

**STATE BOARD OF TECHNICAL EDUCATION, BIHAR****Scheme of Teaching and Examinations for  
IV 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.	Digital Electronics– I	1621401	04	03	10	20	70	100	28	40	04
2.	Communication Components and Materials	1638402	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
<b>Total:-</b>			<b>17</b>				<b>350</b>	<b>500</b>			

**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.	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				Credits
			Periods per week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	
7.	Electronics Circuit -TW.	1621407	05	30	70	100	40	02
8.	Digital Electronics - TW.	1621408	05	15	35	50	20	02
<b>Total:-</b>			<b>10</b>			<b>150</b>		
<b>Total Periods per week Each of duration one Hours =</b>			<b>33</b>			<b>Total Marks = 750</b>		<b>24</b>

# **DIGITAL ELECTRONICS - I**

Subject Code 1621401	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks			04
	L	T	P/S	ESE	:	100	
	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
<b>Unit -1</b>	<u><b>Binary System</b></u> 01.01 Transistor in cut off and saturation. 01.02 Binary Numbers. 01.03 Number Base Conversion. 01.04 Hexadecimal. 01.05 Complements 1's, 2's, 9's and 10's compliments, its application signed binary number, weighted and non-weighted codes. Signed Binary numbers, weighted and non-weighted codes. 01.06 Codes: Weighted and Non-Weighted codes.	[08 ]	
<b>Unit -2</b>	<u><b>Boolean Algebra and Logic Gates</b></u> 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]	
<b>Unit -3</b>	<u><b>Simplification of Boolean Function</b></u> 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]	
<b>Unit -4</b>	<u><b>Digital Integrated Circuits</b></u> 04.01 Introduction to following: RTL, DTL, TTL, ECL, MOS, CMOS, Transmission gate circuits.	[06]	
<b>Unit -5</b>	<u><b>Combinational Logic</b></u> 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]	
<b>Unit -6</b>	<u><b>Multivibrator and Synchronous Sequential Logic</b></u> 06.01 Transistor/IC based multivibrator circuits. 06.02 Flip Flop (RS, JK, T, D, Master Slave type) 06.03 Triggering of flip flops.	[06]	
<b>Unit -7</b>	<u><b>Shift Registers and Counters</b></u> 07.01 Registers. 07.02 Shift Registers using different types of flip flops. 07.03 Ripple Counter, Synchronous and Asynchronous counter.	[07]	
<b>Total</b>		<b>50</b>	

**Reference Books:-**

<b>SL</b>	<b>Title/Publisher</b>		<b>Author</b>
1.	Digital Design	-	Maho
2.	Design Principle Application	-	Malvino and Mano
3.	Digital Computer System	-	Malvino
4.	Digital Circuits and Logic Design	-	Lee

# COMMUNICATION COMPONENTS AND MATERIALS

Subject Code 1638402	Theory			No of Period in one session : 50			Credits 03
	No. of Periods Per Week			Full Marks	:	100	
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

## Rationale:

Electronics is a major part of our day to day life. In each and every field electronic systems are used. Basic electronics is one of the subjects which are the base of all advance electronics. It starts with PN junction which makes the student to follow the functioning of all semiconductor based electronics. This is a core group subject and it develops cognitive and psychomotor skills.

Contents : Theory		Hrs/week	Marks
<b>Unit -1</b>	<b>Passive Components</b> Resistor: definition, symbol, unit. Thermistor (symbol and list of application only) Resistor colour code, wattage (w.r to size) Capacitor : definition, symbol, unit Types of capacitor( to be shown in practical, no theory) Inductor : definition, symbol, unit Transformer: symbol, types ( step up and step down), application.	[12]	
<b>Unit -2</b>	<b>Rectifiers &amp; Filters</b> Need of rectifier , definition Types of rectifier – Half wave rectifier, Full wave rectifier, (Bridge & centre tapped ) Circuit operation Input/output waveforms for voltage & current Average (dc) value of current & voltage (no derivation) Ripple, ripple factor, ripple frequency, PIV of diode used, transformer utilization factor, efficiency of rectifier.	[11]	
<b>Unit -3</b>	<b>Optical Diodes</b> LED, photo diode, Tunnel diode, Varacter diode, symbol, operating principle and application of each. Symbol, operating principle & applications of each.	[07]	
<b>Unit -4</b>	<b>Integrated Circuits</b> Integrated Circuits Advantage and disadvantage of Integrated Circuits IC Package IC Classifications Making Monolithic IC Fabrication of Components on Monolithic IC Simple Monolithic ICs IC Symbols Scale of Integration	[14]	
<b>Unit -5</b>	Gun diode, PIN diode Characteristics and their uses.	[06]	
<b>Total</b>		<b>50</b>	

# **ADVANCE ELECTRONIC DEVICES AND CIRCUITS**

Subject Code 1621403	Theory			No of Period in one session : 60			Credits  04
	No. of Periods Per Week			Full Marks			
	L	T	P/S	ESE	:	100	
	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.

The topics to be covered are:

Contents : Theory		Hrs/week	Marks
<b>Unit -1</b>	<u><b>Transistor Biasing</b></u> 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]	
<b>Unit -2</b>	<u><b>Transistor as Amplifier</b></u> 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]	
<b>Unit -3</b>	<u><b>Coupled Amplifiers</b></u> 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]	
<b>Unit -4</b>	<u><b>Feed-Back Amplifiers</b></u> 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]	
<b>Unit -5</b>	<u><b>Oscillators</b></u> 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]	
<b>Unit -6</b>	<u><b>FET Amplifiers</b></u> 06.01 Construction and operation of FETs biasing. 06.02 Parameters of FETs, MosFET, D-MosET, E-MosFET biasing, JFET amplifier. 06.03 Biasing of UJT, equivalent circuit of UJT, characteristics and its application.	[09]	

<b>Unit -7</b>	<b><u>Operational Amplifiers</u></b> 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]	
	<b>Total</b>	<b>60</b>	

**Reference Books:-**

SL	Title/Publisher		Author
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

# **NETWORK AND LINES**

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

## Rationale

## Objectives

The topics to be covered are:

Contents : Theory		Hrs/week	Marks
<b>Unit -1</b>	<b><u>Network Parameters</u></b> 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]	
<b>Unit -2</b>	<b><u>Two Port Network</u></b> 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 $\Pi$ to T N/W. 02.11 Ladder and Lattice Network.	[12]	
<b>Unit -3</b>	<b><u>Attenuator and Equalizers</u></b> 03.01 Symmetrical and Asymmetrical Networks. 03.02 Design of T and Pai type attenuators. 03.03 Equalizers - Introduction.	[04]	
<b>Unit -4</b>	<b><u>Filters</u></b> 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]	
<b>Unit -5</b>	<b><u>Transmission Lines</u></b> 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.	[19]	
<b>Total</b>		<b>50</b>	

## Recommended Books:-

SL Title/Publisher

Author

# **BASIC COMMUNICATION TECHNIQUES AND SOUND ENGINEERING**

Subject Code 1621405	Theory			No of Period in one session : 50			Credits  03
	No. of Periods Per Week			Full Marks			
	L	T	P/S	ESE	:	100	
	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
<b>Unit -1</b>	<u><b>Introduction to Communication System and Noise</b></u> 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]	
<b>Unit -2</b>	<u><b>Modulation</b></u> 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]	
<b>Unit -3</b>	<u><b>De-Modulation</b></u> 03.01 Diode Transistor and FET Demodulation for AM waves. 03.02 Phase discriminators and ratio detectors for FM and PM waves.	[06]	
<b>Unit -4</b>	<u><b>Pulse Code Modulation</b></u> 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]	
<b>Unit -5</b>	<u><b>Ultrasonic G/R</b></u> 05.01 Detection and Application of Remote Control.	[04]	
<b>Unit -6</b>	<u><b>Acoustics</b></u> 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]	
<b>Total</b>		<b>50</b>	

## **Recommended Books:-**

SL	Title/Publisher		Author
1.	Electronics Communication System	-	Kemecy
2.	Hi-Fi Stereo Hand Book	-	
3.	Radio and TV	-	S.P. Sharma



## **ELECTRONIC CONSTRUCTONS AND REPAIR LAB.**

Subject Code 1621406	Practical			No of Period in one session :			Credits  03
	No. of Periods Per Week			Full Marks	:	100	
	L	T	P/S	ESE	:	100	
	—	—	06	Internal	:	30	
				External	:	70	

### **LIST OF PRACTICALS:-**

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

**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.

# **ELECTRONICS CIRCUIT - TW.**

Subject Code 1621407	Term Work			No of Period in one session :			Credits 02
	No. of Periods Per Week			Full Marks	:	100	
	L	T	P/S	Internal	:	30	
	—	—	05	External	:	70	

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

# **DIGITAL ELECTRONICS - TW.**

Subject Code 1621408	Term Work			No of Period in one session :			Credits 02
	No. of Periods Per Week			Full Marks	:	50	
	L	T	P/S	Internal	:	15	
	—	—	05	External	:	35	

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