

DEVELOPMENT OF LIFE SKILL - II

L T P
1 0 2

Curri. Ref. No.:G302

Total Contact Hrs.:45 Total Marks: 50

Theory: 15

Practical: 15

Credit :2

Prerequisite: Nil

Theory:

End Term Exam.: 0

P.A. :0

Practical:50

End Term Exam:0

P.A.: 50

RATIONALE/AIM :-

Development of life skill is required to develop interpersonal skill. This course will also help students to apply knowledge to solve common problems by applying problem solving skills. Life skill also helps to improve communication and presentation skills.

Course Objective:-

After completion of the course, students will be able to –

1. Describe Inter personal Relationship and its types
2. Explain the “problems and steps of solving the Problem
3. Presentation Skill
4. Differentiate Verbal & Non-verbal Communication
5. Explain Writing skills
6. Analysis Stress and Time management

DETAIL COURSE CONTENT:

THEORY:

UNIT	TOPIC / SUB-TOPIC	Lecture Hrs.
1.0	Interpersonal Relation	1
	1.1 Importance, Interpersonal conflicts, Resolution of conflicts,	
	1.2 Developing effective interpersonal skills communication and conversational skills, Human Relation Skills (People Skills)	

2.0 Problem Solving 2

- 2.1 Steps in Problem Solving (Who? What? Where? When? Why? How? How much?)
- 2.2 Identify, understand and clarify the problem
- 2.3 Information gathering related to problem
- 2.4 Evaluate the evidence
- 2.5 Consider feasible options and their implications
- 2.6 Choose and implement the best alternative
- 2.7 Problem solving Technique: Trial and error, BraiNStroming, Thinking outside the Box.
- 2.8 Review

3.0 Presentation Skills 4

- Concept, Purpose of effective presentations,
Components of Effective Presentations:
Understanding the topic, selecting the right information,
- 3.1 organizing the process interestingly, Good attractive beginning, Summarising and concluding, adding impact to the ending,
 - 3.2 Use of audio visual aids OHP, LCD projector, White board
- Evaluating the presentation:
- 3.3
 - Before the presentation
 - During the presentation
 - After the presentation

4.0 Nonverbal Graphic Communication: 2

- Nonverbal codes : Kinesics, Proxemics, Haptic, Vocalic,
- 4.1 Physical appearance, Chronemics, Artifacts Aspects of Body Language.
- Nonverbal Communication :
- Posture, Gestures, Eye contact and facial expression, Voice and Language Volume, pitch, Inflection, Speed, Pause, Pronunciation, Articulation, Language Handling questions, Respond, Answer, Check, Encourage and Return to presentation

5.0 Formal Written Skills:	4
Memos, Emails, Netiquettes, Business correspondence	
5.1 Letter of enquiry, Letter of placing orders, Letter of complaint	
6.0 Time Management	1
7.0 Stress Management	1

PRACTICAL:

UNIT	TOPIC / SUB-TOPIC	Lecture Hrs.
I	Interpersonal Relationship	2
	<u>Case Studies:</u>	
	1. From books	
	2. From real life situations	
	3. From students' experiences	
	Group discussions on the above and step by step write of any one or more of these in the sessional copies	
II	Problem Solving	4
	<u>Case Studies:</u>	
	1. From books	
	2. From real life situations	
	3. From students' experiences	
	Group discussions on the above and step by step write of any one or more of these in the sessional copies	
III	Presentation Skills	8
	Prepare a presentation (with the help of a Power point) on a particular topic. The students may refer to the sessional activity (Sl.No.8) of the computer fundamental syllabus of semester 1. For engineering subject oriented technical topics the cooperation of a subject teacher may be sought. Attach handout of PPT in the sessional copy	

IV Looking for a Job	4
1. Write an effective CV and covering letter for it.	
2. Write a Job Application letter in response to an advertisement and a Self-Application Letter for a job.	
V Job Interviews & Group Discussions	8
1. Write down the anticipated possible questions for personal interview (HR) along with their appropriate responses.	
2. Face mock interviews. The cooperation of HR personnels of industries may be sought if possible.	
3. Videos of Mock Group Discussions and Interviews may be shown	
VI Formal Written Skills	4
1. Write a memo.	
2. Write an effective official e-mail, write a letter of enquiry, letter of placing orders, letter of complaint	

ELECTRICAL MACHINES - I

L T P
3 1 2

Total Contact Hrs.:75 Total Marks: 150

Theory: 45

Practical: 30

Prerequisite: G103, G104

Credit: 3

Curri. Ref. No.: G303

Theory:

End Exam : 70

P.A.: 30

Practical:

End Exam.:25

P.A. : 25

RATIONALE/AIM:

The application of d.c. machine in modern industries are still in practice. The Electrical Engineering Technicians has to look after the installation, operation and control of machines. So the knowledge of machine is very essential in this regard. As the field of electrical machine is very vast, this subject is divided into two parts Electrical Machine I and Electrical Machine II. The Electrical machine-I deals with d.c. machines and transformers. Though modern industries are now-a-days uses ac motors and alternating mostly, the usage of dc machines like d.c. motors, generators are still in practice. The usages of transformers are very wide for that reason these topics have been included in this subject. This subject deals with the working principles and operation of the machines.

AIM:

1. To acquire knowledge on the construction and working principles of d.c. machine and transformer.
2. To describe the installation and maintenance procedure of d.c. machines and transformers.

DETAIL COURSE CONTENTS: THEORY:

UNIT	TOPIC/SUB-TOPIC	Total hrs.
1	DC MACHINE	10
	1.1 Construction and working principle of d.c. machines, Fleming's right hand and left hand rule.	
	1.2 To describe the magnetic circuit in a d.c. machine	
	1.3 To define geometrical axis and central axis.	
	1.4 To describe armature winding	
	1.5 To describe the brush positions	
	1.6 To define lap and wave winding	
	1.7 To state the field of application of lap and wave winding	
	1.8 To state the function of equalizing ring and dummy coils	
	1.9 To state the types of d.c. machines on the basis of connection of field coil with armature.	
	1.10 To define cumulative & differential compound machines.	
2	DC GENERATOR	9
	2.1 To describe the working principle of d.c. generator.	
	2.2 To write the emf equation of d.c. generator	
	2.3 To state the method of determining O.C.C. curve of d.c. generator (self- excited)	
	2.4 To define critical resistance and critical speed	
	2.5 To describe the armature reaction	
	2.6 To state the method of reducing the effect of armature reaction	
	2.7 To describe the load characteristics of d.c. generator	
	2.8 To state the application of d.c. generator	
	2.9 To solve problems on d.c. generator	
3	DC MOTOR	9
	3.1 To describe the working principle of d.c. motor	
	3.2 To state the significance of back emf.	
	3.3 To write the torque equation of d.c. motor	
	3.4 To describe the characteristics of	
	a) Speed vs. armature current	
	b) Torque vs. armature current	
	c) Speed vs. torque characteristics.	
	d) Speed vs. field current characteristics	

4 SINGLE PHASE TRANSFORMER	12
4.1 To define a transformer & state its basic principle	
4.2 To state the classification of transformer based on application& construction.	
4.3 To describe the construction of transformer	
4.3.1 To prepare the list of components used	
4.3.2 To describe the composition of the components	
4.3.3 To state the type and nature of cooling of transformers	
4.4 To describe the working principle of transformer.	
4.5 To describe transformer on (a) no-load (b) full load	
4.6 To derive the emf equation of transformer	
4.7 To state the effect of leakage flux and leakage reactance of transformer	
4.8 To describe the phasor diagram on no load (specify whether ideal or actual)	
4.9 To describe the actual approximate equivalent circuit	
4.10 To determine the equivalent resistance, reactance impedance referred to either side	
4.11 To determine percentage resistance, reactance and impedance of transformer	
4.12 To draw the phasor diagrams on load at different pf's	
4.13 To describe different type of losses in transformer	
4.14 To calculate the losses & efficiencies of transformer	
4.15 To state the condition for maximum efficiency of transformer.	
4.16 To state the procedure for testing of transformer	
4.17 To describe the open circuit test and short circuit test	
4.18 To determine the voltage regulation of a transformer	
4.19 To describe the construction of auto transformer	
4.20 To describe the working principle of auto transformer	
5 THREE PHASE TRANSFORMER	5
5.1 Construction of 3 phase transformer.	
5.2 Connection for three phase transformers – star/star, delta/delta, star/delta and vee/vee.	
5.3 Scott connection for three-phase to two-phase conversion.	
5.4 Conditions for parallel operation of three-phase transformers.	
TOTAL:	45

PRACTICAL:30 Hrs

S. No. Skills to be developed:

- 1 Intellectual skills-**
Basic concept about DC generator, DC motor, single phase transformer and three phase transformer, OCC characteristics of dc generator, Load characteristics of dc generator, Performance of DC motor and single phase transformer.
- 2 Motor skills –**
Verify OCC and load characteristics of dc generator, torque speed characteristics of dc motor, determine efficiency and regulation of DC generator and Transformer, Find the performance of dc motor, draw the phasor diagram of transformer, speed control of dc motor.
- 3 Social Skills –**
Learn to work with peers as a group
Communicate with peers and teachers to clarify the doubts
Arrange the workplace
Troubleshooting on electrical machines and repairing
Applications of dc motors, generators and transformers

REFERENCE TEXTS/BOOKS:

Authors	Book Title	Edition	Publisher
Dr. S. K. Bhattacharya	Electrical Machines		T.M.H.
J. D. Edwards	Electrical Machines		Mackmillan.
I. J. Nagrath and D. P. Kothari	Electric Machines		T.M.H
B L Theraja	A Textbook of Electrical Technology - Vol II.		S Chand

ELECTRICALPOWER SYSTEM -I

Suggested List of Laboratory Experiments :-

S.No Laboratory Experiments

1. Dismantling of a d.c. machine and study its different parts.
2. Determination of no load characteristics (OCC curve) of d.c. machine
3. Study of a single phase transformer
4. Polarity test on a single phase transformer
5. To determine the speed torque, speed armature current and torque armature current characteristics of a d.c. motor
6. To control the speed of a d.c. motor by (a) armature voltage variation (b) field current variation.
7. To assemble and test the speed reversal circuit of a d.c. shunt motor
8. To study oc and sc test of transformer and draw its phasor diagram
9. To determine the (a) no load loss (b) full load loss (c) efficiency and percentage regulation of a single phase transformer.
10. To determine the phasor diagram of transformer on load at different pf
11. Parallel operation of single phase transformer

- *Any suggested Assignment / Micro project.*

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Total Contact Hrs.:45 Total Marks: 100

Theory: 45

Practical: 0

Pre-requisite: Nil

Credit : 5

Curri. Ref. No.: EE405

Theory:

End Exam : 70

P.A.: 30

Practical:

End Term Exam:0

P.A. : 0

RATIONALE/AIM:

The electrical power generation and energyconsumtion is back bone of every country. The main aim of this subject is to know power generation methods, techniques and economical strategy which methods are suitable on the base of natural resouces, technical expertise and economy. This course is intended to enable the student understand the facts, concepts, principles and procedures related to the electric power generation, transmission and distribution so that students can acquire supervisory skills, which will help him/her to discharge his/her role as a supervisor when he/she starts to work in the industry.

Course Objectives:

After completion of the course, students will be able to:

1. Explain the operation of thermal, hydro electric and nuclear power plant.
2. Discuss the concept of power planning and economics.
3. Describe power plant installation.
- 4 Explain the operation of different types of sub-stations.
- 5 Design maintenance schedule of sub-stations.

DETAIL COURSE CONTENT

THEORY: 45 Hours

UNIT	TOPIC / SUB-TOPIC	Lecture Hrs.
1	Generation of Electrical Power	12
1.1	To state the name of the sources of energy	
1.2	To describe the factors on which the following generating systems are implemented (a) Thermal Power station (b) Hydro Electric Power Station (c) Atomic Power stations (d) Gas Turbine (e) Diesel generating systems	
	Thermal Power Generation	
1.3.1	To describe the detail layout of thermal power station	
1.3.2	To state the factors for site selection and furnish the list of thermal power plants	
1.3.3	To state the generating capacity of the thermal power station	
1.3		
1.3.4	To describe the working principle of the following (a) Coal handling Plant (b) Alternators (c) condensing plant (d) Water treatment plant (d)Ash handling system (f)Station auxiliaries (g) pulverizing system (h) steam generation system (i) turbine system (j) Electrostatic Precipitator (ESP)	
	Hydro Electric Power Generation	
1.4.1	To state the reasons for developing a Hydro Electric Project	
1.4	1.4.2 To describe different type of hydroelectric project	
	1.4.3 To furnish a list of hydroelectric projects and their capacities	
	1.4.4 To describe the detail layout of the hydroelectric project.	

- 1.4.5 To describe the alternator, and turbine of the hydroelectric projects
- 1.4.6 To describe the station auxiliaries of the hydroelectric projects
- 1.5 Atomic Power Generation
 - 1.5.1 To state the reasons for selecting Atomic Power Station as a power-generating unit
 - 1.5.2 To state the factors on which the site is selected
 - 1.5.3 To state different types of Atomic reactors used in Power generating system
 - 1.5.4 To describe the detail layout of the Atomic Power generating system
 - 1.5.5 To describe the safety system needed for the running and maintenance of the Atomic Power generating system
 - 1.5.6 To state the advantages and disadvantages of Atomic Power generating system
- 1.6 Diesel Generating Plants
 - 1.6.1 To state the reason for selection of Diesel generating system as power generating unit
 - 1.6.2 To state the capacities of the Diesel generating System
 - 1.6.3 To describe the schematic layout of the Diesel generating System
 - 1.6.4 To describe the starting procedure of a Diesel generating System
 - 1.6.5 To furnish the list of materials and components required for the operation and maintenance of Diesel generating Set
 - 1.6.6 To state the relevant IE rules for connecting the Diesel generating set with the bus bar
 - 1.6.7 To prepare the maintenance schedule
 - 1.6.8 To prepare the testing schedule for the repair work during breakdown
- 1.7 Gas Turbine
 - 1.7.1 To state the reason for selecting gas turbine
 - 1.7.2 To prepare the layout of the gas turbine
 - 1.7.3 To explain the working principle of the gas turbine
 - 1.7.4 To state the advantages & disadvantages of gas turbine

1.8	To perform the comparative study of steam, Hydel, Atomic, Diesel generating and gas turbine plants			
2	Power Planning Economic and Tariff	10		
2.1	To define (a) Demand (b) Load Curve (c) Maximum Demand or Peak Load (d) Connected load (e) Demand factor (f) Load factor (g) Diversity factor (h) Plant Factor			
2.2	To solve the problems on above			
2.3	(a) to describe the factors involved for determining cost of generation (b) To solve problems on 2.3 (a)			
2.4	(a) To describe the method of determination of size of conductors and apply Kelvin's law (b) Solve problems on 2.4(a)			
2.5	(a) To describe the method of (i) load survey (ii) Planning (iii) calculation for Tariff (b) To solve problems on 2.5 (a)			
2.6	(a) To describe the method of power factor improvement of a plant (b) To solve problems on 2.6(a)			
2.7	(a) To describe the factors involving the economic choice of Equipment (b) To explain power auditing			
3	Power Installations and Drives	10		
3.1	To define power installation			
3.2	To list and explain the factors on which a power installation is designed			
3.3	To prepare a layout of an Industrial Power Distribution System			
3.4	To describe the methods for the selection of drive in an industrial system			
3.5	To state and explain the factors on which the motor is selected			
3.6	To prepare a table stating the properties and application of Different type of Motor			
3.7	To describe the method for the choice of device for specific Industrial Utility			
3.8	To design and estimate for a 400 V, three phase 4 wire bus bar system (Power derived from 3 phase 11 KV system)			
4	Sub Station			10
4.1	To define substation			
4.2	To prepare the list of equipment of a sub-station			
4.3	To design the layout of a transmitting sub-station			
4.4	To design the layout of (a) Primary distribution sub-station (b) Secondary distribution sub-station			
4.5	(a) To describe the method of Earthing the Substation (b) To describe the earthing systems as per Bureau of Indian Standard (c) To state the relevant IE Rules for sub-station earthing			
4.6	(a) To distinguish between Earthed versus Isolated neutral power system (b) To describe the reason for neutral point earthing.			
4.7.1	To describe the method of Inspection & Maintenance of (a) Switchgear (b) Transformer (c) Transformer oil (d) Bus bars (e) Power factor improvement devices			
4.7.2	(a) To describe the method of transformer oil testing (b) Describe the effect of contamination (c) To describe the method of filtering andreconditioning of transformer oil (d) Properties and application of mineral oil (e) State the relevant code for the transformer oil testing			
5	Battery Bank			3
5.1	To describe the detail of connection and function of a battery bank			
				Total: 45

Any Suggested Assignment / Micro project:

ELECTRICAL ENGINEERING WORKSHOP

L T P
0 0 4

Total Contact Hrs.: Total Marks: 50

Theory: 0

Practical: 60

Pre-requisite: Nil

Credit: 2

Curri. Ref. No.: EE408

Theory:

End Term Exam: 0

P.A.: 0

Practical:

End Term exam: 0

P.A.: 50

RATIONALE:

The role of the subject Electrical Engineering Workshop is very important in building up the career of a technician. It is necessary to learn the concepts, skill, process/technique and develop attitude to work. The concept can be learned in the lecture classes, but for developing skill, learning the process or technique or to develop the attitude to work can be acquired by attending the workshop. In, this curriculum case has been taken to include such type of the job which are encountered frequently in the day to day life of an electrical technician. The jobs are arranged in such a manner that the technicians will learn the technique of solving problems and importance of the IE rules and IS specification.

AIM:

- To develop skill on wiring practices
- To develop skill in connecting different accessories
- To learn the techniques of fixing and preparing the layout of electrical wiring
- To learn the techniques of measuring insulation resistance and earth resistance

Course Objective:-

After completion of the course, students will be able to:

- Develop skill on electrical wiring in house, office and industry
- Develop skill in connection of different accessories
- Learn the techniques of fixing and preparing the layout of electrical wiring
- Learn the techniques of measuring insulation resistance and earth resistance

DETAIL COURSE CONTENT

PRACTICAL:

UNIT	TOPIC/SUB-TOPIC	Contact Hrs.
1	To identify different type of tools and accessories used in electrical work shop and prepare a list with diagram.	
2	To study the safety practices in Electrical workshop and prepare a brief Instructional manual	
3	To dismantle a ceiling fan using screw driver, wrenches, bearing puller etc. and prepare a list of components	
4	To dismantle and assemble single phase and three phase pump motor using screw drivers, wrenches, bearing puller and prepare the list of components.	
5	To perform the preventive maintenance operation of a three phase induction motor along with the servicing of star/delta starter and single phase preventor circuit (Maintenance schedule and maintenance log book must be prepared as per bureau of Indian Standard)	
6	To perform the connection of a wiring installation for (a) incandescent lamp controlled by a reed switch (b) 5 amp. 230V. 3 pin socket controlled by a reed switch (c) a ceiling fan controlled from a reed switch through a miniature circuit breaker with neon indicator must be used.	
7	To perform the wiring connection of twin fluorescent lamp (Stroboscopic effect elimination and power factor improvement methods must be practiced)	
8	To perform the wiring connection of three fluorescent lamps using three phase 4-wire supply (To state the reason and field of application of such connection).	
9	To assemble a Semi-Automatic Star Delta starter using contactors and time delay and thermal over load unit.	
10	Assemble a Direct on line starter using contactor, thermal over load and Single phase preventer circuit.	
11	To practice the winding of coils for small transformers, and assemble it in stamping of cores finally perform the testing.	

- 12 To perform the Megger testing of a wiring installation and fill in the test report form of the Electric Supply authorities. (The conventions stipulated in IE Rules and IS specifications must be practiced).
- 13 To perform the resistance measurement of an earth installation using earth Megger testing equipment (The convention stipulated in IE Rules and IS Specification must be practiced).
- 14 To assemble the coils of stator Rotor of an induction motor after using different type of insulating materials and locking wedges.
- 15 Perform the testing of insulation resistance of the stator and rotor of 3 phase 400V wound rotor induction motor.
- 16 To perform the good and bad test of (a) Diode (b) transistor (c) resistor (d) inductor (e) capacitor by digital Multimeter.
- 17 To solder the joints of (a) 12 SWG solid copper conductor using 65 watt 230 V. soldering Iron.(b) Six numbers of 10 amp. 1000 V. Diode with heat sink and connecting lugs by 35 watt 230 V. soldering iron. (c) a 8 pin DIP base on printed circuit vero board by 18 watt 230V. Leakage free soldering iron using of tweeters, nippers, pliers are to be practiced. De-soldering of above job.
- 18 To perform the installation work of a 5KW 400V motor. The work should be completed with (a) foundation detail (b) layout of the system (c) list of connection (d) testing method.
- 19 To study and trace wiring installation of building and prepare the single layout diagram with full specification of the accessories and control gears used.
- 20 To practice the fixing of porcelain insulators, safety devices on the arm Steel pole (uses of the specification of Bureau of Indian Standard Specification).
- 21 To assemble the string insulator.
- 22 To assemble a 400 V. Distribution panel using (a) Miniature circuit Breakers (b) MCCB (c) CT with ammeter and selecting switch (d) Voltmeter with selecting switch.

Text /Reference Books:

Author	Titles of the Book	Edition	Publisher
TG Francis	Electrical Installation Work		ELBS

ELECTRONICS DEVICES & CIRCUITS - II

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3	0	2

Total Contact Hrs.: **Total Marks: 150**

Theory: 45

Practical: 30

Pre-requisite:Nil

Credit: 4

Curri. Ref. No.: EE410

Theory:

End Term Exam: 70

P.A.: 30

Practical:

End Term exam:25

P.A.: 25

RATIONALE:

The application of electronic devices is increasing, not only in the field of electronics communication and instrumentation but it is also used in the field of electrical Engineering. In fact the field of electronics is being amalgamated with the field of electrical engineering. So the study of electronic devices and circuits are very essential for the students of the diploma course in electrical engineering. The part of this subject deals with the characteristics of basic devices like diode transistors and their circuits. The second part is dealing with the special devices e.g. UJT, FET, MOSFET, OPAMP, 555 timers and three terminal regulator chips. The study of CRO, digital multimeter and signal generators have also been included in this subject.

AIM:

1. To acquire the knowledge of application and working principles of UJT, FET, MOSFET, OPAMP, timing regulators.
2. To acquire the knowledge for specifying and indenting of the components as stated in Sl. No 1.

Course Objective:-After completion of the course, students will be able to:

1. Explain different types of field effect transistors.
2. Sketch the characteristics of UJT, FET and MOSFET.
3. Describe the working principle of differential amplifier.
4. Explain the construction, working principle and characteristics of operational amplifier.
5. Illustrate different applications of Transistors and OP-AMP.

DETAILED COURSE CONTENTS

THEORY:

UNIT	TOPIC/SUB-TOPIC	Contact Hrs.
1	Uni-Junction Transistor	6
	1.1 To describe the construction, working principle and characteristics of uni-junction transistor.	
	1.2 To define (a) emitter current (b) negative resistance region (c) saturation region	
	1.3 To describe the UJT relaxation oscillator circuit and write expression for the time period of the oscillator	
	1.4 To state some application of UJT relaxation oscillator	
2	Field Effect Transistor	8
	2.1 To describe the construction, operation and characteristics of junction field effect transistor	
	2.2 To define (a) channel ohmic region (b) pinch off region (c) drain resistance (d) trans conductance	
	2.3 To define the resistance of diode and describe the method of measurements	
3	MOSFET	8
	3.1 To describe: (a) depletion MOSFET (b) enhancement MOSFET	
	3.2 To differentiate the characteristics of JFET and MOSFET	
	3.3 To describe the handling precautions of MOSFET and CMOS	
4	Differential Amplifier	8
	4.1 To define a differential amplifier and explain its significance	
	4.2 To describe four different configuration of the differential amplifier.	
	4.3 To deference the voltage gain, differential input resistance and output resistance.	

5 Operational Amplifier

15

- 5.1 To define operational amplifier.
- 5.2 To describe the manufacturers designation for integrated circuits
- 5.3 To define SSI, MSI, LSI and VLSI packages.
- 5.4 To draw the circuit symbol for a 741 Op-amp and show the in number for each terminal.
- 5.5 To furnish the ordering information of Op-Amp.
- 5.6 To describe the power supplies required for Op-amp circuits
- 5.7 To define (a) Input off set voltage (b) input off set current (c) common mode rejection ratio (d) large signal voltage gain (e) slew rate (f) output resistance (g) output short circuit current of operational amplifier.
- 5.8 To state the seven important properties of the ideal Op-Amp.
- 5.9 To define (a) open loop op-amp configuration (b) differential amplifier (c) inverting amplifier (d) non-inverting amplifier.
- 5.10 To define (a) ground terminal (b) virtual ground.
- 5.11 To draw the inverting and non-inverting amplifier circuit.
- 5.12 To calculate the close gain of inverting and non-inverting amplifiers.
- 5.13 To develop mathematical expression and state the applications of (a) adder (b) subtractor (c) integrator (d) differentiator circuit (e) voltage follower.
- 5.14 To define comparator and show the output waveform for sinusoidal input and the reference voltage of (a) zero voltage (b) Positive voltage (c) Negative voltage.
- 5.15 Describe (a) zero crossing detector with hysteresis (b) voltage to current converter (c) currents to voltage converter
- 5.16 To state some application of op-amp (a) high resistance voltmeter (b) zener diode tester (c) diode tester (d) LED tester (f) 4 - 20 mA current loop (g) tone control circuit.
- 5.17 To explain the operation of a multi vibrator circuit and sketch its output voltage waveform and calculate the frequency of oscillation.

- 5.18 To develop a square/triangular wave generation using op-amp, resistors and capacitor and determine frequency of oscillation.
- 5.19 To develop basic differential amplifier using op-amp
- 5.20 To describe the (a) low pass (b) high pass and (c) band pass filter using Op-Amp.

Total: 45

PRACTICAL :-

SL.No. SKILLS TO BE DEVELOPED

1. **Intellectual skills-**
2. **Motor skills-**
3. **Social skills-**
Learn to work with peers as a group
Communicate with peers and teachers to clarify the doubts
Arrange the workplace
Troubleshooting simple electrical & electronics circuits and repairing

TEXT / TEXTBOOK REFERENCES:

<u>Authors</u>	<u>Book Title</u>	<u>Publisher</u>
S. K. Mandal	Basic Electronics	McGraw Hill Education
Allen Mother Shed	Electronic Devices and Circuits	PHI
Robert Conghlin, Frederick F. Drescolt	Operational Amplifier and Linear Integrated Circuit	PHI
Ramakant A. Gayakwad	Op-Amp and Linear Integrated Circuits	PHI
S. K. Mandal	Basic Electronics	McGraw Hill Education
Allen Mother Shed	Electronic Devices and Circuits	PHI

SUGGESTED LIST OF LABORATORY EXPERIMENTS :-

Sl.No LABORATORY EXPERIMENTS

1. To draw the emitter characteristics curve of the junction transistor and identify cutoff, negative resistance region and saturation region of the device
2. Construct a UJT relaxation oscillator circuit and measure the peak value of output voltage and frequency of oscillation at different value of RC.
3. To draw the (a) drain currents for different values of Vos (b) transconductance curve of JFET
4. Construct the (a) common source (b) common drain (c) common gate amplifier of JFET and compare their gains
5. To construct the inverting amplifier and verify the gain of amplifier with various ratio of Ri and Rf. Also check the gain of input, output signals (use IC 741)
6. To construct the non-inverting amplifier and verify the gain of amplifier with various ratio of Ri and Rf.
7. Construct the adder and subtractor circuit using IC 741 and verify the output voltage with various input voltages
8. Construct an integrator circuit and note the output waveform for a square wave input.
9. Construct a differentiation circuit and note the output wave form for a triangular input voltage.
10. To develop a comparator circuit and note the output waveform with sinusoidal input and (a) zero volt (b) positive voltage and (c) negative voltage inputs as the reference input at the non-inverting input terminals.
11. To develop a square wave/triangular wave generator circuit by using IC 741 as square wave generator and integrator.
12. To develop (a) voltage to current and (b) current to voltage converter circuit and check and adjust its linearity.
13. To use a IC 741 in differential mode and check its common mode rejection capability.
14. To develop an instrumentation amplifier by using three IC 741

- **Any suggested Assignment / Micro project.**

ELECTRICAL ESTIMATING & ILLUMINATION DESIGN

L T P

Curri. Ref. No.: EE502

3 1 0

Total Contact Hrs.:

Total Marks: 100

Theory: 100

Theory: 45

End Exam: 70

Practical: 0

P.A.: 30

Practical:

Pre-requisite:

End Exam: 0

Credit :4

P.A.: 0

RATIONALE:

Electrical engineering diploma holders are very often faces the problems of estimation of the electrical installation work and the design aspects of the illumination system. The basic idea of electrical installations, the detail of electrical components and accessories and luminaries and design procedure of illumination system are discussed here. The study of bureau of Indian standard specifications are also to be discussed in this subject.

AIM:

1. To describe the steps of design procedure
2. To describe the steps of estimating procedure
3. To design the circuits of motor controllers
4. To estimate the quantity and cost of components
5. To prepare the list of components with full specification
6. To select correct size of components
7. To design and estimate the illumination system for domestic, office, street light courtyard and factors installation.

DETAILED COURSE CONTENTS:

UNIT	TOPIC/SUB-TOPIC	Contact Hrs.
1	Electrical symbols and standards	5
	1.1 To state the need of electrical system	
	1.2 To prepare the list of symbols	
	1.3 To illustrate different electrical diagram	
	1.4 To state the methods of representatives for wiring diagrams	
2	Lighting Installation	5
	2.1 To calculate the following of a domestic building	
	a) Total load of the installation	
	b) Size of feeder and main switches	
	c) Number of sub circuits	
	d) Size of sub circuit components	
	e) Length and number of components	
	f) Total cost of the installation	
	2.2 (a) To show the layout of the installation on the building plan	
	(b) Prepare the single line and multiline diagram showing the size of components	
3	To estimate the detail connection of a service line from A three phase four wire overhead system (3 phase 4 wire 400 V, 50Hz 20KW load)	8
	3.1 To calculate the following for an industrial installation	
	a) Total load of the installation	
	b) Size of Feeder and main switches	
	c) Number of three phase sub circuit	
	d) Number of single phase sub circuit as per Bureau of Indian standard	
	e) Size of components	
	f) Length and number of components	
	3.2 To prepare layout of the system	
	3.3 To show the single line diagram	
	3.4 To estimate the cost of the installation	

- 4 To estimate the cost of a pole mounted substation (11 KV/400V three phase 4 wire secondary 150 KVA distribution load) 7**
- Show detail diagram of the accessories mounted
 - Prepare list of equipment with full specification
 - Indicate the quantity and cost of components.
- 5 Automatic Starter Design 5**
- To design and estimate the automatic star/delta starter using contractors and time delay unit
 - To show the connection diagram
 - Prepare list of components with full specifications
 - Estimate the total cost
- 6 Distribution Panel Design 5**
- To design and estimate distribution panel including the bus bar and metering system
 - To prepare the detail diagram
 - To prepare the list of equipment with detail specification
 - To estimate the cost
- 7 Design of Illumination Scheme 10**
- To define the important terminologies related to illumination
 - To state the laws of illumination
 - To use the standard formulae for determining the required lumen output
 - To determine the number of luminaries
 - To state different illumination levels for different purpose
 - To define, state and describe different type of luminaries like fluorescent lamp, incandescent lamp, sodium vapour lamp etc.
 - To design a practical lighting scheme for
 - domestic installations
 - drawing office
 - courtyard lighting
 - street lighting

Total: 45

Text /Reference Books:

Name of Authors	Titles of the Book	Publisher
K. B. Raina and S.K. Bhattacharya	Electrical Design, Estimation and Costing	DhanpatRai& Co.
Surjit Singh	Electrical Estimating and Costing	Khanna Publication
J. B. Gupta	Electrical Estimating and costing	S K Kataria& Sons

* Any Suggested Assignment / Micro project:

DIGITAL ELECTRONICS & MICROPROCESSOR - I

L T P
3 0 2

Curri. Ref. No.: EE503

Total Contact Hrs.:75 Total Marks: 10

Theory: 45

Practical: 30

Prerequisite: Nil

Credit: 4

Theory:100

End Term Exam :70

P.A.: 30

Practical:

End Exam.:25

P.A. :25

RATIONALE:

A lot of MSI, LSI, VLSI and Microprocessors have been developed and are being widely used in the Industrial Applications. To understand the functions of the above-mentioned chips it is required to learn the basic principles. So the different topics of digital electronics have been included in this subject. As the field of Digital Electronics and Microprocessor is very vast, the subject is divided into two parts. In the first part the study of fundamental principles have been included visa vis the study of combinational and sequential logic application of different IC chips have also been included here. The knowledge of digital to Analog and Analog to Digital converters are very essential for interfacing the analog to Digital System. So, these topics have also been included.

AIM:

- To acquire knowledge on the operation of basic building blocks e.g. AND, OR, NOT.
- To develop the (a) combinational logic circuits (b) Sequential logic circuits
- To acquire knowledge on the operation of DAC and ADC modules
- To develop application circuits by using available standard IC Chips

Course Objective:-After completion of the course, students will be able to:

1. Explain the operation of basic building blocks such as AND, OR, NOT, NAND, NOR and Ex-OR gates.
2. Develop combinational and sequential logic circuits
3. Discuss the operating principle of DAC and ADC
4. Use different digital ICs to design any digital circuit

DETAILED COURSE CONTENT:

UNIT	TOPIC/SUB-TOPIC	Contact Hrs.
1	Number system and Binary Codes	7
	1.1 To write the generalized equation for the conversion of a number from other systems to the decimal systems	
	1.2 To convert (a) decimal number to binary number (b) octal to binary (c) binary to octal (d) hexadecimal to binary (e) binary to hexadecimal (f) octal to hexadecimal (g) hexadecimal to octal number	
	1.3 To classify the numeric codes	
	1.4 To define (a) weighted code (b) BCD Code (c) non weighted code (d) non-error detecting code (e) ring counter code (f) excess three code (g) gray code (h) self-checking code (i) parity checking code (j) error checking code (k) simple error correcting code (l) self-correcting code (m) alphanumeric code (o) seven segment display	
	1.7 To perform a) binary addition b) binary subtraction c) binary multiplication d) binary division	
	1.8 To perform the (a) 1's complement operation of binary number (b) binary subtraction by using 1's complement operation (c) 2's complement operation (d) binary subtraction using 2's complement	
2	Digital Logic Circuit and Boolean algebra	7
	2.1 To describe (a) switching circuits (b) logic gates (c) symbols for logic gates (d) truth table for different type of gates	
	2.2 To realize exclusive-OR in terms of basic building blocks.	
	2.3 To define universal building blocks and realization of basic logic gates in terms of universal logic gates	
	2.4 To use diode and transistor, as logic gates	
	2.5 To familiarize with RTL, DTL, TTL, ECL. IIL Circuits	

2.6	To define SSI, LSI, MSI, Fan in, Fan out, Noise level in TTL circuits, totem pole configuration	
2.7	To use Boolean Algebra for the verification De-Morgan's theorem and other Boolean Functions	
2.8	To describe (a) sum of product (b) NAND gate realization (c) Product of Sum (d) NOR gate realization.	
2.9	To define (a) minterm (b) maxterm	
2.10	To use Karnaugh Map for simplification of Boolean equation	
3	Combinational and arithmetic Logic Circuits	7
3.1	To develop and explain (a) half adder (b) full adder (c) binary parallel adder (d) subtractor (e) full & half subtractor (f) adder/subtractor in 1's complement and 2's complement system (g) BCD addition and subtraction in 9's complement system (h) excess 3 adder and subtractor	
3.2	To develop and explain following circuits (a) comparators (b) encoder (c) decoder, (d) multiplexing (e) demultiplexing (f) priority encoder (g) BCD to seven segment display decoder	
3.3	State the application of above circuit	
4	Sequential Circuits	7
4.1	To develop and explain the following circuits (a) flip flop using NAND or NOR gate (b) RS-flip flop (c) clocked RS flip flop (d) D flip-flop (e) triggering of flip-flop (f) J-K flip-flop (g) T flip-flop (h) Master slave flip-flop	
4.2	To state the application of the above circuits	
4.3	To develop and explain following circuits (a) Asynchronous or ripple counter (b) Modulo counter (c) Synchronous counter (d) Divide by N counter (e) Decade counter (f) Up-down counter (g) ring counter (h) Johnson Counter	
4.4	To state the application of above counters	
5	Shift Register	5
5.1	To develop and explain following circuits (a) Shift register (b) Buffer register (c) Serial in serial out register (SISO) (d) Parallel in serial out shift register (PISO) (e) Parallel in parallel out shift register (PIPO) (f) Bi-directional shift registers	
5.2	To describe the connection diagram and application of IC Shift registers.	
6	Digital Memories	5
6.1	To describe the functions and applications of digital memories like (a) RAM (b) ROM (c) PROM (f) Magnetic core memories (g) Magnetic surface storage devices (h) Magnetic tape (i) Magnetic disc storage device.	
6.2	To describe the following operation with the help of digital circuits (a) Serial adding (b) Parallel adding (c) Parallel subtracting (d) Combined adder-subtractor (e) Multiplication circuit (f) Division circuit	
7	DAC AND ADC	7
7.1	To explain the working principles of (a) D/A converter with binary weighted register (b) D/A converter with R and 2 R resistors (c) Monolithic / hybrid D/A converter	
7.2	To describe a practical circuit for using D/A converter in instrumentation and control circuit	
7.3	To explain the working principle of (a) Successive approximation A/D converters (b) Monolithic/hybrid A/D converter (c) Single and dual slope integration ADC (d) Counter and servo type ADC (e) Parallel type ADC	
7.4	To describe a practical circuit for using ADC in instrumentation and control circuit	
Total		45

PRACTICAL:	
S. No.	SKILLS TO BE DEVELOPED

Intellectual Skills –

1. Basic concept of combinational logic circuits, half and full adder, flip flops, shift registers, counters, parity bit checker, decoder, seven segment display, analog to digital converter and digital to analog converter.

2. **Motor skills-**

Construct half and full adder circuits, four bit parallel adder circuits, four bit ripple counters, synchronous counters, seven segment display, ADC and DAC circuits, verify the truth table of JK flip flops, decade counters and decoders.

3. **Social skills-**

Learn to work with peers as a group
 Communicate with peers and teachers to clarify the doubts
 Arrange the workplace
 Troubleshooting digital circuits and repairing

Text /Reference Books:

Authors	Titles of the Book	Publisher
S. K. Mandal	Digital Electronics Principles and Applications	McGraw Hill Education
Malvino& Leach	Digital Principles and application	TMH
R.P.Jain	Digital Electronics and Microprocessor Problems and Solution	TMH
Mono and Kim	Logic and computer design Fundamentals	Pearson
Thomas.L.Floyd	Digital Fundamentals	Pearson Education

Suggested List of Laboratory Experiments :-

S.No Laboratory Experiments

1. To develop the half adder and full adder circuit and verify the truth table
2. To connect a 4-bit parallel full adder circuit and verify the Truth Table
3. To connect four flip flop circuit to develop a four bit ripple counter
4. To connect a J.K. flip flop circuit and verify the truth table for various input of J & K
5. To connect 4 flip flop with "Pre" and "CLR" input terminal for developing different type of shift registers
6. To connect the 7492 counter chip to develop different module counter
7. To connect the 7490 decade counter with display decoder system for showing the counting operation
8. Connect the XOR circuit to develop parity bit checker
9. To develop a 3 to 8 decoder circuit
10. To develop a set-reset flip flop by using 7400 (NAND Gate) chip
11. To develop a divide by 'N' counter by using 7473 chip
12. To develop a two digit counter by using 7490, 7448 and seven segment Display
13. Develop a 4 to 1 multiplexer circuit by using discrete chips
14. To develop a 4 digit multiplexed display counter by using MM 925 and other relevant components
15. To develop a up down counter circuit by using flip flops and AOI (And OR Invert) circuits
16. To connect the DAC chip MC1408 L or 0800 in the circuit to check the conversion process
17. To connect the ADC 7109 on the circuit to check the conversion process

Any Suggested Assignment / Micro project:

PROFFESIONAL PRACTICE - III

L T P
0 0 3

Curri. Ref. No.: EE511

Total Contact Hrs.:45

Total Marks: 50

Practical:

Pre-requisite: Nil

P.A. : 50

Credit : 1

RATIONALE:

To develop general confidence, ability to communicate and attitudes, addition to basic technological concepts through Industrial visits, lectures, seminars on related technical topics and group discussion experts.

DETAIL COURSE CONTENT:

S. No.	ACTIVITIES	Hrs.
1	<p>Structured field visit be arranged and report of the same should be submitted by the individual student, to form part of the term work. Visit to any ONE from the list below(Should not have completed in earlier Term):-</p> <ol style="list-style-type: none"> 1. A thermal generating station 2. A hydal power generating station 3. A wind mill and/ or Hybrid power station of wind and solar 4. An electrical substation 5. A switchgear manufacturing/repair industry 6. An electrical Machine manufacturing Industry 7. A large industry to study protection problem 8. Any industry having Automation for manufacturing process 9. A transformer repair workshop 10. Industry of power electronics devices 11. Maintenance department of a large industry 12. Transmission tower project area 13. Any contemporary industry under MSME sector to understand detail of operation and starting of a new venture. 14. Any other technical field area as may be found suitable alternative to above list. 	

S.No.	ACTIVITIES	Hrs.
2	<p>Guest Lecture by Professional/Industry expert: Lectures by Professional / Industrial Expert to be organized from any TWO of the following areas:</p> <ol style="list-style-type: none"> 1. Modern trend in AC Machine 2. Automotive wiring & Lighting 3. Modern techniques in Power Generation 4. New trends in power electronics devices. 5. TQM 6. Recent modification in IE rule 7. Role of power factor improvement as tool in reducing the cost of generation 8. Digital metering 9. Hydro power generation 10. Functioning of Electricity regulatory authority 11. Introduction and application areas of MEMS (Micro Electromechanical System) 12. Interview techniques 13. Career opportunities for diploma Engineers. 14. Cybercrime & Cyber laws 15. Social networking-effets& Utilities 16. Ethical Hacking 17. Industrial Dispute and labour laws. 18. Entrepreneurship development and opportunities 19. Role of micro, small and medium enterprises in Indian Economy Individual Report of the above lectures are to be submitted by the students. 	4
3	<p>Seminar/Poster Presentation: Students should either present in seminar or prepare poster on any ONE topic as suggested below(should not be already done in earlier semester): Students 9 Group of 4 to 5 students have to search/collect information about the topic through literature survey/internet search/visit and discussion with expert or concerned persons</p>	12

Sample path for Term IV in Electrical Engineering.

Sl. No	Code	Course	Study Scheme			Evaluation Scheme								Total Marks	Credit	
			Pre-requisite	Contact Hours / Week			Theory					Practical				
				L	T	P	End Exam	Progressive Assessment			End Exam	Progressive Assessment				
								Class Test	Assignment	Attendance		Sessional	Viva voce			
1	G302	Development of Life Skill-Ii		1	0	2	0	0	0	0	0	25	25	50	2	
2	EE403	Electrical Machine-I		3	1	2	70	15	10	5	25	25	0	150	5	
3	EE405	Electrical Power System –I		3	0	0	70	15	10	5	0	0	0	100	3	
4	EE408	Electrical Engineering Workshop		0	0	4	0	0	0	0	0	50	0	50	2	
5	EE410	Electronic Devices & Circuit-II		3	0	2	70	15	10	5	25	25	0	150	4	
6	EE502	Electrical Estimating & Illumination Design		3	1	0	70	15	10	5	0	0	0	100	4	
7	EE503	Digital Electronics & Microprocessor		3	0	2	70	15	10	5	25	25	0	150	4	
8	EE511	Professional Practices-III		0	0	3	0	0	0	0	0	50	50	100	2	
TOTAL				19	2	19	420	90	60	30	150	250	50	1050	30	