STATE BOARD OF TECHNICAL EDUCATION, BIHAR
Scheme of Teaching and Examinations for
IV 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		Credits
1.	Digital Electronics– I	1621401	04	03	10	20	70	100	28	40		04
2.	Electronics Components and Materials	1621402	03	03	10	20	70	100	28	40		03
3.	Advance Electronic Devices and Circuits	1621403	04	03	10	20	70	100	28	40		04
4.	Network and Lines	1621404	03	03	10	20	70	100	28	40		03
5.	Basic Comm. Techniques & Sound Engineering	1621405	03	03	10	20	70	100	28	40		03
	Total:- 17						350	500				

PRACTICAL

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME			Total Marks (A+B)	Pass Marks in the Subject	Credits
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	Credits
					Internal (A)	External (B)			
6.	Electronic Construction and Repair Lab.	1621406	06	03	30	70	100	40	03
	Total:- 06						100		

TERM WORK

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME		Total Marks (X+Y)	Pass Marks in the Subject	Credits
			Periods per week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	Credits
7.	Electronics Circuit Lab.	1621407	05	30	70	100	40	02
8.	Digital Electronics Lab.	1621408	05	15	35	50	20	02
	Total:- 10					150		
Total Periods per week Each of duration One Hours = 33						Total Marks = 750	24	

DIGITAL ELECTRONICS - I

Subject Code 1621401	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	4
	L	**T**	**P/S**	ESE	:	70	
	04	—	—	TA	:	10	
				CT	:	20	

Rationale:-

Digital System has made great in roads in the field of Electronics. The use of Digital Circuits is rapidly increasing in all most all the electronic applications, to be it microprocessors, Computers, Communications, Measuring instruments and others.

Objectives:-

This paper is to deal with the basics of Digital System. The students are expected to learn the Binary System, Conversions from one System to another, the various Logic Circuits, Digital ICs and connected basic Digital Circuits used in Electronic field.

Contents (Theory)		Hrs/week	Marks
Unit -1	**Binary System** 01.01 Transistor in cut off and saturation. 01.02 Binary Numbers. 01.03 Number Base Conversion. 01.04 Hexadecimal. 01.05 Compliments: 1's, 2's, 9's and 10's compliments, its application, signed binary number, weighted and non-weighted codes. 01.06 Codes: Weighted and non-weighted codes.	[08]	
Unit -2	**Boolean Algebra and Logic Gates** 02.01 Basic Definition of Boolean Algebra, Axioms of Boolean Algebra. 02.02 Basic theorem and properties of Boolean Algebra. 02.03 Boolean functions, Canonical and standard forms. 02.04 Logic Gates, Universal logic gates and its application.	[06]	
Unit -3	**Simplification of Boolean Function** 03.01 Theorem and K-map methods up to variables. 03.02 Product of sum and sum of product simplification. 03.03 NAND and NOR implementation. 03.04 Don't care conditions.	[05]	
Unit -4	**Digital Integrated Circuits** 04.01 Introduction to following: RTL, DTL, TTL, ECL, MOS, CMOS, Transmission gate circuits.	[06]	
Unit -5	**Combinational Logic** 05.01 Half Adder, Full Adder. 05.02 Half and Full Subtractor. 05.03 Code Conversion. 05.04 Binary Adder and Subtractor. 05.05 Magnitude Comparator. 05.06 Decoder and Encoder. 05.07 Multiplexer and Demultiplexer.	[12]	
Unit -6	**Multi-vibrator and Synchronous Sequential Logic** 06.01 Transistor/IC based multivibrator circutes. 06.02 Flip Flop (RS, JK, T, D, Master Slave type) 06.03 Triggering of flip flops.	[06]	
Unit -7	**Shift Registers and Counters** 07.01 Registers. 07.02 Shift Registers using different types of flip flops. 07.03 Ripple Counter, Synchronous and Asynchronous counter.	[07]	
	Total	**50**	

Reference Books:-

1	Digital Design	-	Maho

2	Design Principle Application	-	Malvino and Mano
3	Digital Computer System	-	Malvino
4	Digital Circuits and Logic Design	-	Lee
5	Digital Electronics-I	-	P.K. Mahapatra

ELECTRONIC COMPONENTS AND MATERIALS

Subject Code 1621402	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	

This subject is being introduced in the Electronics/Electronics and Tele-communication diploma technical programme to prepare a strong base for the students to understand the subjects of electronics that they will have to come across in their higher stage of learning.

The topics and sub-topics are being included which will help the students to:
- Know the characteristics of different electronic components and materials.
- Understand their principles, characteristics, functions and use.
- Develop skill to apply the knowledge in proper selection and use of the electronic components and materials.
- Able to distinguish different types of resistors, capacitors etc. through their color codes.
- Understand the principle of soldering.

Contents (Theory)		Hrs/week	Marks
Unit -1	**Resistor** 01.01 Characteristics 01.02 Classification: Fixed resistors, Metal film, Carbon film, Wire wound, Variable resistors, Rheostat, Chip resistors, Thermistors, and Varistors. 01.03 Color coding (with simple problem)	[11]	
Unit -2	**Capacitors** 02.01 General description and characteristics of capacitor 02.02 Classification: Fixed capacitors, Mica of capacitors, Paper capacitors, Plastic film capacitors, Ceramic glass capacitors, and Electrolytic capacitors. 02.03 Color Coding.	[09]	
Unit -3	**Transformer and Chokes** 03.01 Applications and general principles of operation of transformer. 03.02 Types of magnetic circuits. 03.03 Materials for cores and manufacturing of stacked cores.	[05]	
Unit -4	**Induction Coils** 04.01 Classification and characteristics. Types of Core. 04.02 Inductance of a coil. 04.03 Methods used to decrease Skin Effect. 04.04 Eddy Current Loss. 04.05 Dielectric loss and distributed capacitances in coils.	[06]	
Unit -5	**P.C.B. Construction Materials** 05.01 Base Materials. 05.02 Metal Foil. 05.03 Types of Boards. 05.04 Methods of Fabrications. Taping materials	[13]	
Unit -6	**Electronic packaging parts**	[06]	
	Total	**50**	

Recommended Books:-

1	Radio Circuit Construction, Mir Publication.	-	A.T. Belesvtsev
2	Hand Book for Electronic Engineering Technician	-	Milt Mafman and Arthur H. Seedman
3	Electronic Assembly and Fabrication	-	Goshan J. Wheeler
4	Electronics Components and Materials	-	S.N. Modi

ADVANCE ELECTRONIC DEVICES AND CIRCUITS

Subject Code 1621403	Theory			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	100	4
	L	T	P/S	ESE	:	70	
	04	—	—	TA	:	10	
				CT	:	20	

Rationale

This paper is meant to make the students familiar with widely used IC chips and the solid state devices such as FETs.
The utility of Electronic Devices depends on circuits. Students are to study amplifier and oscillator circuits of different type meant for various applications and specific uses.

Contents (Theory)		Hrs/week	Marks
Unit -1	**Transistor Biasing** 01.01 Introduction Transistor, basic operation. 01.02 Output Characteristics of CE Amplifier. 01.03 Operating Point. 01.04 Bias Stability. 01.05 Types of Biasing. 01.06 Bias Compensation. 01.07 Thermal Sunway.	[07]	
Unit -2	**Transistor as Amplifier** 02.01 Hybrid Circuits 02.02 Z, Y & h Parameters of Two Port Networks. 02.03 Equivalent Circuit of Transistor at low and medium frequencies. 02.04 Analysis of voltage gains, current gain, power gain, input impedance and output impedance for h-parameter.	[07]	
Unit -3	**Coupled Amplifiers** 03.01 Cascading of Amplifier. 03.02 Principles of R-C, D-C and Transformer Coupling. 03.03 Gain Bandwidth consideration. 03.04 Effects of coupling on amplifier performance. 03.05 Changes in frequency response and due to effects on coupling. 03.06 High frequency considerations. 03.07 Compensation of amplifier for high and low frequency tuned circuit.	[09]	
Unit -4	**Feed-Back Amplifiers** 04.01 Classification concept. 04.02 Gain with feedback, input resistance, B.W. 04.03 Current Series and Current Shunt Feedback Circuits. 04.04 Voltage Series and Voltage Shunt Feedback Circuits. 04.05 Voltage Shunt Feedback Circuits with Frequency Response.	[10]	
Unit -5	**Oscillators** 05.01 Principle of Oscillators. 05.02 Effect of feedback on Amplifier Bandwidth. 05.03 Gain and Phase Margin. 05.04 Wein Bridge Oscillator (Basic idea). 05.05 Crystal Oscillator. 05.06 Frequency Stability.	[10]	
Unit -6	**FET Amplifiers** 06.01 Construction and operation of FETs biasing. 06.02 Parameters of FETs, MosFET, D.MosET, E-MosFET biasing, JFET amplifier. 06.03 UJT, equivalent circuit of UJT, characteristics and its application.	[09]	

Unit -7	**Operational Amplifiers** 07.01 Basic Operational Amplifier (OP-AMP). 07.02 Differential Amplifier. 07.03 Operational Amplifier Parameters. 07.04 Parameters Measurement. 07.05 Basic Circuits: Subtractor, Adder, Integrator, Differentiator circuits using Operational Amplifier (OP-AMP).	[08]	
	Total	**60**	

Recommended Books:-

1	Integrated Electronics	-	Millman and Halkias
2	Electronics Devices and Circuits	-	John D. Ryder
3	Electronics Devices and Circuits	-	Millman and Halkias
4	Linear Integrated Circuits	-	Byan
5	Principle of electronics	-	V.K Mehta
6	Basic electronics	-	B.L. Thereja
7	Advance Electronic Devices and Circuits	-	Umesh Mishra

NETWORK AND LINES

Subject Code 1621404	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	
	L	T	P/S	ESE	:	70	3
	03	—	—	TA	:	10	
				CT	:	20	

Rationale:-

	Contents (Theory)	Hrs/week	Marks
Unit -1	**Network Parameters** 01.01 Active and Passive Elements. 01.02 Linear and non-linear elements. 01.03 Unilateral and Bilateral Elements. 01.04 Lumped and Distributed Elements. 01.05 Ideal and Practical Voltage and Current Sources. 01.06 Concept of Nodes, Mesh, Branch, Loop etc.	[07]	
Unit -2	**Two Port Network** 02.01 Introduction to Z, Y and ABCD parameters. 02.02 Equivalent Circuits in Z, Y, ABCD, h parameters. 02.03 Transfer function, Concept and Calculation for two port network. 02.04 Four Terminal Networks. 02.05 Symmetrical and Asymmetrical Networks. 02.06 Image and Iterative Impedance. 02.07 Design of Simple Symmetrical and Asymmetrical networks. 02.08 Propagation Constant. 02.09 T and Pai Network. 02.10 Conversion of T to л N/W and л to T N/W. 02.11 Ladder and Lattice Network.	[12]	
Unit -3	**Attenuator and Equalizers** 03.01 Symmetrical and Asymmetrical Networks. 03.02 Design of T and Pai type attenuators. 03.03 Equalizers - Introduction.	[04]	
Unit -4	**Filters** 04.01 Concept of Decibel and Neper. 04.02 Basic Relations in Filters. 04.03 Classification as per use: Low Pass Filters, High Pass Filters, Band Pass Filters and Band Stop Filters. 04.04 Attenuation and phase shift characteristics. 04.05 Design of simple T and Pai type in derived filters.	[08]	

Unit -5	**Transmission Lines**	[19]	
	05.01 Classification.		
	05.02 Introduction to open wire, co-axial cable, wave guide, optical fibers with application.		
	05.03 Distributed parameters of lines.		
	05.04 Equivalent Circuit of a finite line.		
	05.05 T and Pai type representation of a section of line.		
	05.06 Voltage and Current distribution in an infinite line.		
	05.07 Characteristics impedance and propagation constant of Transmission line.		
	05.08 Concept of propagation, attenuation constant and phase shift constant of a line.		
	05.09 Expression for impedance at a point on line.		
	05.10 Reflected and standing waves.		
	05.11 Voltage reflection coefficient and VSWR.		
	05.12 Maximum and Minimum impedance.		
	05.13 Input and Output impedance of an open and short-circuited loss-less line.		
	05.14 Input impedance as a function of length of line.		
	05.15 Introduction to Smith Chart and Circle Diagrams.		
	Total	**50**	

Recommended Books:-

1	Network and LInes	-	R.K. Mandal

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BASIC COMMUNICATION TECHNIQUES AND SOUND ENGINEERING

Subject Code 1621405	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 basis of communication techniques and a working knowledge of the principles of Acoustics are felt fit to be imparted at this stage.

Objectives

The students are expected to get familiar with the process of Modulation and detection, Sonar and the basic principles of Acoustics. The broad topics to covered are:

Contents (Theory)		Hrs/week	Marks
Unit -1	**Introduction to Communication System and Noise** 01.01 Classification. 01.02 Introduction to Information and Noise and type of noise. 01.03 Introduction of basic elements of communication system, Transmitter channel, receiver.	[04]	
Unit -2	**Modulation** 02.01 AM, expression for AM wave power in carrier and sideband. 02.02 SSB and Vestigial Side Board Systems. 02.03 Frequency Modulation. 02.04 Phase Modulation, Noise.	[10]	
Unit -3	**De-Modulation** 03.01 Diode Transistor and FET Demodulation for AM waves. 03.02 Phase discriminators and ratio detectors for FM and PM waves.	[06]	
Unit -4	**Pulse Code Modulation** 04.01 Introduction. 04.02 Type of Pulse Code Modulation. 04.03 PWM, PPM, PCM, Multiplexing. 04.04 Time-Division Multiplexing and Frequency-Division Multiplexing. 04.05 Introduction to Radio Telemetry.	[13]	
Unit -5	**Ultrasonic G/R** 05.01 Detection and Application of Remote Control.	[04]	
Unit -6	**Acoustics** 06.01 Introduction to sound, ear audibility and stereo. 06.02 Recording and Reproduction, disc recording type of recorder 06.03 Reproducers, recording. 06.04 Hi-Fi and Stereophonic Systems. 06.05 Room Acoustics: Requirement of record room, acoustics room shape. Optimum reverberation in room, Absorbent materials, scale model tests, designer considerations of open air theaters auditorium, commercial building sound recording.	[13]	
	Total	**50**	

Recommended Books:-

1	Electronics Communication System	-	Kemecy
2	Hi-Fi Stereo Hand Book	-	---
3	Radio and TV	-	S.P. Sharma
4	Basic Comm. Techniques & Sound Engineering	-	Sujit Sen

ELECTRONIC CONSTRUCTION AND REPAIR LAB.

Subject Code 1621406	Practical			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	100	
	L	T	P/S	ESE	:	100	3
	—	—	06	Internal	:	30	
				External	:	70	

	Contents (Practical)	Hrs/week	Marks
Unit -1	Construction of a Battery Eliminator Box, Stabilizer Box, Radio and TV Cabinets.	[ ]	
Unit -2	Soldering Practice: connecting circuit components.	[ ]	
Unit -3	Assembling Battery-Stabilizer, Radio Receiver, Intercoil Circuit.	[ ]	
Unit -4	Assembling Inverter.	[ ]	
Unit -5	– Location of faults and repair of: – Battery Eliminator – Voltage Stabilizer – Inverter – Radio Receiver	[ ]	
Unit -6	Location of faults in different types of Electronics Circuits.	[ ]	
Unit -7	Tracing fault in a CRO and its repair.	[ ]	
Unit -8	Handling of different types of multimeter: VTVM, Frequency meters, Calculators.	[ ]	
Unit -9	Fault Location and repair of instruments - Multimeter VTVM, Frequency meters, Calculators.	[ ]	
Unit -10	Repair of faulty study panels of your laboratory.	[ ]	
	Total		

Note:- Three assignments for practical under SL 1 and 2. Two assignments for practical listed under SL 3 and 4, and at least one assignment for each of the practical under SL No. 5 to 10. Altogether eleven assignments to be done by the students in the workshop or laboratory.

Recommended Books:-

1		-	
2		-	
3		-	

ELECTRONICS CIRCUIT LAB.

Subject Code 1621407	Term Work			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	100	
	L	T	P/S	Internal Examiner	:	30	2
	—	—	05	External Examiner	:	70	

	Contents (Term Work)	Hrs/week	Marks
Unit -1	Introduction to various meters and instruments to be used. Study of CRO; Phase and Frequency measurement.	[ ]	
Unit -2	Measurement of h-parameter of transistor.	[ ]	
Unit -3	Frequency response of a CE amplifier.	[ ]	
Unit -4	Frequency response of direct-coupled amplifier.	[ ]	
Unit -5	Frequency response of RC-coupled amplifiers.	[ ]	
Unit -6	Characteristics of a transformer-coupled amplifier.	[ ]	
Unit -7	Calculation of gain, input impedance and output impedance in case of cascaded amplifiers.	[ ]	
Unit -8	Operation of Push-Pull amplifier.	[ ]	
Unit -9	Operation of Class C amplifier, operation of puss-pull class-B amplifier.	[ ]	
Unit -10	Characteristics Curves of FETs.	[ ]	
Unit -11	Operation of Wein Bridge and RC Phase shift oscillator.	[ ]	
Unit -12	Verification of basic operation of OP-AMP curves.	[ ]	
Unit -13	Use of OP-AMP as Adder and Subtractor.	[ ]	
Unit -14	Use of OP-AMP as integrator and differentiator.	[ ]	
	Total		

Recommended Books:-

1		-	
2		-	
3		-	

DIGITAL ELECTRONICS LAB.

Subject Code 1621408	Term Work			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	2
	L	T	P/S	Internal Examiner	:	15	
	—	—	05	External Examiner	:	35	

	Contents (Term Work)	Hrs/week	Marks
Unit -1	Construction and verification of diode OR gate.	[ ]	
Unit -2	Construction and verification of diode AND gate.	[ ]	
Unit -3	Verification of truth table of Basic Gates.	[ ]	
Unit -4	Verification of truth table of Universal Gates from ICs.	[ ]	
Unit -5	Construction of Basic gates from Universal Gates.	[ ]	
Unit -6	Construction of Ex-OR gate from Universal Gates.	[ ]	
Unit -7	Construction of Half Adder and Full adder circuit from Gates and Verification of its function.	[ ]	
Unit -8	Construction of Half and Full subtractor circuit from Universal Gates and Verification of its function.	[ ]	
Unit -9	Verification of truth table of R-S and J-K Flip Flop.	[ ]	
Unit -10	Operation of Transistor Multimeter circuits.	[ ]	
Unit -11	Operation of multivibrator functions from 555 IC.	[ ]	
Unit -12	Construction and verification of function of Ripple and BCD Counter.	[ ]	
Unit -13	Construction and verification of Sequence Generator.	[ ]	
	Total		

Recommended Books:-

1		-	
2		-	
3		-	