols and truth table 6.3 Study of flip flops only RS & D : symbols and truth table 6.4 Working principle with block diagram of shift register & counter 6.5 Working principle with block/ logic diagram of encoder & decoder 6.6 Working principle with block/logic diagram of multiplexer and demultiplexer 6.7 Working of seven segment LED display	**04**	**06**
	Total	**48**	**70**

Text/ Reference Books:

Titles of the Book	**Name of Authors**	**Name of the Publisher**
Applied Electronics	Sedha	S. Chand & company LTD
Electronic Principles	Thomas. Malvino	Tata Mc-Graw hill publishing company LTD
Fundamentals of Electrical & Electronics Engineering	Theraja BL	Nirja Construction & Development Co Ltd Nirja Construction & Development Co Ltd
Digital principles & Applications,	Albert Paul Malvino, Donald Leach	Mc-Graw hill & company
Mechanical Measurement	Thomas. G.Beckwith, N.Lewis Buckwith, Roy. D.Marangoni forward by G.K. Sharma	Narosa Publishing House
Measurement System- Application & design	Ernest Doebelin	Mc-Graw-Hill-International Edition
Electrical and Electronic Measuring Instruments	A K Sawney.	Dhanpat Rai and sons.
Automotive Electrical Equipments	P L Kohli	Tata McGraw Hill.
Basic Electrical And Electronics engineering	R.K Rajput	

ADVANCED AUTOMOBILE ENGINES LAB

(AUTOMOBILE ENGINEERING GROUP)

Subject Code 1633506	Practical						Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	04	Internal	:	15	
	—	—	—	External	:	35	

CONTENTS: PRACTICAL

Skills to be developed:

Intellectual Skills:

1. Identify types of combustion chamber.
2. Locate faults in MPFI system.
3. Identify components of electronic fuel injection system (EFI).
4. Diagnose EFI system.
5. Diagnose engine condition from exhaust gas analysis. To interpret results.

Motor Skills:

1) Observe combustion chamber.
2) Observe EFI system components & their locations.
3) Use diagnostic tester for Electronics fuel injection system diagnosis.
4) Set carburetor for proper / reduced exhaust emission.
5) Set valve clearance by adopting proper procedure.
6) Draw valve-timing diagram.

Adopt recommended service manual procedure for testing EFI system & exhaust gas analyzer application.

List of Practical:

1. Cylinder Head Observation and Combustion Chamber Identification:
   Remove the cylinder head of an engine. Observe the combustion chamber, location of valves, spark plug or Injector.

---Decarbonise combustion chamber. Clean and refit.

---Use any four engines: - a) Bullet, b) Luna, c) Multi cylinder Petrol Engine, d) Multi- cylinder Diesel engine, e) Scooter Engine.

---Interpret the type of combustion chamber. Sketch them and describe the construction. State the characteristics of the combustion chamber.

---Check the valve-valve seats for leakage. Check the condition of Spark Plug or fuel injector. Check the glow plug operation.

2. Valve Clearance Adjustment and Valve Timing Investigation:
   - Perform Tappet setting of a single cylinder four-stroke engine.
   - Perform Tappet setting of a multi cylinder engine.
   - Construct the Port timing diagram of a two- stroke engine.
   - Construct the Valve timing diagram of a four-stroke engine.
   - Electronic Fuel Injection System Diagnosis:

3. Diagnose Electronic fuel Injection system with diagnostic tester/ engine scanner.
   - Perform On-Board diagnosis.
   - Read trouble code at engine check Light/Malfunction Indicator light.
   - Use Engine scanning tool for diagnosis
   - Locate various Components of Electronic fuel injection system.
   - Identify components of EFI system.
   - Perform stand –alone diagnosis using a Multi-meter and test lamp.

4 Exhaust Gas Analysis:
   Perform Exhaust gas analysis of an engine exhaust using 4-gas analyzer:
   - Diagnose engine condition from exhaust gas analysis.
   - Follow test cycle –modes of operation.

BASIC ELECTRICAL & ELECTRONICS LAB

(AUTOMOBILE ENGINEERING GROUP)

Subject Code 1633507	Practical						Credits
	No. of Periods Per Week			Full Marks	:	25	02
	L	T	P/S	ESE	:	25	
	—	—	04	Internal	:	07	
	—	—	—	External	:	18	

CONTENTS: PRACTICAL

Skills to be developed:

Intellectual Skills:

- Select equipment such as motors, meters & components.
- To interpret circuits.

Motor Skills:

- To draw circuits.
- To measure various parameters.

List of Practical:

1) For a given resistive & inductive series & parallel circuit, select ammeter, voltmeter & wattmeter. Make the connections and measure current, voltage and power drawn by the circuit. Measure it by clip on meter & compare it.
2) For a given DC Shunt/Series motor, select suitable meters, make connections as per diagram, check the connections and run the motor. Take the meter readings to draw speed torque characteristics. Make suitable changes in the connections to reverse the direction of rotation.
3) For the above given motor prepare a circuit to control its speed above & below normal, plot its graph.
4) Testing of components like diode, LED, SCR, diac, triac, Zener diode ,inductor, capacitor using a multimeter
5) Verify truth tables for logic gates- . NOT, AND, OR, NAND, NOR.
6) Calculation of Vdc of half and full wave rectifier with and without filter.
7) Line & load regulation of alternator output using Zener diode
8) To measure shaft speed by using

Stroboscope. Study and observe the

characteristics of LVDT.

INDUSTRIAL PROJECT AND ENTREPRENEURSHIP DEVELOPMENT -TW

(MECHANICAL ENGINEERING GROUP)

Subject Code 1625508	Term Work						Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	Internal	:	15	
	—	—	04	External	:	35	

CONTENTS: TERM WORK

Name of the Topic		Hrs/week
Unit -1	**1.1 Entrepreneurship, Creativity & Opportunities Concept, Classification & Characteristics of Entrepreneur** **1.2) Creativity and Risk taking.** **1.2.1) Concept of Creativity & Qualities of Creative person.** **1.2.2) Risk Situation, Types of risk & risk takers.** **1.3) Business Reforms.** **1.3.1) Process of Liberalization.** **1.3.2) Reform Policies.** **1.3.3) Impact of Liberalization.** **1.3.4) Emerging high growth areas.** **1.4) Business Idea - Methods and techniques to generate business idea.** **1.5) Transforming Ideas in to opportunities transformation involves** **Assessment of idea &Feasibility of opportunity** **SWOT Analysis**	**03**
Unit -2	**Information And Support Systems** **2.1) Information Needed and Their Sources.** **Information related to project, Information related to support system, Information related to procedures and formalities** **2.2) SUPPORT SYSTEMS** R. **Small Scale Business Planning, Requirements.** R. **Govt. & Institutional Agencies, Formalities Statutory Requirements and Agencies.**	**03**
Unit -3	**Market Assessment** 3.1) Marketing –Concept and Importance 3.2) Market Identification, Survey Key components 3.3) Market Assessment	**02**
Unit -4	**Business Finance & Accounts Business Finance** 4.1) Cost of Project 1) Sources of Finance 2) Assessment of working capital 3) Product costing 4) Profitability 5) Break Even Analysis 6) Financial Ratios and Significance **Business Account** 4.2) Accounting Principles, Methodology 1) Book Keeping 2) Financial Statements 3) Concept of Audit,	**03**

Unit -5	**Business Plan & Project Report** 5.1) Business plan steps involved from concept to commissioning Activity Recourses, Time, Cost 5.2) **Project Report** 1) Meaning and Importance 2) Components of project report/profile **(Give list**) 5.3) **Project Apprisial**	**03**
Unit -6	**Enterprise Management And Modern Trends** 6.1) **Enterprise Management**: - 1) Essential roles of Entrepreneur in managing enterprise 2) Product Cycle: Concept And Importance 3) Probable Causes Of Sickness 4) Quality Assurance Importance of Quality, Importance of testing 6.2) E-Commerce Concept and process 6.3) Global Entrepreneur	**02**
	Total	**16**

*Contents (**PART A) Industrial Project**)*		Hrs/week
Following activities related to project are required to be dealt with, during this semester		
Unit -1	• Form project batches & allot project guide to each batch. (Max. 4 students per batch).	
Unit -2	• Each project batch should select topic / problem / work by consulting the guide & / or industry. Topic / Problem / work should be approved by Head of department.	
Unit – 3	• Each project batch should prepare action plan of project activities & submit the same to respective guide.	
Unit – 4	• At the end of semester, each project batch should submit the action plan and abstract of the project along with list of materials required if project involves fabrication or other facilities required in other kinds of project.	
Unit – 5	• Action Plan should be part of the project report.	

Part B: Entrepreneurship Development		Hrs/week
OBJECTIVES: Students will be able to		
Unit – 1	• Identify entrepreneurship opportunity.	
Unit – 2	• Acquire entrepreneurial values and attitude.	
Unit – 3	• Use the information to prepare project report for business venture.	
Unit – 4	• Develop awareness about enterprise management	

Text/ Reference Books:		
Titles of the Book	**Name of Authors**	**Name of the Publisher**
Entrepreneurship Development	E. Gorden K.Natrajan	Himalaya Publishing. Mumbai
Entrepreneurship Development	Preferred by Colombo plan staff college for Technical education.	Tata Mc Graw Hill Publishing co. ltd. New Delhi.
A Manual on How to Prepare a Project Report	J.B.Patel D.G.Allampally	EDI STUDY MATERIAL Ahmadabad (Near Village Bhat , Via Ahmadabad Airport & Indira Bridge), P.O.
A Manual on Business Opportunity Identification & Selection	J.B.Patel S.S.Modi	Bhat 382428 , Gujrat,India P.H. (079) 3969163, 3969153 E-mail : ediindia@sancharnet.in/olpe@ediindia.org Website : http://www.ediindia.org
National Derectory of Entrepreneur Motivator & Resource Persons.	S.B.Sareen H. Anil Kumar	
New Initiatives in Entrepreneurship Education & Training	Gautam Jain Debmuni Gupta	
A Handbook of New Enterpreneurs	P.C.Jain	
Evaluation of Enterpreneurship Development Programmes	D.N.Awasthi , Jose Sebeastian	
The Seven Business Crisis & How to Beat Them.	V.G.Patel	
Poornima M. Charantimath	Entrepreneurship Development of Small Business Enterprises	Pearson Education, New Delhi
Special Edition for MSBTE	Entrepreneurship Development	McGraw Hill Publication
Entrepreneurship Theory and Practice	J.S. Saini B.S.Rathore	Wheeler Publisher New Delhi
Entrepreneurship Development		NTTTI, Bhopal / Chandigarh
Development Banking In India	Kaushal Kumar Arora	
Entrepreneurship Development	S Anil Kumar	

2) VIDEO CASSETTES

Subject	Source
Five success Stories of First Generation Entrepreneurs	EDI STUDY MATERIAL Ahmedabad (Near Village Bhat , Via Ahmadabad Airport & Indira Bridge), P.O. Bhat 382428 , Gujrat,India P.H. (079) 3969163, 3969153 E-mail :
Assessing Entrepreneurial Competencies	
Business Opportunity Selection and Guidance	
Planning for completion & Growth	
Problem solving-An Entrepreneur skill	

GLOSSARY:

INDUSTRIAL TERMS

Terms related to finance, materials, purchase, sales and taxes.

Components of Project Report:

1. Project Summary (One page summary of entire project)
2. Introduction (Promoters, Market Scope/ requirement)
3. Project Concept & Product (Details of product)
4. Promoters (Details of all Promoters- Qualifications, Experience, Financial strength)
5. Manufacturing Process & Technology
6. Plant & Machinery Required
7. Location & Infrastructure required
8. Manpower (Skilled, unskilled)
9. Raw materials, Consumables & Utilities
10. Working Capital Requirement (Assumptions, requirements)
11. Market (Survey, Demand & Supply)
12. Cost of Project, Source of Finance
13. Projected Profitability & Break Even Analysis
14. Conclusion.

Assignment:- Prepare a project report and study its feasibility.

PROFESSIONAL PRACTICES V-TW

(MECHANICAL ENGINEERING GROUP)

Subject Code 1625509	Term Work						Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	Internal	:	15	
	—	—	03	External	:	35	

CONTENTS: TERM WORK

	Activity	Hrs/week
Unit -1	**Industrial Visits** Structured industrial visits be arranged and report of the same should be submitted by the individual student, to form a part of the term work (2 visits). Following are the suggested type of Industries/ Fields - i) A modern garage with engine scanning facility (diagnosis of electronic fuel injection systems). ii) A vehicle manufacturing company (Exhaust gas analysis, vehicle testing). iii) Central Institute of Road Transport, Pune. iv) Vehicle Research, Development & Establishment, A'nagar. v) Automotive Research Association of India, Pune. vi) Hydroelectric power plant / sub-station. vii) Vehicle body building workshop. viii) A refuse, recycling / reclamation site. ix) Auto Engine Testing unit to gather details regarding the testing procedures/parameters etc. x) Wheel Balancing unit for light and/or heavy motor vehicles.	
Unit -2	**The Guest Lectures from field/industry experts,** professionals to be arranged (2 Hrs duration), minimum 3 nos. from the following or alike topics. A brief report, on the guest lectures, is to be submitted by each student as a part of Term work. a) Electronic fuel injection systems. b) Exhaust gas analysis. c) Vehicle testing. d) Computer aided drafting. e) Electric motors & generators. f) Automotive wiring & lighting. g) Transducer application in automobiles. h) Environmental pollution & control. i) Vehicle aerodynamics & design. j) Earth moving machines. k) Automobile pollution, norms of pollution control.	

Unit - 3	**Information Search :-** Search information on **Any Two** of the following suggested topics and write a report (group size – 3 to 5 students, report – up to 10 pages) a) Common rail direct injection system / MPFI / TBI system. b) LPG conversion kit. c) CNG conversion kit. d) Vehicle pollution norms & pollution control methods. e) Alternative fuels & energy options. f) Vehicle / Engine tuning. (Tappet clearance values, injection timing, ignition timing, injector opening pressure, spark plug gap, trouble code of MPFI / CRDI system, Idling RPM, Clutch lining thickness, various clearances in clutches, differential backlash, brake lining thickness, various clearances in brakes, steering backlash). g) Vehicle aerodynamics & design. h) Vehicle testing. i) Laboratory testing of vehicle subsystems As per IS/SAE norms) j) Bio-diesel	
Unit - 4	**Group Discussion :** The students should discuss in-group of six to eight students and write a brief report on the same as a part of term work. **The faculty members may select ANY TWO topics for group discussion**. Some of the suggested topics are - I) CNG versus LPG as a fuel. II) Petrol versus Diesel as a fuel for cars. III) Trends in automobile market. IV) Load shading and remedial measures. V) Rain water harvesting. VI) Trends in energy. VII) Disaster management. VIII) Safety in day-to-day life. IX) Energy Saving in Institute. X) Nano technology.	
Unit - 5	**Seminar :** Seminar topic should be related to the subjects of fifth semester / topics from information search & guest lectures given above. Each student shall submit a report of at least 10 pages and deliver a seminar (Presentation time – 10 minutes)	
Unit - 6	**Mini Project : Any other equivalent/Similar topics (any one) .** 1) Design / Drawing of engine component in a group of 4 students. 2) Prepare Models of Fuel injection pump components using suitable material. 3) Preparing preventive maintenance schedule for an automobile. **OR** Modular Courses on ANY One of the suggested or alikerelevant topic be undertaken by a group of students (Min 10): a) LPG/CNG conversion of vehicles b) Advance features in CAD. Two Assignments be completed on the course work as a part of the Term Work.	

Text / Reference Books:-

Titles of the Book	Name of Authors	Name of the Publisher
Architects essentials of ownership transitions	Peter Piven	

AUTOMOBILE COMPONENT DESIGN -TW

(AUTOMOBILE ENGINEERING GROUP)

Subject Code 1633510	Term work						Credits
	No. of Periods Per Week			Full Marks	:	50	
	L	T	P/S	Internal	:	15	01
	—	—	03	External	:	35	

CONTENTS: TERM WORK

Skills to be developed:

Intellectual Skills:

1) Analyze the loads, resisting areas, types of induced stresses on automobile components.
2) Analyze the modes of failure of different automobile components & identify the methods, strength equations to overcome the failures.
3) Calculate the dimensions of automobile components.
4) Identify different engine & chassis components.
5) Identify different fasteners & bearings used in automobiles.

Motor Skills:

1) Draw various automobile components as per the designed dimensions.
2) Use advanced materials for automobile components.
3) Use design data book to standardize component dimensions.
4) Prepare bill of materials.
5) Use various CAD software to draw automobile components

List of Term Work :

1. Identify & classify the different engine & chassis components according to the type of load to which they are subjected. Also state the types of induced stresses in them.
2. Identify the different engine & chassis components which may fail due to stress concentration, observe & state remedy to reduce stress concentration
3. Use of advanced materials with justifications for components like gears, piston, piston rings, leaf springs, cylinder head & block etc.
4. Identify different fasteners & bearings used in an automobile, justify their locations.
5. Design any machine element & coupling for specified data, select suitable materials, prepare assembly-detail drawing on CAD indicating overall dimensions, tolerances, hardness & surface finish, also Prepare bill of material.

DESIGN PROJECT

Design of Power train(Piston, Piston rings, piston pin, connecting rod, crankshaft)/ transmission train (clutch, teeth calculations of gear box, propeller shaft and rear axle)/ leaf spring /coil spring for specified data, select suitable materials, prepare drawing indicating overall dimensions, tolerances, hardness & surface finish.

NOTES:

- Design project activity should be completed in a group of 5-6 students
- Use of design data book is compulsory.

STATE BOARD OF TECHNICAL EDUCATION, BIHAR

Scheme of Teaching and Examinations for

V SEMESTER DIPLOMA IN COSTUME DESIGN & GARMENT TECHNOLOGY

(Effective from Session 2016-17 Batch)

THEORY

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME							Credits
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks (A)	Class Test(CT) Marks (B)	End Semester Exam. (ESE) Marks (C)	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	
1.	Advance Pattern Making	1642501	04	03	10	20	70	100	28	40	04
2.	Fashion Accessories	1642502	03	03	10	20	70	100	28	40	02
3.	Apparel Quality Control	1642503	03	03	10	20	70	100	28	40	03
4.	Embroidery Technology	1642504	03	03	10	20	70	100	28	40	03
5.	Advanced Apparel Production Technology	1642505	04	03	10	20	70	100	28	40	03
		Total:- 17					**350**	**500**			

PRACTICAL

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME					Credits
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	
					Internal (A)	External (B)			
6.	Advance Pattern Making Lab.	1642506	06	03	15	35	50	20	03
7.	Embroidery Technology Lab.	1642507	04	03	15	35	50	20	01
8.	Needle Craft Lab.	1642508	06	03	15	35	50	20	02
Total:- **16**							**150**		

TERM WORK

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME				Credits
			Periods per week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	
9.	In Plant Training & Visit to Work (TW)	1642509	4 weeks continuous	30	70	100	40	03
Total:-						**100**		
Total Periods per week Each of duration one Hours **= 33**						**Total Marks = 750**		**24**

ADVANCE PATTERN MAKING

Subject Code 1642501	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	04
	L	T	P/S	ESE	:	70	
	04	—	—	TA	:	10	
				CT	:	20	

RATIONALE: This course imparts the knowledge of advanced pattern designing using flat pattern technique and draping technique. This course also imparts the skill in advanced pattern making of upper and lower garments using flat pattern technique. It is useful for the students for advanced pattern design and fashion designing. This knowledge is useful for preparing fashioned garments at par with the industry and advanced pattern designing of complex garments such as contour fit using flat pattern technique. It will also be useful for the students to design haute couture and preparing fashioned garments at par with the needs of the industry. Thus it is a key course for costume designers and hence students should develop mastery over it.

Objectives: Students will be able to:

1. Prepare dress and trouser blocks.
2. Prepare appropriate patterns to design fashioned garments.
3. Draft and grade lower block for men and women as per requirement.
4. Develop contoured garments of various types for different applications.

CONTENTS :THEORY

	Name of the Topic	Hrs/ Week	Marks
UNIT-1	**Techniques of Drafting of Children Block.** 1.1 Drafting of children block for boy (8- 10 years). 1.1.1 Development of basic children Shirt from bodice block and its variations. 1.2 Drafting of children block for girl (6- 8 years). 1.2.1 Girl's block variation Dress/frock etc.	06	09
UNIT-2	**Techniques of Drafting of Men's Shirts.** 2.1 Drafting of Men's Shirt and its variations. 2.1.1 Drafting of formal shirt. 2.1.2 Drafting of casual shirt.	04	05
UNIT-3	**Techniques of Draping of Torso Block.** 3.1 Development of torso/dress block by draping method. 3.1.1 Development of Shift (semi fit) and box fit (loose fit) from sheath fit(close fit) torso by using flat pattern making technique and development of their slopers for design adaptation.	05	06
UNIT-4	**Adaptation of Indian Kurta from Torso Block.** 4.1 Adaptation of dress blocks into *Indian Kurta*, princess line *kurta* etc. In different fits (fitted, semi fitted and loose fit).	02	04
UNIT-5	**Techniques of drafting of Men's trouser block** 5.1 Drafting of trouser block for men & its test fit.	02	04
UNIT-6	**Techniques of drafting of Women's trouser block** 6.1 Drafting of trouser & skirt block for women & its test fit.	02	04
UNIT-7	**Adaptation of trouser block (male/female) in variations** 7.1 Adaptation of Trouser block (male/ female) to its variations: Flared trouser, Short, Capri, A-line, Umbrella, Pegged top.	06	08
UNIT-8	**Techniques of drafting of Salwar & Churidar** 8.1 Drafting of Indian bifurcated garment for women & its test fit. 8.1.1 Salwar & Churidar and its variations as per trend.	05	06
UNIT-9	**Manual grading** 9.1 Introduction to manual grading- grading concepts, principles of grading, terminology, zero point, type of grading methods. 9.1.1 Grading of single dart basic bodice block by nest method (two size up - one size down). 9.1.2 Grading of Basic skirt block by nest method (two size up - one size down). 9.1.3 Grading of men's trouser by nest method (two size up - one size down).	06	08
UNIT-10	**Contour Fit Blocks** 10.1 Development of Contour fit block from bodice block. 10.2 Contour fit variations – corset, halter, empire line, evening gown / dress etc. 10.3 Development of Sleeve for contour fit block. 10.4 Design and construct contour fit garment.	06	08
UNIT-11	**Sari blouses** 11.1 Designing of Choli blouse/ princess line/ blouse variation as per current trend. 11.2 Drafting of 3 dart blouse by drafting method and its test fit. 11.3 Construct Choli blouse/ princess line/ blouse variation as per current trend and its test fit.	06	08
	Total	**50**	**70**

List of Recommended Books

S. No.	Title of Books	Author	Publication
1	Pattern making for Fashion design	Armstrong, Helen Joseph	Prentice Hall
2	The Art of Fashion Draping	Connie Amaden-Crford	Fair Child Books
3	Pattern Cutting and Making up	Martin M Shoben & Janet P. Ward	Routledge
4	Metric Pattern Cutting for Children's Wear	Winifred Aldrich	Blackwell Science
5	Metric Pattern Cutting for Children's Wear and baby wear	Winifred Aldrich	Wiley-Blackwell
6	Pattern Design for Children's clothes	Gloria Mortimer-Dunn	B T Batsford, London
7	Childrenswear Design	Hilde Jafee, Rosa Rosa	Fair Child Books
8	Metric Pattern Cutting for men's wear	Winifred Aldrich	Wiley-Blackwell
9	Shirt Making	David Page Coffin	
10	The practical guide to patternmaking for fashion designers	Lori A. Knowles	Fair Child Books
11	Pattern Grading for Women's Clothes	Gerry Cooklin	Wiley
12	Grading Techniques for Modern Design	Jeanne Price & Brenard Zamkoff	Fairchild Publications
13	Fabric, Form and Flat pattern Cutting	Aldrich Winifred	Blackwell Publication
14	Pattern Cutting and Making up	Martin Shoben and Janet Ward	Butter Worth
15	More Dress Pattern Designing	Aldrich Winifred	Blackwell Science

FASHION ACCESSORIES

Subject Code 1642502	Theory			No of Period in one session : 42			Credits
	No. of Periods Per Week			Full Marks	:	100	02
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale: This course will enable students to know about various fashion accessories which are used to complement fashion. Accessories help in highlighting a dress or apparel.

Objectives: Students will be able to:

1. To understand value addition to costumes by innovative use.
2. To understand techniques such as Embellishments, Sequins & other forms.

CONTENTS :THEORY

List of Recommended Books

	Name of the Topic	Hrs/ Week	Marks
Unit-1	**Introduction** 1.1 **Fashion accessories:** Definition, History, Classification, Present trends in fashion accessories and its importance and uses. 1.2 **Accessory types**: Head gears, Footwear, neck wear and belts, Hand bags, gloves and Mitts, Scarves, shawls, stoles stacking, Sun glasses.	06	05
Unit–2	**Handbags and Shoes** 2.1 **Handbags:** Introduction and history, Importance in the fashion, Industry and sourcing of material and trims, Materials used for handbags, Design of different styles of handbags, Construction details of handbags, Care and maintenance, Uses with style. 2.2 **Shoes:** Introduction and history, Industry and sourcing of material and trims, Materials used for Shoes, Design of different styles of Shoes, Construction details of Shoes, Care and maintenance, Uses with style. 2.3 Marketing position of handbag and shoes.	08	15
Unit–3	**Gloves and Belts** 3.1 **Gloves:** Introduction, Importance in the fashion, Industry and sourcing of material and trims, Materials used for Gloves, Design of different styles of Gloves, Construction details of Gloves, Care and maintenance, Uses with style. 3.2 **Belts:** Introduction, Industry and sourcing of material and trims, Materials used for Belts, Design of different styles of Belts, Construction details of Belts, Care and maintenance, Uses with style. 3.3 Marketing position of Gloves and Belts.	08	15
Unit–4	**Hats and Neckwear** 4.1 History, Industry and Sourcing, Material and trims sourcing 4.2 Materials used for Hats and Neckwear Design of different styles of Hats and Neckwear, Construction details of Hats and Neckwear 4.3 Marketing position of Gloves and Belts: Product promotion of Gloves, Product promotion of Belts 4.4 Care measure taken for maintenance: Care and maintenance	08	15
Unit-5	**Costume Jewellery** 5.1 History, Industry and Sourcing, Material and trims sourcing, Materials used for jewellery, Design of different styles of jewellery, Construction details of jewellery. 5.2 Marketing position of Jewellery: Product promotion of Jewellery 5.3 Care measure taken for maintenance: Care and maintenance	06	10
Unit–6	**Scarves and Stole** 6.1 History, Industry and Sourcing, Material and trims sourcing, Materials used for Scarves and Stole, Design of different styles of Scarves and Stole, Construction details of Scarves and Stole 6.2 Marketing & product position of Scarves and Stole. 6.3 Care measure taken for maintenance: Care and maintenance	06	10
	Total	**42**	**70**

Sr. No.	Title	Author	Publisher
1.	Simple Accessories	Jeff Sone & Johnson Gros	--
2.	Fashion From Concept to Consumer	Gini Stephens Frings	Pearson publications, 2009
3.	The complete 20th Century Source Book	John Peacock	Thames and Hudson, London, 2000,
4.	Fashion Accessories- Men	John Peacock	Thames and Hudson, London, 1996
5.	Century of Bags	Claire Billcocks	Chartwell Books, New Jersey 1997
6.	Shoes -Fashion and Fantasies	Malolow Blahnik- Co Collin Mac dolw	Thames and Hudson, 1989

APPAREL QUALITY CONTROL

Subject Code 1642503	Theory			No of Period in one session : 42			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale: The need for quality products by customers is increasing day by day and garment industry is no different. This course tries to develop requisite competency and skills in by diploma holders to carry out inspection at various stages of garment construction viz. pre-production inspection of fabric, in work inspection etc. Thus after learning this course diploma holders would be able to ensure that quality is maintained during production and general quality checks that are essential before transit are carried out.

Objectives: Students will be able to:

i. Employ inspection and quality checks on apparel to ensure quality product.
ii. Select appropriate standard and specification for dress making
iii. Apply requisite test for ensuring fabric quality
iv. Measure garments Shirt, Trouser, T-Shirt, and Jeans, flow charts
v. Identify finishing defects

CONTENTS : THEORY

	Name of the Topic	Hrs/ Week	Marks
UNIT-1	**Introduction to quality** 1.1 Definition, Related terms. 1.2 ISO, Quality Assurance, Quality Control, Quality Management.	03	05
UNIT-2	**Standards and specifications** **2.1 Standards** 2.1.1 Type: National and International standards(AATCC, ASTM, ANSI, ISO, BSI, BIS) 2.1.2 Importance 2.1.3 Difference between various standards 2.1.4 Grade definition **2.2 Specification** 2.2.1 Need and Importance 2.2.2 Types 2.2.3 Process of development 2.2.4 Tolerances, limits.	05	05
UNIT-3	**Fabric Quality** 3.1 Fabric Inspection and grading 3.2 Fabric defects 3.3 Inspection machines/Equipment's 3.4 Grading of fabric 3.5 4 point and 10 point system	03	05
UNIT-4	**Fabric Testing** 4.1 Standard used 4.2 Equipment used 4.3 Types of Test: Physical Tests and Colour fastness tests.	03	05
UNIT-5	**Role of Quality in Cutting and Fusing** 5.1 Quality parameters: Marker making, Spreading, Cutting, Bundling, Ticketing, Fusing. 5.2 Quality problems due to fusing.	03	05
Unit–6	**Cutting Room Equipment** 6.1 Straight Knife Cutter, Round Knife Cutter, Bend Knife Machine. 6.2 Die Cutter. 6.3 Notcher, Drill Machine.	03	05
Unit–7	**Computerized Cutting Room Equipment** 7.1 Automatic Cutter – single ply and multiply, Automatic Spreader, Laser Cutter, Ultrasonic Cutter, Water jet Cutter 7.2 Steam press with steam table and boiler (different types of bugs, Non Return Valve, steam trapper, cladding, steam line etc.)	05	05
Unit–8	**Finishing Equipment** 8.1 Basic understanding of the following finishing room equipments: Foam finisher, Tunnel finisher, Steam Dolly, Carousel press, Topper & leggers.	03	05
Unit–9	**Devices** 9.1 Various types of attachments, folders, guides, pressure feet etc.	03	05

Unit–10	**Advance Machines** 10.1 Different Advance Machines.	02	05
UNIT-11	**Inspection Procedures in the Sewing room** 11.1 Object of Inspection. 11.2 Inspection Loop 11.3 Types of Inspections 11.4 Identification of various minor and major defects.	02	05
UNIT-12	**Garment Inspection Checkpoints** 12.1 Key Inline checkpoints for standards Garment Types	02	05
UNIT-13	**Garment Measuring** 13.1 Measure garments 13.2 Shirt, Trouser, T-Shirt, and Jeans, flow charts.	03	05
UNIT-14	**Quality in Finishing room** 14.1 Finishing Defects	02	05
	Total	**42**	**70**

List of Recommended Books

Sr. No.	Title of Book	Author	Publication
1.	Managing Quality in Apparel Industry	Mehta & Bharadwaj	NewAge Publisher, Delhi
2.	Handbook of Quality	Joseph Juran	Mc Graw Hill. ISBN 978-0-07-0162973-7
3.	Principles of Textile Testing	J.E. Booth	Published by CBS Publishers & Distributors Pvt. Ltd., 1996
4.	Evaluation of Apparel Quality Fairchild Textile & Clothing	Lehnert Gertrud	ASQC, Quality Press, USA. 1990

EMBROIDERY TECHNOLOGY

Subject Code 1642504	Theory			No of Period in one session : 42			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

RATIONALE: This course will provide basic knowledge of embroidery stitches, tools and equipments required for embroidery and about traditional embroidery of India. It is necessary to learn basic embroidery stitches for enhancing the beauty of garments. Numerous fabrics are required to be known to the students on which embroidery is done. Also the Indian state wise hand embroidery and modern machine embroidery. This course will provide base to make garments aesthetically beautiful.

Objectives: Students will be able to:

1. Select appropriate embroidery type for given garment design.
2. Prepare samples of traditional Indian embroidery.

CONTENTS : THEORY

UNIT	Name of the Topic	Hrs/ Week	Marks
Unit-1	**Introduction to embroidery and tools and equipment required for hand embroidery.** 1.1 History and Origin of embroidery 1.2 Development of embroidery 1.3 Importance of embroidery and need of embroidery in garments (to increase beautification, to hide short lacking, to show tradition, to show different culture). 1.4 Uses of embroidery. 1.5 Selection, use and maintenance of tools and equipment for embroidery. 1.6 Various threads used in embroidery. 1.7 Accessories used in embroidery. 1.8 Various types of Needles and fabrics with its impact on quality parameters. 1.9 General rules for hand embroidery 1.10 Design transfer techniques 1.11 Selection of method of design transfer	08	14
Unit–2	**Different types of Basic Embroidery Stitches.** 2.1 Back stitch 2.2 Stem Stitch 2.3 Blanket stitch 2.4 Chain stitch 2.5 Laid and Couching /cording 2.6 Cross stitch 2.7 Feather stitch / Fly stitch 2.8 Satin stitch 2.9 Lazy –daisy stitch 2.10 Bullion and French knot 2.11 Long and short stitch 2.12 Herring bone	06	12
Unit–3	**Different types of Indian Embroideries.** 3.1 Kashmiri Kashida/Kashmiri Embroidery. 3.2 Bagh and Phulkari of Punjab. 3.3 Chamba Rumals of Himachal. 3.4 Kashida, Sujani and appliqué of Bihar. 3.5 Bengal Kantha embroidery 3.6 Murshidabad and Dacca embroidery. 3.7 Manipuri embroidery. 3.8 Rajasthan embroidery. 3.9 Kasuti of Maharashtra and Mysore. 3.10 Chikankari of Luchnow, Uttar Pradesh. 3.11 Kutch and Kathiawar embroidery of Gujarat. 3.12 Gold and silver embroidery (zardosi).	12	20
Unit–4	**Product Development** 4.1 Designing of Product with Application of Any One Traditional Embroidery	04	06
Unit-5	**Ornamental Techniques** 5.1 Eyelet work, Lace work, Cut work, Patch work, Bead work, Sequins work.	04	06

Unit–6	**Machine Embroidery** 6.1 Introduction to various types of embroidery machines and their application. 6.2 Study of difference between hand embroidery and machine embroidery. 6.3 Embroidery related to all fashion elements. 6.4 Introduction to various types of embroidery software. 6.5 Design in computerized embroidery machines: Study of tools in embroidery software for designing.	08	12
	Total	**42**	**70**

List of Recommended Books

Sr. No.	Title of Book	Author	Publication
1	Traditional Embroideries of India	Dr. Shailaja D. Naik	A.P.H. Publishing Corporation, New Delhi , 1996
2	Crafts of Gujarat Embroidery Ornaments.	Jaya Jaitly	
3	Textiles and embroidery of India	Kamladevi Chattopadhyay & Jasleen Dhamecha	Mark Publications, 34-38Bank street, Bombay, India.
4	Indian Embroidery	Savitri Pandit	
5	A stitch in Gujarat embroidery	----	The Gujarat state Handicraft &Handloom Development Corporation Ltd.
6	Bhartiya Kashidakari	Dr. Amita Patel &Anita Patel	Avichl Science Foundation, V.V. Nagar
7	Complete guide to needlework	----	Reader digest publication,
8	Ethnic Embroidery of India	Usha Shrikant	Honesty Publisher & Distributors
9	The coats book of Embroidery	Mary Gostelow	David & Charles Newton, Abbot London Vancouver
10	Embroidered Textiles	Shaila Paine,	Thames & Hudson Ltd, Delhi. 1990
11	Inspirational Ideas for embroideries of India	Gail Lawther	Search Press Ltd Delhi.1992
12	Encyclopedia of needle work		Fashion Book Company of India

ADVANCED APPAREL PRODUCTION TECHNOLOGY

Subject Code 1642505	Theory			No of Period in one session : 42			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	04	—	—	TA	:	10	
				CT	:	20	

RATIONALE: This course gives an awareness of technologies and processes being used in different departments of the apparel production industry. It intends to enable students capable to choose appropriate technology for apparel production and plan production schedule based on knowledge of production capacities of different production machines and time required in different processes.

Objectives: Students will be able to:

i. Plan the processes associated with stores, cutting department, sewing department and finishing department for quality apparel production.
ii. Manage the ware house
iii. Describe different steps in cutting department processes for quality cutting
iv. Explain different steps in sewing department processes for quality sewing
v. Describe the different steps in finishing department processes for quality finishing

CONTENTS : THEORY

UNIT	Name of the Topic	Hrs/ Week	Marks
UNIT-1	**Warehouse management** 1.1 Store management system (LIFO , FIFO, Delivery Chalan, Stock management) 1.2 Store report generation 1.3 Report format example	06	10
UNIT-2	**Cutting department process** 2.1 Marker planning 2.2 Marker making – shirt/ trouser/ t-shirt by miniature or full size patterns for woven and knit (open and tubular) fabric 2.3 Marker making - Check and plaid fabric 2.4 Various ways of marker and their relation with fabric design and weave 2.5 Single pattern double ply marker 2.6 Marker efficiency calculation 2.7 Cut order planning 2.8 Fabric reconciliation report 2.9 Effect of width variation on spreading & cutting 2.10 Effect of fabric shrinkage on spreading & cutting 2.11 Dealing with fabric problems - bowing, skewing& fabric defects 2.12 Different types of spreading 2.13 Introduction to interlining and its checking parameters	18	28
UNIT-3	**Sewing department process** 3.1 Operation breakdown and line balancing 3.2 WIP management 3.3 Line loading based on type of production system 3.4 Preparation for next lot of sewing 3.5 Preparation for introducing new style 3.6 Parameters of line (quality, response time, WIP, throughput, line supervision, crisis management) 3.7 Production reports 3.8 Under pressing 3.9 Setting up of inspection points 3.10 Trims planning	12	22
UNIT-4	**Finishing department process** 4.1. Ironing, pressing, tagging, folding of shirt, trouser, t-shirt, undergarment 4.2. Various packing ratio and packing methods 4.3. Carton marking 4.4. Quality check and analysis 4.5. Reports on quality 4.6. Report on cut to pack ratio	06	10
	Total	**42**	**70**

List of Recommended Books

Sr. No.	Title of Book	Author	Publication
1.	Technology of clothing Manufacturers	Harold Carr & Barbera Latham	Blackwell Science
2.	Apparel Manufacturing Analysis	Jacob Solinger	Bobbin Media Corporation, 1988

ADVANCE PATTERN MAKING LAB

Subject Code	Practical			No of Period in one session : 75			Credits
1642506	No. of Periods Per Week			Full Marks	:	50	03
	L	T	P/S	ESE	:	50	
	—	—	06	Internal	:	15	
				External	:	35	

CONTENTS : PRACTICAL

Unit	List of Experiment:-	Hrs/ Week	Marks
Unit-1	Prepare a upper body block for child (boy, 8-10 years) by drafting method and its test fit	03	
	Create a basic shirt by adaptation of upper body block	02	
	Prepare a upper body block for child (Girl 6-8 years) by drafting method and its test fit	03	
	Create a dress/ frock by adaptation of upper body block	02	
Unit-2	Prepare a draft of men's formal shirt and its test fit	03	
	Prepare a draft of men's casual shirt and its test fit	03	
Unit-3	Prepare a torso block (sheath) by draping method	03	
	Prepare a shift and box fit block from torso (sheath) block and its test fit	03	
	Prepare slopers for all three torso block (sheath, shift & box)	03	
Unit –4	Adapt torso block to create a Indian Kurta, princes line kurta etc. in different fits (fitted, semi fitted or loose fit) and its test fit	04	
Unit –5	Prepare trouser block for men by drafting method & carry out its test fit	03	
Unit –6	Prepare trouser block for women by drafting method & carry out its test fit	03	
Unit –7	Adapt trouser block for its variations- flared trouser, pleated trouser, short, Bermuda, Capri etc.	05	
Unit –8	Prepare draft of Salwar & Churidar and its variations as per trend	04	
Unit –9	i. Grade single dart basic bodice block by nest method(two size up - one size down) ii. Grade Basic skirt block by nest method (two size up - one size down) iii. Grade men's formal/ casual shirt by nest method (two size up - one size down) iv. Grade men's trouser by nest method (two size up - one size down)	09	
Unit –10	Prepare Contour fit block from bodice block	01	
	Prepare Contour fit sleeve block	01	
	Prepare Contour fit variation of bodice block	01	
	Prepare Contour fit variation of sleeve block	01	
	Design corsets.	01	
	Design halter neck garment.	01	
	Designing of empire line garment.	01	
	Designing of evening gown / dress.	01	
	Construct any one contour garment from the above variation.	04	
Unit –11	Construct 3 dart blouses by drafting method for test fit.	02	
	Design designer blouses with princess line.	01	
	Design designer blouses with halter neck.	01	
	Design designer blouses with strapless.	01	
	Designing of designer blouses with choli style.	01	
	Construct any one *Choli*-blouse/ princess line/ blouse variation as per current trend and its test fit. (prepare any one garment from the above variation)	04	
	Total	**75**	

EMBROIDERY TECHNOLOGY LAB

Subject Code 1642507	Practical			No. of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	50	01
	L	T	P/S	ESE	:	50	
	—	—	04	Internal	:	15	
				External	:	35	

CONTENTS :PRACTICAL

UNIT	List of Experiment	Hrs/ Week	Marks
Unit-1	Prepare samples of following Indian embroidery on 8"/8" fabric. The size of the design should be 4"/4". Study of historical background motifs, colours & materials used. Also prepare a report indicating fabric used, type and size of needle, type of thread and amount of all the material consumed. 1.1 Kashmiri 1.2 Phulkari 1.3 Chamba 1.4 Chikankari 1.5 Kantha 1.6 Manipuri 1.7 Kutch 1.8 Kathiawari 1.9 Kasuti (Dharwadi) 1.10 Applique Patch work	18	
Unit–2	Study of ornamental Techniques- Eyelet work, Lace work, Cutwork, Patchwork, Bead work, Sequins work.	10	
Unit–3	Study of design transfer techniques.	03	
Unit–4	Study of computerized embroidery machines threads, needles, frames and fabric for embroidery.	03	
Unit–5	Develop the design in computerized embroidery machines-alphabetical design.	03	
Unit–6	Develop the design in computerized embroidery machines-creative design.	03	
Unit–7	Collect the samples and images on each type of embroidery and make a scrap book.	04	
Unit–8	Design a product with any one Traditional Embroidery	06	
	Total	**50**	

NEEDLE CRAFT LAB

Subject Code 1642508	Practical			No of Period in one session : 56			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	06	Internal	:	15	
				External	:	35	

RATIONALE: This course helps in development of skills related to application of appropriate needlework technique and traditional stitch technique as per the requirement of the garment design. It is useful for the students for embellishing the fabric in garment industry. This knowledge is useful for preparing fashioned garments.

Objectives: Students will be able to:
i. Prepare the samples using appropriate type of basic stitch technique.

CONTENTS :PRACTICAL

UNIT	List of Experiment	Hrs/ Week	Marks
Unit-1	Create five motifs and repeats patterns for field & borders, make Khakha of these patterns Create a sample of net Embroidery Create a sample of Draw Thread Work with various techniques Create a sample of Faggoting with various Techniques	16	
Unit–2	i. Create a Sample of Ribbon work of 8"x8" ii. Create a Sample of Computerized Embroidery iii. Create a Sample of Ari work of 8"x8" iv. Create a Sample of Bead Work 4"x4" v. Create five samples on Explorations of stitches learned in Indian embroidery with material explorations (fabrics, threads, beads, sequins, mirrors, needles)	16	
Unit–3	Prepare following sample of crochet (4"/4" size). i. Circle ii. Triangle iii. Square iv. Decorative (Flower/ leaf/ button/spring)	12	
Unit–4	i. Latch Rug Making	06	
Unit-5	Prepare the following (Any One) ii. Crochet lace.(Size 6") iii Rug Samples	06	
	Total	**56**	

INPLANT TRAINING & VISIT TO WORK-TW

Subject Code 1642509	Term Work			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	Internal	:	30	
	—	—	4 Weeks continuous	External	:	70	

Rationale: In-Plant training will provide an industrial exposure to the students as well as to develop their career in the high-tech industrial requirements. It will enrich the practical knowledge of the students.

Objectives: Students will be able to:

01. To achieve a practical knowledge for promotion of some students to imbibe self confidence. Stress has been given to develop the skill.
02. To gain the knowledge about recent or latest manufacturing principles.
03. To achieve knowledge of recent problems and its remedies.

CONTENTS : TERM WORK

List of Term Work		Hrs/week	Marks
Unit-1	**FIRST WEEK**		
	- Visit to garment manufacturing industry.		
	- Study of the organization with organise of cloth or used clothes like garment.		
	- Garment tools & methods of its use.		
Unit-2	**SECOND WEEK**		
	- Layout of the plant		
	- Study of the process and preparation of flow chart.		
Unit-3	**THIRD WEEK**		
	- Make the list of Machines		
	- Name of manufacturers of the equipment		
Unit-4	**FOURTH WEEK**		
	- Preparation cost, Running cost & Standard cost.		

STATE BOARD OF TECHNICAL EDUCATION, BIHAR

Scheme of Teaching and Examinations for

V SEMESTER DIPLOMA IN CERAMIC ENGINEERING

(Effective from Session 2016-17 Batch)

THEORY

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME							Credits
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks (A)	Class Test(CT) Marks (B)	End Semester Exam. (ESE) Marks (C)	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	
1.	Fuel & Furnace Technology	1613501	03	03	10	20	70	100	28	40	03
2.	Refractory Technology-II	1613502	03	03	10	20	70	100	28	40	03
3.	Pottery & Porcelain Technology–II	1613503	03	03	10	20	70	100	28	40	03
4.	Ceramic Engineering Drawing	1613504	03	04	10	20	70	100	28	40	03
5.	Cement Technology	1613505	03	03	10	20	70	100	28	40	03
		Total:- 15					**350**	**500**			

PRACTICAL

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME					Credits
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	
					Internal (A)	External (B)			
6.	Ceramic Engineering Workshop Practice – III (Pottery & Refractory)	1613506	06	04	15	35	50	20	02
7.	Ceramic Engineering Lab. – II	1613507	06	04	15	35	50	20	02
		Total:- 12					**100**		

TERM WORK

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME				Credits
			Periods per week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	
8.	Ceramic Engineering Drawing (TW)	1613508	06	15	35	50	20	02
9.	In Plant Training & Visit to Works	1613509	4 weeks continuous	30	70	100	40	03
		Total:- 06				**150**		
Total Periods per week Each of duration One Hours **= 33**						**Total Marks = 750**		**24**

FUEL AND FURNACE TECHNOLOGY

Subject Code 1613501	Theory			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

RATIONALE:

The subject is important for Ceramic Engineering Professionals as it deals with various type of Fuel used in the Furnace Employed in various Industries including Ceramic Industry. This subject also provides knowledge on Pyrometry with the type of Instrument or Devise used for the purpose. Furnace construction with the Material used for this is also dealt in with all details.

OBJECTIVE:

The Objective is to know about:

1. Fuel and its type.
2. Combustion.
3. Furnace/Kiln.
4. Pyrometry etc.

Contents : Theory		Hrs/week	Marks
Unit-1	**INTRODUCTION:** General Introduction of Fuel and related topic with Fuel Resource in India, and Concept, and Role of Furnace/Kiln used in Industries.	[05]	
Unit-2	**TYPE OF FUEL:** Classification of Fuel: Solid, Liquid, Gaseous, and Special Fuel. - Solid Fuel: Coal, Other Fossil Fuel, Origin, Composition, Fuels derived from Coal, Constituent and characteristic, Classification and Grading, Handling and Storage, Washing, and Pulverized Coal and its uses etc. - Liquid Fuel: Origin, Composition, Classification and Constituent. Processing of Crude Oil – Refining, Petroleum Products such as: Gasoline (petrol), Kerosene, Lubricating Oil, Diesel. And Coal Tar etc. - Gaseous Fuel: Type of Gaseous Fuel, Properties and Uses, Natural Gas, LPG (Liquefied Petroleum Gas), Gas from underground Gasification of Coal, Methane, Wood Gas, Gobar Gas, Sewage Gas, Producer Gas, Water Gas, Blast Furnace Gas, Coke Oven Gas, and Coal and Gas from Gasification etc. - Special Fuel: Nuclear Fuel, and Rocket Fuel etc.	[10]	
Unit-3	**COMBUSTION:** Combustion of Fuel, Control of Combustion, Heat of Combustion, Flame and Flame Temperature, Specific Heat and Available Heat, and Flue Gas and its Analysis.	[05]	
Unit-4	**ANALYSIS AND TESTING:** Calorific Value and Its Determination, Proximate and Ultimate Analysis, Gaseous Fuel Analysis with Orsat Apparatus, Flow Point, Flash Point, and Viscosity of Liquid Fuel etc.	[05]	
Unit-5	**FURNACE AND KILN:** Definition and Difference between Furnace and Kiln. -Furnace/kiln used in Ceramic Industry such as: Down Draft Kiln, Up Draft Kiln, Chamber Kiln, Tunnel Kiln, Muffle Kiln, Rotary Kiln, Shaft Kiln, Glass Tank Furnace, Electric Furnace, Annealing Furnace, Pot Furnace, and Smelting furnace etc. -Furnace used in Non–Ceramic Industry like: Blast Furnace, LD Converter, Soaking Pit, Batch Furnace, Electric Soaking Pit, Cupola, and boiler etc.	[10]	
Unit-6	**HEAT TRANSFER AND RECOVERY:** Modes of Heat Transfer: Conduction, Convection, Radiation, and Gas Radiation. Heat Exchanger: Recuperator, and Regenerator. Fuel Efficiency, and Savings.	[10]	
Unit-7	**PYROMATRY:** -Measuring Devices. -Instrumentation, and Control.	[05]	

Unit-8	**<u>FURNACE CONSTRUCTION</u>:** -Material of construction for furnace Such as: Non Refractory Material, and Refractory Material. -Application Technology of Refractory in Furnace.	**[10]**	
	TOTAL	**60**	

BOOKS RECOMMENDED:

01. The Efficient use of Fuel - Her Majesty's Stationary Service, London
02. Fuel Furnace and Refractory - G.P.Gupta
03. Modern Furnace Technology - H & G Etherington
04. The Science of Flames and Furnaces - W.W. Thring
05. Fuels, Combustion and Furnaces - John Griswold
06. Fuel, Furnace and Refractories - J.D. Gilchrist

REFRACTORY TECHNOLOGY- II

Subject Code 1613502	Theory			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

RATIONALE:

The subject is an important area to learn about Refractory which is used in Furnace lining as heat resistance material and product. The Furnace operation cannot be carried out without having Refractory lining inside the Furnace. It encounters various hazards such as abrasion. Mechanical shock, slag attack, turbulence, thermal shock etc.

OBJECTIVE:

The Objective is to know about:

1. High temperature resistant Refractory Materials and Products.
2. Refractory Manufacture.
3. Properties of Refractory.
4. Application Technology of Refractory.

Contents : Theory		Hrs/week	Marks
Unit-1	**REFRACTORY SCENARIO:** - Status of Refractory Industry in India and Abroad. - Production and Demand. - R & D. - Plant Layout of a Modern Refractory Plant.	**[05]**	
Unit-2	**MANUFACTURING PROCESS:** - Manual Process in Cottage, Village, Tiny, and Small Scale Refractory Manufacturing Unit. - Semi-Automatic Process. - Automatic Process. - Plant and Machinery. - Tempering of Carbon carrying Basic brick. - Dipping Process. - Hydraulic Processing. - Electrostatic Precipitation.	**[15]**	
Unit-3	**PRODUCT INFORMATION:** - On: Acid, Basic, Neutral, and Special Refractory. - On: Monolithic, Gunning, Fettling, and Flow Control Refractory Material. - On: Cermet, and Coatings in Space Craft. - On: Additives, and Binder. - On: Ladle Nozzle, Collector Nozzle, Tundish Nozzle, Bloating Nozzle, Slide Gate Valve, Slide Plate, and Porous Plug etc.	**[10]**	
Unit-4	**PROPERTIES, USES AND TESTING:** - Properties: Porosity, Density and Bulk Density, Water Absorption, Specific Gravity, Permeability, Pyrometric Cone equivalent (PCE), Refractoriness Under Load (RUL), slag attack, Cold Crushing Strength (CCS), Spalling Resistance, Shrinkage, Expansion, Particle Size Measurement, Size and Tolerance, Abrasion Resistance, and Modulus of Rupture (MOR) etc. - Uses in: Ceramic Industry, Steel Plant, and Other Ferrous Industry, Non-Ferrous Industry, and other than non- Ceramic Industry. - Testing of: All Refractory Products.	**[15]**	

Unit-5	**APPLICATION TECHNOLOGY:** - Selection Parameter for Type and Quality of Refractory in a Furnace. - Designing of Refractory lining details for Hearth, Side Wall, Roof, and Other Places. - Expansion Joints given in various quality of Refractory Lining with the basis. - Brick Laying Technique with Type of Brick Joints. - Refractory Casting. - Refractory Ramming. - Heating Cycle for various qualities of Bricks, and Monolithic in a Furnace. - Hot Repair. - Breakdown Repair. - Routine Maintenance. - Capital Repair. - Application of Refractory in: .1- Blast Furnace, Steel Melting Furnace, Batch Furnace, Annealing Furnace, Lift off Furnace, Shuttle Furnace/Kiln, Soaking Pit, Electric Soaking Pit, Vacuum Degassing Unit, and LD Converter etc. .2- Coke Oven, Producer Gas Plant. .3- Power Plant, Boiler, Locomotive, and Naval ship etc. .4- Non–Ferrous such as Aluminum, Copper, Nickel, Lead, and Zinc etc. .5- Ceramic Industry such as – Pottery, Glass, Refractory, Enamel, Cement, and Electronic Ceramic etc. .6- Chemical Industry such as Petro Chemical, Fertilizer, and Basic Chemical etc.	**[15]**	
	Total	**60**	

BOOKS RECOMMENDED:

1. Refractories - F.H.Norton
2. Fuel Furnace and Refractory - G.P.Gupta
3. Modern Furnace Technology - H & G Etherington
4. The Science of Flames and Furnaces - W.W. Thring
5. Refractory Material, Their Manufacture and Uses - A.B.Searles
6. Monolithic Refractory - Subrata Banerjee
7. Properties of Refractory - Harbinson Walker
8. Technology of Ceramics and Refractories - P.P.Budnikov

POTTERY AND PORCELAIN TECHNOLOGY - II

Subject Code 1613503	Theory			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

RATIONALE:

This deal with Pottery covering both Conventional and High-Tech. Modern Pottery Products. Various Products such as Crockery, Insulator, Dinnerware, Washbasin, Ceramic Tile, Ceramic Capacitor, Carbon Film Resistor, Ferrites, Silicon Chips, Clay Bricks, and Chemical Resistant Wares etc. are dealt in this Subject.

OBJECTIVE:

The Objective is to know about:

1. Various Products used in household, Chemical, Power Transmission, and Electronics etc.
2. Type of Glazes used.
3. Properties and Testing.
4. Environmental Issues.

Contents : Theory		Hrs/week	Marks
Unit-1	**ACTION OF HEAT ON CERAMIC MATERIALS:** - Changes and Reactions in Solid State. - Glassy Phase Formation. - Phase Diagram. - Thermal Stress and Thermal Shock. - Colour. - Type of Dryers and kilns used with Setting of Green Wares and Firing Schedule.	[05]	
Unit-2	**GLAZES, GLAZING AND DECORATION:** - Type of Glazes. - Colours. - Glazing Methods. - Decoration Practice. - Glaze Defects and Remedies.	[10]	
Unit-3	**CERAMIC BUILDING AND HEAVY WARES:** - Common Bricks, Hollow Bricks, Perforated Bricks, Hollow Tiles, Roofing Tiles, Flower Pots, Salt Glazed Pipes, Floor Tiles, Mosaic Tiles, and Filters etc. - Sanitary Ware, Wash Basin, Commode, Indian Pan, and Ceramic Wall and Floor Tiles etc. - Raw Materials Preparation, Shaping, Drying, Firing, Glazing, Decoration, and Finishing of the Products.	[10]	
Unit-4	**WHITE WARES:** - Stone Ware, Porcelain, Chemical Porcelain, Dental Porcelain, Earthen Ware and Bone China etc. - Body Preparation, Fabrication Process (Shaping), Batch Calculation, Batching, Ball Milling, Screening, Filtration, Casting Slip, Dry Press Bodies, Plastic Forming, Jiggering, Casting, Extrusion, Dry Pressing, and Finishing etc. - Drying, and Firing. - Properties and Tests.	[10]	
Unit-5	**ELECTRICAL AND ELECTRONIC CERAMIC:** - Low Tension, High Tension, and Extra High Tension Insulators, and Kit – Kat etc. - Steatite, Cordierite, Resistor, Capacitor, Ferrite, and Silicon Chips etc.	[10]	

Unit-6	**SPECIALISED ENGINEERING AND LABORATORY WARES:** - Chemical Porcelain. - Sintered alumina, Berylia. Zirconium, Magnesia, and Spinel etc. - Thoria, and Uranium Dioxide. - Cermet. - Lead Pencil. - Metal Bonded Carbide Tools and Shapes, Ceramic Cutting Tools, and Grinding Wheels etc.	**[05]**	
Unit-7	**CERAMIC LABORATORY:** - Chemical Analysis. - Physical Tests. - Investigation of: Clays, Glazes, and Fired Properties. - Process Control.	**[05]**	
Unit-8	**ENVIRONMENTAL ISSUES:** - Air Quality, Sound Level, Over and under Illumination. - Fuel Consumption, Water Pollution, Air Pollution, and Disposal of Hazardous Materials.	**[05]**	
	TOTAL	**60**	

BOOKS RECOMMENDED:

1. Industrial Ceramics - Singer & Singer
2. Ceramic Fabrication Process - W.D.Kingrey
3. Elements of Ceramic - F.H.Norton
4. Ceramic White Wares - Sudhir Sen
5. Ceramics – Vol. – I & II - E.P.McNmara
6. Introduction of Ceramic - W.D.Kingrey
7. The Craft of Ceramic - Geza re Ueg and Albert Mandi

CERAMIC ENGINEERING DRAWING

Subject Code 1613504	Theory			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

RATIONALE:

Drawing is the language of Engineering Professionals and therefore for ceramic professional the subject is all the more important. The subject imparts skill and understanding of the technical language presented through drawings. The knowledge of drawing will help the professional in designing the equipments and kilns desired in Ceramic Industries.

OBJECTIVE:

The Objective is to develop the skill of the students:

1. To read and understand Drawing.
2. To understand design aspects of Plant, Machinery, and Kiln.
3. To understand designing of Ceramic Products.
4. To impart ideas, Convey information, and Specific Shapes through Drawing.

Contents : Theory		Hrs/week	Marks
Unit-1	**CONCEPT OF DRAWING:** - Knowledge of Drawing Instruments, and their uses. - Concept of Elevation, Plan, End View, and sectional View. - Isometric View. - Computer aided Drawing.	[05]	
Unit-2	**FREE HAND SKETCHING OF CERAMIC PRODUCTS AND RELATED ITEMS:** - Ceramic art Wares and Products. - Ceramic Plant, Machinery, Dryer, and Kiln/Furnace etc.	[10]	
Unit-3	**CERAMIC PRODUCTS DESIGN AND DRAWING DEVELOPMENT:** - Refractory Products such as: Bricks (Standard, Side Arch, End Arch, Soap, Split, Hanger etc.) Shapes, Nozzle, Sleeve, Slide Gate Valve and Stopper etc. - Pottery Products such as: Crockery, Dinner Ware, Commode, Indian Pan, Art Wares, Insulator, Wash Basin and Cup & Saucer, etc. - Glass Products such as: Tumbler, Bottle, Prism, Lens, electric Bulb and Jug etc. - Enamel Products such as: Plate, Mug, and Tray etc. - Modern and Electronic Ceramic Product such as: Carbon Film Resistor, Ceramic Capacitor, Optical Fiber, and TV Tube etc.	[10]	
Unit-4	**CERAMIC PLANT AND MACHINERY DRAWING:** - Mining Equipment, Pulley, Shovel, and Pneumatic Rammer etc. - Conveyors. - Crushers such as: Jaw Crusher, Disintegrator, Roll Crusher, Cone Crusher, and Gyratory Crusher etc. - Grinders such as: Pot Mill, Ball Mill, Tube Mill, and Pan Mill etc. - Screens. - Blungers, Agitators, Diaphragm Pump, Filter Press, Jigger and Jolly, Potter's Wheel, and Shaping Machine etc. - Pug Mill, Screw Press, Toggle Press, Automatic Press and Mixer, etc. - Silos, Hoppers, Mould. Petrological Microscope	[10]	

Unit-5	**<u>CERAMIC DRYER, KILN/FURNACE DRAWING</u>:** - Hot Floor, Chamber Dryer, Tunnel Dryer, and Electric Dryer etc. - Kiln/Furnace: Updraft Kiln, Downdraft Kiln, Muffle Kiln, Tunnel Kiln, Shaft Kiln, Rotary Kiln, Chamber Kiln, Glass Tank Furnace, Electric Furnace, Pot Furnace, and Induction Furnace etc.	**[10]**	
	GEOMETRICAL DRAWING: - Divide, Bisect, and Trisect etc. in Geometrical drawing. - Making of Domes, and Arches etc.	**[05]**	
	PLANT LAYOUT DRAWING: - For Pottery Plant making: Crockery, Ceramic Tiles, Sanitary wares, Insulator, and Dinnerware etc. - For Glass Plant making: Bottles, Sheet Glass, Float Glass, and Tumbler Glass etc. - For Enamel Plant making: Enamel Products. - For Refractory Plant making: Acid, Basic, Neutral, and Special Refractory, Mortars, and Monolithic etc. - For Cement Plant making: Different kind of Cements. - For Modern and Electronic Plant making: Carbon Film Resistor, Ceramic Capacitor, Optical Fiber, and Ferrite etc.	**[10]**	
	TOTAL	**60**	

<u>BOOKS RECOMMENDED:</u>

1. Engineering Drawing - N.D.Bhatt
2. Refractories - F.H.Norton
3. Ceramics – Vol. – I, II, III - E.P.Mc Nmara
4. Porcelain Enamel - A.I.Andrews
5. Glass Engineering Hand Book - E.B. Shand
6. Technology of Portland cement and Blended Cement - H.N. Banerjee
7. Ceramic Fabrication Process - W.D. Kingrey
8. Introduction of Ceramics - W.D.Kingrey
9. The Craft of Ceramics - Geza re Ueg and Albert Mandi
10. Optical Minerology - Roger and Kerr

CEMENT TECHNOLOGY

Subject Code 1613505	Theory			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale :

Cement is termed as basic material required for developing infrastructure of any country. Besides taking care of the construction activities, it also becomes the parameter of development of any country. Various types of cement is required in the construction of buildings, bridges, damns, oil installation, factories etc., a through study of this subject is quite essential for the Diploma students in Ceramic Engineering.

OBJECTIVE:

The Objective is to develop the Knowledge of Students to understand:

1. Role and Use of Lime and cement.
2. Various type of Lime and Cement.
3. Application of Cement in Construction.

Contents : Theory		Hrs/week	Marks
Unit-1	**INTRODUCTION:** - Origin and Development of Lime Industry. - Origin and Development of Cement Industry. - Development of Allied Products.	**[05]**	
Unit-2	**RAW MATERIALS, IT'S MINING AND PREPARATIONS:** - For Lime and Cement: Procurement, Selection, and Proportioning. - For Allied Products: Proportioning, selection, and Proportioning. - Preparation of raw Materials, Crushing, and Grinding, Blending, and Beneficiation.	**[10]**	
Unit-3	**CLASSIFICATION OF LIME AND CEMENT:** - For Lime and Cement: Classification, Properties, and Uses.	**[05]**	
Unit-4	**MANUFACTURE:** - Of Lime Products such as: Agricultural Lime, Quick Lime, and Slaked lime. - Of Cement such as: Portland Cement, Pozzolona Cement, Slag Cement, Quick Setting Cement, Rapid Hardening Cement, High alumina Cement, Low Heat Cement, Sorel Cement, Coloured Cement, Hydrophobic Cement, Water Proof Cement, Sulfate Resisting Cement, and Acid Proof Cement etc.	**[10]**	
Unit-5	**MACHINERY AND KILNS:** - Crushers: Jaw Crusher, Disintegrators, and other Crushers. - Grinders: Ball Mill, Tube Mill, Pan Mill, and other Grinders. - Screens and Screening, Conveying and Conveyors, and Silos etc. - Kilns: Shaft Kiln, Rotary Kiln, and other Kilns. - Pollution Control, Packaging, and Dispatch.	**[10]**	
Unit-6	**PROPERTIES, TESTS AND USES:** - Physical Properties. - Mechanical Properties. - Effect of Raw Materials, and Constituents of Cement. - Various Tests Recommended in ISO. - Use of Cement.	**[05]**	
Unit-7	**APPLICATION:** - In Brick Lining. - Casting, Concreting etc. - Ramming and other Applications.	**[05]**	

Unit-8	**ALLIED PRODUCTS:** - Gypsum and Plaster of Paris. - Lime Products. - Mosaic Tiles, Asbestos Sheets, Concrete Pipes, Reinforced Products, Precast Products, and Railway Sleepers etc. - Retarder, Accelerator, Colours, Water Proofing Materials. And Clinker etc.	**[10]**	
	Total	**60**	

BOOKS RECOMMENDED:

1. Cement Chemistry - H.F.W.Taylor
2. Modern Industrial Ceramics - Engene C. Stafford
3. Technology of Portland Cement and Blended Cement - H.N.Banerjee
4. Cement Data Book - W.H.Duda
5. Clays and Ceramic Raw Materials - W.E.Worrall

CERAMIC ENGINEERING WORKHOP PRACTICE – III
(POTTERY AND REFRACTORY)

Subject Code 1613506	Practical			No of Period in one session : 90			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	06	Internal	:	15	
				External	:	35	

RATIONALE:

This Workshop Practice has been kept to teach Practical method of making Pottery and Refractory Products using the required raw materials. Use of various machinery used for the purpose are also taught and practiced while making the products.

OBJECTIVE:

The Objective is to know about:

1. Working with hand and practice the shaping techniques.
2. Familiarizing with the machine used for the purpose.
3. Practicing various care and precautions required for getting good products without defects.

Contents : Practical

	Pottery (A)	Hrs/week	Marks
Unit-1	**SELECTION AND PREPARATION OF RAW MATERIALS:** - Selection of quartz, Clay, and Feldspar etc. - Preparation of Raw Materials.	[05]	
Unit-2	**SHAPING:** By: Throwing, Pressing, Casting, and Other Techniques.	[10]	
Unit-3	**PREPARATION OF STAINS , COLOUR AND GLAZE APPLICATION:** - Selection of Stains. - Selection of Colours. - Preparation of required Stains, and Colours. By using: Dipping, Spraying, Painting and Brushing etc.	[10]	
Unit-4	**GREEN WARE FINISHING AND REPAIR::** Finishing to be done using the proper Tools like: Knife, Sand paper and Brush etc. Repairing of defective wares.	[05]	
Unit-5	**DRYING:** - Natural Drying. - Drying by using Dryer.	[05]	
Unit-6	**FIRING:** - Firing in Kiln.	[05]	
Unit-7	**INSPECTION, PACKING AND DISPATCH:** - Inspection of Pottery Wares and Repair if required. - Packing - Dispatch Technique	[05]	
	Refractory (B)		
Unit-1	**SELECTION AND PREPARATION OF RAW MATERIALS:** - Selection of Refractory clay, and Plastic Clay. - Preparation of Raw Materials for Refractory making.	[05]	

Unit-2	**SHAPING:** Shaping of Refractory Bricks and Shapes by: - Hand Moulding. - Tamping. - Pressing. - Casting.	[10]	
Unit-3	**BRICK LAYING:** - Joining of Bricks by using different type of joints. - Hearth, Side Wall, Roof, Arch, and Dome etc.	[10]	
Unit-4	**GREEN FINISHING:** - Finishing of Refractory in green stage.	[05]	
Unit-5	**DRYING:** - By natural Process. - By using Dryer.	[05]	
Unit-6	**FIRING:** - Firing of Refractory Bricks, and Shapes in a Furnace/Kiln.	[05]	
Unit-7	**INSPECTION, PACKING, AND DISPATCH:** - Inspection, and Repair. - Packing Techniques to be adopted - Dispatch Technique.	[05]	
	Total	**90**	

BOOKS RECOMMENDED:

1. The Craft of Ceramics - Geza de Vegh and Albert Mandi
2. Ceramic Fabrication Process - W.D.Kingrey
3. Monolithic Refractories -Subrata Banerjee

CERAMIC ENGINEERING LAB.-II

Subject Code 1613507	Practical			No of Period in one session : 90			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	06	Internal	:	15	
				External	:	35	

RATIONALE:

Ceramic Engineering Laboratory has been kept for studying properties of Clay and carrying out various lab tests on Pottery, Refractory, Glass, and Enamel materials and products.

OBJECTIVE:

The Objective is to provide exposure towards laboratory practices carried out to:

1. Know Physical Properties of Clay.
2. Determine Properties of Pottery Clay.
3. Determine Properties of Refractory, Glass, and Enamel Materials and Products.

Contents : Practical		Hrs/week	Marks
Unit-1	**Refractory** **ANALYSIS:** Determination of: - True and Apparent Porosity. - Modulus of Rupture. - Differential Thermal Analysis (DTA). - Cold Crushing Strength (CCS). - Pyrometric Cone Equivalent (PCE). - Refractoriness under Load (RUL). - Spalling Resistance. - Moisture Content. - Specific Gravity.	**[23]**	
Unit-2	**Pottery** **ANALYSIS AND TESTING:** Determination of: - Moisture Content. - pH Value. - Tensile Strength. - Permanent Linear Change (PLC). - Flow and Rolling Limit of Clay. - Expansion Allowance.	**[23]**	
Unit-3	**Enamel** **ANALYSIS AND TESTING:** - Adherence Test. - Hardness Test. - Detection of Defects in Enamel Wares. - Metal Deformation Test. - Moh's Hardness test. - Spot Test for observing the effect of acid on Enamel.	**[23]**	
Unit-4	**Glass** **TESTING:** - Chemical Durability Test. - Determination of Fusion Temperature of Silica. - Bursting Pressure Determination of Hollow Wares. - Thermal Expansion of Glass. - Impact Testing of Glass. - Testing of Glass Durability.	**[22]**	
	Total:-	**(90)**	

BOOKS RECOMMENDED:

1. Porcelain Enamel - A. I. Andrew
2. Hand book of Glass Technology - Dr. R.Charan
3. Modern Pottery manufacture - H.N.Bose
4. Refractories - M.L.Mishra
5. Industrial Ceramics - Singer and Singer

CERAMICS ENGINEERING DRAWING - TW

Subject Code 1613508	Term Work			No of Period in one session : 90			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	Internal	:	15	
	—	—	06	External	:	35	

RATIONALE:

Drawing is the language of Engineering Professionals and Therefore for Ceramic Professionals the subject is all the more important. The subject imparts skill and understanding of the Technical language presented through Drawing. Knowledge of Drawing helps The Professional in designing the Equipment, Kiln, and Plant Layout in Ceramic Industries.

OBJECTIVE:

The Objective is to develop the skill of the students:

1. To read and understand Drawing.
2. To understand design aspects of Plant, Machinery, and Kiln.
3. To understand designing of Ceramic Products.
4. To impart ideas, Convey information, and Specific Shapes through Drawing.

Contents : Term Work		Hrs/week	Marks
Unit-1	**GENERAL CONCEPT OF DRAWING:** - Knowledge of Drawing Instruments and their uses. - Concept of Elevation, Plan, End View and sectional View. - Isometric View. - Computer aided Drawing.	**[10]**	
Unit-2	**FREE HAND SKETCHING OF CERAMIC PRODUCTS AND RELATED ITEMS:** - Ceramic art Wares and Products. - Ceramic Plant, Machinery, Dryer and Kiln/Furnace etc.	**[10]**	
Unit-3	**CERAMIC PRODUCTS DESIGN AND DRAWING DEVELOPMENT:** - Refractory Products such as: Bricks (Standard, Side Arch, End Arch, Soap, Split, Hanger etc.), Shapes, Nozzle, Sleeve, Slide Gate Valve, and Stopper etc. - Pottery Products such as: Crockery, Dinner Ware, Commode, Indian Pan, Art Wares, Insulator, Wash Basin, and Cup & Saucer etc. - Glass Products such as: Tumbler, Bottle, Prism, Lens, electric Bulb, and Jug etc. - Enamel Products such as: Plate, Mug, and Tray etc. - Modern and Electronic Ceramic Product such as: Carbon Film Resistor, Ceramic Capacitor, Optical Fiber, and TV Tube etc.	**[20]**	
Unit-4	**CERAMIC PLANT AND MACHINERY DRAWING:** - Mining Equipment, Pulley, Shovel, and Pneumatic Rammer etc. - Conveyors. - Crushers such as: Jaw Crusher, Disintegrator, Roll Crusher, Cone Crusher, and Gyratory Crusher etc. - Grinders such as: Pot Mill, Ball Mill, Tube Mill, and Pan Mill etc. - Screens. - Blungers, Agitators, Diaphragm Pump, Filter Press, Jigger and Jolly, Potter's Wheel, and Shaping Machine etc. - Pug Mill, Screw Press, Toggle Press, Automatic Press, and Mixer, etc. - Silos, Hoppers, and Mould. - Petrological Microscope.	**[10]**	
Unit-5	**CERAMIC DRYER, KILN/FURNACE DRAWING:** - Hot Floor, Chamber Dryer, Tunnel Dryer, and Electric Dryer etc. - Kiln/Furnace: Updraft Kiln, Downdraft Kiln, Muffle Kiln, Tunnel Kiln, Shaft Kiln, Rotary Kiln, Chamber Kiln, Glass Tank Furnace, Electric Furnace, Pot Furnace, and Induction Furnace etc.	**[10]**	
Unit-6	**GEOMETRICAL DRAWING;** - Divide, Bisect, and Trisect etc. in Geometrical drawing. - Making of Domes, and Arches etc.	**[10]**	

Unit-7	**PLANT LAYOUT DRAWING:** - For Pottery Plant making: Crockery, Ceramic Tiles, Sanitary wares, Insulator, and Dinnerware etc. - For Glass Plant making: Bottles, Sheet Glass, Float Glass, and Tumbler Glass etc. - For Enamel Plant making: Enamel Products. - For Refractory Plant making: Acid, Basic, Neutral, and Special Refractory, Mortars, and Monolithic etc. - For Cement Plant making: Different kind of Cements. - For Modern and Electronic Plant making: Carbon Film Resistor, Ceramic Capacitor, Optical Fiber, and Ferrite etc.	**[20]**	
	Total	**90**	

BOOKS RECOMMENDED:

1. Engineering Drawing - N.D.Bhatt
2. Refractories - F.H.Norton
3. Ceramics – Vol. – I, II, III - E.P.Mc Nmara
4. Porcelain Enamel - A.I.Andrews
5. Glass Engineering Hand Book - E.B. Shand
6. Technology of Portland cement and Blended Cement - H.N. Banerjee
7. Ceramic Fabrication Process - W.D. Kingrey
8. Introduction of Ceramics - W.D.Kingrey
9. The Craft of Ceramics - Geza re Ueg and Albert Mandy
10. Optical Minerology - Roger and Kerr

INPLANT TRAINING AND VISIT TO WORKS

Subject Code 1613509	Term Work			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	Internal	:	30	
	—	—	4 week Continues	External	:	70	

RATIONALE:

In Plant Training and Visit to Works has been kept in the Curriculum mainly to impart practical knowledge to the students by getting them exposed to Industries/Institutions. They come to know about Plant, Plant Layout, Plant and Machinery, manufacturing Process, R&D, Management and Manpower, Market and Marketing, Commercial Aspect etc. They come across the Problems faced by the Industries and put their mind towards its possible remedy.

OBJECTIVE:

The Objective is to achieve:

1. First hand exposure towards Ceramic Industries/ Institutions.
2. Knowledge on the availability and source of Raw Materials, Plant and Machinery, and Manufacturing Process.
3. Knowledge of Management and Control.
4. Knowledge of Problem areas and possible Remedies.

Contents : Term Work		Hrs/week	Marks
Unit-1	**INPLANT TRAINING** **GENERAL** - Introduction indicating necessity and use etc. - Plant Details. - Location.		
Unit-2	**MANPOWER AND MANAGEMENT:** - Manpower Details. - Chief Executive and Managers Details. - Details of Supervisors and Workers (Skilled, Semi-Skilled, Un-Skilled). - Reporting System.		
Unit-3	**TECHNICAL DETAILS:** - About Raw Materials, Software, Hardware with its name, Source, Price, Requirement etc. - Raw Mix Details (Composition). - Plant and Machinery. - Manufacturing Process. - Operational Details. - Product Mix. - Quality Control. - Inspection, Packaging, and Dispatch.		
Unit-4	**MARKETING AND SALES:** - Selling Price of the Products/Services. - Annual Turnover. - Marketing. - Competitors. - Standing of the Company in the Market.		
Unit-5	**FINANCIAL AND COMMERCIAL DETAILS:** . Annual Expenses on: - Raw Materials/Soft Ware/Hard Ware etc. - Salary and Wages. - Fuel, Power, Consumables, Maintenance, and Other Expenses. - Profit and Loss A/c. - Balance Sheet.		
Unit-6	**DIAGNOSTIC STUDY:** - Problem areas. - Possible Remedy (Should include the remedial measures taken by the Plant Management, and the suggestion put forward by the Student)		

Unit-7	**REPORT WRITING:** -Should be carried out covering all the aspects indicated from Topic 01 to 06 and the final In Plant Training Report should be submitted as Sessional. NOTE: The Plant Training Must be carried out in the concerned Industry of the Particular branch of Engineering.		
Unit-1	**VISIT TO WORKS:** **VISIT TO WORKS REPORT:** Visit Report Should Contain: - Introduction. - Name and address details of the Works visited. - Location. - Manpower and Management. - Technical Details. - Marketing and Sales Details. - Price details and Sales Technique adopted by Works. - Financial and Commercial Details covering Profit and Loss A/c etc. - Problem Area with Remedy.		
	Total		

STATE BOARD OF TECHNICAL EDUCATION, BIHAR

Scheme of Teaching and Examinations for

V SEMESTER DIPLOMA IN CHEMICAL ENGINEERING

(Effective from Session 2016-17 Batch)

THEORY

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME							
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks A	Class Test (CT) Marks B	End Semester Exam.(ESE) Marks C	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	Credits
1.	Heat Transfer Operation	1614501	03	03	10	20	70	100	28	40	03
2.	Energy Management	1614502	03	03	10	20	70	100	28	40	03
3.	Chemical Reaction Engineering.	1614503	04	03	10	20	70	100	28	40	04
4.	Plant Safety and Maintenance	1614504	02	03	10	20	70	100	28	40	02
5.	Chemical Instrumentation and Process Control	1614505	03	03	10	20	70	100	28	40	02
		Total :-	**15**				**350**	**500**			

PRACTICAL

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME					
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	Credits
					Internal(A)	External(B)			
6.	Heat Transfer Operation Lab	1614506	04	03	15	35	50	20	02
7.	Energy Management Lab	1614507	02	03	15	35	50	20	01
8.	Plant Safety and Maintenance Lab	1614508	02	03	15	35	50	20	01
9.	Chemical Instrumentation and Process Control Lab	1614509	02	03	15	35	50	20	01
Total :-			**10**				**200**		

TERM WORK

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME				
			Periods per Week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	Credits
10.	Industrial Project and Entrepreneurship Development (TW)	1614510	03	07	18	25	10	03
11.	Professional Practice -V (TW)	1614511	05	07	18	25	10	02
Total :-			**08**			**50**		
Total Periods per week Each of duration One Hour			**33**	Total Marks =		**750**		**24**

HEAT TRANSFER OPERATION
(CHEMICAL ENGINEERING)

Subject Code 1614501	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	
	L	T	P/S	ESE	:	70	03
	03	—	—	TA	:	10	
				CT	:	20	

CONTENTS: THEORY

		Hrs/week	Marks
Unit -1	**CONDUCTION** 1.1 Introduction- Modes of Heat Transfer (Conduction, Convection, Radiation) **2 Marks** 1.2 Fourier's Law, Steady state conduction, Conduction through Rectangular block, Compound resistances in Series, Problems. **4 Marks** 1.3 Conduction through cylinder, Sphere, concept of log mean radius for thick walled cylinders, Problems. **8 Marks** 1.4 Variation of Thermal conductivity with temperature, Problems. **4 Marks** 1.5 Critical Thickness of Insulation- Concept and Definition.	**10**	**18**
Unit -2	**CONVECTION.** 2.1 Natural & Forced Convection. **2 Marks** 2.2 Definition of Film concept in heat transfer by convection Film coefficient and its comparison with Thermal Conductivity. 2.3 Derivation of Overall Heat Transfer coefficient from hot fluid to cold fluid through a metal wall. Effect of surface coefficient on overall heat transfer coefficient. **12 Marks** 2.4 Dimensional analysis for heat transfer for understanding the use of Reynolds number, Prandtl number, nusselt number and Grashoff number in calculating film coefficient. **8 Marks** 2.5 Calculating heat transfer in Laminar and Turbulent flow by Dittus Bolter & Sider Tatte Equation. 2.6 Co-current and Counter current Heat Exchanger. Their comparison and the concept of Log Mean temperature difference and its derivation, Problem. **6 Marks** 2.7 Significance of Heat transfer coefficient in boiling liquid and condensing vapors. Dropwise and Film wise condensation. **2 Marks**	**14**	**30**
Unit - 3	**Radiation.** 3.1 Definition Kirchoff's law. Statement and equation of Plank's law. 3.2 Absorptivity, Reflectivity, Transmissivity, Black body, Gray body, body emissivity. 3.3 Radiation between two surfaces.	**03**	**04**
Unit – 4	**Heat Transfer Equipments** 4.1 Description with sketches and construction details of the following Heat Exchangers. a. Double pipe Heat Exchanger. **08 Marks** b. Shell & Tube – Multi pass. c. Plate type heat exchanges. d. Graphite block heat exchanges. e. Extended surface heat exchanges. f. Scrapped surface heat exchanges. 4.2 Advantages & disadvantages of multi pass heat exchangers. **04 Marks**	**10**	**12**

Unit - 5	**Evaporation.** 5.1 Evaporation as a Unit Operation, Comparison of Evaporation, Drying, Distillation. **02 Marks** 5.2 Properties that influences evaporation, capacity and economy of evaporator, Problems. Method to improve economy, feeding of multiple effect evaporator, mechanical recompression, thermal recompression. **06 Marks** 5.3 Material and Enthalpy balance for Single effect evaporator, Problems based on this topic. Detail study of construction and working of open pan evaporator, Horizontal tube evaporator. Vertical tube evaporator, long tube vertical evaporator, Forced circulation evaporator. **08 Marks**	**11**	**16**
	TOTAL	**48**	**80**

Text/ Reference Books:

Titles of the Book	Name of Authors	Name of the Publisher
Introduction to Chemical Engg.	Mr. Walter L. Badger & Mr. Julius T. Bachero	Mc Graw Hill International.
Unit Operations of Chemical Engineering.	Mc Cabe, W. L. Smith & Harriot.	Mc Graw Hill International.
Process Heat Transfer	Kern D.Q.	Mc Graw Hill International.

ENERGY MANAGEMENT
(CHEMICAL ENGINEERING)

Subject Code 1614502	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

CONTENTS: THEORY

	Name of Topics	Hrs/week	Marks
Unit -1	**Energy Scenario** 1.1 Classification of Energy 1.2 Indian Energy Scenario 1.3 Energy Security? 1.4 Energy Conservation and it's importance. 1.5 Energy conservation Act, 2001.	**04**	**10**
Unit -2	**Basics of Energy** 2.1 Electrical basics-DC & AC current Electricity tariff load Management Power Factor (PF). 2.2 Thermal basics-fuels, Thermal Energy, Contents of Fuel, Heat Capacity, Heat Transfer, Units & Conservation	**04**	**08**
Unit - 3	**Energy Audit & Monitoring** 3.1 Types of Energy audit. 3.2 Understanding Energy Costs. 3.3 Benchmarking and Energy Performance. Energy monitoring & Targetting.	**08**	**18**
Unit – 4	**Energy Efficiency in Electrical & Thermal Utilites.** 4.1 Pumps & Pumping system. 4.2 Cooling towers 4.3 Fuel & Combustion. 4.4 Energy efficient Technologies.	**08**	**18**
Unit – 5	**Energy Performances Assessment** 5.1 Water pumps 5.2 Heat Exchangers..	**04**	**08**
Unit – 6	**Non-Conventional & Renawable Energy Sources.** 6.1 Solar Energy. 6.2 Wind Energy. 6.3 Bio Energy. 6.4 Hydro Energy. 6.5 Tidal & Ocean Energy.	**04**	**08**
	TOTAL	**32**	**70**

Text/ Reference Books:

Titles of the Book	Name of Authors	Name of the Publisher
Guide book for Nation Certification Examination for Energy Managers & Energy Auditors Book 1 to 4	--	Bureau of Energy Efficiency, New Delhi.
Energy Handbook	Robert L. Loftness	Non Nostrand Reinhold Compnay

Web Source

(i) www.bp.com/centres/energy.
(ii) www.epa.org
(iii) www.calculator.org/properties.html
(iv) www.eeca.govt.nz
(v) www.energyusernews.com/
(vi) www.bce-india.nic.in

CHEMICAL REACTION ENGINEERING

(CHEMICAL ENGINEERING)

Subject Code 1614503	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	04
	L	T	P/S	ESE	:	70	
	04	—	—	TA	:	10	
				CT	:	20	

CONTENTS: THEORY

Name of Topics		Hrs/ week	Marks
Unit -1	**Thermodynamics** 1.1 **General basic terms used: Thermodynamics, System,** Surrounding, State and path functions, Intensive Ant extensive properties, Cyclic process, equilibrium process, Heat and work as form of energy. 1.2 First law of Thermodynamics. 1.3 Second law of Thermodynamics. 1.4 Third law of Thermodynamics. 1.5 Concept of internal energy, enthalpy, entropy. 1.6 Calculation of entropy changes for ideal gas process. 1.7 Concept of free energy, Chemical potential. 1.8 Feasibility of chemical reaction from free energy change. 1.9 Relation between Gibbs free energy change and equilibrium constant. 1.10 Relation between k_p, k_c and k_y. 1.11 Van't Hoff equation, Variation of equilibrium constant with temperature at constant pressure. Variation of equilibrium constant with pressure at constant temperature. 1.12 Extent of reaction (Along with variation with temperature and pressure). No problem from thermodynamics.	**13**	**18**
Unit -2	**Introduction to Chemical kinetics.** 2.1 Concept of rate of reaction, rate equation, rate constant, order of reaction, Molecularity of reaction, Chain reaction, Non chain reaction. **6 Marks** 2.2 Type of intermediate form in non chain reaction. 2.3 Single reaction multiple reaction, non-elementary reaction. 2.4 Theories of reaction rates constant. a. Arrhenius law & Problems based on it. b. From Thermodynamics. c. From Collision theory. d. From Transition state theory. **8 Marks** 2.5 Activation Energy.	**08**	**14**
Unit - 3	**Interpretation of batch reactor data.** 3.1 Concept of Batch reactor data, constant and variable volume reactions. 3.2 Analysis of total pressure data. 3.3 Integral and Differential method of analysis of batch reactor data. **8 Marks** 3.4 Integral method of analysis for irreversible unimolecular first order reaction, bimolecular second order reaction, n^{th} order, zero order and auto catalytic reaction. Problem based on zero order, first order and second order reactions. **6 Marks** 3.5 Half-life concept for the overall order of irreversible reactions and problem based on that. 3.6 Differential method- Partial analysis of rate equation and other methods. **4 Marks**	**13**	**18**

Unit - 4	**Introduction to reactor design.** 4.1 Types of reactors (Batch reactor, Continuous reactor, Plug flow reactor,Mixed flow reactor, Biological reactor, Fixed (packed) bed reactor, fluidized bed reactor. 4.2 Concept of space-time, space velocity and holding time. **6 Marks** 4.3 Performance equation for ideal batch reactor, mixed flow reactor and plug flow reactor for constant volume and variable volume irreversible first order reaction. Problems based on the above topic. 4.4 Size comparison of the reactors a. Batch reactors vs PFR (For first order reactions) b. PFR vs MFR (For first order irreversible reactions) and Problems based on the above topics. **5 Marks** 4.5 Multiple reactor systems. a. Equal size MFR in series. b. Different size MFR in series. (Finding final conversion for given system and finding the best system for achieving desired conversion.) - PFR in series. **5 Marks** - **PFR in parallel.** - PFR in parallel-series combination and problems based on that. - Reactors of different type in series and number of CSTR's.	**12**	**16**
Unit - 5	**Catalysis.** 5.1 Definition, types and classification. 5.2 Preparation of catalyst, ingradients (Promotors, inhibitor, accelerator) 5.3 Catalyst Poisoning, regenerator. 5.4 Theories of catalysis- Adsorption. 5.5 Desired properties of catalyst.	**02**	**04**
	TOTAL	**48**	**70**

Text/ Reference Books:

Titles of the Book	Name of Authors	Name of the Publisher
Chemical Reaction Engineering	Octave Levenspiel	Wiley Eastern Ltd.
Chemical Engineering Kinetics	J. M. Smith	Mc Graw Hill Publication
Chemical Engineering Thermodymamics	J. M. Smith H. C. Vanness	Mc Graw Hill
Thermodynamic for Chemists	Samuel Glasstone	East Wet Pvt. Ltd.

PLANT SAFETY AND MAINTENANCE

(CHEMICAL ENGINEERING)

Subject Code 1614504	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	02
	L	T	P/S	ESE	:	70	
	02	—	—	TA	:	10	
				CT	:	20	

CONTENTS: THEORY

Name of Topics		Hrs/week	Marks
Unit -1	**Plant Safety** 1.1 1.1 Importance & objectives of safety 1.2 1.2 Safety in chemical industry 1.3 1.3 Criteria for setting & layout of chemical plant. 1.4 Instrumentation for safe plant operation.	**04**	**06**
Unit -2	**Plant Hazards** 2.1 Chemical hazards, Toxic hazards, Explosion hazards, Electrical hazards, Mechanical hazards, Radiation hazards, Noise hazards. 2.2 Control, precautions & prevention, Safety measures in	**05**	**10**
Unit - 3	**Personal Protective Equipment:** 3.1 Respiratory equipment 3.2 Non-respiratory equipments.	**03**	**08**
Unit – 4	**Fire Prevention** 4.4 Classification of fires. 4.5 Causes of fire. 4.6 Prevention of fire: Portable extinguishers, Water systems, carbon-di- oxide systems, foam extinguisher system, dry chemical extinguisher systems.	**03**	**08**
Unit – 5	**Storage & Transportation of chemicals** 5.5 Different methods of storage 5.6 Characteristics of chemical with special reference to safe storage & handling of chemicals. 5.7 Layout of storage 5.8 Various modes of transport 5.9 Safety precautions in transportation of different types of chemicals.	**05**	**10**
Unit - 6	**Safety Audit** 6.1 Objective of safety audit 6.2 Procedure for safety auditing 6.3 Audit report, Safety report.	**03**	**08**
Unit - 7	**Plant Maintenance** 7.1 Concepts of maintenance 7.2 Preventive maintenance 7.3 ON-line Maintenance 7.4 Shut down Maintenance 7.5 Procedure for startup, Commissioning and shut down of	**09**	**20**
	TOTAL	**32**	**70**

Text / Reference Books:		
Titles of the Book	**Name of Authors**	**Name of the Publisher**
Safe Handling of Hazardous Chemical	A.K. Rohatgi	J.K. Enterprises, Bombay
Safety & Accident prevention in Chemical operation	H.H Faucet & W.S. Wood	Interscience Publishers of Jhon Wiley & Sons, New York
Safety in Process Plant Design	G.L. Wells	John Wiley & Sons.
Industrial Safety Handbook	William & Handley	McGraw Hill
Plant Maintenance	S.S. Apte	Delhi Productivity Council
Maintenance Engineer's Handbook	C.L. Morrow	McGraw Hill

CHEMICAL INSTRUMENTATION & PROCESS CONTROL

(CHEMICAL ENGINEERING)

Subject Code 1614505	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	02
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

CONTENTS: THEORY

		Hrs/week	Marks
Unit -1	**Measurement Systems** 1.1 Measurement and its aim 1.2 Measurement system element 1.3 Static characteristics Calibration, Accuracy, Precision, Repeatability, Drift, Sensitivity, Resolution, Dead zone, Static error. 1.4 Dynamic Characteristics Speed of response, fidelity, lag, Dynamic error.	02	04
Unit -2	**Temperature** 2.1 Temperature Scales 2.2 Methods of Temperature Measurement. 2.3 Expansion Thermometer 2.4 Filled-system Thermometer 2.5 Electrical Temperature Instruments 2.6 Pyrometer	05	12
Unit - 3	**Pressure** 3.1 Units of Pressure 3.2 Methods of Pressure Measurement 3.3 Manometers 3.4 Elastic Pressure Transducer 3.5 Force-balance Pressure Gauges 3.6 Electrical Pressure Transducer 3.7 Measurement of Vacuum.	05	10
Unit – 4	**Level** 4.1 Methods of Liquid level Measurement 4.2 Direct Methods: Sight Glass, Float, Displacer. 4.3 Indirect Methods: Pressure gauge, Air trap, Diaphragm box, Air purge, Radioactive, Ultrasonic, Capacitive. Solid level Measurement.	02	06
Unit – 5	**Flow** 5.1 Methods of flow Measurement 5.2 Inferential Flow Measurement: Variable head, Variable area, Magnetic meter, Turbine meter, Vortex meter, Ultrasonic flow meter. 5.3 Quantity Flow meter: Positive displacement meters, Nutating disc meters, Rotating vane meter, Lobed impeller meter. 5.4 Mass Flow meters: Gyroscopic Flowmeter, Thermal meter.	05	10
Unit - 6	**Process Control System & Controllers** 6.1 Open & closed loop system, cascade control system. 6.2 System input step, ramp, sinusoidal, pulse. 6.3 Control Action : On-Off, proportional integral, derivative. 6.4 Pneumatic Controllers. Electronic	05	10

Unit – 7	**Control Valve** 7.1 Valve characteristics. 7.2 Valve types, Valve actuators, Valve positioners. 7.3 Valve selection and sizing.	04	08
Unit – 8	**Computer-Aided Measurement & Control System** 8.1 Elements of computer-aided measurement and control. 8.2 Computer aided process control Architecture. 8.3 Man-machine Interface (MMI). 8.4 Computer- aided process control hardware. 8.5 Programmable Logic controller (PLC) Architecture. 8.6 Distributed Control System (DCS) Architecture.	04	10
	TOTAL	**32**	**70**

Text/ Reference Books

Titles of the Book	Name of Authors	Name of the Publisher
Industrial Instrumentation and control	S.K.Singh	Tata McGraw Hill publishing company Ltd
Instrumentation	Franklyn Kirk & Nicholas Rimboi	D.B.Taraporevala Sons & Co Private Ltd
Industrial control and Instrumentation	W. Bolten	Universities Press (India) Ltd
Process control	Peter Harriott	Tata McGraw Hill Publishing Company Ltd

HEAT TRANSFER OPERATION LAB

(CHEMICAL ENGINEERING)

Subject Code 1614506	Practical						Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	04	Internal	:	15	
				External	:	35	

CONTENTS: PRACTICALS

Skills to be developed:

Intellectual Skills:

a. To calculate the Physical property (thermal conductivity) of material.

b. To calculate the rate of heat flow through different materials.

c. To calculate the overall heat transfer coefficient.

Motor Skill:

a. To operate different types of heat exchange.

b. To control the operating parameters of heat exchange.

List of Practicals:

1. To find the thermal conductivity of material at different temperatures.
2. To calculate the rate of heat loss through composite wall.
3. To calculate the overall heat transfer coefficient for finned tube heat exchanges.
4. To calculate the overall heat transfer coefficient for shell and tube heat exchanges.
5. To calculate the overall heat transfer coefficient for double pipe heat exchanges.
6. To calculate the emissivity of a material.
7. To calculate heat transfer coefficient for natural and forced convection.
8. Measures various parameters controlled in a heat exchanger using process simulator.

ENERGY MANAGEMENT LAB

(CHEMICAL ENGINEERING)

Subject Code	Practical						Credits
	No. of Periods Per Week			Full Marks	:	50	
1614507	L	T	P/S	ESE	:	50	01
	—	—	02	Internal	:	15	
				External	:	35	

CONTENTS: PRACTICAL

Skills to be developed

Intellectual Skills:

- Ability to identify and select proper instruments for measuring parameter of importance.
- Ability to prepare energy audit report & present it.

Motor Skills:

- Ability to measure parameter of importance in electrical & non electrical system.
- Ability to acquire Hands-on experince.

List of Practicals:

1) To measure the parameters of importance other than electrical such as temperature / Air & Gas flow / Liquid flow / revolutions per minute / noise & vibration / dust concentration etc.

2) To measure basic electrical parameters in AC & DC system – Voltage / Current / Power Factor / Active power / Apparent power / Energy consumption etc.

3) To Prepare preliminary audit report for any organization Considering following points.
   i) Energy Consumption in the Organization.
   ii) Scope of Saving.
   iii) Identify the mostly and the easiest areas of attention.
   iv) Identify immediate improvements/ saving etc.

4) To collect information for detailed audit report such as.
   i) Energy consumption by department, type of Energy.
   ii) Energy Cost and Tariff data.
   iii) Process and Material flow diagram.
   iv) Sources of Energy supply.
   v) Material balance data.
   vi) Capacity Utilisation etc.

5) To Prepare detailed Energy audit report for any Organisation.

6) Report Presentation with case studies on any one topic in Energy Management.

6) Visit to any industrial sector where energy Management Policy is Implements.

7) To Collect Information about Energy Management Policy of any 2 Companies using web source.

PLANT SAFETY AND MAINTENANCE LAB

(CHEMICAL ENGINEERING)

Subject Code 1614508	Practical						Credits
	No. of Periods Per Week			Full Marks	:	50	01
	L	T	P/S	ESE	:	50	
	—	—	02	Internal	:	15	
				External	:	35	

CONTENTS: PRACTICALS

Intellectual Skills

- Proper selection of personal protective devices, fire extinguishers, storage devices, Transportation system.
- Analyze the potential hazards & take corrective measures.
- Prepare plant layout based on safe plant operation.
- Prepare on-site & off site emergency plans, Fire Prevention check list.
- Prepare safety audit report, safety report.
- Prepare maintenance schedule.

Motor Skills

- Proper handling of personal protective devices, fire extinguishers.
- Adopt safe procedure while handling & storing chemicals.
- Ability to acquire hands-on experience in handling emergencies, trouble shooting of chemical plant problem.

List of Practical:

1) Demonstration and practice in the use of personal protective devices.
2) Demonstration and practice in the use of fire extinguishers.
3) Prepare plant setting and layout of chemical plant.
4) Prepare safety Audit report for a given plant.

4) Prepare fire prevention check list.
5) Prepare checklist of potential hazards in chemical plants.
6) Anaylse case studies of major Industrial disasters.
7) Prepare Preventive Maintenance chart for given equipment.
8) Prepare PERT-Chart for shutdown maintenance for given plant.
10) Fault finding and repairing of given equipment used in process plant.

Video Cassettes / Posters on Safety:

1) Loss prevention Association of India Ltd.
   Warden House, Sir
   P.M. Road, Mumbai –
   400 001
2) National Safety
   Council Plot No.
   98A, Sector – 15,
   Industrial Area, CBD Belapur, Navi Mumbai – 400 614

CHEMICAL INSTRUMENTATION AND PROCESS CONTROL LAB

(CHEMICAL ENGINEERING)

Subject Code 1614509	Practical						Credits
	No. of Periods Per Week			Full Marks	:	50	01
	L	T	P/S	ESE	:	50	
	—	—	02	Internal	:	15	
				External	:	35	

CONTENTS: PRACTICAL

Intellectual Skills:

- To verify the principles, laws, using given measuring instruments under different conditions.
- To read and interpret the graph.
- To interpret the results from observations and calculations.

Motor Skills:

- Proper handling of measuring devices.
- Measuring physical quantities accurately.
- To observe the phenomenon and to list the observations in proper tabular form.
- To adopt proper procedure while performing the experiment.
- To plot the graphs.

List of Practicals:

1) Measurement of temperature using thermocouple or RTD or Thermistor and to find their characteristics.
2) Measurement of high temperature using radiation or Optical pyrometer.
3) Measurement of pressure using LVDT or Strain gauge transducer.
4) Calibration of pressure gauge using Dead Weight Tester.
5) Measurement of level using air purge or capacitance type level detector.
6) Measurement of flow using magnetic flow meter or Ultrasonic flow meter.
7) Determine the characteristics of ON- OFF or proportional or proportional integral or proportional derivative or proportional integral derivative controller.
8) Determine the characteristics of control valve
9) Practice plant operating skills like start up and shutdown of plant, analyze normal operating conditions, attend any malfunction operate the plant safely using DCS / PLC based process simulator on any two unit operations.

INDUSTRIAL PROJECT AND ENTREPRENEURSHIP DEVELOPMENT -TW

(CHEMICAL ENGINEERING)

Subject Code 1614510	Term Work						Credits
	No. of Periods Per Week			Full Marks	:	25	03
	L	T	P/S	Internal	:	07	
	—	—	03	External	:	18	

CONTENTS

PART A) Industrial Project	Following activities related to project are required to be dealt with, during this semester 1. Form project batches & allot project guide to each batch. (Max. 4 students per batch) 2. Each project batch should select topic / problem / work by consulting the guide & / or industry. Topic / Problem / work should be approved by Head of department. 3. Each project batch should prepare action plan of project activities & submit the same to respective guide. 4. At the end of semester, each project batch should submit the action plan and abstract of the project along with list of materials required if project involves fabrication or other facilities required in other kinds of project. 5. Action Plan should be part of the project report.
Part B: Entrepreneurship Development	**Students will be able to** 1) Identify entrepreneurship opportunity. 2) Acquire entrepreneurial values and attitude. 3) Use the information to prepare project report for business venture. 4). Develop awareness about enterprise management

CONTENTS

Name of the Topic		Hrs/week
Unit -1	**Entrepreneurship, Creativity & Opportunities** 1.1) Concept, Classification & Characteristics of Entrepreneur 1.2) Creativity and Risk taking. 1.2.1) Concept of Creativity & Qualities of Creative person. 1.2.2) Risk Situation, Types of risk & risk takers. 1.3) Business Reforms. 1.3.1) Process of Liberalization. 1.3.2) Reform Policies. 1.3.3) Impact of Liberalization. 1.3.4) Emerging high growth areas. 1.4) Business Idea Methods and techniques to generate business idea. 1.5) Transforming Ideas in to opportunities transformation involves Assessment of idea &Feasibility of opportunity 1.6) SWOT Analysis	03

Unit -2	**Information And Support Systems** 2.1) **Information Needed and Their Sources**. Information related to project, Information related to support system, Information related to procedures and formalities ***2.2) Support Systems*** 1) Small Scale Business Planning, Requirements. 2) Govt. & Institutional Agencies, Formalities 3) Statutory Requirements and Agencies.	03
Unit - 3	**Market Assessment** 3.1) Marketing -Concept and Importance 3.2) Market Identification, Survey Key components 3.3) Market Assessment	02
Unit - 4	**Business Finance & Accounts** **Business Finance** 4.1) Cost of Project 1) Sources of Finance 2) Assessment of working capital 3) Product costing 4) Profitability 5) Break Even Analysis 6) Financial Ratios and Significance **Business Account** 4.2) Accounting Principles, Methodology 1) Book Keeping 2) Financial Statements 3) Concept of Audit,	03
Unit – 5	**Business Plan & Project Report** 5.1)Business plan steps involved from concept to commissioning: Activity Recourses, Time, Cost 5.2) Project Report 1) Meaning and Importance 2) Components of project report/profile **(Give list)** 5.3) Project Appraisal 1) Meaning and definition 2) Technical, Economic feasibility 3) Cost benefit Analysis	03
Unit - 6	**Enterprise Management And Modern Trends** 6.1) Enterprise Management**: -** 1) Essential roles of Entrepreneur in managing enterprise 2) Product Cycle: Concept And Importance 3) Probable Causes Of Sickness 4) Quality Assurance 5) Importance of Quality, Importance of testing 6.2**) E-Commerce** Concept and process 6.3) **Global Entrepreneur**	02
	Total	**16**

Text/ Reference Books

Titles of the Book	Name of Authors	Edition
Entrepreneurship Development	E. Gorden K.Natrajan	Himalaya Publishing. Mumbai
Entrepreneurship Development	Preferred by Colombo plan staff college for Technical education.	Tata Mc Graw Hill Publishing co. ltd. New Delhi.
A Manual on How to	J.B.Patel	EDI STUDY MATERIAL
Prepare a Project Report	D.G.Allampally	Ahmadabad (Near Village Bhat , Via Ahmadabad Airport & Indira Bridge), P.O. Bhat 382428 , Gujrat,India P.H. (079) 3969163, 3969153
A Manual on Business Opportunity Identification & Selection	J.B.Patel S.S.Modi	
National Directory of Entrepreneur Motivator & Resource Persons.	S.B.Sareen H. Anil Kumar	
New Initiatives in Entrepreneurship Education & Training	Gautam Jain Debmuni Gupta	
A Handbook of New Entrepreneurs	P.C.Jain	
Evaluation of Entrepreneurship Development Programmes	D.N.Awasthi , Jose Sebeastian	
The Seven Business Crisis & How to Beat Them.	V.G.Patel	
Entrepreneurship Development of Small Business Enterprises	Poornima M. Charantimath	Pearson Education, New Delhi
Entrepreneurship Development	--	McGraw Hill Publication
Entrepreneurship Theory and Practice	J.S. Saini B.S.Rathore	Wheeler Publisher New Delhi
Entrepreneurship Development	--	TTTI, Bhopal / Chandigadh

Video Cassettes

No	Subject	Source
1	Five success Stories of First Generation Entrepreneurs	EDI STUDY MATERIAL Ahmadabad (Near Village Bhat , Via Ahmadabad Airport & Indira Bridge), P.O. Bhat 382428 , Gujrat,India P.H. (079) 3969163, 3969153
2	Assessing Entrepreneurial Competencies	
3	Business Opportunity Selection and Guidance	E-mail : ediindia@sancharnet.in/olpe@ediindia.org Website : http://www.ediindia.org
4	Planning for completion & Growth	
5	Problem solving-An Entrepreneur skill	

Glossary:
Industrial Terms:
Terms related to finance, materials, purchase, sales and taxes.

Components of Project Report:

1. Project Summary (One page summary of entire project)
2. Introduction (Promoters, Market Scope/ requirement)
3. Project Concept & Product (Details of product)
4. Promoters (Details of all Promoters- Qualifications, Experience, Financial strength)
5. Manufacturing Process & Technology
6. Plant & Machinery Required
7. Location & Infrastructure required
8. Manpower (Skilled, unskilled)

PROFESSIONAL PRACTICES V - TW

(CHEMICAL ENGINEERING)

Subject Code 1614511	Term Work						Credits
	No. of Periods Per Week			Full Marks	:	25	02
	L	T	P/S	Internal	:	07	
	—	—	05	External	:	18	

CONTENTS: TERM WORK

		Hrs/week
Unit -1	**Industrial Visits:** Structured industrial visits be arranged and report of the same should be submitted by the individual student, to form part of the term work. Visits to **any two** of the following : i. Fabrication Industry involved in manufacturing Chemical Engineering equipments like Reaction kettle, HE, Tanks etc. ii. Petroleum industry to see Safety equipments. iii. Factory to see various instruments like Thermocouple, Flow measuring Devices, Level measuring Devices Level. iv. Chemical Industry for Studying various types of heat exchange	24
Unit -2	Lectures by Professional / Industrial Expert / Student Seminars based on information search to be organized from any of the following areas : viii) Industrial Engineer in a Chemical Industry. ix) Controllers used in a Chemical Industry. x) Safety Engineer a Chemical Industry. xi) E. T. P. plant in a Chemical Industry.	14
Unit - 3	Student Activities : The students in a group of 3 to 4 will perform **any one** of the following activities (others similar activities may be considered Activity : v) Collect 2 types of Pressure Gauges & 2 types of Vacuum Gauges. vi) Visit a Chemical factory & see Working of GLC.	32
	Total	**70**

STATE BOARD OF TECHNICAL EDUCATION, BIHAR

Scheme of Teaching and Examinations for

V SEMESTER DIPLOMA IN CIVIL ENGINEERING / CIVIL (RURAL) ENGINEERING

(Effective from Session 2016-17 Batch)

THEORY

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME							
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks A	Class Test (CT) Marks B	End Semester Exam.(ESE) Marks C	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	Credits
1.	Theory of Structure	1615501	03	03	10	20	70	100	28	40	03
2.	Design of Steel Structure	1615502	03	03	10	20	70	100	28	40	03
3.	Estimating and Costing	1615503	03	04	10	20	70	100	28	40	03
4.	Highway Engineering	1615504	04	03	10	20	70	100	28	40	04
5.	Irrigation Engineering	1615505	03	03	10	20	70	100	28	40	03
		Total :-	**16**				**350**	**500**			

PRACTICAL

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME					
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	Credits
					Internal(A)	External(B)			
6.	Theory of Structure Lab	1615506	02	03	15	35	50	20	01
7.	Design of Steel Structure Lab	1615507	02	03	15	35	50	20	01
8.	Irrigation Engineering Lab	1615508	02	03	15	35	50	20	01
Total :-			**06**				**150**		

TERM WORK

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME				
			Periods per Week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	Credits
9.	Professional Practice V (TW)	1625509	04	07	18	25	10	02
10.	Estimating and Costing (TW)	1615510	02	07	18	25	10	01
11.	Building Services and Entrepreneurship Development (TW)	1615511	05	15	35	50	20	02
Total :-			**11**			**100**		
Total Periods per week Each of duration One Hour 33				Total Marks = **750**				**24**

THEORY OF STRUCTURES
(CIVIL ENGINEERING GROUP)

Subject Code 1615501	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS : THEORY

Name of the Topic		Hrs/week	
Unit -1	**Direct And Bending Stresses** 1.1 Concept of direct and eccentric loads, eccentricity about one principal axis, nature of stresses, maximum and minimum stresses, resultant stress distribution diagram. **1.2 Condition for no tension or zero stress at extreme fiber, limit of eccentricity, core of section for rectangular and circular cross sections.** 1.3 Columns, pillars and chimneys of uniform section subject to lateral wind pressure, coefficient of wind resistance, stress distribution at bases	**10**	**16**
Unit -2	**Slope And Deflection** 2.1 Concept of slope and deflection, stiffness of beam 2.2 Relation between slope, deflection and radius of curvature, differential equation (no derivation), double integration method to find slope and deflection of simply supported and cantilever beam 2.3 Macaulay's method for slope and deflection,, application to simply supported and cantilever beam subjected to concentrated and uniformly distributed load.	**10**	**14**
Unit – 3	**Fixed Beam** 3.1 Concept of fixity, effect of fixity, advantages and disadvantages of fixed beam. 3.2 Principle of superposition. 3.3 Fixed end moments from first principle for beam subjected to UDL over entire span, central point load, Point load other than mid span. 3.4 Application of standard formulae in finding moments and drawing S.F. and B.M. diagrams for a fixed beam (Derivation need not be asked in the examination)	**06**	**10**
Unit – 4	**Continuous Beam** 4.1 Definition, effect of continuity practical example, nature of moments induced due to continuity, concept of deflected shape 4.2 Clapeyron's theorem of three moment (no derivation) 4.3 Application of theorem maximum up to three spans and two unknown support moment only, Support at same level, spans having same moment of inertia subjected to concentrated loads and uniformly distributed loads over entire span. 4.4 Drawing SF and BM diagrams for continuous beams.	**08**	**10**

Unit – 5	**Moment Distribution Method** 5.1 Introduction, sign convention 5.2 Carry over factor, stiffness factor, distribution factor. 5.3 Application of moment distribution method for various types of continuous beams subjected to concentrated loads and uniformly distributed load over entire span having same or different moment of inertia up to three spans and two unknown support moment only, SF and BM diagrams (Supports at same level) 5.4 Application of moment distribution method to single storey single bay symmetrical portal frames, SF and BM diagrams	**08**	**10**
Unit – 6	**Columns** 6.1 Definition, classification of column 6.2 Buckling of axially loaded compression member, Types of end conditions for column, effective length, radius of gyration, slenderness ratio 6.3 Assumptions in the theory of long column Euler's theory, buckling load and Rankin's theory, crippling load , factor of safety, safe load 6.4 Application of Rankin's and Euler theory, designing solid circular or hollow circular sections	**06**	**10**
	Total	**48**	**70**

Text /Reference Books:-

Titles of the Book	**Name of Authors**	**Name of the Publisher**
Mechanics of structures	S. B. Junnarkar	Charotar Publishing House, Anand
Theory of structures	S. Ramanrutham	Dhanpatrai & Sons, Delhi
Analysis of Structures	V.N.Vazirani & M.M. Ratwani	Khanna Publishers Delhi
Theory of Structure	R.S. Sharma	Foundation Publishing

(I) Beam Colum Joint for Duetile Structure.

(II) Earthquake Part on old Syllabus.

DESIGN OF STEEL STRUCTURES
(CIVIL ENGINEERING GROUP)

Subject Code	Theory						Credits
1615502	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS : THEORY

	Name of the Topic	Hrs/week	
Unit -1	**Introduction** Tyes of sections used, Grades of steel and strength characteristics; advantages and disadvantages of steel as construction material; Use of steel table and relevant I. S . code; Types of loads on steel structure and its I. S. code specification.	**02**	**08**
Unit -2	**Connections** Riveted connections, Types of rivets and their use, Types of riveted joint and its failure, Strength of riveted joint and efficiency of a riveted joint. Assumptions in theory of riveted joint Design of riveted joint for axially loaded member. Welded connection Introduction, Permissible stress in weld, strength of weld, advantages and disadvantages of welded joint. Types of weld and their symbols. Design of fillet weld and butt weld subjected to axial load.	**06**	**10**
Unit – 3	**Design of Tension Member** TYPES OF SECTIONS USED, PERMISSIBLE STRESSES IN AXIAL TENSION AND GROSS AND NET CROSS- SECTIONAL AREA OF TENSION MEMBER Analysis and Design of tension member with welded and riveted connection. Introduction to Lug Angle and Tension splice.	**04**	**08**
Unit – 4	**Design of Compression Member** Angle struts Types of Sections used, Effective length, Radius of gyration, slenderness ration and its limit, Permissible compressive stresses. Analysis and Design of axially loaded angle struts with welded and riveted connection. Stanchion and Columns types of sections used; simple and built up sections, effective length, Analysis and design of axially loaded column introduction to lacing andbattening (No numerical problem on Lacing and Battening)	**06**	**12**
Unit – 5	**Steel Roof Truss** Types of steel roof truss & its selection criteria Calculation of panel point load for Dead load; Live load and wind load as per I.S. 875-1987 Analysis and Design of steel roof truss. Design of Angle purlin as per I. S. Arrangement of members at supports	**06**	**14**

Unit – 6	**Beams** Different steel sections used; Simple and built-up sections Permissible bending stresses. Design of simple beams, check for shear only. Design of built-up beams (Symmetrical I Section with cover plates only), check for shear only. Introduction to Plate Girder: Various components and their functions. (No numerical Problem on Plate Girder)	**04**	**08**
Unit – 7	**Column Bases** Types of column bases design of slab base & concrete block introduction to gusseted base (no numerical problems on gusseted Base)	**04**	**10**
	Total	**32**	**70**

Text/ Reference Books:-

Titles of the Book	**Name of Authors**	**Name of the Publisher**
Design of steel structure	S. K. Duggal	Tata Macgraw Hill Publication Company ltd. New Delhi
Design of steel structure	M. Raghupati	Tata Macgraw Hill publication Company ltd. New Delhi
Design of steel structure	L. S. Nege	Tata Macgraw Hill publication Company ltd. New Delhi
Design of steel structure	Ramchandra	Dalpatrai & Sonts publication Company ltd. New Delhi
Design of Steel Structures	S.S. Bhari katti	I.K. International Publishing House
Design of Steel Structures	Kazimi & Jindal	Prentice hall India, New Delhi.
Design of Steel Structure	S.N. Malik	Foundation Publishing

ESTIMATING & COSTING
(CIVIL ENGINEERING GROUP)

Subject Code	Theory						Credits
1615503	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS : THEORY

	Name of the Topic	Hrs/week	Marks
Unit -1	Overview Of Estimating & Costing 1.1 Meaning of the terms estimating, costing. Purpose of estimating and costing . 1.2 Types of estimate - Approximate and Detailed. Approximate estimate Types- Plinth area rate method, Cubic Content method, Service Unit method, Typical bay method, Approximate Quantity method , Problems on Plinth area rate method & application of Service unit method for selection of service unit for different types of civil Engineering Structures. 1.3 Types of detailed estimate. Detailed estimate for new work. Revised estimate. Supplementary estimate. Revised & Supplementary estimate. Maintenance & Repair estimate. Uses of detailed estimate	**06**	**08**
Unit -2	***Detailed Estimate*** 2.1 Unit quantity method, Total quantity method, Data required for detailed estimate. Factors to be considered during preparation of detailed estimate, Specification, Quantity availability of material, Location of site, Labour Component. 2.2 Steps in preparing detailed estimate. Taking out quantities, squaring, abstracting. 2.4 Preparing check list – by adoption of Sequence of execution. drafting Brief Specification of items, contents of measurement Sheet , Abstract sheet , face sheet	**04**	**06**
Unit – 3	**Mode of Measurements**. 3.1 General Rules for fixing units of Measurements for different – items of work as per IS 1200 & As per PWD Hand Book 3.2 Desired accuracy in taking measurements of various items of work & rules for deductions as per IS 1200 & P.W.D. handbook.	**06**	**09**
Unit – 4	Procedure for Preparing Detailed Estimate 4.1 Procedure for taking out quantities for various items of works by P.W.D & IS 1200 for:- a) Load bearing Structure –Long Wall and short wall method , Center line method . b) Framed Structure building. -- - By using thumb rules for reinforcement quantity calculation - By preparing bar bending Schedule 4.2 Provisions in detailed estimate for contingencies, work charged establishment, Provisional items, Provisional Sum, Provision for water Supply & Sanitary works, Electrical wiring & installations, centage charges, Tools & Plants, Prime cost, Day work.	**14**	**22**

Unit – 5	**Rate analysis** 5.1 Meaning of term Rate analysis –Factors affecting rate analysis, lead, lift, task work, materials and labour component, Market Rate and labour rate. 5.2 Transportation of Materials, load factor for different materials. Standard lead , extra lead, Transportation Charges , Labour - Categories of labours, labour rates, overheads , contractor's profit, water charges, taking out quantities of materials for different items of works. 5.3 Preparing rate analysis of different items of work 5.4 Standard Schedule of rates, full rates & labour rates. Taking out quantities of work for different Civil Engineering Works Roads, Dam , Canals ,Railway embankments, methods of mean area , mid sectional area, trapezoidal, Prismoidal formula. Calculation of quantity of earth work.	**18**	**25**
	Total	**48**	**70**

Text / Reference Books:-

Titles of the Book	**Name of Authors**	**Name of the Publisher**
Estimating & costing in Civil Engineering	B.N. Datta	UBS Publishers Distributors Pvt Ltd New Delhi
Estimating & costing, Specification and Valuation in Civil Engineering	M. Chakraborti	M. Chakraborti , Calcutta
Estimating & costing	S.C. Rangwala	Charotar Publication, Anand
Civil Engineering Estimating, Contracts and accounts Vol . I	B.S. Patil	Orient Longman, Mumbai
Estimating & costing	G. S. Birdie	Dhanpat Rai and Sons Delhi
Estimating and Costing	R.S. Majumdar	Foundation Publishing

HIGHWAY ENGINEERING
(CIVIL ENGINEERING GROUP)

Subject Code	Theory						Credits
1615504	No. of Periods Per Week			Full Marks	:	100	04
	L	T	P/S	ESE	:	70	
	04	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS: THEORY

Name of the Topic		Hrs/week	Marks
Unit -1	**Road Engineering** : 1.1 Importance of road in India. 1.2 Classification of roads according to Nagpur plan (Location and function), and third road development plan. Traffic and tonnage, 1.3 Classification of urban roads.	**03**	**04**
Unit -2	**Investigation for Road Project** 2.1 Reconnaissance survey, Preliminary survey and Location survey for a road project. 2.2 Detailed survey for cross drainage- L-section and C/S sections. 2.3 Fixing the alignment of road, factors affecting alignment of road. 2.4 Drawings required for road project- Key map, Index map, Preliminary survey plan and detailed location survey plan, L-section and C/S sections cross drainage work, land acquisition plan. 2.5 Survey for availability of construction material, location plan of quarries.	**03**	**04**
Unit – 3	**Geometric Design Of Highways** 3.1 Camber- definition, purpose, types, IRC – specifications. 3.2 Kerbs, road margin, road formation, right of way. 3.3 Design speed- IRC – specifications 3.4 Gradient – definition, types, IRC specification. 3.5 Sight distances– definition, types, IRC specification. 3.6 Curves–Necessity, types– horizontal, vertical and transition curves. 3.7 Widening of roads on curves. 3.8 Super Elevation – definition, formula for calculating super elevation, minimum and maximum values of super elevation, and methods of providing super elevation. 3.9 Sketching of standard C/S of national highway in embankment and cutting. 3.10 Simple problems on geometric design of road.	**12**	**18**

Unit – 4	**Construction of Roads Pavements and materials** 4.1 Types of road materials and Tests – soil, aggregates, bitumen, Cement Concrete. Test on soil sub grade- C.B.R. test, Test on Aggregate – Los Angeles abrasion, impact, and shape test. Tests on bitumen- Penetration, Ductility and Softening point test. 4.2 Pavement – objective of pavement, structure of pavement, function of pavement components, types of pavement. 4.3 Construction of earthen road – general terms used- borrows pits, spoil bank, lead and lift, balancing of earthwork. Construction procedure. 4.4 Soil stabilized roads – necessity, methods of soil stabilization, brief details of mechanical soil stabilization. 4.5 Water bound macadam roads – materials used, size and grading of aggregates and screening, construction procedure including precautions in rolling. 4.6 Construction of bituminous roads. Terms used–bitumen, asphalt, emulsion, cutback, tar, common grades adopted for construction. Types of bituminous surface – prime coat, tack coat, seal coat, Surface dressing – procedure of construction bituminous penetration macadam, and Bitumen/Tar carpets – procedure of construction. 4.7 Cement concrete pavements- Construction procedure and equipments, Construction joints, joint filler, joint sealer.	**14**	**18**
Unit – 5	**Traffic Engineering** 5.1 Traffic volume study, 5.2 Traffic control devices-road signs, marking, Signals, Traffic island. 5.3 Road intersections- intersections at grade and grade separator intersections. 5.4 Road accident. Building code IS:1904 5.5 Definition of active earth pressure and passive earth pressure, structures subjected to earth pressure in the field	**06**	**10**
Unit – 6	**Hill Roads** 6.1 Parts and functions of hill road components, types of curves, Hill road formation. 6.2 Land slides- causes and prevention. 6.3 Structures- drainage structures.	**04**	**06**
Unit – 7	**Drainage of Roads** 7.1 Surface drainage – side gutter, catch water drains, surface drainage. 7.2 Sub-surface drainage –Longitudinal drains and cross drains.	**03**	**05**
Unit – 8	**Maintenance and Repairs of Roads** 8.1 Necessity of maintenance of roads 8.2 Classification of maintenance operation – ordinary, routine and periodic maintenance. 8.3 Maintenance of W.B.M., bituminous and cement concrete roads.	**03**	**05**
	Total	**48**	**70**

Text/ Reference Books:-		
Titles of the Book	**Name of Authors**	**Name of the Publisher**
Highway Engineering	Khanna & Justo	Khanna Publication
Traffic Engineering	L.R. Kadiyali	--
Transportation Engineering	N.L. Arora, S.P. Luthara	I.P.H. New Delhi
Transportation Engineering	Vazarani & Chandola	Khanna Publication
Road, Railway, Bridges	Biridi & Ahuja.	S.B.H.New Delhi
Transportation Engineering	Kamala.	T.M.H. New Delhi
DATA book of P.W. D.	Khanna & Justo	--
Highway Engineering	B.K. Mathur	Foundation Publishing

IRRIGATION ENGINEERING
(CIVIL ENGINEERING GROUP)

Subject Code	Theory						Credits
1615505	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS : THEORY

Name of the Topic		Hrs/week	Marks
Unit -1	**Introduction** Definition – Irrigation and irrigation engineering, advantages of irrigation, ill effects of over irrigation, types of irrigation project- purpose wise and administrative wise, Methods of irrigation.	04	04
Unit -2	**Hydrology** Definition of rainfall , rain gauge and rain gauge station , types of rain gauges (names only average annual rain fall and its calculation , definition of run of , factor affecting run off, calculation of run off by run of coefficient, inglis' formula , Stranges and Binnie's tables and curves. Maximum flood discharge and methods of calculation. Yeild and Dependable yield and methods of calculation.	08	06
Unit – 3	**Water Requirement Of Crops** Cropping seasons and crop in Maharashtra. Definition – Crop period, base period Duty & Delta , factors affecting Duty , relation between Duty Delta and base period Definition – CCA , GCA, IA, intensity of irrigation time factor capacity factor. Problems on water requirement and capacity of canal . Modified Penman method . Assessment of irrigation water.	08	08
Unit – 4	**Investigation And Reservoir Planning** Survey for irrigation project data collected for irrigation project. area capacity curve, silting of reservoir, rate of silting , factors affecting silting , methods to control levels and respective storage in reservoir . Fixing control levels.	06	08
Unit – 5	**Dams And Spillways** Types of dams – Earthen dams and Gravity dams (masonry and concrete) Comparison of earthen and gravity dams with respect to foundation, seepage, construction and maintenance Earthen Dams – Components and their function , typical cross section seepage through embankment and foundation seepage control though embankment and foundation . Methods of constructions, types of failure of earthen dams and remedial measures. Gravity Dams Theoretical and practical profile, typical cross section, drainage gallery, joint in gravity dam, high dam and low dam Spillways-Definition, function, location and components. Emergency and services, ogee spillway and bar type spillway, discharge over spillway. Spillway with and without gates.	14	18
Unit – 6	**Bandhara , Precolation Tanks And Lift Irrigation** Advantages and disadvantages of bandharairrigation layout and component parts, solid and open bandhara. Percolation Tanks – necessity and importance, selection of site. Layout of lift irrigation scheme. Irrigation department standard design and specification.	04	06

Unit – 7	**Divertion Head Works** Weirs – components parts, function and types, layout of diversion head works with its components and their function, canal head regulator, silt excluders and slit ejectors. Barrages – components and their function. Difference between weir and barrage irrigation department standard design and specifications.	**10**	**10**
Unit – 8	**Canals** CANALS – classification of canals according to alignment and position in the canal network. Design of most economical canal section. Canal lining – Definition, purpose, types of canal lining advantages of canal lining properties of good canal lining material. CD. works- different C.D. works, canal falls, escapes, cross regulators and canal outlets.	**10**	**10**
	Total	**64**	**70**

Text/ Reference Books:-

Titles of the Book	Name of Authors	Name of the Publisher
Irrigation and hydraulic structure	S. K. Garg	Khanna publisher, New Delhi
Irrigation Engineering	B.C.punmia	Laxmi Publication, Delhi
Irrigation Engineering	Deepak Verma	Foundation Publishing

THEORY OF STRUCTURE LAB
(CIVIL ENGGINGERING GROUP)

Subject Code	Practical						Credits
1615506	No. of Periods Per Week			Full Marks	:	50	01
	L	T	P/S	ESE	:	50	
	—	—	02	Internal	:	15	
	—	—	—	External	:	35	

CONTENTS : PRACTICAL

LIST OF PRACTICALS - (ANY SIX):-

1.	To Verify Strain in an externally loaded beam with the help of a strain gauge indicater and to verify theoretically.
2.	To study behavior of different types of Calumns: (i) Both ends fixed (ii) One end fixed and other Pinned (iii) Both ends pinned (iv) One end fixed and other free.
3.	To find Euler's buckling load for different types of Columns : (i) Both ends fixed (ii) One end fixed and other pinned. (ii) Both ends pinned (iv) One end fixed and other free.
4.	To Study two hinged arch for the horizontal displacement of the roller end for a given system of loading and to compare the same with those obtained analytically.
5.	Determination of Shear force and loading.
6.	Compression test on metal.
7.	Determination of deflection of beam.
8.	Determination of moment of Inertia of fly wheel.

DESIGN OF STEEL STRUCTURE LAB
(CIVIL ENGGINGERING GROUP)

Subject Code 1615507	Practical						Credits
	No. of Periods Per Week			Full Marks	:	50	01
	L	T	P/S	ESE	:	50	
	—	—	02	Internal	:	15	
	—	—	—	External	:	35	

CONTENTS : PRACTICAL

PRACTICAL SHALL CONSISTS OF SKETCH BOOK AND DESIGN REPORT OF STEEL ROOF TRUSS FOR AN INDUSTRIAL BUILDING, TWO FULL IMPERIAL SIZE SHEET SHALL BE USED FOR DRAWINGS.

1. **Sketch Book:**

   Sketch book shall consists of any five plates out of the below mentioned

   1. Typical sketches of sections of tension member, determination of net effective cross sectional area of tension member for angle section.
   2. Typical sketches of sections of compression member, determination of effective length for different end conditions.
   3. Type of trusses for different spans.
   4. Riveted and welded connections for axially loaded member.
   5. Column section and slab base
   6. Important information of clauses of IS800-1984 and IS875 (Part-1,2 & 3)

2. **Design of Steel roof truss:**

   The student should draw two full imperial size sheets covering design of steel roof truss any one of the truss fink, fan, pratt, lattice truss for Span from 8 to 16 meter the design shall cover calculations for the dead load, live load, wind load with design of the various elements. The drawing shall include detailing the truss for below mentioned elements.

   a. Architectural drawing
   b. Data for structural design
   c. Key plan at tie level
   d. Detailed layout of steel roof truss.
   e. Details at end support.

2. Is Codes :

1. IS 800-1984 Indian Standard code of practice for use of structural steel in general building construction, BIS New Delhi.
2. IS-875 Part-1, 2, & 3- 1987 Indian Standard code of practice for use of structural steel in general building construction, BIS New Delhi.
3. IS hand book No. 1 Properties of structural steel rolled section
4. Steel table.

IRRIGATION ENGINEERING LAB
(CIVIL ENGGINGERING GROUP)

Subject Code	Practical						Credits
1615508	No. of Periods Per Week			Full Marks	:	50	01
	L	T	P/S	ESE	:	50	
	—	—	02	Internal	:	15	
	—	—	—	External	:	35	

CONTENTS: PRACTICAL

Data should be collected from irrigation engineering department or irrigation project and processed accordingly.

1. Collection of information and prepare list of documents and drawings required for irrigation project.
2. Calculation of yield from given Tope sheet of a catchment area, plotting catchment area, determination of catchment area by planimeter.
3. Canal capacity calculation from a given command area and cropping pattern.
4. Plotting of area capacity curve of a given contour map of irrigation project
5. From a given data fixation of control levels of reservoir.
6. Layout of drainage in earthen dam on A4 size plate
7. Neat labeled sketch of ogee spillway with gate and energy dissipation arrangement.
8. Study of National Water Policy.

PROFESSIONAL PRACTICES V-TW
(MECH.+CIVIL ENGINEERING GROUP)

Subject Code 1625509	Term Work						Credits
	No. of Periods Per Week			Full Marks	:	25	02
	L	T	P/S	Internal	:	07	
	—	—	04	External	:	18	

CONTENTS : TERM WORK

Name of the Topic		Hrs/week
Unit -1	**Structured industrial visits shall be arranged and report of the same should be submitted by the individual student, to form a part of the term work.** Following are the suggested type of Industries/ Fields –(Any three visits) vi) Irrigation project for observing components of dam and canal. vii) Steel structure for study of its details. viii) Residential apartment /public building to study plumbing system. ix) Hot mix plant	**18**
Unit -2	**The Guest Lecture/s from field/industry experts, professionals to be arranged (2 Hrs duration), minimum 2 nos. from the following or alike topics. The brief report to be submitted on the guest lecture by each student as a part of Term work.** a) Construction of highway, material of construction, machinery used and manpower requirement . b) To set up a small scale industry. c) Planning and design of irrigation project.	**10**
Unit – 3	**Information Search ,data collection and writing a report on the topic** a) Collecting an estimate from P.W.D. b) International Plumbing code and material specifications from market. c) Collecting market rates for material and labour for building items . d) Collecting D.S.R. /C.S.R. from PWD and its use for preparing revise estimate.	**14**
Unit – 4	The students should discuss in group of six to eight students and write a brief report on the same as a part of term work. The topic of group discussions may be selected by the faculty members. Some of the suggested topics are - i) Recent trends in civil engineering as a service industry. j) Waterproofing and leakage prevention. k) Troubleshooting in plumbing system. l) Causes of failure of road.	**18**
Unit – 5	**Seminar :** Seminar topic should be related to the subjects of fifth semester Each student shall submit a report of 5 to10 pages and deliver a seminar (Presentation time – 10 minutes)	**10**
	Total	**70**

ESTIMATING AND COSTING -TW
(CIVIL ENGGINGERING GROUP)

Subject Code	Term Work						Credits
1615510	No. of Periods Per Week			Full Marks	:	25	01
	L	T	P/S	Internal	:	07	
	—	—	02	External	:	18	

CONTENTS : TERM WORK

Term Work / Assignments:

Skills to be developed:

Intellectual Skills:

a. List various items of work with their units in a Civil Engineering Structure.
b. Calculate quantities of various items of work.
c. Prepare rate analysis.

List of Term Work / Assignments:

1) Prepare Check list of items of following type of Civil Engineering works.
   a) Load Bearing type Building
   b) Framed structure type building
   c) W.B.M.Road
   d) Septic Tank
   e) Community well
2) Writing the rules of deduction's for below mentioned items of work as per IS 1200.
   a) Brick / Stone masonry.
   b) Plastering / Pointing
3) Taking out quantities of various items of work for load bearing building.
   i) Earth work in excavation for foundation
   ii) Base Concrete of foundation
   iii) U.C.R./BB Masonry work in foundation and plinth.
   iv) D.P.C.
   v) Plinth Filling.
   vi) Brick work in masonry.
   vii) Flooring
   viii) Plastering.
   ix) Wood work in doors & windows
4) Taking out quantities of following items for small R.C.C. Hall
   i) Concreting for footing, Column, Beam, slab.
   ii) Reinforcement for above items by preparing Schedule of bars.
   iii) Form work for all above items.
5) Preparing detailed estimate of a RCC single & two storied residential building for all items of work. (The quantity of reinforcement shall be calculated by percentage.)
6) Preparing Rate analysis of following items:
   Building work – Brick work, P.C.C., R.C.C., Plastering, Flooring, Doors, Windows.
7) Taking out quantities of earth work for a Road profile prepared in surveying subject. Prepare the lead statement.
8) Taking out quantities of work for a Community well or Jack well or Septic Tank.
9) Taking out quantities of work for pipe culvert.

(Drawings shall be provided for the above exercises by subject teacher.)

2. Video Cassettes /CDS

MSBTE CAI Package.
Q. E. PRO software

3. IS/INTERNATIONAL CODES:

IS 1200- Method of Measurement of building and Civil engineering works

BUILDING SERVICES AND ENTREPRENEURSHIP DEVELOPMENT -TW
(CIVIL ENGINEERING GROUP)

Subject Code	Term Work						Credits
1615511	No. of Periods Per Week			Full Marks	:	25	02
	L	T	P/S	Internal	:	07	
	—	—	05	External	:	18	

CONTENTS : TERM WORK

	A: Building Services:	Hrs/week
Unit -1	**Plumbing** 1.1 **Elements of plumbing** Objectives of plumbing, purpose of plumbing, role of plumber, licensing of plumbers their functions, sewer Air, supply pipes, drainage & vent pipes application for obtaining supply connection. 1.2 **Pipes joints & fittings** Introduction. Types of Pipe – G.I. Pipes, PVC Pipes, Copper pipes, C.I. Pipes, A.C. Pipes, prestressed concrete pipes, joints in pipes, method of fixing pipes such as G.I. fitting C.I. fitting. 1.3 **Valves & Terminal Fittings** Types of valves & its purpose, sluice valve, reflux valve, scour valve, Air relief valve, pressure relief valve, gate valves, Bio-taps & stop valve self closing valve. Flush valve, mixing valve. 1.4 **Sanitary fixture & Building drainage system** Building sanitary fittings – water closet, flushingappliances, urinals, washbasins, flushing cisterns, principles of building drainage siphonic action, traps & its types. Capacity & sizing of pipe, soil pipe, waste pipe, rain water pipe, system of plumbing. Installation of pipes, testing of pipes.	**08**
Unit -2	**Water Proofing Treatment** Introduction, material required for water proofing and its specification. Water proofing of water closet and bath room procedure & Cross section. Terrace and basement water proofing, Precautions to be taken while water proofing.	**04**
Unit – 3	**Termite Proofing** Introduction, general principles of termite proofing. Methods of termite proofing. Material used in termite proofing treatment.	**02**
Unit – 4	**Damp Proofing** Sources of dampness & its effects. Material used for damp proofing, Methods of damp – proofing. Damp proofing treatment in building such as basement, floors, walls.	**02**
	Total	**16**

Term Work :

1. Term Work on joining P.V.C. / G.I. Pipes & fittings/Models and writing report on the process.
2. Term Work based on sanitary fitting like, traps, wash basin & water closet fittings.
3. Prepare drawing for water supply. Layout plan for campus showing following details service pipe, communication pipe. consumer pipe, water meter, rain water pipes
4. Prepare drawing for drainage line plan for campus showing following details: Inspection chambers, sewage pipes, traps, man holes.
5. Market survey for different materials available in market their trade names & rates used for water proofing, termite proofing and damp proofing treatment and writing report on the materials collected.

Part B : Entrepreneurship Development

S.No	Students will be able to:
1.	• Identify entrepreneurship opportunity.
2.	• Acquire entrepreneurial values and attitude.
3.	• Use the information to prepare project report for business venture.
4.	• Develop awareness about enterprise management.

	CONTENTS	Hrs/week
Unit -1	**Entrepreneurship, Creativity & Opportunities** 1.1) Concept, Classification & Characteristics of Entrepreneur 1.2) Creativity and Risk taking. 1.2.1) Concept of Creativity & Qualities of Creative person. 1.2.2) Risk Situation, Types of risk & risk takers. 1.3) Business Reforms. 1.3.1) Process of Liberalization. 1.3.2) Reform Policies. 1.3.3) Impact of Liberalization. 1.3.4) Emerging high growth areas. 1.4) Business Idea Methods and techniques to generate business idea. 1.5) Transforming Ideas in to opportunities transformation involves Assessment of idea &Feasibility of opportunity 1.6) SWOT Analysis	**03**
Unit -2	**Information and Support Systems** 2.1) **Information Needed and Their Sources**. Information related to project, Information related to support system, Information related to procedures and formalities 2.2) Support Systems 1) Small Scale Business Planning, Requirements. 2) Govt. & Institutional Agencies, Formalities 3) Statutory Requirements and Agencies.	**03**
Unit -3	**Market Assessment** 3.1) Marketing –Concept and Importance 3.2) Market Identification, Survey Key components 3.3) Market Assessment	**02**

Unit -4	**Business Finance & Accounts** **Business Finance** 4.1) Cost of Project 1) Sources of Finance 2) Assessment of working capital 3) Product costing 4) Profitability 5) Break Even Analysis 6) Financial Ratios and Significance **Business Account** 4.2) Accounting Principles, Methodology 1) Book Keeping 2) Financial Statements 3) Concept of Audit,	**03**
Unit -5	**Business Plan & Project Report** 5.1) Business plan steps involved from concept to commissioning: Activity Recourses, Time, Cost 5.2) **Project Report** 1) Meaning and Importance 2) Components of project report/profile **(Give list)** 5.3) **Project Appraisal** 1) Meaning and definition 2) Technical, Economic feasibility 3) Cost benefit Analysis	**03**
Unit -6	**Enterprise Management and Modern Trends** 6.1) Enterprise Management: - Essential roles of Entrepreneur in managing enterprise 2) Product Cycle: Concept And Importance 3) Probable Causes Of Sickness 4) Quality Assurance Importance of Quality, Importance of testing 6.2) E-Commerce Concept and process 6.3) Global Entrepreneur	**02**
	Total	**16**

Text/Reference Books:-		
Titles of the Book	**Name of Authors**	**Name of the Publisher**
Plumbing Design & Practice	S. Deolalikar	Sata M.C. Graw hill publishing company, New Delhi
Building services	Prof. S.M. Patil	Patil Publication & Goregaon, Mumbai.
Design & Practical Handbook on plumbing	S.R. Mohan & Vivek Anand	Standard Publishing, New Delhi.
A to Z of practical building and its management	Sandeep Mantri	Mantri Institute of Development & research, Pune.
Building Construction	Bindra & Arora	Dhanpat rai publishing
Building Construction	Rangwala	Charotor publishing House Anand
Building Services and Entrepreneurship Development	Rajiv Sinha	Foundation Publishing

2. IS / International Codes :

1. National Building Code – 1983, Bureau of Indian Standards, New Delhi.

Text/Reference books :-		
Titles of the Book	**Name of Authors**	**Name of the Publisher**
Entrepreneurship Development	E. Gorden K.Natrajan	Himalaya Publishing.
Entrepreneurship Development	Preferred by Colombo plan staff college for Technical education.	Tata Mc Graw Hill Publishing co. ltd. Delhi.
A Manual on How to Prepare a Project Report	J.B.Patel D.G.Allampally	EDI STUDY MATERIAL Ahmadabad (Near Village Bhat , Via Ahmadabad Airport & Indira Bridge), P.O. Bhat 382428 , Gujrat,India P.H. (079) 3969163, 3969153 E-mail : ediindia@sancharnet.in/olpe@ediindia .org Website : http://www.ediindia.org
A Manual on Business Opportunity Identification & Selection	J.B.Patel S.S.Modi	
National Directory of Entrepreneur Motivator & Resource Persons.	S.B.Sareen H. Anil Kumar	
New Initiatives in Entrepreneurship Education & Training	Gautam Jain Debmuni Gupta	
A Handbook of New Entrepreneurs	P.C.Jain	
Evaluation of Entrepreneurship	D.N.Awasthi , Jose Sebeastian	
Development Programmes		

The Seven Business Crisis & How to Beat Them.	V.G.Patel	
Entrepreneurship Development of Small Business Enterprises	Poornima M. Charantimath	Pearson Education, New Delhi
Entrepreneurship Development	--	McGraw Hill Publication
Entrepreneurship Theory and Practice	J.S. Saini B.S.Rathore	Wheeler Publisher New Delhi
Entrepreneurship Development		TTTI, Bhopal / Chandigadh

2) Video Cassettes

SUBJECT	SOURCE
Five success Stories of First Generation Entrepreneurs	EDI STUDY MATERIAL Ahmadabad (Near Village Bhat , Via Ahmadabad Airport & Indira Bridge), P.O. Bhat 382428 , Gujrat,India P.H. (079) 3969163, 3969153 E-mail : ediindia@sancharnet.in/olpe@ediindia.org Website : http://www.ediindia.org
Assessing Entrepreneurial Competencies	
Business Opportunity Selection and Guidance	
Planning for completion & Growth	
Problem solving-An Entrepreneur skill	

Glossary:
Industrial Terms:
Terms related to finance, materials, purchase, sales and taxes.

Components of Project Report:

1. Project Summary (One page summary of entire project)
2. Introduction (Promoters, Market Scope/ requirement)
3. Project Concept & Product (Details of product)
4. Promoters (Details of all Promoters- Qualifications, Experience, Financial strength)
5. Manufacturing Process & Technology
6. Plant & Machinery Required
7. Location & Infrastructure required
8. Manpower (Skilled, unskilled)
9. Raw materials, Consumables & Utilities
10. Working Capital Requirement (Assumptions, requirements)
11. Market (Survey, Demand & Supply)
12. Cost of Project, Source of Finance

STATE BOARD OF TECHNICAL EDUCATION, BIHAR

Scheme of Teaching and Examinations for

V SEMESTER DIPLOMA IN COMPUTER SCIENCE & ENGINEERING

(Effective from Session 2016-17 Batch)

THEORY

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME							Credits
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks (A)	Class Test(CT) Marks (B)	End Semester Exam. (ESE) Marks (C)	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	
1.	System Maintenance	1618501	03	03	10	20	70	100	28	40	03
2.	Data Communication & Networking	1618502	03	03	10	20	70	100	28	40	03
3.	Internet & Web Technology	1618503	03	03	10	20	70	100	28	40	03
4.	Software Engineering	1618504	03	03	10	20	70	100	28	40	03
5.	JAVA	1618505	03	03	10	20	70	100	28	40	03
		Total:- 15					**350**	**500**			

PRACTICAL

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME					Credits
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	
					Internal (A)	External (B)			
6.	Data Communication & Network Lab	1618506	06	03	15	35	50	20	02
7.	Internet & Web Technology Lab	1618507	06	03	15	35	50	20	02
8.	System Maintenance Lab	1618508	06	03	15	35	50	20	02
		Total:-	**18**				**150**		

TERM WORK

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME				Credits
			Periods per week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	
9.	In Plant Training & Visit to Works -TW	1618509	4 weeks continuous	30	70	100	40	03
	Total:-					**100**		
Total Periods per week Each of duration One Hours = **33**						**Total Marks = 750**		**24**

SYSTEM MAINTENANCE

Subject Code 1618501	Theory			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale & Objective:

Today, the computer has become a household thing. In order to understand the proper functioning of Computer System one need to get exposed to various hardware components in the computer system. This subject will expose the diploma students to understand the various hardware components and will teach them to troubleshoot the problems in these components.

S.No.	Topics	Periods
01	Hardware Organization of PC	(12)
02	Bus Standard and Architecture	(08)
03	HDD	(08)
04	Monitors	(10)
05	Printers	(10)
06	PC Installation	(12)
	Total:-	**(60)**

Contents : Theory		Hrs/week	Marks
Unit -1	**HARDWARE ORGANIZATION OF PC** 01.01 The Motherboard of PC 01.02 Memory Organization : BIOS, ROM, RAM etc.	**[12]**	
Unit -2	**BUS STANDARD AND ARCHITECTURE** 02.01 PC Bus-16 bit, 32 bit. 02.02 Slots-ISA, EIAS, PCI. 02.03 Ports-USB, Serial, Com	**[08]**	
Unit -3	**HDD** 03.01 Understanding types (IDE, SCSI, ESDI) 03.02 Connecting HDD.	**[08]**	
Unit -4	**MONITORS** 04.01 Type of monitors CCA, HGA, SVGA, PGA and their functions. 04.02 Troubleshooting.	**[10]**	
Unit -5	**PRINTERS** 05.01 Types of printers: Dot matrix, inkjet, Laserjet and their working.	**[10]**	
Unit--6	**PC INSTALLATION** 06.01 Installation of motherboard, peripheral devices and Operating System. 06.02 Troubleshooting : Diagnostic Software	**[12]**	
	Total-	**60**	

Books Recommended:

IBM PC Technical Manual -

Computer maintenance and repair - Schott Muller

Computer Architecture - Raffiquzzaman

Hardware and Software of PC, Willey Eastern Ltd., New Delhi. - S. K. Bose

Computer Installation and Trouble shooting, I.S.T.E. - M. Radhakrishnan and D. Balasubramaniam

DATA COMMUNICATION & NETWORK

Subject Code 1618502	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale:

This course will allow students to develop background knowledge as well as core expertise in data communications and networking, which is one of the fastest growing technologies in our culture today. It forms an integral part of the modern Information Technology. Starting from Intranet in small offices to the global Internet, principles of data communication and networking play an important role.

Objective:

At the end of the course, the students will be able to know:

- Evolution of data communication and networking up to the internet
- Principles of data communication, channel characteristics, signalling, modulation and encoding
- Various transmission media, their comparative study, fibre optics and wireless communication in details
- Categories and topologies of networks
- OSI model vis-à-vis TCP/IP architecture
- Multiplexing, channel error detection and correction, data link protocols
- Ethernet and token ring, X.25 ATM, BISDN
- Details of IP operations in the INTERNET and associated routing principles
- Operation of optical networks, satellite networks and wireless mobile systems
- Strategies for securing network application using cryptography
- Emerging technologies such as SONET, FDDI, mobile telephony etc.

S.No.	Topics	Periods
01	Fundamentals of Data Communications	(03)
02	Transmission Media	(05)
03	Data Modems	(04)
04	Multichannel Data Communication	(04)
05	Networking Fundamentals	(04)
06	OSI Model and TCP/IP Suite	(08)
07	Data Link Protocol	(04)
08	Local Area Network (LAN)	(04)
09	Wide Area Network (WAN)	(05)
10	Data Transmission Network	(04)
11	Wireless Communication	(03)
12	Security and Privacy	(02)
	Total	**(50)**

Contents : Theory		Hrs/week	Marks
Unit -1	**FUNDAMENTALS OF DATA COMMUNICATIONS** Introduction, Communication Systems, Signal and data, Channel Characteristics, Transmission modes, Synchronous and asynchronous transmission.	**[03]**	
Unit -2	**TRANSMISSION MEDIA** Guided Media: - Twisted pair - Co-axial cable - Optical fibre Unguided Media - Radio, VHF, Mircrowave, Satellite Infrared Transmission	**[05]**	
Unit -3	**DATA MODEMS** Concept of Modulation, Pulse Code Modulation (PCM), Shift Keying (ASK, FSK, PSK)	**[04]**	
Unit -4	**MULTICHANNEL DATA COMMUNICATION** Circuits, channels and multi channeling, Multiplexing (FDM, TDM, WDM).	**[04]**	
Unit -5	**NETWORKING FUNDAMENTALS** An overview of networking Switching techniques: - Circuit Switching - Packet Switching - Message Switching Network Topologies: - Bus Topologies Ring Topologies: Star Topologies:	**[04]**	
Unit--6	**OSI MODEL AND TCP/IP SUITE** Network architectures, Layering the communication process, The need for layered solutions, Open Systems Interconnection (OSI) model, TCP/IP Model, Introduction to Protocol TCP/IP, UDP, FTP.	**[08]**	
Unit--7	**DATA LINK PROTOCOL** Protocol, Transmission Control Procedure: - Synchronous Protocols - Asynchronous Data Link Control (DLC) Protocols Character Oriented Protocols (COP): Bit Oriented Protocols (BOP): Synchronous Data Link Control Protocol (SDLC) High Level Data Control Protocol (HDLC)	**[04]**	
Unit--8	**LOCAL AREA NETWORK (LAN)** Baseband versus Broadband, Media Access Control, LAN hardware, LAN operating systems Extending LAN: Fibre Optic Extension, Repeaters, Bridges, Router, Gateways, Switches Hubs, Virtual LANs	**[04]**	
Unit--9	**WIDE AREA NETWORK (WAN)** Router Concepts: - Forwarding Function - Filtering Function Routing Method - Static and Dynamic routing	**[05]**	

Unit--10	**LOCAL AREA NETWORK (LAN)** Telephone Networks: - Dial up Telephone Networks - Leased Line - X.25 The Integrated Services Digital Network (ISDN): - Narrow band ISDN - Broadband ISDN Service Frame Relay, Cell Relay	**[04]**	
Unit--11	**WIRELESS COMMUNICATION** Cellular Radio, Telephony (GSM), VSAT	**[03]**	
Unit--12	**SECURITY AND PRIVACY** Network Security, Firewall, VPN	**[02]**	
	Total	**50**	

Books Recommended:

Text Books

1. Data Communication and Networking, First Edition, 1999 - B. Forouzan Tata McGraw Hill
2. Data and Communication, Sixth Edition, 2002 - W. Stallings Prentice Hall of India
3. Wireless and Mobile Network Architecture, 2001 - Lin and Chlatmtac John Wile and Sons, India

Reference Books

1. Computer Networks, Fourth Edition, 2002 - A.S. Tanenbaum Pearson Education
2. Communication Networks, First Edition, 2000 - A. Leon-Gracia and I Widjaja Tata McGraw Hill
3. An Engineering Approach to Computer Networking, 1999 - S. Keshav Addison Wesley
4. Understanding Data Communication and Networks, Second Edition, 1999 - William A. Shay Brook Cole Publishing Company
5. Local Area Networks, 1997 - C.E. Keiser Tata McGraw Hill

INTERNET AND WEB TECHNOLOGY

Subject Code 1618503	Theory			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale & Objective:

Internet is the easiest and fastest way of communication. The use of Internet can be easily seen in our day to day life, be it sending a mail or looking for same information, its importance can't be overruled. This subject exposes the diploma students to basic networking technology and the Internet technology. IT will teach the students, the Internet technology and different features available on the Internet.

S.No.	Topics	Periods
01	Review of Network concepts.	(08)
02	IP Addressing	(09)
03	IP Datagram	(09)
04	TCP	(09)
05	Domain Name System	(07)
06	E-mail and File transfer	(10)
07	World Wide Web (WWW)	(08)
	Total:-	**(60)**

Contents : Theory		Hrs/week	Marks
Unit -1	**REVIEW OF NETWORK CONCEPTS** 01.01 Introduction to Networking 01.02 Network Topology, Interconnecting devices: (Repeaters, Bridges, Switches, Router, Gateway, Hub) 01.03 Introduction to Wi-Fi and Bluetooth 01.04 OSI Stack and TCP/IP model.	[08]	
Unit -2	**IP ADDRESSING** 02.01 Scheme. 02.02 Hierarchy Classes. 02.03 Division of Address space. 02.04 Special Address.	[09]	
Unit -3	**IP DATAGRAM** 03.01 Header. 03.02 Virtual Packet. 03.03 Routing Tables. 03.04 Error detection and correction. 03.05 Ethernet , Fast Ethernet and Gigabit Ethernet, Comparison between IPV4 and IPV6	[09]	
Unit -4	**TCP** 04.01 Segment Format of TCP 04.02 Three way handshake 04.03 Congestion control.	[09]	
Unit -5	**DOMAIN NAME SYSTEM** 05.01 Structure 05.02 DNS client, server model 05.03 Hierarchy Multiple Server 05.04 Resolving a Name.	[07]	

Unit--6	**E-MAIL AND FILE TRANSFER** 06.01 SMTP 06.02 Mail Transfer 06.03 Dial up and POP 06.04 FTP general model and user interface. 06.05 File name translation and Network file system.	[10]	
Unit--7	**WORLD WIDE WEB (WWW):** 07.01 Interface. 07.02 Hypertext 07.03 Hypermedia. 07.04 HTML format and representation. 07.05 Embedding graphics and images. 07.06 HTTP.	[08]	
	Total	**60**	

Books Recommended:

1. Network Theory - A. Tanaunbomb
2. HTML-4 for world wide web, Wesley (Singapore) Pvt., New Delhi. - Castro Addison
3. Using the world wide web, Prentice Hall of India Pvt., New Delhi - Wall
4. Internet for everyone, Vikas Publishing House Pvt. Ltd., New Delhi. - Alexis Leon and Mathew Leon
5. HTML 4.0 Unlashed, Tech Media Publication - Rick Dranell
6. Teach yourself HTML 4.0 with XML, DHTML and Java Script, IDG Books India Pvt. Ltd., New Delhi - Stephanie, Cottrell, Bryant

SOFTWARE ENGINEERING

Subject Code 1618504	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale & Objective:

S.No.	Topics	Periods
01	Software Engineering Concepts	(04)
02	Software Life Cycle Models	(08)
03	Software Requirements Analysis and Design	(10)
04	Programming Tools and Standards	(08)
05	Testing and Maintenance	(10)
06	Software Project Management	(10)
		(50)

Contents : Theory		Hrs/week	Marks
Unit -1	**SOFTWARE ENGINEERING CONCEPTS** 01.01 Categories and characteristics of software systems 01.02 Attributes of a good software product 01.03 Software Engineering (SE) principles and their role in software system design	[04]	
Unit -2	**SOFTWARE LIFE CYCLE MODELS** 02.01 Classical life cycle, iterative waterfall model, spiral model, comparison of different models	[08]	
Unit -3	**SOFTWARE REQUIREMENTS ANALYSIS AND DESIGN** 03.01 Need and preparation of Software requirements. 03.02 Design concepts and notations; high level and low level design; modularization techniques; structured and object-oriented design; attributes of good requirement specifications and design.	[10]	
Unit -4	**PROGRAMMING TOOLS AND STANDARDS** 04.01 Procedural and nonprocedural languages.. 04.02 Coding standards and guidelines.	[08]	
Unit -5	**TESTING AND MAINTENANCE** 05.01 Introduction to verification and validation methods. 05.02 Debugging and testing strategies. 05.03 Black box and white box testing of software systems 05.04 Software maintenance, configuration management.	[10]	
Unit--6	**Software Project Management** 06.01 Project size and its categories 06.02 Planning and estimations 06.03 Gantt and PERT charts; software measures: LOC, function point and COCOMO models	[10]	
	Total	**50**	

Books Recommended:

1. Software Engineering - R.S. Pressman McGraw Hill International Edition
2. Software Engineering, 1996 - Ghezzi C.et al Prentice Hall of India
3. Software Engineering - Pankaj Jalote, Narosa Publication

JAVA

Subject Code 1618505	Theory			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale:

This course is designed to impart knowledge and skills required to solve the real world problems using object-oriented approach utilizing Java language constructs. This course covers the subject in two parts, viz, Java Language and Java Library.

Objective:

After completion of the course students is expected to understand the following:

- Java tokens for creating expressions and creating datatypes.
- The way various expression and data types are assembled in packages.
- Implementation of Inheritance, Exception handling and Multithreading in Java.
- Java I/O basics and Applets.
- Setting up GUI using AWT/ Swing.
- Network Programming in Java.
- Accessing relational databases from Java Programmes.

Contents : Theory			Hrs/week	Marks
UNIT-1	**THE JAVA LANGUAGE:**		**[50]**	
	01.01	Introduction to Java	[02]	
	01.01.01	An overview of JAVA, JAVA Applets and Applications.		
	01.01.02	Difference between Java Script and JAVA.		
	01.01.03	Object Oriented programming features.		
	01.02	Data types, Variable & Arrays	[04]	
	01.02.01	Java Token & Keywords		
	01.02.02	Integers types, Floating point types		
	01.02.03	The JAVA class libraries		
	01.02.04	Declaring a variable, Dynamic initialization		
	01.02.05	The scope and lifetime of variable		
	01.02.06	Type conversion and casting		
	01.02.07	Arrays: - One-dimensional arrays - Multi-dimensional arrays	[06]	
	01.02.08	Alternative array declaration syntax		
	01.03	Operators	[04]	
	01.03.01	Arithmetic operations		
	01.03.02	The Bitwise operators		
	01.03.03	Relational operators		
	01.03.04	Boolean logical operators		
	01.03.05	The assignment operator		
	01.03.06	The ? Operator		

	01.03.07	Operator precedence		
	01.04	Control Statements	[06]	
	01.04.01	Selection statements		
	01.04.02	Iteration statements		
	01.05	Introduction Classes and objects	[08]	
	01.05.01	Class fundamentals		
	01.05.02	Declaring objects, Assigning object reference variables		
	01.05.03	Introducing methods		
	01.05.04	Constructors		
	01.05.05	Garbage Collection		
	01.05.06	A stack class, overloading constructors		
	01.05.07	Using objects as parameters, argument passing		
	01.05.08	Returning objects, Recursion		
	01.06	Inheritance	[06]	
	01.06.01	Inheritance basics, member access and inheritance		
	01.06.02	Using class, creating a multilevel hierarchy		
	01.06.03	Method overriding, dynamic method dispatch		
	01.06.04	Using abstract classes, using final with inheritance, the object class		
	01.07	Packages and Interfaces	[04]	
	01.07.01	Packages: Defining a package, understanding class path, importing packages.		
	01.07.02	Interfaces: Defining an interface,		
	01.08	Exception handling	[04]	
	01.08.01	Exception handling fundamentals		
	01.08.02	Exception types, uncaught exceptions, using try and catch		
	01.09	Multithreaded Programming	[02]	
	01.09.01	The JAVA thread model, The main thread, creating a thread		
	01.09.02	Alive ( ) and Joint ( ), Suspend ( ) and Resume ( ), Thread priorities.		
	01.10	I/O, Applets and Other Topics	[04]	
	01.10.01	I/O Basics: Streams, The stream classes, The predefined streams, Reading console input, Writing console output, Reading and Writing files.		
	01.10.02	Applet fundamentals		
UNIT-2	**<u>THE JAVA LIBRARY</u>:**		**[10]**	
	02.01	String Handling	[02]	
	02.01.01	The string constructor, Special string operations		

	02.02	Exploring JAVA Lang	[02]	
	02.02.01	Simple type wrappers, Runtime memory management		
	02.02.02	Array Copy, Object, Clone ( ) and the cloneable interface.		
	02.02.03	Class & class loader		
	02.03	The Utility Classes	[02]	
	02.03.01	The enumeration interface, Vector & Stack		
	02.03.02	Dictionary, Hash-table, string tokenizer		
	02.03.03	Bitset		
	02.03.04	Date: Date Comparison, String and time zones		
	02.03.05	Random, Observer interface		
	02.04	Input/ Output - Exploring JAVA I/O	[04]	
	02.04.01	The JAVA I/O classes and interface		
	02.04.02	File Namefilter & Directories		
	02.04.03	I/O stream classes: File input stream, file output stream, Byte array input stream, Byte array output stream, Filtered streams		
	02.04.04	Buffered streams: Buffered input stream, Buffered output stream, Pushback input stream, Sequence input stream		
		Total	**60**	

Books Recommended:-

Text Books:-

1.	The Complete Reference - Java2, Fourth Edition, 2001	-	H. Schildt, Tata McGraw Hill
2.	Java: How to Program Java 2, Second Edition, 2001	-	Dietal and Dietel, Pearson Education

Reference Books:-

1.	Java Examples in a Nutshell, Third Edition, 2001	-	D. Hanagan 'O' Reilly
2.	A Programmers Guide to Java Certification, First Edition, 1999	-	K. Mughal and R.W. Rasmuessen Pearson Education Comprehensive Primer Publication
3.	Java Foundation Classes	-	M.T. Nelson, Tata McGraw Hill

DATA COMMUNICATION & NETWORK LAB

Subject Code 1618506	Practical			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	06	Internal	:	15	
				External	:	35	

Rationale & Objective:

List of Experiments:

	Contents : Practical	Hrs/week	Marks
Unit -1	Consider a PCM system in which 24 signals are to be time-multiplexed. Each signal has a bandwidth from 400 to 3.4 KHz the sampling rate is 33.33% higher than the theoretical minimum, and 8 bits are used for each sample. Determine the output bit rate.		
Unit -2	A very heavily loaded 1-km-long 10-Mbps token ring has a propagation speed of 200m/ usec. Fifty stations are uniformly spaced around the ring. Data frames and are thus included as spare bits within the data frames and are effectively free. The token is 8 bits. Calculate the effective data rate of the ring.		
Unit -3	Explain the steps involved in computing the checksum for a given message frame, and hence find the complete frame bit pattern for the data given below: Data polynomial D(x) = 1101011011 Generator polynomial G(x) = $x^4 + x + 1$		
Unit -4	Write a program to simulate the operation of a token ring with no priorities. Take into account the walk time between stations and the time required to drain the ring before regenerating the token. Now change the simulator to allow stations to regenerate the token as soon as they are done transmitting, without waiting to drain the ring.		
Unit -5	Configure a machine to assign an IP address to it and also put a suitable subnet mask.		
Unit -6	Connect two machines to a hub and ping one machine from the other. Now change the subnet masks of the machines and see the effects.		
Unit -7	Connect a client to a server via a hub and telnet to log in to the server.		
Unit -8	Connect two machines to two different hubs and connect the hubs to a switch. Connect a server to the switch and telnet to the server from the machines.		

INTERNET AND WEB TECHNOLOGY LAB

Subject Code 1618507	Practical			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	06	Internal	:	15	
				External	:	35	

Rationale & Objective:

Internet is a great source of information and communication in present world. This course will allow student to explore basics of Internet. The students are expected to create web pages and to connect them, using features available in HTML and DHTML. This course allows students to study more about the web browsers present in present market and to compose them with this course the diploma student is expected to learn more about Internet and web technologies.

List of Experiments:

Contents : Practical		Hrs/week	Marks
Unit -1	Introduction of basic commands of HTML.	(06)	
Unit -2	To create a web page using basic feature of HTML.	(06)	
Unit -3	To create two web pages and connect them using functions available in HTML.	(06)	
Unit -4	To add pictures in a web page, changing in a web page, changing size and alignment of picture using HTML.	(04)	
Unit -5	Using the internet- Studying the basic features of web pages.	(06)	
Unit -6	To understand the differences and features available in different web browsers.	(04)	
Unit -7	Using the telnet to access the resources from the server.	(08)	
Unit -8	Creating web pages using Dynamic HTML and inter lunching them.	(08)	
Unit -9	Using Basics of Internet-Google search, E-mail etc., downloading files from Internet.	(06)	
Unit -10	Estimating Connection using dial up and troubleshooting the errors if any.	(06)	
	Total:-	**(60)**	

Books Recommended:

1. Network Theory - A. Tanaunbomb
2. HTML-4 for world wide web, Wesley (Singapore) Pvt., New Delhi. - Castro Addison
3. Using the world wide web, Prentice Hall of India Pvt., New Delhi - Wall
4. Internet for everyone, Vikas Publishing House Pvt. Ltd., New Delhi. - Alexis Leon and Mathew Leon
5. HTML 4.0 Unlashed, Tech Media Publication - Rick Dranell
6. Teach yourself HTML 4.0 with XML, DHTML and Java Script, IDG Books India Pvt. Ltd., New Delhi - Stephanie, Cottrell, Bryant

SYSTEM MAINTENANCE LAB

Subject Code 1618508	Practical			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	06	TA	:	15	
				CT	:	35	

Rationale & Objective:

This course will allow the students with hand on experience on various components of the computer system. The student can explore the PC and can learn to troubleshoot the problems and errors of any. The diploma students are expected to learn the basic of various component and there interconnection and troubleshooting, through this course.

List of Experiments:

Contents : Practical		Hrs/week	Marks
Unit -1	To identify various components, devices and section of PC	(04)	
Unit -2	To study motherboard, Intel Pentium IV Processor (Introduction)	(06)	
Unit -3	To interconnect the system with the video monitor, mouse, keyboard etc. and testing the operation of PC.	(04)	
Unit -4	To interconnect hard disk, and to connect Input / Output devices such as printers and TV tuner card and to install them.	(06)	
Unit -5	Study the bus system and various signal lines.	(04)	
Unit -6	Study of peripherals and their speed and capacity	(08)	
Unit -7	To install various operating systems such as Windows, Unix and Linux.	(12)	
Unit -8	To study the protection required for Windows and Linux Operating System.	(06)	
Unit -9	To study the various functions such as disk fragmentation and add/ remove hardware / software functions under Windows Operating System.	(06)	
Unit -10	To study the Burning process of CD under the latest version of any CD writing CD. Study exiting multi session disk etc.	(04)	
	Total:-	**(60)**	

Books Recommended:

1. IBM PC Technical Manual -
2. Computer maintenance and repair - Schott Muller
3. Computer Architecture - Raffiquzzaman
4. Hardware and Software of PC, Willey Eastern Ltd., New Delhi. - S. K. Bose
5. Computer Installation and Trouble shooting, I.S.T.E. - M. Radhakrishnan and D. Balasubramaniam

IN PLANT TRAINING AND VISIT TO WORKS - TW

Subject Code 1618509	Term Work			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	Internal	:	30	
	—	—	4 week Continues	External	:	70	

Rationale:

A student is required to develop a skill to synthesize his knowledge, skill and attitudes gained while going through different courses. So, it is essential to expose the students to the world of work to be familiar with the real life situations and understand the problem there in.

Objective:

So, "In plant training and visit to work" is introduced to place the students in actual work situations for stipulated period with the objectives:-

- To understand and conceptualize the subject based knowledge given in class room in the context of its application st work places.
- To develop understanding regarding the nature of activities, size and scale of operations & environments in which they are going to work.
- To understand how the technical, managerial, quality control, safety & other principles are being applied in real life situations.
- To know how a supervisor / technician perform day to day work and co-ordinate shop floor activities.
- To develop confidence amongst them to use and apply institute based knowledge and skills to solve practical problems in world of work.
- Develop interpersonal relationship, communication skill and positive attitudes.

CONTENTS

The industries / organisations for industrial training / visit should be decided by institute faculty in consultation with respective industrial establishment. It is necessary that each organization is visited will in advance and activities to be performed by students are well defined. The chosen activities should be of curricular interest to students and of professional value to industrial / field organizations. Efforts should be made to provide opportunities of task oriented or problem solving oriented to students. Students are to prepare report of work done by them.

The report should include the followings:-

Contents : Practical		Hrs/week	Marks
Unit -1	Introduction		
Unit -2	Types of industries.		
Unit -3	Location.		
Unit -4	Organisation Structure		
Unit -5	Technical Details.		
Unit -6	Marketing & Marketing Details.		
Unit -7	Man Power & its Management.		
Unit -8	Performance Details		

Unit -9	Future Programme		
Unit -10	Conclusion- - Observations - Typical Characteristics - Area of Weakness - Suggestions		
	Others-As introduced by faculty.		

It is advisable that the students may be assured both by Industry & Institute faculty. The suggested performance criteria for continuous assessment is given below:-

Activity		**Weightage in %**
Punctuality & Regularity	**-**	**10 %**
Initiative in learning / working at site	**-**	**05 %**
Level / proficiency of practical skills acquired	**-**	**20 %**
Sense of responsibility	**-**	**10 %**
Self Expression / Communication Skill	**-**	**10 %**
Interpersonal Skills / Human relations	**-**	**05 %**
Report Writing Skills	**-**	**25 %**
Viva Voice	**-**	**15 %**

STATE BOARD OF TECHNICAL EDUCATION, BIHAR

Scheme of Teaching and Examinations for

V SEMESTER DIPLOMA IN ELECTRONICS & COMMUNICATION ENGINEERING

(Effective from Session 2016-17 Batch)

THEORY

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME							Credits
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks (A)	Class Test(CT) Marks (B)	End Semester Exam. (ESE) Marks (C)	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	
1.	Microprocessor & Applications	1621501	03	03	10	20	70	100	28	40	03
2.	Electronics Measurement – II	1621502	04	03	10	20	70	100	28	40	03
3.	Radio & Telecommunication System	1621503	03	03	10	20	70	100	28	40	03
4.	Power Electronics	1621504	04	03	10	20	70	100	28	40	03
5.	Television Communication System	1638505	03	03	10	20	70	100	28	40	03
		Total:- 17					**350**	**500**			

PRACTICAL

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME					Credits
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	
					Internal (A)	External (B)			
6.	Radio & T.V. Engineering Lab.	1621506	06	04	15	35	50	20	03
7.	Digital Electronics & M.P. Lab.	1621507	06	04	15	35	50	20	02
		Total:-	**12**				**100**		

TERM WORK

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME				Credits
			Periods per week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	
8.	Power Electronics TW	1621508	04	15	35	50	20	02
9.	In plant training and Visit to Works -TW	1621509	4 weeks continuous	30	70	100	40	02
		Total:-	**04**			**150**		
Total Periods per week Each of duration one Hours		**=**	**33**			**Total Marks = 750**		**24**

MICROPROCESSOR & APPLICATION

Subject Code 1621501	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale :

Objective:

S.No.	Topics	Periods
01	Introduction 8085.	10
02	Microprocessor Software Concepts.	10
03	Peripheral Interfacing and Timers.	05
04	Assembly Language Programming.	05
05	A/D and D/A converters.	05
06	Introduction to Advanced Microprocessors (Intel 8086 & others)	10
07	Applications.	05
	Total :	**(50)**

Contents : Theory			Hrs/week	Marks
Unit-1	**INTRODUCTION 8085**		**(10)**	
	03.01	Architecture & Pin Diagram.		
	03.02	Chip Architecture.		
	03.03	Register Structure.		
	03.04	Memory Addressing.		
	03.05	8085 Addressing Modes.		
	03.06	8085 Instruction sets.		
	03.07	8085 Instruction timing and execution.		
	03.08	8085 Interrupt System.		
	03.09	8085 D M A.		
	03.10	8085 S I D & S O D lines.		
Unit-2	**MICROPROCESSOR SOFTWARE CONCEPTS**		**(10)**	
	04.01	Instruction formats.		
	04.02	Addressing Modes.		
	04.03	Instruction Types.		
	04.04	Data Transfer Instructions.		

	04.05	Arithmetic Instructions.		
	04.06	Logical Instructions.		
	04.07	Prog. Control Instructions.		
	04.08	Input / Output Instructions.		
	04.09	Introduction to assembly language programming.		
Unit-3.	**PERIPHERAL INTERFACING AND TIMERS**		**(05)**	
	05.01	Intel 8251, 8255, 8253 and 8259 chips.		
	05.02	555 Timers.		
Unit-4	**ASSEMBLY LANGUAGE PROGRAMMING**		**(05)**	
Unit-5	**A/D AND D/A CONVERTERS**		**(05)**	
	07.01	Successive apporox type A/D.		
	07.02	Counter type A/D.		
	07.03	Dual Slope Type A/D.		
	07.04	Sample and Hole Circuits A/D.		
Unit-6	**INTRODUCTION TO ADVANCED MICROPROCESSORS**			
	08.01	8085, 68000, Z800- Brief discussion of each		
	08.01.01	Architecture of Intel 8086		
	08.01.02	Instruction Set.		
	08.01.03	Addressing Modes.		
	08.01.04	Advanced features.		
	08.01.05	Stacks.		
Unit-7	**APPLICATIONS**		**(05)**	
	09.01	A few examples.		
		Total	**50**	

Books Recommended:

1. Digital Computer System - Malvino
2. Introduction to Microprocessor - Prof. B. Ram
3. Microprocessor Architecture - Gaonkar
4. Microprocessor and Microcomputer - Lui and Gibson

ELECTRONICS MEASUREMENT - II

Subject Code 1621502	Theory			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	04	—	—	TA	:	10	
				CT	:	20	

Rationale:

Objective:

S.No.	Topics	Periods
01	High Frequency Measurement.	(12)
02	Electronic Measurement.	(08)
03	Digital Measuring Instrument.	(10)
04	Instruments for Generation and Analysis of waves.	(06)
05	Transducers and Sensors.	(08)
06	Optical Measuring Instruments.	(06)
07	Data Acquisition System (DAS).	(10)
	Total:	**60**

Contents : Theory			Hrs/week	Marks
Unit-1	**HIGH FREQUENCY MEASUREMENT**		**[12]**	
	01.01	Introduction.		
	01.02	Resonance method.		
	01.03	Measurement of inductance by reactance variation method.		
	01.04	Measurement of capacitance by reactance variation method.		
	01.05	Measurement of effective resistance by variation method.		
	01.06	T Net work.		
	01.07	Parallel T network.		
	01.08	Bridge T network.		
	01.09	Q measurement.		
	01.10	Measurement of frequency.		
	01.11	Radio receiver characteristics measurement.		
	01.11.01	Sensitivity.		
	01.11.02	Selectivity.		
	01.11.03	Fidelity.		
	01.11.04	Noise figure.		
Unit-2	**ELECTRONIC MEASUREMENT**		**[08]**	
	02.01	Electronic voltmeters (average and peak reading) VTVM.		
	02.02	Rectifier-Amplifier and amplifier-rectifier type VTVM.		
	02.03	Transistor voltmeters.		

	02.04	Differential voltmeter.		
	02.05	Small current measurement.		
Unit-3.	**DIGITAL MEASURING INSTRUMENT**		**[10]**	
	03.01	Digital Vs. analog systems.		
	03.02	Diode matrix.		
	03.03	Digital display system.		
	03.04	Digital read out system.		
	03.05	Digital frequency meter.		
	03.06	Period measurement.		
	03.07	Time interval measurement.		
	03.08	Digital voltmeter: Introduction and types.		
	03.08.01	Potentiometer etc. type.		
Unit-4	**INSTRUMENTS FOR GENERATION AND ANALYSIS OF WAVES**		**[06]**	
	04.01	Basic oscillator circuit.		
	04.02	Pulse and square wave generator.		
	04.03	Signal/function generator.		
	04.04	Signal/function wave analyser.		
	04.05	Harmonic distortion anlyser.		
	04.06	Spectrum analyser.		
Unit-5	**TRANSDUCERS AND SENSORS**		**[08]**	
	05.01	Introduction and classification.		
	05.02	Electrical phenomenon employed in transducer.		
	05.03	Linear variable differential transformer.		
	05.04	Rotary variable reluctance transducer.		
	05.05	Variable reluctance transducer.		
	05.06	Synchros resolvers.		
	05.07	Strain gauges.		
	05.08.01	Wire wound.		
	05.08.02	Pirani gauge.		
	05.08.03	Semi Conductor types.		
	05.09.	Seismic accelerometer.		
	05.10.	Thermisters.		
	05.11	Microphones (different type of introduction only)		
Unit-6	**OPTICAL MEASURING INSTRUMENTS**		**[06]**	
	06.01	Black body.		
	06.02	Primary and secondary standards.		
	06.03	Measurement of lumen intensity.		

	06.04	Photo emissive cell.		
	06.05	Photo conductive cell.		
	06.06	Photo voltaic cell.		
Unit-7	**DATA ACQUISITION SYSTEM (DAS):**		**(10)**	
	07.01	Classification.		
	07.02	Components of analog DAS.		
	07.03	Components of digital DAS.		
	07.04	Uses of DAS.		
	07.05	Digital to analog converter.		
	07.06	Analog to digital converter.		
	07.07	Multiplexing equipment.		
		TOTAL	**60**	

Books Recommended:

1. Electronic Instrument and Measurement Techniques. - Cooper.
2. A Course in Elect. and Electronics Measurement - Sawhney.
3. Electrical and Electronics Measurement. - Golding.

RADIO & TELECOMMUNICATION SYSTEM

Subject Code 1621503	Theory			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale:

Objective:

S.No.	Topics	Periods
01	Elements of Communications.	(08)
02	Radio Receiver.	(06)
03	Propagation of Waves.	(08)
04	Antenna.	(06)
05	Radar and Navigation Aids.	(10)
06	Satellite Communication.	(06)
07	Analog Transmission.	(06)
08	Digital Transmission.	(04)
09	Switching.	(06)
	Total:	**(60)**

Contents : Theory			Hrs/week	Marks
Unit-1	**ELEMENTS OF COMMUNICATIONS:**		**[08]**	
	01.01	Principle of heterodyning.		
	01.02	Mixers.		
	01.03	Converters.		
	01.04	Radio Transmitters.		
	01.04.01	Block Diagram.		
	01.04.02	Operation and performance of AM and FM Transmitters.		
Unit-2	**RADIO RECEIVER:**		**[06]**	
	02.01	Block diagram of AM and FM Radio Receivers.		
	02.02	Principle of Operation.		
	02.03	Different stages i.e. R. F. Section, I F Stage, Local Oscilloator, mixer, tuning, band selection and switch, Volume Control.		
Unit-3	**PROPAGATION OF WAVES:**		**[08]**	
	03.01	Introduction to various modes of propagation.		
	03.02	Ground wave propagation.		
	03.03	Space wave propagation.		
	03.04	Tropospheric wave propagation.		
	03.05	Refraction by tropospheric wave.		
	03.06	Tilt of surface wave.		

	03.07	Sky wave propagation.		
	03.08	Ionospheric propagation.		
	03.08.01	Introduction.		
	03.08.02	Critical frequency.		
	03.08.03	Maximum usable frequency.		
	03.08.04	Characteristics of ionospher.		
	03.08.05	Virtual height.		
	03.08.06	SKIP distance.		
	03.08.07	Troppspheric scattering system.		
Unit-4	**ANTENNA:**		**[06]**	
	04.01	Introduction.		
	04.02	Radiation intensity.		
	04.03	Directivity.		
	04.04	Gain.		
	04.05	Field Pattern.		
	04.06	Phase Pattern.		
	04.07	General equation for field of a point source.		
	04.08	Introduction to working principle of- Helical, Biconical, Horn, lense, Long wire, Yagi type of Antennas.		
Unit-5	**RADAR AND NAVIGATION AIDS:**		**[10]**	
	05.01	Elements of RADAR System.		
	05.02	Radar Equation.		
	05.03	Radar transmitting system.		
	05.04	Radar antenna and scanning.		
	05.05	Duplexer.		
	05.06	Radar Receiver.		
	05.07	Moving Target Indicator. (MTI)		
	05.08	Radar range and beckons.		
	SATELLITE COMMUNICATION:		**[05]**	
	06.01	Introduction.		
	06.02	Need.		
	06.03	Low orbiting satellites.		
	06.04	Geo stationary satellite.		
	06.05	Choice of frequency bands.		
	06.06	Satellite broadcasting.		
	06.07	Remote sensing : basic principle.		
Unit-6	**ANALOG TRANSMISSION:**		**[04]**	
	07.01	DC signalling, AC signalling and Band Width, Transmission media, attenuators and repeaters, Modems.		

Unit-7	**DIGITAL TRANSMISSION:**		**[04]**	
	08.01	Digital Channels and PCM, Optical Fibre Transmission Systems, Integrated Services Digital Network (ISDN), ISDN Services & Applications, Broad Band Networks.		
Unit-8	**SWITCHING:**		**[06]**	
	09.01	Telephone Switching-Struggler : Switching Systems, Crossbar Switching, Electronic space, Division switching, Speech digitization and transmission, Time Division Switching, Optical Fibre Systems, Traffic Engg., Telephone Networks, Data Networks.		
		Total	**60**	

Books Recommended:

1. Electronic Communication System - Kennedy.
2. Radio Engineering - Chatterjee.
3. Telecommunications and the Computers, PHI. - James Martin.
4. Telecommunication Switching Systems & Networks, PHI. - T. Vishwanathan.

POWER ELECTRONICS

Subject Code 1621504	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	04	—	—	TA	:	10	
				CT	:	20	

Rationale:

Objective:

S.No.	Topics	Periods
01	Regulated Power Supply.	(05)
02	Large Signal Amplifier.	(08)
03	Thyristors.	(06)
04	Power Switching Devices and Triggering Circuits.	(06)
05	A C Power Control and Motor Speed Control.	(05)
06	Line Commutated Converters.	(04)
07	Inverters.	(06)
08	Choppers.	(06)
09	Speed Control of D. C. Motor.	(01)
10	Speed Control of A. C. Motor.	(03)
	Total:	**(50)**

Contents : Theory			Hrs/week	Marks
Unit-1	**REGULATED POWER SUPPLY:**		**[05]**	
	01.01	Series Regulators.		
	01.02	Shunt Regulators.		
	01.03	Over load and over voltage protection.		
	01.04	Switching mode regulators.		
Unit-2	**LARGE SIGNAL AMPLIFIER:**		**[08]**	
	02.01	Introduction.		
	02.02	Classification.		
	02.03	Class A, B, AB and C amplifier.		
	02.04	Harmonic Distortion.		
	02.05	Transformer Coupled Amplifier.		
	02.06	Push Pull Amplifier. (Class-B)		
	02.07	Cross over distortion and its elimination.		

Unit-3	**THYRISTORS:**		**[06]**	
	03.01	Thyristor family, symbol and working.		
	03.02	Silicon controlled rectifier operation.		
	03.03	SCR characteristics.		
	03.04	Two transistor analogy.		
	03.05	Methods of turning on.		
	03.06	Turn off mechanism.		
	03.07	Device ratings.		
	03.08	Series and Parallel operation of SCR.		
Unit-4	**POWER SWITCHING DEVICES AND TRIGGERING CIRCUITS:**		**[06]**	
	04.01	Diac.		
	04.02	Triac.		
	04.03	U J T.		
	04.04	Relaxation Oscillator.		
	04.05	Use of Diac and Triac.		
	04.06	Resistance turn on circuit.		
	04.07	R C turn on circuit.		
Unit-5	**A C POWER CONTROL AND MOTOR SPEED CONTROL:**		**[05]**	
	05.01	Phase control.		
	05.02	Full wave control circuit.		
	05.03	Half controlled bridge circuit.		
	05.04	Dual Converters.		
Unit-6	**LINE COMMUTED CONVERTERS:**		**[04]**	
	06.01	Line commuted circuit.		
	06.02	Effect of source impedance.		
	06.03	Inverter operation.		
Unit-7	**INVERTERS:**		**[06]**	
	07.01	Forced commutation inverters.		
	07.02	Classification of forced commutation.		
	07.03	Parallel inverter.		
	07.04	Self commutated inverter.		
	07.05	Bridge inverter single and three phase.		

Unit-8	**CHOPPERS:**		**[06]**	
	08.01	On off control.		
	08.02	Rotor on off control chopper circuit.		
	08.03	Improved on off circuits.		
	08.04	Step up chopper circuit.		
	08.05	Multi phase circuit.		
	08.06	Two quadrant Choppers.		
	08.07	A C Choppers.		
Unit-9	**SPEED CONTROL OF D. C. MOTOR.**		**[01]**	
Unit-10	**SPEED CONTROL OF A. C. MOTOR.**		**[03]**	
		Total	**50**	

Books Recommended:

1. SCR - Gentry and Others.
2. Thyristor and Their Application - Ramamoorthy.
3. SCR - P. C. Sen.
4. SCR Mannual - Gen. Electric Co.
5. SCR - Sugandhi and Sugandhi

TELEVISION COMMUNICATION SYSTEM

Subject Code 1638505	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale:

Objective:

S.No.	Topics	Periods
01	Introduction.	(06)
02	Monochrome Picture Tube.	(09)
03	Basic T V Broadcasting.	(10)
04	T. V. Receiver.	(08)
05	Colour Television.	(10)
06	Receiver Servicing.	(07)
	Total:	**(50)**

Contents : Theory			Hrs/week	Marks
			[06]	
Unit-1	**INTRODUCTION:**			
	01.01	Elements of T. V. System.		
	01.02	Analysis and synthesis of T. V. Picture.		
	01.03	Composite video signal.		
Unit-2	**MONOCHROME PICTURE TUBE:**		[09]	
	02.01	Camera tubes.		
	02.02.01	Image orthicon.		
	02.02.02	Vidicon.		
	02.02.03	Plumbicon.		
	02.02.04	Comparison between one another.		
Unit-3	**BASIC T V BROADCASTING:**		[10]	
	03.01	Block diagram of T. V. Transmission.		
	03.02	Principle of operation.		
	03.03	T. V. Signal propagation.		
	03.04	Antennas used for transmission.		
	03.05	Antenna used for reception.		

Unit-4	**T. V. RECEIVER:**		**[08]**	
	04.01	Classification.		
	04.02	Block diagram.		
	04.03	Different sections.		
	04.04	Tuners.		
Unit-5	**COLOUR TELEVISION:**		**[10]**	
	05.01	Compatibility.		
	05.02	Three colour theory.		
	05.03	Colour Camera.		
	05.04	Colour receiver tubes.		
	05.05	Colour T. V. Transmitter and receiver block diagram.		
	05.06	Colour signal transmission and reception.		
	05.07	PAL system details.		
Unit-6	**RECEIVER SERVICING:**		**[07]**	
	6.01	Troubleshooting procedures for monochrome T. V.		
	6.02	Troubleshooting procedures for colour T. V.		
	6.03	Safety precautions.		
		Total	**50**	

Books Recommended:

1. Television. - R. C. Gulati.
2. Monochrome Television. - Grob.
3. Colour Television. - Grob.
4. Television. - Dhakne.

RADIO & TELEVISION ENGINEERING LAB.

Subject Code 1621506	Practical			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	03
	L	T	P/S	ESE	:	50	
	—	—	06	Internal	:	15	
				External	:	35	

	Contents : Practical	Hrs/week	Marks
Unit-1	Study of operation of CTV.		
Unit-2	Video tape recorder circuit operation.		
Unit-3	Study of pattern generator.		
Unit-4	Familiarization with Black and White T. V. Receiver.		
Unit-5	Familiarization with Colour T. V. Receiver.		
Unit-6	Study and serving of CRT, deflection and high voltage section.		
Unit-7	Alignment of I F and frequency response curve.		
Unit-8	Study and serving of sound section.		
Unit-9	Study and serving of VHF & UHF tuner circuit.		
Unit-10	Study of Chrome section and colour sync. Circuit.		
Unit-11	Study of typical yagi antenna.		
Unit-12	Study of Remote control circuit.		
Unit-13	Study of VCR circuit.		
Unit-14	Study of video recording room.		

DIGITAL ELECTRONICS & MICROPROCESSOR LAB.

Subject Code 1621507	Practical			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	06	Internal	:	15	
				External	:	35	

Contents : Practical		Hrs/week	Marks
Unit-1	Operation of Mono stable multivibrator circuit.		
Unit-2	Operation of Bi stable multivibrator circuit.		
Unit-3	Operation of Astable multivibrator circuit.		
Unit-4	Operation of Schmitt trigger circuit.		
Unit-5	Operation of Comparator circuit.		
Unit-6	Operation of Integrator circuit.		
Unit-7	Operation of Blocking Oscillator circuit.		
Unit-8	Operation of Shift registers and counters.		
Unit-9	Operation of EPROM eraser.		
Unit-10	Operation of Multiplexers ICs.		
Unit-11	Operation of D/A converter.		
Unit-12	Operation of A/D converter.		
Unit-13	Operation of R-2R ladder network.		
Unit-14	Operation of Sample and Hold circuit.		
Unit-15	Operation of Delta modulation circuit.		
Unit-16	Operation of seven segments display circuit.		

POWER ELECTRONICS - TW

Subject Code 1621508	Term Work			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	Internal	:	15	
	—	—	04	External	:	35	

Contents : Term Work		Hrs/week	Marks
Unit-1	Series regulated power supply.		
Unit-2	Shunt regulated power supply.		
Unit-3	Characteristics of S C R.		
Unit-4	Operation of controlled rectifier.		
Unit-5	Study of parallel inverter circuit.		
Unit-6	Study of series inverter circuit.		
Unit-7	Operation of various speed control methods of induction motor.		
Unit-8	Speed control of D C motor.		
Unit-9	Speed control of synchronous motor.		
Unit-10	Operation of magnetic amplifier.		
Unit-11	Input / Output characteristics of OP AMP.		
Unit-12	Amplifier circuit operation using 723 and 309 IC.		

INPLANT TRAINING AND VISIT TO WORKS - TW

Subject Code 1621509	Term Work			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	100	02
	L	T	P/S	Internal	:	30	
	—	—	4 Week Continues	External	:	70	

Rationale :

A student is required to develop his knowledge skill and attitudes gained while joining through different course. It is desirable to expose the students to the world of work to be familiar with the real life situations and understand the problem there in. The "In plant training and visit to work "being introduced for the final year part time diploma technicians for Electronics Engineering with the above objective in view. This course will help the students to observe how the technical, managerial, quality control safety and other principle, are being applied in real life situation. They will be able to observe the technique of decision making on the shop floor. He will also, be able to observe the technique of decision making on the shop floor. He will, also be able to observe how his sub-ordinate perform in their day to day work and co-ordinate shop floor activities. The course will also, help bring attitudinal changes in a student.

Objective:

A student will be able to:

- Understand the working of the machines, tools and equipments more clearly.
- Write down the specifications of the machines, tools, equipments.
- Know the process of material storing / material management.
- Learn to maintain office records / filing.
- Know the process of planning, implementation and monitoring.
- Learn the skill shop floor co-ordination.
- Know the skill of office management and inventory Control.
- Understand the process of production.
- Know the skill of quality control.
- Know the organizational set-up and plant Lay-out.
- Find out Characteristics, Functions, and activities of those industries.
- Find out opportunities and method of recruitments.
- Know the source of raw materials and markets for industries.
- Find out the special characteristics of the industries.
- Observe and understand special machines, which they may not have been in their institutes.
- Observe the energy consumption in on industry method to same energy.
- Try to learn techniques to save energy.
- Observe the environment Pollutants and learn how to minimize environmental Pollution.

CONTENTS

Student should preferably visit and undergo training in the following industries:-

Contents : Term Work		Hrs/week	Marks
Unit-1	Microwave Tower Stations.		
	Radio Stations.		
	T. V. Stations.		
	Telephone Exchange.		
	Railway Signaling System Station.		
	Wireless Transmission & Distribution System.		
	Any other Industry which may be useful to the electronics Engineering technicians and are comfortably situated.		

REPORT WRITING:

A report on "In Plant Training" should include

Unit-2	Introduction.		
	Plant Lay-out and organization.		
	Planning for Product/Maintenance/Repair.		
	Shop floor training.		
	Testing and quality control facility.		
	Special observations which are special characteristics of the plant viz. material storing etc.		
	Conclusion- - Observations - Typical Characteristics - Area of Weakness - Suggestions		

SCHEDULE FOR TRAINING:

- Planning/Office Management - One Week
- Shop floor - Two Weeks
- Testing/Quality Control/Stores - One Week

The report on visit to works should be presented and assessed in the form of Seminar.

STATE BOARD OF TECHNICAL EDUCATION, BIHAR

Scheme of Teaching and Examinations for

V SEMESTER DIPLOMA IN ELECTRICAL ENGINEERING/ ELECTRICAL & ELECTRONICS ENGINEERING.

(Effective from Session 2016-17 Batch)

THEORY

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME							
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks A	Class Test (CT) Marks B	End Semester Exam.(ESE) Marks C	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	Credits
1.	Switchgear and Protection	1620501	04	03	10	20	70	100	28	40	04
2.	A.C. Machines	1620502	04	03	10	20	70	100	28	40	04
3.	Utilization of Electrical Energy	1620503	04	03	10	20	70	100	28	40	04
4.	Electric Traction-I	1620504	03	03	10	20	70	100	28	40	03
5	Industrial Automation	1620505	03	03	10	20	70	100	28	40	03
		Total :-	**18**				**350**	**500**			

PRACTICAL

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME					
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	Credits
					Internal(A)	External(B)			
6.	Switchgear and Protection Lab	1620506	02	03	15	35	50	20	01
7.	A.C. Machines Lab	1620507	02	03	15	35	50	20	01
8.	Electric Traction Lab-I	1620508	02	03	15	35	50	20	01
9.	Industrial Automation Lab	1620509	02	03	15	35	50	20	01
		Total :-	**08**				**200**		

TERM WORK

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME				
			Periods per Week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	Credits
10.	Industrial Project & Entrepreneurship Development (TW)	1620510	04	07	18	25	10	01
11.	Professional Practices-V (TW)	1620511	03	07	18	25	10	01
		Total :-	**07**			**50**		
Total Periods per week Each of duration One Hour			**33**	Total Marks = **750**				**24**

SWITCHGEAR & PROTECTION
(ELECTRICAL ENGINEERING GROUP)

Subject Code	Theory						Credits
1620501	No. of Periods Per Week			Full Marks	:	100	04
	L	T	P/S	ESE	:	70	
	04	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS: THEORY

	Name of the Topic	Hours	Marks
Unit-01	**Fundamental:** 1.1 Necessity & functions of protective system. 1.2 Normal & abnormal conditions. 1.3 Types of faults & their causes. 1.4 Short circuit calculations(Symmetrical faults only) 1.5 Use of current limiting reactors & their arrangements.	05	08
Unit-02	**Circuit interrupting devices** 2.1 HRC fuses – construction, types, working, characteristics, selection and applications 2.2 Isolators- vertical break, horizontal break & pentograph type 2.3 Arc formation process, methods of arc extinction, related terms. 2.4 Circuit breakers- Concept, Classification, Working principle, Construction, Specification & Applications of 2.4.1 H.T – Bulk oil circuit breaker, Minimum oil circuit breakers (M.O.C.B.), Sulpher Hexa Fluoride circuit breaker (SF6). Vacuum circuit breaker. 2.4.2 L.T.- Air circuit breakers (ACB),miniature circuit breakers (M C B) , Moulded case circuit breakers (M C C B) , Earth leakage circuit breaker (E L C B or R L C B), Comparison of fuse & MCCB 2.5 Selection of MCCB for motor. 2.6 Selection and rating of circuit breakers.	12	14
Unit-3	**Protective Relaying** 3.1 Requirements- relay time, related terms. 3.2 Classification – Electromagnetic attraction, induction static , µP based relays. 3.3 Protective transformers. (No numerical on above topic.) 3.4 Over current relay-Time current characteristics. 3.5 Static over current relays 3.6 µP based over current relays. 3.7 Distance relaying- Principle, static, µP based 3.8 Directional relay. 3.9 Differential Relay. (Simple numerical on relay setting)	12	12
Unit-4	**Protection of Alternator** 4.1 Abnormalities & Faults 4.2 Differential protection 4.3 Overcurrent , earth fault, interturn fault, negative phase sequence, over heating protection. 4.4 Reverse power protections. (Simple numerical on differential protection)	08	08

Unit-5	**Protection of Transformer** 5.1 Abnormalities & faults. 5.2 Differential, over current, earth fault, interturn, restricted earth fault, over heating protection. 5.3 Buchholtz relay (Simple numerical on differential protection)	08	08
Unit-6	**Protection of Motor** 6.1 Abnormalities & faults. 6.2 Short circuit protection, Overload protection, Single phase preventor	04	05
Unit-7	**Protection of Busbar & transmission line** 7.1 Abnormalities & faults. 7.2 Bus bar protection. 7.3 Transmission line, over current, distance protection. Pilot wire protection	06	08
Unit-8	**Neutral Earthing** 8.1 Introduction & importance. 8.2 Types of earthing 8.3 substation earthing	03	03
Unit-9	**Over voltage Protection** 9.1 Causes of over voltages. 9.2 Lighting phenomena & over voltage due to lightning. 9.3 Protection of transmission line & substation from direct stroke. 9.4 Types of lightning arresters & surge absorbers & their Construction & principle of operation. 9.5 Protection against traveling waves. 9.6 Insulation co-ordination.	06	04
	Total	**64**	**70**

Text /Reference Books:

Titles of the Book	Name of Authors	Name of the Publisher
Switch gear & protection	S.Rao.	Khanna Publications, New
A text book on electrical power system	Soni,Gupta & Bhatnagar.	Dhnapat Rai & Sons, New
The art & science of protective relaying	Mason C.R.	--------
A text book of Electrical power	S.L.Uppal.	Khanna Publisher, Delhi.
Power System Protection & Switchgear	Badriram & Vishwakarma P.N.	TMH, New Delhi
Switchgear & Power system Protection	Ravindra P. Singh	PHI Publication
Handbook of Switchgears	BHEL	Tata McGraw Hill
Switchgear and Protection	Prabhat Kumar	Foundation Publishing

A. C. MACHINES (ELECTRICAL ENGINEERING GROUP)

Subject Code 1620502	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	04
	L	T	P/S	ESE	:	70	
	04	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS: THEORY

	Name of the Topic	Hours	Marks
Unit-01	**Three phase induction motor** 1.1 Construction of three phase induction motor 1.2 Production of rotating magnetic field 1.3 Principle of working/operation 1.4 Concept of slip 1.5 Equation of rotor induced emf, current, frequency, reactance, and impedance under steady and running condition 1.6 Torque equation of three phase induction motor 1.7 Starting and running torque of squirrel cage and slip ring induction motor 1.8 Condition for maximum and starting torque 1.9 Torque slip characteristics of three phase induction motor 1.10 Effect of change in rotor circuit resistance on torque-slip characteristics 1.11 Effect of change in supply voltage on torque-slip characteristics	13	14
	1.12 measurement of slip by a) Tachometer method b) Comparing rotor frequency and stator frequency 1.13 Speed control of three phase induction motor by a) Pole changing method b) Frequency control method c) By stator voltage control d) Rotor resistance control 1.14 Comparison between squirrel-cage and slip-ring induction motor. 1.15 Applications of three phase induction motor. 1.16 Power stages of three phase induction motor. 1.17 Double cage IM a) Construction b) Characteristic of outer, inner cage & combined characteristic c) Industrial Applications (Numerical on all above) 1.18 I.M. as a generalized transformer 1.19 Vector diagram of IM	13	14
	1.20 Equivalent circuit of 3-phase IM (No numerical) 1.21 Starting of 3-phase IM (No numerical) a) Stator resistance starter b) Star-Delta starter c) Auto transformer starter d) Rotor resistance starter	07	08

Unit-02	**Three Phase Alternator** 2.1 Definition and construction of three phase Alternator a) Armature b) Rotor- smooth cylindrical & projecting type 2.2 Derivation of e.m.f. equation of Alternator which includes a) Chording factor b) Distribution factor 2.3 Factors affecting the terminal voltage of Alternator a) Armature resistive drop b) Leakage reactance drop c) Armature reaction at various power factors & concept of Synchronous impedance 2.4 Regulation of three phase Alternator by a) Synchronous impedance method b) mmf method (Numerical on all	12	14
Unit-03	**Synchronous Motor** 3.1 Principle of working/operation 3.2 Synchronous Motor on load with constant excitation 3.3 Effect of excitation at constant load 3.4 V curve & inverted V curve 3.5 Hunting & phase swinging 3.6 Applications 3.7 Starting of Synchronous Motor 3.8 Comparison between IM & Synchronous Motor (Numerical on all above)	12	13
Unit-04	**Single phase Motors** 4.1 Types of Single phase IM 4.2 Split phasing principle of starting a) Resistance start induction run b) Capacitor start induction run c) Capacitor start Capacitor run d) Double value Capacitor applications motor 4.3 Shaded pole IM 4.4 Applications	07	07
	Total	**64**	**70**

	Text / Reference Books:	
Titles of the Book	**Name of Authors**	**Name of the Publisher**
Electrical Machines	S. K. Bhattacharya	TTTI, Chandigarh
Electrical Technology Vol. II	B. L. Theraja	S chand & Co.
Electrical engineering	C.L.Dawes	T. M. G. H.
Electrical Machinery	Dr.P.S. Bimbra	Khanna Publishers, New Delhi.
Electrical Machines	M.V.Deshpande	PHI Learning Pvt.Ltd, New Delhi.
Electrical Machines	D.P.Kothari, I.J.Nagrath	Tata McGraw Hill
A.C. Machines	Shalini Verma	Foundation Publishing

UTILIZATION OF ELECTRICAL ENERGY
(ELECTRICAL ENGINEERING GROUP)

Subject Code 1620503	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	04
	L	T	P/S	ESE	:	70	
	04	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS: THEORY

	Name of the Topic	Hours	Marks
Unit-01	**Illumination:** 1.1 **Definitions of Terms Used in Illumination:** Light, Luminous Flux, Luminous Intensity, Lumen, Candle Power, Illumination, Lux or Meter Candle, Mean Horizontal Candle Power (MHCP), Mean Spherical Candle Power (MSCP), Mean Hemi-spherical Candle Power (MHSCP), Reduction Factor, Lamp Efficiency, Specific Consumption, Glare, Space-Height Ratio, Utilization Factor, Maintenance Factor, Depreciation Factor, Waste Light Factor, Absorption Factor, Reflection Factor, Solid Angle. 1.2 **Laws of Illumination:** - Law of Inverse Squares - Lambert's Cosine Law. (No Numerical) 1.3 **Sources of Light:** Construction, Working and Applications of Following Lamps: - Incandescent Lamps. - Halogen Lamps. - Low Pressure Mercury Vapour Lamps (Fluorescent Tube). - High Pressure Mercury Vapour Lamps. - Sodium Vapour Lamps. - Compact Fluorescent Lamps (C.F.L.) - Metal Halide Lamps - LED Lamps - Neon Signs. 1.4 – **Basic Principles of Light Control.** 1.5 – **Types of Lighting Schemes.** Direct, Semi-direct, Semi-indirect, Indirect, General Lighting. 1.6 – **Design of Lighting Scheme:** Objectives of Lighting Scheme. Factors to be considered While Designing the Lighting Scheme. (Simple Numericals) 1.7 - **Factory Lighting:** - General Requirements - Types of Installations: General Lighting, Local Lighting, Emergency Lighting. 1.8 – **Lumen or Light Flux Method of Lighting** Calculations. (Simple Numericals) 1.9 – **Flood Lighting** - Flood Lighting Purposes. - Classification of Projectors. - Location and Mounting of Projectors. (Simple Numericals)	14	14

Unit-02	**Electric Heating and Welding: Electric Heating:** 2.1.1– Advantages of Electric Heating. 2.1.2 – Modes of Transfer of Heat: - Conduction, Convection and Radiation. 2.1.3 – Classification of Electric Heating Methods: 2.1.4 – Resistance Heating:(Construction & Operation) - Direct Resistance Heating: Salt Bath Furnace. - Indirect Resistance Heating: Resistance Ovens, Requirements of Heating Element Material, Causes of Failure of Heating Elements, Methods of Temperature Control. - Applications of Resistance Heating. 2.1.5 – Arc Heating: (Construction & Operation) - Direct Arc Furnace: - Indirect Arc Furnace. - Applications of Arc Heating. 2.1.6 –Induction Heating: (Construction & Operation) - Core Type Induction Furnaces: Ajax Wyatt Furnace. - Coreless Induction Furnace. - Applications of Induction Heating. (Simple Numericals on Melting Furnaces) 2.1.7 – Dielectric Heating: - Principle of Dielectric Heating. - Advantages of Dielectric Heating - Limitations of Dielectric Heating. - Applications of Dielectric Heating. (Simple Numericals on Dielectric Heating) **Electric Welding:** 2.2.1– Methods of Electric Welding: Electric Arc Welding, Resistance Welding. 2.2.2 – Resistance Welding: - Principle of Resistance Welding. - Advantages of Resistance Welding. - Types of Resistance Welding - (Only List) 2.2.3 – Spot Welding Machine. 2.2.4 – Electric Arc Welding: - Formation and Characteristics of Electric Arc. - Effect of Arc Length. - Arc Blow. 2.2.5 – Polarity in DC Welding: 2.2.6 – Electrodes for Metal Arc Welding: 2.2.7 – V-I Characteristics of Arc Welding DC Machines. 2.2.8 – Arc Welding Machines: - DC Welding Machines – MG Set, AC Rectified Welding Unit. - AC Welding Machines – Welding Transformer.	16	10 10
Unit-03	**Elevators:** 3.1 Types of electric elevators 3.2 Size and shape of elevator car 3.3 Speed of elevators 3.4 Location of elevator machine 3.5 Types of elevator machines, elevator motors 3.6 Power transmission gears braking 3.7 Safety in elevators 3.8 Bombay lift act.	08	08

Unit-04	**Electric Drives:** 4.1 – Introduction: - What is drive? - Drives – Mechanical Drive and Electric Drive. 4.2 – Advantages and Disadvantages of Electric Drive. 4.3 – Factors Governing Selection of Electric Motors. 4.4 - Nature of Electric Supply: 3 ϕ & 1ϕ AC and DC. 4.5 - Type of Drive: Group Drive & Individual Drive. 4.6 - Nature of Load: Nature of the Mechanical Load, Matching of the Speed Torque Characteristics of the Motor with that of the Load, and Starting Conditions of the Load. 4.7 - Electrical Characteristics: (Only DC Series, Three Phase and Single Phase Induction Motors are to be dealt) - Running Characteristics: Three Typical Speed Torque Characteristics – Inverse, Constant Speed and Drooping. - Starting Characteristics: Starting Torque only. (No Starters). - Speed Control: Suitability to Economic and Efficient Speed Control Methods (Above and Below Normal Speed). - Braking Characteristics: Plugging, Rheostatic Braking and Regenerative Braking, as Applied to DC Series and Three Phase Induction Motor. 4.8 - Mechanical Features: - Type of Enclosure as per IS - Type of Bearings - Type of Transmission for Drive - Noise Level. 4.9 - Size of Motor: - Load Conditions – Continuous Loads, Short Time Loads, Intermittent Loads, Continuous Operation with Short Time Loads and Continuous Operation with Intermittent Loads. - Duty Cycles. - Standard Ratings for Motors as per ISS. - Estimation of Rating of a Motor. (Simple Numericals on Estimating Size of Continuously Rated Motor) - Load Equalisation. (No Calculations) 4.10 - Cost: - Capital Cost - Running Cost (Losses, p.f., Maintenance).	16	18
Unit-05	**Economic Aspects of Utilising Electrical Energy:** 6.1 – Economic Aspects of Utilising Electrical Energy. 6.2 – Costing of Electrical Energy: Fixed Charges, Semi Fixed Charges and Running Charges. 6.3 – Formulation of Electrical Tariffs. 6.4 – Various Types of Tariffs: Tariffs in force for Domestic, Commercial and Industrial Consumers. 6.5 – Power Factor Improvement: Causes of Low Power Factor, Disadvantages of Low Power Factor, Power Factor Improvement by using Static Capacitors, Location of Capacitors for Power Factor Improvement, Most Economical Power Factor. Automatic Power Factor Controller (Derivation and Simple Numerical) 6.6 – Energy Conservation: Importance and need of Energy Conservation, Measures for Energy Conservation in (i) Electric Drives (ii) Electric Traction (iii) Electric Heating (iv) Refrigeration and Air Conditioning (v) Illumination.	10	10
	Total	**64**	**70**

Text / Reference Books:		
Titles of the Book	**Name of Authors**	**Name of the Publisher**
Art & Science of Utilisation of Electrical Energy	H. Partab	Dhanpat Rai & Sons
Utilisation of Electric Power & Electric Traction.	J. B. Gupta	S. K. Kataria & Sons
Utilisation of Electric Power & Electric Traction.	G. C. Garg	Khanna Publishers
Electric Traction	J. Upadhyay S. N. Mahendra	Allied Publisher Ltd.
Fundamentals of Electrical Drives	G. K. Dubey	Narosa Publishing House.
Generation & utilization of Electrical Energy	S. Shivnagaraju, M. Balasubba Reddy, D. Srilatha	Pearson Publications
Utilization of Electrical Energy	E. Openshaw Taylor	Orient Longman Pvt. Ltd.
Utilization of Electrical Energy	Rajiv Ranjan	Foundation Publishing

ELECTRIC TRACTION-I
(ELECTRICAL ENGINEERING GROUP)

Subject Code	Theory						Credits
1620504	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS: THEORY

Chapter	Name of the Topic	Hours	Marks
Unit-01	**Power Supply Arrangements:** 1.1 – Introduction 1.2 – High Voltage Supply. 1.3 – Constituents of Supply System. Substations. Feeding Posts. Feeding and Sectioning Arrangements. Sectioning and Paralleling Post. Sub sectioning and Paralleling Post. Sub sectioning Post. Elementary Section. Miscellaneous Equipments at Control Post or Switching Stations. 1.4 – Major Equipments at Substation. Transformer. Circuit Breaker. Interrupter. Protective System for AC Traction – Transformer Protection and 25 KV Catenary Protection 1.5 – Location and Spacing of Substations.	12	18

Unit-02	**Overhead Equipments:** 2.1 – Overhead Equipments (OHE). 2.2 – Principles of Design of OHE: Composition of OHE. Height of Contact Wire. Contact Wire Gradient. Encumbrances. Span Length. 2.3 – Automatic Weight Tension and Temp. Compensation. 2.4 – Uninsulated Overlaps. 2.5 – Insulated Overlaps. 2.6 – Neutral Section. 2,7 – Section Insulator. 2.8 – Isolator. 2.9 – Polygonal OHE: Single Catenary Construction. Compound Catenary Construction. Stitched Catenary Construction. Modified Y Compound Catenary. 2.10 – Effect of Speed on OHE. 2.11 – OHE Supporting Structure. 2.12 – Different types of signal boards of OHE. 2.13 – Maintenance of OHE: - OHE Maintenance Schedule. (No Derivation and No Numerical)	12	14
Unit-03	**Current Collecting Equipments:** 3.1 – Introduction. 3.2 – Systems of Supplying Power in Electric Traction: Third Rail or Conductor Rail System. Overhead System. 3.3 – Current Collectors for Overhead System: - Trolley Collector or Pole Collector, Bow Collector, Pentograph Collector. 3.4 – Types of Pentographs: Diamond Pentograph and Faiveley Type. 3.5 – Construction of Faiveley Type Pantograph. 3.6 – Methods of Raising and Lowering of Pentograph. 3.7 – Maintenance of Pentograph.	08	14

Unit-04	**Signalling and Supervisory Control:** 4.1 – Requirements of Signalling System 4.2 – Types of Signals. 4.3 – Colour Light Signals. 4.4 – Three and Four Aspects of Colour Light Signals. 4.5 – Track Circuits. 4.6 – DC Track Circuit. 4.7 – AC Track Circuit. 4.8 – Supervisory Control: Introduction. Advantages of Remote Control. Systems of Remote Control: DC versus Voice Frequency (VF) Signalling. Remote Control System Equipment and Network. Mimic Diagram. Control Desk for TPC.	08	14
Unit-05	**Train Lighting:** 5.1 – Systems of Train Lighting. 5.2 – Special Requirements of Train Lighting. 5.3 – Method of obtaining Unidirectional Polarity. 5.4 – Method of obtaining Constant Output. 5.5 – Single Battery System. 5.6 – Double Battery Parallel Block System. 5.7 – Failure of Under frame Generating Equipments. 5.8 – End on Generation. 5.9 – Railway Coach Air Conditioning: - Requirements. - Types of Installations. - Air Conditioned Rolling Stock. 5.10 – Air Conditioning Equipments on Coaches.	08	10
	Total	**48**	**70**

Text / Reference Books:		
Titles of the Book	**Name of Authors**	**Name of the Publisher**
Modern Electric Traction	H. Partab	Dhanpat Rai & Sons
Electric Traction	J. Upadhyay S. N. Mahendra	Allied Publishers Ltd.
Viddut Engine Parichay (In Hindi)	Om Prakash Kesari	S. P. Graphics, Nashik.
Electric Traction –Motive Power and Energy supply	Andreas Steimel	Oldenbourg-indstrieverlag
Electric Traction-I	Deepak Srivastava	Foundation Publishing

INDUSTRIAL AUTOMATION (ELECTRICAL ENGINEERING GROUP)

Subject Code	Theory						Credits
1620505	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS: THEORY

Chapter	Name of the Topic	Hours	Marks
Unit-1	**Automation** 1.1 Need of automation 1.2 Advantages of automation 1.3 Requirements of automation	02	--
Unit-2	**Control System** 2.1 Concept of control system 2.2 Basic block diagram of control system 2.3 Transfer function 2.4 Block diegram reduction Techniques. 2.5 Types of control system 2.6 Applications of control system	04	08
Unit-3	**Control System Components & Electrical Actuators** 3.1 I/P devices- switches-push buttons, foot switch, selector switch, pilot switch, proximity Switch. 3.2 Sensors 3.3 Relays [Electro mechanical, reed] 3.4 Valves, pilot lamps, contactors 3.5 Potentio meteer- working uses as error detector 3.6 Servo motors - AC & DC working Principle. 3.7 Synchros- Transmitter & control transformer 3.8 Tacho generator- working Principle 3.9 Stepper motor (Permanent magnet & Variable reluctance)- working Principle 3.10 Power & control circuits for different applications like hoist, ganes, comeyer belt etc.	16	30
Unit-4	**Controllers & Control Actions** 4.1 Electric & Electronic Controllers & Lead log networks. 4.2 Digital controllers :- Brief overview of microprocessor & microcontroller to be worked as controller 4.3 P, I P+I, P+D, P+I+D actions. 4.4 P+I+D action using hydraulic pneumatic & electronic controller 4.5 Tacho - generator	14	20
Unit-5	**Programmable logic Controller** 5.1 Introduction 5.2 Advantages & disadvantages. 5.3 PLC vs PC 5.4 Block diegram of PLC	10	12
Unit-6	**Introduction to special control system** 6.1 Distribution control system (DCS)- brief introduction to hardware & Software used.	02	
	Total	**48**	**70**

Text / Reference Books:		
Titles of the Book	**Name of Authors**	**Name of the Publisher**
Control System Engg.	Nagrath Gopal	Wiley Eastern
Modern Control Engg.	Ogata	Prentice Hall
Industrial Control Engg	Jacob	Prentice Hall
Hydraulics & Pneumatics	Andrew Parr	Jaico Publication
Programmable Logic Controller: Principle applications	Webb & Reis	Wiley Eastern
Control of Electrical Machines	S.K. Bhattachrya Brijinder Singh	New Age International
Industrial automation and process control	Jon stenerson	Prentice Hall
Handbook of Industrial automation	Richad Shell	Taylor and Francis
Industrial Automation	Balakrishnan	Foundation Publishing

SWITCHGEAR AND PROTECTION LAB
(ELECTRICAL ENGINEERING GROUP)

Subject Code	Practical						Credits
1620506	No. of Periods Per Week			Full Marks	:	50	01
	L	T	P/S	ESE	:	50	
	—	—	02	Internal	:	15	
	—	—	—	External	:	35	

CONTENTS: PRACTICAL

Skills to be developed:

Intellectual Skills:

5. Identify different types of circuit breakers
6. Identify various faults on the system
7. Calculate the

fault levels **Motor Skills:**

1. Simulate circuit configuration to create various faults
2. Set the relays for various fault levels

List of Practical:

1) Identify the components of different types of circuit breakers with their specifications (through visits , video or model).
   - I) Low tension air circuit breaker.(including protective devices)
   - II) Minimum oil circuit breaker (M O C B)
   - III) Miniature circuit breaker (M C B)
   - IV) Moulded case circuit breaker (M C C B)
   - V) Earth Leakage circuit breaker (E L C B) or Residual leakage circuit breaker (R L C B)
   - VI) Sulpher - Hexa fluoride circuit breaker (S F 6)
   - VII) Vacuum circuit breaker.
2) Plot performance characteristics of over current relay.
3) Simulation of alternator protection.
4) Simulation of transformer protection.
5) Comparative study of specifications of earthing at different substations / different locations & new trends in earthing schemes (information search)
6) Comparative study of specification of lightning arresters of different manufacturers Through Brochures / Literature
7) For a given 3-ph induction motor with D.O.L. starter
   a. Check the operation of over current relay for various loads.
   b. Check the operation of single phasing preventer by creating single phasing fault.
   c. Check the operation of D.O.L. starter under short circuit condition.

List of Laboratory Experiments :	
1	To identify given 3-ph induction motor with D.O.L. starter a. Check the operation of over current relay for various loads. b. Check the operation of single phasing preventer by creating single phasing fault. Check the operation of D.O.L. starter under short circuit condition.
2	Plot performance characteristics of over current relay.
3	To perform an experiment on Simulation of A. Alternator protection. B. Transformer protection.
4	Comparative study of specifications of earthing at different substations / different locations & new trends in earthing schemes (information search)
5	Comparative study of specification of lightning arresters of different manufacturers through Brochures / Literature
6	Explain the different types of circuit breakers with their specifications

A.C. MACHINES LAB (ELECTRICAL ENGINEERING GROUP)

Subject Code	Practical						Credits
1620507	No. of Periods Per Week			Full Marks	:	50	01
	L	T	P/S	ESE	:	50	
	—	—	02	Internal	:	15	
	—	—	—	External	:	35	

CONTENTS: PRACTICAL

Intellectual Skills: 1. Analytical Skills
2. Identification Skills

Motor Skills : 1. Measuring Skills
2. Connecting instruments / machines

List of Practical's:

1) a) To measure the slip of 3-phase IM by
   i) Tachometer
   ii) Comparing rotor & stator frequency
   iii) Stroboscopic method.
   b) To reverse the direction of rotation of 3-phase IM.
2) To measure the performance of 3-phase IM by direct loading
3) To list different types of starters used for 3-phase IM .Identify & use the same to start & run 3-phase IM
4) Using an MG set (DC motor-Alternator) observe the effect of excitation & speed on induced e.m.f. & plot O.C.C. of the given alternator.
5) To find the percentage regulation of 3-phase alternator by synchronous impedance method at various power factors.
6) To find the percentage regulation of 3-phase alternator by direct loading method at various power factors.
7) To list & explain various starting methods of synchronous motor & applying one of them to start the synchronous motor. Plot V & inverted V curve of the same.
8) To list the various types of 1-phase IM, Collect the literature for them from Dealers / manufacturers of local places & compare on the following pts.
   i) Method of starting ii) Cost iii) Performance iv) Starting torque etc.
   Prepare a report

List of Laboratory Experiments :	
1	To measure the performance of 3-phase IM by direct loading
2	Using an MG set (DC motor-Alternator) observe the effect of excitation & speed on induced e.m.f. & plot O.C.C. of the given alternator.
3	To find the percentage regulation of 3-phase alternator by direct loading method at various power factors
4	To list the various types of 1-phase IM, Collect the literature for them from Dealers / manufacturers of local places & compare on the following pts. i) Method of starting ii) Cost iii) Performance iv) Starting torque etc. Prepare a report
5	To list & explain various starting methods of synchronous motor & applying one of them to start the synchronous motor. Plot V & inverted V curve of the same
6	To list different types of starters used for 3-phase IM .Identify & use the same to start & run 3-phase IM

ELECTRIC TRACTION LAB -I
(ELECTRICAL ENGINEERING GROUP)

Subject Code	Practical						Credits
1620508	No. of Periods Per Week			Full Marks	:	50	01
	L	T	P/S	ESE	:	50	
	—	—	02	Internal	:	15	
	—	—	—	External	:	35	

CONTENTS: PRACTICAL

List of Experiments:-	
1	**Drawing Sheets:** (i) Drawing on half Imperial sheet for Traction Substation Layout or Feeding Post. (ii) Drawing of half Imperial sheet for Pentagonal OHE Catenary, Different Catenary. according to speed limit, Cantilever assembly OHE Supporting structure, Pentograph, Cross section of Contact Wire. **Note:** Students should be able to identity, explain the functions of various components of substation and OHE. **Visits:** Visit to Traction Substation (for substation layout and OHE) **or** Railway Station (for signaling and train lighting) and writing a report.

INDUSTRIAL AUTOMATION LAB
(ELECTRICAL ENGINEERING GROUP)

Subject Code	Practical						Credits
1620509	No. of Periods Per Week			Full Marks	:	50	01
	L	T	P/S	ESE	:	50	
	—	—	02	Internal	:	15	
	—	—	—	External	:	35	

CONTENTS: PRACTICAL

Intellectual Skills: a. Logical development
b. Programming skills

Motor Skills : a. Interpretation skills
b. Connecting properly

List of Practical's:

1) a) To plot the characteristics of potentiometer

b) Use of potentiometer as error detector

2) To plot V-I characteristics of DC & AC servomotors. compare them with DC & AC motor characteristics

3) a) To plot the characteristics of synchro transmitter

b) Use of synchro transmitter- control transformer pair as error detector.

4) Measure step angle for a stepper motor in forward & reverse direction.

5) Draw a power circuit & control circuit using control symbols for a 3-phase IM using DOL starter.

6) Observe various components /parts/symbols/connections of a PLC demonstration kit in your laboratory.

7) Draw a ladder logic diagram for two different examples.

8) By using above ladder logic diagram observe the status of I/Os using PLC.

9) Perform stepper motor/ temperature control using PLC.

10) Identify the parts of hydraulic/ pneumatic servomotor from cut-section/model.

B) Mini Project: (one in a group of eight students)

11) Collect the data of various PLC brands market & list.

12) Collect the data from internet about hardware & software of new control systems like SCADA, DCS.

13) Use the various control components in your laboratory to built a AC/DC position control system.

14) Built P, I, PI, PD & PID controller using op-amps & R-C circuits. Plot V-I characteristics

List of Laboratory Experiments :	
1	a) To plot the characteristics of potentiometer b) Use of potentiometer as error detector
2	To plot V-I characteristics of DC & AC servomotors. compare them with DC & AC motor characteristics
3	Observe various components /parts/symbols/connections of a PLC demonstration kit in your laboratory.
4	Collect the data from internet about hardware & software of new control systems like SCADA, DCS
5	Make a study of DC/AC position control system using Various control components.

INDUSTRIAL PROJECT AND ENTREPRENEURSHIP DEVELOPMENT-TW
(ELECTRICAL ENGINEERING GROUP)

Subject Code	Term Work						Credits
1620510	No. of Periods Per Week			Full Marks	:	25	01
	L	T	P/S	Internal	:	07	
	—	—	04	External	:	18	

CONTENTS : TERM WORK

PART A) Industrial Project

Following activities related to project are required to be dealt with, during this semester

1. Form project batches & allot project guide to each batch. (Max. 4 students per batch)
2. Each project batch should select topic / problem / work by consulting the guide & / or industry. Topic/ Problem / work should be approved by Head of department.
3. Each project batch should prepare action plan of project activities & submit the same to respective guide.
4. At the end of semester, each project batch should submit the action plan and abstract of the project along with list of materials required if project involves fabrication or other facilities required in other kinds of project.
5. Action Plan should be part of the project report. Actual work of project should be done in sixth semester.

Group	Projects
01	(1) Design of Illumination Scheme (Up to 20 KW) for Hospital / Shopping Mall / Cinema Theatre / Commercial Complex / Educational Institute / Industrial Complex. (2) Design of Rural Electrification Scheme for small Village, Colony. (3) Case Studies Related to Industries – Operation / Maintenance / Repair and Fault Finding. (Refer Guideline Document). (4) Energy Conservation and Audit. (5) Substation Model (Scaled) (6) Wind Turbine Model (Scaled)
02	(1) Rewinding of Three Phase/Single Phase Induction Motor. (2) Rewinding of Single Phase Transformer. (3) Fabrication of Inverter up to 1000 VA. (4) Fabrication of Battery Charger. (5) Fabrication of Small Wind Energy System for Battery Charging. (6) Fabrication of Solar Panel System for Battery Charging. (7) Microprocessor/ Micro controller Based Projects. (8) PC Based Projects. (9) Simulation Projects.
03	Seminar on any relevant latest technical topic based on latest research, recent trends, new methods and developments in the field of Electrical Engineering / Power Electronics.

Part B: Entrepreneurship
Development Objectives:
Students will be able to

1) Identify entrepreneurship opportunity.
2) Acquire entrepreneurial values and attitude.
3) Use the information to prepare project report for business venture.
4) Develop awareness about enterprise management.

Chapter	Name of the Topic	Hours
Unit-01	**Entrepreneurship, Creativity & Opportunities** 1.1) Concept, Classification & Characteristics of Entrepreneur 1.2) Creativity and Risk taking. 1.2.1) Concept of Creativity & Qualities of Creative person. 1.2.2) Risk Situation, Types of risk & risk takers. 1.3) Business Reforms. 1.3.1) Process of Liberalization. 1.3.2) Reform Policies. 1.3.3) Impact of Liberalization. 1.3.4) Emerging high growth areas. 1.4) Business Idea Methods and techniques to generate business idea. 1.5) Transforming Ideas in to opportunities transformation involves Assessment of idea &Feasibility of opportunity 1.6) SWOT Analysis	03
Unit-02	**Information And Support Systems** 2.1) Information Needed and Their Sources: Information related to project, Information related to support system, Information related to procedures and formalities 2.2) Support Systems 1) Small Scale Business Planning, Requirements. 2) Govt. & Institutional Agencies, Formalities 3) Statutory Requirements and Agencies.	02
Unit-03	**Market Assessment** 3.1) Marketing -Concept and Importance 3.2) Market Identification, Survey Key components 3.3) Market Assessment	02
Unit-04	**Business Finance & Accounts Business Finance** 4.1) Cost of Project 1) Sources of Finance 2) Assessment of working capital 3) Product costing 4) Profitability 5) Break Even Analysis 6) Financial Ratios and Significance **Business Account** 4.2) Accounting Principles, Methodology 1) Book Keeping 2) Financial Statements 3) Concept of Audit	03
Unit-05	**Business Plan & Project Report** 5.1) Business plan steps involved from concept to commissioning Activity Recourses, Time, Cost 5.2) **Project Report** 1) Meaning and Importance 2) Components of project report/profile **(Give list)** 5.3) **Project Appraisal** 1) Meaning and definition 2) Technical, Economic feasibility 3) Cost benefit Analysis	03

Unit-06	Enterprise Management And Modern Trends 6.1) Enterprise Management: 1) Essential roles of Entrepreneur in managing enterprise 2) Product Cycle: Concept and importance 3) Probable Causes Of Sickness 4) Quality Assurance: Importance of Quality, Importance of testing 6.2) E-Commerce: Concept and Process 6.3) Global Entrepreneur 6.3.1 Assess yourself-are you an entrepreneur? 6.3.2 Prepare project report and study its feasibility.	03
	Total	**16**

	Text /Reference Books:	
Titles of the Book	**Name of Authors**	**Name of the Publisher**
Entrepreneurship Theory and Practice	J.S. Saini B.S.Rathore	Wheeler Publisher
TTTI, Bhopal / Chandigadh	--	--
Entrepreneurship Development	E. Gorden K.Natrajan	Himalaya Publishing.
Entrepreneurship Development	Prepared by Colombo plan staff college for Technician Education.	Tata Mc Graw Hill Publishing co. ltd. New Delhi.
A Manual on How to Prepare a Project Report	J.B.Patel D.G.Allampally	EDI STUDY MATERIAL Ahmadabad (Near Village Bhat , Via Ahmadabad Airport & Indira Bridge), P.O. Bhat 382428 , Gujrat,India P.H. (079) 3969163, 3969153 E-mail : ediindia@sancharnet.in/olpe@ediindia.org Website : http://www.ediindia.org
A Manual on Business Opportunity Identification & Selection	J.B.Patel S.S.Modi	
National Derectory of Entrepreneur Motivator & Resource Persons.	S.B.Sareen H. Anil Kumar	
New Initiatives in Entrepreneurship Education & Training	Gautam Jain Debmuni Gupta	
A Handbook of New Enterpreneurs	P.C.Jain	

2) Video Cassettes:

No	Subject	Source
1	Five success Stories of First Generation Entrepreneurs	EDI STUDY MATERIAL Ahmadabad (Near Village Bhat , Via Ahmadabad Airport & Indira Bridge), P.O. Bhat 382428 , Gujrat,India P.H. (079) 3969163, 3969153 E-mail : ediindia@sancharnet.in/olpe@ediindia.org Website : http://www.ediindia.org
2	Assessing Entrepreneurial Competencies	
3	Business Opportunity Selection and Guidance	
4	Planning for completion & Growth	
5	Problem solving-An Entrepreneur skill	

Glossary: Industrial Terms

Terms related to finance, materials, purchase, sales and taxes.

Components of Project Report:

1. Project Summary (One page summary of entire project)
2. Introduction (Promoters, Market Scope/ requirement)
3. Project Concept & Product (Details of product)
4. Promoters (Details of all Promoters- Qualifications, Experience, Financial strength)
5. Manufacturing Process & Technology
6. Plant & Machinery Required
7. Location & Infrastructure required
8. Manpower (Skilled, unskilled)
9. Raw materials, Consumables & Utilities
10. Working Capital Requirement (Assumptions, requirements)
11. Market (Survey, Demand & Supply)
12. Cost of Project, Source of Finance
13. Projected Profitability & Break Even Analysis
14. Conclusion.

PROFESSIONAL PRACTICES – V - TW

(ELECTRICAL ENGINEERING GROUP)

Subject Code	Term Work						Credits
1620511	No. of Periods Per Week			Full Marks	:	25	01
	L	T	P/S	Internal	:	07	
	—	—	03	External	:	18	

CONTENTS: TERM WORK

	Activity	Hours
Unit-1	**Industrial Visits** Structured industrial visits be arranged and report of the same should be submitted by the individual student, to form a part of the term work. Following are the suggested type of Industries/ Fields - i) Visit to Electrical Machine Manufacturing Industry. ii) Visit to a Foundry to see Furnaces and Ovens. iii) Visit to L & T LT Switchgear Laboratory at Pune. iv) Visit to Railway Station to study operation of Signaling system. v) Visit to Loco shade or EMW at Nasik. vi) Visit to Large Industry to study Protection Schemes. vii) Any Industry having Automation for manufacturing Processes.	16
Unit-2	**The Guest Lecture/s from field/industry experts, professionals to be arranged minimum 3 Lectures each of two hours from the following or alike topics. The brief report to be submitted on the guest lecture by each student as a part of Term work** a) Modern trends in A. C. Machines b) Bio Medical Instruments: Working, Calibration etc c) Testing of Switchgears d) Computer aided drafting. e) Automotive wiring & lighting. f) Environmental pollution & control. g) Interview Techniques. h) Automobile pollution, norms of pollution control.	10
Unit-3	**Information Search (Student seminars based on information search & guest lecture topics.)** a) Magnetic Levitation Systems b) Recent developments in use of Electrically operated vehicles for mass ransport c) Metro Railway in Kolkata and Delhi comparative study d) Electrically operated Motor Cars and Scooters/Motorbikes e) Alternative fuels & energy options. f) Any other topic	06
Unit-4	**Group Discussion :** The students should discuss in group of six to eight students and write a brief report on the same as a part of term work. The topic of group discussions may be selected by the faculty members. Some of the suggested topics are - i) CNG versus LPG as a fuel. ii) Load shading and remedial measures. iii) Rain water harvesting. iv) Trends in energy conservation v) Disaster management. vi) Use of Plastic Carry Bags vii) Safety in day to day life. viii) Energy Saving in Institute.	06
Unit-5	**Seminar :** Seminar topic should be related to the subjects of fifth semester / topics from information search & guest lectures. Each student shall submit a report of at least 10 pages and deliver a seminar (Presentation time – 10 minutes)	10
	Total	**48**

STATE BOARD OF TECHNICAL EDUCATION, BIHAR

Scheme of Teaching and Examinations for

V SEMESTER DIPLOMA IN ELECTRONICS ENGINEERING

(Effective from Session 2016-17 Batch)

THEORY

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME							Credits
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks (A)	Class Test(CT) Marks (B)	End Semester Exam. (ESE) Marks (C)	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	
1.	Microprocessor & Applications	1621501	03	03	10	20	70	100	28	40	03
2.	Electronics Measurement – II	1621502	04	03	10	20	70	100	28	40	03
3.	Radio & Telecommunication System	1621503	03	03	10	20	70	100	28	40	03
4.	Power Electronics	1621504	04	03	10	20	70	100	28	40	03
5.	Television Engineering	1621505	03	03	10	20	70	100	28	40	03
		Total:- 17					**350**	**500**			

PRACTICAL

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME					Credits
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	
					Internal (A)	External (B)			
6.	Radio & T.V. Engineering Lab.	1621506	06	04	15	35	50	20	03
7.	Digital Electronics & M.P. Lab.	1621507	06	04	15	35	50	20	03
		Total:-	**12**				**100**		

TERM WORK

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME				Credits
			Periods per week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	
8.	Power Electronics - TW	1621508	04	15	35	50	20	01
9.	In plant training and Visit to Works - TW	1621509	4 weeks continuous	30	70	100	40	02
		Total:-	**04**			**150**		
Total Periods per week Each of duration One Hours		**=**	**33**			**Total Marks = 750**		**24**

MICROPROCESSOR & APPLICATION

Subject Code 1621501	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale :

Objective:

S.No.	Topics	Periods
01	Introduction 8085.	10
02	Microprocessor Software Concepts.	10
03	Peripheral Interfacing and Timers.	05
04	Assembly Language Programming.	05
05	A/D and D/A converters.	05
06	Introduction to Advanced Microprocessors (Intel 8086 & others)	10
07	Applications.	05
	Total :	**(50)**

Contents : Theory			Hrs/week	Marks
Unit-1	**INTRODUCTION 8085:**		**(10)**	
	01.01	Architecture & Pin Diagram.		
	01.02	Chip Architecture.		
	01.03	Register Structure.		
	01.04	Memory Addressing.		
	01.05	8085 Addressing Modes.		
	01.06	8085 Instruction sets.		
	01.07	8085 Instruction timing and execution.		
	01.08	8085 Interrupt System.		
	01.09	8085 D M A.		
	01.10	8085 S I D & S O D lines.		
Unit-2	**MICROPROCESSOR SOFTWARE CONCEPTS:**		**(10)**	
	02.01	Instruction formats.		
	02.02	Addressing Modes.		
	02.03	Instruction Types.		
	02.04	Data Transfer Instructions.		
	02.05	Arithmetic Instructions.		
	02.06	Logical Instructions.		
	02.07	Prog. Control Instructions.		
	02.08	Input / Output Instructions.		
	02.09	Introduction to assembly language programming.		
Unit-3.	**PERIPHERAL INTERFACING AND TIMERS:**		**(05)**	
	03.01	Intel 8251, 8255, 8253 and 8259 chips.		
	03.02	555 Timers.		
Unit-4	**ASSEMBLY LANGUAGE PROGRAMMING:**		**(05)**	
Unit-5	**A/D AND D/A CONVERTERS:**		**(05)**	
	05.01	Successive apporox type A/D.		

	05.02	Counter type A/D.		
	05.03	Dual Slope Type A/D.		
	05.04	Sample and Hole Circuits A/D.		
Unit-6	**INTRODUCTION TO ADVANCED MICROPROCESSORS.**		**(10)**	
	06.01	8085, 68000, Z800- Brief discussion of each		
	06.01.01	Architecture of Intel 8086		
	06.01.02	Instruction Set.		
	06.01.03	Addressing Modes.		
	06.01.04	Advanced features.		
	06.01.05	Stacks.		
Unit-7	**APPLICATIONS.**		**(05)**	
	07.01	A few examples.		
		Total	**50**	

Books Recommended:

1. Digital Computer System - Malvino
2. Introduction to Microprocessor - Prof. B. Ram
3. Microprocessor Architecture - Gaonkar
4. Microprocessor and Microcomputer - Lui and Gibson

ELECTRONICS MEASUREMENT – II

Subject Code 1621502	Theory			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	04	—	—	TA	:	10	
				CT	:	20	

Rationale:

Objective:

S.No.	Topics	Periods
01	High Frequency Measurement.	(12)
02	Electronic Measurement.	(08)
03	Digital Measuring Instrument.	(10)
04	Instruments for Generation and Analysis of waves.	(06)
05	Transducers and Sensors.	(08)
06	Optical Measuring Instruments.	(06)
07	Data Acquisition System (DAS).	(10)
	Total:	**60**

Contents : Theory			Hrs/week	Marks
	HIGH FREQUENCY MEASUREMENT:		**[12]**	
Unit-1	01.01	Introduction.		
	01.02	Resonance method.		
	01.03	Measurement of inductance by reactance variation method.		
	01.04	Measurement of capacitance by reactance variation method.		
	01.05	Measurement of effective resistance by variation method.		
	01.06	T Net work.		
	01.07	Parallel T network.		
	01.08	Bridge T network.		
	01.09	Q measurement.		
	01.10	Measurement of frequency.		
	01.11	Radio receiver characteristics measurement.		
	01.11.01	Sensitivity.		
	01.11.02	Selectivity.		
	01.11.03	Fidelity.		
	01.11.04	Noise figure.		
Unit-2	**ELECTRONIC MEASUREMENT:**		**[08]**	
	02.01	Electronic voltmeters (average and peak reading) VTVM.		
	02.02	Rectifier-Amplifier and amplifier-rectifier type VTVM.		
	02.03	Transistor voltmeters.		
	02.04	Differential voltmeter.		
	02.05	Small current measurement.		
Unit-3	**DIGITAL MEASURING INSTRUMENT:**		**[10]**	
	03.01	Digital Vs. analog systems.		
	03.02	Diode matrix.		
	03.03	Digital display system.		
	03.04	Digital read out system.		
	03.05	Digital frequency meter.		
	03.06	Period measurement.		
	03.07	Time interval measurement.		
	03.08	Digital voltmeter: Introduction and types.		
	03.08.01	Potentiometer etc. type.		
Unit-4	**INSTRUMENTS FOR GENERATION AND ANALYSIS OF WAVES:**		**[06]**	
	04.01	Basic oscillator circuit.		
	04.02	Pulse and square wave generator.		
	04.03	Signal/function generator.		
	04.04	Signal/function wave analyser.		
	04.05	Harmonic distortion anlyser.		
	04.06	Spectrum analyser.		

Unit-5	**TRANSDUCERS AND SENSORS:**		**[08]**	
	05.01	Introduction and classification.		
	05.02	Electrical phenomenon employed in transducer.		
	05.03	Linear variable differential transformer.		
	05.04	Rotary variable reluctance transducer.		
	05.05	Variable reluctance transducer.		
	05.06	Synchros resolvers.		
	05.07	Strain gauges.		
	05.08.01	Wire wound.		
	05.08.02	Pirani gauge.		
	05.08.03	Semi Conductor types.		
	05.09.	Seismic accelerometer.		
	05.10.	Thermisters.		
	05.11	Microphones (different type of introduction only)		
Unit-6	**OPTICAL MEASURING INSTRUMENTS:**		**[06]**	
	06.01	Black body.		
	06.02	Primary and secondary standards.		
	06.03	Measurement of lumen intensity.		
	06.04	Photo emissive cell.		
	06.05	Photo conductive cell.		
	06.06	Photo voltaic cell.		
Unit-7	**DATA ACQUISITION SYSTEM (DAS):**		**[10]**	
	07.01	Classification.		
	07.02	Components of analog DAS.		
	07.03	Components of digital DAS.		
	07.04	Uses of DAS.		
	07.05	Digital to analog converter.		
	07.06	Analog to digital converter.		
	07.07	Multiplexing equipment.		
		Total	**60**	

Books Recommended:

1. Electronic Instrument and Measurement Techniques. - Cooper.
2. A Course in Elect. and Electronics Measurement - Sawhney.
3. Electrical and Electronics Measurement. - Golding.

RADIO & TELECOMMUNICATION SYSTEM

Subject Code 1621503	Theory			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale:

Objective:

S.No.	Topics	Periods
01	Elements of Communications.	(08)
02	Radio Receiver.	(06)
03	Propagation of Waves.	(08)
04	Antenna.	(06)
05	Radar and Navigation Aids.	(10)
06	Satellite Communication.	(06)
07	Analog Transmission.	(06)
08	Digital Transmission.	(04)
09	Switching.	(06)
	Total:	**(60)**

Contents : Theory			Hrs/week	Marks
Unit-1	**ELEMENTS OF COMMUNICATIONS:**		**[08]**	
	01.01	Principle of heterodyning.		
	01.02	Mixers.		
	01.03	Converters.		
	01.04	Radio Transmitters.		
	01.04.01	Block Diagram.		
	01.04.02	Operation and performance of AM and FM Transmitters.		
Unit-2	**RADIO RECEIVER:**		**[06]**	
	02.01	Block diagram of AM and FM Radio Receivers.		
	02.02	Principle of Operation.		
	02.03	Different stages i.e. R. F. Section, I F Stage, Local Oscilloator, mixer, tuning, band selection and switch, Volume Control.		
Unit-3	**PROPAGATION OF WAVES:**		**[08]**	
	03.01	Introduction to various modes of propagation.		
	03.02	Ground wave propagation.		
	03.03	Space wave propagation.		
	03.04	Tropospheric wave propagation.		
	03.05	Refraction by tropospheric wave.		
	03.06	Tilt of surface wave.		
	03.07	Sky wave propagation.		
	03.08	Ionospheric propagation.		
	03.08.01	Introduction.		
	03.08.02	Critical frequency.		
	03.08.03	Maximum usable frequency.		
	03.08.04	Characteristics of ionospher.		
	03.08.05	Virtual height.		
	03.08.06	SKIP distance.		
	03.08.07	Troppspheric scattering system.		
Unit-4	**ANTENNA:**		**[06]**	
	04.01	Introduction.		
	04.02	Radiation intensity.		
	04.03	Directivity.		
	04.04	Gain.		
	04.05	Field Pattern.		
	04.06	Phase Pattern.		
	04.07	General equation for field of a point source.		
	04.08	Introduction to working principle of- Helical, Biconical, Horn, lense, Long wire, Yagi type of Antennas.		

Unit-5	**RADAR AND NAVIGATION AIDS:**		**[10]**	
	05.01	Elements of RADAR System.		
	05.02	Radar Equation.		
	05.03	Radar transmitting system.		
	05.04	Radar antenna and scanning.		
	05.05	Duplexer.		
	05.06	Radar Receiver.		
	05.07	Moving Target Indicator.		
	05.08	Radar range and beckons.		
Unit-6	**SATELLITE COMMUNICATION:**		**[05]**	
	06.01	Introduction.		
	06.02	Need.		
	06.03	Low orbiting satellites.		
	06.04	Geo stationary satellite.		
	06.05	Choice of frequency bands.		
	06.06	Satellite broadcasting.		
	06.07	Remote sensing : basic principle.		
Unit-7	**ANALOG TRANSMISSION:**		**[04]**	
	07.01	DC signalling, AC signalling and Band Width, Transmission media, attenuators and repeaters, Modems.		
Unit-8	**DIGITAL TRANSMISSION:**		**[04]**	
	08.01	Digital Channels and PCM, Optical Fibre Transmission Systems, Integrated Services Digital Network (ISDN), ISDN Services & Applications, Broad Band Networks.		
Unit-9	**SWITCHING:**		**[06]**	
	09.01	Telephone Switching-Stroggler : Switching Systems, Crossbar Switching, Electronic space, Division switching, Speech digitization and transmission, Time Division Switching, Optical Fibre Systems, Traffic Engg., Telephone Networks, Data Networks.		
		Total-	60	

Books Recommended:

1. Electronic Communication System - Kennedy.
2. Radio Engineering - Chatterjee.
3. Telecommunications and the Computers, PHI. - James Martin.
4. Telecommunication Switching Systems & Networks, PHI. - T. Vishwanathan.

POWER ELECTRONICS

Subject Code 1621504	Theory			No of Period in one session :50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	04	—	—	TA	:	10	
				CT	:	20	

Rationale:

Objective:

S.No.	Topics	Periods
01	Regulated Power Supply.	(05)
02	Large Signal Amplifier.	(08)
03	Thyristors.	(06)
04	Power Switching Devices and Triggering Circuits.	(06)
05	A C Power Control and Motor Speed Control.	(05)
06	Line Commutated Converters.	(04)
07	Inverters.	(06)
08	Choppers.	(06)
09	Speed Control of D. C. Motor.	(01)
10	Speed Control of A. C. Motor.	(03)
	Total:	**(50)**

Contents : Theory			Hrs/week	Marks
Unit-1	**REGULATED POWER SUPPLY:**		**[05]**	
	01.01	Series Regulators.		
	01.02	Shunt Regulators.		
	01.03	Over load and over voltage protection.		
	01.04	Switching mode regulators.		
Unit-2	**LARGE SIGNAL AMPLIFIER:**		**[08]**	
	02.01	Introduction.		
	02.02	Classification.		
	02.03	Class A, B, AB and C amplifier.		
	02.04	Harmonic Distortion.		
	02.05	Transformer Coupled Amplifier.		
	02.06	Push Pull Amplifier. (Class-B)		
	02.07	Cross over distortion and its elimination.		
Unit-3	**THYRISTORS:**		**[06]**	
	03.01	Thyristor family, symbol and working.		
	03.02	Silicon controlled rectifier operation.		
	03.03	SCR characteristics.		
	03.04	Two transistor analogy.		
	03.05	Methods of turning on.		
	03.06	Turn off mechanism.		
	03.07	Device ratings.		
	03.08	Series and Parallel operation of SCR.		

Unit-4	**POWER SWITCHING DEVICES AND TRIGGERING CIRCUITS:**		**[06]**	
	04.01	Diac.		
	04.02	Triac.		
	04.03	U J T.		
	04.04	Relaxation Oscillator.		
	04.05	Use of Diac and Triac.		
	04.06	Resistance turn on circuit.		
	04.07	R C turn on circuit.		
Unit-5	**A C POWER CONTROL AND MOTOR SPEED CONTROL:**		**[05]**	
	05.01	Phase control.		
	05.02	Full wave control circuit.		
	05.03	Half controlled bridge circuit.		
	05.04	Dual Converters.		
Unit-6	**LINE COMMUTED CONVERTERS:**		**[04]**	
	06.01	Line commuted circuit.		
	06.02	Effect of source impedance.		
	06.03	Inverter operation.		
Unit-7	**INVERTERS:**		**[06]**	
	07.01	Forced commutation inverters.		
	07.02	Classification of forced commutation.		
	07.03	Parallel inverter.		
	07.04	Self commutated inverter.		
	07.05	Bridge inverter single and three phase.		
Unit-8	**CHOPPERS:**		**[06]**	
	08.01	On off control.		
	08.02	Rotor on off control chopper circuit.		
	08.03	Improved on off circuits.		
	08.04	Step up chopper circuit.		
	08.05	Multi phase circuit.		
	08.06	Two quadrant Choppers.		
	08.07	A C Choppers.		
Unit-9	**SPEED CONTROL OF D. C. MOTOR.**		**[01]**	
Unit-10	**SPEED CONTROL OF A. C. MOTOR.**		**[03]**	
		Total-	**50**	

Books Recommended:

1. SCR - Gentry and Others.
2. Thyristor and Their Application - Ramamoorthy.
3. SCR - P. C. Sen.
4. SCR Mannual - Gen. Electric Co.
5. SCR - Sugandhi and Sugandhi

TELEVISION ENGINEERING

Subject Code 1621505	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale:

Objective:

S.No.	Topics	Periods
01	Introduction.	(04)
02	Monochrome Picture Tube.	(08)
03	Basic T V Broadcasting.	(08)
04	T. V. Receiver.	(06)
05	Colour Television.	(08)
06	Remote Control.	(04)
07	Special Circuits	(06)
08	Receiver Servicing.	(06)
	Total:	**(50)**

Contents : Theory			Hrs/week	Marks
Unit-1	**INTRODUCTION:**		**[04]**	
	01.01	Elements of T. V. System.		
	01.02	Analysis and synthesis of T. V. Picture.		
	01.03	Composite video signal.		
Unit-2	**MONOCHROME PICTURE TUBE:**		**[08]**	
	02.01	Camera tubes.		
	02.02.01	Image orthicon.		
	02.02.02	Vidicon.		
	02.02.03	Plumbicon.		
	02.02.04	Comparison between one another.		
Unit-3	**BASIC T V BROADCASTING:**		**[08]**	
	03.01	Block diagram of T. V. Transmission.		
	03.02	Principle of operation.		
	03.03	T. V. Signal propagation.		
	03.04	Antennas used for transmission.		
	03.05	Antenna used for reception.		

Unit-4	**T. V. RECEIVER:**		**[06]**	
	04.01	Classification.		
	04.02	Block diagram.		
	04.03	Different sections.		
	04.04	Tuners.		
Unit-5	**COLOUR TELEVISION:**		**[08]**	
	05.01	Compatibility.		
	05.02	Three colour theory.		
	05.03	Colour Camera.		
	05.04	Colour receiver tubes.		
	05.05	Colour T. V. Transmitter and receiver block diagram.		
	05.06	Colour signal transmission and reception.		
	05.07	PAL system details.		
Unit-6	**REMOTE CONTROL:**		**[04]**	
	06.01	Introduction.		
	06.02	Special Circuits.		
	06.03	Booster amplifier.		
	06.04	Automatic brightness Control.		
Unit-7	**SPECIAL CIRCUITS:**		**[06]**	
	08.01	Closed circuit T V.		
	08.02	Cable T. V.		
	08.03	V C P and V C R Monitors.		
Unit-8	**RECEIVER SERVICING:**		**[06]**	
	10.01	Troubleshooting procedures for monochrome T. V.		
	10.02	Troubleshooting procedures for colour T. V.		
	10.03	Safety precautions.		
		Total-	**50**	

Books Recommended:

1. Television. - R. C. Gulati.
2. Monochrome Television. - Grob.
3. Colour Television. - Grob.
4. Television. - Dhakne.

RADIO & TELEVISION ENGINEERING LAB.

Subject Code 1621506	Practical			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	03
	L	T	P/S	ESE	:	50	
	—	—	06	Internal	:	15	
				External	:	35	

Contents : Practical		Hrs/week	Marks
Unit-1	Study of operation of CTV.		
Unit-2	Video tape recorder circuit operation.		
Unit-3	Study of pattern generator.		
Unit-4	Familiarization with Black and White T. V. Receiver.		
Unit-5	Familiarization with Colour T. V. Receiver.		
Unit-6	Study and serving of CRT, deflection and high voltage section.		
Unit-7	Alignment of I F and frequency response curve.		
Unit-8	Study and serving of sound section.		
Unit-9	Study and serving of VHF & UHF tuner circuit.		
Unit-10	Study of Chrome section and colour sync. Circuit.		
Unit-11	Study of typical yagi antenna.		
Unit-12	Study of Remote control circuit.		
Unit-13	Study of VCR circuit.		
Unit-14	Study of video recording room.		

DIGITAL ELECTRONICS & MICROPROCESSOR LAB.

Subject Code 1621507	Practical			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	03
	L	T	P/S	ESE	:	50	
	—	—	06	Internal	:	15	
				External	:	35	

Contents : Practical		Hrs/week	Marks
Unit-1	Operation of Mono stable multivibrator circuit.		
Unit-2	Operation of Bi stable multivibrator circuit.		
Unit-3	Operation of Astable multivibrator circuit.		
Unit-4	Operation of Schmitt trigger circuit.		
Unit-5	Operation of Comparator circuit.		
Unit-6	Operation of Integrator circuit.		
Unit-7	Operation of Blocking Oscillator circuit.		
Unit-8	Operation of Shift registers and counters.		
Unit-9	Operation of EPROM eraser.		
Unit-10	Operation of Multiplexers ICs.		
Unit-11	Operation of D/A converter.		
Unit-12	Operation of A/D converter.		
Unit-13	Operation of R-2R ladder network.		
Unit-14	Operation of Sample and Hold circuit.		
Unit-15	Operation of Delta modulation circuit.		
Unit-16	Operation of seven segments display circuit.		

POWER ELECTRONICS LAB

Subject Code 1621508	Term Work			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	01
	L	T	P/S	Internal	:	15	
	—	—	04	External	:	35	

Contents : Term Work		Hrs/week	Marks
Unit-1	Series regulated power supply.		
Unit-2	Shunt regulated power supply.		
Unit-3	Characteristics of S C R.		
Unit-4	Operation of controlled rectifier.		
Unit-5	Study of parallel inverter circuit.		
Unit-6	Study of series inverter circuit.		
Unit-7	Operation of various speed control methods of induction motor.		
Unit-8	Speed control of D C motor.		
Unit-9	Speed control of synchronous motor.		
Unit-10	Operation of magnetic amplifier.		
Unit-11	Input / Output characteristics of OP AMP.		
Unit-12	Amplifier circuit operation using 723 and 309 IC.		

INPLANT TRAINING AND VISIT TO WORKS

Subject Code 1621509	Term Work			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	100	02
	L	T	P/S	Internal	:	30	
	—	—	4 Weeks Continues	External	:	70	

Rationale :

A student is required to develop his knowledge skill and attitudes gained while joining through different course. It is desirable to expose the students to the world of work to be familiar with the real life situations and understand the problem there in. The "In plant training and visit to work "being introduced for the final year part time diploma technicians for Electronics Engineering with the above objective in view. This course will help the students to observe how the technical, managerial, quality control safety and other principle, are being applied in real life situation. They will be able to observe the technique of decision making on the shop floor. He will also, be able to observe the technique of decision making on the shop floor. He will, also be able to observe how his sub-ordinate perform in their day to day work and co-ordinate shop floor activities. The course will also, help bring attitudinal changes in a student.

Objective:

A student will be able to:

- Understand the working of the machines, tools and equipments more clearly.
- Write down the specifications of the machines, tools, equipments.
- Know the process of material storing / material management.
- Learn to maintain office records / filing.
- Know the process of planning, implementation and monitoring.
- Learn the skill shop floor co-ordination.
- Know the skill of office management and inventory Control.
- Understand the process of production.
- Know the skill of quality control.
- Know the organizational set-up and plant Lay-out.
- Find out Characteristics, Functions, and activities of those industries.
- Find out opportunities and method of recruitments.
- Know the source of raw materials and markets for industries.
- Find out the special characteristics of the industries.
- Observe and understand special machines, which they may not have been in their institutes.
- Observe the energy consumption in on industry method to same energy.
- Try to learn techniques to save energy.
- Observe the environment Pollutants and learn how to minimize environmental Pollutio

Student should preferably visit and undergo training in the following industries:-

	Contents : Term Work	Hrs/week	Marks
Unit-1	Microwave Tower Stations.		
Unit-2	Radio Stations.		
Unit-3	T. V. Stations.		
Unit-4	Telephone Exchange.		
Unit-5	Railway Signaling System Station.		
Unit-6	Wireless Transmission & Distribution System.		
Unit-7	Any other Industry which may be useful to the electronics Engineering technicians and are comfortably situated.		

REPORT WRITING:

A report on “In Plant Training” should include

Introduction.

Plant Lay-out and organization.

Planning for Product/Maintenance/Repair.

Shop floor training.

Testing and quality control facility.

Special observations which are special characteristics of the plant viz. material storing etc.

Conclusion-

- Observations
- Typical Characteristics
- Area of Weakness
- Suggestions

SCHEDULE FOR TRAINING:

- Planning/Office Management - One Week
- Shop floor - Two Weeks
- Testing/Quality Control/Stores - One Week

The report on visit to works should be presented and assessed in the form of Seminar.

STATE BOARD OF TECHNICAL EDUCATION, BIHAR

Scheme of Teaching and Examinations for
V SEMESTER DIPLOMA IN INSTRUMENTATION AND CONTROL ENGG.

(Effective from Session 2016-17 Batch)

THEORY

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME							Credits
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks (A)	Class Test(CT) Marks (B)	End Semester Exam. (ESE) Marks (C)	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	
1.	Microprocessor & Application	1621501	03	03	10	20	70	100	28	40	03
2.	Automatic Control System	1640502	03	03	10	20	70	100	28	40	03
3.	Electronics Measurement	1640503	04	03	10	20	70	100	28	40	03
4.	Power System- I	1640504	03	03	10	20	70	100	28	40	03
5.	Power Electronics	1640505	04	03	10	20	70	100	28	40	03
		Total:- 17					**350**	**500**			

PRACTICAL

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME					Credits
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	
					Internal (A)	External (B)			
6.	Control System Lab	1640506	04	04	15	35	50	20	03
7.	Electronics & Micro Processor Lab	1640507	04	04	15	35	50	20	02
		Total:- 08					**100**		

TERM WORK

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME				Credits
			Periods per week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	
8.	Electrical & Electronics Measurement	1640508	04	15	35	50	20	02
9.	Industrial Project And Entrepreneurship Development	1640509	04	30	70	100	40	02
		Total:- 08				**150**		
Total Periods per week Each of duration one Hours **= 33**						**Total Marks = 750**		**24**

MICROPROCESSOR & APPLICATION

Subject Code 1621501	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale :

Objective:

S.No.	Topics	Periods
01	Introduction 8085.	10
02	Microprocessor Software Concepts.	10
03	Peripheral Interfacing and Timers.	05
04	Assembly Language Programming.	05
05	A/D and D/A converters.	05
06	Introduction to Advanced Microprocessors (Intel 8086 & others)	10
07	Applications.	05
	Total :	**(50)**

Contents : Theory			Hrs/week	Marks
Unit-1	**INTRODUCTION 8085**		**(10)**	
	03.01	Architecture & Pin Diagram.		
	03.02	Chip Architecture.		
	03.03	Register Structure.		
	03.04	Memory Addressing.		
	03.05	8085 Addressing Modes.		
	03.06	8085 Instruction sets.		
	03.07	8085 Instruction timing and execution.		
	03.08	8085 Interrupt System.		
	03.09	8085 D M A.		
	03.10	8085 S I D & S O D lines.		
Unit-2	**MICROPROCESSOR SOFTWARE CONCEPTS**		**(10)**	
	04.01	Instruction formats.		
	04.02	Addressing Modes.		
	04.03	Instruction Types.		
	04.04	Data Transfer Instructions.		
	04.05	Arithmetic Instructions.		
	04.06	Logical Instructions.		
	04.07	Prog. Control Instructions.		
	04.08	Input / Output Instructions.		

	04.09	Introduction to assembly language programming.		
Unit-3.	**PERIPHERAL INTERFACING AND TIMERS**		**(05)**	
	05.01	Intel 8251, 8255, 8253 and 8259 chips.		
	05.02	555 Timers.		
Unit-4	**ASSEMBLY LANGUAGE PROGRAMMING**		**(05)**	
Unit-5	**A/D AND D/A CONVERTERS**		**(05)**	
	07.01	Successive apporox type A/D.		
	07.02	Counter type A/D.		
	07.03	Dual Slope Type A/D.		
	07.04	Sample and Hole Circuits A/D.		
Unit-6	**INTRODUCTION TO ADVANCED MICROPROCESSORS**			
	08.01	8085, 68000, Z800- Brief discussion of each		
	08.01.01	Architecture of Intel 8086		
	08.01.02	Instruction Set.		
	08.01.03	Addressing Modes.		
	08.01.04	Advanced features.		
	08.01.05	Stacks.		
Unit-7	**APPLICATIONS**		**(05)**	
	09.01	A few examples.		
		Total-	**50**	

Books Recommended:

1. Digital Computer System - Malvino
2. Introduction to Microprocessor - Prof. B. Ram
3. Microprocessor Architecture - Gaonkar
4. Microprocessor and Microcomputer - Lui and Gibson

AUTOMATIC CONTROL SYSTEM

Subject Code 1640502	Theory			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale and objectives :-

This course introduces various control mechanisms, modes and derives with are necessary to understand simple control systems in a process plants. With the knowledge of control system components one must here the idea about time and frequency response of the system with the objective to provide a logical understanding of the subject the topics are designed in a semiotic manner .

SL.NO.	TOPIC	PERIODS
1.	Introduction	6
2.	Lap lace Transform	6
3	Mathematical modeling of physical systems	4
4.	Control system components	7
5.	Root locus Technique	4
6.	Time Response Analysis	6
7.	Concept of stability and Algebraic criteria	6
8.	Frequency Response Analysis	8
9.	Stability in Frequency Domain	8
10.	Introduction to state-space Approach	5
	Total-	**60**

Contents : Theory			Hrs/week	Marks
Unit-1	[1]	**Introduction**	[6]	
	1.1	The control system, open loop and closed loop control		
	1.2	Servomechanism		
	1.3	Control of physical quantity live temperature, flow, liquid lend etc.		
	1.4	Feedback and non-feedback systems, Regenerative feedback		
Unit-2	[2]	**Lap lace transform**	[6]	
	2.1	The lap lace transform		
	2.2	The inverse lap lace transform		
	2.3	Properties of Lap lace transform		
	2.4	Solving differential equations by lap lace transform method.		
Unit-3.	[3]	**Mathematical modeling of physical system.**	[4]	
	3.1	Differential equations of physical system		
	3.2	Transform function		
Unit-4	[4]	Control system Components	**[7]**	
	4.1	Introduction		
	4.2	Controller Components		
	4.3	A.C & D.C Servomotor		
	4.4	Potentiometer, synchros, Tachometer Amplidyne and Metodyne.		

Unit-5	[5]	**Root Locus Technique**	[4]	
	5.1	Introduction		
	5.2	The Root locus Technique		
	5.3	Construction of root locus		
Unit-6	[6]	**Time Response Analysis**	[6]	
	6.1	Standard test signals		
	6.2	Time response of first order systems		
	6.3	Time response of second order system		
	6.4	Time response specification		
	6.5	Steady state errors and error constants		
Unit-7	[7]	**Concept of stability and algebraic criteria**	[6]	
	7.1	The concept of stability		
	7.2	Necessary conditions for stability		
	7.3	Routh Huraitz stability criterion		
	7.4	Relative stability analysis.		
Unit-8	[8]	**Frequency Response Analysis**	[8]	
	8.1	Introduction		
	8.2	Correlation between time response and frequency response.		
	8.3	Bode plots and polar plots of different types of transfer function		
Unit-9	[9]	**Stability in frequency domain**	[8]	
	9.1	Mathematical preliminaries		
	9.2	Nyquist stability criterion		
	9.3	Assessment of relative stability using nyquist stability Criterion, Phase margin, gain merging.		
	9.4	Closed loop frequency response.		
Unit-10	[10]	**Introduction to state space approach**	[5]	
	10.1	Concept of state		
	10.2	state variables and state model		
	10.3	Controllability and observability		
		Total	**60**	

Books Recommended :-

1. Control system engineering - I.J Nagrath / M.Gopal
2. Control system engineering - Sushil Das gupta
3. Automatic Control systems - S. Hassan Saeed- s.k kataria & sons
4. Control system engineering - Nise-Willey

ELECTRONICS MEASUREMENT

Subject Code 1640503	Theory			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	04	—	—	TA	:	10	
				CT	:	20	

	Contents : Theory	Hrs/week	Marks
Unit-1	**High Frequency Measurement :** Introduction, Resonance method, Measurement of inductance by reactance variation method, measurement of capacitance by reactance variation method , measurement of effective resistance by variation method, T& Bridge network, measurement of Q and Frequency, Radio receiver characteristics measurement.		
Unit-2	**Electronic Measurement :** Electronic voltmeters VTVM, Rectifier Amplifier and amplifier rectifier type VTVM Transistor voltmeter, Electronics galvanometer and frequency meter.		
Unit-3	**Digital Measurement :** Digital vs analog Ajsters, Digital voltmeter and frequency meter, Period and time interval measurement.		
Unit-4	**Instruments for generation and Analyses of works:** Basic oscillator circuit, pulse and same wave generator.		
Unit-5	**Transducers and sensors :** Classification, linear variable differential transducer syrcheos resolves, Tachometer, Stalin ganges, thermitors.		
Unit-6	**Optical measuring Instruments :** Black body, Measurement of linear intensity, photo enussive and conductive cell, photo voltaic cell.		
Unit-7	**Data Acquisition System (DAS):** Components of digital and Analog DAS, Analog to digital Converter Digital to Analog Converter, PLC.		

POWER SYSTEM – I

Subject Code 1640504	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

1. Generation -- 18
2. Transmission -- 36
3. Distribution -- 06

Contents : Theory			Hrs/week	Marks
Unit-1	**Generation:-**		(04)	
	1.01	Thermal Power Station		
	I	Site Selection		
	II	Main Parts and their working		
	III	Thermal Power Station layout		
	1.02	Hydro Electric Power Station	(04)	
	I	Selection of Site and Principle of Working of a hydro-electric power plant.		
	II	Types of turbines used		
	III	Structure and layout of hydro-electric plant		
	IV	Simple problems.		
	1.03	Nuclear Power Station	(06)	
	I	Elements of a nuclear power station types of nuclear, reactions, chain reaction		
	II	Main parts of a reactor and their functions.		
	III	Structure and layout of nuclear power plant.		
Unit-2	**Transmission:-**			
	2.01	Constants of overhead Transmission Lines	(12)	
	I	Flux Linkages of one conductor in a group of Conductors.		
	II	Inductance of Two-wire Transmission Line		
	III	Inductance of 3- unsymmetrical spaced Transmission Line with transposition, Problems.		
	IV	Potential difference between two points due to a Line charge.		
	V	Capacitance of a 1-Ø Transmission Line		
	VI	Capacitance of a 3-Ø unsymmetrical spaced Transmission Line.		
	2.02	Mechanical design of Transmission Lines	(06)	
	I	Types of Line supports (Pole, Towers, Cross arms, Gay wires)		
	II	Calculation of Sag, Effect of ice and Wind pressure.		
	2.03	Overhead line Insulator and Corons		
	I	Type of insulators and their description		
	II	Method of increasing string efficiency		
	III	Phenomenon of Corona, Critical disruptive voltage	(08)	
	2.04	Performance of Transmission Line		
	I	Short Transmission Line-regulation and Transmission efficiency		

	II	Medium Transmission Line- End condenser Method, Nominal T-method and Nominal II method- regulation and transmission efficiency, Problems.		
	III	ABCD constants and Ferranti-effect		
	2.05	Underground cables	(04)	
	I	Types of cables		
	II	Insulation resistance		
Unit-3	**Distribution:-**		(06)	
	3.01	Distribution System		
	I	Comparision of various supply systems on the basis of equal maximum potential difference between any conductor and earth.		
	II	Choice of conductor size and Kelvin's Law.		
		Total	**50**	

Books Recommended:-

1. Electric Power (Generation, Transmission, Distribution, Protection) — Soni gupta & Bhatnagar
2. Electric Power (Hindi) — D.R.Nagpal
3. Principles of Power System — V.K. Mehta
4. Electrical Power System — C.L.Wadhwe
5. A Course in Power System — J.B. Gupta

POWER ELECTRONICS

Subject Code 1640505	Theory			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	04	—	—	TA	:	10	
				CT	:	20	

Rationale:

The courses is intended for man in electrical engineering technician training programme and people working in industries who want to up-grade their knowledge of electronics and electronics controlled circuits. The purpose is to enable the technicians to further advance their knowledge and acquaint them with day to day use of electronics in electrical control circuits.

Objective:

The fast moving advancement in the field of electronics has given rise to prepare a Diploma holder with up- to-date control and working of different types of machines. The through knowledge of this paper will enable him to face and work on the current modern machines properly.

S.No.	Topics	Periods
01	Circuit Devices	(15)
02	Applications of circuit Devices	(15)
03	Inverters and Choppers	(15)
04	Introduction to Electric Drive	(15)
	Total :	**(60)**

Contents : Theory		Hrs/week	Marks
Unit-1	**CIRCUIT DEVICES:** Review of power electronics devices, Diodes, Power transistors, UJT (Uni Junction Transistor), Thyristors, operational amplifier. Ideal characteristics. Analog to Digital convertor.	**[15]**	
Unit-2	**APPLICATIONS OF CIRCUIT DEVICES:** Introduction to switched mode power supply(SMPS), Static switches, Solid State relays, Wave generator.	**[15]**	
Unit-3	**INVERTERS AND CHOPPERS:** Pulse width Modulated Inverter, Single and three phase, A. C. voltage controllers, Switching functions of converters, Protection of devices, D. C. Choppers and control strategies. Introduction to U.P.S.	**[15]**	
Unit-4	**INTRODUCTION TO ELECTRIC DRIVE:** Concept of D. C. Drives, Single-phase D. C. Drives, Chopper drives, Induction motor drives, Introduction to analog digital drive and its application.	**[15]**	
	Total	**60**	

Books Recommended:

1. An Introduction to Thyristor and their applications - M. Ramamoorthy
2. Integrated circuits and semi conductor devices theory and application - Gordon J. Deboo & Clifford N. Burrous
3. Power Electronics and Rotating Electric Devices - R. S. Ramshaw
4. Power Electronics - Dr. P. S. Bhimbhra
5. Solid State Electronics Devices, TMH -
6. Integrated Electronics, McGraw Hill - Milliman
7. Semi Conductor Devices - S. M. Sze, Willey Eastern
8. Electronics Device and Circuits, Khanna Publishers - G. K. Mithal
9. Electronic Principles, TMH - A. P. Malvino
10. Transistor Approximation, TMH - A. P. Malvino
11. Introduction to Micro Electronic Devices - Pulfrey
12. Micro Electronic Devices, McGraw Hill - Yang

CONTROL SYSTEM LAB.

Subject Code 1640506	Practical			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	03
	L	T	P/S	ESE	:	50	
	—	—	04	Internal	:	15	
				External	:	35	

Name of Experiments:

Contents : Practical		Hrs/week	Marks
Unit-1	Study of D. C. position control servomechanism system.		
Unit-2	Study of Control System Components.		
Unit-3	Transient Response of First Order System.		
Unit-4	Transient Response of Second Order System.		
Unit-5	Frequency Response of Second Order System.		
Unit-6	ON-OFF temperature Control.		
Unit-7	Analogue Computer, Solution of different equation.		

ELECTRONICS & MICROPROCESSOR LAB.

Subject Code 1640507	Practical			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	04	Internal	:	15	
				External	:	35	

Rationale

The importance of the microprocessor based systems is well established. With the advent of microprocessor only the world of Digital Computer found its place in every sphere of our life. There are numerous application of this technology in the industries for control and efficient running of machineries. It is therefore essential that the students the students who read about this technology should also perform experiments to acquaint themselves with the actual working. The machine language which is the nearest programming language and is in close association of the Assembly Language to be introduced in this subject for practice. This subject will also enable the students to have an idea of memory management in Digital Computers.

Objectives

This will enable the students to have practical and physical concept of digital and electronics equipments. Thus it will make them a good supervisor for location and replacement of the faulty components.

LIST OF PRACTICALS

SL Experiments

1. Study of logic trainer kit and verification of Truth Table in respect of following:
    a. AND gate
    b. OR gate
    c. NAND gate
    d. NOR gate
    e. EX-OR gate
2. Study of the Microprocessor Kit (8085 based).
3. Study of D-Flip Flop and T-Flip Flop.
4. Programming to add two 8-bit numbers: Sum 8-bit.
5. Programming for 8-unit subtraction.
6. Decimal addition of two 8-bit numbers, Sum 16-bit.
7. Programming practice for 1's and 2's complement of a number.
8. Shifting an 8-bit number (left shift and right shift).
9. Program to find the largest and smallest numbers from a series of numbers stored in memory.
10. Program to arrange a series of numbers in ascending and descending order.
11. Interfacing of A/D converter (ADC 0800).
12. Display of Alphabetic and Numeric characters in the data field using LED display.
13. Measurement of Frequency.
14. Measurement and monitoring of Temperature.
15. To draw the static characteristic of a junction diode.
16. To measure the amplification factor of a NPN or PNP transistor.
17. To connect a common emitter amplifier and measure the gain.
18. Assembling and testing of a burglar's alarm etc.

ELECTRICAL & ELECTRONICS MEASUREMENT

Subject Code 1640508	Term Work			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	Internal	:	15	
	—	—	04	External	:	35	

Rationale:

The background of theoretical knowledge about Electrical instrument and m/c has been imparted in the theoretical papers.

However, the electrical Diploma Holders will require to handle various Electrical Instruments and m/cs in the field whenever they are given change of. So, it is necessary to acquaint the students with the practical aspects handling the Instruments & m/cs to increase their confidence and develop skill of level measurements, data entry, graph reading, analysis of the experimental results, etc.

Objectives:-

The coverage of syllabus is made in such a way that the students will get through knowledge of Handling the m/cs & Instruments. By performing such experiments they will gain confidence to face the problems and rectify they boldly. The students will develop skills of measuring taking data, their tabulations, plotting graphs, interpreting the data and the graphs to develop analytical skill.

Contents : Term Work		Hrs/week	Marks
Unit-1	Calibration of Ammeter by D. C. Potentiometer.	(06)	
Unit-2	Study of Transducers.	(06)	
Unit-3	Extension of Range of Ammeter and Voltmeters.	(06)	
Unit-4	Calibration of Wattmeter.	(06)	
Unit-5	Testing of Energy Meter.	(06)	
Unit-6	Measurement of single phase power without using wattmeter.	(06)	
Unit-7	Measurement of R, using Kelving Double Bridge Method.	(06)	
Unit-8	Measurement of Dielectric strength of Transformer Oil.	(09)	
Unit-9	Measurement of Point of fault in a given cable.	(09)	
Unit-10	Measurement of inductance by reactance variation method	( )	
Unit-11	Measurement of capacitance by reactance variation method	( )	
Unit-12	Radio receiver characteristic measurement	( )	
	Total :	**( )**	

Books Recommended:

1. Laboratory Expects in Electrical Power - C. S. Indulkay
2. Projects and Molecules in Electrical Electronics, Khanna Publishers - Bhatia
3. Study Electrical Appliances & Drives, Khanna Publishers - K. B. Bhatia
4. Testing Commissioning & Maintenance of Electrical Equipments, Khanna Publishers - S. Rao
5. Text Book & Laboratory Course in Electrical Engineering, S. Chand & Company - S. G. Jarnekar

INDUSTRIAL PROJECT AND ENTREPRENEURSHIP DEVELOPMENT

Subject Code	Term Work						Credits
1640509	No. of Periods Per Week			Full Marks	:	100	02
	L	T	P/S	Internal	:	30	
	—	—	04	External	:	70	

CONTENTS : TERM WORK

PART A) Industrial Project

Following activities related to project are required to be dealt with, during this semester

1. Form project batches & allot project guide to each batch. (Max. 4 students per batch)
2. Each project batch should select topic / problem / work by consulting the guide & / or industry. Topic / Problem / work should be approved by Head of department.
3. Each project batch should prepare action plan of project activities & submit the same to respective guide.
4. At the end of semester, each project batch should submit the action plan and abstract of the project along with list of materials required if project involves fabrication or other facilities required in other kinds of project.
5. Action Plan should be part of the project report. Actual work of project should be done in sixth semester.

Group	Projects
01	(1) Design of Illumination Scheme (Up to 20 KW) for Hospital / Shopping Mall / Cinema Theatre / Commercial Complex / Educational Institute / Industrial Complex. (2) Design of Rural Electrification Scheme for small Village, Colony. (3) Case Studies Related to Industries – Operation / Maintenance / Repair and Fault Finding. (Refer Guideline Document). (4) Energy Conservation and Audit. (5) Substation Model (Scaled) (6) Wind Turbine Model (Scaled) (7) Pole Mounted Substation Model (Scaled)
02	(1) Rewinding of Three Phase/Single Phase Induction Motor. (2) Rewinding of Single Phase Transformer. (3) Fabrication of Inverter up to 1000 VA. (4) Fabrication of Battery Charger. (5) Fabrication of Small Wind Energy System for Battery Charging. (6) Fabrication of Solar Panel System for Battery Charging. (7) Microprocessor/ Micro controller Based Projects. (8) PC Based Projects. (9) Simulation Projects.
03	Seminar on any relevant latest technical topic based on latest research, recent trends, new methods and developments in the field of Electrical Engineering / Power Electronics.

Part B: Entrepreneurship Development

Objectives:

Students will be able to

1) Identify entrepreneurship opportunity.
2) Acquire entrepreneurial values and attitude.
3) Use the information to prepare project report for business venture.
4) Develop awareness about enterprise management.

Chapter	Name of the Topic	Hours
Unit-01	**Entrepreneurship, Creativity & Opportunities** 1.1) Concept, Classification & Characteristics of Entrepreneur 1.2) Creativity and Risk taking. 1.2.1) Concept of Creativity & Qualities of Creative person. 1.2.2) Risk Situation, Types of risk & risk takers. 1.3) Business Reforms. 1.3.1) Process of Liberalization. 1.3.2) Reform Policies. 1.3.3) Impact of Liberalization. 1.3.4) Emerging high growth areas. 1.4) Business Idea Methods and techniques to generate business idea. 1.5) Transforming Ideas in to opportunities transformation involves Assessment of idea &Feasibility of opportunity 1.6) SWOT Analysis	03
Unit-02	**Information And Support Systems** 2.1) Information Needed and Their Sources: Information related to project, Information related to support system, Information related to procedures and formalities 2.2) Support Systems 1) Small Scale Business Planning, Requirements. 2) Govt. & Institutional Agencies, Formalities 3) Statutory Requirements and Agencies.	02
Unit-03	**Market Assessment** 3.1) Marketing -Concept and Importance 3.2) Market Identification, Survey Key components 3.3) Market Assessment	02
Unit-04	**Business Finance & Accounts Business Finance** 4.1) Cost of Project 1) Sources of Finance 2) Assessment of working capital 3) Product costing 4) Profitability 5) Break Even Analysis 6) Financial Ratios and Significance **Business Account** 4.2) Accounting Principles, Methodology 1) Book Keeping 2) Financial Statements 3) Concept of Audit	03
Unit-05	**Business Plan & Project Report** 5.1) Business plan steps involved from concept to commissioning Activity Recourses, Time, Cost 5.2) Project Report 1) Meaning and Importance 2) Components of project report/profile **(Give list)** 5.3) **Project Appraisal** 1) Meaning and definition 2) Technical, Economic feasibility 3) Cost benefit Analysis	03

Unit-06	Enterprise Management And Modern Trends 6.1) Enterprise Management: 1) Essential roles of Entrepreneur in managing enterprise 2) Product Cycle: Concept and importance 3) Probable Causes Of Sickness 4) Quality Assurance: Importance of Quality, Importance of testing 6.2) E-Commerce: Concept and Process 6.3) Global Entrepreneur 6.3.1 Assess yourself-are you an entrepreneur? 6.3.2 Prepare project report and study its feasibility.	03
	Total	**16**

Text /Reference Books:		
Name of Authors	**Titles of the Book**	**Name of the Publisher**
J.S. Saini B.S.Rathore	Entrepreneurship Theory and Practice	Wheeler Publisher New Delhi
--	TTTI, Bhopal / Chandigadh	--
E. Gorden K.Natrajan	Entrepreneurship Development	Himalaya Publishing. Mumbai
Prepared by Colombo plan staff college for Technician Education.	Entrepreneurship Development	Tata Mc Graw Hill Publishing co. ltd. New Delhi.
J.B.Patel D.G.Allampally	A Manual on How to Prepare a Project Report	EDI STUDY MATERIAL Ahmadabad (Near Village Bhat , Via Ahmadabad Airport & Indira Bridge), P.O. Bhat 382428 , Gujrat,India P.H. (079) 3969163, 3969153 E-mail : ediindia@sancharnet.in/olpe@ediindia.org Website : http://www.ediindia.org
J.B.Patel S.S.Modi	A Manual on Business Opportunity Identification & Selection	
S.B.Sareen H. Anil Kumar	National Derectory of Entrepreneur Motivator & Resource Persons.	
Gautam Jain Debmuni Gupta	New Initiatives in Entrepreneurship Education & Training	
P.C.Jain	A Handbook of New Enterpreneurs	

2) Video Cassettes:

No	**Subject**	**Source**
1	Five success Stories of First Generation Entrepreneurs	EDI STUDY MATERIAL Ahmadabad (Near Village Bhat , Via Ahmadabad Airport & Indira Bridge), P.O. Bhat 382428 , Gujrat,India P.H. (079) 3969163, 3969153 E-mail : ediindia@sancharnet.in/olpe@ediindia.org Website : http://www.ediindia.org
2	Assessing Entrepreneurial Competencies	
3	Business Opportunity Selection and Guidance	
4	Planning for completion & Growth	
5	Problem solving-An Entrepreneur skill	

Glossary:

Industrial Terms

Terms related to finance, materials, purchase, sales and taxes.

Components of Project Report:

1. Project Summary (One page summary of entire project)
2. Introduction (Promoters, Market Scope/ requirement)
3. Project Concept & Product (Details of product)
4. Promoters (Details of all Promoters- Qualifications, Experience, Financial strength)
5. Manufacturing Process & Technology
6. Plant & Machinery Required
7. Location & Infrastructure required
8. Manpower (Skilled, unskilled)
9. Raw materials, Consumables & Utilities
10. Working Capital Requirement (Assumptions, requirements)
11. Market (Survey, Demand & Supply)
12. Cost of Project, Source of Finance
13. Projected Profitability & Break Even Analysis
14. Conclusion.

STATE BOARD OF TECHNICAL EDUCATION, BIHAR
Scheme of Teaching and Examinations for
V SEMESTER DIPLOMA IN LIBRARY & INFORMATION SCIENCE

(Effective from Session 2016-17 Batch)

THEORY

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME							Credits
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks (A)	Class Test(CT) Marks (B)	End Semester Exam. (ESE) Marks (C)	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	
1.	Management of Library & Information Centre	1641501	03	03	10	20	70	100	28	40	03
2.	Preservation & Conservation of Library Materials	1641502	03	03	10	20	70	100	28	40	03
3.	Information Source and Services	1641503	03	03	10	20	70	100	28	40	03
4.	Internet resources	1641504	03	03	10	20	70	100	28	40	03
5.	Advance Library Classification	1641505	03	03	10	20	70	100	28	40	03
		Total:- 15					**350**	**500**			

PRACTICAL

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME					Credits
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	
					Internal (A)	External (B)			
6.	Preservation & Conservation of Library Material Lab	1641506	06	03	15	35	50	20	02
7.	Advance Library Classification Lab	1641507	06	03	15	35	50	20	02
		Total:- 12					**100**		

TERM WORK

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME				Credits
			Periods per week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	
7.	Advance Library Classification (TW)	1641508	06	15	35	50	20	02
8.	Preservation & Conservation of Library Materials (TW)	1641509	2 weeks continuous	30	70	100	40	03
		Total:- 06				**150**		
Total Periods per week Each of duration one Hours **= 33**						**Total Marks = 750**		**24**

MANAGEMENT OF LIBRARY & INFORMATION CENTRE

Subject Code 1641501	Theory			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rational :

Information Management system forms a part of information Management , which deals with all sorts of problems relatively to management of information techniques of management, Man- Power Management and ways of motivating people for better management.

Objectives :

A study of the theories of Information system management thus envisages financial, organizational and attitudinal training for the students of Information Technology.

S.No. **Topics**

1. Management : Concept and principles
2. Physical Management and Library operation
3. Human Resource Development
4. Financial Management
5. Report writing and statistics

Contents : Theory		Hrs/week	Marks
Unit-1	**Management : concept & principles** • Principles of Management • scientific Management and their application to libraries and Information centers. • Elements of Management Process (POSDCORB) Total Quality Management		
Unit-2	**Physical Management and Library Operation** • Library Building : Site Selection, Planning • Furniture , Fitting and Equipments : standards and specification • Routine and work Flow relating to different sessions • Elements of System Analysis of Library operations.		
Unit-3	**Human Resource Development** • Organizational Structure • Job description and Analysis : Job – Evaluation • Inter – Personal Relations • Recruitment Procedures • Motivation : Group Dynamics • Training and Development • Disciplines and Grievances • Performance Appraisal		
Unit-4	**Financial Management** • Resource Mobilization • Budgeting Techniques and Methods – PPBS, Zero based Budgeting etc • Budgetary Control • Cost Effectiveness and Cost Benefit Analysis Outsourcing		
Unit-5	**Report writing and statistics** • Report Writing • Library Statistics		

Books Recommended for Management of Library and Information Centers:

Reference Book:

1. TheLibrary and Information Manager's Guide to online Service - By Hoover, Knowledge Industry Publication, New York
2. Encyclopedia of Library and Information Series- by Kent, Lacour Daily –vol- 20 - By Msercel Deker, New York
3. Information Technology Management - R.L. Mittal
6. Library and Inf. Management - Narayan, G.J (1991) New Delhi : Prentioe Hall of India

PRESERVATION AND CONSERVATION OF LIBRARY MATERIALS

Subject Code 1641502	Theory			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rational and Objective:

One of the very important aspects of a librarian's obligation to the society is the preservation of the collection of reading materials in his custody in a good, healthy and usable condition. To enable him to fulfill this basic responsibility with the required competence, he has to have an adequate knowledge of the 'Whys' and 'Hows' of preservation and conservation. This subject explains the concept and its various implications. It also gives a general outline of the various preservation and conservation methods and techniques to create a general background for a more elaborate study.

After reading this subject students will able to:

- Know the concept of preservation and conservation and the role of the librarian in doing so;
- Plan the steps required for preservation of various library materials;
- **Understands the method used for effective preservation in a library; and**
- Get a clear insight into the techniques of conservation or restoration of book materials.

Contents : Theory		Hrs/week	Marks
Unit-1	Preservation and Conservation: overview: Overview Preservation and Conservation: Need and Purpose Historical Development of Writing Materials.		
Unit-2	Preservation of Print Materials Books Periodicals News Pamphlet		
Unit-3	Preservation of Non-Print Materials Palmleaves Manuscripts Fibers Floppies		
Unit-4	Hazards to Library Materials and Control measures Environmental Factor (Temperature, Humidity, Water, Light, Air Pollution, Smoke, Dust etc) Chemical Factors		
Unit-5	1. Binding 2. Types of Binding of Library Materials 3. Binding Material and their varieties 4. Binding Process 5. Standards for Library Binding.		

Book Recommended for Preservation and Conservation of Library Materials:

1. Chakraborti, B. and Mahapatra, P.K. Library Collection: Selection and Preservation: Calcutta Word Press, 1970.
2. Dasgupta, Kalpana, ed. Conservation of Library Materials, Calcutta, National Library, 1988.
3. Durean, J.M. and elements D.W.G. Principles of the preservation of Library Materials. The Hague, IFLA, 1986.
4. Greenfield, N.J. Books: Their care and repair. New York, Wilson, 1983.
5. Singh, R. S. Conservation of documents in library, archiver and museums. Delhi, 1993.
6. IGNUO (1997): Preservation and Conservation of Library Materials.

INFORMATION SOURCES AND SERVICES

Subject Code 1641503	Theory			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Course Objectives

- To understand the different types of information sources and services.
- To develop familiarity with standard reform sources.
- To develop proficiency in using information literacy and make students information literate.
- To develop skills of effective information searching.

Contents : Theory		Hrs/week	Marks
Unit-1	**Nature of Information Sources** (i) Concept of information sources (ii) Kinde of information source **(iii)** Basic Referme and information source and criteria of their evaluation.		
Unit-2	**Reference Tools :** (i) Bibliographical sources: National bibliographies INB & BNB, Trade Bibliographice. (ii) Language Dictionaries (iii) Yearbook and directiories (iv) Bigraphical sources (v) Geographical Sources		
Unit-3	**Electronic Sources :** (i) Magnetic Tapes, CD-ROM, and Multimedia. (ii) Electronic Books and electronic Journals. (iii) Electronic Database.		
Unit-4	**Web Resources :** (i) World wide web: Services and Facilities. (ii) Websites and Sources-Subject Gateways, Digital Libraries, Forums, Bulletin Board etc.		
Unit-5	**INFORMATION Service :** (i) Concept of , Type and Need. (ii) Type of services: Literature search, Documentation Service, Translation Service, Document Delivery Service etc. (iii) CAS and SDI service.		

References books:

1. New Dimension in information service and Technology-By Panda K.C. Karisiddapa
2. An Indian Model of Database Service by-Alihiri-NISSAT, New Delhi.
3. Basic of Library and information Science-KT Delhi, Vikash Publishing.

INTERNET RESOURCES

Subject Code 1641504	Theory			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale :

A information technician, who is to be trained to become a information professional, is required to be fully conversant with his duties, responsibility and authority in any organization. He is expected to have knowledge of the position that he may hold in an organization. He is also to be trained to keep best professional tradition, work culture and ethics how to maintain values of the organization to which he may belongs.

Today we are at the threshold of yet another revolution. The role of information has attained new properties with the acceleration of research and development, mounting social and population pressure, changing technological environment and increasing need of common man are walls man in selective professions.

Objective :

After covering the course a student will be able to :-

- Identify the role of a information technician, his/ her horizontal/ vertical linkages.
- Knowledge of Internet Resources, which helps in information day to day.
- Be aware with growing needs of information service.
- Be aware information revolution.
- Understand the Internet sources and to gain optimum importance through help actual user's.
- Bring attitudinal for making him an honest professional to the point approach towards use of network for the advancement in information storage and retrieval.

S.No.	Topics	Periods
1.	Types of Resources (By Form)	
2.	Types of Resources (By Subject)	

Contents : Theory		Hrs/week	Marks
Unit-1	**TYPES OF RESOURCES (BY FORM) :**		
	A. 1.1 Paperless Library Service : Introduction and Utilization. A. 1.2 Meta Documents : Introduction and Types. A. 1.3 Developing Process. A. 1.4 User's Study : Methods and Techniques of users studied & Evaluation of User's Studies. A. 1.5 User's Profile and Training. B. 1.1 Information Resources : Tools and Techniques. B. 1.2 Computer Application. B. 1.3 Telephone or TELNET. B. 1.4 Modem. B. 1.5 E-Mail B. 1.6 Fax B. 1.7 WWW B. 1.8 FTP B. 1.9 ARCHI B. 1.10 GOPHER B. 1.11 VERONICA B. 1.12 WAIS C : O1 : 01: Digital Library 01 : Introduction and utilization 02 : Book Keeping and packing 03 : Software packing: LIBSYS, INFLIBSYS & SOUL		

Unit-2	**TYPES OF RESOURCES (BY SUBJECT) :** 02 : 01 :Science and Technology : OCLC, NICNET, INDONET, 02 : 02 : Social Scienc EURONET, DESNET, ADJNET, BONET 02 : 03 : Huminities INFLIBNET, DELNET, CALIBNET, ERNET, INTERNET		

Books Recommended for Internet Resources :

Reference Books :

1. Developing of an Information and Library Network - Apporao (ed) – UGC, New Delhi
2. कम्प्यूटर और सूचना तकनीक – शंकर सिंह– पूर्वांचल प्रकाशन, दिल्ली

ADVANCE LIBRARY CLASSIFICATION

Subject Code 1641505	Theory			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rational & Objectives

Arrangement of book and non-book materials according to subject, Author, time, place etc is the basic need of a library. Classification of reading materials according to recognized devices have been incorporated in the classification theory paper. The methods are put in to practice in this chapter. For the IIIrd and IV Semester students classification according to DDC 19th edition is practiced. Colon classification scheme is in range for V Semester students.

S.No.	Topic	
1.	Species of classification Scheme	10
2.	Some important canon of classification	15
3.	Fundamental categories and devices	10
4.	Book Number	10
5.	Salient features of CC and DDC	15

Contents : Theory		Hrs/week	Marks
Unit-1	**Species of classification scheme** 01.01 Prefacated Period 01.02 Transition to Facet period 01.03 Facet Period 01.04 Restricted Facet formula Period 01.05 Un-restricted Facet formula period 01.06 Relativity period		
Unit-2	**Some Important Canon of classification** 02.01 Canons for Idea Plane 0.2.02 Canons for Verbal Plane 02.03 Canons for Notational Plane 02.04 Canons for Mnemonics		
Unit-3	**Fundamental Categories and Devices** 03.01 Fundamental Categories 03.02 Detailed study of PMEST 03.03 Use and identification of different facets in titles 03.04 Devices 03.05 Alphabetical, chronological, subject, Geographical device etc. 03.06 Phase Relation		
Unit-4	**Book Number** 04.01 Call Number 04.02 Book Number, Collection Number 04.03 Author Mark, Merril, Biscoe, Jast and Browne 04.04 Ranganathan's Book Numbering System		
Unit-5	**Salient features of CC and DDC** 05.01 Salient features of colon classification 6th ed 05.02 Salient features of DDC 19th ed 05.03 Comparative study of CC and DDC		

Book Recommended:

Text Book:

1. Granthalaya Classification – G D Bhargav
2. Library Classification – by Srivastava
3. Library Classification – by Parkhi
4. Library Classification – by Krishan Kumar

Reference Book:

1. Colon classification 6th ed – by Dr. S R Ranganathan
2. DDC 19th ed - Melvil Dewey

PRESERVATION AND CONSERVATION OF LIBRARY MATERIAL LAB

Subject Code 1641506	Practical			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	06	Internal	:	15	
				External	:	35	

Rational & Objectives

Preservaion and Conservation of the Library Materials insure service to the Library stock as well as users. It starts from the Point of use and print and non print Moterial. The Present day innovation of Modern Technology has affered a mass problems for storage and Presentation of the Library material.

The Course has been Planed to train candidate for how to preserve Library Material under Library Home joh. So it is the most important part of Library service.

Contents : Practical		Hrs/week	Marks
Unit-1	Preservation of print Material-Books, Periodicde, News, Pamphlet.		
Unit-2	Preservation of Non-Print Materials-Palmleaves, Manuicript, Fibers, Floppies.		
Unit-3	Hazards to Library Moterials and Control measures. Environmental Faston (Temperature, Humidity, Wrter, Light, air Pollution, Smoke, Dust etc.) Chemical Factors.		
Unit-4	Binding- Binding Process, standard for Library Binding.		
	Total		

ADVANCE LIBRARY CLASSIFICATION LAB

Subject Code 1641507	Practical			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	06	Internal	:	15	
				External	:	35	

Rational & Objective

Arrangement of book and non book materials according to subject another time, place etc is the basic need at a library classification of reading material according to recognized devices have been incorporated in the classification theory paper. The methods are put in to practice in this chapter for the IIIrd and IV Semester student's classification accordingly to DDC 19th edition is practiced. Colon classification scheme is in range for V Semester students.

Contents : Practical		Hrs/week	Marks
Unit-1	**1. Introducing various devices as enumerated in** a. Colon Classification Scheme b. Dewey Decimal Classification Scheme		
Unit-2	**1. Constructing number of complex and interdisciplinary titles according to** a. Colon 6th ed b. DDC 19th ed		
	2. Practice of at least 200 complex title according to a. Colon 6th ed b. DDC 19th ed		

ADVANCE LIBRARY CLASSIFICATION -TW

Subject Code 1641508	Term Work			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	Internal	:	15	
	—	—	06	External	:	35	

Rational & Objective

Arrangement of books and non-book materials according to subject, author, time, place etc is the basic need of a library. Classifications of reading materials according to recognised devices have been incorporated in the classification theory paper. The methods are put in to practice in this chapter for the IIIrd and IV Semester student's classification according to DDC 19th edition is practiced. Colon classification scheme is in vogue for the V Semester Students.

Contents : Term Work		Hrs/week	Marks
Unit-1	Classification of books & periodicals according to Colon 6th ed.		
Unit-2	Classification of 50 titles of one's own Institute Library.		
	Total		

PRESERVATION AND CONSERVATION OF LIBRARY MATERIALS -TW

Subject Code 1641509	Term Work			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	Internal	:	30	
	—	—	2 Week Continues	External	:	70	

Rational and objective:

Preservation and Conservation of the Library Materials insures service to the library stock as well as users. It starts from the point of use o and print and non-print material. The present day innovation of modern technology has offered a mars of problems for storage and presentation of the library materials.

The course has been planed to trained candidate for How to preserve Library Material under Library Home job. So it is the most important part of Library Service.

Contents -Term Work		Hrs/week	Marks
Unit-1	Preservation of print Material-Books, Periodicde, News, Pamphlet.		
Unit-2	Preservation of Non-Print Materials-Palmleaves, Manuicript, Fibers, Floppies.		
Unit-3	Hazards to Library Moterials and Control measures. Environmental Faston (Temperature, Humidity, Wrter, Light, air Pollution, Smoke, Dust etc.) Chemical Factors.		
Unit-4	Binding- Binding Process, standard for Library Binding.		
	Total		

STATE BOARD OF TECHNICAL EDUCATION, BIHAR

Scheme of Teaching and Examinations for

V SEMESTER DIPLOMA IN MECHANICAL ENGG.

(Effective from Session 2016-17 Batch)

THEORY

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME							
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks A	Class Test (CT) Marks B	End Semester Exam.(ESE) Marks C	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	Credits
1.	Advanced Manufacturing Processes	1625501	03	03	10	20	70	100	28	40	03
2.	Power Engineering	1625502	03	03	10	20	70	100	28	40	03
3.	Environmental Pollution & Control	1625503	03	03	10	20	70	100	28	40	03
4.	Metrology & quality Control	1625504	03	03	10	20	70	100	28	40	03
5.	Automobile Engineering	1625505	03	03	10	20	70	100	28	40	03
		Total :-	**15**				**350**	**500**			

PRACTICAL

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME					
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	Credits
					Internal(A)	External(B)			
6.	Metrology & quality Control Lab	1625506	04	03	15	35	50	20	02
7.	Advanced Manufacturing Processes Lab	1625507	04	06	15	35	50	20	02
		Total :-	**08**				**100**		

TERM WORK

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME				
			Periods per Week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	Credits
8.	Industrial Project & Entrepreneurship Development (TW)	1625508	03	15	35	50	20	02
9.	Professional Practices-V (TW)	1625509	04	15	35	50	20	02
10.	Metrology & quality Control (TW)	1625510	03	15	35	50	20	01
		Total :-	**10**			**150**		
Total Periods per week Each of duration One Hour			**33**		Total Marks = **750**			**24**

ADVANCED MANUFACTURING PROCESSES
(MECHANICAL ENGINEERING GROUP)

Subject Code	Theory						Credits
1625501	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS : THEORY

Chapter	Name of the Topic	Hours	Marks
Unit-01	**Non traditional machining processes :** 1.1 **Electrical discharge Machining.** Principle of working, Setup of EDM, Dielectric fluid, tools (electrodes), Process parameters, Output characteristics, Applications e.g. microhole drilling, curve hole drilling. 1.2 **Wire cut EDM -** Principle of working, Setup of WEDM, controlling Parameters, Applications. 1.3 **Laser Beam Machining.** Physical principle of Laser, Laser action in ruby rod, Types of Lasers. Set-up for LBM. Characteristics, controlling Parameters, Applications, Application Of Laser Beam for Welding (LBW) 1.4 Other non traditional machines such as ECM Principle of working, Applications.	05 03 05 03	08 04 08 04
Unit-02	**CNC milling machines :** Vertical and horizontal machining center: Constructional features, Axis identification, Electronic control system. Automatic tool changer and tool magazine. CNC programming: Preparatory functions (G code), miscellaneous functions (M code), Part programming including subroutines and canned cycles. Principles of computer aided part programming.	12	16
Unit-03	**Machine Tool Automation: Introduction and Need :** (A) Single spindle automates, transfer lines. (B) Elements of control system, Limit switches, Proximity switches, Block diagram for feedback and servo control system, Introduction to PLC, Block diagram of PLC.	05 07	08 08
Unit-04	**Special Purpose Machines (SPM) :** Concept, General elements of SPM, Productivity improvement by SPM, Principles of SPM design.	03	06
Unit-05	**Maintenance of Machine Tools :** Types of maintenance, Repair cycle analysis, Repair complexity, Maintenance manual, Maintenance records, Housekeeping. Introduction to Total Productive Maintenance (TPM).	05	08
	Total	48	70

Text /Reference Books:		
Titles of the Book	**Name of Authors**	**Name of the Publisher**
Manufacturing Science	Amitabh Ghosh , Mallik	East-West Press Pvt. Ltd.
Production Technology	HMT, Banglore	Tata Mc-Graw Hill
CNC machines	Pabla B. S. M. Adithan	New Age international limited.
Industrial maintenance	H.P.Garg	S. Chand & Co. Ltd.
Non conventional Machining	P. K. Mistra	Narvasa Publishining House
Maintenance Engg. Handbook	Lindley R. Higgins	Mc-Graw Hill
Manufacturing Processes	Begman, Amsted	John Willey and Sons.
Fundamental of metal cutting and machine tools	B. L. Juneja	New age international limited.
Technology of Machine Tools.	Steve Krar, Albert Check	Mc-Graw-Hill International.
CAD/CAM Principals and Applications	P. N. Rao	Tata McGrow-Hill
Manufacruting Technology Metal Cutting & Machne tools	P. N. Rao	Tata McGrow-Hill
Advanced Manufacturing Processes	R.M. Pandey, S.K. Goyal	Foundation Publishing

POWER ENGINEERING
(MECHANICAL ENGINEERING GROUP)

Subject Code	Theory						Credits
1625502	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS : THEORY

Chapter	Name of the Topic	Hours	Marks
Unit-01	**I.C. Engine :** 1.1 Power Cycles - Carnot, Otto, Diesel, Dual, Brayton Cycle, representation on P-V, T-S diagram and Simple numerical on Otto cycle only. 1.2 Classification of I.C. Engines 1.3 Two stroke and four stroke Engines Construction and working, comparison, valve timing Diagram. 1.4 Brief description of I.C. Engine combustion (SI & CI), scavenging, preignition, detonation, supercharging, turbo charging, simple Carburetor, M.P.F.I., fuel injection pump. 1.5 List of fuel, lubricant additives and their advantages.	14	18
Unit-02	**I.C. Engine Testing and Pollution Control :** 2.1 Engine Testing - I.P., B.P. Mechanical, Thermal relative and volumetric efficiency, BSFC, Heat Balance sheet. 2.2 Morse Test, Motoring test 2.3 Pollution Control - Pollutants in exhaust gases of petrol and diesel engines, their effects on environment, exhaust gas analysis for petrol and diesel engine, Catalytic Converter, Bharat stage I, II, III norms.	12	14
Unit-03	. **AIR COMPRESSER :** 3.1 Introduction 3.2 uses of compressed air - Classification of air compressors - Definition: - Compression ratio - Compressor capacity - Free Air Delivered - Swept volume 3.3 Reciprocating air compressor - Construction and working of single stage and two stage compressor - Efficiency: - Volumetric , Isothermal & Mechanical (only simple numerical) - Advantages of multi staging. 3.4 Rotary Compressor - Construction and working of screw, lobe, vane, centrifugal compressors (No numerical) - Comparison and applications of reciprocating and rotary compressors - Purification of air to remove oil, moisture and dust 3.5 Methods of energy saving in air compressors	12	14

Unit-04	**Gas Turbine And Jet Propulsion :** 4.1 Classification and applications of gas turbine. 4.2 Constant volume and constant pressure gas turbines. - Closed cycle and open cycle gas turbines and their comparison. 4.3 Methods to improve thermal efficiency of gas turbine- Regeneration, inter- cooling, reheating using T- Ø diagram (no analytical treatment). 4.4 Jet Propulsion - Principles of turbojet, turbo propeller, Ram jet. 4.5 Rocket propulsion - Solid propellants and liquid propellants, components of liquid propellants rocket engine.	**12**	**10**
Unit-05	**Refrigeration and Air- Conditioning :** 5.1 Introduction - COP of Heat Pump and refrigerator, Tonnes of Refrigeration. 5.2 Vapour compression system - Vapour compression refrigeration cycle, components of Vapour Compression Cycle. Applications- Water cooler Domestic refrigerator, Ice plant & cold storage. 5.3 Psychrometry - Properties of air, psychrometric chart & processes (No Numerical) 5.4 Air conditioning systems - Definition of Air conditioning and classification of Air conditioning Systems.	**14**	**14**
	Total	**64**	**70**

Text / Reference Books:

Titles of the Book	**Name of Authors**	**Name of the Publisher**
Course in Thermal Engineering	V. M. Domkundwar	Dhanpat Rai & Co
Thermal Engineering	P.L.Ballaney	Khanna Publishers
Text Book of Thermal Engineering	R.S.Khurmi	S.Chand & Co. Ltd
Heat Engine Vol.-I and Vol.-II	Patel. Karamchandani	Acharya Publication
Automobile Engineering	R. k. Jain	Tata McGraw Hill
Industrial power engg.& application handbook	K.C.Agrawal	
Power Engineering	Bishwajeet Ranjan, Rajesh Verma	Foundation Publishing

ENVIRONMENTAL POLLUTION & CONTROL
(MECHANICAL ENGINEERING GROUP)

Subject Code 1625503	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS: THEORY

	Name of the Topic	Hrs/week	Marks
Unit -1	**Introduction** 5.5 Environment 5.6 Ecosystem 5.7 Classification of pollution & pollutants 5.8 Environment & pollution control acts 5.9 ISO 14OOO standards, 5.10 Kyoto treaty / protocol, carbon units.	**04**	**06**
Unit -2	**Air Pollution** **Part A** • Sources & classification of air pollution • Effects of air pollution on human health • Effects of air pollution on economy • Photochemical air pollution Air pollution from major Industrial operations e.g. Fertilizer industries aluminum manufacturing plants, Acid plants, Cement industries, Coal & tar industries, paper industries, Refinery & petrochemical industries	**10**	**14**
	Part B Air pollution due to Automobiles-design and operating parameters and methods of control • Pollution due to S. I. Engines. Design & operating parameters responsible for emission and methods of pollution control. • Pollution due to C. I. Engines. Design & operating parameters responsible for emission and methods of pollution control. • Air quality & emission standards of India & Europe • Air pollution in Indian metro cities- Delhi, Mumbai, Chennai, Kolkata	**14**	**18**

Unit – 3	**Water Pollution**
	• Sources of water pollution.
	• Effects of water pollution.
	• Water pollution analysis
	  • Physical examination of water
	  • Chemical characteristics of water
	  • Biological investigation of water
	• Definitions of Important terms used in water pollution – Dissolved O_2 , Chemical O_2 demand, Biological O2 demand, Theoretical O2 demand, Total solids, Total suspended solids, Total dissolved solids, Turbidity, Alkalinity, Acidity.
	• Water quality standards
	• Steps in Water treatment
	• Sampling & analysis of water pollution
		06	**10**

Unit – 4	**Noise Pollution** • Definition of noise • Sources of noise • Types of noise – Impulsive & sonic noise • Effects of noise on health • Noise measurement • Noise mapping	**04**	**08**

Unit – 5	**Other Types Of Pollution**
	• Solid waste
	  • Classification of solids
	  • Solid waste management
	  • Method of solid waste disposal
	  • Reuse, Recycling & recovery of materials from refuse
	• Soil pollution
	  • Chemistry of soil
	  • Soil irrigation by effluents
	  • Agricultural pollution
	• Radiation pollution
	  • Sources & effects of radiation
	  • Radiation exposure standards
	  • Radiation protection
	  5.3.4 Treatment & disposal of radiation waste
	• Global pollution
	  • Green house effect
	  • Acid rain
	  • Ozone depletion problem
		10	**14**

	Total	**48**	**70**

Text/ Reference Books:-

Titles of the Book	**Name of Authors**	**Name of the Publisher**
Air pollution	M.N. Rao & H.V.N. Rao	Tata McGraw Hill
Automotive Mechanics	William H. Course & Donald L. Anglin	Tata McGraw Hill
Internal Combustion Engines	K.K. Ramlingam	Scitech
Water Supply and Sanitary Engineering	G.S. Bilgi	Dhanpat Rai and Sons.
Elements of Environment Science & Engineering	P. Meenakshi	Prentice-Hall
A basic course in environmental studies	S.Deswal & A. Deswal	Dhanpat Rai and Sons.
Introduction to Environmental Engineering.	P. Aarne Vesilind & Susan M. Morgan	Thomson
Environmental Pollution Control Engineering	C.S Rao	
Environmental pollution control microbiology	McKinney	

METROLOGY & QUALITY CONTROL
(MECHANICAL ENGINEERING GROUP)

Subject Code	Theory						Credits
1625504	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS : THEORY

Chapter	Name of the Topic	Hours	Marks
Unit-01	**Introduction to metrology :** **1.1 Metrology Basics** Definition of metrology, Categories of metrology,Scientific metrology, Industrial metrology, Legal metrology, Need of inspection, **Revision of** (no questions be set) -	03	04
	Precision, Accuracy, Sensitivity, Readability, Calibration, Traceability, Reproducibility, Sources of errors, Factors affecting accuracy, Selection of instrument, Precautions while using an instruments for getting higher precision and accuracy. **1.2 Standards and Comparators** Definition and introduction to line standard, end standard, Wavelength standard, Slip gauge and its accessories, Length bars. Definition, Requirement of good comparator, Classification, use of comparators, Working principle of comparators, Dial indicator, Sigma comparator, Pneumatic comparator, Electrical, Electronic, Relative advantages and disadvantages. **1.3 Limits, Fits ,Tolerances and Gauges** Concept of Limits, Fits, And Tolerances, Selective Assembly, Interchangeability, Hole And Shaft Basis System, Taylor's Principle, Design of Plug, Ring Gauges, IS919-1993 (Limits, Fits & Tolerances, Gauges IS 3477-1973, concept of multi gauging and inspection. **1.4 Angular Measurement** Concept, Instruments For Angular, Measurements, Working And Use of Universal Bevel Protractor, Sine Bar, Spirit Level, Principle of Working of Clinometers, Angle Gauges (With Numerical on Setting of Angle Gauges).	06 05	08 06
Unit-02	**Threads and Gear Metrology :** **2.1 Screw thread Measurements** ISO grade and fits of thread, Errors in threads, Pitch errors, Measurement of different elements such as major diameter, minor diameter, effective diameter, pitch , Two wire method, Thread gauge micrometer, Working principle of floating carriage dial micrometer. **2.2 Gear Measurement and Testing** Analytical and functional inspection, Rolling test, Measurement of tooth thickness (constant chord method), gear tooth vernier, Errors in gears such as backlash, run out, composite.	03 03	03 03

Unit-03	**Testing Techniques :** **3.1 Measurement of surface finish** Primary and secondary texture, Sampling length, Lay, terminology as per IS 3073- 1967, direction of lay, Sources of lay and its significance, CLA, Ra, RMS, Rz values and their interpretation, Symbol for designating surface finish on drawing, Various techniques of qualitative analysis, Working principle of stylus probe type instruments. **3.2 Machine tool testing** Parallelism, Straightness, Squareness, Coaxiallity, roundness, run out, alignment testing of machine tools as per IS standard procedure.	**03** **06**	**04** **06**
Unit-04	**Quality Control :** **A) Quality :** Definitions, meaning of quality of product & services, Quality characteristics, Quality of design, Quality of conformance, Quality of performance, Concept of reliability, Cost, Quantity assurance, Cost of rework & repair, Quality & Inspection, Inspection stages.	**04**	**04**
	B) Total Quality Management : 1) Principles of total quantity management. i) Customer focus. ii) Commitment by top management. iii) Continuous improvement–PDCA, Quality Circles. iv) Employee empowerment (JIDOKA). 2) Quality Audit: Concept of audit practices, lead assessor certification. 3) Six sigma: Statistical meaning, methodology of system Improvement , DMAIC cycle, Yellow belt, Green belt, Black belt certification. **C) ISO 9000 Series & other standards :** Concept, ISO 9000 series quality standards, QS14000, Standards in general, Its evaluation & Implications, necessity of ISo certification, other Quality systems.	**06** **04**	**06** **04**
Unit-05	**Elementry Statistics & it's application in quality control :** **5.1 Statistical Quality Control** – Meaning and importance of SQC, Variable and attribute Measurement. control charts – inherent and assignable sources of variation, control charts for variables – X & R charts, control charts for attributes p, np, C charts, process capability of machine, determination of statistical limits, different possibilities, Rejection area, Statistically capable and incapable processes, Cp, Cpk. **5.2 Acceptance Sampling –** Concept, Comparison with 100% inspection, Different types of sampling plans, with merits and demerits, OC curve, It's importance and significance, Producers risk, Consumer's risk, AQL, AOQL, IQL, LTPD	**10** **08**	**10** **08**
	Total	**64**	**70**

	Text / Reference Books:-	
Titles of the Book	**Name of Authors**	**Name of the Publisher**
Engineering metrology	R. K. Jain	Khanna Publisher, Delhi.
Metrology for Engineers	J.F.W. Galyer and C. R. Shotbolt	ELBS
Engineering Metrology	K. J. Hume	Kalyani publishers
A text book of Engineering metrology	I.C. Gupta	Dhanpat Rai and Sons,
Metrology Lab. Manual	M. Adithan and R. Bahn	T.T.T.I. Chandigarh.
Statistical Quality Control	M. Mahajan	Dhanpat Rai and Sons ,
Quality control	T.T.T.I. Chennai	Tata McGraw Hill,
Quality planning and analysis	Juran U.M. and Gryna	Tata McGraw Hill,
Inspection and quality control	National productivity council	N.P.C., New Delhi.
Managing for Total Quality	N. Logothetis	Prentice – Hall, Delhi.
Statistical Process analysis	Lauth Alwan	Tata McGraw Hill.
Metrology & Quality Control	S.P. Singhal	Foundation Publishing
Metrology & Precision Engg	A.J.T. Scarr	Tata McGraw hill

2. IS/ International Codes :

IS 919 – 1993 Recommendation for limits, fits and tolerances IS 2029 – 1962 Dial gauges.
IS 2103 – 1972 Engineering Square
IS 2909 – 1964 Guide for selection of fits.
IS 2921 – 1964 Vernier height gauges
IS 2949 – 1964 V Block.
IS 2984 – 1966 Slip gauges.
IS 3139 – 1966 Dimensions for screw threads. IS 3179 – 1965 Feeler gauges.
IS 3455 – 1966 Tolerances for plain limit gauges.
IS 3477 – 1973 Snap gauges.
IS 6137 – 1971 Plain plug gauges. IS 3651 – 1976 - Vernier Caliper
IS 4218 - Isometric screw threads
IS 4440 – 1967 Slip gauges accessories
IS 5359 – 1969 Sine bars
IS 5402 – 1970 Principle and applications of sine bars
IS 5939 – 1970 Sine angles, sine tables.

AUTOMOBILE ENGINEERING
(MECH. ENGG. GROUP)

Subject Code	Theory						Credits
1625505	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

Contents : Theory		Hrs/week	
Chapter	**Name of the Topic**	**Hours**	**Marks**
Unit-01	**Introduction of Automobile** 1.1 Classification of automobiles 1.2 Vehicle layout & types 1.3 Body construction - Types & Nomenclature of car body. Introduction to aerodynamic body shapes 1.4 Automobile market in India of "on road vehicles", major manufacturers, their products & their collaborations.	**06**	**08**
Unit-02	**Automobile Transmission** 2.1 Clutch- necessity, construction & working of coil spring & diaphragm spring type clutch. 2.2 Gear Box- tractive effort and tractive resistance, types of G.B construction & working of constant mesh G.B., & synchromesh G.B., Epicyclic G.B., Torque converter, Overdrive, Transfer case 2.3 Final drive- necessity, construction & working of propeller shaft & differential. 2.4 Axle- Type of rear axles, front axles & their applications.	**12**	**18**
Unit-03	**Control Systems** 3.1 Steering system- Requirement of steering system. Construction and working of steering linkage. Steering gear box- construction & working of rack and pinion & re-circulating ball type gearbox. Introduction to Power steering, Steering geometry- camber, caster, toe-in, toe-out, Kingpin inclination & their effects. 3.2 Brake system- construction & working of hydraulic & Pneumatic brakes. Comparison of disc & drum brake.	**08**	**14**
Unit-04	**Suspension systems, wheels & Tyres** 4.1 Necessity & classification of suspension system. 4.2 Working & construction of Leaf spring, rigid axle suspension. 4.3 Introduction to air suspension 4.4 Construction & working of McPherson & wishbone, trailing link suspensions. 4.5 Construction & working of telescopic shock absorbers. 4.6 Construction & working of spoked wheel, disc wheel & light alloy cast wheel. 4.7 Types of rims, their construction & working. 4.8 Construction, working & comparison of radial, cross-ply and tubed, tubeless tyre & tyre specifications 4.9 Factors affecting tyre life 4.10Wheel Alignment and Balancing	**08**	**12**

Unit-05	**Automobile Electrical Systems & Body** 5.1 Battery- working, construction & rating of battery. 5.2 Ignition system- construction & working of electronic and CDI ignition system. 5.3 Starting system- construction & working of starting motor. 5.4 Charging system- construction & working of alternator 5.5 Wiring system-harnessing & colour codes. 5.6 Lighting system-head light, tail light, indicator light & their circuits. 5.7 Gauges- construction & working of Fuel level gauge, oil gauge and water temperature gauge. 5.8 Use of microprocessor in automobile control systems	**14**	**18**
	Total	**48**	**70**

Text / Reference Books:

Titles of the Book	**Name of Authors**	**Name of the Publisher**
Automobile Engineering	K. K. Jain and R.B. Asthana	Tata Mcgraw hill
Automobile Mechanics	William Crouse	Tata Mcgraw hill
Automobile Mechanics	SRINIVASAN	Tata Mcgraw hill
Automotive Technology	H.M.Sethi	Tata Mcgraw hill
Automobile Engineering	G.B.S. Narang	Khanna Publication
Auto Mechanics	Harold T. Glenn	Bennett & Mckknight
Automobile Engineering Vol. I and Vol. II	Kirpal Singh	Standard Publication
Automotive Mechanics	Joseph Hitner	--
Automobile Engg.	Kaushik Berman	Foundation Publishing

C. D.

- C. D. Prepared By MSBTE under its CAI Package Program.
- C. D. on various Topics of Automobile Engineering By SAE

METROLOGY & QUALITY CONTROL LAB
(MECH. ENGG. GROUP)

Subject Code	Practical						Credits
1625506	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	04	Internal	:	15	
	—	—	—	External	:	35	

CONTENTS : PRACTICAL

Skill to be developed:

Intellectual Skills:

1. To understand principle, working of various measuring instruments.
2. Selection of proper instruments for measurement.
3. Calculation of least count of instrument.
4. Take reading using the instrument
5. Interpret the observation and results
6. Collection and recording of data
7. Analysis of data.

Motor Skills:

1. Setting the instruments for zero error adjustment.
2. Proper alignment of the instrument with work piece
3. Handling of instruments
4. Care and maintenance of instruments.
5. Measure the dimensions form the instruments.
6. Calibration and traceability of the instruments
7. Graphical representation of data.

Notes:

1. The practical shall be conducted by the subject teacher, by taking actual measurements of different parameters on the jobs prepared by earlier batches in workshop practice or actual measurement ofcomponent dimension.
2. The data collected from the practical of basic measuring instruments may be used for experiments of SQC.
3. During practical examination student should measure at least five parameters by using two to three different measuring instruments and evaluation of practical be done considering
   (a) Selection of appropriate measuring instrument by the examinee.
   (b) Computation of Least count of instrument used.
   (c) Correctness of measurements of the measured.

List of Practical:

1. Standard use of basic measuring instruments. Surface plate, v-block, sprit level, combination set, filler gauge, screw pitch gauge, radius gauge, vernier caliper, micrometer and slip gauges to measure dimension of given jobs.
2. To find unknown angle of component using sine bar and slip gauges.
3. Study and use of optical flat for flatness testing.
4. Measurement of screw thread elements by using screw thread micrometer, screw pitch gauge.
5. Study and use of dial indicator as a mechanical comparator for run out measurement, roundness comparison.
6. Measurement of gear tooth elements by using gear tooth vernier caliper and span micrometer, verification of gear tooth profile using profile projector,.
7. Testing of machine / machine tool for flatness, parallelism, perpendicularity by autocollimator.
8. Draw the frequency histogram, frequency polygon and ogee for given samples (min 5o reading) and find mean, mode, median.
9. To draw the normal distribution curve and find standard deviation, variance, range
10. To draw and interpret the control limit for variable measurement (X and R chart).

ADVANCED MANUFACTURING PROCESSES LAB
(MECH. ENGG. GROUP)

Subject Code 1625507	Practical						Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	04	Internal	:	15	
	—	—	—	External	:	35	

CONTENTS : TERM WORK

Practical: Skills to be developed:

Intellectual skills:

1) To select an appropriate non conventional machining process for required component.
2) To write programs for CNC milling machine.
3) To specify the requirement for special purpose machines and automation.

To select the maintenance procedure for given machine tool.

Motor Skills:

1) To execute part programs on CNC milling machine / machining center.
2) To repair and maintain machine tools and sub systems.
3) To use and operate different hand tools required for repair and maintenance.
4) To identify and rectify the faults in the given sub assembly.

test: 1. The workshop instructors should prepare specimen job in each shop as demonstration practice before the student (as per the drawing given by subject teacher / workshop superintendent)

2. Theory behind practical is to be covered by the concerned subject teacher / workshop superintendent.

3. Workshop diary should be maintained by each student duly signed by respective shop instructors

List of Practical:

1) Two jobs on CNC milling having following operations – face milling, slotting, Contour machining. (Group of two students , each group must use different program for different job dimensions)
2) One assignment on part programming on machining center.
3) One assignment on machine tool installation procedure.
4) Industrial visit to observe automats and report on the tools, fixtures and cams used on automats.
5) Industrial visit to observe at least one non traditional machining process and report on visit.
6) Dismantling and Assembly of any one – a) Tailstock on lathe b) Apron Mechanism. c) Tapping attachment on drilling machine. d) Lathe Chuck
7) Report on mounting and dismounting procedure of following (any two) – a) Milling machine arbor. b) Vertical milling head. c) Tool post
8) One assignment on USM, CHM, EBM, AJM, WJM, PAM.

INDUSTRIAL PROJECT AND ENTREPRENEURSHIP DEVELOPMENT- TW
(MECH. ENGG. GROUP)

Subject Code	Term Work						Credits
1625508	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	Internal	:	15	
	—	—	04	External	:	35	

Contents :Term Work

PART A) Industrial Project

Following activities related to project are required to be dealt with, during this semester

1. Form project batches & allot project guide to each batch. (Max. 4 students per batch)
2. Each project batch should select topic / problem / work by consulting the guide & / or industry. Topic / Problem / work should be approved by Head of department.
3. Each project batch should prepare action plan of project activities & submit the same to respective guide.
4. At the end of semester, each project batch should submit the action plan and abstract of the project along with list of materials required if project involves fabrication or other facilities required in other kinds of project.
5. Action Plan should be part of the project report.

Part B: Entrepreneurship Development

OBJECTIVES:-
Students will be able to

1) Identify entrepreneurship opportunity.
2) Acquire entrepreneurial values and attitude.
3) Use the information to prepare project report for business venture.
   Develop awareness about enterprise management.

Contents		Hrs/week
Chapter	**Name of the Topic**	**Hours**
Unit-01	**Entrepreneurship, Creativity & Opportunities** **1.1)** Concept, Classification & Characteristics of Entrepreneur **1.2)** Creativity and Risk taking. **1.2.1)** Concept of Creativity & Qualities of Creative person. **1.2.2)** Risk Situation, Types of risk & risk takers. **1.3)** Business Reforms. 1.3.1) Process of Liberalization. 1.3.2) Reform Policies. **1.3.3)** Impact of Liberalization. **1.3.4)** Emerging high growth areas. 1.4) Business Idea Methods and techniques to generate business idea. 1.5) Transforming Ideas in to opportunities transformation involves Assessment of idea & Feasibility of opportunity 1.6) SWOT Analysis	**03**

Unit-02	**Information And Support Systems** **2.1) Information Needed and Their Sources.** Information related to project, Information related to support system, Information related to procedures and formalities **2.2) SUPPORT SYSTEMS** **1**) Small Scale Business Planning, Requirements. 2) Govt. & Institutional Agencies, Formalities 3) Statutory Requirements and Agencies.	**0 3**
Unit-03	**Market Assessment** 3.1) Marketing -Concept and Importance 3.2) Market Identification, Survey Key components 3.3) Market Assessment	**02**
Unit-04	**Business Finance & Accounts Business Finance** 4.1) Cost of Project 1) Sources of Finance 2) Assessment of working capital 3) Product costing 4) Profitability 5) Break Even Analysis 6) Financial Ratios and Significance **Business Account** 4.2) Accounting Principles, Methodology 1) Book Keeping 2) Financial Statements	**03**
Unit-05	**Business Plan & Project Report** 5.1) Business plan steps involved from concept to commissioning Activity Recourses, Time, Cost 5.2) **Project Report** 1) Meaning and Importance 2) Components of project report/profile **(Give list**) 5.3) **Project Apprisial** 1) Meaning and definition 2) Technical, Economic feasibility 3) Cost benefit Analysis	**03**
Unit-06	**Enterprise Management And Modern Trends** 6.1) **Enterprise Management**: - 1) Essential roles of Entrepreneur in managing enterprise 2) Product Cycle: Concept And Importance 3) Probable Causes Of Sickness 4) Quality Assurance Importance of Quality, Importance of testing 6.2) E-Commerce Concept and process 6.3) Global Entrepreneur	**02**
	Total	**16**

Text/ Reference Books:		
Titles of the Book	**Name of Authors**	**Name of the Publisher**
Entrepreneurship Development	E. Gorden .Natrajan	Himalaya Publishing. Mumbai
Entrepreneurship Development	Preferred by Colombo plan staff college for Technical education.	Tata Mc Graw Hill Publishing co. ltd. New Delhi.
A Manual on How to Prepare a Project Report	J.B.Patel D.G.Allampally	EDI STUDY MATERIAL Ahmadabad (Near Village Bhat , Via Ahmadabad Airport & Indira Bridge), P.O. Bhat 382428 , Gujrat,India P.H. (079) 3969163, 3969153 E-mail : ediindia@sancharnet.in/olpe@ediindia.org Website : http://www.ediindia.org
A Manual on Business Opportunity Identification & Selection	J.B.Patel S.S.Modi	
National Derectory of Entrepreneur Motivator & Resource Persons.	S.B.Sareen H. Anil Kumar	
New Initiatives in Entrepreneurship Education & Training	Gautam Jain Debmuni Gupta	
A Handbook of New Enterpreneurs	P.C.Jain	
Evaluation of Enterpreneurship Development Programmes	D.N.Awasthi , Jose Sebeastian	
The Seven Business Crisis & How to Beat Them.	V.G.Patel	
Entrepreneurship Development of Small Business Enterprises	Poornima M. Charantimath	Pearson Education, New Delhi
Entrepreneurship Development	Special Edition for MSBTE	McGraw Hill Publication
Entrepreneurship Theory and Practice	J.S. Saini B.S.Rathore	Wheeler Publisher New Delhi
Entrepreneurship Development		TTTI, Bhopal / Chandigadh
Entrepreneurship in Action.	Mary Coulter.	Prentice Hall of India Pvt. Ltd., New Delhi.
Fundamentals of Entrepreneurship	Mohanty, S.K.	Prentice Hall of India Pvt. Ltd., New Delhi.

2) VIDEO CASSETTES

NO	SUBJECT	SOURCE
1	Five success Stories of First Generation Entrepreneurs	EDI STUDY MATERIAL Ahmedabad (Near Village Bhat , Via Ahmadabad Airport & Indira Bridge), P.O. Bhat 382428 , Gujrat,India P.H. (079) 3969163, 3969153 E-mail : ediindia@sancharnet.in/olpe@ediindia.org Website : http://www.ediindia.org
2	Assessing Entrepreneurial Competencies	
3	Business Opportunity Selection and Guidance	
4	Planning for completion & Growth	
5	Problem solving-An Entrepreneur skill	

GLOSSARY:

INDUSTRIAL TERMS

Terms related to finance, materials, purchase, sales and taxes.

Components of Project Report:

1. Project Summary (One page summary of entire project)
2. Introduction (Promoters, Market Scope/ requirement)
3. Project Concept & Product (Details of product)
4. Promoters (Details of all Promoters- Qualifications, Experience, Financial strength)
5. Manufacturing Process & Technology
6. Plant & Machinery Required
7. Location & Infrastructure required
8. Manpower (Skilled, unskilled)
9. Raw materials, Consumables & Utilities
10. Working Capital Requirement (Assumptions, requirements)
11. Market (Survey, Demand & Supply)
12. Cost of Project, Source of Finance
13. Projected Profitability & Break Even Analysis
14. Conclusion.

PROFESSIONAL PRACTICES V - TW
(MECH.+CIVIL ENGG. GROUP)

Subject Code 1625509	Term Work						Credits
	No. of Periods Per Week			Full Marks	:	25	02
	L	T	P/S	Internal	:	07	
	—	—	04	External	:	18	

Contents :Term Work		Hrs/week
	Activities	**Practical Hours**
Unit-01	**Industrial Visits** Structured industrial visits be arranged and report of the same shall be submitted by the individual student, to form a part of the term work.(**2 visits**) Following are the suggested types of Industries/ Fields – i) Automobile manufacturing / auto component manufacturing units to observe the working of SPM ii) Refrigeration and air conditioning manufacturing / servicing units / industries / workshops iii) Automobile service stations for four wheelers iv) Co-ordinate measuring machine to observe its construction working specifications and applications. v) Auto Engine Testing unit to gather details regarding the testing procedures/parameters etc. vi) Wheel Balancing unit for light and/or heavy motor vehicles. vii) Food processing unit. viii) Textile industry machinery manufacturing / servicing units. ix) Hydro electric and Thermal power plants. x) Automotive Research Association of India, Pune, Central Iinstitute of Road Transport, Pune, Vehicle Research and Development establishment , Ahmednagar. xi) Engine testing, exhaust gas analysis and vehicle testing xii) PWD workshop. xiii) Safety museum at Central Labour Institute, Sion, Mumbai	**08**
Unit-02	**The Guest Lecture/s** From field/industry experts, professionals to be arranged (2 Hrs duration), minimum 4 nos. from the following or alike topics. The brief report to be submitted on the guest lecture by each student as a part of Term work a) Electronic fuel injection systems b) Exhaust gas analysis. c) Vehicle testing. d) Transducer application in automobiles. e) Environmental pollution & control. f) Vehicle aerodynamics & design. g) Earth moving machines. h) Automobile pollution, norms of pollution control. i) Biotechnology j) Nanotechnology k) Rapid prototyping l) Programmable logic controllers m) TQM n) MPFI o) Hybrid motor vehicles p) Packaging technology q) Appropriate technology r) Six sigma systems s) LPG / CNG conversion kit.	**10**

Unit-03	**Group Discussion :** The students should discuss in group of six to eight students and write a brief report on the same, as a part of term work. The topic of group discussions may be selected by the faculty members. Some of the suggested topics are (**any one**)- i) CNG versus LPG as a fuel. ii) Petrol versus Diesel as a fuel for cars. iii) Trends in automobile market. iv) Load shading and remedial measures. v) Rain water harvesting. vi) Trends in refrigeration Technology. vii) Disaster management. viii) Safety in day to day life. ix) Energy Saving in Institute. x) Nano technology.	**10**
Unit-04	**Seminar : (any 2 topics)** Seminar topic should be related to the subjects of fifth semester / topics from guest lectures. Students shall submit a report of at least 10 pages and deliver a seminar (Presentation time – 10 minutes for a group of 2 students)	**12**
Unit-05	**Mini Projects : (in a group of 4-5 students)** 1) Design / drawing of simple jigs, fixtures 2) Thermocouple based temperature controller. 3) Pump on / off timer 4) Models of jigs / fixtures 5) Layout design of SSI units / factory / workshop of the institute **Models of material handling route systems** OR **Modular Course on any one of the suggested or alike relevant topic be undertaken by a group of students (Min 10) :** a) LPG/CNG conversion of vehicles b) Advance features in CAD – CAM c) basics of PLC programming d) die design e) JIT techniques f) Non traditional manufacturing methods g) jigs and fixture design h) 3D Modeling I) finite element method j) Mechatronics k) Advanced computer programming l) maintenance of home appliances m) value stream mapping n) piping technology	**04**
Unit-6	**Student Activities** – Students in a group of 3 to 4 shall perform **ANY TWO** of the following activities (Other similar activities may be considered) and write a report as a part of term work. **Activities :-** 1. Collection of data regarding loan facilities or other facilities available through different organizations / banks to budding entrepreneurs 2. Survey and interviews of successful entrepreneurs in near by areas 3. Survey of opportunities available in thrust areas identified by Government or DIC. 4. Measuring Screw thread parameters on floating carriage dial micrometer and select the optimum diameter of wire. 5. Survey of data regarding different types of pumps with specifications from manufacturers catalogue, local markets, end users (any other engineering products may be considered for survey) 6. Survey of farm implements used by farmers	**04**
	Total	**48**

Text/ Reference Books:

Titles of the Book	Name of Authors	Name of the Publisher
Nanotechnology	Mark Ratner and Daniel Ratner	Pearson Educatuion, New Delhi
Computer Control of Manufactring System	Yoram Korem	Mcgraw Hill Publication
Supply Chain Management	Sunil Chopra, Peter Meindl	Pearson Educatuion, New Delhi

METROLOGY & QUALITY CONTROL - TW

(MECH. ENGG. GROUP)

Subject Code	Term Work						Credits
1625510	No. of Periods Per Week			Full Marks	:	25	
	L	T	P/S	Internal	:	07	01
	—	—	03	External	:	18	

CONTENTS : TERM WORK

List of Term Work:- (Perform any five) :-

1. Standard use of basic measuring instruments. Surface plate, v-block, sprit level, combination set, fillergauge, screw pitch gauge, radius gauge, vernier caliper, micrometer and slip gauges to measuredimension of given jobs.
2. To find unknown angle of component using sine bar and slip gauges.
3. Study and use of optical flat for flatness testing.
4. Measurement of screw thread elements by using screw thread micrometer, screw pitch gauge.
5. Study and use of dial indicator as a mechanical comparator for run out measurement, roundness comparison.
6. Measurement of gear tooth elements by using gear tooth vernier caliper and span micrometer, verification of gear tooth profile using profile projector,.
7. Testing of machine / machine tool for flatness, parallelism, perpendicularity by autocollimator.
8. Draw the frequency histogram, frequency polygon and ogee for given samples (min 5o reading)
9. Andfind mean, mode, median.
10. To draw the normal distribution curve and find standard deviation, variance, range
11. To draw and interpret the control limit for variable measurement (X and R chart).

STATE BOARD OF TECHNICAL EDUCATION, BIHAR

Scheme of Teaching and Examinations for

V SEMESTER DIPLOMA IN MODERN OFFICE PRACTICE

(Effective from Session 2016-17 Batch)

THEORY

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME						Credits
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks (A)	Class Test(CT) Marks (B)	End Semester Exam. (ESE) Marks (C)	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	
1.	Professional Language & Comm. Skill (Eng + Hindi)	1626501	03	03	10	20	70	100	28	40	03
2.	Office Equipment Services & Office Automation	1626502	03	03	10	20	70	100	28	40	03
3.	Commercial & Industrial Law	1626503	03	03	10	20	70	100	28	40	03
4.	Office Organization	1626504	03	03	10	20	70	100	28	40	03
5.	Business Org. & Management	1626505	03	03	10	20	70	100	28	40	03
		Total:- 15					**350**	**500**			

PRACTICAL

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME					Credits
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	
					Internal (A)	External (B)			
6.	Office Equipment Services Lab & Office Automation	1626506	06	03	15	35	50	20	03
7.	Short Hand-II	1626507	03	03	15	35	50	20	01
	Total:- 09						**100**		

TERM WORK

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME				Credits
			Periods per week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	
8.	Office Equipment Services & Office Automation - TW	1626507	05	15	35	50	20	01
9.	Professional Language & Comm. Skill - TW	1626508	04	15	35	50	20	02
10.	In office training & visit to organization - TW	1626509	4 weeks continuous	30	70	50	40	02
	Total:- 09					**150**		**24**
Total Periods per week Each of duration one Hours **= 33**						**Total Marks = 750**		

PROFESSIONAL LANGUAGE & COMMUNICATION SKILL (English+HIndi)

Subject Code 1626501	Theory			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	100	3
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

PART- I PLCS (HINDI)

उद्देश्य

विभिन्न शैक्षणिक, प्रशासनिक एवं व्यावसायिक स्तरों। पर हिन्दी भाषा के स्वरूप से छात्रों को परिचित कराना पाठ्यक्रम का उद्देश्य है। सूचना, संचार, तकनीकी, उधोग, व्यवसाय बाजार आदि के क्षेत्रो में हिन्दी भाषा के विभिन्न प्रयोग एवं प्रभाव में होनेवाली वृद्धि को देखते हुए यह आवश्यक हो जाता है कि छात्र हिन्दी भाषा के विभिन्न प्रयोग में सक्षम हो सके। हिन्दी भारत की राष्ट्रभाषा, राजभाषा, व्यवहार–भाषा तो है ही यह शैक्षणिक भाषा के साथ–साथ एक व्यावसायिक भाषा का रूप भी ले चुकी है। यह शिक्षा का माध्यम भी है। इस भाषा में ज्ञान – विज्ञान, वाणिज्य, उद्योग, व्यवसाय, पत्रकारिता, तकनीक आदि से संबंधित अपनी शब्दावली है। हिन्दी भाषा के इन विभिन्न रूपों को ध्यान में रखते हुए इस पाठ्यक्रम की रूप रेखा तैयार की गयी है। पाठ्यक्रम के पूरा होने के पश्चात् छात्र व्यवसायिक संचार के सैद्धान्तिक पक्ष से परिचित होंगे। व्यवसाय – जगत में होनेवाले संचार से परिचित होंगे। जन – संचार माध्यमो के द्वारा अपने विचारों के अभिव्यक्त करने में सक्षम हो सकेंगे। अनुवाद के महत्व से परिचित होंगे।

Contents : Theory		Hrs/week	Marks
Unit-1	**हिन्दी राजभाषा के रूप में** क. राष्ट्रभाषा हिन्दी ख. राजभाषा हिन्दी ग. सम्पर्क भाषा एवं मानक भाषा के रूप में हिन्दी घ. राष्ट्रभाषा एवं राभाषा में अंतर ड. वैज्ञानिक और तकनीकी क्षेत्र में हिन्दी भाषा की स्थिति	[05]	
Unit-2	**यावसायिक पत्राचार** क) आवेदन – पत्र ख) क्रयादेश संबंधी पत्र ग) बैंक – पत्र घ) बीमा – पत्र ड.) संपादक के नाम पत्र च.) बायोडाटा	[05]	
Unit-3	**बैंको में हिन्दी प्रयोग के विविध स्तर** क) वर्तमान स्थिति ख) समस्याएँ और समाधान ग) शब्दावली	[05]	
Unit-4	**जन संचार माध्यम और हिन्दी** क) समाचार – पत्र ख) दूरदर्शन ग) रेडियो (आकाशवाणी)	[05]	
Unit-5	**अनुवाद** क) स्वरूप ख) प्रकार ग) महत्व घ) हिन्दी से अंग्रेजी में अनुवाद ड.) अंग्रेजी से हिन्दी में अनुवाद	[05]	

Unit-6	**व्यक्तित्व विकास** क) सामूहिक परिचर्चा ख) वार्त्ता ग) शुद्ध उच्चारण का अभ्यास घ) वाद – विवाद ड.) हिन्दी शब्द – सम्पदा	[05]	

संदर्भ पुस्तकें

1.	प्रयोजनमूलक हिन्दी संरचना एवं अनुप्रयोग	–	डा० रामप्रकाश, डा० दिनेश गुप्त राधाकृष्ण प्रकाशन
2.	अंग्रेजी – हिन्दी शासकीय प्रयोग कोश	–	गोपीनाथ श्रीवास्तव राजपाल एंड सन्स
3.	एडवांस लर्नर्स डिक्शनरी	–	आक्सफोर्ड यूनिवर्सिटी प्रेस
4.	व्यावसयिक हिन्दी	–	डा० रामप्रकाश, डा० दिनेश गुप्त
5.	Business Communication	–	Keval J. Kumar, Jaico Books Jaico Publishing House
6.	हिन्दी विविध व्यवहारों की भाषा	–	सुवास कुमार
7.	राजभाषा समस्या : व्यावहारिक समाधान	–	आचार्य देवेन्द्रनाथ शर्मा
8.	हिन्दी भाषा शिक्षण	–	डा० भोलानाथ तिवारी, केलाशचन्द्र भाटिया

PART – II PLCS (ENGLISH) (30 Periods)

Rationale:

Communication is a vital aspect of the managerial process. In fact superior subordinate relation cannot thrive in through effective and meaningful communication. Use of appropriate word, proper construction of sentences, decorous language and coherent presentation confirming to widely accepted corporate practices make communication effective, effective communication includes exchange of thoughts, facts, opinion and information by two or more persons so as to bring about under tonguing or confictence. Communication may be through words, symbols, letters or actions. It is all pervarive and it influences every function of management. ?\Effective communication helps to build a highly dedicated and motivated work force needed to achieve the objective. Thus the success of all managerial function largely depends upon effective communication. The subject, therefore, assumes special importance in general and to the students of modern office management in particular. As such an attempt her beeb made in the given course content to give an exposure to students of various communication situations in general.

Objective:

The main objectives for introducing the subject are as under :

(i) To develop among students in general the habit of effective communication and develop among them the abilities for implementing the same in actual practice.

(ii) To lay down a firm foundation of communication capabilities of a high order commensurate with challenging professions.

(iii) To make the students conversant with clear, simple, easy and understandable language and practices prevalent in trade and business world.

(iv) To make the students understand the importance of securing and maintaining co-operation between superiors and subordinates for accomplishment of enterprise objectives through communication.

(v) To make the students aware of and to utilize the informal organization to supplement the communication channels of the formal organization.

S.No.	Chapter
01	Introduction
02	Oral & Written Communication
03	Office Orders
04	Business Letters
05	Economic & Commercial Essays
06	Collection and Presentation of Data and Audio- Visual Aid
07	Meeting of Board and then Committees

Contents : Theory		Hrs/week	Marks
Unit-1	**INTRODUCTION:** Essentials of good English Enriching Vocabulary		
Unit-2	**ORAL & WRITTEN COMMUNICATION:** Oral Communication: - Introduction Effective oral communication: - Pictation - Telephoning and - PublicSpeaking Written Communication: - Pattern - Form and Media of Communication - Essentials of Communication Written Communication analysed précis writing		
Unit-3	**OFFICE ORDERS:** Office greulaus Office Notes- Suggestion- Complaints and office memorandum Office manuals- Internal enginries and reports Advertisement & Press Release		
Unit-4	**BUSINESS LETTERS:** - Introduction - Format of a business letter - Style of a business letter (written letter/internense/appointments/rejected letters, letter of enquiries/replies, status enquiring & replies, orders & complaints, collection and follow up letters, circular letters, miscollection correspondence.)		

Unit-5	**ECONOMIC & COMMERCIAL ESSAYS:** Steps in economic & commercial essays		
Unit-6	**COLLECTION AND PRESENTATION OF DATA AND AUDIO- CISUAL AID:** - Collection of data- diagram - Graphic Method - Rules for framing data collection and presentation Audio Visual aid		
Unit-7	**MEETING OF BOARD AND THEN COMMEITTEE:** Board's report and Chairman's speech.		

OFFICE EQUIPMENTS SERVICES & OFFICE AUTOMATION

Subject Code 1626502	Theory			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	100	3
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale:

S. No.	Topics	Periods
01	Office Equipment and Machine	
02	Mail Service, Communication and Telecommunication	
03	Postal Services	
04	Use of different Machines (Practical) (E.T.)	

Contents : Theory		Hrs/week	Marks
Unit-1	**OFFICE EQUIPMENT AND MACHINE:** 01.01 Basic Principle of Selecting Furniture, Equipment and Machine. 01.02 Office Furniture viz. Desk, Table, Chair and Miscellaneous types 01.03 Office Machine and its Advantage and Disadvantages 01.04 Mechanisation of office work 01.05 Types of Office Machines and their uses: Typewriter, Stenographic Tools, Duplicating Machines, Imprinting Machines and Processes, Computing, Accounting and Tabulating Machines, Punching Machines, Electronic Computer, Dictating Machines, Mailing Machines, Franking Machines, FAX, Intercom and Telephone, Teleprinter, PABX, PBX, Addressing Machine, Xerox and other Miscellaneous Machine.	**[14]**	
Unit-2	**MAIL SERVICE, COMMUNICATION AND TELECOMMUNICATION:** 02.01 Mailing Department, Centralization of Mail Services, Handling of Inward Mail and Outward Mail. 02.02 Internal Communication like Oral and Written Communication 02.03 External Communication viz. use of telephone and guidelines thereto, Telephone tones, Long Distance Calls, Telephone numbers, Cordless Telephone, Intercom Services, Emergency Call, Telephone Directories and Yellow Pages, Fax.	**[20]**	
Unit-3	**POSTAL SERVICES:** 03.01 Letters, Registered Letters, Under Certificate of Posting, Foreign Letters, Parcels, Business Reply Services and Telegrams.	**[18]**	
Unit-4	**USE OF DIFFERENT MACHINES (PRACTICAL):**	**[08]**	
	Total	**60**	

OFFICE AUTOMATION			
UNIT-1	**THE MODERN OFFICE: Functions and Problems**	**[ ]**	
	- Introduction		
	- Business Communication		
	- Informative Management		
	- Conventional Data Processing Methods		
	- Office Information System		
	- Information Cycle		
	- System Attributes		
	- Problems of the Present Office		

UNIT-2	**THE ELECTRONIC OFFICE:**	[ ]	
	- Introduction		
	- Need for Electronic Devices		
	- Electronic Tasks		
	- Office Automation		
UNIT-3	**AUXILIARY WP EQUIPMENT:**	[ ]	
	- Introduction		
	- Media Input Devices		
	- Optical Character Reader (OCR)		
	- Graphics Tablets		
	- Dictation Systems		
	- Transcription System		
	- Micrographics Equipment		
	- Graphic Plotters		
	- Duplicators		
	- Photocopying Machines		
	- Electronic Copiers		
	- Photo composers		
	- Collating and Binding Machines		
	- Facsimile System		
	- Telex Equipment		
	- Fax		
	- E-Mail		
	- Teleconferencing		
	- Tele-Text		
	- Desk Top Publisher		
	- Electronic Type-Writer		
	- Voice-Mail		
	- Video Text		
	- Dicta Phone		
	- Telephone		
	- EPBX		
	- Paging Service		
UNIT-4	**ELECTRONIC MESSAGE TRANSMISSION:**	[ ]	
	- Introduction		
	- Types of Communications		
	- Elements of Message Transmission System		
	- Transmission Channels		
	- Transmission Networks		
	- Nodal Hardware		
	- Automex Message Switcher		
	- SFT System		
	- Local Area Network		
UNIT-5	**COMPUTER MAIL/MESSAGE SYSTEM:**	[ ]	
	- Introduction		
	- Message Distribution		
	- Voice Mail System (VMS)		
	- Transmission of Text		
	- Video Text		
	- Transmission of Pictures		
	- Teleconferencing		
	- Computerized Teleconferencing		

UNIT-6	**ELECTRONIC MESSAGE TRANSMISSION:**	[ ]	
	- Introduction		
	- Capabilities of WP System		
	- Benefits of WP System		
	- Input Process Output Concept		
	- Hardware and Software		
	- Evolution of Word Processing		
UNIT-7	**WORD PROCESSING AT WORK:**	[ ]	
	- Introducing		
	- Repetitive Letter		
	- Standards Documents		
	- Special Reports		
	- Financial Reports		
UNIT-8	**WP HARDWARE:**	[ ]	
	- Introduction		
	- Input Component		
	- Processing Unit		
	- Storage Devices		
	- Output Devices		
UNIT-9	**WP SOFTWARE:**	[ ]	
	- Introduction		
	- Word Processing Software		
	- Text Editing		
	- Print-Time Controls		
	- Specials Functions		
	- Operating Processing Software		
	- Creating of Text		
	- Output Formatting		
	- Utility Functions		
	Total		

Books Recommended:

1. Secretarial Duties — Jhon Haurison
2. A Text Book of Office Organisation and — G.N. Sahoo Management P.P. Patnaik

COMMERCIAL & INDUSTRIAL LAW

Subject Code 1626503	Theory			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	100	3
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

	Contents : Theory	Hrs/week	Marks
Unit-1	**Group A**	[25]	
	1.01 Law of Contract : 1.01.01 Definition of Essential Elements of a Contract 1.01.02 Offer and Acceptance 1.01.03 Consideration 1.01.04 Void and Voided Agreements 1.01.05 Capacity of Parties 1.01.06 Free Consent 1.01.07 Performance of contracts 1.01.08 Termination of contracts 1.01.09 Indemnity and Guarantee 1.01.10 Bailment and pledge 1.01.11 Law of Agency	[04]	
	1.02 Law relating to Negotiable Instruments 1.02.01 Definition and Characteristics of various Negotiable Instruments like promissory Notes Cheque and Bills of Exchange etc.1 1.02.02 'Holder' and 'Holder' in due course		
Unit-2	**Group B** 2.01 **Factories Act :** 2.01.01 Definitions under the factories Act. 2.01.02 Objects and application of the Act. 2.01.03 Provisions relation to Health safety and welfare of the workers. 2.01.04 Provisions relation to working Hours, Holiday, Annual leave etc.	[25]	
	2.02 Workmen's compensation. Act 2.02.01 Definition, Scope, Rules regarding workmen's compensation.	[04]	
	2.03 Industrial Disputes Act. 2.03.01 Definition 2.03.02 Referring of Disputes, Strikes and Lock outs lay off and Retrenchments	[06]	
	2.04 Maximum Wages Act. 2.04.01 Definitions 2.04.02 Fixation of Minimum Wages rate, working hours and rate of claims wage.	[06]	
	2.05 Payment of wages Act. 2.05.01 Object, Scope and Rules regarding payment of wages.	[05]	
	Total	**75**	

BOOKS RECOMMENDED

1. Commercial & Industrial - N.D. Kapoor
2. Commercial Law & Industrial Law - Das Gupta
3. Commercial Law - M.C. Shukla Sen & Mehta

OFFICE ORGANISATION

Subject Code 1626504	Theory			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	100	3
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Contents : Theory		Hrs/week	Marks
Unit-1	**Modern Office** 1. 00 Meaning, Importance and Function.	**[4]**	
Unit-2	**Office Management** 2. 01 Meaning and Importance of Office System nd Procedures 2. 02 Duties, Responsibilities and Qualities of an Office Manager.	**[4]**	
Unit-3	**Organisation Structure** 3. 01 Special features of office work 3. 02 Contralisation of office services 3. 03 Job sub division and specialization 3. 04 Organization charts and manuals 3. 05 Principal Departments of a modern office	**[10]**	
Unit-4	**Office Accommodation and working Environment** 4. 01 Office Lay out, Lighting Ventilation, Interior Decoration, Maintaining a proper working Environment.	**[2]**	
Unit-5	**Management of Office Records** 5. 01 Filling and Indexing 5. 02 Proper work in a modern Office 5. 03 Data Processing 5. 04 Record Management 5. 05 Essentials of a Good Filling System 5. 06 Classification and arrangement 5. 07 Filling Methods 5. 08 Centralised Vs decentralized Filling 5. 09 Meaning of Indexing 5. 10 Types of Index, and Loose leaf Binders.	**[20]**	
Unit-6	**Office Stationery and forms** 6. 01 Types of Stationery 6. 02 Good System of Regulating stationery 6. 03 Selection, Purchase, Storage and Control of Stationery 6. 04 Various Types of Office forms and their rational use	**[8]**	

Unit-7	**Supervision and work Measurement** 7. 01 Meaning and Principles of supervision 7. 02 The duties and responsibilities of Office supervisor 7. 03 The importance and purposes of measurement of Office work. 7. 04 Units of Measurement and setting Standards	**[8]**	
Unit-8	**Safety and Security arrangement in an Office** 8. 01 The Importance of Maintaining Safety and Security in an Office 8. 02 Measures for ensuring Safety and Security arrangement in an Office.	**[4]**	

BOOK RECOMMONDED :-

1. Office Organisation and Management - S. P. Arora
2. Office Organisation and Management - T. B. Susar & G. N. Sahco
3. Fundamental of Office Management - Mahesh
4. Office Organisation and Management - P. K. Ghosh
5. Office Management - P. K. Mitra

BUSINESS ORGANIZATION & MANAGEMENT

Subject Code 1626505	Theory			No of Period in one session : 62			Credits
	No. of Periods Per Week			Full Marks	:	100	3
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale:

S. No.	Topics
01	Meaning and Classification of Business
02	Forms of Business Organisation
03	Plant location and layout
04	Purchase Organisation and Control
05	Store Organisation and Control
06	System of Wage Payment
07	Production Planning and Control
08	Cost Analysis

Contents : Theory		Hrs/week	Marks
Unit-1	**MEANING AND CLASSIFICATION OF BUSSINESS**	**[06]**	
Unit-2	**FORMS OF BUSINESS ORGANISATION:** 02.01 Meaning Characteristics, Merits and Demerits and Demerits and Demerits of Sole Trading Business 02.02 Meaning Characteristics, Merits and Demerits and Demerits and Demerits of Partnership Firm 02.03 Meaning Characteristics, Merits and Demerits and Demerits and Demerits of Co-operative societies 02.04 Meaning Characteristics, Merits and Demerits and Demerits and Demerits of Joint Stock Company 02.05 Meaning Characteristics and forms of Public Enterprises	**[10]**	
Unit-3	**PLANT LOCATION AND LAYOUT**	**[06]**	
Unit-4	**PURCHASE ORGANISATION AND CONTROL:** 04.01 Importance of Purchase Department 04.02 Function of Purchasing Department 04.03 Steps in Purchasing 04.04 Centralized Purchasing 04.05 Decentralized Purchasing	**[08]**	
Unit-5	**STORES ORGANISATION AND CONTROL:** 05.01 Functions of Stores Department 05.02 Procedure for issue of Materials 05.03 Maintenance of Stores Records 05.04 Location of Stores 05.05 Duties of a Storekeeper 05.06 Meaning of Inventory Control 05.07 Techniques of Inventory Control	**[10]**	
Unit-6	**SYSTEM OF WAGE PAYMENT:** 06.01 Meaning, Advantage and Disadvantages of Piece rate System 06.02 Meaning, Merits and Demerits of Time rate System 06.03 Incentive Plans 06.04 Classification of Wages	**[06]**	
Unit-7	**PRODUCTION PLANNING AND CONTROL:** 07.01 Meaning and Importance of Production Planning and Control 07.02 Steps in Production, Planning and Control	**[06]**	
Unit-8	**COST ANALYSIS:** 08.01 Meaning of Cost 08.02 Element of Cost 08.03 Classification of cost 08.04 Meaning and Classification of Overheads 08.05 Preparation of a simple Cost Sheet	**[10]**	
	Total	**62**	

OFFICE EQUIPMENT SERVICES LAB & OFFICE AUTOMATION

Subject Code 1626506	Practical			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	50	3
	L	T	P/S	ESE	:	50	
	—	—	06	Internal	:	15	
				External	:	35	

Contents : Practical		Hrs/week	Marks
Unit-1	कार्यालय संबंधी मशीनें	**20**	
Unit-2	डाक व्यवस्था संबंधी मशीनें	**20**	
Unit-3	संप्रेषण संबंधी मशीनें	**20**	
	Total	**60**	

विभिन्न प्रकार के मशीनों को संचालित करने का ज्ञान एवं रख–रखाव की विस्तृत जानकारी।

1.	**M.S. ACCESS :** Creating a Data Base	7
2.	Creating a Parent Table-Basic Data Table	7
3.	Creating Form	7
4.	Query : Extracting Data from single Table	7
5.	Creating Child Table – Academic Data Table	7
6.	Append Query	7
7.	Building Relationship	7
8.	Manipulation of Data	7
9.	Retrieving Data From Multiple Tables	7
10.	Creating and Running Reports	7
11.	**INTERNET :** Creation of an E-mail I.D	7
12.	Composing and Sending a E-Mail	7
13.	Sending the E-Mail with attachment	7
14.	Searching for a detail and down loading it	7
15.	Checking, viewing and saving the mail and taking printout	7

SHORT HAND -II

(English+Hindi)

Subject Code 1626507	Practical			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	50	3
	L	T	P/S	ESE	:	50	
	—	—	06	Internal	:	15	
				External	:	35	

Contents : Practical

SHORT HAND- ENGLISH

Unit -1	Introduction of Short Hand
Unit -2	Dictation from unseen easy exercises
Unit -3	Transcription on Typewriter
Unit -4	Dictation from seen and unseen passages including correspondences
Unit -5	Daily Transcription on Typewriter
Unit -6	Five to Seven minutes speed tests
Unit -7	Practice from exercises, Dictation and Reading Book
(Attainment to develop ability to take notes in neat and accurate style at a speed of 40 to 60 W.P.M.)	

Contents : Practical

SHORT HAND- HINDI

Unit -1	वर्ण अक्षर को काट कर बनने वाला संकेत।
Unit -2	संबंध सूचक को जोड़कर बनने वाला शब्दो का संकेत।
Unit -3	काल 3.1 वर्त्तमान काल 3.2 भूत काल 3.3 भविष्य काल
Unit -4	समास
Unit -5	लिंग के लिए Special संकेत।
Unit -6	पैराग्राफ का संकेत।
Unit -7	Matter Wise Topic
Unit -8	श्रुतिलेखन।
Unit -9	श्रुतिलेखन एवं उसका अनुवाद (Longhand)
Unit -10	प्रतिदिन का अदृश्य पैराग्राफ का श्रुतिलेख।

OFFICE EQUIPMENT SERVICES & OFFICE AUTOMATION -TW

Subject Code 1626508	Term Work			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	
	L	T	P/S	Internal	:	15	2
	—	—	06	External	:	35	

S. No. **Topics** **Periods**

1. कार्यालय संबंधी मशीनें
2. डाक व्यवस्था संबंधी
3. संप्रेषण संबंधी मशीनें

Contents : Term Work		Hrs/week	Marks
Unit-1	कार्यालय संबंधी मशीनें		
Unit-2	डाक व्यवस्था संबंधी मशीनें		
Unit-3	संप्रेषण संबंधी मशीनें		

विभिन्न प्रकार की मशीनों को संचालित करने का ज्ञान एवं रख–रखाव की विस्तृत जानकारी।

1.	**M.S. ACCESS :** Creating a Data Base	7
2.	Creating a Parent Table-Basic Data Table	7
3.	Creating Form	7
4.	Query : Extracting Data from single Table	7
5.	Creating Child Table – Academic Data Table	7
6.	Append Query	7
7.	Building Relationship	7
8.	Manipulation of Data	7
9.	Retrieving Data From Multiple Tables	7
10.	Creating and Running Reports	7
11.	**INTERNET :** Creation of an E-mail I.D	7
12.	Composing and Sending a E-Mail	7
13.	Sending the E-Mail with attachment	7
14.	Searching for a detail and down loading it	7
15.	Checking, viewing and saving the mail and taking printout	7

PROFESSIONAL LANGUAGE & COMMUNICATION SKILL - TW

Subject Code 1626509	Term Work			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	2
	L	T	P/S	Internal	:	15	
	—	—	06	External	:	35	

PART-I PLCS (HINDI)

व्याख्यान 30

उद्देश्य

व्यवस्या संचार के सात्रिक पाठ्क्रम में व्यावसायिक हिन्दी के विभिन्न रूपों पर विचार किया या है एवं अभ्यास पर विशेष बल दिया गया है। इस पाठ्यक्रम को पूरा करने के पश्चात् छात्र –

– व्यावसायिक लेखन क्षमता विकसित कर सकेंगें।
– पर्याप्त अभ्यास के द्वारा अपने व्यक्तित्व को विकसित करने का प्रयास कर सकेंगे।

विषय :–

1. समाचार – पत्रों का अवलोकन। विभिन्न पुस्तकों का अध्ययन
2. विभिन्न प्रकार के लेखन का अभ्यास
3. हिन्दी से अंग्रेजी में अनुवाद का अभ्यास
4. अंग्रेजी से हिन्दी में अनुवाद का अभ्यास
5. शुद्ध उच्चारण का अभ्यास
6. वैज्ञानिक, तकनीकी एवं व्यावसायिक का शब्दावली का अध्ययन
7. समाचार – पत्रों में प्रकाशित समाचारों, प्रेस – सूचना, विज्ञप्ति आदि का हिन्दी और अंग्रेजी में अनुवाद का अभ्यास।
8. बायोडाटा

परीक्षा का आयोजन

सत्र के अंत में छात्रों द्वारा पाठ्यक्रम के सभी विषयों से संबंधित अभ्यास का अभिलेख प्रस्तुत करना आवश्यक होगा।

आंतरिक अंक	10
वार्षिक परीक्षा अंक	15
	25

PART-II PLCS (ENGLISH) (25 Periods)

Rationale:

The primary aim of Business Communication (Sessional) is to help the students acquire skill of communication (either oral or written) for development of their personality and for a successful professional life.

The curriculum has therefore been so designed as to meet the above requirements by seeking to bring about an overall improvement in their way of presentation, both orally and in writing. It also seeks to develop the student's power of communication through effective use of worksheets and exercises.

Objectives:

The students will be able to:

(1) Develop their personality traits.
(2) Comprehend the conversation with people.
(3) Develop & maintain good contacts with people.
(4) Develop their skills of communication orally and in writing

S.No. Topic

01. Practice on written Communication.
    (a) Letter Writing
    (b) Report writing
    (c) Precis/ Summary writing
    (d) Drafting advertisements
    (e) Drafting Fax messages/ Telegrams
02. Writing effective Bio-data/ Curriculum Vitae
03. Exercises in Oral Communication
    (a) Debates, Elocution, speeches, mock interviews

Contents : Term Work		Hrs/week	Marks
Unit-1	**PRACTICE ON WRITTEN COMMUNICATION:** 01.01 Drafting letters: Official, Business, D.O, (a) Format (b) Content (c) Style/language 01.02 Report Writing: types (a) General/Informative (b) Technical (c) Enquiry Report (d) Report of complaint 01.03 Precis/ Summary Writing: (a) Reading & Understanding (b) Selection of important points (c) Writing down points in own words (d) To stay within limits prescribed 01.04 Drafting advertisements: (a) Format (b) Style of presentation (c) Brevity of words used 01.05 Drafting Telegrams/ Faxograms (a) Make text concise & precise (b) Arrange words appropriately		

Unit-2	**WRITING EFFECTIVE BIO- DATA/ CURRICULUM VITAE:** 02.01 Contents of Bio-data 02.01.01 Personal Information (a) Name (b) Age (c) Marital Status (d) Address (with telephone no. etc.) 02.01.02 Educational background 02.01.03 Academic honors, if any 02.01.04 Employment history 02.01.05 Extra- curricular Activities: - Personal achievement - Hobbies & Interests 02.01.06 Career goals & job objectives 02.01.07 Preparations made towards attainment of career goal through training/courses taken, articles/papers published etc. **Hints:** (a) Remember that the Bio-data serves as a personal advertisement of the job seeker and must therefore appear interesting, attractive, brief and informative. (b) The Bio-Data may not include the following items unless specifically asked for by the employer: (i) Willingness to travel extensively (ii) Statement of health (iii) Reasons for leaving past job (iv) Names and addresses of referees (c) The Bio-data is the first contact between the candidate and the interview board. It serves as a starting point of the interview. Hence the information given in the Bio-data should be brief, to the point and effective enough to catch the attention of the interviewer.		
Unit-3	**EXERCISES IN ORAL COMMUNICATION:** 04.01 Essentials of debating, elocution, extempore speech. 04.01.01 Taming fears 04.01.02 Preparation of text/ subject matter 04.02.01 Conversational- logical flow 04.02.02 Adequate information, examples 04.03 Presentation 04.03.01 Language, style, pronunciation, fluency 04.03.02 Manners, gestures, posture, expressions 04.03.03 Establishing eye contact with audience – every section of audience to again confidence, control. 04.03.04 Image projection – appear confident, calm and composed- professional image, garments, accessories, shoes, face, hands, hair. 04.04 Vocal skills 04.04.01 Listening effectively 04.04.02 Projection of voice appropriately (up or down) 04.04.03 Varying voice & pace of speech 04.04.04 Varying vocal pitch and inflection 04.04.05 Enunciation		

IN OFFICE TRAINING AND VISIT TO ORGANIZATION - TW

Subject Code 1626510	Term Work			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	100	2
	L	T	P/S	Internal	:	30	
	—	—	4 Week Continues	External	:	70	

1. **In Office Visit:** - (Related to Typing/Shorthand/Stenography).

It is very important for the student of M.O.P. to visit the office of Secretariat, Different offices in District and Muffasil, any big organization – such as Bank, L.I.C., S.S.C. Industrial Estate etc.

Contents : Term Work		Hrs/week	Marks
Unit-1	COMFED (Sudha Dairy Project)		
Unit-2	Patna Museum		
Unit-3	Darbhanga Museum		
Unit-4	BIHAR STATE ELECTRICITY BOARD, PATNA		
Unit-5	Hazipur Industrial Estate		
Unit-6	Muzaffarpur Industrial Estate		
Unit-7	Bank (Govt & Private Sector)		
Unit-8	STATE BOARD OF TECHNICAL EDUCATION (SBTE)		
Unit-9	Govt Polytechnic Institution.		
Unit-10	PATNA SECRETERIATE.		
Unit-11	Bhagalpur Silk Industrial		
Unit-12	Dying and Finishing Plant-Darbhanga		
Unit-13	Oil Refinery, Barauni		
Unit-14	Thermal Power Station, Barauni.		
Unit-15	Thermal Power Station, Kanti, Muzaffarpur		

STATE BOARD OF TECHNICAL EDUCATION, BIHAR

Scheme of Teaching and Examinations for

V SEMESTER DIPLOMA IN PRINTING TECHNOLOGY

(Effective from Session 2016-17 Batch)

THEORY

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME							Credits
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks (A)	Class Test(CT) Marks (B)	End Semester Exam. (ESE) Marks (C)	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	
1.	Pre-Press Technology	1627501	03	03	10	20	70	100	28	40	03
2.	Surface Preparation	1627502	03	03	10	20	70	100	28	40	03
3.	Reproduction & Photography-II	1627503	03	03	10	20	70	100	28	40	03
4.	Business Management	1627504	03	03	10	20	70	100	28	40	03
5.	Computer Aided Printing	1627505	03	03	10	20	70	100	28	40	03
		Total:-15					**350**	**500**			

PRACTICAL

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME					Credits
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	
					Internal (A)	External (B)			
6.	Reproduction & Photography Lab – II	1627506	06	03	15	35	50	20	03
	Total:- 06						**50**		

TERM WORK

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME				Credits
			Periods per week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	
7.	Surface Preparation - TW	1627507	06	15	35	50	20	02
8.	Computer Aided Printing - TW	1627508	06	15	35	50	20	02
9.	In plant Training & Visit to Work - TW	1627509	4 weeks continuous	30	70	100	40	02
	Total:- 12					**200**		
Total Periods per week Each of duration one Hours = **33**						**Total Marks = 750**		**24**

PRE-PRESS TECHNOLOGY

Subject Code 1627501	Theory			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale & Objective:

Pre-press is the most sensitive area in the printing trade. The final quality of a Printing mainly depends upon the state of the pre-press technology. Image setting, scanning and advance plate making techniques are the key areas here which need special attention.

S.No.	Topics	Periods
01	Introduction of Page make up Techniques.	(10)
02	Introduction of Process Camera operation.	(10)
03	Scanner Operations.	(10)
04	Imagesetter operation.	(10)
05	Processing operation.	(10)
06	Platemaking operation.	(10)
	Total :	**(60)**

Contents : Theory		Hrs/week	Marks
Unit-1	**INTRODUCTION OF PAGE MAKE UP TECHNIQUES:**	**[10]**	
	Copy preparation, Selection of Text files and graphic files, Scaling of originals.		
Unit-2	**INTRODUCTION OF PROCESS CAMERA OPERATION:**	**[10]**	
	Types of camera; Horizontal type, Vertical Type, Colour correction, Filter factor, Filter ratio, Exposure setting, Developing & Finishing.		
Unit-3	**SCANNER OPERATIONS:**	**[10]**	
	Basic principles, Line, black and white & Colour scanning operations, Screen Angle Colour removal, scanner operated vignette, optical system, Colour correction, Sharpness, Sizing, Resolution, Digital Retouching, Saving picture files.		
Unit-4	**PROCESSING OPERATIONS:**	**[10]**	
	Media cassette, Screen Angle, Types of screen, Horizontal/Vertical Ripping, Exposure setting, Media loading , operation of media cassette, Cutting.		
Unit-5	**INTRODUCTION OF PAGE MAKE UP TECHNIQUES:**	**[10]**	
	Automatic Film processor, online processor, speed setting, Heater temperature setting, Ph value, Chemical equations, Retouching & Finishing.		
Unit-6	**PLATEMAKING OPERATIONS:**	**[10]**	
	Imposition, Operation of automatic plate processor, Wipe on plates, presenstized plates, Surface platemaking operations.		
	Total	**60**	

SURFACE PREPARATION

Subject Code 1627502	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale & Objective:

It is technology subject. It gives the knowledge of different printing surface preparation techniques like potomechanics, offset plates, gravure cylinders etc., with this information one can control the preparation of equipment production of printing surface etc.

S.No.	Topics	Period
01	Substrate's used for preparing base, mechanicals.	(05)
02	Preparing the techniques of screen tints.	(05)
03	Preparing layout by various methods.	(05)
04	Preparing mechanicals for single and multiple colour works use of pin register system.	(05)
05	Quality Control	(05)
06	Offset Plates-Introduction to different plate making process.	(05)
07	Illuminates, desensitizing, dark and continue reaction.	(05)
08	Removal and addition of work on plates.	(05)
09	Plate Making Trouble.	(05)
10	Quality Control aids and their applications.	(05)
	Total:	**(50)**

Contents :Theory			Hrs/week	Marks
Unit-1	**SUBSTRATE'S USED FOR PREPARING BASE, MECHANICALS.:**		**[05]**	
Unit-2	**PREPARING THE TECHNIQUES OF SCREEN TINTS.**		**[05]**	
Unit-3	**PREPARING LAYOUT BY VARIOUS METHODS.**		**[05]**	
Unit-4	**PREPARING MECHANICALS FOR SINGLE AND MULTIPLE COLOUR WORKS USE OF PIN REGISTER SYSTEM.**		**[05]**	
Unit-5	**QUALITY CONTROL.**		**[05]**	
Unit-6	**OFFSET PLATES-INTRODUCTION TO DIFFERENT PLATE MAKING PROCESS.**		**[05]**	
	06.01	Study of different high sources used in plate making.		
	06.02	Detailed study of making a surface plate.		
	06.03	Wipe-on process of plate making.		
	06.04	Detailed study of deep-etched plates.		
	06.05	Pre-Sensitized plates.		
	06.06	Bi-metals and tri-metals plates.		
Unit-7	**ILLUMINATES, DESENSITIZING, DARK AND CONTINUING REACTION.**		**[05]**	
Unit-8	**REMOVAL AND ADDITION OF WORK ON PLATES.**		**[05]**	
Unit-9	**PLATE MAKING TROUBLE.**		**[05]**	
Unit-10	**QUALITY CONTROL AIDS AND THEIR APPLICATION.**		**[05]**	
	TOTAL		**50**	

REPRODUCTION & PHOTOGRAPHY - II

Subject Code 1627503	Theory			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale & Objective:

Photomechanics, transfer of image and electronic image generation of the photography and their importance for a student to learn, in making tinting for the job and mainly deals with operation and handling of different equipments machinery etc, used for reproduction photography.

S.No.	Topics	Periods
01	Light & Colour.	(15)
02	Equipments and Materials.	(25)
03	Quality Control Techniques.	(25)
04	Colour Separation.	(25)
05	Colour Reproduction.	(25)
06	Electronic Scanner.	(20)
07	Proofing.	(15)
	Total :	**(150)**

Contents : Theory		Hrs/week	Marks
Unit-1	**LIGHT & COLOUR:**	**[15]**	
	Electromagnetic waves, visual appreciation, properties of colour, colour temperature, additive colour principle, subtractive colour principle.		
Unit-2	**EQUIPMENTS AND MATERIALS:**	**[25]**	
	Camera essentials, filters, filter factor, filter ratio, halftone screen, screen angles, lighting and matches.		
Unit-3	**QUALITY CONTROL TECHNIQUES :**	**[25]**	
	Copy preparation and evaluation, tone and colour control, grey scale, register marks register punch, colour patches.		
Unit-4	**COLOUR SEPARATION:**	**[25]**	
	Principles of colour reproduction methods of colour, separation, direct-colour separation, indirect colour separation, exposure control system, evaluation of colour separations.		
Unit-5	**COLOUR REPRODUCTION:**	**[25]**	
Unit-6	Basic principles of colour correction masks, manual colour correction, photographic colour correction, single overlay, two overlay, high light, pre-mask, camera back masking, quality control mask, under colour removal.		
Unit-7	**ELECTRONIC SCANNER:**	**[20]**	
	Electronic colour separation, scanner development, scanner principles, scanner operation, evaluation of separation through scanner.		
Unit-8	**PROOFING:**	**[15]**	
	After-treatment of negative/positive, pre-press proofing, needs for pre-press proofing.		
	Total		

BUSINESS MANAGEMENT

Subject Code 1627504	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale & Objective:

The existence of profit of a business is no more a chance phenomenon. It is a scientifically calculated management activity. Therefore, it is essential that in the curriculum for Diploma courses in Printing Technology the subject should be included as a Basic subject. Supervisors are called front line Manager in the sense that they are the persons directly in touch with the workers. The study of management will enable the students to apply a usefully the knowledge of industrial relations, legislations relating to industries, printing and publication management functions, personnel Management and many other important and relevant activities in their professional lives.

S.No.	Topics	Periods
01	Business organisations.	08
02	State Enterprises.	06
03	Small Scale Industries.	06
04	Management.	08
05	Production Management.	06
06	Personnel Management.	06
07	Financial Management	05
08	Marketing Management.	05
	Total	**50**

Contents : Theory		Hrs/week	Marks
Unit-1	**BUSINESS ORGANISATIONS:**	**[8]**	
	Proprietary, Partnership, joint stock company, private limited, public limited-relative advantages & disadvantages.		
Unit-2	**STATE ENTERPRISES:**	**[6]**	
	Government Department, Public corporation and Govt. Company, Public undertaking.		
Unit-3	**SMALL SCALE INDUSTRIES:**	**[6]**	
	Definition, Governmental incentives and support, scope of Self-employment for Printing technicians.		
Unit-4	**MANAGEMENT:**	**[8]**	
	Definition, general management functions-planning, organising, wordinating, motivating, directing and controlling.		
Unit-5	**PRODUCTION MANAGEMENT:**	**[6]**	
	Production Planning and control system, Factories Act, Industries laws, Quality Control.		
Unit-6	**PERSONNEL MANAGEMENT:**	**[6]**	
	Employment, Job Specifications, selection tests and interviews, Wants, Incentives, Labour-laws.		
Unit-7	**FINANCIAL MANAGEMENT:**	**[5]**	
	Assessing financial requirement, working & fixed capital, financial control, Break-even analysis, Pricing.		
Unit-8	**MARKETING MANAGEMENT:**	**[5]**	
	Role of marketing, market growth and market share, sale promotion and advertising, Consumer's behaviour preference.		
	Total	**50**	

COMPUTER AIDED PRINTING

Subject Code 1627505	Theory			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale & Objective:

Now-a-days computers have entered into all walks of life. The thrust or impact of computers in the field of printing and packaging is visible with the use of increase computerised machines. hence the study of formats, computer based jobs and other applications of computers to printing industry is must for the students undergoing this course. It is expected that after undergoing this course, the students will be able to do various jobs to the desired quality by using modern processes and practices. They will be made proficient in the use of sophisticated computerised machines related to printing and packaging.

S.No.	Topics	Periods
01	Formats.	(20)
02	Computer based jobs.	(20)
03	Application of computers in Printing Industry.	(20)
	Total :	**(60)**

Contents : Theory			Hrs/week	Marks
Unit-1	**FORMATS:**		**[20]**	
	Knowledge of making formats, knowledge of creation, updation and editing of the life.			
Unit-2	**COMPUTER BASED JOBS:**		**[20]**	
	jobs in printing office and automation; data base facilities, graphic facilities, simple calculations using spread sheet window facility. Packages useful for printing industry like print master and story board.			
Unit-3	**APPLICATION OF COMPUTERS IN PRINTING INDUSTRY:**		**[20]**	
	03.01	Office automation using dBase III for payroll, inventory control, personal services, estimation mailing etc.		
	03.02	Desk Top Publishing.		
	03.03	Computer/microprocessor based printing equipment.		
	03.04	Prototype setting including justification.		
	03.05	Reproduction system		
	03.06	Plate making system.		
	03.07	Finishing system and Press control.		
		Total	**60**	

REPRODUCTION & PHOTOGRAPHY LAB - II

Subject Code 1627506	Practical			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	03
	L	T	P/S	ESE	:	50	
	—	—	06	Internal	:	15	
				External	:	35	

Contents : Practical		Hrs/week	Marks
Unit-1	1. Colour separation from reflection copy.		
Unit-2	2. Manual colour correction.		
Unit-3	3. Screening from continuous-tone-separation, negative and dot-etching on positives.		
Unit-4	4. Manual retouching exercises.		
Unit-5	5. Indirect separation from Reflection copy. Transparencies & colour correction with masking.		
Unit-6	6. Positive masking:- (a) One-stage positive, (b) Two-stage positive overlay masking pre and final masks.		
Unit-7	7. Highlight-pre-mask from colour transparencies.		
Unit-8	8. Different masking techniques.		
Unit-9	9. Pre-press proofing		

SURFACE PREPARATION -TW

Subject Code 1627507	Term Work			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	Internal	:	15	
	—	—	06	External	:	35	

Contents : Term Work			Hrs/week	Marks
Unit-1	01	Preparing wipe on plate making process.		
Unit-2	02	Preparing relief plates.		
Unit-3	03	Use of different, photo-resists for line and halftone etching.		
Unit-4	04	Making deep-etched and pre-sensitized plates.		
Unit-5	05	Preparing Albumen plates making process.		
		Total :	**(50)**	

COMPUTER AIDED PRINTING - TW

Subject Code 1627508	Term Work			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	Internal	:	15	
	—	—	06	External	:	35	

Contents : Term Work			Hrs/week	Marks
Unit-1	01	B & W and Colour correction in PhotoShop.		
Unit-2	02	Pagemaking operations.		
Unit-3	03	Making EPS & PDF files for page output.		
Unit-4	04	Selection of colour for fore ground and background. Study of various colour combinations.		

IN PLANT TRAINING AND VISIT TO WORKS- TW

Subject Code 1627509	Term Work			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	100	02
	L	T	P/S	Internal	:	30	
	—	—	4 Week Continues	External	:	70	

Rationale:

A student is required to develop a skill to synthesise his knowledge, skill and attitudes gained while going through different courses. It is desirable to expose the students to the world of work to be familiar with the real life situations and understand the problem theirin. the "In Plant Training" is being introduced for the final year diploma technicians for Printing Technology with the above objectives in view. This course will help a student to observe how the technical. Managerial, quality control, safety and other principles are being applied in real life situation. he will be able to observe how is supervisor performs day-to-day work and co-ordinate shop floor activities. The course will no doubt, be a great help in developing skill required for a diploma holder technician, and will also help in bringing attitudinal change in him.

Objective:

The objectives of this course are following:

A student will be able to:

- Understand the working of the machines, tools and equipment more clearly.
- Write specifications of the machines, tools, equipment.
- Learn to maintain office records.
- Know the process of planning, implementation and monitoring.
- Learn the skills of shop-floor coordination.
- Know the skill of office management & inventory control
- Understand the process of production.
- Know the skills of quality control.
- Know the skill of maintenance management
- Know the skill of production control.
- Acquire the skill of man/machine loading.
- Know the organisational setup and plant layout.
- Locate the plants and industry related to Printing Technology, State and Nation wise.
- Find out the characteristics, functions, activities of those industries.
- Know the source of raw materials and markets for the industries.
- Find out the opportunities and method of recruitment.
- Find out the special characteristics of the industries.
- Find out the special characteristics of the industries.
- Observe the special purpose production machines, which the student may not have seen in the institution, in production.
- Learn the special testing which have not been provided in institutions, of the products.

Contents : Term Work		Hrs/week	Marks
Unit-1	**Introduction.**		
Unit-2	**Name and types of industries visited, their special characteristics.**		
Unit-3	**Working of different industries:-** - Location. - Lay-out. - Raw materials used. - Products. - OrganiSation Structure. - Special Machine. **Special Tools.**		
Unit-4	**Conclusions** - Observations. - Typical Characteristics. - Area of Weakness. **Suggestions.**		

The report on visit to works should be presented and assessed in the form of Seminar.

STATE BOARD OF TECHNICAL EDUCATION, BIHAR
Scheme of Teaching and Examinations for
V SEMESTER DIPLOMA IN TEXTILE ENGINEERING

(Effective from Session 2016-17 Batch)

THEORY

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME						Credits
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks (A)	Class Test(CT) Marks (B)	End Semester Exam. (ESE) Marks (C)	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	
1.	Yarn Manufacture - II	1628501	03	03	10	20	70	100	28	40	03
2.	Fabric Manufacture - II	1628502	03	03	10	20	70	100	28	40	03
3.	Fabric Structure and Design - II	1628503	03	03	10	20	70	100	28	40	03
4.	Textile Management	1628504	03	03	10	20	70	100	28	40	03
5.	Garment Technology	1628505	03	03	10	20	70	100	28	40	03
		Total:- 15					**350**	**500**			

PRACTICAL

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHIG SCHEME	EXAMINATION – SCHEME					Credits
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	
					Internal (A)	External (B)			
6.	Yarn manufacture Lab. – II	1628506	06	03	15	35	50	20	02
7.	Fabric Manufacture Lab. – II	1628507	06	03	15	35	50	20	02
8.	Cloth Analysis & Designing Practice-II	1628508	06	03	15	35	50	20	02
		Total:-	**18**				**150**		

TERM WORK

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME				Credits
			Periods per week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	
9.	In-Plant Training & Visit to Works - TW	1628509	4 weeks continuous	30	70	100	40	03
	Total:-					**100**		
Total Periods per week Each of duration One Hours **= 33**						**Total Marks = 750**		**24**

YARN MANUFACTURE - II

Subject Code 1628501	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale :

Yarn Manufacture is one of the main activities for a diploma holder technician in Textile Engineering. He is required to handle the yarn manufacturing machines, tools and equipments and also supervise the yarn manufacturing processes. He must be well versed with the subject of yarn manufacture.
The subject is being introduced to develop the understanding of the yarn manufacturing processes. It will help in discharge of his duties in the world of work as he can understand a problem, analyse the same and take an appropriate decision as and when the job demands.

Objective:

After completion of the courses student will be able to :-

- ♦ Define the terminologies related with yarn manufacture machineries and processes.
- ♦ Explain the principle and working of the machine.
- ♦ Sketch the machine parts and level them.
- ♦ Understand the process of production and their related problem.
- ♦ Yarn Manufacture - II

S.No.	UNIT-:-	Periods
01	Speed Frame.	(15)
02	Ring Frame.	(15)
03	Doubling Frame.	(05)
04	Open End Spinning.	(05)
05	Waste Spinning.	(05)
06	Texturisation.	(05)
	Total :	**(50)**

Contents : Theory

UNIT-: 01 –	SPEED FRAME:	[15]
	01.01 Objectives of speed frames.	
	01.02 Principles of drafting, twisting, winding and building.	
	01.03 Description of speed frame.	
	01.03.01 CREEL.	
	01.03.02 Drafting System.	
	01.03.03 Twisting Mechanism.	
	01.03.04 Winding mechanism-Flyer leading, Bobbin leading, Advantages and Disadvantages of each method.. Differential Motion-Types and Description. Building of Bobbin, Traverse motion of the bobbin.	
	01.03.05 Head Stock Gearing.	
	01.04 Different passage of flyer frame.	
	01.04.01 Conventional Process-Slubber, Inter frame, Roving Frame.	
	01.04.02 Short Cut Process-Simplex.	
	01.05 Construction and design of Conedrum.	
	01.06 Recent developments in Speed frames.	
	01.07 Calculation regarding draft and draft constant, Twist and twist Constant, Production, Required Change Wheel.	

UNIT-: 02–	**RING FRAME:**	**[15]**
	02.01 Objects of Ring Spinning.	
	02.02 Construction and Working of Conventional Ring frame.	
	02.03 Detailed Study of the ring frame mechanism.	
	02.04 Forces acting on the traveller and yarn baloon in ring spinning.	
	02.05 Resultant of the forces acting on the traveller.	
	02.06 Variation in yarn tension during spinning.	
	02.07 Twist flow in ring spinning.	
	02.08 Effect of various parameters.	
	02.09 Types of Draft-Tension Draft, Break Draft, Main Draft.	
	02.10 Types of package builds-Cop build, Roving build, Combined build.	
	02.11 Builder motion on ring frame.	
	02.12 Ring Rail movement.	
	02.13 Improvements in various parts and features of modern ring frame for high speed spinning.	
	02.14 Setting in ring frames.	
	02.15 Calculation regarding Speed, Draft and draft Constant, Twist and twist Constant, Production.	
	02.16 Modifications required in ring frames to process, various types of blend.	

UNIT-: 03	**– DOUBLING FRAME:**	**[05]**
	03.01 Objects of doubling process.	
	03.02 Construction and working of a doubler-Dry doubling and Wet doubling.	
	03.03 Different methods of threading the yarn through delivery rollers.	
	03.04 Fancy yarns and fancy doublers.	
	03.05 Preparation of standard yarn packages.	
UNIT-: 04	**OPEN END SPINNING:**	**[05]**
	04.01 Limitations of Ring spinning.	
	04.02 Principles of Break spinning.	
	04.03 Construction and working of Open End Frames.	
	04.04 Comparison of ring and open end yarns.	
	04.05 Recent developments in open end spinning.	
UNIT-: 05	**WASTE SPINNING:**	**[05]**
	05.01 Classification of cotton waste.	
	05.02 Preparation and methods of converting waste into useful products.	
	05.03 Machineries involved in their conversion.	
UNIT-: 06	**TEXTURISATION:**	**[05]**
	06.01Introduction to texturisation.	
	06.02 Theory of texturing.	
	06.03 Yarn texturising methods.	
	06.04 Properties of textured yarns.	

Reference Books:

1.	Manual of Cotton Spinning Vol.-IV, V, Ed: AFW Coulson, Textile Institute, Manachester.	-	
2.	Hand Book of Cotton Spinning, Universal Publication Corporation.	-	William Taggart.
3.	Essential Facts of Practical Cotton Spinning, Soumya Publication, Bombay	-	T. K. Pattabhiraman.
4.	Cotton Spinning Calculation, Soumya Publication, Bombay.	-	T. K. Pattabhiraman.
5.	Spun Yarn Technology, Butter Worths, London.	-	Osteby.
6.	Cotton Speed Frame.	-	G. R. Merrill.
7.	Cotton Ring Frame.	-	G. R. Merrill.
8.	Open End Spinning.	-	Niglol.

FABRIC MANUFACTURE - II

Subject Code 1628502	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale: The ornamentation of fabric is done by the constant variation in number of warp threads in the top and bottom lines of shed in successive picks, so as to conceal certain threads to form an effective pattern on the face or back of the fabric. This is accomplished by means of Dobbies and Jacquard. The ornamentation of fabric is also done by the introduction of more than one colour, count or quality in the warp or weft or both. The ornamentation in the weft is done by means of multiple box motion. This subject intends to impart knowledge and skills in the area of ornamentation of fabrics when the fabric is manufactured by the use of Dobbies, Jacquard and multiple box motion. It also covers unconventional weaving methods like Projectile, Rapier, Air jet and Water jet, Circular looms.

Objectives:

- Learn weaving using dobby and jacquard.
- Learn Automatic weaving and weft patterning methods.
- Learn in details the shuttleless weaving techniques.

S.No.	Topics	Periods
01	Dobby.	(08)
02	Jacquard.	(10)
03	Box Motions.	(05)
04	Automatic Looms.	(09)
05	Shuttleless Looms.	(15)
06	Fabric Defects.	(02)
07	Loom Faults.	(01)
	Total :	**(50)**

Contents : Theory

Name of the Topic			Hrs/week	Marks
Unit-1	**DOBBY:**		**08**	
	01.01	Definition and Principle.		
	01.02	Scope of dobby and uses of dobby.		
	01.03	Classification of dobby.		
	01.03.01	Single lift and double lift dobby.		
	01.03.02	Negative and Positive dobby.		
	01.03.03	Centre shed and open shed dobby.		
	01.03.04	Horizontal and Vertical dobby.		
	01.03.05	Right and Left Hand dobby.		
	01.04	Types of double lift dobby.		
	01.04.01	Detail study of Keighley dobby.		
	01.04.02	Detail study of Dobcross dobby.		
	01.04.03	Detail study of Climax dobby.		
	01.04.04	Brief idea about Postitive Hattersley dobby.		
	01.04.05	Detail study of Paper dobby.		
	01.05	Methods of Pegging Lags.		
	01.06	Causes of 'Jack-Missing'.		
	01.07	Dwell of dobby.		
	01.08	Dobby Timing.		
	01.09	Features of Modern dobby.		
	01.10	Cross – Border dobby (In-brief).		

Unit-2	**JACQUARD:**		**10**	
	02.01	Definition:- Jacquard, Jacquard shedding.		
	02.02	Principle of Jacquard shedding.		
	02.03	Types of Jacquard.		
	02.03.01	Coarse Pitch, Medium Pitch and Fine-Pitch Jacquard.		
	02.03.02	Single Lift Jacquard.		
	02.03.03	Double Lift Single Cylinder Jacquard.		
	02.03.04	Double Lift Double Cylinder Jacquard.		
	02.03.05	Jacquard for Special use.		
	02.04	Size of Jacquard.		
	02.05	Figuring Capacity of Jacquard.		
	02.06	Detail Study of Single Lift Jacquard.		
	02.06.01	Timing of Single Lift Jacquard.		
	02.07	Detail Study of Double Lift Single Cylinder Jacquard.		
	02.07.01	Advantage of Double Lift Jacquard.		
	02.08	Detail study of Double Lift Double Cylinder Jacquard.		
	02.08.01	Advantage and disadvantage of Double Lift Double Cylinder Jacquard.		
	02.08.02	Timing of Double Lift Double Cylinder Jacquard.		
	02.09	Brief Idea about Cross – Border Jacquard.		
	02.10	The Vincenzi Jacquard.		
	02.11	The Verdol Jacquard.		
	02.12	Harness Building.		
	02.12.01	Harness, Lingoe, Mail– Eyes or Coupling, Comber board, Harness mounting.		
	02.12.02	System of Harness Mounting.		
	02.12.02.01	Norwich System.		
	02.12.02.03	London System.		
	02.13	Casting – out.		
	02.14	Card – Cutting and Card Lacing.		
	02.15	Brief Idea about Leno Jacquard and Twilling Jacquard.		
Unit-3	**BOX MOTIONS:**		**05**	
	03.01	Importance of Multiple Box Motions.		
	03.02	Classification of Multiple Box Motions.		
	03.02.01	Drop –Box motion.		
	03.02.02	Circular Box motion.		
	03.02.03	Pick – at – will Box motion.		
	03.03	Conditions to Good Multiple Box Motion.		
	03.04	Type of Multiple Box motion (Negative & Positive).		

	03.04.01	Negative Multiple Box , motion.		
	03.04.01.01	Chain Drop –Box motion.		
	03.04.01.02	Pick – at – will Drop – Box motion.		
	03.04.02	Positive Multiple Box motion.		
	03.04.02.01	Eccle's Box motion.		
Unit-4	**<u>AUTOMATIC LOOMS</u>:**		**09**	
	04.01	Automatic Loom and its improvements.		
	04.02	Characteristic features.		
	04.03	Advantage of Automatic Loom over Non- Automatic Loom.		
	04.04	Types of Automatic Looms.		
	04.04.01	Shuttle – Changing automatic loom.		
	04.04.02	Bobbin or Pirn or Cop changing automatic Loom.		
	04.04.03	Comparision between Cop-changing and Shuttle changing Looms.		
	04.05	Warp Stop motion.		
	04.05.01	Function.		
	04.05.02	Types of Warp Stop motion.		
	04.05.02.01	Electrical Warp Stop motion.		
	04.05.02.02	Mechanical Warp stop motion.		
	04.05.02.02.01	Northrop Mechanical Warp stop motion.		
	04.06	Automatic Cop (or, Bobbin) Changing mechanism.		
	04.06.01	Automatic Supply of Weft.		
	04.06.02	Weft Feeler motion.		
	04.06.03	Bunching motion.		
	04.06.04	Methods on types of Automatic Bobbin Change Loom.		
	04.06.04.01	Battery Loom (Magazine Loom).		
	04.06.04.02	Bobbin Loaders.		
	04.06.04.03	Loom Winders.		
	04.06.05	Northrop Bobbin – changing Loom mechanism.		
	04.06.05.01	Shuttle Protector and Weft Cutter.		
	04.06.05.02	Three Miss – Thread motion.		
	04.06.05.03	Northrop Roper Let – off motion.		
	04.07	Shuttle changing Automatic Loom.		
	04.07.01	Characteristics.		
	04.07.02	Methods of changing Shuttle.		
	04.07.03	Types of Shuttle changing Looms.		
	04.07.03.01	Hattersley Automatic Shuttle changing Loom (In-brief).		

Unit-5	**SHUTTLELESS LOOMS:**		**15**	
	05.01	Introduction of Shuttleless Weaving.		
	05.02	Advantage of Shutteless weaving as compared to conventional Loom.		
	05.03	Classification of Shuttleless Loom.		
	05.03.01	Sulzer Projectile Shuttleless Loom.		
	05.03.02	Rapier Shuttleless Loom.		
	05.03.03	Air Jet Loom.		
	05.03.04	Water Jet Loom.		
	05.04	Sulzer Projectile Shuttleless Loom: - Introduction, Principle, Main Features, Advantages and Working description (Details).		
	05.05	Rapier Shuttleless Weaving :- Introduction, Principle, Main Features and Working description (details).		
	05.06	Air Jet Loom :- Introduction, Principle and working of Maxbo-air Jet and Elitex –air Jet Loom.		
	05.07	Brief idea about Water – Jet Loom.		
Unit-6	**FABRIC DEFECTS:**		**02**	
	06.01	Classification of Cloth faults.		
	06.01.01	Warp defects :- Broken ends, Wrong ends, Selvedge defects, Stiching, and Floats.		
	06.01.02	Weft defects :- Weft Breakages and Mispicks, Bareness or Thin and Thick places, Tight pick, Picks –out , Weft Curling, kinky fabrics, slugs, cracks, shuttle Marks.		
	06.01.03	Cloth defects :- Oil Spots, Dirty Cloth, Hairy or Flossy cloth, Rough surface cloth and Harness skips.		
Unit-7	**LOOM FAULTS:**		**01**	
	07.01	Loom Faults :- Reed marks and cover of cloth, Shuttle Flying out, Shuttle Trapping in warp, Loom Banging – off, Loom stopping, Weft Cutting, Bumping and splitting or cops knocking – off.		
		Total-	**50**	

FABRIC STRUCTURE & DESIGN - II

Subject Code 1628503	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale: To objective of the subject in to make students familiar with Jacquard designs and some advance designs like Double cloth, Tapestry Brocade, Leno, warp and weft pile structures. Some of these structures are used in furnishing, upholstery and technical textiles. Knowledge of these structures helps the student in better understanding various aspects of textiles. During practical students analyses above structures which help them in better understanding of the subject.

S.No.	Topics	Periods
01	Extra Figuring.	(06)
02	Backed Cloth.	(05)
03	Double Cloth.	(07)
04	Treble Cloth.	(03)
05	Figured Pique Fabrics.	(04)
06	Gauze and Leno Structures.	(06)
07	Damasks, Brocades and Tapestries.	(04)
08	Terry Pile Structures.	(04)
09	Weft and Warp Pile Structures.	(04)
10	Simple Colour and Weave effects.	(03)
11	Compound Colour and Weave effects.	(04)
	Total :	**(50)**

Contents : Theory

Name of theTopic			Hrs/week	Marks
Unit-1	**EXTRA FIGURING:**		**06**	
	01.01	Figuring With Extra thread.		
	01.02	Methods of introducing Extra Figuring threads.		
	01.03	Methods of disposing of the Surplus extra threads.		
	01.04	Extra Warp Figuring and Construction of Extra Wrap Figures.		
	01.04.01	Continuous Extra Wrap Figuring.		
	01.02.02	Intermittent Extra Wrap Figuring.		
	01.05	Extra Weft Figuring and Construction of Extra Weft Figures.		
	01.05.01	Continuous Extra Weft Figuring.		
	01.05.02	Intermittent Extra Weft Figuring.		
	01.06	Difference between Extra Wrap and Extra Weft Figuring.		
	01.07	Quality Particulars of above figuring.		
Unit-2	**BACKED CLOTH:**		**05**	
	02.01	Introduction.		
	02.02	Methods of Designing.		
	02.02.01	Weft Backed Cloth.		
	02.02.02	Reversible Weft Backed Cloth.		
	02.02.03	Warp Backed Cloth.		
	02.02.04	Reversible Warp Backed Cloth.		
	02.03	Backed Cloths With Wadding Threads.		
	02.03.01	Weft Backed and Warp Wadded Design.		
	02.03.02	Warp Backed and Weft Wadded Design.		
	02.04	Quality Particulars of above types of Cloths.		

Unit-3	**DOUBLE CLOTH:**		**07**	
	03.01	Introduction.		
	03.02	Classification of Double Cloths.		
	03.02.01	Self-Stitched Double Cloths.		
	03.02.02	Centre-Stitched Double Cloths.		
	03.02.03	Double Cloths Stitched by thread interchange.		
	03.02.04	Double Cloths Stitched by Cloth interchange.		
	03.02.05	Alternate Single-ply and double-ply Construction.		
	03.03	Self-Stitched double Cloths.		
	03.03.01	Stitching.		
	03.03.02	Construction.		
	03.03.03	Selection of Suitable Stitching Positions.		
	03.04	Wadded Double Cloth.		
	03.04.01	Weft-Wadded Double Cloth.		
	03.04.02	Warp-Wadded Double Cloth.		
	03.05	Centre-Stitched Double Cloths.		
	03.05.01	Centre-Warp Stitching.		
	03.05.02	Centre-Weft Stitching.		
	03.06	Quality Particulars of each cloth.		
Unit-4	**TREBLE CLOTH:**		**03**	
	04.01	Introduction.		
	04.02	Construction of Treble Cloths.		
	04.03	Methods of Stitching.		
Unit-5	**FIGURED PIQUE FABRICS:**		**04**	
	05.01	Introduction		
	05.02	Classification of the Figured Pique Structure.		
	05.02.01	Loose-back Pique.		
	05.02.02	Half Fast-back Pique.		
	05.02.03	Fast-back Pique.		
	05.02.04	Methods of Designing.		
	05.03	Wadding Picks for Figured Pique Fabrics.		
Unit-6	**GAUZE AND LENO STRUCTURES:**		**06**	
	06.01	Introduction.		
	06.02	Principle of Leno Structure.		
	06.03	Methods of Producing Leno Structure.		
	06.04	Simple Figured effects.		
Unit-7	**DAMASKS, BROCADES AND TAPESTRIES:**		**04**	
	07.01	Basic idea of Damasks, Brocades and Tapestries.		
Unit-8	**TERRY PILE STRUCTURES:**		**04**	
	08.01	Introduction.		
	08.02	Terry Pile Weaves.		
	08.03	Formation of the Pile.		
	08.04	Formation of 3, 4, 6 Picks Terry Pile Structures.		
	08.05	Special mechanism require in terry Weaves.		

Unit-9	**WEFT AND WARP PILE STRUCTURES:**		**04**	
	09.01	Weft Pile Structure.		
	09.01.01	Velveteens.		
	09.01.02	Corded Velveteens.		
	09.01.03	Figured Velveteens.		
	09.01.04	Corduroy Fabrics.		
	09.02	Warp Pile Structure.		
	09.02.01	Warp Pile fabrics produced with the aid of wired and on the Face - to - Face Principle.		
Unit-10	**SIMPLE COLOUR AND WEAVE EFFECTS:**		**03**	
	10.01	Introduction.		
	10.02	Representation of Colour and Weave effects upon design Paper.		
	10.03	Classification of Colour and Weave effects.		
	10.04	Methods of Producing variety of effect in the Same Weave and Colouring.		
Unit-11	**COMPOUND COLOUR AND WEAVE EFFECTS:**		**04**	
	11.01	Stripe Colour and Weave effects.		
	11.02	Check Colour and Weave effects.		
	11.03	Special Colour and Weave effects.		
	11.04	Figured Colour and Weave effects.		
		Total-	**50**	

TEXTILE MANAGEMENT

Subject Code 1628504	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale: The subject covers the calculations regarding production and machinery allocation in spinning and weaving and knitting. These calculations are important in day today working plan for a textile mill. This subject also covers selection of site for new industry, Material handling, Building and construction requirement for Textile Mill, It also covers the categories of labour required in textile mills. Costing covers basic conceptual understanding of subject and its application in various methods.

Contents : Theory

Name of the Topic			Hrs/week	Marks
UNIT-1	**INTRODUCTION:**		**05**	**8**
	01.01	Objects of Textile Management.		
	01.02	A Brief Profile of Indian Textile Industry.		
	01.03	Technocracy and Management.		
	01.04	Industry as a Social System.		
	01.05	Indian Textile Industry and its Importance.		
	01.06	Primary Principles of Textile Industry.		
	01.07	Management Problems of Indian Textile Industry and their remedies.		
UNIT-2	**MACHINERY SPECIFICATION, SELECTION & CALCULATION FOR NO. OF MACHINES**		**12**	**16**
	02.01	Selection of machines & machinery specifications required for the product in spinning, weaving, knitting.		
	02.02	Calculation for no. of machines in spinning /spin plan.		
	02.02.01	Preparation of organization for ring spinning mill and preparatory departments based on ring spindle capacity and production of ring spun yarn (Carded, Combed, Blended, Folded).		
	02.02.02	Preparing organization of rotor spinning mill.		
	02.03	Calculation regarding efficiency, waste, draft, twist, production rates, amount of raw material required and no. of machinery required at different stages of spinning process.		
	02.04	Calculation for no. of machines in weaving / weave plan - Preparation of organization for shuttle & shuttleless weaving mill and preparatory departments based on number of weaving machines & production of different cloths.		
	02.04.01	Calculation regarding efficiency, waste, crimp, production rates, raw material and no. of machinery required at different weaving processes.		
UNIT-3	**PLANT & MACHINERY LAYOUT**		**08**	**10**
	03.01	Introduction		
	03.02	Objectives of good plant layout		
	03.03	Principles of layouts,		
	03.04	Types of layouts and their advantages and disadvantages		
	03.05	Flow pattern, work station design, tools and devices of making layouts		
	03.06	Storage space requirements		
	03.07	Plant layout procedure		
	03.08	Factors influencing layouts		
	03.09	To determine the number of machines required for producing desired Quantities of end products (Yarns and Fabric).		
	03.10	Effect of automation on plant layout		
	03.11	Symptoms of bad layout.		
	03.12	Layout aspects of spinning, weaving, knitting and composite mills.		

UNIT-4	**SITE SELECTION**		**03**	**5**
	04.01	Introduction		
	04.02	Selection of site for textile mills		
	04.02.01	General location		
	04.02.02	Actual selection of specific site		
	04.03	Factors influencing site selection		
	04.03.01	Climatic considerations, geo-technical report, bearing pressure etc.		
UNIT-5	**LABOUR COMPLIMENT**		**03**	**5**
	05.01	Types of labour required		
	05.02	Labour compliment, labour and staff required for spinning and weaving based on workload consideration.		
	05.03	Use of mathematics for number of operations in deciding the workload.		
UNIT-6	**MATERIALS HANDLING**		**05**	**8**
	06.01	Introduction, Definition and functions		
	06.02	Principles of materials handling		
	06.03	Material handling methods, engineering and economic factors, relationship to plant layout		
	06.04	Selection and types of material handling equipments		
	06.05	Study of different types of equipments used for materials handling in spinning, weaving, knitting mills.		
UNIT-7	**COSTING**		**14**	**18**
	07.01	Introduction, definition, classification.		
	07.02	Classification of costing methods		
	07.03	Marginal costing and Break even analysis		
	07.03.01	Classification of costs		
	07.03.02	Assumptions of break even analysis		
	07.03.03	Break even chart, Break even point, Margin of safety and angle of incident		
	07.03.04	Marginal cost, Contribution,		
	07.03.05	P/V ratio and its significance		
	07.03.06	Methods to improve P/V ratio		
	07.03.07	Problems based on break even analysis and marginal costing		
	07.04	Standard costing		
	07.04.01	Classification of Standard cost		
	07.04.02	Methods to determine standard costing		
	07.04.03	Advantages and limitations of standard Costing		
	07.04.04	Types of variances		
	07.04.05	Significance of Revision Variance		
	07.04.06	Problems based on standard costing		
		Total	**50**	**70**

Books Recommended :-

1.	Practical Cotton Mill Management.	-	Benjamin.
2.	Textile Technocracy.	-	Darab B. Unwalla.
3.	Management of Systems.	-	A. S. Chauhan.
4.	The Textiles.	-	Madan Gaur.
5.	Costing in Cotton Textile Industry.	-	H. K. Verma.
6.	Management of Textile Industry.	-	Dudeja
7.	Textile Project Management	-	A. Ormerod, The Textile Institute Publication.
8.	Project, Planning Analysis, Selection Implementation & Review	-	Prasanna Chandra, Tata McGraw Hill Publishing Co. Ltd.
9.	Norms for Process Parameters, Productivity etc. ATIRA, BTRA, SITRA, NITRA.	-	-

GARMENT TECHNOLOGY

Subject Code 1628505	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale: With increasing demand of readymade garments the need for personnel in the garment industry is increasing day by day. The subject garment technology is therefore included and it is kept in VI semester. This would give the students necessary knowledge for working in garment industry.

Objective: With the input provided in this paper, the students will be able to:-

- Acquire basic knowledge of Garment Technology.
- Define the terminologies related with Garment Technology.
- Understand the principle and working operation of Cutting, Sewing and Finishing of garment and their related problem.

Contents : Theory

	Name of the Topic	Hrs/week	Marks
UNIT-1	**Garment Manufacturing:** Introduction, An overview about Indian Garment Industry - Fashion Trends- Labour and capital requirements in the garment industry. Production planning in garment manufacturing, Different garment production systems, Growth of readymade garments Industry in India. Global scenario	**03**	
UNIT-2	**Selection of Fabrics:** Garment from Woven and Knitted fabrics, various fabrics available in market, their characteristics and applications to suit to different purposes.	**03**	
UNIT-3	**Pattern making:** Introduction to pattern making and garment Construction, Different terminologies. Methods of making basic pattern, grading of pattern, size, size charts.	**04**	
UNIT-4	**Garment Cutting:** Objectives, (i) Planning, drawing and reproduction of marker: Requirements of marker planning, Marker plan efficiency, Methods of marker planning and marker use. (ii) Spreading of the fabric to form a lay: Requirements of the spreading process, Methods of spreading, Nature of fabric packages. (iii) The cutting operation. Methods of cutting and their merits and demerits. Bundling system.	**12**	
UNIT-5	**Garment Sewing:** The properties of seam, seam types, stitch types, sewing machine feed mechanism, sewing machine needles, sewing threads. Thread properties and seam performance, testing for sewability and tailorability. Sewing problems and quality control; Sewing machinery, mechanism and accessories.	**15**	
UNIT-6	**Trimming and Garment accessories:** Definition, types, trimming methodologies and accessories application.	**03**	

UNIT-7	**Garment finishing:** Fasteners, thread tucking, care and size labeling system, checking, pressing, folding and packing, packing standards for domestic and export markets.	**04**	
UNIT-8	**Quality Control in Garment manufacturing:** Control in pattern making, grading, fabric laying, marking, sewing and finishing, control of garment defects.	**04**	
UNIT-9	**Computer Application Garment Manufacturing:** Application in pattern making, grading, lay planning, sewing and finishing, computer aided embroidery designs. Concepts of computer integrated manufacturing (CIM) to the garment industry.	**02**	
	Total	**50**	

Books Recommended:-

1. Carr H AND Lantham B, " The Technology of Clothing Manufacure", Om Book Service, Delhi.
2. Mehta P V and Bhardwaj S K, " Managing Quality in apparel industry", Om Book Service, Delhi.
3. Aldrich W, " Metric Pattern Cutting", Om Book Service, Delhi, 1998
4. Cooklin Gerry, " Garment Technology for Fashion Designers", Om Book Service, Delhi, 1997
5. G. Cooklin, Introduction to clothing Manufacture, Blackwell Science, London.6. Harold Care & Barbar Latham,
6. The Technology of Clothig and Manufacturing, Oxford Blackwell Scientific Publication, London, 1984

YARN MANUFACTURE LAB. - II

Subject Code 1628506	Practical			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	06	Internal	:	15	
				External	:	35	

Rationale: Diploma holder technicians in Textile Engineering are very frequently require to set the machines for their efficient running. The course is introduced to develop the skills to measures the diameter of pulley, set machines for different counts, and sketch the machine parts for better understanding of the subject.

Objective: Able to develop skill to:-

- Measure diameter of pulley.
- Set machines for optimum operation and productivity.
- Sketch gear and gearings.
- Sketch different machine parts.
- Dismantle, refitting and resetting of the machines and the parts for the better understanding of their functioning.

S.No.	Topics	Periods
01	Speed Frame.	(15)
02	Ring Frame.	(15)
03	Ring Doubler.	(10)
04	New Spinning System	(15)
05	Spin Plan.	(05)
	Total:-	**(60)**

Contents : Practical

List of Experiments:-			Hrs/week	Marks
Unit-1	**SPEED FRAME:**		**15**	
	01.01	Sketching the line and gearing diagram of the flyer frame and show passage of material.		
	01.02	Demonstration of the working of flyer frame.		
	01.03	Dismantling, refitting and setting of the machine for different cottons and counts.		
	01.04	Running the machine with the material.		
	01.05	Calculations pertaining to speed, draft, twist, number of coils, production per spindle and per machine.		
Unit-2	**RING FRAME:**		**15**	
	02.01	Sketching the line and gearing diagram of Ring frame and show passage of material.		
	02.02	Demonstration of the working of Ring frame.		
	02.03	Dismantling, refitting and resetting of the machine for different cotton and counts.		
	02.04	Running the machine with the material.		
	02.05	Calculations pertaining to speed, draft, twist, number of coils, Production per spindle and per machine.		

Unit-3	**RING DOUBLER:**		**10**	
	03.01	Demonstration of the Working of Dry doublers and Wet doublers.		
	03.02	Dismantling, refitting and resetting of the machine.		
	03.03	Calculation pertaining speed, production.		
Unit-4	**NEW SPINNING SYSTEM:**		**15**	
	04.01	Study of various components of Rotor spinning machine and their functions.		
	04.02	Calculation of speeds of various components of Rotor spinning machine		
	04.03	Estimation of twist loss in rotor spinning		
	04.04	Studies on twist-strength relationship of ring and rotor spun yarn		
	04.05	Study of Dref-III m/cs or Air-jet and produce samples.		
Unit-5	**SPIN PLAN:**		**05**	
	05.01	Spin Plan for different counts of yarn from available raw materials.		
		Total-	**60**	

FABRIC MANUFACTURE LAB - II

Subject Code 1628507	Practical			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	06	Internal	:	15	
				External	:	35	

Rationale :

Objective :

S.No.	Topics	Periods
01	Dobby.	(17)
02	Jacquard.	(17)
03	Box-Motion.	(12)
04	Automatic Looms.	(14)
	Total:-	**(60)**

Contents : Practical

List of Experiments:-			Hrs/week	Marks
Unit-1	**DOBBY:**		**17**	
	01.01	Study of various types of dobbies.		
	01.02	Practice of weaving designed fabrics on dobby.		
Unit-2	**JACQUARD:**		**17**	
	02.01	Study of various types of Jacquard.		
	02.02	Practice of Weaving designed fabric on Jacquard Loom.		
Unit-3	**BOX-MOTION:**		**12**	
	03.01	Study of various types of Box-motion.		
	03.02	Study of Pick at will motion.		
	03.03	Study of Centre fork motion.		
Unit-4	**AUTOMATIC LOOMS:**		**14**	
	04.01	Study of various motions in automatic Looms.		
	04.02	Practice of Weaving on automatic Loom.		
	04.03	Weave plans for various types of fabrics.		
		Total-	**60**	

CLOTH ANALYSIS AND DESIGNING PRACTICE - II

Subject Code 1628508	Practical			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	06	Internal	:	15	
				External	:	35	

Rationale:

Diploma holder technicians in Textile Engineering very frequently require to analyse the sample for the purpose of reproduction.

The course is introduced to develop the skill to analyse the sample for ends/cm, picks/cm, count of yarn, twist, material, weave, crimp in the yarn, representation of Weave in point paper, preparation of artistic design, for better understanding of the subject.

Objective :

Able to develop skill to

- Analyse the test sample.
- Represent Weave in point paper, find out drafting, denting of warp yarns and its lifting plan for weaving.
- Prepare Artistic design.

S.No.	Topics	Periods
01	Cloth Analysis.	(45)
02	Design and Colours.	(15)
	Total:-	**(60)**

Contents : Practical

List of Experiments:-			Hrs/ week	Marks
Unit-1	CLOTH ANALYSIS:		45	
	01.01	Discussion on the method of analysis representation of weave on point paper, thread interlacing diagrams, Drawing in drafts and peg plans.		
	01.02	Practice of evaluating the thread density, thickness by gauge etc.		
	01.03	Studying the characteristics of Riblike effect fabrics, dissecting the same fabric for various data.		
	01.04	Studying the characteristics of Woven rib effect fabrics, Dissecting the same fabric for various data.		
	01.05	Analysis of Satin and Sateen Weave fabrics.		
	01.06	Analysis of Bedford cord fabrics.		
	01.07	Analysis of Fancy cord fabrics.		
	01.08	Analysis of Welts and Pique fabrics.		
	01.09	Analysis of figured pique fabrics.		
	01.10	Analysis of Extra warp figured fabrics.		
	01.11	Analysis of Extra weft fabrics.		
	01.12	Analysis of Warp backed fabrics.		
	01.13	Analysis of Weft backed fabrics.		

	01.14	Analysis of Self stitching double cloths fabrics.		
	01.15	Analysis of Interchanging double cloths fabrics.		
	01.16	Analysis of Treble cloths fabrics.		
	01.17	Analysis of Simple terry towel fabrics.		
	01.18	Analysis of Warp pile fabrics.		
	01.19	Analysis of Weft pile fabrics.		
Unit-2	**<u>DESIGN AND COLOURS</u>:**		**15**	
	02.01	Practice of developing all-over design effects for various fabrics.		
	02.02	Practice of developing Border designs.		
	02.03	Practice of developing Cross border designs.		
	02.04	Practice of representing colour and weave effects on point paper.		
	02.05	Practice of developing all over design using Indian historical designs.		
	02.06	Practice of developing all over design using Chinese historical designs.		
	02.07	Practice of composing textile design for house hold and furnishing fabrics.		
		Total-	**60**	

IN PLANT TRAINING AND VISIT TO WORKS -TW

Subject Code 1628509	Term Work			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	Internal	:	30	
	—	—	4 weeks Continues	External	:	70	

Rationale :

Most of the students from the technical institutes after completing their courses are absorbed by various industries. The end product of any technical institutes which is going to industries as a raw material needs to be processed by providing proper training to them by industry. The "In Plant Training" is being introduced to the final year diploma students for Textile Engineering with the view to generate technical manpower with adequate theoretical knowledge and practical skills to tackle the shop floor industry problems. They will also be able to observe how their sub-ordinate perform in their day to day work and co-ordinate shop floor activities.

Objective:

With the help of In-plant Training the students will be able to :

- Understand the working of the machines, tools and equipments more clearly.
- Write down the specifications of the machines, tools and equipments.
- Know the process of material storing/handling.
- Learn to maintain office records/filing.
- Know the process of planning, implementation and monitoring.
- Learn the skill of shop-floor co-ordination.
- Know the skill of office management.
- Understand the process of production.
- Know the skill of quality control.
- Know the organizational set-up and plant Lay-out.
- Know the requirements to set-up textile mills.
- Know the markets of the end product.
- Find out opportunities and methods of recruitments.

Contents : Term Work

List of Industry:-		
Unit-1	01	Spinning Industry.
Unit-2	02	Weaving Industry.
Unit-3	03	Processing Industry.
Unit-4	04	Knitting Industry.
Unit-5	05	Composite mills.
Unit-6	06	Man-made fibre Industry like Man-made fibre production plant, synthetic filament Industry etc.

REPORT WRITING:

The Report on " In plant Training" should include :

S.No.	**Topics**
01	Introduction.
02	Plant Lay-out and organisational Chart.
03	Planning for Product/Maintenance/Repair.
04	Shop-floor training (Mainly concerned with machines)
05	Line and Gearing diagram of different textile machines.
06	Testing and quality control equipments processing parameters.
07	Material Storage/Handling facility/methods.
08	Markets of the end products.
09	Calculation regarding cost of production of end - products.
10	Conclusion :

- ♠ Observations.
- ♠ Typical Characteristics.
- ♠ Area of Weakness.
- ♠ Important Suggestions.