WEST BENGAL STATE COUNCIL OF TECHNICAL EDUCATION

TEACHING AND EXAMINATION SCHEME FOR DIPLOMA COURSES

COURSE NAME: ***DIPLOMA IN ELECTRICAL ENGINEERING (INDUSTRIAL CONTROL)***

COURSE CODE : ***EEIC***

DURATION OF COURSE : 6 SEMESTER

SEMESTER: ***THIRD SEMESTER***

Sl. No.	SUBJECT	PERIODS			EVALUATION SCHEME							CREDITS
	THEORY	L	T	P	INTERNAL EVALUATION			ESE	PRACTICAL (SESSIONAL)		TOTAL MARKS	
					TA	CT	TOTAL		(INT.)	(EXT.)		
1	Electrical Circuits & Network	3	--	2	10	20	**30**	70	25	25	**150**	5
2	Basic Electronics	3	--	2	10	20	**30**	70	25	25	**150**	4
3	Electrical Machine - I	3	--	3	10	20	**30**	70	50	50	**200**	5
4	Electrical & Electronic Measuring Instruments	4	--	2	10	20	**30**	70	25	25	**150**	4
5	Programming concept using C	2	--	2	5	10	**15**	35	25	25	**100**	3
6	Control Theory	3	--	--	10	20	**30**	70			**100**	3
7	Electrical Workshop - I	--	--	2					25	25	**50**	1
8	Professional Practices - I	--	--	2					50		**50**	1
	TOTAL	***18***	***0***	***15***	***55***	***110***	***165***	***385***	***225***	***175***	***950***	***26***
							550		***400***			

STUDENT CONTACT HOURS PER WEEK: **33 HRS**

THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH

ABBREVIATIONS: L - Lecture, T - Tutorial, P – Practical, TA - Teachers Assessment, CT- Class Test, ESE - End Semester Exam, INT-Internal, EXT-External

TA: Attendance & surprise quizzes = 6 marks. Assignment & group discussion = 4 marks.

Total Marks : 950

Minimum passing marks for sessional is 40%, and for theory subject 40%.

Name of the Course: ***DIPLOMA IN ELECTRICAL ENGINEERING (INDUSTRIAL CONTROL)*** Subject : ***Electrical Circuit & Network***	
Course Code: ***EEIC/S3/ECN***	Semester: ***THIRD***
Duration: ***ONE SEMESTER***	Maximum Marks: ***150***
Teaching Scheme	**Examination Scheme**
Theory : 3 hrs./week	Mid Semester Exam.: **20 Marks**
Tutorial: -- hrs./week	Attendance, Assignment & interaction: **10 Marks**
Practical: 2 hrs./week	End Semester Exam.: **70 Marks**
Credit: 5	Practical: **50 Marks**

Aim:

Sl. No.	
1.	This subject finds utility in understanding the concepts in other electrical subjects such as Electrical Power System, Electrical Measurement and Instrumentation, & Electrical Machines etc.
2.	**The goal of physics is to formulate comprehensive principles that bring together and explain the world around us.**
3.	**To establish the awareness about the power of Physics as a tool in the practicality of the life.**

Objective:

Sl. No.	The students will be able to:
1.	Know and define the basic elements; electric circuit terminology; energy sources used in electrical circuit and also AC waveform and its various quantities.
2.	Interpret the response of R,L,C elements to AC supply.
3.	Calculate various parameters of AC Circuits.
4.	Know Mesh and Node Analysis
5.	Use Network Theorems for solutions of DC Networks
6.	Interpret Transient Response

Pre-Requisite:

Sl. No.	
1.	Series and parallel resistances, parallel & series cells

Contents (Theory)		**Hrs./ Unit**	**Marks**
Unit: 1	**Review of Basic Concepts of Electrical Circuit** 1.1) Electrical Circuit Elements R, L, C 1.2) Energy Sources 1.3) A.C. waveform and definition of various terms associated with it 1.4) Response of pure R, L, and C to AC supplies. 1.5) Vector representation of alternating quantity.	04	05

Contents (Theory)		**Hrs./ Unit**	**Marks**
Unit: 2	**Single phase AC circuits** 2.1) Concept of complex impedance - Rectangular & polar form. 2.2) Series AC circuits R-L, R-C, R-L-C circuits. Impedance, Reactance, Phasor diagram, Impedance Triangle, Power Factor, Average power, Apparent power, Reactive power, Power triangle (Numerical). 2.3) Series Resonance, Quality factor (Numerical) 2.4) Parallel AC circuits R-L, R-C and R-L-C circuits . Admittance, Susceptance, solution by admittance method, phasor diagram and complex Algebra method. (Numerical) 2.5) Comparison of series and parallel resonance.	12	20
Unit: 3	**Principles of circuit Analysis (AC and DC circuits)** 3.1) Mesh Analysis (Numerical) 3.2) Node analysis with voltage current source. (Numerical)	06	10
Unit: 4	**Network Theorems(Statement, procedure, applications and areas of applications, simple Numerical)** 4.1) Source conversion/ideal voltage and current source 4.2) Superposition Theorem 4.3) Thevinin's Theorem 4.4) Norton's Theorem 4.5) Maximum Power Transfer Theorem	10	15
Unit: 5	**Transient Analysis** 5.1) Introduction 5.2) Simple R-L Circuit supplied from a DC voltage source 5.3) Simple R-C circuit supplied from a DC voltage source. 5.4) Time Constant.	08	10
Unit 6	**Laplace Transform** 6.1) Definition & Properties. 6.2) Laplace Transform of Unit Step, Impulse, Ramp, Exponential, Sine, Cosine Function. 6.3) Initial value and Final Value Theorem. 6.4) Applications of Laplace Transformations for solving differential equations describing simple circuits (Numericals)	08	10
Unit 7	**Pspice** 7.1) Pspice - Introduction and Simulation Approach (Theory only)		
	TOTAL	48	70

Contents (Practical)

Sl. No.	**Skills to be developed**
1.	Intellectual Skills: i) Interpret results ii) Calculate values of various components for given circuits. ii) Select Instruments
2.	Motor Skills: i) Connect the instruments properly. Take accurate readings. Draw phasor diagram and graphs.

List of Laboratory Experiments:

Sl. No.	**Laboratory Experiments**
1.	To observe A.C. waveform on C.R.O. and calculate R.M.S. Values, frequency, Time periods.
2.	To determine the current and P.F. of R-L, R-C and R-L-C series circuit.
3.	To determine the current and P.F. of R-L, R-C and R-L-C Parallel circuit.
4.	To verify conditions for Series and Parallel Resonance.
5.	To verify Superposition Theorem applicable to D.C. and A.C. circuit.
6.	To verify Thevenin's Theorem applicable to D.C. and A.C. circuit.
7.	To verify Norton's Theorem applicable to D.C. and A.C. circuit.
8.	To verify Maximum Power Transfer Theorem applicable to D.C. and A.C. circuit.
9.	Application of Pspice : Calculation of network parameters, simulation of Transient response in R-L & R-C network.

TEXT BOOKS

Sl No.	Name of Authors	Titles of the Book	Name of Publisher
1.	Edminister	Schaum online series Theory and problems of Electric circuits	T.M.G.H., Newyork
2.	D Roy Choudhury	Networks and Systems	Wiley Eastern Limited
3.	A.Chakraborty	Circuit Theory (Analysis and Synthesis)	Dhanpat Rai & Co.
4.	S.P. Eugene Xavier	Electric Circuit Analysis	New Age International Publishers
5.	S P Ghosh & A K Chakraborty	Network Analysis & Synthesis	T.M.H. Education Pvt. Ltd.
6.	K.S. Syresh Kumar	Electric Circuit and Networks	Pearson Education
7.	B.L.Theraja	Electrical Technology Volume-I	S.Chand & Co.
8.	Ravish R Singh	Network Analysis & Synthesis	T.M.H. Education Pvt. Ltd.

EXAMINATION SCHEME (THEORITICAL)

GROUP	UNIT	ONE OR TWO SENTENCE ANSWER 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, 3	12	TWENTY	ONE	1 X 20 = 20	FOUR	FIVE, TAKING AT LEAST TWO FROM EACH GROUP	10 (TEN)	10 X 5 = 50
B	4,5,6,7	11				FIVE			

E X A M I N A T I O N S C H E M E (SESSIONAL)

1.	Continuous Internal Assessment of 25 marks **is to be carried out by the teachers throughout the Third Semester.** Distribution of marks: Performance of Job - 15, Notebook - 10.
2.	**External Assessment of 25 marks** shall be held at the end of the Third Semester on the entire syllabus. One Experiment per student from any one of the above is to be performed. Experiment is to be set by lottery system. **Distribution of marks: On spot job - 15, Viva-voce - 10.**

Name of the Course: ***DIPLOMA IN ELECTRICAL ENGINEERING (INDUSTRIAL CONTROL)*** Subject : ***Basic Electronics***	
Course Code: ***EEIC/S3/BE***	Semester: ***THIRD***
Duration: ***ONE SEMESTER***	Maximum Marks: ***150***
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs./week	Mid Semester Exam.: **20 Marks**
Tutorial: -- hrs./week	Attendance, Assignment & interaction: **10 Marks**
Practical: 2 hrs./week	End Semester Exam.: **70 Marks**
Credit: 4	Practical: **50 Marks**

Aim:

Sl. No.	
1.	This subject is the base of all advance electronics. It starts with semiconductor physics and P-N junction which makes the student to follow the functioning of all semiconductor based devices.
2.	Understanding of the subject will provide skill to the students for trouble shooting & testing of some basic electronic components and circuits.

Objective:

Sl. No.	Student will be able to:
1.	Describe the formation of P-N junction.
2.	Draw the characteristics of basic components like diode, transistor etc.
3.	Draw & describe the basic circuits of rectifier, filter, regulator & amplifier.
4.	Test diode and transistors.
5.	Read the data sheets of diode and transistors.

Pre-Requisite:

1.	Knowledge of physics and P-N junction.

Contents (Theory):		**Hrs./Unit**	**Marks**
Unit : 1	1) Diode: 1.1) Semiconductor Diode: 1.1.1) Fundamentals of semiconductor - Energy bands (conduction & valence), Intrinsic & Extrinsic semiconductor, Concept of P-N junction, Diffusion, Barrier potential, Depletion region, Junction capacitance. 1.1.2) Forward & Reverse biasing of P-N junction, Diode symbol, Circuit diagram for characteristics of diode (Forward & Reverse), Characteristics of diode. 1.1.3) Diode specifications - Forward voltage drop, reverse saturation current, maximum forward current, power dissipation, package view of diodes of different power ratings. 1.2) Zener Diode: 1.2.1) Construction, Symbol, Circuit diagram for characteristics of zener diode (Forward & Reverse), Zener & Avalanche Breakdown. 1.2.2) Zener diode specifications - zener voltage, power dissipation, break over current, dynamic resistance & maximum reverse current. 1.3) Other Diodes: Shottky diode, Photo diode - operating principles & applications of each only.	10	14
Unit : 2	2) Rectifiers & Filters: 2.1) Need of rectifier, Types of rectifier - Half wave & full wave rectifier (Bridge & Centre tapped). 2.2) Circuit operation of the rectifiers, Input & output waveforms for voltage & current, Average value of voltage & current (expression only), Ripple, Ripple factor, Ripple frequency, form factor, PIV of diode used, Rectifier efficiency. 2.3) Need of filters, Types of filter - a) Series inductor, b) Shunt capacitor, c) LC filter, d) n filter.	07	10

Contents (Theory):		**Hrs./Unit**	**Marks**
	2.4) Circuit operation of the filters, limitations & advantages.		
Unit : 3	3. Transistors: 3.1) Bipolar Junction Transistor (BJT): 3.1.1) Symbol of NPN & PNP types, Construction, Operation of NPN and PNP transistor - current flow, relation between different currents. 3.1.2) Transistor amplifying action - Transistor configurations - CB, CE, CC, circuit diagram for input & output characteristics of each configuration, Input & output characteristics. Comparison between three configurations. 3.1.3) Transistor parameters - input & output resistance, α, β and relation between them. 3.1.4) Transistor specification - Vce sat, Ic Max, Vceo, Iceo,Vce Breakdown, a, P, Power dissipation. 3.2) Field effect transistor (JFET): Symbol, Construction of JFET, Working principle and V-I characteristics of JFET, pinch-off voltage, drain resistance, transconductance, amplification factor and their relationship. 3.3) Unijunction transistor (UJT): Symbol, Construction, Working principle and characteristics of UJT, Equivalent circuit, UJT as relaxation oscillator, Applications.	10	14
Unit : 4	4. Biasing of BJT: 4.1) Need of biasing, concept of DC load line, selection of Q point and stabilization. 4.2) Types of biasing circuits (concept only) - a) Fixed biased circuit, b) Base biased with emitter feedback, c) Base biased with collector feedback, d) Voltage divider biasing, e) Emitter biased.	06	10
Unit : 5	5. Regulated Power Supply: 5.1) Need of regulation, voltage regulation factor. 5.2) Concept of load regulation & line regulation. 5.3) Zener diode voltage regulator. 5.4) Linear regulators - 5.4.1) Basic block diagram of DC power supply. 5.4.2) Shunt and series regulator using transistor - circuit diagram and operation. 5.4.3) Regulator IC's - 78xx, 79xx, 723 - their Pin configuration, operation and practical applications.	06	08
Unit : 6	6. Small Signal Amplifiers: 6.1) Small signal amplifier using BJT. 6.2) Determination of current, Voltage & Power gain, phase shift between input and output, Input and Output resistance, Graphical analysis of amplification. 6.3) AC load line. 6.4) Function of input & output coupling capacitors, emitter bypass capacitor. 6.5) Single stage CE amplifier with voltage divider bias - operation with circuit diagram. 6.6) Frequency response of Single stage CE amplifier, Bandwidth and its significance. 6.7) Need of Cascade (multistage) amplifiers, Gain of amplifier. 6.8) Types of amplifier coupling - RC, Transformer & Direct coupling.	09	14
	Total:	**48**	**70**

Practical:

Skills to be developed:

Intellectual Skills:

1. Identification & selection of components.
2. Interpretation of circuits.

3. Understand working of basic instruments.

Motor Skills:
1. Ability to draw the circuit diagrams.
2. Ability to measure various parameters.
3. Ability to test the components using multimeter.
4. Follow standard test procedures.

List of practicals:

1. Identification & Checking methods of the following basic components – Resistor, Potentiometer, Capacitor (polarised, Non-polarised), Choke coil, Diode, Zener diode, Transistor (NPN & PNP), Thyristor, Diac, Triac, UJT, IGBT, MOSFET, JFET, OPAMP(IC741), IC78XX, IC79XX.
2. To be familiar with the following basic instruments**:** — Digital Multimeter, Oscilloscope, Power supply (single / dual channel), Function generator, LCR Meter
3. To plot the forward & reverse characteristics of P-N junction diode.
4. To construct half-wave & full-wave rectifier circuit & draw input, output waveforms.
5. To Plot the characteristics of Zener diode.
6. To study the Zener diode as voltage regulator & calculate load regulation.
7. To plot the characteristics of FET.
8. To plot the characteristics of UJT.
9. To plot the input & output characteristics of a BJT in CE or CB mode.
10. To construct a single stage CE amplifier circuit on a bread board to find out the gain and observe the input and output waveforms.
11. To construct a single stage CE amplifier circuit on a bread board to find out the gain at different frequency and plot Gain vs. Frequency characteristics and also find out the Bandwidth.
12. To construct a ±12V power supply on a bread board using IC regulator and observe the effect of filter circuit in output waveform by oscilloscope.

List of Text Books:

Sl. No.	Title of the Books	Name of Author	Name of Publisher
1.	Electronic Principles	Albert Malvino & D.J.Bates	T.M.Hill
2.	Electronic Circuits & Systems	Y.N.Bapat	T.M.Hill
3.	Basic Electronics	S.K.Mandal	T.M.Hill
4.	Electronic Devices & Circuits	David J.Bell	P.H.I. Pvt. Ltd.
5.	Basic Electronics for Polytechnics	S.Chowdhury	Dhanpat Rai & Co.
6.	Electronics Engineering	J.B.Gupta	S.K.Kataria & Sons
7.	Electronic Devices & Circuits	P.John Paul	New Age International
8.	Electronic Devices & Circuits	Chereku & Krishna	Pearson Education
9	Basic Electronics	Debashis De	Pearson

EXAMINATION SCHEME (THEORITICAL)

GROUP	UNIT	ONE OR TWO SENTENCE ANSWER 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, 3	12	TWENTY	ONE	1 X 20 = 20	FOUR	FIVE, TAKING AT LEAST TWO FROM EACH GROUP	TEN	10 X 5 = 50
B	4,5,6	11				FIVE			

EXAMINATION SCHEME (SESSIONAL)

1. **Continuous Internal Assessment of 25 marks** is to be carried out by the teachers throughout the Third Semester. **Distribution of marks: Performance of Job – 15, Notebook – 10.**
2. **External Assessment of 25 marks** shall be held at the end of the Third Semester on the entire syllabus. One Experiment per student from any one of the above is to be performed. Experiment is to be set by lottery

system.
Distribution of marks: On spot job – 15, Viva-voce – 10.

Name of the Course: ***DIPLOMA IN ELECTRICAL ENGINEERING (INDUSTRIAL CONTROL)*** Subject : ***Electrical Machine – I***	
Course Code: ***EEIC/S3/EMI***	Semester: ***THIRD***
Duration: ***ONE SEMESTER***	Maximum Marks: ***200***
Teaching Scheme	**Examination Scheme**
Theory : 3 hrs./week	Mid Semester Exam.: **20 Marks**
Tutorial: -- hrs./week	Attendance, Assignment & interaction: **10 Marks**
Practical: 3 hrs./week	End Semester Exam.: **70 Marks**
Credit: 5	Practical: 100 **Marks**

Aim:

Sl. No.	
1.	Students will be able to analyze the performance of DC motors and Transformers both qualitatively and quantitatively.
2.	These machines are used in different aspects in electrical power systems. So knowledge gained by the students will be helpful in the study of different technological subjects related with electrical machines & other electrical subjects.
3.	The knowledge and skills achieved from this subject will be helpful in discharging duties in industry and as R&D technician.

Objective:

Sl. No.	Student will be able to:
1.	Know the constructional details & working principles of DC machines & Transformers.
2.	Test DC machines & Transformers.
3.	Evaluate the performance of DC machines & Transformers by conducting different tests.
4.	Decide the suitability of DC machines & Transformers for particular purpose.
5.	Write specifications of DC machines & Transformers as required.
6.	Operate DC machines & Transformers as per requirement.

Pre-Requisite:

Sl. No.	
1.	Basic electrical engineering.
2.	Basic electronics engineering.

Contents (Theory):		***Hrs./Unit***	***Marks***
Unit : 1	**1. GENERAL INTRODUCTION OF ROTATING MACHINE** Mechanism of Electro-Mechanical energy conversion for 1.1) generator & motor mode..	02	04
Unit : 2	**2. D.C. Generator:** 2.1 Working principles, Construction & Types of dc generator. 2.2 Function of Interpole & Compensating winding. 2.3 Armature winding types – Concept of Lap & Wave winding. 2.4 E.m.f equation, Methods of building up of e.m.f, Significance of Critical resistance and Critical speed (Numerical). 2.5 Concept of flux distribution in DC machine. 2.6 Armature reaction in DC machine (Concept only). 2.7 Commutation method, Concept of reactance voltage. 2.1) 2.8 Applications of different types of D.C. generator.	10	12

Contents (Theory):		***Hrs./Unit***	***Marks***
Unit : 3	**3. D.C. Motor:** 3.1 Working principles, Back e.m.f., Speed and Torque equation. (Numerical) 3.2 Characteristics of Series, Shunt & Compound motors. 3.3 Methods of speed control of DC motors. (Numerical) 3.4 Starting methods of DC motor – 3-point & 4-point starter. 3.5 Losses and Efficiency (Numerical). 3.6 Braking methods of DC motor – Regenerative braking, Counter current braking, Dynamic braking. 3.1) 3.7 Applications of different types of DC motor.	10	12
Unit : 4	**4. Single phase Transformer:** 4.1 Principle of operation. 4.2 E.m.f. equation, Transformation ratio, KVA rating. (Numerical) 4.3 Types of transformer, Core construction & different parts of transformer and their function. 4.4 Concept of ideal transformer. 4.5 Different types of cooling methods (in brief). 4.6 Performance under no-load condition with phasor diagram. (Numerical) 4.7 Performance under load condition with phasor diagram. (Numerical) 4.8 Equivalent circuit. (Numerical) 4.9 Per unit representation of impedance. 4.10 Voltage Regulation at upf, lagging pf & leading pf. (Numerical) 4.11 Polarity test of transformer. 4.12 O.C. and S.C. tests – Estimation of losses & Equivalent circuit parameters. (Numerical) 4.13 Losses, Efficiency, Maximum efficiency, All-day efficiency. (Numerical) 4.14 Parallel operation of single phase transformers. (Numerical) 4.15 Tap-changing methods, Tap changers – Off load & On-load type. 4.16 Principles of single-phase Auto transformer – step-up & step-down, Comparison of weight, copper loss with 2-winding transformer. (Numerical) 4.17 Applications of 2-winding transformer & Auto transformer.	**17**	**30**
Unit : 5	**5. Three phase Transformer:** 5.1 Types of three phase transformer. 5.2 Construction of 3-phase transformer – Core & different types of Winding. 5.3 Connections of 3-phase transformer – Vector grouping (classification & necessity). 5.4 Concept of Tertiary winding and its utility. 5.5 Three-phase Auto transformer – working principle, connection diagram, Step-up & Step-down autotransformer. (Numerical) 5.6 Comparison of Autotransformer with two-winding transformer, practical application of autotransformer. 5.7 Scott-connected transformer – working principle, connection diagram, practical application. 5.8 Open delta connection – working principle, connection diagram, practical application. 5.9 Applications of 3-phase transformer. **5.10 Special purpose Transformer:** a)Isolation transformer. b)Welding transformer.	**09**	**12**
		48	70

Practical:

Skills to be developed:
Intellectual skills:
1. Analytical skills.
2. Identification skills.
Motor skills:
1. Measurement (of parameters) skills.

2. Connection (of machine terminals) skills.

List of Practicals

1. To plot the O.C.C. of a D.C. generator & find the critical resistance.
2. To find the performance of a D.C. Series motor by conducting load test & draw the load characteristics.
3. To find the performance of a D.C. shunt motor by conducting load test & draw the load characteristics.
4. To compute the efficiency of a D.C. motor by Swinburn's test.
5. To control the speed of D.C. shunt motor above & below normal speed & draw the speed characteristics.
6. To determine equivalent circuit parameters of single-phase transformer by performing O.C. test and S.C. test.
7. To determine the regulation & efficiency of single-phase transformer by direct loading method.
8. To operate two single-phase transformers in parallel & find out the load sharing between them.
9. To perform heat run test of a single-phase transformer.
10. To compute the efficiency of a single-phase transformer by Back-to-Back test.

Text books:

Sl No.	Titles of Book	Name of Author	Name of Publisher
1.	Electrical Machines	S.K.Bhattacharya	T.M.H Publishing Co. Ltd.
2.	Electrical Technology- Vol-II	B.L.Thereja	S.Chand
3.	Electrical Machinery	Dr. S.K.Sen	Khanna Publisher
4.	Electrical Machines	J.B.Gupta	S.K.Kataria & Sons.
5.	Principles of Electrical Machines	V.K.Mehta, Rohit Mehta	S. Chand
6.	Electrical Machinery	P.S.Bhimbra	Khanna Publisher
7.	Electrical Machines	M.N.Bandyopadhyay	P.H.I. Pvt. Ltd.
8.	Electrical Machines	Ashfaq Husain	Dhanpat Rai & Co.
9.	Principles of Electrical Machines and Power Electronics	P.C.Sen	Wiley India
10.	Fundamentals of Electrical	B.R.Gupta & V.Singhal	New Age Publisher
11.	Electrical Machines	Nagrath & Kothari	T.M.Hill
12.	Electrical Technology	H.Cotton	C.B.S. Publisher New Delhi
13.	Electrical Machines	Smarajit Ghosh	Pearson

EXAMINATION SCHEME (THEORITICAL)

GROUP	UNIT	ONE OR TWO SENTENCE ANSWER 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, 3	09	TWENTY	ONE	1 X 20 = 20	FOUR	FIVE, TAKING AT LEAST TWO FROM EACH GROUP	TEN	10 X 5 = 50
B	4,5	13				SIX			

EXAMINATION SCHEME (SESSIONAL)

1. **Continuous Internal Assessment of 50 marks** is to be carried out by the teachers throughout the Third Semester. **Distribution of marks: Performance of Job – 30, Notebook – 20.**
2. **External Assessment of 50 marks** shall be held at the end of the Third Semester on the entire syllabus. One Experiment per student from any one of the above is to be performed. Experiment is to be set by lottery system.
   Distribution of marks: On spot job – 35, Viva-voce – 15.

Name of the Course: ***DIPLOMA IN ELECTRICAL ENGINEERING (INDUSTRIAL CONTROL)*** Subject : ***Electrical & Electronic Measuring Instruments***	
Course Code: ***EEIC/S3/EEMI***	Semester: ***THIRD***
Duration: ***ONE SEMESTER***	Maximum Marks: ***150***
Teaching Scheme	**Examination Scheme**
Theory : 4 hrs./week	Mid Semester Exam.: **20 Marks**
Tutorial: -- hrs./week	Attendance, Assignment & interaction: **10 Marks**
Practical: 2 hrs./week	End Semester Exam.: **70 Marks**
Credit: 4	Practical: **50 Marks**

Aim:

Sl. No.	
1.	This subject finds utility in understanding the concepts in other electrical subjects such as Electrical Power System, Electrical Circuit Theory & Electrical Machines etc.
2.	The Diploma holder has to work as Technical supervisor, maintenance engineer, production engineer in industries, electrical power generation, transmission and distribution system, traction installation system, machine operation etc.
3.	For above job responsibilities he has to take the measurements of various electrical quantities power & energy for testing, monitoring, maintenance, and controlling the process. In addition to this he 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.

Objective:

Sl. No.	
1.	Identify the measuring instruments used for measuring electrical quantities.
2.	Classify measuring instruments based on construction, principle of operation and quantity to be measured, types of errors.
3.	Select appropriate measuring instrument with range for measurement of various electrical quantities. Select and use range multiplier if required.
4.	Select appropriate instrument for measurement of power, energy and Calibrate various types of instruments as per is.

Pre-Requisite:

Sl. No.	
1.	Knowledge of current, voltage & power and their measurements.

Contents (Theory)

Unit	*Name of the Topic*	Hrs./Unit	Marks
Unit: 1	1. ***Fundamentals of Measurement*** 1.1. Purpose of measurement and significance of measurement. 1.2. Definition & brief explanations of: 1.3. Range, sensitivity, true & indicated value, Errors (including limiting errors), Resolutions, Accuracy, Precision and instrument efficiency. 1.4. Classification of instruments: 1.5. Absolute and secondary instruments, Analog (electro-mechanical and electronic) and digital instruments, secondary Instruments - Indicating, integrating & recording instruments. 1.6. Basic Requirements for measurements: 1.7. Deflection torque and methods of production. 1.8. Controlling torque and controlling system (Spring Control & Gravity control system) 1.9. Damping torque & different methods of damping 1.10. Balancing of moving parts. 1.11. [No mathematical deductions - only the final expression (if any)	7	7

Contents (Theory)

Unit	*Name of the Topic*	Hrs./Unit	Marks
	to be mentioned]		
Unit: 2	2. ***Name of the Topic: Measurement of Current and Voltage*** 2.1 Construction and principle of PMMC, MI & Dynamometer type Instrument. 2.2 Production of torque : methods. 2.3 Principles of Voltage and Current measurement. 2.4 Different Methods of range extension of Ammeter and Voltmeter & related problems. 2.6 Calibration of Ammeter and Voltmeter.	8	8
Unit: 3	3. ***Name of the Topic: Measurement of Electrical Power*** 4.1. Concept of power in A.C. Circuit 4.2. Principle and Construction of dynamometer type wattmeter. 3.3 Errors and their compensation. 3.4 Multiplying factor of wattmeter. 3.5 Measurements of power in 3 phase circuit for balanced and unbalanced load by one wattmeter method, two wattmeter method - problems 3.6 Effect of power factor variation on wattmeter readings in two wattmeter method -problems 3.7 Measurement of reactive power in three phase balance load by one wattmeter method and two wattmeter method. 3.8 Digital Wattmeter : Construction, Principle of Operation	9	9
Unit: 4	**4.*Name of the Topic :Measurement of Electrical Energy*** 4.1 Concept of electrical energy. 4.2 Constructional feature & principle of working of single phase and three-phase induction type energy meter. 4.3 Different types of errors and their compensation. 4.4 Calibration and Testing of energy meter. 4.5 Electronic energy meter : Basic circuit diagram and principle of operation 4.6 Phantom loading	7	9
Unit: 5	**5. Name of the Topic** : **Measurement of Circuit Parameters** 5.1 Classification of Resistance, Low, Medium and High. 5.2 Methods of Measurements of Low, Medium and High. Resistance by Kelvin Double bridge, Wheatstone bridge and Megger respectively--problems 5.3 Measurement of Earth resistance- Earth tester (Analog & Digital) 5.4 Digital Multimeter: Basic circuit diagram and working principle 5.5 Measurement of Inductance:---Maxwell's inductance bridge --problems 5.6 Measurement of capacitance: Schering Bridge - Problems	9	8
Unit: 6	**6. *Name of the Topic : Constructional features and working principles of other Instruments/Meters*** 6.1 Single phase and three phase Power Factor Meter(only dynamometer type). 6.2 Sychronoscope. 6.1 Clip-on-mmeter. 6.2 Instrument Transformers: Introduction and utility of using Instrument transformers (in the light of measurement and protection purposes) 6.3 CT (i) CT used in HV installations—multicore-secondary C.T (ii) Reduction of errors (Mention the various methods briefly). Accuracy class, Burden on CT, Specifications, Precautions in the	9	9

Contents (Theory)

Unit	*Name of the Topic*	Hrs./Unit	Marks
	use of CT 6.4 PT or VT Types - Mention the names with comparative study in brief. (Electromagnetic VT, CVT and CCVT) - basic circuit diagram of CVT, Working principle, Errors (concept only), Accuracy class, Burdens, Specifications, Precautions.		
Unit: 7	**7. *Digital Measuring Instrument*** 7.1. Comparison between analog & digital measuring instrument 7.2. Rectifier type, True RMS type analog voltmeter. 7.3. Ramp type and dual slope integrating type DVM 7.4. Q Meter- application & error.	3	3
Unit: 8	**8. *Frequency & Power Measurement*** 8.1. Name of different frequency meter 8.2. Operation of Electronic frequency counter for the measurement of frequency and time period. 8.3. Power Measurement by bolometer & calorimetric method	3	4
Unit: 9	**9. *CRO and its Application*** 9.1. Block diagram of CRO 9.2. Cathode Ray Tube, Deflection Amplifier, Time base generator, Delay line. 9.3. Electrostatic deflection technique. Automatic synchronization of time base. 9.4. Basic control of CRO 9.5. Different types of probes. 9.6. Dual trace, dual beam CRO. 9.7. Measurement of voltage, current, time period, phase, delay time, frequency by CRO.	5	7
Unit: 10	**10. *Digital instruments and Display Devices*** 10.1. Digital display devices (LED, seven segment only) 10.2. Concept of 3 ½ ,4 ½ digit 10.3. Digital voltmeter, Ramp type, Integrating type, successive approximation only. 10.4. 3.4 Digital frequency meter.	4	6
		64	**70**

Contents (Practical)

Sl. No.	Skills to be developed
1.	Intellectual Skills: 5.7 Identification of instruments 5.8 Selection of instruments and equipment for measurement
2.	Motor Skills: 6.3 Accuracy in measurement 6.4 Making proper connections

Suggested list of Laboratory Experiments:

Sl. No.	**Laboratory Experiments**
1.	Measurement of Low resistance by Kelvin's Double Bridge.
2.	Measurement of active and reactive power in three phase balanced load by two wattmeter method and observe the effect of Power Factor variation on Wattmeter reading.
3.	Calibration of single phase Energy meter at various power factor by standard energy meter.
4.	Measurement of energy in single phase & three phase balanced load using Electronic Energy Meter.
5.	Measurement of inductance by Maxwell bridge.

Contents (Practical)

6.	Determination of an unknown capacitance with the help of Schering Bridge network
7.	Measurement of Resistance, Voltage, Current, Voltage, Current in A.C & D. C. Circuit by using digital multimeter. Measurement of A.C. Current by Clip-on ammeter
8.	Measurement of power factor of single phase and three phase load by PF meter and verifying through I, V and P measurement.
9.	Determination of Q factor of Resonant circuit
10.	Measurement of current & voltages by low range ammeter & voltmeter respectively by using CT and PT.
11	Measurement of voltage, current and Phase difference and frequency using CRO.

Text Books:

Name of Authors	Title of the Book	Name of the Publisher
A.K. Sawhney	Electric & Electronic Measurement and Instrumentation	Dhanpatrai & Sons
Golding	Electrical Measurement & measuring Instrument	Wheeler
N.V.Suryanaryan	Electrical Measurement & measuring Instrument	S. Chand & Co.
J.B. Gupta	Electrical & Electronic Measurements	S. K. Kataria Publication
Stout	Basic Electrical Measurement	
S.K.Singh	Industrial Instrumentation & Control	Tata McGraw Hill
David A.Bell	Electronic Instrumentation and Measurements	OXFORD Higher Education
Kalsi	Electronic Instrumentation	TMH
J J Car	Elements of Electronic Instrumentation & Measurement	Pearson
Helfrick & Cooper	Modern Electronic Instrumentation & Measurement Techniques	PHI
P.Purkait, B. Biswas, S, Das, C. Koley	Electrical and Electronics Measurements and Instrumentation	Tata McGraw Hill

E X A M I N A T I O N S C H E M E (THEORITICAL)

GROUP	UNIT	ONE OR TWO SENTENCE ANSWER 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, 3	9	TWENTY	ONE	1 X 20 = 20	3	FIVE, TAKING AT LEAST ONE FROM EACH GROUP	TEN	10 X 5 = 50
B	4,5,6	9				3			
C	7, 8, 9, 10	7				3			

E X A M I N A T I O N S C H E M E (SESSIONAL)

1.	**Continuous Internal Assessment of 25 marks** is to be carried out by the teachers throughout the Third Semester. **Distribution of marks: Performance of Job - 15, Notebook - 10.**
2.	**External Assessment of 25 marks** shall be held at the end of the Third Semester on the entire syllabus. One Experiment per student from any one of the above is to be performed. Experiment is to be set by lottery system. **Distribution of marks: On spot job - 15, Viva-voce - 10.**

Name of the Course: ***DIPLOMA IN ELECTRICAL ENGINEERING (INDUSTRIAL CONTROL)*** Subject : ***Programming concept using C***	
Course Code: ***EEIC/S3/PC***	Semester: ***THIRD***
Duration: ***ONE SEMESTER***	Maximum Marks: ***50***
Teaching Scheme	**Examination Scheme**
Theory : 2 hrs./week	Mid Semester Exam.: **10 Marks**
Tutorial: -- hrs./week	Attendance, Assignment & interaction: **5 Marks**
Practical: 2 hrs./week	End Semester Exam.: **35 Marks**
Credit: 3	Practical: **50 Marks**

Aim:

Sl. No.	
1.	Programming concept finds utility in understanding the subjects such as Microprocessor, Microcontroller, PLC etc. It will also become helpful to understand various application Softwares.

Objective:

Sl. No.	The students will be able to:
1.	Define program and programming
2.	Briefly understand compiler, interpreter, linker and loader function.
3.	Understand algorithm and learn the different ways of stating algorithms.
4.	Understand the basic structure of a program in C
5.	Learn the data types, variables, constants, operators etc.
6.	Get to know the input and output streams that exist in C to carry out the input output task.
7.	Learn about decision type control construct and looping type control constructs in C.
8.	Learn about one dimensional array.
9.	Understand what a function is and how its use benefits a program

Pre-Requisite:

Sl. No.	
1.	Basic units of computer system

Unit	*Topic*	Hrs./Unit	Marks
Unit: 1	***Introduction to Programming: Algorithms and Flowcharts*** 1.1 Programs and Programming 1.2 Programming Languages 1.3 Compiler, Interpreter, Loader, and Linker 1.4 Fourth Generation Languages 1.5 Structured Programming Concept 1.6 Key features of an Algorithm 1.7 Different ways of stating Algorithms	05	8
Unit: 2	***Overview of C Programming*** 2.1 Introduction of C Language 2.2 Basic Structure of C 2.3 Working steps of C compiler - Source Code- Object Code – Executable object code	02	3

Unit	*Topic*	Hrs./Unit	Marks
Unit: 3	***Types, Operator & Expression*** 3.1 Introduction (Grammars/Syntax Rules) 3.2 Character Sets, Keywords, Identifiers, Constants, Variables 3.3 Data types and sizes 3.4 Different operators & expressions 3.5 Type conversions.	05	5
Unit: 4	***Managing Input & Output Operations*** 4.1 Some input as well as output functions : scanf(), printf(), getchar(), putchar()	02	3
Unit: 5	***Control Flow (Decision Making)*** 5.1 Introduction 5.2 IF-ELSE statement 5.3 Looping : FOR,WHILE and DO-WHILE statements 5.4 BREAK, CONTINUE and GOTO statements. 5.5 Simple Program	06	6
Unit 6	***Arrays*** 6.1 Introduction 6.2 Declaration and initialization of Array 6.3 Accessing of array elements and other allowed operations. 6.4 Simple program with a one dimensional array	06	5
Unit 7	***User defined Function*** 7.1 The concepts of user defined functions 7.2 Using functions : i) Function Declaration, ii) Function Definition, iii) Function Call 7.3 Simple program	06	5
	TOTAL:	**32**	**35**

Contents (Practical)

Sl. No.	Skills to be developed
1.	Intellectual Skills: i) Improvement of Logical thinking capability ii) Improvement of analytical thinking capability
2.	Motor Skills: i) Operate various parts of computer properly. ii) Problem solving skills. iii) Draw Flow charts

List of Laboratory Experiments:

Sl. No.	
	Write algorithm, Draw Flow chart, and Write programming codes in C on following topics
1.	To find the sum and identify the greater number between any two numbers.
2.	To interchange the numeric values of two variables.
3.	Take three sides of a triangle as input and check whether the triangle can be drawn or not. If possible, classify the triangle as equilateral, isosceles, or scalene
4.	To test whether the given character is vowel or not.
5.	To find sum of the digits of an integer .
6.	To find the roots of a quadratic equation.
7.	To check whether an input number is palindrome or not.
8.	To find the G.C.D and L.C.M of two numbers.
9.	To find the factorial of given number.
10.	To find the sum of n natural numbers.
11	To accept 10 numbers and make the average of the numbers
12	To accept 10 elements and sort them in ascending or descending order.
13.	To find the summation of three numbers using function.

14	To find the maximum between two numbers using function

Sl No.	Name of Authors	Titles of the Book	Name of Publisher
1.	Pradip Dey and Manas Ghosh	Computer Fundamental and Programming in C	Oxford Higher Education
2.	T . Jeyapoovan	A first course in Programming with C	Vikas Publishing House Pvt. Ltd.
3.	K R Venugopal and S R Prasad	Mastering C	T.M.H. Publishing Company Ltd.
4.	Reema Theraja	Introduction to C Programming	Oxford University Press.
5.	E. Balaguruswamy	Programming in ANSI C	T.M.H. Publishing Company Ltd.
6.	Byron Gottfried	Schaum's Outlines Programming with C	T.M.H.
7.	Ashok N. Kamthane	Programming in C	Pearson

E X A M I N A T I O N S C H E M E (THEORY)

GROUP	UNIT	ONE OR TWO SENTENCE ANSWER 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, 3	5	TEN	ONE	1 X 10 = 10	FOUR	FIVE, TAKING AT LEAST TWO FROM EACH GROUP	FIVE	5 X 5 = 25
B	4,5,6,7	7				FIVE			

E X A M I N A T I O N S C H E M E (SESSIONAL)

1.	**Continuous Internal Assessment of 25 marks** is to be carried out by the teachers throughout the Third Semester. **Distribution of marks: Performance of Job - 15, Notebook - 10.**
2.	**External Assessment of 25 marks** shall be held at the end of the Third Semester on the entire syllabus. One Experiment per student from any one of the above is to be performed. Experiment is to be set by lottery system. **Distribution of marks: On spot job - 15, Viva-voce - 10.**

Name of the Course: ***DIPLOMA IN ELECTRICAL ENGINEERING – INDUSTRIAL CONTROL*** Subject : ***Control Theory***	
Course Code:	Semester: ***THIRD***
Duration: ***ONE SEMESTER***	Maximum Marks: ***100***
Teaching Scheme	**Examination Scheme**
Theory : 3 hrs./week	Mid Semester Exam.: **20 Marks**
Tutorial: -- hrs./week	Attendance, Assignment & interaction: **10 Marks**
Practical: -- hrs./week	End Semester Exam.: **70 Marks**
Credit: 03	Practical: **--**

Aim :

1. Electrical power system, Electrical machines, Industrial process and many other systems such as Biomedical, environmental, defence etc. nowadays use sophisticated instruments and their related control systems for fast, accurate and reliable measurements, operations and control.
2. Being Electrical Diploma Holders has a role of supervisor, Maintenance engineer and to assist in carrying out design & testing and R & D work in electrical, Industrial, Electronics and communication field.
3 He must understand the basics, facts, concepts and principles of various modern control system

Objective:	
Sl. No.	The students will be able to:
1.	Identify the components & modeling of control system for processing given Input to get desired Output.
2.	Identify appropriate feedback system with modeling for given application and to know how to use them.
3.	Identify basic signal conditioning, circuit components for Instrumentation & control system in Industrial processes, Electrical power system, Electrical machine operation, Measurement and control.
4.	Understand basic control system theory, stability concept.
5.	Understand basics of P, PI, PD, PID system and their application in real system.

Pre-Requisite:	
Sl. No.	
1.	Basic knowledge of Basic Electronics, Circuit theory, Electrical machines & instruments.

Contents (Theory)		Hrs./ Unit	Marks
Unit: 1	1. *Fundamentals of Control Systems* 1.1. Basic Definitions: System, Control, Plant, Controller, Input, Output, Disturbance, Control System 1.2. Classification of Control Systems 1.3. Open-loop and Closed-loop Systems 1.4. Effects of Feedback 1.5. Comparison of Open-loop and Closed-loop Control System 1.6. Standard Test Signals 1.7. Step Function 1.8. Ramp Function 1.9. Parabolic Function 1.10. Impulse Function 1.11. Feedback and Feed-forward System 1.12. Servomechanism 1.13. Laplace Transform of Standard Input Signals: Unit Step Function, Ramp Function, Parabolic Function, Impulse function [δ(t)], Exponential Function, Sine Wave, Cosine Wave.	5	5

Contents (Theory)		Hrs./ Unit	Marks
	Initial Value and Final Value Theorems		
Unit: 2	2. *Transfer Function* 2.1. Definition 2.2. Impulse Response and Transfer Function 2.3. Properties of Transfer Function (TF) 2.4. Advantages and Disadvantages of Transfer Function 2.5. Poles and Zeros of a Transfer Function 2.6. Representation of Pole and Zero on the s-plane 2.7. Characteristic Equation	3	8
Unit: 3	3. *Mathematical Modeling of Physical Systems* 3.1. Modeling of Mechanical Systems a. Translational Motion b. Rotational Motion 3.2. Modeling of Electrical Systems a. Resistor b. Inductor c. Capacitor 3.3. Analogous Systems a. Force-Voltage Analogy b. Force-Current Analogy 3.4. Modeling of Different Systems 3.4.1. Mechanical systems a. Rotary systems b. Gear Trains c. Lever d. Chain Driver 3.4.2. Electromechanical systems a. DC Generator b. DC motors c. Thermal systems : First order and Second order models 3.4.3. Electric circuit analogues. 3.4.4. Modeling of LTI systems using operational amplifiers.	9	10
Unit: 4	4. *Block Diagram* 4.1. Definition of Basic Elements of a Block Diagram 4.2. Canonical Form of a Closed Loop System 4.3. Rules for Block Diagram Reduction 4.4. Procedure for Reduction of Block Diagram 4.5. Multiple Input-Multiple Output System	4	10
Unit: 5	5. *Signal-Flow Graphs* 5.1. Basic Definitions in Signal-Flow Graphs 5.2. Rules for Signal-Flow Graph 5.3. Addition Rule 5.4. Transmission Rule 5.5. Multiplication Rule 5.6. Properties of Signal-Flow Graph 5.7. Mason's Gain Formula 5.8. Steps for Solving Signal-Flow Graph 5.9. SFG from Block Diagram 5.10. Formation of SFG from Given Equation(s) 5.11. Signal-Flow Graph for Networks	5	8
Unit: 6	Time Domain Analysis of Control Systems Classification of Time Responses 6.1 Transient Response 6.2 Steady-State Response 6.3 Definition of different term related to Time Response: 1. Delay Time	6	10

Contents (Theory)		Hrs./ Unit	Marks
	2. Rise Time 3. Settling Time 4. Peak Time 5. Overshoot 6.4 Steady State Error 6.5 Analysis of Steady-State Error 6.6 Type of Input and Steady-State Error 3.4.1. Step Input 3.4.2. Ramp Input 3.4.3. Parabolic Input 6.7 Steady-State Error for Type 0 and 1 Systems 1.Error for Step Input 2.Error for Ramp Input 3.Error for Parabolic Input		
Unit: 7	7. *Feedback System* 7.1 Effect of Parameter Variation in an Open-Loop Control System 7.2 Effect of Parameter Variation in a Closed-Loop System 7.3 Sensitivity of a Control System 7.4 Sensitivity of Closed-Loop System 7.5 Effect of Feedback on Time Constant of a Control System 7.6 Effect of Feedback on Overall Gain 7.7 Effect of Feedback on Stability 7.8 Effect of Feedback on Disturbance 7.8.1. Disturbance in the Feedback Path 7.8.2. Disturbance at the Output 7.9 Introduction to Basic Control Action of Controllers 7.9.1. Two-Position Controller 7.9.2. Proportional Controller (P) 7.9.3. Integral Controller (I) 7.9.4. Proportional Plus Derivative Controller (PD) 7.9.5. Proportional Integral Controllers (PI) 7.9.6. Proportional Plus Integral Plus Derivative Controller (PID) 7.9.7. Rate Feedback Controller 7.10 Realization of Controllers with Op-Amp 7.10.1. Proportional Controller (P) 7.10.2. Integral Controller (I) 7.10.3. PI Controller 7.10.4. PD Controller 7.10.5. PID Controller	9	12
Unit: 8	8. *Stability* 8.1. Effect of Location of Poles on Stability 8.2. Routh-Hurwitz's Criterion 8.2.1. Hurwitz's Criterion—423 8.2.2. Routh's Stability Criterion 8.3. Applications of Routh's Criterion 8.3.1. Relative Stability Analysis 8.3.2. Determination Range of Values of 8.4. Advantages of Routh's Criterion 8.5. Limitations of Routh's Criterion	7	7
	TOTAL	48	70

Text Books

Sl. No.	Name of Authors	Titles of the Book	Name of Publisher
1	Nagrath Gopal	Control System Engineering	New Age International

2	S.K. Bhattachrya Brijinder Singh	Control of Electrical Machines	New Age International
3	M. Gopal	Control Systems Principles and Design	McGraw Hill Education (India) Pvt. Ltd
4	B. C. Kuo	Automatic Control System	Prentice Hall of India
5	S. Dasgupta	Control System Theory	Khanna Publishers

EXAMINATION SCHEME (THEORITICAL)

GROUP	UNIT	ONE OR TWO SENTENCE ANSWER 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, 3	6	TWENTY	ONE	1 X 20 = 20	THREE	FIVE, TAKING AT LEAST ONE FROM EACH GROUP	10 (TEN)	10 X 5 = 50
B	4,5	10				THREE			
C	6,7,8	9				FOUR			

Name of the Course: ***DIPLOMA IN ELECTRICAL ENGINEERING (INDUSTRIAL CONTROL)*** Subject : ***Electrical Workshop - I***	
Course Code:	Semester: ***THIRD***
Duration: ***ONE SEMESTER***	Maximum Marks: ***50***
Teaching Scheme	**Examination Scheme**
Theory : -- hrs./week	Mid Semester Exam.: **--**
Tutorial: -- hrs./week	Attendance, Assignment & interaction: **--**
Practical: 2 hrs./week	End Semester Exam.: --
Credit: 1	Practical: **50 Marks**

Aim:

Sl. No.	
1.	A technician should also have the practical skills regarding wiring, in order to provide him/her the various ways, techniques of fault finding while working on the shop floor. These skills will be developed when he/she actually performs the work.

Objective:

Sl. No.	
1.	Identify various electrical accessories.
2.	Draw & understand the wiring diagrams
3.	Prepare schedule of material
4.	Use methods of wiring

Pre-Requisite:

Sl. No.	
1.	Studies of different types of wires, switches, circuits.
2.	Protection for safety of electrical wiring installation as per I.S.
3.	Protection against electric shock, thermal effect, over-current, over-voltage, under-voltage and against a measure of isolation and switching of electrical circuits.

Contents (Practical)	
Suggested list of Practicals/Exercises:	
Sl. No.	Practicals/Exercises
1.	Prepare & mount the energy meter board
2.	Wire up consumer's main board with ICDP & distribution fuse box & With ELCB / MCB
3.	Identification of diff. Windings of D.C. compound m/c.
4.	Study of constructional features and windings of D.C. m/c
5.	Study of D.C. motor starters
6.	Study of sodium vapour lamp, mercury vapour lamp, Compact fluorescent lamp and connections of these.
7.	Dismantling and assembling of a ceiling-fan/Table fan.
8.	To test a battery for its charged and discharged condition and to make connections for charging
9.	Wire up a test board
10.	Study the connection of fire-alarm
11.	Measurement of Insulation Resistance using megger.

E X A M I N A T I O N S C H E M E (SESSIONAL)

1.	**Continuous Internal Assessment of 25 marks** is to be carried out by the teachers throughout the Third Semester. **Distribution of marks: Performance of Job - 15, Notebook - 10.**
2.	**External Assessment of 25 marks** shall be held at the end of the Third Semester on the entire syllabus. One job per student from any one of the above is to be performed. Job is to be set by lottery system. **Distribution of marks: On spot job - 15, Viva-voce - 10.**

Name of the Course: ***DIPLOMA IN ELECTRICAL ENGINEERING (INDUSTRIAL CONTROL)*** Subject : ***Professional Practices - I***	
Course Code:	Semester: ***THIRD***
Duration: ***ONE SEMESTER***	Maximum Marks: ***50***
Teaching Scheme	**Examination Scheme**
Theory : -- hrs./week	Mid Semester Exam.: **--**
Tutorial: -- hrs./week	Attendance, Assignment & interaction: **--**
Practical: 2 hrs./week	End Semester Exam.: **--**
Credit: 1	Practical: **50 Marks**

Aim:

Sl. No.	
1.	Most of the diploma holders join industries. Due to globalization and competition in the industrial and service sectors the selection for the job is based on campus interviews or competitive tests.
2.	While selecting candidates a normal practice adopted is to see general confidence, ability to communicate and attitude, in addition to basic technological concepts.
3	The purpose of introducing professional practices is to provide opportunity to students to undergo activities which will enable them to develop confidence. Industrial visits, expert lectures, seminars on technical topics and group discussion are planned in a semester so that there will be increased participation of students in learning process.

Objective:

Sl. No.	The student will be able to
1.	Acquire information from different sources
2.	Prepare notes for given topic
3.	Present given topic in a seminar
4	Interact with peers to share thoughts
5	Prepare a report on industrial visit, expert lecture

Pre-Requisite:

Sl. No.	
1.	Desire to gain comparable knowledge and skills of various activities in various areas of importance.
2.	Eagerness to cohesively participate in group work and to share thoughts with group members.
3.	Knowledge of basic electrical engineering.

Activities

Sl.No	Activities	Hours
1.	**Industrial / Field Visit :** Structured Field visits be arranged and report of the same should be submitted by the individual student, to form part of the term work. Visits to **any TWO** from the list below: i)Electrical machine manufacturing industry ii)Multistoried building for power distribution iii) Telephone Exchange iv) Transformer repair workshop. v) Foundry (to see furnaces and oven) vi) Food Processing industry (overall technical and other activities) vii) Tea processing industry. viii) District Industries Centre (to know administrative set up, activities, various schemes etc) ix) Cold storage / Rice Mill (operation, machineries, power distribution, chilling plant etc.) x) Community health Centre (organization, modus-operandi, various activities) xi) Panchayet/ BDO office to understand swarojkar yojona / gram sarak yojona scheme / Rural electrification and Report on a particular/ specific case. xii) Visit warehouse / Rail yard / port and observe Material Handling 1.1. Management & documentation.	**10**

Activities

Sl.No	Activities	Hours
2.	***Guest Lecture by professional / industrial expert:*** Lectures by Professional / Industrial Expert to be organized from any THREE of the following areas: i) Free and open source software ii) Software for drafting iii) Cyber crime & Cyber laws iv)Social networking – effects & utilities v) Ethical Hacking. vi)Common electricity rules & norms(do's and don'ts) for all vii) Automobile pollution, norms of pollution control viii) Industrial Dispute & labour Law ix) Public health & Hygiene awareness. x) Working around trucks – loading and unloading of engineering machineries. xi) Industrial hygiene. xii) Special purpose wiring in chemical / hazardous industries. xiii) Safe application of electrical energy in daily life. xiv) Energy and environment xv) Carbon Trading. xvi) Challenges and opportunities in MSME sector. Individual report of the above lecture should be submitted by the students.	6
3.	Group Discussion: The students should discuss in a group of six to eight students. Each group to perform any TWO group discussions. Topics and time duration of the group discussion to be decided by concerned teacher. Concerned teacher may modulate the discussion so as to make the discussion a fruitful one. At the end of each discussion each group will write a brief report on the topic as discussed in the group discussion. Some of the suggested topics are – i) Social networking – effects & utilities ii) Disaster management – role of electrical engineer iii) Energy saving in the institute iv) Use of plastic carry bag (social & domestic Hazard) v) Any other common topic related to electrical field as directed by concerned teacher.	10
4.	Students' Activities: The students in a group of 3 to 4 will collect information from market regarding specification and cost of items (at least five) used in electrical wiring for Domestic, commercial and industrial use. They will submit individual report on the same.	6

EXAMINATION SCHEME (SESSIONAL)

1.	**Continuous internal assessment of 50 marks is to be carried out by the teachers throughout the third semester. Distribution of marks: Performance of job and attendance in guest lecturer = 30, Report = 20**