CURRICULAR STRUCTURE FOR PART- II (2ND YEAR) OF THE FULL TIME DIPLOMA COURSES IN ENGINEERING AND TECHNOLOGY

WEST BENGAL STATE COUNCIL OF TECHNICAL EDUCATION												
TEACHING AND EXAMINATION SCHEME FOR DIPLOMA IN ENGINEERING COURSES												
COURSE NAME: DIPLOMA (3 YEARS)												
DURATION OF COURES: 6 SEMESTERS												
SEMESTER: **THIRD**												
BRANCH: **ELECTRONICS AND INSTRUMENTATION ENGINEERING**												
SR. NO.	SUBJECT	CREDIT	PERIODS			EVALUATION SCHEME						
			L	TU	PR	INTERNAL SCHEME			ESE	PR		TOTAL
						TA	CT	TOTAL		INT	EXT	
1	Fundamentals of Electronics	3+1	3		2	10	20	30	70	25	25	150
2	Circuit Theory	4+2	3	1	3	10	20	30	70	50	50	200
3	Fundamentals of Instrumentation	3	3			10	20	30	70	-----		100
4	Electrical Measurement & Measuring Instruments	2	2			5	10	15	35	-----		50
5	Electrical Machine	2	2			5	10	15	35	-----		50
6	Optical Instrumentation	2	2			5	10	15	35	-----		50
7	Programming in C	3	1		4	--	--	--	--	50	50	100
8	Electrical Measurement & Measuring Instruments Lab	1			2	--	--	--	--	25	25	50
9	Electrical Machine Lab	1			2					25	25	50
10	Professional Practice - I	1			2	--	--	--	--	50	----	50
TOTAL		25	16	1	15	45	90	135	315	400		**850**

STUDENT CONTACT HOURS PER WEEK: 32
Theory and Practical Period of 60 Minutes each.
L - Lecture, TU – Tutorial, PR- Practical, TA- Teachers Assessment, CT- Class Test, ESE – End Semester Exam, INT – Internal, EXT- External

Syllabus for FUNDAMENTALS OF ELECTRONICS

Name of the Course : Diploma in Electronics & Instrumentation Engineering				
Name of the Subject : **Fundamentals of Electronics**				
Subject Code:			Semester: Third	
Duration: 6 months			Maximum Marks: 100	
Teaching Scheme: Theory : 3 hrs/week Tutorial : Practical:			Examination Scheme: Internal Scheme : Teachers Assessment: 10 Class Test : 20 End Semester Exam : 70	
Credit: 3				
Aim:				
1	Electronics plays major roles in our day to day life. In each and every field, electronics systems are used. Fundamentals of Electronics is one of the subject which is the base of all advance electronics. It starts with different components used in electronic circuit with semiconductor fundamentals.			
Objective:				
Sl No.	The Student will able to			
1	know about different passive components like resistor, capacitor, inductor and identification of those			
2	be familiar with transformer, relays, switches and connectors			
3	understand the basic functions of zener diode, transistors, thyristor .			
4	Draw the characteristics of basic components like diode, transistor, UJT etc			
	Read the data sheets of diode, transistors etc			
Pre-requisite:				
1	Knowledge of physics			
Contents				
Group	**Module**	**Name of the topic**	**Hrs/ Module**	**Marks**
A	01	**Passive Components** 1.1 Active & Passive Components 1.2 Application, Specification of Carbon composition, Carbon film, Metal Film, Wire Wound Resistor. Idea of Colour Coding of Resistor. Idea of Potentiometer, Preset, Multi turn Potentiometers, Thermistor, LDR and VDR 1.3 Application, Specification of Paper Capacitor, Mica Capacitor, Ceramic Capacitor, Plastic Film Capacitor, Electrolytic Capacitor. Idea of Trimmers, Identifying values of Ceramic Disc Capacitor. 1.4 Fundamental idea of Inductor. Application, Specification of Ferrite Core Inductor, Pot Core Inductor, Air Core Inductor.	9	
	02	**Relay, Cable, Fuse, Switch, Connector** 2.1 Construction & Operation of Simple Electromagnetic Relay, Idea of SPST, SPDT, DPDT, AC/DC type of Relay. Construction & Application of Reed Relay, Solid State relay. 2.2 Idea of Conductor, Insulation, Shield, Jacket. Construction & Application of Coaxial cable, Flat Cable. Idea of Cable Impedance. Name of different cables used in television and telephone systems. 2.3 Specification and Use of Fuse 2.4 Idea of SPST, SPDT, DPST, DPDT, Toggle, Push Button, Rotary, Thumbwheel Switch 2.5 Idea on Plugs and Sockets, RF connectors, Edge connectors. Different connectors for different applications	9	

B	03	**Semiconductor Theory & Diode** 3.1 Idea on Intrinsic, Extrinsic, P type, N type semiconductor 3.2 Construction, symbol, Barrier voltage, depletion region, junction capacitance, V-I characteristics, biasing, specification & application of PN junction diode 3.3 Application of diode as Full wave & half wave rectifier. 3.4 Construction, symbol, characteristics, biasing, specification & application of Zener diode 3.5 Examples of Diode & Zener Diode	7	
	04	**Bipolar Junction Transistor** 4.1 Construction and operation of NPN and PNP transistors- 4.2 Biasing, Cut-off and saturation, V-I characteristics of transistor in CE, CB, CC configuration. Definitions of current gains and their relationship for three configurations 4.3 Application of transistor as amplifier, switch. 4.4 Specification & Example of a Transistor	7	
	05	**Field Effect Transistor** 5.1 Construction, operation, VI characteristics, parameter & application of JFET. 5.2 Construction, operation, VI characteristics, of E-MOSFET, DE-MOSFET, CMOS 5.3 Difference between BJT & JFET. 5.4 Example of JFET & MOSFET	5	
C	06	**Unijunction Transistor** 6.1 Construction, operation, characteristics of UJT. 6.2 Application of UJT as Relaxation Oscillator 6.3 Example of UJT	3	
	07	**Thyristors** 7.1 Construction, operation, characteristics, Application of SCR 7.2 Construction, operation, characteristics, Application of DIAC 7.3 Construction, operation, characteristics, Application of TRIAC 7.4 Example of SCR, DIAC, TRIAC	5	

Books:

Title	Author	Publisher
Basic Electronics	Subhadeep Choudhury	Dhanpat Rai & Co (P) Ltd
Basic Electronics	De	Pearson Education
Principle of Electronics	V K Mehta	S. Chand & Co.
Electronic Principle	A.P. Malvino	McGraw-Hill
Electronic Devices & Circuits	Millman & Halkias	McGraw-Hill
Basic Electronics & Linear Circuits	Bhargava	McGraw-Hill
Electronic devices & Circuit Theory	Boylestad & Nashalsky	Pearson Education
Electronic Fundamentals & Applications	D. Chattopadhyay & P.C. Rakhshit	New Age International

End Semester Examination Scheme	
Maximum Marks: 70	Time: 3 Hrs

Group	Module	Objective Questions				Subjective Questions			
		To be set	To be answered	Marks per question	Total Marks	To be set	To be answered	Marks per question	Total Marks
A	1	8	Any 20	1	1 x 20 =20	3	Any 5 taking at least 1 from each group	10	10 x 5 =50
	2								
B	3	10				3			
	4								
	5								
C	6	7				2			
	7								

Syllabus for CIRCUIT THEORY

Name of the Course : Diploma in Electronics & Instrumentation Engineering	
Name of the Subject: **Circuit Theory**	
Subject Code:	Semester: Third
Duration: 6 months	Maximum Marks: 100
Teaching Scheme: Theory : 3hrs/week Tutorial : 1hrs/week Practical:	Examination Scheme: Internal Scheme : Teachers Assessment: 10 Class Test : 20 End Semester Exam : 70
Credit: 4	
Aim:	
1	This subject find utility in understanding the concept in dc and ac response of different network and electric circuit.
Objective:	
Sl No.	The Student will able to
1	use network theorem for solution of DC network
2	interpret the response of R,L,C elements to AC supply
3	calculate various parameters of AC circuits
4	interpret AC series and parallel circuits
5	have clear conception of series and parallel resonance, calculate resonance frequency in series & parallel circuits and explain the method of attaining resonance in them
6	calculate Quality Factor, selectivity and band-width in both series & parallel resonance circuit, voltage magnification in series circuit and current magnification in parallel circuit
7	understand the meaning of acceptor and rejector circuits
8	state the applications of series & parallel resonance circuits and be able to compare them
9	define and state properties of Laplace Transformation
10	understand the operations and characteristics of different kinds of Filter Circuits
11	understand and explain Two-port networks

12	understand short circuit and open circuit parameters			
13	Calculate short circuit and open circuit parameter for simple circuit			
Pre-requisite:				
1	Idea on component used in circuit			
2	knowledge of complex algebra and knowledge of operator 'j'			
	Contents			
Group	**Module**	**Name of the topic**	**Hrs/ Module**	**Marks**
A	01	**Network Theorem in dc Circuits:** Statement, explanation, limitation & problems on 1.1 Thevenin's theorem, 1.2 Norton's theorem 1.3 Superposition theorem 1.4 Maximum power transfer theorem. 1.5 Star-delta conversion	8	
	02	**A. C. Fundamentals & Sinusiodal Steady State Analysis:** 2.1 Definitions & explanation of Active & Passive elements. 2.2 Concept of complex impedance, Rectangular & polar form. Simple problem. 2.3 Idea on Apparent, real , and active power. 2.4 Sinusiodal response of a series RLC circuit 2.5 Sinusiodal response of a parallel RLC circuit	8	
B	03	**Resonance:** 3.1 Series Resonance: Properties, Impedance, Phase angle, Voltages, Current, Resonant frequency in series resonant circuit. Variation of voltage, current, Resistance, inductive & capacitive reactance, power factor with frequency, Explanation of half power frequencies, Quality factor, Selectivity, Bandwidth, Voltage Magnification, Acceptor Circuit, Simple problem. 3.2 Parallel Resonance: Properties, Impedance & Phase angle, Voltages, Current, Resonant frequency in parallel resonant circuit / Tank circuit. Variation of voltage, current, Resistance, inductive & capacitive reactance, power factor with frequency. Explanation of Quality factor, Selectivity, Bandwidth, Current magnification Magnification, Rejector Circuit, Simple problem. 3.3 Comparison between series & parallel resonance.	13	
	04	**Passive Filter:** 4.1 Idea of Passive & Active Filter, Their relative advantages and disadvantages 4.2 Idea of Fourier Series & frequency spectrum. (concept only) 4.3 Construction, Principle of operation, Characteristics of Low pass, High pass, Band pass & Band stop filter. 4.4 Design of Low pass filter & High pass filter (Constant K type only). Numerical problems on them. 4.5 Composite filter (concept only).	11	
C	05	**Laplace Transformation:** 5.1 Definition & properties of LT 5.2 Laplace Transform of unit step, impulse, ramp, exponential, sine, cosine, pulse, impulse, Dirac delta function. 5.3 Explanation of Laplace Transform theorems like Differential, integral, Time displacement, initial value & final value.	12	

		5.4 Inverse Laplace Transformation. Simple problem 5.5 Application of Laplace transformation in circuit theory		
	06	**Two Port Network:** 6.1 Idea on Linear & Non linear networks, Unilateral & Bilateral networks 6.2 Explanation of Z parameter (Open Circuit Impedance Parameter) 6.3 Explanation of Y parameter (Short Circuit Admittance Parameter) 6.4 Explanation of h -parameter (Hybrid Parameter) 6.5 Interrelation of above parameters 6.4 Simple problem on above parameters.	8	

Books:

Title	**Author**	**Publisher**
Circiut Theory (Analysis & Synthesis)	A. K. Chakraborty	Dhanpat Rai & Co
Electric Circuit Analysis	Kumar	Pearson Education
Introduction to Electric Circuits	Dorf	Wiley
Network Theory: Analysis & Synthesis	Ghosh	PHI
Circuit Theory	S. Salivahanan, S. Pravin Kumar	Vikas
Fundamentals of Electric Circuit	Alexander	Mc Graw Hill
Electric Circuit	David A. Bell	Oxford
Circuits & Network	Sukhua, Nagsarkar	Oxford
A Text Book of Electrical Technology Part-I	B.L. Thereja	S. Chand &. Co
Electric Circuit Analysis	P Ramesh Babu	Scitech
Electric Circuit Theory	Chattopadhyay, Rakshit	S. Chand &. Co
Circuit Network	A. Dani	BPB
Network Analysis & Synthesis	R R Singh	Mc Graw Hill
Electric Circuit Analysis	S.N. Sivanandam	Vikas

End Semester Examination Scheme

Maximum Marks: 70						Time: 3 Hrs			
Group	**Module**	**Objective Questions**				**Subjective Questions**			
		To be set	To be answered	Marks per question	Total Marks	To be set	To be answered	Marks per question	Total Marks
A	1	7	Any 20	1	1 x 20 =20	2	Any 5 taking at least 1 from each group	10	10 x 5 =50
	2								
B	3	9				3			
	4								
C	5	9				3			
	6								

Syllabus for FUNDAMENTALS OF INSTRUMENTATION

Name of the Course : Diploma in Electronics & Instrumentation Engineering	
Name of the Subject : **Fundamentals of Instrumentation**	
Subject Code:	Semester: Third
Duration: 6 months	Maximum Marks: 100
Teaching Scheme: Theory : 3 hrs/week Tutorial : Practical:	Examination Scheme: Internal Scheme : Teachers Assessment: 10 Class Test : 20 End Semester Exam : 70
Credit: 3	

Aim:	
1	As a core technology subject, it intends to teach the basics of instrumentation system, operating principle and application of basic sensors and their use in Instrumentation system
2	The subject knowledge is required in measurement and transmission the signal to control of process parameter
3	Understanding the subject will provide skill to the students to communicate the sensing system to display with signal conditioning part.

Objective:	
Sl No.	The Student will able to
2	Get idea what is Instrumentation
2	Know different subsystems required in a complete instrumentation system
4	Get idea on different important parameter/ specification & characteristic of instruments
5	Idea of different sensors and transducers for given application
6	Know the principle of operation, advantages, disadvantages of different process parameter like velocity, acceleration , torque, density viscosity
7	Select appropriate data transmission system
8	Idea on Pneumatic system
9	Know different recording instrument used to record different process parameters

Pre-requisite:	
Sl No.	
1	Basic knowledge on Resistance, Capacitance, Inductance
2	Basic idea on electronic components

Contents

Group	Module	Name of the topic	Hrs/ Module	Marks
A	01	**Principles of Instrumentation:** 1.1 Basic concepts of Instrumentation, block diagram of generalised measurement system, function of different components, basic idea of electronic & pneumatic instrumentation. 1.2 Performance Characteristics of Instruments : Specification, range, sensitivity, accuracy, precision, error, drift, threshold, resolution, hysteresis, correction, span, linearity, repeatability, reproducibility, speed of response, lag, fidelity, static & dynamic	6	

		characteristics (Definition with brief explanation only) 1.3 Errors in Measurement: types of error, normal distribution of errors. 1.4 Concept of calibration.		
	02	**Sensors & Transducers** 2.1 Definition of sensors & transducers, difference between sensor & transducer, factors governing the choice of transducer, 2.2 Classification of Transducer : Primary & Secondary, Electrical & Mechanical, Analog & Digital, Active & Passive. 2.3 Description of the following transducers: Resistance type (potentiometric, strain gauge), Inductance type (LVDT), RVDT, Capacitive type, Piezoelectric type, Magneto-strictive type, Hall effect type. 2.4 Radiation Detectors : photovoltaic ell, photo emissive tube, photomultiplier tube	10	
	03	**Recording & Display System** 3.1 Necessity of Recorders in Instrumentation system 3.2 Classification of Recorders 3.3 Explanation of XY, Strip chart recorder, magnetic tape recorder 3.4 Basic concept of data logger, TFT, LED, LCD display, sequential display using LED, Dot matrix display	6	
B	04	**Measurement of Velocity, Acceleration & Torque:** 4.1 Tacho generators, tacho meters, stroboscope, encoders, 4.2 Seismic accelerometers, piezoelectric accelerometer. 4.3 Torque measurement of rotating shaft using strain gauge, optical methods, magnetostrictive methods.	10	
	05	**Measurement of Density & Viscosity** 5.1 Definition and unit of density & viscosity 5.2 Density measurement for constant level & varying level application 5.3 Principle, advantage, disadvantage of Oscillating U tube/ coriolis, hydrometer, pycnometer type density measurement 5.4 Continuous online density measurement 5.5 Viscosity measurement by Viscometer method (rotational, Capillary, Vibratory), Ultrasonic pulse echo method	9	
	06	**Basics of Pneumatic System** 6.1 Advantages and limitations of pneumatic system 6.2 Construction, characteristic & application of Flapper-Nozzle assembly. 6.3 Pneumatic Relay, Filter, Regulator 6.4 Explanation of Pneumatic Transmitter	4	

Books:

Title	**Author**	**Publisher**
Principles of Industrial Instrumentation	D. Patranabis	TMH
Fundamentals of Industrial Instrumentation	A Barua	Wiley India Pvt Ltd
Instrumentation Devices & System	Rangan, Sarma, Mani	Mc Graw Hill
Sensors & Transducers	D. Patranabis	PHI
Measurement System Application & Design	E.O. Doeblin	Mc Graw Hill
Principles of Measurement & Instrumentation	Alan S. Morris	PHI

Instrumentation for Engineering Measurement	Dally	Wiley India Pvt Ltd
Introduction to Measurement & Instrumentation	Ghosh	PHI
Process Control Instrumentation Technology	Kartis Johnson	PHI
Sensors & Transducers	Sinclair	Yes Dee Publishing

End Semester Examination Scheme

Maximum Marks: 70						Time: 3 Hrs			
Group	**Module**	**Objective Questions**				**Subjective Questions**			
		To be set	To be answered	Marks per question	Total Marks	To be set	To be answered	Marks per question	Total Marks
A	1	10	Any 20	1	1 x 20 =20	4	Any 5 taking at least 2 from each group	10	10 x 5 =50
	2								
	3								
B	4	10				4			
	5								
	6								

Syllabus for ELECTRICAL MEASUREMENT & MEASURING INSTRUMENTS

Name of the Course : Diploma in Electronics & Instrumentation Engineering	
Name of the Subject : **Electrical Measurement & Measuring Instruments**	
Subject Code:	Semester: Third
Duration: 6 months	Maximum Marks: 50
Teaching Scheme: Theory : 2 hrs/week Tutorial : Practical:	Examination Scheme: Internal Scheme : Teachers Assessment: 05 Class Test : 10 End Semester Exam : 35
Credit: 2	
Aim:	
1	Diploma holders need to measure various electrical quantities with electrical measuring instruments. So electrical parameter measurement is important.
2	Measurements of various electrical quantities is needed for testing, monitoring, maintenance, and controlling the process. In addition to this, student must know the calibration techniques and extension of meter ranges. Therefore Electrical Measurement skills are very important. Accuracy of measurement is one of the main parameters in industrial processes as ability of control depends upon ability to measure.
3	
Objective:	
Sl No.	The Student will able to
1	Identify the measuring instruments used for measuring electrical quantities
2	Select appropriate measuring instrument with range for measurement of various electrical quantities.

3	Select and use range of multiplier
	Select appropriate instrument for measuring power and energy
	Classify measuring instruments based on construction, principle of operation and quantity to be measured, types of error
	Calibrate various types of instruments
Pre-requisite:	
1	Basic idea on electrical technology
2	Knowledge of current, voltage, power etc

Contents

Group	Module	Name of the topic	Hrs/ Module	Marks
A	01	**Fundamentals of Measurements:** 1.1 Purpose and significance of measurement. 1.2 Various effects of electricity employed in measuring instruments 1.3 Desirable qualities of measuring instruments 1.4 Classification of instruments 1.5 Types of errors 1.6 Different types of torque in analog instruments	4	
	02	**D'Arsonaval Galvanometer:** 2.1 Construction, working principle, Deflecting torque equation 2.2 Applications 2.3 Scale shape, damping arrangement, shunt, swamping resistance.	3	
	03	**Measurement of Voltage & Current :** 3.1 Construction, working principle, torque equation, scale shape, sources of error, merits & demerits, & applications of a. Permanent Magnet Moving Coil Instrument, b. Electrodynamics instrument, c. Moving Iron instrument, 3.2 Extension of instrument ranges: shunts & multipliers.	7	
B	04	**Measurement of Power & Energy:** 4.1 Construction & working principle of – a. Single-phase dynamometer type wattmeter, b. Induction type Watt-hour meter (single phase). 4.2 Errors & adjustments of those 4.3 Advantages & disadvantages.	7	
	05	**Measurement of Circuit Parameters :** 5.1 Classifications of low, medium, high resistance. 5.2 Measurement of Resistance by Wheatstone bridge, Kelvin Double Bridge & Megger 5.3 Wien's Bridge 5.4 Maxwell's Bridge 5.5 Schering Bridge 5.6 Hay bridge 5.7 De-sauté bridge	9	

Books:

Title	Author	Publisher
A course in Electrical & Electronics Measurement & Instrumentation	A.K. Sawhney	Dhanpat Rai & Co.
A Course in Electrical & Electronics Measurement & Instrumentation	J.B. Gupta	S. K.Kataria & Sons
Electrical Measurements & Measuring Instruments	Golding & Widdis	A H Wheeler

Electrical & Electronics Measurements and Instrumentation	Purkait, Biswas, Das, Koley	McGraw Hill Education

End Semester Examination Scheme

Maximum Marks: 35						Time: 2 Hrs			
Group	**Module**	**Objective Questions**				**Subjective Questions**			
		To be set	**To be answered**	**Marks per question**	**Total Marks**	**To be set**	**To be answered**	**Marks per question**	**Total Marks**
A	1	8	Any 10	1	1 x 10 = 10	5	Any 5 taking at least 2 from each group	5	5 x 5 = 25
	2								
	3								
B	4	5				3			
	5								

Syllabus for ELECTRICAL MACHINE

Name of the Course : Diploma in Electronics & Instrumentation Engineering	
Name of the Subject : **Electrical Machine**	
Subject Code:	Semester: Third
Duration: 6 months	Maximum Marks: 50
Teaching Scheme: Theory : 2 hrs/week Tutorial : Practical:	Examination Scheme: Internal Scheme : Teachers Assessment: 05 Class Test : 10 End Semester Exam : 35
Credit: 2	
Aim:	
Sl No.	
1	Students will be able to analyze the characteristics of DC motor, Transformers & qualitative parameters of these machines.
2	This machines are used in the process plant. Knowledge gained by the students will be helpful to work in different control system in process plant.
3	The knowledge and the skill obtained will be helpful in discharging duties such as supervisor, controller & R&D technicians.
Objective:	
Sl No.	The Student will able to
1	Know the constructional details & working principles of DC machines & transformers
2	Test motors & transformers
3	Evaluate the performance of transformer by conducting various tests
4	Write the specification of DC machine & transformer as per requirement

5	Decide the suitability of dc generator motor & transformer for particular purpose			
6	Operate any machine properly.			
Pre-requisite:				
1	Basic Electrical Engineering			
2	Basic Electronic Engineering			
Contents				
Group	**Module**	**Name of the topic**	**Hrs/ Module**	**Marks**
A	1	**Transformer** 1.1 Construction & working principle of transformer. 1.2 EMF equation of transformer, transformation ratio, turn ratio, transformer rating, Simple problem 1.3 Transformer on No Load & on Load 1.4 Open & short circuit test 1.5 Losses & efficiency of transformer, voltage regulation. 1.6 Principle, advantage & disadvantage of Single phase auto-transformer, Current & Potential transformer, their characteristics. 1.7 Specification of a transformer.	5	
B	2	**D.C. Generator** 2.1 Construction & working principle of D. C. Generator, EMF equation. 2.2 Excitation system, types of D.C. Generator, terminal voltage, losses & efficiency, Specification of DC machine.	3	
	3	**D. C. Motor** 3.1 Construction & working principle of D. C. Motor. 3.2 Type of motors & their uses 3.3 Explanation of D.C. Motor starters, necessity of starters, types of starters. 3.4 Speed control of DC Motor by field flux control & armature voltage control of dc shunt motor. 3.5 Basic idea of enclosure of motor. 3.6 Simple concept of BLDC motor.	8	
C	4	**Synchronous Generator (Alternator)** 4.1 Construction, Working principle, 4.2 Relation between speed & frequency, 4.3 Pitch factor, Distribution Factor (No derivation required), 4.4 Emf equation of alternator, Simple Problem 4.5 Alternator on No Load & on load, 4.6 Conception on efficiency 4.7 Voltage Regulation (Only definition)	6	
	5	**A. C. Motors** 5.1 Induction Motor: construction, types of rotor, rotating magnetic field, principle of operation of three phase induction motor. 5.2 Synchronous speed, actual speed & slip, torque equation, factors affecting the motor -torque, speed torque characteristics. 5.3 Starting methods of induction motor by using DOL & Star-Delta starter, basic idea of soft starter. 5.4 Speed control of AC induction motor by variable frequency & variable voltage (V/F) control.	8	

Books:		
Title	**Author**	**Publisher**
A Text Book of Electrical Technology Part-II	B.L. Thereja	S. Chand &. Co
Electrical Technology Vol2:Machines & Measurement	S.P. Bali	Pearson Education
Electrical Technology	E. Huges	Longman
Electrical Technology	H. Cotton	CBS Publisher
Electrical Machine Design	A K Sahwney	Dhanpat Rai & Co (P) Ltd
Induction & Synchronous Machine	K Murgesh Kumar	Vikas
Electrical Machines	Samarjit Ghosh	Pearson Education
Electrical Machine	P K Mukherjee	Dhanpat Rai Publishing Co (P) Ltd
DC Machine & Transformer	K Murgesh kumar	Vikas
Electrical Machine	S K Bhattachaya	Mc Graw Hill
Electrical Machine	R.K. Rajput	Laxmi Publication

End Semester Examination Scheme

Maximum Marks: 35 | Time: 2 Hrs

Group	Module	Objective Questions				Subjective Questions			
		To be set	To be answered	Marks per question	Total Marks	To be set	To be answered	Marks per question	Total Marks
A	1	2	Any 10	1	1 x 10 = 10	2	Any 5 taking at least 1 from each group	5	5 x 5 = 25
B	2	5				3			
	3								
C	4	6				3			
	5								

Syllabus for OPTICAL INSTRUMENTATION

Name of the Course : Diploma in Electronics & Instrumentation Engineering	
Name of the Subject : **Optical Instrumentation**	
Subject Code:	Semester: Third
Duration: 6 months	Maximum Marks: 50
Teaching Scheme: Theory : 2 hrs/week Tutorial : Practical:	Examination Scheme: Internal Scheme : Teachers Assessment: 05 Class Test : 10 End Semester Exam : 35
Credit: 2	
Aim:	
Sl No.	
1	Optical fiber communication is better than copper wire communication. Now a days in every sector, signal transmission is done via optic fiber. In process plant also there is numerous application of optical sensor, detector to measure and control process parameter. So a diploma holder having instrumentation

	background must have sufficient knowledge on this subject.
Objective:	
Sl No.	The Student will able to
1	Explain the configuration, advantage of a fiber optic communication system
2	Understand material required for the production of optical fiber
3	Understand jointing, splicing and connectors of optical fiber
4	Understand the features of LED, LASER, Optocoupler
5	Understand about photodetectors
6	Understand the need of optical amplifier
7	Understand Industrial application of fiber optic sensor
Pre-requisite:	
Sl No.	
1	Basic Electronics
2	Theory of light

Contents

Group	Module	Name of the topic	Hrs/ Module	Marks
A	01	**Introduction** 1.1 Block diagram of an optical fiber communication systems, 1.2 advantages & disadvantage of optical fibre communication 1.3 Different components used in optical fiber communication system 1.4 application of fibre optic communication	4	
	02	**Optical Fiber & Ray Propagation** 2.1 Components in a fiber optic cable 2.2 Types of optical fibers (single & multimode, step index & graded index: basic idea) 2.3 Fiber material 2.4 Ray (meridional) propagation in step index fiber, acceptance angle and numerical aperture 2.5 coupling components for optical fiber (coupler, connector & splices)	6	
B	03	**Optoelectronic Sources & Amplifier** 3.1 Material, construction, Drive Circuitry of Light emitting diodes (LEDs), 3.2 Laser principles, Laser diodes, Operating characteristics of laser diodes, 3.3 LED & Laser materials 3.4 Industrial application of LASER as measurement of distance, length, velocity 3.5 Necessities of Repeater & optoelectronic amplifiers	7	
	04	**Optoelectronic Detectors** 4.1 Detector material 4.2 Principles of photo detection, photomultiplier, 4.3 Structure, Characteristics, application of p-n photodiode, p-i-n photodiode and avalanche photodiode, phototransistor, LDR, solar cell 4.4 Optocoupler: main features, basic components, characteristics, speed response	7	
	05	**Optical Fiber Sensor** 5.1 Block diagram of a generalized fiber optic sensor configuration	6	

		5.2 Classification of Fiber Optic sensors 5.3 Explanation of major multimode Fiber Optic Sensors like displacement, pressure, stress, strain, temperature, liquid level sensors. 5.4 Advantages of Optical Sensors		

Books:

Title	Author	Publisher
Fiber Optic Communication	Mishra, Ugale	Wiley India Pvt Ltd
Optical Instrumentation	Satyajit Das	S. K Khataria
Optical Fibre Communication	Joseph, C. Palais,	Pearson Education
Optical Fibre Communication	Gerd Keiser	Mc Graw Hill, International
Fiber Optics & Optoelectronics	R.P. Kher	Oxford University Press
Fibre – Optic Communication Systems	G.P. Agrawal	John Wiley and Sons
Optical Fibre Communication and its Applications	S.C.Gupta	Prentice Hall of India
Optical Fibres Communication	John M. Senior	Pearson Education
Optical Communication Systems	J.Gower	Prentice Hall of India
Optical & Optoelectronics Instrumentation	A K Ganguly	Narosa Publishing House
Advance Optical Fiber Communication	K. Roy	Scitech Publication

End Semester Examination Scheme

Maximum Marks: 35						Time: 2 Hrs			
		Objective Questions				**Subjective Questions**			
Group	**Module**	**To be set**	**To be answered**	**Marks per question**	**Total Marks**	**To be set**	**To be answered**	**Marks per question**	**Total Marks**
A	1	5	Any 10	1	1 x 10 = 10	3	Any 5 taking at least 2 from each group	5	5 x 5 = 25
	2								
B	3	7				4			
	4								
	5								

Syllabus for FUNDAMENTALS OF ELECTRONICS LAB

Name of the Course : Diploma in Electronics & Instrumentation Engineering	
Name of the Subject : **Fundamentals of Electronics Lab**	
Subject Code:	Semester: Third

Duration: 6 months	Maximum Marks: 50
Teaching Scheme: Theory : Tutorial : Practical: 2 hrs/week	Examination Scheme: Continuous Internal Assessment Performance of job : 15 Notebook, Viva : 10 External Assessment On spot Job : 15 Viva Voce : 10
Credit: 1	
Skill to be developed:	
Intellectual Skill;	
1	Identification & selection of components
2	Interpretation of circuits
3	
4	
Motor Skill:	
1	Ability to draw the circuit
2	Ability to measure various parameter
3	Ability to test the components using multimeter
4	Follow standard test procedure
List of Practical:	
Sl No.	**Experiment**
01	To know about the hand tools, their use & maintenance.
02	To learn & practice soldering and desoldering of components
03	Identification of different passive and active circuit elements & to know their symbols: Resistor, capacitor, inductor, transformer, relay, switches, batteries/cells, diode/Zener diode, transistors, SCR, DIAC, TRIAC, LED, LCD, photodiode, phototransistors, ICs etc.
04	To determine the value of a carbon resistor by using colour code
05	To study different types of capacitor & to determine value of those.
06	To study a Multimeter & its applications.
07	To plot forward and reverse biased characteristics of diode and zener diode
08	To study a Zener Diode based voltage regulator
09	To construct & test a battery eliminator and simple amplifier circuit on a Bread Board and Vero Board.

Syllabus for CIRCUIT THEORY LAB

Name of the Course : Diploma in Electronics & Instrumentation Engineering	
Name of the Subject : **Circuit Theory Lab**	
Subject Code:	Semester: Third
Duration: 6 months	Maximum Marks: 100

Teaching Scheme: Theory : Tutorial : Practical: 3 hrs/week	Examination Scheme: Continuous Internal Assessment Performance of job : 30 Notebook, Viva : 20 External Assessment On spot Job : 30 Viva Voce : 20
Credit: 2	
Skill to be developed:	
Intellectual skill:	
1	Interpret results
2	Calculate values of various components for given circuits
3	Select instrument
Motor skill:	
1	Connect the instrument properly
2	Take accurate readings
List of practical:	
Sl No.	**Experiment**
01	Verification of- • Superposition theorem. • Thevenin's theorem. • Norton's theorem. • Maximum power transfer theorem.
02	To observe an AC wave form on CRO and calculate its average & RMS values, frequency, time period
03	Analysis of charging & discharging of RC circuit with CRO (calculation of time constant, rise time).
04	Design of series resonance circuit with a particular cut of frequency and to plot frequency response
05	Design of parallel resonance circuit with a particular cut of frequency and to plot frequency response
06	Designing of (considering cut-off frequency) Low pass filter and to plot frequency response..
07	Designing of (considering cut-off frequency) High pass filter to plot frequency response.

Syllabus for PROGRAMMING IN C

Name of the Course : Diploma in Electronics & Instrumentation Engineering	
Name of the Subject : **Programming in C**	
Subject Code:	Semester: Third
Duration: 17 weeks	Maximum Marks: 100
Teaching Scheme: Theory : 1 hrs/week Tutorial : Practical: 4 hrs/week	Examination Scheme: Continuous Internal Assessment Performance of job : 30 Notebook, Viva : 20 External Assessment On spot Job : 30 Viva Voce : 20
Credit: 3	

Aim:	
1	To study basics of C programming
Objective:	
Sl No.	The Student will able to
1	Describe the concepts of constants, variables, data types and operators
2	Develop programs using input and output operations
3	Write programs using looping and branching statements
4	Write program based on arrays and string handling functions
5	Write program using user defined functions, structures and union
6	Write program using C pointer
Pre-requisite:	
1	Introduction with windows Operating System

Chapter	Contents	Hrs/ Chapter
01	**Basics of C** 1.1 C character set, tokens, constants, variables, keywords 1.2 C operators (arithmetic, logical, assignment, relational, increment and decrement, conditional, bit wise, special, operator precedence), C expression date types 1.3 Formatted input, formatted output	
02	**Decision Making** 2.1 If statement (if, if-else, else - if ladder, nested if-else), Switch case statement, Break statement 2.2 while, do, do-while, continue statements	
03	**Arrays and Strings** 3.1 Declaration and initialization of one dimensional, two dimensional and character array, accessing array elements 3.2 Declaration and Initialization of string variables, string handling function from standard library (strlen (), strcpy(), strcat(), strcmp())	
04	**Functions, Structures** 4.1 Need of functions, scope and lifetime of variables, defining functions, function call (call by value, call by reference), return value, storage classes, category of function (no argument no return value, no argument with return value, argument with return value), recursion. 4.2 Definition of structure, declaring and accessing structure members, initialization of structure, arrays of structure.	
05	**Pointers** 5.1 Understanding pointers, 5.2 Declaring and accessing pointers 5.3 Pointer arithmetic	

Practical:	
Skill to be developed:	
Intellectual Skill:	
1	Use of programming language
2	Apply different logics to solve given problem

3	Write program using implementations for the same problem
4	Identify different types of errors as syntax semantic, fatal, linker & logical
5	Debugging of programs
6	Understanding different steps to develop program.
Motor skill:	
	Proper handling of computer system
List of practical	
Sl No.	**Experiments**
	Write C programming
01	Any one from 1 to 3 1) To display hexadecimal, decimal, octal formats of the entered numbers. 2) To display entered number with leading zeros and trailing zeros 3) To display entered number with right justification and left justification 4) To demonstrate all possible formatting specifiers
02	Any one from 5 to 6 5) To find greatest / smallest of 3 numbers 6) To display pass class, second class, distinction according to the marks entered
03	Any one from 7 & 8 7) To find even or odd numbers 8) To display spellings of numbers 1-10 on entry
04	Any one from 9 & 10 9) To display menu 1. Addition 2. Subtraction 3. Multiplication 4. Division and execute it using switch case 10) To check whether there exist real roots of a quadratic equation and if exist find them
05	Any three from 11 & 16 11) To display our college name twenty times on screen 12) To demonstrate Continue and Break statements within loop structure 13) To display all natural, even, odd numbers from 1 to 100 using different loop structure 14) To perform addition of 1 to 100 numbers 15) To find GCD, LCM of two integral number 16) To generate all prime numbers within the given range
06	Any one from 17 & 18 17) To find smallest/ largest numbers from array elements 18) To sort array elements in ascending / descending order
07	Any one from 19 & 21 19) To enter elements of 3X3 matrix and display them 20) to calculate addition / subtraction of 2 dimensional matrix 21) To calculate multiplication of two dimensional matrix
08	Any two from 22 & 26 22) To calculate area of circle using function 23) To calculate factorial of any given number using recursion 24) To demonstrate call by reference, call by value 25) To maintain and manipulate student data using structure 26) To perform four arithmetic functions on pointers

Books:

Title	**Author**	**Publisher**
Programming in C	E. Balagurusamy	Mc Graw Hill
Let Us C	Kanetkar	BPB

Programming in C	Reema Thereja	Oxford University Press
Complete Reference C	Herbert Shield	Mc Graw Hill
A Textbook on C	E. Karthikeyan	PHI
Introduction to programming using C	Pawar	Wiley
Programming With C	T. Jeyapoovan	Vikas
All of C	Ghosh	PHI
Project Using C	P V N Varalakshmi	Scitech
Programming in C	S. S. Khandare	S. Chand &. Co
Programming in C	J. Shah	Charotar
Websites: • **http://cplus.about.com/od/beginnerctutoriali/a/blctut.htm** • **http://computer.howstuffworks.com/c.htm** • **http://www.indiastudycenter.com/studyguides/sc/objtest/default.asp**		

Syllabus for **ELECTRICAL MEASUREMENT & MEASURING INSTRUMENTS LAB**

Name of the Course : Diploma in Electronics & Instrumentation Engineering	
Name of the Subject : **Electrical Measurement & Measuring Instruments Lab**	
Subject Code:	Semester: Third
Duration: 6 months	Maximum Marks: 50
Teaching Scheme: Theory : Tutorial : Practical: 2 hrs/week	Examination Scheme: Continuous Internal Assessment Performance of job : 15 Notebook, Viva : 10 External Assessment On spot Job : 15 Viva Voce : 10
Credit**:** 2	
Skill to be developed:	
Intellectual Skill:	
1	Identification of Instruments
2	Selection of Instruments and equipments for measurement
3	
Motor skill:	
1	Accuracy in measurement
2	Making proper connection
List of practical	
Sl No.	**Experiments**
01	Measurement of current and voltage by low range ammeter and voltmeter respectively with shunt and multiplier
02	Measurement of medium valued resistance by Wheat stone bridge method.
03	Measurement of low valued resistance by Kelvin's double bridge.
04	Measurement of insulation resistance by Megger.

05	Extension of range of ammeter & voltmeter.
06	Measurement of power & PF by Wattmeter for a load like fluorescent lamp.
07	Measurement of Circuit Parameter using
	7.1 Wein Bridge
	7.2 Maxwell's Bridge
	7.3 Schering Bridge
	7.4 Hay Bridge
	7.5 De Saute Bridge

Syllabus for **ELECTRICAL MACHINE LAB**

Name of the Course : Diploma in Electronics & Instrumentation Engineering	
Name of the Subject : **Electrical Machine Lab**	
Subject Code:	Semester: Third
Duration: 6 months	Maximum Marks: 100
Teaching Scheme: Theory : Tutorial : Practical: 2 hrs/week	Examination Scheme: Continuous Internal Assessment Performance of job : 15 Notebook, Viva : 10 External Assessment On spot Job : 15 Viva Voce : 10
Credit**:** 2	
Skill to be developed:	
Intellectual Skill:	
1	Identification of DC/AC machine, motor, transformer
2	
3	
Motor skill:	
1	Accuracy in measurement
2	Making proper connection
List of practical	
Sl No.	**Experiments**
1	To identify the construction details of D.C. machine
2	To identify the construction details of A.C. synchronous machine and asynchronous machine
3	Starting and reversing of DC shunt motor
4	Speed control of D.C. shunt motor by- (a) Armature voltage control. (b) Field flux control.
5	Measurement of performance of single phase transformer by conducting O.C. and S.C. test
6	Speed control of AC induction motor by V/F drive

Syllabus for PROFESSIONAL PRACTICE I

Name of the Course : Diploma in Electronics & Instrumentation Engineering		
Name of the Subject : **Professional Practice I**		
Subject Code:	Semester: Third	
Duration: 6 months	Maximum Marks: 50	
Teaching Scheme: Theory : Tutorial : Practical: 2 hrs/week	Examination Scheme (Only Internal Assessment) Continuous Internal Assessment : 30 Viva/ report/ notebook etc : 20	
Credit: 1		
Aim:		
1	After passing most of the diploma holders join industries. Due to globalization and competition in the industrial and service sector the selection for job is based on campus interview or competitive tests	
2	The purpose of introducing professional practice is to provide opportunity to students to undergo activities which will enable them to develop confidence. Industrial visits, expert lecturers, seminars on technical topics and group discussions are planned in a semester so that there will be increased participation of students in learning process	
3	To introduce FOSS	
Objective:		
Sl No.	The Student will able to	
1	Prepare a report on industrial visit	
2	Prepare notes for given topics	
3	Present given topic in a seminar	
4	Interact with peers to share thought	
5	Operate LibraOffice software	
Pre-requisite:		
1	Knowledge on basic electrical & electronic engineering	
2	Knowledge on Instrumentation engineering	
	Knowledge of basic computer operation	
Contents		
Unit	**Name of the activity**	**Hrs/Unit**
01	**Field Visit** Structured field visit (at least one) should be arranged and report the same should be submitted by the student, as part of term work. The field visit may be arranged in the following areas / Industries a) Nearby Petrol Pump (fuel, oil, product specification) b) Automobile Service Station (Observation of components / aggregates) c) Dairy Plant / Water Treatment Plant d) Power supply/ UPS/SMPS/ Inverter manufacturing unit e) Electronic Instrument calibration laboratory f) Any other plant	10
02	**Lecture by Professional / Industrial experts / Student Seminar** Some of the suggested topics are,	8

	a) Pollution Control b) Illumination & lighting System c) Fire Fighting/ safety Precaution and First Aids d) Traffic Control System, e) Nonconventional Energy source. f) Problems of drinking water in rural areas g) above or any other suitable topic	
03	**Group Discussion** The student should discuss in a group of six to eight students and write a brief report on the same as a part of term work. Two topics for group discussions may be selected by the faculty members. Some of the suggested topics are- a) Sports b) Current news items c) Discipline & House Keeping d) Unemployment f) Illiteracy g) Dowry Problem h) Duties and responsibilities of students e) Futures in Indian Echonomy f) Indian Mission to Mars g) Any other suitable topic	8
04	**Free & Open Source Software** (a) Introduction to FOSS (b) Installation of LibraOffice (c) Getting started with Libraoffice Writer • Typing text and basic formatting in Writer • Inserting Picture & Objects in Writer document • Viewing & Printing a Text document (d) Using Different Tools in Writer • Using search replace auto correct • Typing in local languages • Using track changes • Header Footer and notes • Creating newsletter	8