C20-EE–506

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BOARD DIPLOMA EXAMINATION, (C-20)

MAY/JUNE—2023

DEEE - FIFTH SEMESTER EXAMINATION

ELECTRICAL UTILIZATION AND TRACTION

Time : 3 Hours] [*Total Marks* : 80

PART—A

3×10=30

Instructions : (1) Answer **all** questions.

(2) Each question carries **three** marks.

(3) Answers should be brief and straight to the point and shall not exceed five simple sentences.

1. Define the terms *(a)* solid angle, *(b)* luminous intensity and *(c)* illumination.

2. State any three requirements of good lighting.

3. List any three applications of indirect resistance heating.

4. Write any three advantages of electrical heating.

5. State the necessity of power saving devices.

6. Write any three advantages of LED lamp over other types of lamps.

7. State the factors affecting scheduled speed.

8. Define tractive effort.

9. List any three considerations for the location of traction substation.

10. Mention any three requirements of railway coach air conditioning.

PART—B

8×5=40

Instructions : (1) Answer **all** questions.

(2) Each question carries **eight** marks.

(3) Answers should be comprehensive and criterion for valuation is the content but not the length of the answer.

11. *(a)* State and explain inverse square law of illumination. 8

(OR)

(b) Two lamps of 500 W each with an efficiency of 25 lumens/watt are mounted on two lamp posts 10 m apart. The posts are 3 m and 5 m height. Find the illumination *(i)* just below the lamps and *(ii)* at a point mid-way between the lamps. 8

12. *(a)* Explain the any two methods of temperature controls with diagrams in resistance furnace. 8

(OR)

(b) Explain the core type induction furnace with a neat sketch. 8

13. *(a)* Derive the expression for *(i)* maximum speed and *(ii)* acceleration and retardation for trapezoidal speed-time curve. 8

(OR)

(b) An electric train is accelerated at 1.5 kmphps and is braked at 3 kmphps. The train has an average speed of 45kmph on a level track of 1500 meters between stations. Determine *(i)* actual time of run, *(ii)* maximum speed and *(iii)* distance travelled before applying brakes and *(iv)* scheduled speed. Assume time for stop as 15 seconds and run according to trapezoidal speed-time curve. 8

14. *(a)* An electrical locomotive is required to haul a train having 10 coaches each 25 ton on a main line track. The initial acceleration is 1.2 kmphps up a gradient of 1.5 in 100. The permissible axel loading is 18 ton per axel. Take rotational inertia to be 5% for coach and 10% for locomotive. Find the adhesive weight and axels on locomotive if tractive resistance is 40 N/ton and coefficient of adhesion is 0.21. 8

(OR)

(b) Explain various methods of track electrification. 8

15. *(a)* *(i)* Draw the automatic temperature control circuit. 4

(ii) Explain MID ON generation with a neat sketch. 4

(OR)

(b) *(i)* Draw the automatic illumination control circuit using LDR. 4

(ii) Explain the end-on generation with a neat sketch. 4

PART—C

10×1=10

Instructions : (1) Answer the following question.

(2) The question carries **ten** marks.

(3) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

16. A drawing hall 30 m × 15 m with ceiling height of 5 m is to be provided with a general illumination of 120 lux. Taking the coefficient of utilization of 0.5 and depreciation factor of 1.4, determine the no. of fluorescent tubes required, their spacing, mounting height and total wattage. Take luminous efficiency of fluorescent tube as 40 lumen/watt for 80 watt tube. Suggest the places of fluorescent tubes uniformity of light.

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