Code : 103606

B.Tech 6th Semester Exam., 2022

(New Course)

INDUSTRIAL ELECTRICAL SYSTEM

Time : 3 hours *Full Marks* : 70

Instructions:

(i) The marks are indicated in the right-hand margin.

*(ii) There are **NINE** questions in this paper.*

*(iii) Attempt **FIVE** questions in all.*

(iv) Question No. 1 is compulsory.

1. Choose the correct option (any *seven*) : 2×7=14

(a) Tariff is best defined as

(i) the rate at which electricity is supplied to the customer

(ii) the duty imposed on exporting electrical equipment

(iii) A set of rules explaining the pros and cons of using a specific rating of alternators

(iv) None of the above

3. reduction of kVA rating of distribution transformers

Select the correct answer from the codes given below :

(i) 1

(ii) 1 and 2

(iii) 3 alone

(iv) 1, 2 and 3

(j) Low power factor is usually not due to

(i) discharge lamps

(ii) arc lamps

(iii) induction furnaces

(iv) incandescent lamps

2. *(a)* List out various components used to wire an LT system. Discuss ratings of each component so that we can make put a demand from a seller. 8

(b) What is the basic difference between a switch and fuse? 2

(c) Classify various cables (domestic and industrial both) with their uses/applications. 4

3. (a) Discuss and classify various residential and commercial wiring systems. 5

(b) Explain the role of earthing in detail along at a residential/commercial location. 5

(c) What is the role of main switch? How is this rated? 4

4. (a) Define the following terms : 6

(i) Solid angle

(ii) Luminous intensity

(iii) Illumination

(iv) Brightness

(v) Candle power

(vi) Meter candle and foot candle

(b) Establish the relation among Luminous intensity, Illumination and Brightness. 3

(c) A room with an area of 6×9 m^2 is illustrated by ten 80-W lamps. The luminous efficiency of the lamp is 80 lumens/W and the coefficient of utilization is 0·65. Find the average illumination. 5

(b) The tariff in which power factor is taken as reference

(i) sliding scale tariff

(ii) kVA maximum demand tariff

(iii) kW and kVAR tariff

(iv) All of the above

(c) The fuse rating is expressed in terms of

(i) voltage

(ii) VAR

(iii) kVA

(iv) current

(d) For painful shock, what is the range of electric shock current at 50 Hz?

(i) 3-5 mA

(ii) 0-3 mA

(iii) 5-10 mA

(iv) 0-1 mA

(e) The type of wiring that is highly suitable for a temporary shed is

(i) cleat wiring

(ii) wooden capping and casing wiring

(iii) lead sheathed wiring

(iv) conduit wiring

(f) Which lamp is used in the outdoor illumination of buildings and airport runway?

(i) Gaseous discharge lamp

(ii) Halogen lamp

(iii) Sodium vapour lamp

(iv) All of the above

(g) Lux is unit of which physical quantity?

(i) Illumination

(ii) Luminance

(iii) Luminous flux

(iv) Luminous intensity

(h) Flood lighting is used for

(i) enhancing the beauty of building at nights

(ii) illuminating sports stadium

(iii) illuminating showcases

(iv) All of the above

(i) Installation of capacitors at suitable locations and of optimum size in a distribution system results in—

1. improved voltage regulation
2. reduction in distribution power losses

5. (a) What is the role of an industrial substation? How are the monitoring and controlling performed at these substations? Discuss in detail. 5

(b) Discuss the industrial loads with the help of examples. How are these different from residential loads? Does industrial load require additional focus? Explain. 5

(c) Clearly differentiate isolators and circuit breakers with their roles. 4

5. (a) What do you understand by a distributed generation? Write and discuss its advantages and limitations. Discuss in detail. 10

(b) Write a short note on DG sizing and its optimal placement. 4

7. Define PLC, stating its role in process automation. Discuss various advantages and limitations of PLC-based control system. 14

8. What are various faults that are in general monitored over various panels available at an industrial substation? Stepwise narrate the operation of the protection system to protect the equipment from various electrical faults. 14

9. Write detailed notes on any *three* of the following : 14

   (a) Power metering system

   (b) MCB, MCCB, ELCB with related applicability

   (c) Electric shock and electrical safety practices

   (d) Street lighting and photoshoot lighting

   (e) Incandescent lamps and modern luminaries

   (f) Power triangle and role of various components in power system

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