

**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	
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
<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
<b>Total:-</b>			<b>06</b>				<b>100</b>		

**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 Lab.	1621407	05	30	70	100	40	02
8.	Digital Electronics Lab.	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

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

**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.

<b>Contents : Theory</b>		<b>Hrs/week</b>	<b>Marks</b>
<b>Unit -1</b>	<b><u>Binary System</u></b> 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]	
<b>Unit -2</b>	<b><u>Boolean Algebra and Logic Gates</u></b> 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>	<b><u>Simplification of Boolean Function</u></b> 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>	<b><u>Digital Integrated Circuits</u></b> 04.01 Introduction to following: RTL, DTL, TTL, ECL, MOS, CMOS, Transmission gate circuits.	[06]	
<b>Unit -5</b>	<b><u>Combinational Logic</u></b> 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>	<b><u>Multi-vibrator and Synchronous Sequential Logic</u></b> 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>	<b><u>Shift Registers and Counters</u></b> 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:-**

1	Digital Design	-	Maho
2	Design Principle Application	-	Malvino and Mano
3	Digital Computer System	-	Malvino
4	Digital Circuits and Logic Design	-	Lee

# ELECTRONIC COMPONENTS AND MATERIALS

<b>Subject Code</b> <b>1621402</b>	<b>Theory</b>			<b>No of Period in one session : 50</b>			<b>Credits</b>  <b>03</b>
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>			
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>ESE</b>	<b>:</b>	<b>70</b>	
	<b>03</b>	<b>—</b>	<b>—</b>	<b>TA</b>	<b>:</b>	<b>10</b>	
			<b>CT</b>	<b>:</b>	<b>20</b>		

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.

<b>Contents : Theory</b>		<b>Hrs/week</b>	<b>Marks</b>
<b>Unit -1</b>	<b><u>Resistor</u></b> 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]	
<b>Unit -2</b>	<b><u>Capacitors</u></b> 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]	
<b>Unit -3</b>	<b><u>Transformer and Chokes</u></b> 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]	
<b>Unit -4</b>	<b><u>Induction Coils</u></b> 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]	
<b>Unit -5</b>	<b><u>P.C.B. Construction Materials</u></b> 05.01 Base Materials. 05.02 Metal Foil. 05.03 Types of Boards. 05.04 Methods of Fabrications. Taping materials	[13]	
<b>Unit -6</b>	<b>Electronic packaging parts</b>	[06]	
<b>Total</b>		<b>50</b>	

### 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

# ADVANCE ELECTRONIC DEVICES AND CIRCUITS

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

## **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.

<b>Contents : Theory</b>		<b>Hrs/week</b>	<b>Marks</b>
<b>Unit -1</b>	<b><u>Transistor Biasing</u></b> 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>	<b><u>Transistor as Amplifier</u></b> 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>	<b><u>Coupled Amplifiers</u></b> 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>	<b><u>Feed-Back Amplifiers</u></b> 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>	<b><u>Oscillators</u></b> 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>	<b><u>FET Amplifiers</u></b> 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]	

<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>	

**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

# NETWORK AND LINES

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

**Rationale:-**

<b>Contents : Theory</b>		<b>Hrs/wee</b>	<b>Marks</b>
<b>Unit -1</b>	<p><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.</p>	[07]	
<b>Unit -2</b>	<p><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 <math>\pi</math> N/W and <math>\pi</math> to T N/W.                      02.11 Ladder and Lattice Network.</p>	[12]	
<b>Unit -3</b>	<p><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.</p>	[04]	
<b>Unit -4</b>	<p><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.</p>	[08]	
<b>Unit -5</b>	<p><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.                      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.</p>	[19]	
<b>Total</b>		<b>50</b>	

# BASIC COMMUNICATION TECHNIQUES AND SOUND ENGINEERING

<b>Subject Code 1621405</b>	<b>Theory</b>			<b>No of Period in one session : 50</b>			<b>Credits  03</b>
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>			
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>ESE</b>	<b>:</b>	<b>100</b>	
	<b>03</b>	<b>—</b>	<b>—</b>	<b>TA</b>	<b>:</b>	<b>10</b>	
			<b>CT</b>	<b>:</b>	<b>20</b>		

### 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:

<b>Contents : Theory</b>		<b>Hrs/week</b>	<b>Marks</b>
<b>Unit -1</b>	<b><u>Introduction to Communication System and Noise</u></b> 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>	<b><u>Modulation</u></b> 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>	<b><u>De-Modulation</u></b> 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>	<b><u>Pulse Code Modulation</u></b> 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>	<b><u>Ultrasonic G/R</u></b> 05.01 Detection and Application of Remote Control.	[04]	
<b>Unit -6</b>	<b><u>Acoustics</u></b> 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:-

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



## ELECTRONIC CONSTRUCTION AND REPAIR LAB.

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

<b>Contents : Practical</b>		<b>Hrs/week</b>	<b>Marks</b>
<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>	<ul style="list-style-type: none"> <li>– Location of faults and repair of:</li> <li>– Battery Eliminator</li> <li>– Voltage Stabilizer</li> <li>– Inverter</li> <li>– Radio Receiver</li> </ul>	[ ]	
<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.	[ ]	
<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.

### Recommended Books:-

1		-	
2		-	
3		-	

## **ELECTRONICS CIRCUIT LAB.**

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

<b>Contents : Term Work</b>		<b>Hrs/week</b>	<b>Marks</b>
<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 puss-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>			

**Recommended Books:-**

1		-	
2		-	
3		-	

## DIGITAL ELECTRONICS LAB.

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

<b>Contents : Term Work</b>		<b>Hrs/week</b>	<b>Marks</b>
<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>			

### Recommended Books:-

1		-	
2		-	
3		-	

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(Effective from Session 2016-17 Batch)

**THEORY**

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			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.	Electrical Machine & Control	1640401	04	03	10	20	70	100	28	40	04	
2.	Electronics Comp. & Materials	1621402	03	03	10	20	70	100	28	40	03	
3.	Advance Electronic Devices & 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.	Industrial & Automation	1640405	03	03	10	20	70	100	28	40	03	
			<b>Total:- 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.	Electronics Construction And repair Lab	1621406	06	03	30	70	100	40	03
			<b>Total:- 06</b>				<b>100</b>		

**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 Lab	1621407	05	30	70	100	40	02	
8.	Digital Electronics Lab	1621408	05	15	35	50	20	02	
			<b>Total:- 10</b>				<b>150</b>		
			Total Periods per week Each of duration one Hours = 33				<b>Total Marks = 750</b>	<b>24</b>	

## ELECTRICAL MACHINE AND CONTROL

<b>Subject Code 1640401</b>	<b>Theory</b>			<b>No of Period in one session : 50</b>			<b>Credits  04</b>
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>			
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>ESE</b>	<b>:</b>	<b>70</b>	
	<b>04</b>	<b>—</b>	<b>—</b>	<b>TA</b>	<b>:</b>	<b>10</b>	
			<b>CT</b>	<b>:</b>	<b>20</b>		

### RATIONALE:-

The students are well conversant with the electric and magnetic field and circuit, electro-magnetic induction, D.C. and A.C. circuits, based on related electric and magnetic theories. They also know about electrical components and materials, Now the Electrical Machine is being introduced for IVth Semester Diploma in Electrical & Electronics Engineering to impart the knowledge of D.C. & A.C. machines, which play vital roles even in this era of electronics in different industries throughout the world.

The topics of requisites and construction of D.C. machines, generators, D.C. & A.C. motors, converters, special motors and electro plating have been included in the content. Which will give full insight of electrical equipments in their practical life.

Topics have been divided into sub-topics in order to facilitate the students to understand the subject matters properly. Tentative no. of lectures have been allotted for each topic and sub-topic, so that the whole syllabus may be covered easily in the academic year.

### OBJECTIVES :-

The thorough study of these topics will enable the students know fully about D.C. machines, their operation, maintenance and proper connection and hence will enable him to work as a good supervisor and also to efficiently monitor the works of operators under him. The topics of special motors used and that of electroplating will provide full insight of practical use of electrical equipments.

<b>Contents :Theory</b>		<b>Hrs/week</b>	<b>Marks</b>
<b>Unit-1</b>	<p><b><u>Requisites and Construction of D.C. Machines</u></b></p> <p>01.01 Armature winding: Pole-pitch, Conductor coil and winding elements, coil span, coil-pitch, pitch of winding, back pitch, front pitch, resultant pitch, commutator pitch.</p> <p>01.02 Single layer winding, lap and wave winding, use of lap and wave windings.</p>	<b>[15]</b>	
<b>Unit-2</b>	<p><b><u>D.C. Generator</u></b></p> <p>02.01 Types of generator, E.M.F. equation of generator.</p> <p>02.02 Losses and efficiency of a generator, condition for maximum efficiency.</p> <p>02.03 Generator characteristics: No load curve of self-excited generator, How to find critical resistance, How to draw O.C.C. at different speeds, critical speed, voltage build-up of a shunt generator, condition for voltage build-up.</p>	<b>[15]</b>	

<b>Unit-3</b>	<b><u>D.C. Motor</u></b> 03.01 Significance of back E.M.F. voltage equation of a motor, armature torque, shaft torque. 03.02 Characteristics of series shunt and compound motors. 03.03 Losses and efficiencies of a motor. 03.04 Speed control of a D.C. motor: Speed control of a series motor, speed control of a shunt motor, merits and demerits of a rheostatic control method, series. Parallel control. Simple problems. 03.05 Testing of D.C. Motors : NO-load test (Swin Burne's test) of D.C. shunt motor, back to back test (Hopkinson's test), retardation test of a series motor. 03.06 Necessity of a starter : Shunt motor starter: 3-point starter, 4-point starter.	<b>[15]</b>	
<b>Unit-4</b>	<b><u>A.C Motor</u></b> 04.01 Speed control of induction motors : control from startor side, control from rotor side. 04.02 Direct On-Line starter, star-Delta starter and Autotransformer starter.	<b>[05]</b>	
	<b>Total</b>	<b>50</b>	

**Recommended Books:-**

<b>Sl.No</b>	<b>Title/Publisher</b>	<b>Author</b>
1.	Theory of Direct Current Machinery, TMN editions	Alexander S.Langsdorf
2.	A text-Book of Electrical Technology, Vol-II	B.L. Theraja
3.	Electrical Machinery, Khanna Publications	P.S. Pimbhra

# ELECTRONIC COMPONENTS AND MATERIALS

<b>Subject Code 1621402</b>	<b>Theory</b>			<b>No of Period in one session : 50</b>			<b>Credits  03</b>
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>			
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>ESE</b>	<b>:</b>	<b>70</b>	
	<b>03</b>	<b>—</b>	<b>—</b>	<b>TA</b>	<b>:</b>	<b>10</b>	
				<b>CT</b>	<b>:</b>	<b>20</b>	

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.

<b>Contents :Theory</b>		<b>Hrs/week</b>	<b>Marks</b>
<b>Unit-1</b>	<b><u>Resistor</u></b> 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)	<b>[11]</b>	
<b>Unit-2</b>	<b><u>Capacitors</u></b> 02.01 General description and characteristics. 02.02 Classification: Fixed capacitors, Mica capacitors, Paper capacitors, Plastic film capacitors, Ceramic glass capacitors, and Electrolytic capacitors. 02.03 Color Coding.	<b>[09]</b>	
<b>Unit-3</b>	<b><u>Transformer and Chokes</u></b> 03.01 Applications and general principles of operation. 03.02 Types of magnetic circuits. 03.03 Materials for cores and manufacturing of stacked cores.	<b>[05]</b>	
<b>Unit-4</b>	<b><u>Induction Coils</u></b> 04.01 Classification and characteristics. Types of Core. 04.02 G 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.	<b>[06]</b>	
<b>Unit-5</b>	<b><u>P.C.B. Construction Materials</u></b> 05.01 Base Materials. 05.02 Metal Foil. 05.03 Types of Boards. 05.04 Methods of Fabrications. Taping materials	<b>[13]</b>	
<b>Unit-6</b>	<b><u>Electronic packaging parts</u></b>	<b>[06]</b>	
<b>Total-</b>		<b>50</b>	

### Recommended Books:-

Sl.No.	Title/Publisher	Author
1.	Radio Circuit Construction, Mir Publication.	A.T. Belesvtsev
2.	Hand Book for Electronic Engineering Technician Seedman	Milt Mafman and Arthur H.
3.	Electronic Assembly and Fabrication	Goshan J. Wheeler

## ADVANCE ELECTRONIC DEVICES AND CIRCUITS

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

### 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:

<b>Contents :Theory</b>		<b>Hrs/week</b>	<b>Marks</b>
<b>Unit-1</b>	<p><b><u>Transistor Biasing</u></b>                      01.01 Output Characteristics of CE Amplifier.                      01.02 Operating Point.                      01.03 Bias Stability.                      01.04 Types of Biasing.                      01.05 Bias Compensation.                      01.06 Thermal Sunway.</p>	<b>[07]</b>	
<b>Unit-2</b>	<p><b><u>Transistor as Amplifier</u></b>                      02.01 Hybrid Circuits.                      02.02 Z, Y &amp; 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</p>	<b>[07]</b>	
<b>Unit-3</b>	<p><b><u>Coupled Amplifiers</u></b>                      03.01 Cascading of Amplifier Types.                      03.02 Principles of R-C, D-D 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.</p>	<b>[09]</b>	
<b>Unit-4</b>	<p><b><u>Feed-Back Amplifiers</u></b>                      04.01 Classification concept.                      04.02 Gain with feedback, input resistance, type of resistance.                      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.</p>	<b>[10]</b>	
<b>Unit-5</b>	<p><b><u>Oscillators</u></b>                      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.</p>	<b>[10]</b>	



<b>Unit-6</b>	<b><u>FET Amplifiers</u></b> 06.01 Biasing of FETs. 06.02 CS, CD, CG amplifiers with equivalent circuits analysis and frequency response. 06.03 Biasing of UJT.	<b>[09]</b>	
<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).	<b>[08]</b>	
	<b>Total</b>	<b>60</b>	

**Reference Books:-**

<b>Sl.No.</b>	<b>Title/Publisher</b>		<b>Author</b>
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

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

### RATIONALE:-

#### Objectives

The topics to be covered are:-

<b>Contents : Theory</b>		<b>Hrs/week</b>	<b>Marks</b>
<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.	<b>[07]</b>	
<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 T to Pai to T network transformation. 02.11 Ladder and Lattice Network.	<b>[12]</b>	
<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.	<b>[04]</b>	
<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.	<b>[08]</b>	
<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.	<b>[19]</b>	

	05.07 Characteristics impedance a TX 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.		
	<b>Total</b>	<b>50</b>	

**Recommended Books:-**

**Sl.No. Title/Publisher**

**Author**

# INDUSTRIAL AUTOMATION

<b>Subject Code</b> <b>1640405</b>	<b>Theory</b>						<b>Credits</b>
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>100</b>	<b>03</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>ESE</b>	<b>:</b>	<b>70</b>	
	<b>03</b>	<b>—</b>	<b>—</b>	<b>TA</b>	<b>:</b>	<b>10</b>	
<b>—</b>	<b>—</b>	<b>—</b>	<b>CT</b>	<b>:</b>	<b>20</b>		

<b>CONTENTS: THEORY</b>		<b>Hours</b>	<b>Marks</b>
<b>Unit-1</b>	<b>Automation</b> 1.1 Need of automation 1.2 Advantages of automation 1.3 Requirements of automation	02	--
<b>Unit-2</b>	<b>Control System</b> 2.1 Concept of control system 2.2 Basic block diagram of control system 2.3 Transfer function 2.4 Different terms in control system 2.5 Types of control system 2.6 Applications of control system 2.7 Development of block diagram for simple applications like level, temperature, flow control	04	04
<b>Unit-3</b>	<b>Control System Components</b> 3.1 Contacts-types, current capacity & load utilization categories 3.2 Solenoids-dc, ac 3.3 I/P devices- switches-push buttons, foot switch, selector switch, pilot switch, proximity, photoelectric, temperature actuated, level control, pressure sensing, overload sensing 3.4 Relays- electromechanical, reed 3.5 O/P devices- contactors, valves, pilot lamps 3.6 Symbols in power & control circuits 3.7 Developing control circuit-basic & thumb rule 3.8 Power & control circuit for different applications like hoist, crane, conveyer belt, induction motors	08	12
<b>Unit-4</b>	<b>Electrical Actuators</b> 4.1 Potentiometers-working & use as error detector 4.2 Servomotors-ac & dc –working principle 4.3 Synchros - transmitter, control transformer, use of as error detector 4.4 Stepper motor-PM & variable reluctance- working principle 4.5 Tacho - generator 4.6 Applications of above components as AC/DC control system.	08	10
<b>Unit-5</b>	<b>Controllers</b> 5.1 Hydraulic-advantages & disadvantages, hydraulic servomotor, types of pumps used, control valves, components like accumulator, filter, seals 5.2 Pneumatic-resistance & capacitance of pressure system, pneumatic flapper-nozzle system, pneumatic relays, actuating valves, cylinders, comparison between pneumatic & hydraulic systems 5.3 Electrical & electronic controller-brief overview of op-amps, inverting, non-inverting, lead-lag networks 5.4 Digital controllers-brief overview of microprocessor & micro- controller to be worked as controller	08	10
<b>Unit-6</b>	<b>Control actions</b> 6.1 On-Off, P, I, P+I, P+D, P+I+D, actions 6.2 P+I+D action using hydraulic, pneumatic electronic controller 6.3 Tuning of P+I+D controller	06	10

<b>Unit-7</b>	<b>Programmable Logic Controller</b> 7.1 Introduction 7.2 Advantages & disadvantages 7.3 PLC Vs PC 7.4 Block diagram of PLC 7.5 Basic blocks like CPU, I/O modules, bus system, power supplies & remote I/Os 7.6 Different PLC's available in market	08	10
<b>Unit-8</b>	<b>Programming of PLC</b> 8.1 development of Ladder logic 8.2 some simple programs such as I/O connections, starting of IM, stepper motor control (treatment to topic no.8.2 should be given at the time of practical / pp hours.)	02	10
<b>Unit-9</b>	<b>Introduction to special control systems</b> 9.1 Distributed Control System(DCS)-brief introduction to hardware & software used 9.2 SCADA- brief introduction to hardware & software used	02	04
	<b>Total</b>	<b>48</b>	<b>70</b>

**Text / Reference Books:**

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

## ELECTRONIC CONSTRUCTION AND REPAIR LAB.

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

<b>Contents : Practical</b>		<b>Hrs/week</b>	<b>Marks</b>
<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 C.H.O. 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.	[ ]	
<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 LAB.

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

<b>Contents : Term Work</b>		<b>Hrs/week</b>	<b>Marks</b>
<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.	[ ]	
<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 LAB.**

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

<b>Contents : Term Work</b>		<b>Hrs/week</b>	<b>Marks</b>
<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>			