

**STATE BOARD OF TECHNICAL EDUCATION, BIHAR**

**Scheme of Teaching and Examinations for  
VI SEMESTER DIPLOMA IN ELECTRONICS ENGINEERING**

**(Effective from Session 2016-17 Batch)**

**THEORY**

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME Periods per Week	EXAMINATION – SCHEME							Credits
				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 (Common)	1600601	03	03	10	20	70	100	28	40	03
2.	Advance Communication System	1621602	04	03	10	20	70	100	28	40	03
3.	Digital Electronics-II	1621603	04	03	10	20	70	100	28	40	03
4.	Signal System	1621604	03	03	10	20	70	100	28	40	03
5.	Elective (Any One)	1621605	03	03	10	20	70	100	28	40	03
	Elective - (i) Advanced Microprocessor (1621605A)		(ii) Advanced Instrumentation & Measurement (1621605B)		(iii) Mining Electronics (1621605C)		(iv) Medical Electronics (1621605D)	(v) Microwave Engineering (1621605E)			
<b>Total:- 17</b>							<b>350</b>	<b>500</b>			

**PRACTICAL**

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME Periods per Week	Hours of Exam.	EXAMINATION – SCHEME				Credits
					Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	
					Internal (A)	External (B)			
6.	Advance Communication System Lab.	1621606	06	03	15	35	50	20	03
<b>Total:- 06</b>							<b>50</b>		

**TERM WORK**

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME Periods per week	EXAMINATION – SCHEME				Credits
				Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	
7.	Signal and System -TW	1621607	04	15	35	50	20	02
8.	Digital Electronics & M.P. -TW	1621608	06	15	35	50	20	02
9.	Project Work & Its presentation in Seminar - TW	1621609	-	30	70	100	40	02
<b>Total:- 10</b>						<b>200</b>		
Total Periods per week Each of duration One Hours = 33						<b>Total Marks = 750</b>	<b>24</b>	

# MANAGEMENT (COMMON)

<b>Subject Code 1600601</b>	<b>Theory</b>						<b>Credits</b>
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>100</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>	

## CONTENTS : THEORY

	Name of the Topics	Hrs/week	Marks
<b>Unit -1</b>	<b>Overview Of Business</b> 1.1. Types of Business <ul style="list-style-type: none"> <li>• Service</li> <li>• Manufacturing</li> <li>• Trade</li> </ul> 1.2. Industrial sectors Introduction to <ul style="list-style-type: none"> <li>• Engineering industry</li> <li>• Process industry</li> <li>• Textile industry</li> <li>• Chemical industry</li> <li>• Agro industry</li> </ul> 1.3 Globalization <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Advantages &amp; disadvantages w.r.t. India</li> <li>• 1.4 Intellectual Property Rights (I.P.R.)</li> </ul>	<b>02</b>	
<b>Unit -2</b>	<b>Management Process</b> 2.1 What is Management? <ul style="list-style-type: none"> <li>• Evolution</li> <li>• Various definitions</li> <li>• Concept of management</li> <li>• Levels of management</li> <li>• Administration &amp; management</li> <li>• Scientific management by F.W.Taylor</li> </ul> 2.2 Principles of Management (14 principles of Henry Fayol) 2.3 Functions of Management <ul style="list-style-type: none"> <li>• Planning</li> <li>• Organizing</li> <li>• Directing</li> <li>• Controlling</li> </ul>	<b>07</b>	
<b>Unit - 3</b>	<b>Organizational Management</b> 3.1 Organization :- <ul style="list-style-type: none"> <li>• Definition</li> <li>• Steps in organization</li> </ul> 3.2 Types of organization <ul style="list-style-type: none"> <li>• Line</li> <li>• Line &amp; staff</li> <li>• Functional</li> <li>• Project</li> </ul> 3.3 Departmentation <ul style="list-style-type: none"> <li>• Centralized &amp; Decentralized</li> <li>• Authority &amp; Responsibility</li> <li>• Span of Control</li> </ul> 3.4 Forms of ownership <ul style="list-style-type: none"> <li>• Proprietorship</li> <li>• Partnership</li> <li>• Joint stock</li> <li>• Co-operative Society</li> <li>• Govt. Sector</li> </ul>	<b>07</b>	

<p><b>Unit - 4</b></p>	<p><b>Human Resource Management</b></p> <p>4.1 Personnel Management</p> <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Definition</li> <li>• Functions</li> </ul> <p>4.2 Staffing</p> <ul style="list-style-type: none"> <li>• Introduction to HR Planning</li> <li>• Recruitment Procedure</li> </ul> <p>4.3 Personnel- Training &amp; Development</p> <ul style="list-style-type: none"> <li>• Types of training</li> <li>➤ Induction</li> <li>➤ Skill Enhancement</li> </ul> <p>4.4 Leadership &amp; Motivation</p> <ul style="list-style-type: none"> <li>• Maslow's Theory of Motivation</li> </ul> <p>4.5 Safety Management</p> <ul style="list-style-type: none"> <li>• Causes of accident</li> <li>• Safety precautions</li> </ul> <p>4.6 Introduction to –</p> <ul style="list-style-type: none"> <li>• Factory Act</li> <li>• ESI Act</li> <li>• Workmen Compensation Act</li> </ul> <p>Industrial Dispute Act</p>	<p style="text-align: center;"><b>08</b></p>	
<p><b>Unit - 5</b></p>	<p><b>Financial Management</b></p> <p>5.1. Financial Management- Objectives &amp; Functions</p> <p>5.2. Capital Generation &amp; Management</p> <ul style="list-style-type: none"> <li>• Types of Capitals</li> <li>• Sources of raising Capital</li> </ul> <p>5.3. Budgets and accounts</p> <ul style="list-style-type: none"> <li>• Types of Budgets</li> <li>➤ Production Budget (including Variance Report )</li> <li>➤ Labour Budget</li> <li>• Introduction to Profit &amp; Loss Account ( only concepts ) ; Balance Sheet</li> </ul> <p>5.4 Introduction to –</p> <ul style="list-style-type: none"> <li>• Excise Tax</li> <li>• Service Tax</li> <li>• Income Tax</li> <li>• VAT</li> <li>• Custom Duty</li> </ul>	<p style="text-align: center;"><b>08</b></p>	
<p><b>Unit - 6</b></p>	<p><b>Materials Management</b></p> <p>6.1. Inventory Management (No Numerical)</p> <ul style="list-style-type: none"> <li>• Meaning &amp; Objectives</li> </ul> <p>6.2 ABC Analysis</p> <p>6.3 Economic Order Quantity</p> <ul style="list-style-type: none"> <li>• Introduction &amp; Graphical Representation</li> </ul> <p>6.4 Purchase Procedure</p> <ul style="list-style-type: none"> <li>• Objects of Purchasing</li> <li>• Functions of Purchase Dept.</li> <li>• Steps in Purchasing</li> </ul> <p>6.5 Modern Techniques of Material Management</p> <ul style="list-style-type: none"> <li>• Introductory treatment to JIT / SAP / ERP</li> </ul>	<p style="text-align: center;"><b>08</b></p>	

<b>Unit – 7</b>	<b>Project Management ( No Numerical)</b> 7.1 Project Management <ul style="list-style-type: none"> <li>• Introduction &amp; Meaning</li> <li>• Introduction to CPM &amp; PERT Technique</li> <li>• Concept of Break Even Analysis</li> </ul> 7.2 Quality Management <ul style="list-style-type: none"> <li>• Definition of Quality , concept of Quality , Quality Circle, Quality Assurance</li> <li>• Introduction to TQM, Kaizen, 5 ‘S’, &amp; 6 Sigma</li> </ul>	<b>08</b>	
	<b>Total</b>	<b>48</b>	

<b>Text/ Reference Books:-</b>		
<b>Name of Authors</b>	<b>Titles of the Book</b>	<b>Name of the Publishe</b>
Dr. O.P. Khanna	Industrial Engg & Management	Dhanpal Rai & sons New
Dr. S.C. Saksena	Business Administration & Management	Sahitya Bhavan Agra
W.H. Newman E.Kirby Warren Andrew R. McGill	The process of Management	Prentice- Hall
Rustom S. Davar	Industrial Management	Khanna Publication
Banga & Sharma	Industrial Organisation & Management	Khanna Publication
Jhamb & Bokil	Industrial Management	Everest Publication , Pune

## ADVANCE COMMUNICATION SYSTEM

<b>Subject Code</b> 1621602	<b>Theory</b>			<b>No of Period in one session : 60</b>			<b>Credits</b>  03
	<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 :**

**Objective:**

<b>Contents : Theory</b>		<b>Hrs/week</b>	<b>Marks</b>
<b>UNIT-1</b>	<b>Introduction (Review of Communication System):</b> 01.01 Reflection and Refraction of Radio Wave 01.02 Ground Wave, Space Wave and Sky Wave 01.03 Muf, Skip Distance 01.04 Fading and Composition of Ionosphere 01.05 Modulation (AM, FM, PM), Expression for $e_{AM(t)}$ , $e_{FM(t)}$ , and $e_{PM(t)}$ 01.06 Simple Problem based on Formulae.	<b>[ 12 ]</b>	
<b>UNIT-2</b>	<b>Noise</b> 02.01 Types of Noise, External Noise , Thermal Noise, Internal Noise and Short Noise 02.02 Noise Figure, Noise Figure Measurement and Noise Temperature 02.03 Noise in Communication System 02.04 Simple Problem based on Noise Measurement	<b>[08]</b>	
<b>UNIT-3</b>	<b>Satellite and optical fibre Communication</b> 03.01 Satellite communication System, Satellite Orbits, Geo Stationary Orbit 03.02 Basic Components of Satellite Communication System, History of development of satellite Communication in India 03.03 Optical Communication, Basic Fibre Optics System, Its Advantages 03.04 Optical Fibre Construction, Modes of Propagation 03.05 Numerical Aperture, losses in Optical Fibre, Optical Communication System	<b>[10]</b>	
<b>UNIT-4</b>	<b>Radar</b> 04.01 Introduction, basic radar system, Determination of Range of Radar. 04.02 PPI (Plan Position Indicator) 04.03 MTI (Moving target Indicator) 04.04 Doppler Effect, MTI principles and Application.	<b>[08]</b>	
<b>UNIT-5</b>	<b>Basic Information Theory</b> 05.01 Introduction 05.02 Discrete channel, redundancy 05.03 Channel Capacity 05.04 Hartley-Shannon Law, bandwidth, signal to noise Ratio Simple Numerical Problems	<b>[10]</b>	

<b>UNIT-6</b>	<b><u>Modern Communication System.</u></b>	<b>[12]</b>	
06.01	Cellular Mobile Communication, Concept of Cells, Basic Cellular mobile radio system		
06.02	Cell phone, Fascimile (FAX), Important features of Fax machine, Its application		
06.03	VSAT (very small aperture terminal), Radio Paging System Advantages of Pager		
06.04	MODEM, VOD(Video On Demand), IPTV (Internet Protocol Television)		
06.05	Wi-Fi,3G		
<b>Total</b>		<b>[60]</b>	

**Books Recommended:**

Sl No.	Title	Author	Publisher
1	Electronics Communication System by Kennedy and Davis.	by Kennedy and Davis.	(TMH)
2	Principles of Communication engineering	by Anokh Singh & A.K Chhabra	(S.CHAND)
3	Wireless & Cellular Communication	by Sanjay Sharma	(KATSO)

## DIGITAL ELECTRONICS–II

<b>Subject Code 1621603</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>04</b>	<b>—</b>	<b>—</b>	<b>TA</b>	<b>:</b>	<b>70</b>	
			<b>CT</b>	<b>:</b>	<b>10</b>		
				<b>:</b>	<b>20</b>		

**Rationale :**

**Objective:**

<u>S.No.</u>	<u>Topics</u>	<u>Periods</u>
01	Multivibrator Circuit.	(08)
02	Linear and Non Linear Wave Shaping Circuits.	(06)
03	Memories.	(12)
04	Input / Output Devices.	(10)
05	A / D and D / A Conversion.	(12)
06	Compact Disks.	(04)
07	Digital Display.	(08)
<b>Total:</b>		<b>(60)</b>

<b>Contents : Theory</b>		<b>Hrs/week</b>	<b>Marks</b>
<b>UNIT-1</b>	<b><u>MULTIVIBRATOR CIRCUIT:</u></b> 01.01 Introduction. 01.02 Transistor and Multivibrator circuits. 01.03 F E T based Multivibrator circuits. 01.04 Schmitt Trigger circuit. 01.05 555 IC based above circuits. 01.06 CMOS based Multivibrator Circuits.	<b>[08]</b>	
<b>UNIT-2</b>	<b><u>LINEAR AND NON LINEAR WAVE SHAPING CIRCUITS:</u></b> 02.01 Voltage comparater. 02.02 Voltage time base generator. 02.03 Current time base generator.	<b>[06]</b>	
<b>UNIT-3</b>	<b><u>MEMORIES:</u></b> 03.01 Classification in different aspects. 03.02 Semi conductor dynamic, static memories. 03.03 Shift register memory unit. 03.04 Magnetic core memories. 03.05 Magnetic tape. 03.06 Paper tapes. 03.07 Read only memories: PROM, EPROM. 03.08 EPROM Eraser. 03.09 Storage capacity.	<b>[10]</b>	

<b>UNIT-4</b>	04.01 Punched Card. 04.02 Paper tape, Magnetic tape, Magnetic drum & recording devices. 04.03 Digital recording devices. 04.04 CRT Terminals. 04.05 Decoder, encoder and Multiplexer. 04.06 Serial and Parallel data transfer. 04.07 U A R T. 04.08 Bi-directional buffer. 04.09 Parity and encoder. 04.10 74150, 74156, 74139, 74155, 74151, 74246, ICs.	<b>[10]</b>	
<b>UNIT-5</b>	<b><u>A / D AND D / A CONVERSION:</u></b> 05.01 Introduction. 05.02 Sampling theorem. 05.03 Weighted register D/A Converter. 05.04 R-2R Ladder D/A Converter. 05.05 Inverted ladder D/A converter. 05.06 A/D converter: parallel comparater, successive approx., counting, Dual slope type. 05.07 Sample and hold circuit.	<b>[12]</b>	
<b>UNIT-6</b>	<b><u>COMPACT DISKS:</u></b> 06.01 Hard disk. 06.02 CD ROM. 06.03 CCD (charged coupled devices). 06.04 Storage charge.	<b>[04]</b>	
<b>UNIT-7</b>	<b><u>DIGITAL DISPLAY:</u></b> 07.01 LED, LCD, Light detectors displays. 07.02 Magnetic bubble display. 07.03 Seven segment display.	<b>[08]</b>	
<b>Total</b>		<b>50</b>	

**Books Recommended:**

<b>Sl No.</b>	<b>Title</b>	<b>Author</b>	<b>Publisher</b>
1	Digital Principle and Application.	-	Malvino and Leach.
2	Pulse and Digital Circuit.	-	Milman and Taub.
3	Digital Int. Circuits.	-	Taub and Schilling.

# SIGNAL SYSTEM

<b>Subject Code</b> <b>1621604</b>	<b>Theory</b>			<b>No of Period in one session : 60</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>	

**Rationale :**

**Objective:**

<b>Contents : Theory</b>		<b>Hrs/week</b>	<b>Marks</b>
<b>UNIT-1</b>	<b><u>SIGNALS &amp; THEIR REPRESENTATION:</u></b> 01.01 Basic Continuous time Signals. 01.02 Basic discrete time Signals. 01.03 Linear time invariant Signals. 01.04 Random Signals.	<b>[07]</b>	
<b>UNIT-2</b>	<b><u>INTRODUCTION TO LINEAR SYSTEM:</u></b> 02.01 Introduction. 02.02 Linear System from a physical point of view 02.03 Linear System from a Mathematical point of view	<b>[05]</b>	
<b>UNIT-3</b>	<b><u>FOURIER SERIES &amp; TRANSFORMS:</u></b> 03.01 Fourier series expansion. 03.02 Symmetry expansion. 03.03 Exponential form of Fourier series. 03.04 Fourier Integral & Fourier Transform. 03.05 Analysis by Fourier Methods.	<b>[08]</b>	
<b>UNIT-4</b>	<b><u>LAPLACE TRANSFORMS:</u></b> 04.01 Introduction, Definition of Laplace transform of a function, Inverse Laplace transform Basic properties of Laplace transform, Laplace transform algebraic and trigonometric functions, Laplace transform of derivatives and integrals. L-transform of periodic function.	<b>[10]</b>	
<b>UNIT-5</b>	<b><u>INVERSE LAPLACE TRANSFORMATIONS:</u></b> Inverse Laplace transform Heaviside expansion theorem, initial and final value theorem, convolution integral, inverse Laplace transform of some irrational function, Application of Laplace transform and Inverse Laplace transform for the solution of differential equations.	<b>[09]</b>	
<b>UNIT-6</b>	<b><u>SAMPLED-DATA SYSTEM &amp; THE Z-TRANSFORMATIONS:</u></b> 06.01 Introduction. 06.02 The Z-transformations. 06.03 Z-transformations of some important functions. 06.04 The shifting Theorem. 06.05 The initial & final value Theorem. 06.06 Introductions to difference equations. 06.07 Solution of difference equations.	<b>[12]</b>	
<b>UNIT-7</b>	<b><u>MATHEMATICAL MODELLING OF PHYSICAL SYSTEMS:</u></b> 07.01 System response & transfer function. 07.02 Block diagram representations. 07.03 Rule for block diagram transformations Signal flow graph. 07.04 Mason's gain formula & its applications.	<b>[09]</b>	
<b>Total</b>		<b>60</b>	

**Books Recommended:**

1.	Analysis of linear systems.	-	D. K. Cheng.
2.	Circuit & System Analysis.	-	A. Paspoulis.
3.	Signal & linear system.	-	Gabel & Roberts.
4.	Communication System.	-	Haykins.
5.	Signals and Systems, PHI.	-	A. Oppenheirn and A. Willsky.
6.	Control System Engineering.	-	Nagrath & Gopal.

## ELECTIVE (ANY ONE) -(i) ADVANCED MICROPROCESSOR

<b>Subject Code</b> <b>1621605A</b>	<b>Theory</b>			<b>No of Period in one session :</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>	

**Rationale :**

**Objective:**

<u>S.No.</u>	<u>Topics</u>	<u>Periods</u>
01	Introduction to 16 BIT Microprocessor.	
02	Data and Address-BUS Configuration.	
03	Addressing Modes.	
04	Interrupt Processing.	
05	Peripheral Interfacing Chips.	
06	Architecture of 68000 Motorola processor in detail.	
07	Organisation of Instruction Sets.	
08	Architecture for standard peripheral devices.	
09	I/O Control.	
10	System Design with few industrial examples using 8086 and 68000 processors.	

<b>CONTENTS : THEORY</b>			<b>Hrs/week</b>	<b>Marks</b>
<b>Unit-1</b>	<b><u>INTRODUCTION TO 16 BIT MICROPROCESSOR:</u></b>		[ ]	
	01.01	Intel 8086 Architecture.		
	01.02	Intel 8088 Architecture.		
	01.03	Pipeline Architecture.		
	01.04	Bus interface unit and execution unit.		
<b>Unit-2</b>	<b><u>DATA AND ADDRESS-BUS CONFIGURATION:</u></b>		[ ]	
	02.01	Memory segmentation.		
	02.02	Memory address generation details.		
	02.03	Logical and Physical address generation.		
	02.04	I/O Port addresses.		
	02.05	Memory mapping.		
	02.06	Data, Code and Stack segmentation.		
<b>Unit-3</b>	<b><u>ADDRESSING MODES:</u></b>		[ ]	
	03.01	Instruction set in detail and Addressing Modes.		
	03.02	Assembler directives.		
	03.03	Programming examples.		
<b>Unit-4</b>	<b><u>INTERRUPT PROCESSING:</u></b>		[ ]	
	04.01	Hardware Interrupt.		
	04.02	Software Interrupt.		
	04.03	Internal Interrupt.		
	04.04	Types of Interrupt.		
	04.05	Interrupt enabling and disabling.		
<b>Unit-5</b>	<b><u>PERIPHERAL INTERFACING CHIPS:</u></b>		[ ]	
	05.01	Intel 8255.		
	05.02	Intel 8253.		
	05.03	Intel 8259.		
	05.04	Intel 8251.		
	05.05	Interfacing of these chips with processor.		
	05.06	Digital interfacing.		
	05.07	Analog interfacing.		
	05.08	Industrial control applications.		

<b>Unit-6</b>	<b>ARCHITECTURE OF 68000 MOTOROLA PROCESSOR IN DETAIL.</b>		[ ]	
	06.01	Introduction.		
	06.02	Reference in 68000.		
	06.03	Memory Address.		
	06.04	Instruction formats.		
	06.05	Addressing Modes.		
	06.06	Instruction Sets.		
	06.07	STACK, Read and Write Cycle Timing.		
<b>Unit-7</b>	<b>ORGANISATION OF INSTRUCTION SETS:</b>		[ ]	
	07.01	Addressing modes.		
	07.02	Assembly language programming.		
	07.03	Examples for sorting logical operations.		
	07.04	Control loops.		
	07.05	Interrupt and exception programming.		
<b>Unit-8</b>	<b>I/O CONTROL:</b>		[ ]	
	08.01	I/O control using parallel interface.		
	08.02	I/O control using memory mapped I/O control for data acquisition.		
	08.03	Data output through binary I/O lines.		

**Books Recommended:**

1. Intel Manual of 8086 -
2. Microprocessing and Interfacing. - Hall
3. 6800 Assembly Lan. Programming. - Leventhal
4. Microprocessor - Lui & Gibson
5. Motorola Manufacturing Data Sheets. -

## ELECTIVE (ANY ONE) -(ii) ADVANCED INSTRUMENTATION & MEASUREMENT

<b>Subject Code</b> 1621605B	Theory			No of Period in one session :			Credits  03
	No. of Periods Per Week			Full Marks			
	L	T	P/S	ESE	:	100	
	03	—	—	TA	:	70	
				CT	:	10	
				:	20		

**Rationale :**

**Objective:**

**S.No. Topics**

**Periods**

- |    |  |  |
|----|--|--|
| 01 | Sensors.                               |  |
| 02 | Microprocessor based data acquisition. |  |
| 03 | Process Control.                       |  |
| 04 | Electronic Graphic Recording Systems.  |  |

CONTENTS : THEORY			Hrs/week	Marks
<b>Units-1</b>	<b><u>SENSORS:</u></b>			
	01.01	Electrical sensors for : (a) Mechanical acquisition, (b) Hydraulic acquisition, (c) Pneumatic acquisition.		
	01.02	Analog sensors.		
	01.03	Digital sensors.		
<b>Units-2</b>	<b><u>MICROPROCESSOR BASED DATA ACQUISITION:</u></b>			
	02.01	Instrumentation amplifier.		
	02.02	Multiplexers.		
	02.03	Sample and hold circuit.		
	02.04	D/A Converter.		
	02.05	A/D Converter.		
	02.06	Data acquisition system.		
<b>Units-3</b>	<b><u>PROCESS CONTROL:</u></b>			
	03.01	Process controller.		
	03.02	Hardware data logging.		
	03.03	Microcomputer as process controller.		
	03.04	Supervisory control.		
	03.05	Direct digital control.		
<b>Units-4</b>	<b><u>ELECTRONIC GRAPHIC RECORDING SYSTEMS:</u></b>			
	04.01	Introduction.		
	04.02	Balancing arrangement.		
	04.03	XY Recorder.		
	04.04	Types and briefs of permanent recording systems.		
<b>Total</b>				

**Books Recommended:**

- |  |                  |
|--|------------------|
| 1. Microprocessor with Application in Control. | - Ahson.         |
| 2. Microprocessor in Instruments & Control.    | - Bibbero        |
| 3. Modern Instrumentation System.              | - Mani & Others. |

## ELECTIVE (ANY ONE) -(iii) MINING ELECTRONICS

Subject Code 1621605C	Theory			No of Period in one session :			Credits  03
	No. of Periods Per Week			Full Marks			
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
			CT	:	20		

**Rationale :**

**Objective:**

**S.No.**

**Topics**

**Periods**

01	Basic Quantity Measurement.	
02	Environmental Measurement.	
03	Sensors.	
04	Detectors.	
05	Transport System Monitoring.	
06	Surveillance of Electrical System.	
07	MIS Systems.	

CONTENTS : THEORY		Hrs/week	Marks
<b>Unit-1</b>	<b><u>BASIC QUANTITY MEASUREMENT:</u></b>		
	01.01	Measurement of temperature.	
	01.02	Measurement of pressure.	
	01.03	Measurement of humidity.	
	01.04	Measurement of Air Velocity.	
<b>Unit-2</b>	<b><u>ENVIRONMENTAL MEASUREMENT:</u></b>		
	02.01	Introduction.	
	02.02	Monitoring and recording of methane.	
	02.03	Monitoring and recording of carbon mono-oxide.	
	02.04	Measuring of Oxygen and other gas quantities.	
<b>Unit-3</b>	<b><u>SENSORS:</u></b>		
	03.01	Classification of gas sensors.	
	03.02	Solid state sensors.	
	03.03	Gas analysis.	
	03.04	Ionisation chamber.	
<b>Unit-4</b>	<b><u>DETECTORS:</u></b>		
	04.01	Introduction & Classification.	
	04.02	Early detectors of ground fires.	
	04.03	Smoke/fire detectors.	
	04.04	Detection of rock movements.	
	04.05	Detection of change in pressure.	
<b>Unit-5</b>	<b><u>TRANSPORT SYSTEM MONITORING:</u></b>		
	05.01	Introduction & Classification.	
	05.02	Tub transport system.	

	05.03	Conveyer belt transport system.		
	05.04	NDT for wire ropes.		
<b>Unit-6</b>	<b><u>SURVEILLANCE OF ELECTRICAL SYSTEM:</u></b>			
	06.01	Introduction.		
	06.02	Surveillance of underground electrical systems.		
	06.03	Surveillance of ground electrical system.		
	06.04	Surveillance of communication system.		
	06.05	Insulation monitoring.		
	06.06	Fault detection in different section.		
<b>Unit-7</b>	<b><u>MIS SYSTEMS:</u></b>			
	07.01	Introduction to control dispatch system.		
	07.02	Signaling in mines.		
	07.03	Different types of transmitters used in mines.		
	07.04	Different types of receiver used in mines.		
	07.05	Important safely signals used in mines.		
<b>Total</b>				

## ELECTIVE (ANY ONE) -(iv) MEDICAL ELECTRONICS

Subject Code 1621605D	Theory			No of Period in one session :			Credits  03
	No. of Periods Per Week			Full Marks			
	L	T	P/S	ESE	:	100	
	03	—	—	TA	:	70	
				CT	:	20	

**Rationale :**

**Objective:**

<u>S.No.</u>	<u>Topics</u>	<u>Periods</u>
01	Body Skeleton.	
02	Muscle Physiology.	
03	Heart Physiology.	
04	Respiration.	
05	Neuro Physiology.	
06	Recording Techniques.	
07	Measurement & Recording of Non-Electrical Systems.	
08	Electronic Instruments affecting Human Body.	

CONTENTS : THEORY		Hrs/week	Marks
<b>Unit-1</b>	<b><u>BODY SKELETON:</u></b>		
	01.01	Nerve Physiology.	
	01.02	Membrane Potential.	
	01.03	Action Potential.	
	01.04	Function of Nerve Junctions.	
	01.05	Functions of Neo-Neural Junctions.	
<b>Unit-2</b>	<b><u>MUSCLE PHYSIOLOGY:</u></b>		
	02.01	Function of Skeleton & Smooth Muscle.	
	02.02	Function of Cardiac Muscle.	
	02.03	Cardiac Rhythmic Contraction.	
<b>Unit-3</b>	<b><u>HEART PHYSIOLOGY:</u></b>		
	03.01	Introduction to Heart function.	
	03.02	Blood flow.	
	03.03	Arterial Pressure.	
	03.04	E C G.	
<b>Unit-4</b>	<b><u>RESPIRATION.</u></b>		
<b>Unit-5</b>	<b><u>NEURO PHYSIOLOGY:</u></b>		
	05.01	Introduction.	
	05.02	Function of Spinal Cord.	
	05.03	Cord Reflexes.	
<b>Unit-6</b>	<b><u>RECORDING TECHNIQUES:</u></b>		
	06.01	Introduction.	
	06.02	Electro-Cardiac Graph.	
	06.03	Electro Mypho Graph.	
	06.04	Electro Encyclo Graph.	
<b>Total</b>			

**Books Recommended:**

- |  |                      |
|--|----------------------|
| 1. Bio Medical Electronics                 | - Cromwell & others. |
| 2. Bio Electronic Instrument & Measurement | - Khandpur.          |
| 3. Bio Medical Instrument & Measurement    | - Cromwell & others. |

## ELECTIVE (ANY ONE) -(v) MICROWAVE ENGINEERING

<b>Subject Code</b> 1621605E	<b>Theory</b>			<b>No of Period in one session :</b>			<b>Credits</b>  03
	<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:**

**Objective:**

**S.No.    Topics**

- 01      Microwave Tubes.
- 02      Microwave Semi Conductor Devices.
- 03      Microwave Components and Antennas.
- 04      Microwave Transmission.
- 05      Microwave Measurements.

<b>CONTENTS : THEORY</b>			<b>Hrs/week</b>	<b>Marks</b>
<b>Unit-1</b>	<b><u>MICROWAVE TUBES:</u></b>			
	01.01	Introduction.		
	01.02	Microwave frequency band spectrum.		
	01.03	Klystron.		
	01.04	Reflex Klystron.		
	01.05	Travelling Wave tubes.		
	01.06	Magnetron.		
<b>Unit-2</b>	<b><u>MICROWAVE SEMI CONDUCTOR DEVICES:</u></b>			
	02.01	Microwave Diodes.		
	02.01.01	Varactor Diodes.		
	02.01.02	Tunnel Diodes.		
	02.01.03	Gunn Diodes.		
	02.01.04	Avalanche effect diodes.		
	02.02	M A S E R.		
<b>Unit-3</b>	<b><u>MICROWAVE COMPONENTS AND ANTENNAS:</u></b>			
	03.01	Coaxial Lines.		
	03.02	Wave guides.		
	03.02.01	Rectangular.		
	03.02.02	Circular.		
	03.03	Wave guide corners and Tees.		
	03.04	Directional couplers.		
	03.05	Attenuators.		
	03.06	Antennas.		
	03.07.01	Parabolic.		
	03.08.02	Horn.		
03.09.03	Slot.			

<b>Unit-4</b>	<b><u>MICROWAVE TRANSMISSION:</u></b>			
	04.01	Maxwells equations.		
	04.02	Modes of propagation in rectangular and circular wave guides.		
	04.03	Transmission through rectangular wave guide.		
	04.04	Cut off and guide wavelength.		
	04.05	Phase and group velocity.		
<b>Unit-5</b>	<b><u>DETECTORS:</u></b>			
	05.01	Measurement of impedance.		
	05.02	Measurement of frequency.		
	05.03	Voltage standing wave ratio.		

**Books Recommended:**

- |  |                           |
|--|---------------------------|
| 1. Microwave Communication.                  | - Angelkos & Everhar.     |
| 2. Foundation of Microwave Communication.    | - Collins.                |
| 3. Microwaves.                               | - Sanjeev Gupta & others. |
| 4. Electromagnetic Waves & Radiating Systems | - Jordan.                 |
| 5. Microwave Theory & Measurement            | - Heylward Packard.       |

## ADVANCE COMMUNICATION SYSTEM LAB.

<b>Subject Code</b> 1621606	<b>Practical</b>			<b>No of Period in one session :</b>			<b>Credits</b>  03
	<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>50</b>	
	—	—	<b>06</b>	<b>Internal</b>	<b>:</b>	<b>15</b>	
			<b>External</b>	<b>:</b>	<b>35</b>		

<b>Contents : Practical</b>		<b>Hrs/week</b>	<b>Marks</b>
<b>Unit-1</b>	To observe an AM wave on CRO produced by standard signal generator using internal and external modulation. The depth of modulation is to be measured with the above experiment.		
<b>Unit-2</b>	To generate an amplitude modulated Signal using a square-law modulator and study the spectra of AM wave.		
<b>Unit-3</b>	To generate and study double side band suppressed carrier (DSB-SC) modulated Signal.		
<b>Unit-4</b>	To Study the frequency characteristics of pre-emphasis and de-emphasis.		
<b>Unit-5</b>	To Study time-division multiplexing and demultiplexing technique and observe cross-talk.		
<b>Unit-6</b>	To generate and Study wide band and narrow band noise.		
<b>Unit-7</b>	Observation of dependence of intersymbol Interference (ISI) on bandwidth of the channel and the eye pattern due to noise in the channel.		
<b>Unit-8</b>	To Set-up circuits for pulse code modulation and demodulation and to study the modulator and demodulator with the study of quantization noise.		
<b>Unit-9</b>	To verify the sampling theorem and to observe aliasing effect.		
<b>Unit-10</b>	To Study phase locked characteristics and its application as FM demodulator.		
<b>Unit-11</b>	To generator frequency modulated signal using VCO (Voltage controlled oscillator)		
<b>Unit-12</b>	To study the troubleshooting of monochrome TV receiver with expected faults with their remedy.		
<b>Unit-13</b>	To study the trouble shooting of colour TV receiver with normal defects with their remedy.		
<b>Unit-14</b>	Study of CRO, and its application for measurement of phase, frequency, and amplitude such that it can be used for the communication System.		

# SIGNAL AND SYSTEM -TW

<b>Subject Code</b> <b>1621607</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>04</b>	<b>External</b>	<b>:</b>	<b>35</b>	

**Rationale :**

**Objective:**

<b>Contents : Term Work</b>		<b>Hrs/week</b>	<b>Marks</b>
<b>UNIT-1</b>	Write a program to generate the discrete sequences (i) unit step (ii) unit impulse (iii) ramp (iv) periodic sinusoidal sequences. Plot all the sequences.		
<b>UNIT-2</b>	Find the Fourier transform of a square pulse. Plot its amplitude and phase spectrum.		
<b>UNIT-3</b>	Write a program to convolve two discrete time sequences. Plot all the sequences. Verify the result by analytical calculation.		
<b>UNIT-4</b>	Write a program to find the trigonometric Fourier series coefficients of a rectangular periodic signal. Reconstruct the signal by combining the Fourier series coefficients with appropriate weightings.		
<b>UNIT-5</b>	Write a program to find the trigonometric and exponential Fourier series coefficients of a periodic rectangular signal. Plot the discrete spectrum of the signal.		
<b>UNIT-6</b>	Generate a discrete time sequence by sampling a continuous time signal. Show that with sampling rates less than Nyquist rate, aliasing occurs while reconstructing the signal.		
<b>UNIT-7</b>	The signal $x(t)$ is defined as below. The signal is sampled at a sampling rate of 1000 samples per second. Find the power content and power spectral density for this signal. $X(t) = \begin{cases} \cos(2\pi \times 47t) + \cos(2\pi \times 219t), & -10 \leq t \leq 10 \\ 0, & \text{otherwise} \end{cases}$		
<b>UNIT-8</b>	Write a program to find the magnitude and phase response of first order low pass and high pass filter. Plot the responses in logarithmic scale.		
<b>UNIT-9</b>	Write a program to find the response of a low pass filter and high pass filter, when a speech signal is passed through these filters.		
<b>UNIT-10</b>	Write a program to find the autocorrelation and cross correlation of sequences.		
<b>UNIT-11</b>	Generate a uniformly distributed length 1000 random sequence in the range (0,1). Plot the histogram and the probability function for the sequence. Compute the mean and variance of the random signal.		
<b>UNIT-12</b>	Generate a Gaussian distributed length 1000 random sequence. Compute the mean and variance of the random signal by a suitable method.		
<b>UNIT-13</b>	Write a program to generate a random sinusoidal signal and plot four possible realizations of the random signal.		
<b>UNIT-14</b>	Generate a discrete time sequence of N=1000 i.i.d uniformly distributed random numbers in the interval (-0.5, 0.5) and compute the autocorrelation of the sequence.		
<b>UNIT-15</b>	Obtain and plot the power spectrum of the output process when a white random process is passed through a filter with specific impulse response.		
<b>Total</b>			

# DIGITAL ELECTRONICS & MICROPROCESSOR -TW

<b>Subject Code</b> 1621608	<b>Term Work</b>			<b>No of Period in one session :</b>			<b>Credits</b>  02
	<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>06</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>	Operation of Mono stable multivibrator circuit.		
<b>Unit-2</b>	Operation of Bi stable multivibrator circuit.		
<b>Unit-3</b>	Operation of Astable multivibrator circuit.		
<b>Unit-4</b>	Operation of Schmitt trigger circuit.		
<b>Unit-5</b>	Operation of Comparator circuit.		
<b>Unit-6</b>	Operation of Integrator circuit.		
<b>Unit-7</b>	Operation of Blocking Oscillator circuit.		
<b>Unit-8</b>	Operation of Shift registers and counter.		
<b>Unit-9</b>	Operation of EPROM eraser.		
<b>Unit-10</b>	Operation of Multiplexers ICs.		
<b>Unit-11</b>	Operation of D/A converter.		
<b>Unit-12</b>	Operation of A/D converter.		
<b>Unit-13</b>	Operation of R-2R ladder network.		
<b>Unit-14</b>	Operation of Sample and Hold circuit.		
<b>Unit-15</b>	Operations of seven segments display circuit.		
<b>Total</b>			

## PROJECT WORK AND ITS PRESENTATION IN SEMINAR -TW

<b>Subject Code</b> <b>1621609</b>	<b>Term Work</b>			<b>No of Period in one session :</b>			<b>Credits</b>	
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>				<b>02</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Internal</b>	<b>:</b>	<b>30</b>		
	—	—	—	<b>External</b>	<b>:</b>	<b>70</b>		

### Rationale :

The Project work and its presentation in seminar is an important subject for a Diploma holder technician. The course is designed to help a students develop confidence, skill in report writing, skill to analyse, design, estimating and costing, deciding a process etc, the course will also help in developing communication skill, skill of quality documentation.

### Objective:

A student will be able to:

- Identify a Problem
- Analyse the Problem
- Develop logical approach to solution of a Problem.
- Design of a product
- Make estimate of materials and processes and calculate the cost of production and decide the price of the product.
- Manufacture / assemble /fabricate the product in the workshop.
- Test the product for its quality.
- Prepare a project report (Computer printed / typed)
- Present in the form of seminar.

<u>S.No.</u>	<u>Topics</u>
01	To make a bridge rectifier.
02	To make/assemble a voltage stabilizer.
03	To make/assemble stabilizer for refrigerator.
04	To make a timer circuit IC 555.
05	Electronic Regulator for Ceiling Fan.
06	To fabricate a circuit for characteristics for NPN/PNP transistors.
07	Bi-stable Multivibrator
08	Half & Full adder, subtractor & Comparator.
09	8:1 Multiplexer.
10	Realising Railway Signaling System.

### REPORT WRITING:

A report must include

<b>Contents : Term Work</b>		<b>Hrs/week</b>	<b>Marks</b>
<b>Unit-1</b>	Introduction.		
<b>Unit-2</b>	Design.		
<b>Unit-3</b>	Estimating of materials.		
<b>Unit-4</b>	Calculation of cost of the materials.		
<b>Unit-5</b>	Operation time estimation.		
<b>Unit-6</b>	Cost of Operation.		
<b>Unit-7</b>	Process of Manufacture / Assembly / fabrication.		
<b>Unit-8</b>	List of tools/equipments used with specification.		
<b>Total</b>			

**OR**

A project on live industrial problems that may be—

- Technical
- Human Relation
- Welfare
- Safety
- Any other

The Project Report should consist of :-

<b>Unit-1</b>	Introduction.	<b>Hrs/week</b>	<b>Marks</b>
<b>Unit-2</b>	Problem statement.		
<b>Unit-3</b>	Background of Industry.		
<b>Unit-4</b>	Organisational set –up.		
<b>Unit-5</b>	Plant Lay –out.		
<b>Unit-6</b>	Reason for selecting a problem.		
<b>Unit-7</b>	Analysis of Problem.		
<b>Unit-8</b>	Probable solution.		
<b>Unit-9</b>	Best solution possible.		
<b>Unit-10</b>	Any other.		

Project work/ project report should be presented in the form of a seminar for developing confidence and communication skill among the students.

**NOTE:-**

Project work will be allotted to the students just in the beginning of the session. Each student will be given a separate work under the supervision of a teacher. Total number of students may be divided among the number of teachers available. The teacher concerned will select separate problem for each student under him and allot it to him at the beginning of the session. The work allotted should be completed within scheduled time, i.e. by the end of the session. Problems selected should preferably conform to the syllabus. If it is outside of the syllabus then it must be within the field of electronics engineering.