

**ELECTRICAL SYSTEM DESIGN (E)**  
**(MODEL QUESTION-B)**

Time: Three Hours

Maximum: 100 marks

*(Answer all questions from Part A and any four questions from Part B)*  
*(Approved data manual as per syllabus to be permitted)*

**PART A**

1. List the names of three major building services and three minor building services.
2. List the standard symbols for the following:  
(a) A.C. generator, (b) DOL starter, (c) Fuse, (d) Fuse Link, (e) Distribution board, (f) I6A socket, (g) 3  $\phi$  415V, 50Hz supply, (h) circuit breaker.
3. What is the role of Bureau of Energy Efficiency (BEE) in energy conservation measures?
4. What is the role of an MCB (miniature circuit breaker) in domestic installations? How is its tripping characteristics specified.
5. What is the letter symbols used to specify Power cables? How are cables specified in terms of number of cores
6. Distinguish between MCCB (Molded case circuit breaker) and ELCB (Earth leakage circuit breaker).
7. What are the pre-commissioning tests to be conducted on a transformer?
8. What are the difference between average lumen method and point by point method of lighting design?
9. What is the significance of short circuit level in designing the earthing system for a transformer substation
10. What are the special features of electrical systems in high rise buildings

**(10 × 2 = 20 marks)**

**PART B**

(Assume any suitable data that is missing)

**(Module I)**

- 11 a) What are the major changes that has been brought about in Indian Electricity Act 2003. (10)
- b) Discuss the role of NEC 2011 in Electrical systems design (10)

**OR**

- 12 a) Explain the safety features to be included in every electrical systems design (10)  
 b) Write brief notes on the significance of IS 732 and IS 3043 (10)

**(Module II)**

13 The plan layout of a three bed room domestic building is shown below. Prepare the electrical installation plan showing the positions of light, fan, socket points etc and compute the following:

- 1 Connected load of the building
- 2 Maximum demand in kW
- 3 Type of supply required
- 4 Number of light and power circuits and
- 5 The details of the distribution board. (5x4=20)



**OR**

- 14 a) A residential building has the following loads. Design the electrical system for the building and draw the single line schematic diagram. (8)

Number of light points	42
Number of power points	6
Ceiling fans	7
6A sockets	10
Room airconditioners-1.5T each	2

b) Also, determine:

- 1 Connected load of the building and Maximum demand
- 2 Number of Light and Power circuits
- 3 Type of power supply required
- 4 Specification of the distribution board (4x3=12)

**(Module III)**

15 A small industry has the following connected load.

- i. 7.5kW ,415V,three phase IM 1No
- ii. 3.7kW,415V.three phase IM 3Nos
- iii. 2.2kW, 415V, three phase IM 3Nos
- iv. 0.735W,240V,single phase IM 3Nos
- v. Lighting load consisting of 15Nos 2x40W fluorescent fixtures, 6Nos, ceiling fans, 6Nos 6A socket points, 3Nos 16A power socket points and 3Nos, 300mm Sweep exhaust fans.

- 1 Prepare a schematic wiring diagram for the industry. (Specify the type of Industry)
- 2 Design the sizes of the incoming and outgoing switch fuse units of the switch board and the starting devices for the motors. (20)

**OR**

- 16 a) Discuss the various factors that are to be considered while selecting a motor drive for a machine? (10)
- b) A 37kW/50HP, 415 V, three phase squirrel cage motor is having a blocked rotor kVA/HP of 6 and a blocked rotor power factor of 0.35. If the motor is started with a DOL starter, determine the percentage voltage drop at starting. Also determine the maximum number of starts permitted per hour based on the voltage flicker curve. (10)

**(Module IV)**

- 17 Design the earthing system for an industry having a 11kV/433V, 2 MVA transformer with 6% reactance. The industry is fed from a grid substation 3km away by overhead line conductors of 84.1 sq.mm Al (Grasshopper) section and 1m spacing. The fault level at the grid substation is 250MVA. Assume earth resistivity at the transformer location as 70 ohm.m. (20)

**OR**

- 18 a) A parking area measuring 135m in length and 90 m in width is to be provided with area lighting. The specifications given are

- Illumination required = 10 lux
- Mounting height restriction = 10 m
- Lamps per pole = 2
- The available lamp details are

<b>Details</b>	<b>HPSV</b>	<b>LPSV</b>
CU	<b>0.60</b>	<b>0.55</b>
LLF	<b>0.75</b>	<b>0.9</b>

Determine the layout of the lighting scheme with the wattage of lamps required. (10)

b) What are the special features of electrical installation in a cinema theatre?

(10)

**(20 × 4 = 80 marks)**