

SIXTH SEMESTER

Sr. No.	SUBJECTS	STUDY SCHEME Periods/Week			Credits	MARKS IN EVALUATION SCHEME								Total Marks of Internal & External
		L	T	P		INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
						Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot	
6.1	Installation, Maintenance and Repair of Electrical Equipment	6	-	6	7	20	35	55	50	2 ½	70	3	120	175
6.2	Electrical Design, Drawing and Estimating II	5	-	8	7	20	20	40	50	3	40	4	90	130
6.3	Utilization of Electrical Energy	5	-	-	4	20	-	20	50	2.5	-	-	50	70
6.4	Application of Computer Software in Electrical Engineering	-	-	2	1	-	20	20	-	-	30	3	30	50
6.5	Project Work	-	-	12	5	-	50	50	-	-	100	3	100	150
#Student Centred Activities		-	-	4	2	-	30	30	-	-	-	-	-	30
Total		16	-	32	26	60	155	215	150	-	240	-	390	605

Student Centred Activities will comprise of co-curricular activities like extension lectures, games, hobby clubs e.g. photography etc., seminars, declamation contests, educational field visits, N.C.C., NSS, Cultural Activities and self study etc.

6.1 INSTALLATION, MAINTENANCE AND REPAIR OF ELECTRICAL EQUIPMENT

L T P
6 - 6

RATIONALE

In his career as a supervisor, an electrical engineering technician will be called upon to inspect, test and modify the work done by skilled workers or artisans working under him. Many a times, it will become necessary for him to demonstrate the correct method and procedure of doing certain operations. Normally manufacturers of heavy electrical equipment provide service manuals, instructions for installation, maintenance and fault location. Indian Electricity Rules and Indian Standard Specifications also provide enough guidelines. This syllabus has been designed to provide certain guidelines and broad principles regarding the above activities. Appropriate field trips will reinforce the learning.

LEARNING OUTCOMES

After undergoing the subject, the students will be able to:

- Erect/install various electrical equipment as per IE Rules Act by adopting all safety measures.
- Prepare specifications for different items required for transmission lines.
- Design and excavation of cable trenches.
- Lay underground cables
- Test cables and their termination.
- Check HT/LT circuit breakers, transformers and related equipment in a substation
- Carry out earthing, make earth pits and measure earth resistance values.
- Find fault in a transmission/distribution system.
- Carry out preventive maintenance to minimize breakdowns.

DETAILED CONTENTS

1. Tools and Accessories (14 Periods)

Tools, accessories and instruments required for installation, maintenance and repair work. Knowledge of Indian Electricity rules, safety codes, causes and prevention of accidents, artificial respiration of an electrocuted person, workmen's safety devices

2. Installation (40 Periods)

2.1 Installation of transmission and Distribution Lines

Erection of steel structures, connecting jumpers, tee-off points, joints and dead ends; crossing of roads, streets, power/telecommunication lines and railway line crossings, clearances; earthing of transmission lines and guarding, spacing and

configuration of conductors: Arrangement for suspension and strain insulators, bird guards, anti-climbing devices and danger plates; sizes of conductor, earthwire and guy wires.

Laying of service lines, earthing, provision of service fuses, installation of energy meters

2.2 Laying of Underground Cables

Inspection, storage, transportation and handling of cables, cable handling equipment, cable laying depths and clearances from other services such as: water, sewerage, gas, heating and other mains, and also a series of power and telecommunication cables and coordination with these services, excavation of trenches, direct cable laying, including laying of cable from the drum, laying cable in the trench, taking all measurements and making drawings, back filling of trenches with earth or sand, laying protective layer of bricks etc,) laying of cables into pipes and conduits and within buildings.

2.3 Elementary idea regarding, inspection and handling of transformers; pole mounted substations, plinth mounted substations, grid substation, busbars, isolators, voltage and current transformers, lightning arrestors, control and relay panels, HT/LT circuit breakers, LT switches, installation of power/distribution transformers, dehydration. Earthing system, fencing of yard, equipment foundations and trenches etc..

2.4 Testing of various electrical equipment such as electrical motor, transformers, cables, and generators, motor control centres, medium voltage distribution panels, power control centres, motor control centres, lighting arrangement, storage, pre-installation checks, connecting and starting, pre-commissioning checks, drying out

2.5 Testing of Transformers: Typetest, oil testing of transformers

3. Maintenance (30 Periods)

3.1 Types of maintenance, maintenance schedules, procedures

3.2 Maintenance of Transmission and Distribution System

Authorized persons, danger notice, caution notice, permit to work, arranging of shutdowns personally, temporary earthing, cancellation of permit and restoration of supply.

Patrolling and visual inspection of lines - points to be noted during patrolling from ground; special inspections and night inspections;

Location of faults using Meggar, effect of open or loose neutral connections, provision of proper fuses on service lines and their effect on system, causes of dim and flickering lights.

3.3 Maintenance of Distribution Transformers

Transformer maintenance and points to be attended to in respect of various items of equipment

Checking of insulation resistance, transformer oil level and BDV test of oil, measurement of earth resistance

3.4 Maintenance of Grid Substations

Checking and maintenance of busbars, isolating switches, HT/LT circuit breakers, LT switches. Power transformers

3.5 Maintenance of Motors

Over hauling of motors, preventive maintenance, trouble shooting of electric motors

3.6 Domestic Installation

Introduction, testing of electrical installation of a building, testing of insulation resistance to earth, testing of insulation and resistance between conductors, continuity or open circuit test

INSTRUCTIONAL STRATEGY

This subject needs theoretical and practical inputs. Demonstration at actual site may be arranged for conceptual understanding. The subject teacher should plan in advance about the visits to the actual sites and establish liaison with the appropriate authorities/ persons with the help of HOD and Principal of the institution. The students be taken to actual workplace and explain various test procedures.

MEANS OF ASSESSMENT

- Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making
- Actual laboratory and practical work, model/prototype making, assembly and disassembly exercises and viva-voce

LIST OF PRACTICALS

1. Testing of Insulation Resistance of PVC in PVC wire, measurement of winding resistance of a motor.
2. Wiring of tube light connection with starter and choke.
3. Oil testing of a transformer and note its breakdown value.
4. Make a alarm circuit.
5. Make ON/OFF control circuit to run an electric induction motor (Single Phase)
6. Make a circuit to run a ceiling fan.

RECOMMENDED BOOKS

1. Testing, Commissioning , Operation and Maintenance of Electrical Equipment by S Rao, Khanna Technical Publication, New Delhi
2. Preventive Maintenance of Electrical Apparatus by SK Sharotri, Katson Publishing House, Ludhiana
3. Installation and Maintenance of Electrical Equipment by Praveen Kumar, North Publication, Jalandhar
4. e-books/e-tools/relevant software to be used as recommended by AICTE/UBTE/NITTTR, Chandigarh.

Websites for Reference:

<http://swayam.gov.in>

SUGGESTED DISTRIBUTION OF MARKS

Topic No	Time Allotted (Periods)	Marks Allocation (%)
1	14	18
2	40	50
3	30	32
Total	84	100

6.2 ELECTRICAL DESIGN, DRAWING AND ESTIMATING - II

L T P
5 - 8

RATIONALE

A diploma holder in Electrical Engineering is supposed to have ability to :

- i) Read, understand and interpret electrical engineering drawings
- ii) Communicate and correlate through sketches and drawings
- iii) Prepare working drawings of electrical circuits, motor control, earthing and motor parts

The contents of this subject has been designed to develop requisite knowledge and skills of electrical drawings in the students of diploma in electrical engineering.

LEARNING OUTCOMES

After undergoing the subject, students will be able to:

- recognize contactor and its use in various applications of 3 phase induction motor
- recognize different types of earthing
- name relevant IS specification for earthing
- read and interpret key diagrams
- read and interpret schematic and wiring diagrams
- Prepare estimate of wiring installation.
- Prepare estimate of small sub-station.

DETAILED CONTENTS

- 1 Contractor Control Circuits (10 periods)
Design of circuit drawing of schematic diagram and power wiring diagram of following circuits, specification of contactors
 - 1.1 DOL starting of 3-phase induction motor
 - 1.2 3-phase induction motor getting supply from selected feeder
 - 1.3 Forwarding/reversing of a 3-phase induction motor
 - 1.4 Two speed control of 3-phase induction motor
 - 1.5 Limit switch control of a 3-phase induction motor
 - 1.6 Sequential operating of two motors using time delay relay
 - 1.7 Manually generated star delta starter for 3-phase induction motor
 - 1.8 Automatic star delta starter for 3-phase Induction Motor
 - 1.9 Control circuit for cross road signal

2. Earthing (08 periods)
 - 2.1 Concept and purpose of earthing

- 2.2 Different types of earthing, drawings of plate and pipe earthing
 - 2.3 Procedure of earthing, test of materials required and costing and estimating
 - 2.4 Method of reducing earth resistance
 - 2.5 Relevant IS specifications of earth electrode for earthing a transformer, a high building
 - 2.6 Earthing layout of distribution transformer
 - 2.7 Substation earthing layout and earthing materials
 - 2.8 Line diagram of 11kV, 33kV, 66kV, 132 kV sub-stations
3. Schematic Diagram of lighting system of conference room/Theatre/sports stadium (indoor and outdoor) and Circuits using timers using CAD and, Drawing sheets. (08 periods)
 4. Estimation of Internal Wiring Installation (12 periods)

Estimation of wiring installation for commercial and industrial buildings such as multi-storied hotels, hospitals, schools, colleges, cinema, community centers, public library, high rise residential buildings etc. including design of layout, load estimation, Demand factor and diversity factor, power distribution scheme, list of material with specifications estimation of cost preparing relevant electrical schedule or rate (CPWD or PWD) using latest practices, materials and accessories.
 5. Estimation of Power Wiring (08 periods)

I.S. specifications and I.E. rules, calculation of current for single and three phase motors. Determination of sizes of cables, conductors distribution board, main switches and starters for power circuits. Cost of equipments and accessories and schedule of material. Estimation and cost of material and work for motors up to 20 H.P., pumpsets and small workshops.
 6. Estimation of Overhead and Underground Distribution Lines (08 periods)

Main components of overhead lines-line supports, cross-arm, clamps, conductors and staysets, lightening arrestors, danger plates, anti climbing devices, bird guards, jumpers etc., concerting of poles, earthing of transmission line, formation of lines, specification of materials for O.H. lines, I.S, specification and I.E. rules. Cost of material and work for overhead and undergoing lines up to 11 KV only.
 7. Estimation of Service Connections (08 periods)

Service connection, types of service connections-overhead and underground for single story and double story buildings, estimate of materials required for giving service connection to domestic consumers, commercial consumers and industrial consumers at L.T. and H.T. costing of material and work in above cases.

8. Estimation of Small Sub-Station (08 periods)

Main equipments and auxiliaries installed on the substation. Estimation of materials required for a small distribution substation (indoor and outdoor type-platform and pole mounted). Costing of material and work of above substations.

Note: Draw various schematic and wiring diagrams using graphic package(preferably CAD)

LIST OF PRACTICALS

1. Earthing
2. Commercial and industrial buildings
3. Power wiring layout and circuits
4. Stays, line crossings, line earthing, end poles and terminal poles, junction poles/towers and transposition pole/towers.
5. Service connection domestic, industrial and agriculture.
6. Substation layout and bus bar arrangements
7. Machine drawings-induction and synchronous machines.
8. Winding of induction machine, 3phase; 1phase.
9. Reading and interpreting practical drawing of wiring installation and control circuits.
10. Winding of synchronous machine 3 phase. (alternator and synchronous motor)

MEANS OF ASSESSMENT

- Design and drawing
- Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making

RECOMMENDED BOOKS

1. Electrical Design and Drawings by Raina & Bhattacharya
2. Electrical Design & Drawings by Sarabjeet Singh
3. IEEE Guide 80 for Earthing, IEEE Publication, New York
4. Electrical Design and Drawing by Surjit Singh, North Publication, Jalandhar
5. BIS for Electrical Earthing
6. e-books/e-tools/relevant software to be used as recommended by AICTE/UBTE/NITTTR.

Websites for Reference:

<http://swayam.gov.in>

SUGGESTED DISTRIBUTION OF MARKS

Topic No	Time Allotted (Periods)	Marks Allocation (%)
1.	10	15
2.	08	10
3.	08	10
4.	12	25
5.	08	10
6.	08	10
7.	08	10
8.	08	10
Total	70	100

6.3 UTILIZATION OF ELECTRICAL ENERGY

L T P
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RATIONALE

This subject assumes importance in view of the fact that an electrical technician has to work in a wide spectrum of activities wherein he has to make selection from alternative schemes making technical and economical considerations; e.g. to plan and design an electrical layout using basic principles and handbooks, to select equipment, processes and components in different situations. The contents have been designed keeping the above objectives in view. Besides giving him basic knowledge in the topics concerned, attempts have been made to ensure that the knowledge acquired is applied in various fields as per his job requirements. To orient the subject matter in the proper direction, visits to industrial establishments are recommended in order to familiarize the students with the new developments in different areas

LEARNING OUTCOMES

After undergoing the subject, the student will be able to:

- Explain different methods of illumination
- Design lighting scheme for domestic, industrial and commercial installation
- Design and select a suitable heating arrangement for a particular job
- Handle and maintain electric welding equipment
- Handle and maintain electrolytic plant
- Find faults in electric circuits of refrigerators
- Suggest electric drives as per need
- Maintain electric traction lines and track

DETAILED CONTENTS

1. Illumination (14 Periods)
 - 1.1 Nature of light, visibility spectrum curve of relative sensitivity of Human eye and wave length of light.
 - 1.2 Definition: Luminous flux, solid angle, intensity, luminous efficiency. Space to height ratio, reflection factor, lux, shadow .
 - 1.3 Different types of lamps, construction and working of incandescent and discharge lamps. Fitting required for filament lamp,mercury vapor, sodium lamp, halogen lamp, CFL, LED lamp.
 - 1.4 Calculation of number of light points for interior illumination calculation of indoor and outdoor illumination levels at different points..

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- 1.5 Time switches, street lighting, flood lighting and its characteristics.
2. Electric Heating and Welding (18 Periods)
- 2.1 Advantages of electrical heating
- 2.2 Heating methods
- 2.2.1 Resistance heating – direct and indirect resistance heating, electric ovens, their temperature range, properties of resistance heating elements, domestic water heaters and other heating appliances, thermostat control circuit
- 2.2.2 Induction heating; principle of core type and coreless induction furnace, their construction and applications
- 2.2.3 Electric arc heating; direct and indirect arc heating, construction, working and applications of arc furnace
- 2.2.4 Dielectric heating, applications in various industrial fields
- 2.2.5 Infra-red heating and its applications (construction and working of two appliances)
- 2.2.6. Microwave heating and its applications (construction and working of two appliances)
- 2.2.7 Solar Heating
- 2.3 Calculation of resistance heating elements (simple problems)
- 2.4 Electric Welding
- 2.4.1 Advantages of electric welding
- 2.4.2 Welding methods
- 2.4.3 Principles of resistance welding, types – spot, projection, seam and butt welding, welding equipment
- 2.4.4 Principle of arc production, electric arc welding, characteristics of arc; carbon arc, metal arc, hydrogen arc welding method and their applications.
Power supply requirement. Advantages of using coated electrodes, comparison between AC and DC arc welding, welding control circuits, welding of aluminum and copper
3. Electrolytic Processes (08 Periods)
- 3.1 Need of electro-deposition
- 3.2 Laws of electrolysis, process of electro-deposition - clearing, operation, deposition of metals, polishing and buffing
- 3.3. Equipment and accessories for electroplating

- 3.4. Factors affecting electro-deposition
- 3.5. Principle of galvanizing and its applications
- 3.6. Principles of anodizing and its applications
- 3.7. Electroplating of non-conducting materials
- 3.8. Manufacture of chemicals by electrolytic process

4. Electrical Circuits used in Refrigeration, Air Conditioning and Water Coolers (08 Periods)
 - 4.1 Principle of air conditioning
 - 4.2 Description of Electrical circuit used in
 - a) Refrigerator,
 - b) Air-conditioner, and
 - c) Water cooler

5. Electric Drives (10 Periods)
 - 5.1 Advantages of electric drives
 - 5.2. Characteristics of different mechanical loads
 - 5.3. Types of motors used as electric drive
 - 5.4. General idea about the methods of power transfer by direct coupling by using devices like belt drive, gears, chain drives etc.
 - 5.5 Examples of selection of motors for different types of domestic loads
 - 5.6 Selection of drive for applications such as general workshop, textile mill, paper mill, steel mill, printing press, crane and lift etc. Application of flywheel.
 - 5.7 Selection of motors for Domestic Appliances

6. Electric Traction (12 Periods)
 - 6.1 Advantages of electric traction
 - 6.2 Different systems of electric traction, DC and AC systems, diesel electric system, types of services – urban, sub-urban, and main line and their speed-time curves
 - 6.3 Different accessories for track electrification; such as overhead catenary wire, conductor rail system, current collector-pentagraph
 - 6.4 Factors affecting scheduled speed
 - 6.5. Electrical block diagram of an electric locomotive with description of various equipment and accessories used.
 - 6.6 Types of motors used for electric traction
 - 6.7 Power supply arrangements
 - 6.8 Starting and braking of electric locomotives
 - 6.9 Introduction to EMU and metro railways
 - 6.10 Train Lighting Scheme

Note: Students should be taken for visits to nearest electrified railway track and railway station to study the electric traction system. Also visit should be made to show electric illumination in building.

INSTRUCTIONAL STRATEGY

It is desired to give ample practical examples in the class while teaching this subject. Teacher must supplement his/her classroom teaching with aids such as models, charts, and video films from time to time. This subject requires demonstrations and exposure to actual workplace/industry/field. For this purpose, the subject teacher should do advance planning for visits/studies related to each topic in consultation with HOD and Principal of the polytechnic/institution.

MEANS OF ASSESSMENT

- Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making
- Actual laboratory and practical work, model/prototype making, assembly and disassembly exercises and viva-voce
- Software installation, operation, development

RECOMMENDED BOOKS

1. Art and Science of Utilization of Electrical Energy by H Partap, Dhanpat Rai & Sons, Delhi
2. Utilization of Electrical Energy by JB Gupta, Kataria Publications, Ludhiana
3. Utilization of Electrical Energy by Sahdev, Uneek Publication, Jalandhar
4. A Text Book. of Electrical Power by Dr. SL Uppal, Khanna Publications, Delhi
5. Modern Electric Traction by H Partap, Dhanpat Rai & Sons, Delhi
6. Utilization of Electrical Energy by D.R. Arora, North Publication, Jalandhar
7. Generation, Distribution and Utilization of Electrical Power by CL Wadhwa, Wiley Eastern Ltd., New Delhi
8. e-books/e-tools/relevant software to be used as recommended by AICTE/UBTE/NITTTR.

Websites for Reference:

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SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allocation (%)
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4	08	12
5	10	14
6	12	18
Total	70	100

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6.4 APPLICATIONS OF COMPUTER SOFTWARE IN ELECTRICAL ENGINEERING

L T P
- - 2

RATIONALE

All equipment, installations, circuits and other electrical and electronic systems in commercial, power and industrial sector need drawings for their manufacturing, installation, operation and maintenance. A diploma holder in Electrical Engineering must possess the skill of reading, interpreting different drawings and simulating electrical and electronics circuits for most of the activities. With the evolution of various computer softwares, the conventional role of draftsman has been is now taken over by Computer software. Computer Aided Drawing (CAD) and simulation (MATLAB/SIMULINK) software will be used to perform various practical exercises in this course. This will enable the students to become competent to function in the fast growing information technology environment by enhancing their computer aided drawing, designing and simulating skills in the field of electrical and electronics engineering.

LEARNING OUTCOMES

At the end of this course, the students will be able to :

- Use various symbols and notations in electrical and electronics engineering drawings.
- Interpret drawings and draw interferences.
- Draw various electrical and electronics circuits using CAD software.
- Simulate simple electrical and electronics circuits using simulation software

LIST OF PRACTICALS

1. Draw different types of following rectifier circuits using MATLAB/Simulink/Open Source Software and take print out of
 - (a) Single phase half wave
 - (b) Single phase full wave
2. Simulate three resistances in series circuit and find out voltage and current in each resistance .
3. Simulate the following circuits and find out voltage and current in each resistance
 - (a) Two resistances in parallel
 - (b) Resistance and inductor in parallel
4. Simulate R-L series circuit and observe voltage wave forms across each component.
5. Simulate R-C series circuit and observe voltage wave forms across each component.
6. Simulate R-L-C series circuit and observe voltage wave forms across each component.
7. Simulate R-L-C parallel circuit and observe current wave forms across each component.

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8. Simulate star connection using resistors and observe voltage current relation of line and phase.
9. Simulate delta connection using resistors and observe voltage current relation of line and phase.
10. Simulate single phase half-wave rectifier circuit.
11. Simulate single phase full-wave rectifier circuit.
12. Simulate single phase bridge rectifier circuit.

LIST OF RECOMMENDED BOOKS

1. Computer Aided Electrical Drawing by M. Yogesh, B.S. Nagaraja, N. Nandan, Prentice Hall of India.
2. Mastering electronics workbench: Version 5 and Multisim Version 6 by John Adams, McGraw-Hill, New Delhi
3. Electrical Drafting by S.F. Divalapur, Eastern Book Promoters, Belgaum.
4. Getting Started with MATLAB by Rudra Pratap

6.5 PROJECT WORK

L T P
- - 12

RATIONALE

Major Project Work aims at developing innovative skills in the students whereby they apply in totality the knowledge and skills gained through the course work in the solution of particular problem or by undertaking a project. In addition, the project work is intended to place students for project oriented practical training in actual work situation for the stipulated period.

LEARNING OUTCOMES

After undergoing the project work, students will be able to:

Apply in totality the knowledge and skills gained through the course work in the solution of particular problem or by undertaking a project. In addition, the project work is intended to place the learner for project oriented practical training in actual work situation for the stipulated period with a view to:

- Develop understanding regarding the size and scale of operations and nature of field-work in which students are going to play their role after completing the courses of study
- Develop understanding of subject based knowledge given in the classroom in the context of its application at work places.
- Develop firsthand experience and confidence amongst the students to enable them to use and apply polytechnic/institute based knowledge and skills to solve practical problems related to the world of work.
- Develop abilities like interpersonal skills, communication skills, positive attitudes and values etc.

General Guidelines

The individual students have different aptitudes and strengths. Project work, therefore, should match the strengths of students. For this purpose, students should be asked to identify the type of project work, they would like to execute. The activity of problem identification should begin well in advance (say at the end of second year). Students should be allotted a problem of interest to him/her as a major project work. It is also essential that the faculty of the respective department may have a brainstorming session to identify suitable project assignments for their students. The project assignment can be individual assignment or a group assignment. There should not be more than 3 students if the project work is given to a group. The project work identified in collaboration with industry should be preferred.

This practical training cum project work **should not be considered** as merely conventional industrial training in which students are sent at work places with either minimal or no supervision. This experience is required to be planned in advance and supervised on regular basis by the polytechnic faculty. For the fulfillment of above objectives, polytechnics may establish close linkage with 8-10 relevant organization for providing such an experience to students. It is necessary that each organization is visited well in advance and activities to be performed by students are well defined. The chosen activities should be such that it matches with the curricular interest to students and of professional value to industrial/ field organizations. Each teacher is expected to supervise and guide 5-6 students.

Some of the project activities are given below:

- Projects related to designing small electrical equipment / instruments.
- Projects related to increasing productivity in electrical manufacturing areas.
- Projects related to quality assurance.
- Projects connected with repair and maintenance of plant and equipment.
- Projects related to design of PCBs.
- Projects related to design of small oscillators and amplifier circuits.
- Projects related to design, fabrication, testing and application of simple digital circuits and components.
- Projects related to microprocessor/microcontroller based circuits/ instruments.

A suggestive list of project is given below:-

1. Design and fabrication of control panel for various applications in the field of electrical engineering.
2. Rewinding of a single phase/three phase induction motor
3. Fabrication of working model of a solar thermal power plant.
4. Design and fabrication of automated car parking system.
5. Design and fabrication of automated gate control of railway crossing.
6. Design and fabrication of electrical resistive/inductive/capacitive loads.
7. Design and fabrication of remote control of various domestic electrical appliances.
8. Design and fabrication of microcontroller based DC drive system.
9. Design and fabrication of automatic water level control system.
10. Design and fabrication of automatic solar battery charger.
11. Fabrication of automatic star-delta starter.
12. Fabrication of working model of hydro electric power plant.
13. Fabrication of sine wave inverter up to 500VA.
14. Fabrication of water level indicator.
15. Fabrication of rain/fire/ smoke/burglar detector.
16. Fabrication of automatic solar panel based street lights.
17. Fabrication of automatic solar panel based traffic lights
18. Fabrication of automatic voltage stabilizer up to 1 KVA.
19. Fabrication of working model of wind power plant.
20. Fabrication of heat convector blower with humidifier.
21. Fabrication of oil based radiation type room heater.
22. Fabrication of small 1- phase transformer up to 1KVA.
23. Fabrication of UPS up to 500VA.

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24. Fabrication of a distribution board as per requirement.
25. Fabrication of Direct-On-Line (DOL) starter.
26. Fabrication of solar tracking system.
27. Fabrication of automatic power factor corrector.
28. Fabrication of desert cooler/ room cooler.
29. Fabrication of electric/solar water heater.
30. Erection, installation & commissioning of electrical equipments.
31. Fault detection & repair of electrical/ electronic instruments.
32. Drawing, estimating and costing of electrical installation of the institution from supplier's pole to the institution distribution board.
33. Drawing, estimating and costing of electrical installation of a workshop having a given number of electrically operated appliances/machines.
34. To study the laying out of underground distribution cable for a small colony starting from main distribution pole.
35. To study the erection of a 5 pole span over head line for a small distance for distribution of electrical energy and to prepare list of material required.
36. Energy audit for the workshop of your institution & to suggest remedies to reduce electricity bills.
37. Estimate the material required to provide a service connection to a consumer's premises for domestic purposes.
38. To survey the load of a given area in a village, small colony, calculate the effective load and find out the sizes of cables/conductors for the proposed distribution system.
39. Designing of light and fan scheme for an institutional or commercial building.
40. To study and estimate the material required during augmentation of a nearby pole mounted sub-station.
41. To study and estimate the material required during augmentation of a nearby in door sub-station.
42. To study and estimate the material required for a solar power station up to 100KW after visiting the actual site
43. To prepare a proposal for substation of your institution , calculating the total load (estimating and costing)
44. Installation of home security system
45. Detection of electricity theft control system with wireless indication system
46. Fabrication of cyclo-converter (frequency changer)
47. Design and fabrication of panel for automatic switching of DG set with supply system
48. Design and fabrication of wireless AC Power transmission.
49. Design and fabrication of solar energy based projects like solar cooker, solar dryer, solar street light, solar inverter, solar pump, solar emergency light etc.

NOTE: The project should be preferably undertaken by a group of students depending upon cost and time involved.

There is no binding to take up the above projects as it is only a suggestive list of projects.

A suggestive criterion for assessing student performance by the external (person from industry) and internal (teacher) examiner is given in table below: