Nirma University
Institute of Technology
Semester end Examination (IR), May - 2022
B. Tech., Semester-VII (Open Elective)
2EEOE02: ELECTRICAL POWER UTILISATION 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) What charges are considered in residential electricity bill? Take one [6]
CO1,BL3 example to demonstrate the calculation.

(B) Discuss the factors affecting the choice of electric wiring. With neat [6]
CO2,BL4 diagram, discuss Batten wiring system.

(C) Draw the symbol for following, used in electric wiring. [4]
CO3,BL2 (i) Fuse (ii) Exhaust fan (iii) Three-phase transformer (iv) Energy meter

Q.2 (A) Calculate the value of capacitance needed to correct a power factor of [4]
CO4,BL3 500 kVAR load operating at 0.5 lagging power factor to 0.9 power
factor lagging. The load is supplied by a 230 V (rms), 50 Hz line.

(B) Discuss the types of Earth rods used in electric earthing with [6]
CO4,BL2 necessary diagram.

OR

(B) Define power factor. Elaborate the advantages to maintain unity [6]
CO4,BL2 power factor with necessary examples.

(C) Discuss the functioning of following protective devices with necessary [6]
CO3,BL3 diagram.
(i)   Miniature Circuit Breaker (ii) Earth leakage circuit breaker

Q.3 (A) Explain with neat diagram electrical heating method employed for [6]
CO2,BL3 joining PVC sheets or layers in hand tools as well as toy
manufacturing.

OR

(A) Explain with neat diagram Eddy current heating method. [6]
CO2,BL2

(B) A 30 kW, 3-phase, 440 V, star connected, resistance oven employs a [6]
CO4,BL5   nichrome strip of 0.38 mm thickness as its heating element. If the temperature of the element is to be limited to 1300 °C and temperature of charge is to be kept at 1000 °C, then calculate suitable width and length of heating element assuming radiating efficiency as 0.6 and emissivity as 0.9. The resistivity of nichrome strip is 101.6×10^{-8} Ω-m. Also determine temperature of the heating element when the charge is cold (25°C).

(C) Elucidate the role of diffuser and reflector in illumination. Comment [6]
CO3,BL2   on the criteria for selection of colour of light source in an application.

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