

Nirma University

Institute of Technology

Semester End Examination (IR), February - 2022

B. Tech. in CL / CH / ME / EC, Semester-VII

2EEOE02 Electrical Power Utilization and Safety

Roll /
Exam No.

Supervisor's initial
with date

Time: 02 Hours

Max. Marks: 50

Instructions:

1. Attempt all questions.
2. Figures to right indicate full marks.
3. Draw neat sketches whenever necessary.
4. Assume suitable additional data if required.

Q.1 (A) How the Load estimation is carried out? Discuss the following factors [6]
CO1,BL1 with their relevance with the procedure of load estimation.

(i) Demand Factor (ii) Load factor (iii) Diversity factor

Take one case study to justify your process.

Q.1 (B) A generating station has connected load of 75 MW and maximum [4]
CO2,BL5 demand of 45 MW, the units generated 83×10^6 per annum. Calculate

(i) Demand factor (ii) Load factor

Q.1 (C) Classify the types of electrical supply system? Derive the expression [6]
CO3,BL2 for the conductor area and volume for three-phase, four wire AC system.

Q.2 (A) Discuss following types wiring system with necessary diagram. Also [6]
CO1,BL1 write their application in real field.

(i) Cleat wiring (ii) Wooden casing wiring

OR

Q.2 (A) Discuss the factors to be considered for choice of wiring. As per [6]
CO1,BL1 standard IS 732, what are the permissible voltage drop in conductor based on type of supply system?

Q.2 (B) What is power factor? Discuss the effect of poor power factor with [4]
CO4,BL2 relevant example.

Q.2 (C) What the factors influencing the electric shock? What are limits for [6]
CO2,BL5 body current limits? List the standards the available for electric safety in India.

Q.3 (A) Explain with neat diagram electrical welding method employed for [6]
CO2,BL3 joining metal sheets in aircraft or ship manufacturing mimicking mechanical riveting technology.

OR

Q.3 (A) Suggest and explain with neat diagram heating method used in [6]
CO2,BL3 electric iron with controllable temperature feature.

Q.3 (B) A 40 kW, 3-phase, 415 V, star connected, resistance oven employs a [6]
CO4,BL5 nichrome strip of 0.35 mm thickness as its heating element. If the temperature of the element is to be limited to 1200 °C and temperature of charge is to be kept at 1050 °C, then calculate suitable width and length of heating element assuming radiating efficiency as 0.6 and emissivity as 0.91. The resistivity of nichrome strip is $101.6 \times 10^{-8} \Omega\text{-m}$. Also determine temperature of the heating element when the charge is cold (20°C).

Q.3 (C) A workshop having dimensions of 40 m x 10 m is required to be [6]
CO3,BL5 illuminated to a level of 100 lumens/m². Assuming a depreciation factor of 0.8 and coefficient of utilization as 0.4, calculate number of lamps and their position when breadthwise 7 beams are provided at a distance of 5m on which the lamps are to be mounted on. Take efficiency of lamps as 14 lumens/watt and power rating of each lamp as 500 W. Also draw the schematic arrangement of the lamps.
