W.B.S.C.T.E.

TEACHING AND EXAMINATION SCHEME FOR DIPLOMA COURSES

COURSE NAME: ELECTRICAL ENGINEERING

COURSE CODE : EE

DURATION OF COURSE : 6 SEMESTER

SEMESTER: THIRD SEMESTER **SCHEME : C**

Sr.No.	SUBJECT	PERIODS			EVALUATION SCHEME							Credits
	THEORY	L	T	P	SESSIONSAL EXAM			ESE	PR(INT.)	PR (EXT.)		
					TA	CT	Total					
1	Electrical Circuit & Network	03	01	02	10	20	30	70	25	25		5
2	Electrical Machine I	03	__	03	10	20	30	70	25	50		5
3	Basic Electronics	03	--	02	10	20	30	70	25	25		4
4	Programming concept using C	02	--	02	5	10	15	35				3
5	Electrical Measuring Instrument	03	--	02	10	20	30	70	25	25		4
6	Electrical Workshop I	--	--	02	--	--	--	--	25	25		1
7	Elements of Mechanical Engineering	02			5	10	15	35				2
8	Professional Practices I	--	--	02	--	--	--	--	50			1
	Total	**16**	**01**	**15**	**50**	**100**	**150**	**350**	**175**	**150**		**25**

STUDENT CONTACT HOURS PER WEEK: **32**

THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH

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

TA: Attendance & surprise quizzes = 6 marks. Assignment & Group Discussion = 4 marks.

Total Marks : 825

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

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Name of the Subject: Electrical Circuit & Network	
Course Code: EE/S3/CTN	**Semester: Third**
Duration: one Semester	**Maximum Marks: 150**
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs./week	Mid Semester Exam.: 20 Marks
Tutorial: 1 hrs./week	Assignment & Quiz: 10 Marks
Practical: 2 hrs./week	End Semester Exam.: 70 Marks
	Practical : 50 Marks
Credit: 5 (Five)	

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.

Objective:

Sl. No.	The students will be able to:
1.	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.	Analyze dc and ac circuits using Mesh and Node methods
5.	Use Network Theorems for solutions of DC Networks
6.	Interpret Transient Response
7.	Use of Laplace Transform

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 Voltage and Current Source. 1.3 A.C. waveform and definition of various terms associated with it. 1.4 Voltage and current response and impedance diagram of pure R, L, and C to AC supply. 1.5 Phasor representation of alternating quantity.	04	05
Unit: 2	**Single phase AC circuits & Resonance:** 2.0 Study of J operator. 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, Active power, Apparent power, Reactive power,	10+5(T)	15

	Power triangle, complex power (Numerical). 2.3 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) 2.4 Series resonance – Effects of varying inductance and capacitance in series RLC circuit – Selectivity- 'Q' factor- Resonance frequency – Bandwidth – Half power frequencies (numerical). 2.5 Parallel resonance – Two branch parallel circuits, Q factor- Resonance frequency-bandwidth (numerical) 2.6 Comparison of series and parallel resonance.		
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 +2(T)	10
Unit: 4	**Network Theorems(Statement, procedure, areas of applications and limitations)** 4.1 Source conversion/ideal voltage and current source 4.2 Superposition Theorem 4.3 Thevenin's Theorem 4.4 Norton's Theorem 4.5 Maximum Power Transfer Theorem **(Numerical of all theorems)**	08 + 2(T)	10
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. **(Numerical)**	08 +2(T)	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 electrical circuits **(Numerical)**	08 +3(T)	10
Unit 7	**Two port network** : Open circuit Impedance and Short circuit Admittance parameters, Transmission parameters and their Inter-relations.**(Simple Numerical)**	04 + 2(T)	10
	Total	**48 +16(T)**	**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.

	ii) Take accurate readings. iii) Draw phasor diagram and graphs.

List of Laboratory Experiments: (At least Eight experiments are to be performed)	
Sl. No.	Laboratory Experiments
1.	To verify Kirchoff's Current Law and Kirchoff's Voltage Law.
2.	To measure inductance of a choke using an external resistance in series with choke and by drawing relevant phasor diagram. Verify the result with LCR meter and calculate Q factor.
3.	To measure the current , voltage across each element of R-L-C series circuit and draw the phasor diagram to calculate p.f.
4.	To measure the current , voltage across each element of R-L-C parallel circuit and draw the phasor diagram to calculate p.f.
5.	To verify conditions for Series and Parallel Resonance.
6.	To verify following network theorems applicable to D.C. circuit. i) Superposition Theorem ii) Thevenin's Theorem
7.	To verify following network theorems applicable to D.C. circuit. i) Norton's Theorem ii) Maximum Power Transfer Theorem
8.	To study the basics of PSpice and know the important commands.
9.	To calculate network parameters of a simple d.c. circuit using Pspice.
10.	To simulate the d.c. transient response of R-L circuit using PSpice.

Text Books

Sl No.	Name of Authors	Titles of the Book	Name of Publisher
1.	Mahmood Nahvi & Joseph A Edminister	Schaum's outlines Electric circuits	McGrawhill Education (India)Pvt. Ltd.
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.	Ravish R Singh	Network Analysis & Synthesis	T.M.H. Education Pvt. Ltd.
8.	Muhammad H. Rashid	Introduction to Pspice using OrCad	PHI Learning Pvt. Ltd.
9.	P. Ramesh Babu	Electric Circuit Analysis	Scitech Publication (India) Ltd.
10.	M.S. Sukhija, T.K. Nagsarkar	Circuits and Network	Oxford University Press

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	11	TWENTY	ONE	1 X 20 = 20	FOUR	FIVE, TAKING AT LEAST TWO FROM EACH GROUP	TEN	10 X 5 = 50
B	4,5,6,7	12				FIVE			

Note: Paper-setter should take into account the marks which have been allotted in each unit and set the paper accordingly so that all units get the importance as allotted.

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 : Electrical Machine – I	
Course Code : EE/S3/EMI	**Semester : Third**
Duration : One Semester	**Maximum Marks : 175**
Teaching scheme :	**Examination scheme :**
Theory: 3 Hrs./ Week	Mid Semester Exam: 20 Marks
Practical: 3 Hrs./ Week	Assignment & Quiz: 10 Marks
	End Semester Exam: 70 Marks
	Practical: 75 Marks
Credit: 5 (Five)	

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.	Describe 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 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. 2.8 Applications of different types of D.C. generator.	**10**	**12**
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. 3.7 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	**17**	**30**

	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.		
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	**09**	**12**

	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.		
	Total	**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 Practical: (At least Eight experiments are to be performed)
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 Machinery	Dr. S.K.Sen	Khanna Publisher
3.	Electrical Machines	Nagrath & Kothari	T.M.Hill
4.	Electrical Machines	Ashfaq Husain	Dhanpat Rai & Co.
5.	Electrical Machines	J.B.Gupta	S.K.Kataria & Sons.
6.	Principles of Electrical Machines and Power Electronics	P.C.Sen	Wiley India
7.	Electrical Machines-I	K.Krishna Reddy	Scitech Publication (India) Pvt. Ltd.
8.	Electrical Technology- Vol-II	B.L.Thereja	S.Chand
9.	Principles of Electrical Machines	V.K.Mehta, Rohit Mehta	S. Chand
10.	Electrical Machinery	P.S.Bhimbra	Khanna Publisher
11.	Electrical Machines	M.N.Bandyopadhyay	P.H.I. Pvt. Ltd.
12.	Fundamentals of Electrical Machines	B.R.Gupta & V.Singhal	New Age Publisher
13.	Electrical Technology	H.Cotton	C.B.S. Publisher New Delhi
14.	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			

Note: Paper-setter should take into account the marks which have been allotted in each unit and set the paper accordingly so that all units get the importance as allotted.

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 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 : Basic Electronics	
Course Code : EE/S3/BE	**Semester : Third**
Duration : One Semester	**Maximum Marks : 150**
Teaching scheme :	**Examination scheme :**
Theory: 3 Hrs./ Week	Mid Semester Exam: 20 Marks
Practical: 2 Hrs./ Week	Assignment & Quiz: 10 Marks
	End Semester Exam: 70 Marks
	Practical: 50 Marks
Credit: 4(Four)	

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) π filter. 2.4 Circuit operation of the filters, limitations & advantages.	**07**	**10**

Unit : 3	**3. Transistors:** **3.1 Bipolar Junction Transistor (BJT):** 3.1.1 Symbol of NPN & PNP types, Construction, Different types of package, 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 – $V_{CE\ Sat}$, $I_{C\ Max}$, V_{CEO}, I_{CEO}, $V_{CE\ Breakdown}$, α, β, Power dissipation. **3.2 Field effect transistor (JFET):** Symbol, Construction of JFET, Working principle and V-I characteristics of JFET, pinch-off voltage, drain résistance, 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:**	**06**	**08**

	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- IC78xx, IC79xx, IC723 – their Pin configuration, operation and practical applications.		
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: (No.1&2 and At least Six experiments are to be performed from the rest)
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 bread board and observe the output waveform by CRO with and without filter circuit. Also observe the output voltage using IC regulator 78XX & 79XX.

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.	Basic Electronics	S.K.Mandal	T.M.Hill
3.	Electronic Devices & Circuits	A.K.Maini, V.Agarwal	Wiley India
4.	Electronic Devices & Circuits	S.Salivahanan, N.Suresh Kumar	T.M.Hill
5.	Electronic Circuits & Systems	Y.N.Bapat	T.M.Hill
6.	Electronic Devices & Circuits	David J.Bell	P.H.I. Pvt. Ltd.
7.	Basic Electronics for Polytechnics	S.Chowdhury	Dhanpat Rai & Co.
8.	Electronics Engineering	J.B.Gupta	S.K.Kataria & Sons
9.	Electronic Devices & Circuits	P.John Paul	New Age International
10.	Electronic Devices & Circuits	Chereku & Krishna	Pearson Education

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			

Note: Paper-setter should take into account the marks which have been allotted in each unit and set the paper accordingly so that all units get the importance as allotted.

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: Programming concept using C	
Course Code: EE/S3/C	**Semester: Third**
Duration: one Semester	**Maximum Marks: 50**
Teaching Scheme	**Examination Scheme**
Theory: 2 hrs./week	Mid Semester Exam.: 10 Marks
Practical: 2 hrs./week	Assignment & Quiz: 05 Marks
	End Semester Exam.: 35 Marks
	Practical : Nil
Credit: 3 (Three)	

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 Software such as Matlab, Pspice etc.

Objective:

Sl. No.	The students will be able to:
1.	Define program and programming
2.	understand compiler, interpreter, linker and loader function.
3.	Understand algorithm and different ways of stating algorithms.
4.	Understand the basic structure of a program in C
5.	Explain data types, variables, constants, operators etc.
6.	Understand the input and output streams that exist in C to carry out the input output task.
7.	Illustrate decision type control construct and looping type control constructs in C.
8.	Describe 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

Contents (Theory)		Hrs./Unit	Marks
Unit: 1	**Introduction to Programming: Algorithms and Flowcharts** 1.1 Programs and Programming 1.2 Programming Languages 1.3 Compiler, Interpreter, Assembler, Loader, and Linker 1.4 Fourth Generation Languages 1.5 Structured Programming Concept 1.6 Algorithm – Features and its applications 1.7 Flow Chart – Features and its applications	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 compilation – Source Code-	02	3

	Object Code – Executable object code.		
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(),getch(),getche(), gets(), puts().	02	3
Unit: 5	**Control Flow (Decision Making)** 5.1 Introduction 5.2 if…else, switch----case 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 using “if…else” and “switch….case”
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

Text Books

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

Note: Paper-setter should take into account the marks which have been allotted in each unit and set the paper accordingly so that all units get the importance as allotted.

EXAMINATION SCHEME (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			

Name of the Course: Electrical Measuring Instruments	
Course Code: EE/S3/EMI	**Semester: THIRD**
Duration: one Semester	**Maximum Marks: 150**
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs./week	Mid Semester Exam.: 20 Marks
Tutorial:	Assignment & Quiz: 10 Marks
Practical: 2 hrs./week	End Semester Exam.: 70 Marks
	Practical : 50 Marks
Credit: 4 (Four)	

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.	**The students will be able to**:
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.
4.	Calibrate various types of instruments as per IS..

Pre-Requisite:

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

Contents (Theory)		Hrs./Unit	Marks
Unit: 1	**Name of the Topic :Fundamentals of Measurement**	6	8

	1.1 Purpose of measurement and significance of measurement. 1.2 Definition & brief explanations of: Range, sensitivity, true & indicated value, Errors (including limiting errors), Resolutions, Accuracy, Precision and instrument efficiency. 1.3 Classification of instruments: Absolute and secondary instruments, Analog (electro-mechanical and electronic) and digital instruments, secondary Instruments - Indicating, integrating & recording instruments. 1.4 Basic Requirements for measurements: Deflection torque and methods of production. Controlling torque and controlling system (Spring Control & Gravity control system) Damping torque & different methods of damping Balancing of moving parts. [No mathematical deductions – only the final expression (if any) to be mentioned]		
Unit: 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.	7	10
Unit: 3	**Name of the Topic**: **Measurement of Electrical Power** 3.1 Concept of power in A.C. Circuit 3.2 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.	9	15

	3.8 Digital Wattmeter : Construction, Principle of Operation		
Unit: 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	10
Unit: 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 Measurement of Inductance:---Maxwell's inductance bridge -- problems 5.5 Measurement of capacitance: Schering Bridge - Problems	10	15
Unit: 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 Digital Multimeter: Working principle with Block diagram. 6.3 Sychronoscope. 6.4 Clip-on-mmeter. 6.5 Instrument Transformers: Introduction and utility of using Instrument transformers (in the light of measurement and protection purposes) 6.6 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 use of CT 6.7 PT or VT Working principle, Errors (concept only), Accuracy class, Burdens, Specifications, Precautions.	9	12
	Total	**48**	**70**

Text Books:

Name of Authors	Title of the Book		Name of the Publisher
A.K. Sawhney	Electric & Electronic Measurement and Instrumentation		Dhanpat Rai & Sons
Golding, Widdies	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
S.K.Singh	Industrial Instrumentation & Control		Tata McGraw Hill
David A.Bell	Electronic Instrumentation and Measurements		OXFORD Higher Education
P.Purkait, B. Biswas, S, Das, C. Koley	Electrical and Electronics Measurements and Instrumentation		Tata McGraw Hill
Reddy	Electrical Measurement		Scitech Publication (India) Ltd.

Contents (Practical)

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

Suggested list of Laboratory Experiments:

Sl. No.	**List of Practical:**
1.	a) To measure Resistance, Voltage, Current, in A.C & D. C. Circuit using digital multimeter. b) To measure A.C. Current by Clip-on ammeter.
2.	To measure Low resistance by Kelvin's Double Bridge.
3.	To measure active and reactive power in three phase balanced load by two wattmeter method and observe the effect of Power Factor variation on Wattmeter reading.
4.	To calibrate single phase Energy meter using resistive and inductive loads.
5.	To measure energy of three phase balanced load using Electronic Energy Meter.

6.	To measure an inductance by Maxwell's bridge.
7.	To measure an unknown capacitance by Schering Bridge.
8.	To measure power factor of single phase and three phase load by PF meter and verify the same through I, V and P measurement.
9.	To measure current & voltages by low range ammeter & voltmeter respectively using CT and PT.

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	12	TWENTY	ONE	1 X 20 = 20	FOUR	TWO	TEN	10 X 5 = 50
B	4,5,6	11				FIVE	THREE		

Note: Paper-setter should take into account the marks which have been allotted in each unit and set the paper accordingly so that all units get the importance as allotted.

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: Electrical Workshop	
Course Code: EE/S3/WS	**Semester: THIRD**
Duration: one Semester	**Maximum Marks: 50**
Teaching Scheme	**Examination Scheme**
Theory:	**Practical : 50 Marks**
Tutorial:	
Practical: 2 hrs./week	
Credit: 1 (One)	

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:	
1.	To study MCB, ELCB and RCCB and to know their applications.
2.	To Mount and wire up the main board by batten/conduit wiring and connect Energy Meter, MCB, ELCB, RCCB etc. as per IE rule.
3.	To Study the constructional features and windings of different types of D.C. Machines.
4.	To demonstrate the D.C. motor starters (3 pt. & 4 pt.starter).
5.	To dismantle and assemble of a ceiling-fan/Table fan and study the specifications of major components.
6.	To test a battery for its charged and discharged condition and to make connections for charging and obtain its capacity.
7.	To demonstrate the connection of fire-alarm along with cable, sensors and symbolic display (do's and don'ts) and maintenance.
8.	To measure insulation resistance using Megger.
9.	To measure earth resistance using Earth Taster.

EXAMINATION SCHEME

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 – 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: Elements of Mechanical Engineering	
Course Code: EE/S3/EMCE	**Semester: Third**
Duration: one Semester	**Maximum Marks:**
Teaching Scheme	**Examination Scheme**
Theory: 2 hrs/week	Mid Semester Exam.: 10 Marks
Tutorial:	Assignment & Quiz: 05 Marks
Practical:	End Semester Exam.: 35 Marks
Credit: 2 (Two)	

Aim:

Sl. No.	
1.	Diploma in Electrical Engineering passes outs, work as Maintenance Engineers in industry. They have to look after maintenance of Mechanical Machines also. For completing these tasks they need knowledge of Mechanical Machinery related to maintenance

Objective:

Sl. No.	
1.	• Supervise routine maintenance of Machinery such as Boilers, Turbines, Pumps, Steam Turbines etc.
2.	• Identify faults, mal functioning of machines and equipment

Pre-Requisite:

Sl. No.	
1.	Studies of applied mechanics & Engineering Drawing.

Contents (Theory)		Hrs./Unit	Marks
Unit: 1	**Thermodynamics, Refrigeration and Air Conditioning** 1.1 Laws of Thermodynamics. 1.2 Comparison between Heat Engine, Heat Pump and Refrigeration. 1.3 Definition of refrigeration, ton of refrigeration, COP, enthalpy, entropy. 1.4 Vapour Compression System (Basic concept). 1.5 Vapour absorption system (Basic concept). 1.6 Comparison of Vapour Compression and Vapour absorption system. 1.7 Working principle of Domestic Refrigerator. 1.8 Air Conditioning System & factors affecting the human comfort. 1.9 Classification of Air conditioner and comparison between Window Air Conditioning system and split type air conditioning system. 1.10 Working principle of Room Air conditioner.	08	8

Unit: 2	**Boilers, Steam Turbines, Steam Engines:** 1.1 Layout of modern Steam Power Plant. 1.2 Definition and classification of Boiler and their applications. 1.3 Working principle of Fire Tube (Cochran), water Tube (Babcock & Willcox Boiler) and Modern High Pressure Boiler. 1.4 Definition and classification of Steam Turbine. 1.5 Working Principle of impulse and reaction Turbine. 1.6 Major troubleshooting and remedial measures for boiler & turbine.	08	08
Unit: 3	**I.C. Engines:** 2.1 Definition & classification. 2.2 Main parts of an I.C. Engine & their functions 2.2 Working Principle of 2 stroke & 4 stroke Petrol & Diesel Engine, their differences and applications. 2.3 Major troubleshooting & remedial measures for I.C. Engines.	05	7
Unit: 4	**Air Compressors:** 3.1 Definition, Classification & application of Air Compressor. 3.2 Construction & Working Principle of Single stage reciprocating Compressor. 3.3 Working Principle of centrifugal and Screw Compressor. 3.4 Major troubleshooting & remedial measures for Air Compressor.	05	5
Unit : 5	**Hydrostatics & Pumps:** 4.1 Atmospheric pr. , Absolute pr. & Gauge pressure. 4.2 Determination of pressure at a point, pressure measuring instrument. 4.3 Classification of Pumps and their applications. 4.4 Working principle of Single acting & Double acting Reciprocating pump. 4.5 Working principle of Centrifugal Pump. 4.6 Reason for malfunctioning & remedial measures for Pumps.	06	7
	Total	**32**	**35**

Text Books:			
Name of Authors	Title of the Book	Edition	Name of the Publisher
P.L. Ballaney	A Course in Thermal Engineering		Khanna Publishers
R. S. Khurmi	A test book of Thermal Engineering		S. Chand & Co. Ltd.
R. K. Rajput	Thermal Engineering		Laxmi Publication, New Delhi
Patel, Karmchandani	Heat Engine Vol. I & II		Achrya publication
P.K. Nag	Engineering Thermodynamics		Tata McGraw Hill
P.Selvaraj, M.Periyasamy,S.Selva kumar	Basic Civil and Mechanical Engineering		Scitech Publications (India) Pvt Ltd.
T.J.Prabhu, V.Jaiganesh	Basic Mechanical Engineering		Scitech Publications (India) Pvt Ltd.

EXAMINATION SCHEME

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

Note: Paper-setter should take into account the marks which have been allotted in each unit and set the paper accordingly so that all units get the required as allotted.

Name of the Course: Professional Practices I	
Course Code: EE/S3/PF1	**Semester: Third**
Duration: one Semester	**Maximum Marks: 50**
Teaching Scheme	**Examination Scheme**
Theory:	Mid Semester Exam.: Marks
Tutorial:	Assignment & Quiz: Marks
Practical: 2 hrs / week	End Semester Exam.: Marks
	Practical : 50 Marks
Credit: 1 (One)	

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

Sr . 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 **<u>any ONE</u>** from the list below: i) Nearby Petrol Pump.(fuel, oil, product specifications) ii)Automobile Service Station (Observation of Components / aggregates) iii) Telephone Exchange iv) Food Processing industry (Lay out and machine) v) Tea processing industry (Lay out and machine) vi) Dairy Plant / Water Treatment Plant (Lay out and machine) vii) Community health Centre (organization, modus-operandi, various activities) viii) Panchayet/ BDO office to understand swarojkar yojona / gram sarak yojona scheme / Rural electrification and Report on a particular/ specific case.	**10**
2.	**Guest Lecture by professional / industrial expert**: Lectures by Professional / Industrial Expert to be organized from **<u>any THREE</u>** of the following areas: i) Free and open source software ii) Software for drafting iii) Non destructive testing iv) Acoustics v) Illumination / Lighting system. vi)Common electricity rules & norms(do's and don'ts) for all vii) Automobile pollution, norms of pollution control viii) Fire Fighting / Safety Precautions and First aids.	**6**

	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) Topics related to Social Awareness such as - Traffic Control System, Career opportunities, Communication in Industry, Yoga Meditation, Aids awareness and health awareness. Individual report of the above lecture should be submitted by the students	
3.	**Group Discussion:** The students should discuss in a group of six to eight students. Each group to perform **<u>any TWO</u> 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 areas are - i) Sports ii) Social networking - effects & utilities iii) Current news item iv) Discipline and house keeping v) Use of plastic carry bag (social & domestic Hazard) vi) 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 perform ANY ONE of the following activities: i) Collect and study IS code for Engineering Drawing. ii) Specifications of Lubricants. iii)Draw orthographic projections of a given simple machine element using CAD software	**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: Activities =20, Group Discussion = 10, field visit = 10, guest lecture attendance and report = 10**