

Course code	Course Name	L-T-P - Credits	Year of Introduction
EE405	Electrical System Design	3-1-0-4	2016
Prerequisite : Nil			
Course Objectives <ul style="list-style-type: none"> To gain the knowledge of acts and rules used for regulating the electrical supply in our country. To impart sound knowledge in the design and estimation of low voltage and medium voltage electrical installations. To gain the knowledge of selection of distribution transformers and their installations. To gain the knowledge of Earthing designs in different installations and the standard dimensions of earthing systems. 			
Syllabus Electrical system design practices – general awareness of IS Codes, Electricity Acts & Rules, NEC etc. Domestic Installations, Motor Installations, 11 kV substation installations. Cinema theatre, auditorium and high rise building installations. Standby generator selection and their Installations. Underground cable installations and their accessories. Types of earthing, lightning arresters, fire fitting and lifts.			
Expected outcome The students will <ol style="list-style-type: none"> Know the basic Rules and regulations in electrical installations. To prepare the schematic diagram, installation plan, quantity of materials and estimate for different electrical installations. 			
Text Book: <ol style="list-style-type: none"> J. B. Gupta, A Course in Electrical Installation Estimating and Costing, S.K. Kataria & Sons; Reprint 2013 edition (2013). K. B. Raina, S. K. Bhattacharya, Electrical Design Estimating Costing, NEW AGE; Reprint edition (2010). M.K.Giridharan, Electrical Systems Design, , M/s I K International Publishers, New Delhi, 2nd edition, 2016 			
Data Book (Approved for use in the examination): M K Giridharan, Electrical Systems Design Data Hand book, , M/s I K International Publishers , New Delhi, 2011			
References: <ol style="list-style-type: none"> National Electric Code, Bureau of Indian Standards publications, 1986. Relevant Indian Standard – specifications (IS – 732, IS – 746, IS – 3043, IS – 900), etc. S.L.Uppal, Electrical Wiring Estimating & Costing, Khanna Publishers (2008) 			
Course Plan			
Module	Contents	Hours	Sem. Exam Marks
I	General awareness of IS Codes (IS 3043, IS 732, IS 2675, IS 5216-P1-2, IS 2309), The Indian Electricity Act 1910, The Indian Electricity supply Act 1948, Indian Electricity Rules 1956, The Electricity Regulatory Commission Act 1998, Electricity Act 2003, Bureau of Energy Efficiency (BEE) and its labeling. National Electric Code (NEC) - scope and safety aspects applicable to low and medium (domestic) voltage installations, Electric services in buildings, Classification of voltages, standards and specifications.	8	15%
II	Safety aspects applicable to low and medium voltage installations. General aspects of the design of electrical installations for domestic dwellings (low and medium voltage installations)–connected load calculation, sub circuit determination, selection of main distribution board, sub distribution board, MCB, ELCB, MCCB and cables for sub	10	15%

	circuits. Pre-commissioning tests of domestic installations.		
FIRST INTERNAL EXAMINATION			
III	Medium and HV installations – selection of cables and cable glands, guidelines for cable installation in detail. Panel boards: LT & HT control panel boards. Installation of induction motors: Design of distribution systems with light power and motor loads. Design of automatic power factor correction (APFC) Panel. Selection and installation of transformers, switchgears and protective devices – Design of indoor and outdoor 11 kV substation upto 630 kVA.	10	15%
IV	Air-conditioning loads and its specifications. Energy conservation techniques. Selection of standby generator – installation and its protection. Introduction to Automatic Main Failure (AMF) System. Pre-commissioning tests of cables, transformers and generators.	8	15%
SECOND INTERNAL EXAMINATION			
V	Design of earthing system for an HT consumer, Dimensions and drawings of typical earth electrodes (1) Pipe Earthing, (2) Plate Earthing. Touch, Step and Transfer potentials at EHT Sub-Stations, Earth-mat, installations of special equipment like X-Ray, Neon-Sign, Basics of lightning arresters.	8	20%
VI	Design of illumination systems – Yard lighting, street lighting and flood lighting. Kerala Cinema Regulation Act – 1958, design and layout of installation for recreational or assembly buildings, cinema theatre and high rise building. Design of Electrical system related to firefighting, lifts and escalators.	10	20%
END SEMESTER EXAM			

QUESTION PAPER PATTERN:

Maximum Marks: 100

Exam Duration: 3Hours.

Part A: 8 compulsory questions.

One question from each module of Modules I - IV; and two each from Module V & VI.

Student has to answer all questions. (8 x 5)=40

Part B: 3 questions uniformly covering Modules I & II. Student has to answer any 2 from the 3 questions: (2 x 10) =20. Each question can have maximum of 4 sub questions (a,b,c,d), if needed.

Part C: 3 questions uniformly covering Modules III & IV. Student has to answer any 2 from the 3 questions: (2 x 10) =20. Each question can have maximum of 4 sub questions (a,b,c,d), if needed.

Part D: 3 questions uniformly covering Modules V & VI. Student has to answer any 2 from the 3 questions: (2 x 10) =20. Each question can have maximum of 4 sub questions (a,b,c,d), if needed.