C16-EE–403

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BOARD DIPLOMA EXAMINATION, (C-16)

MAY/JUNE—2023

DEEE - FOURTH SEMESTER EXAMINATION

ELECTRICAL UTILISATION 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 and *(b)* illumination.

2. List the types of lamps used for domestic, industrial and streetlighting schemes.

3. What are the different types of electric heating?

4. List the applications of direct and in-direct resistance heating methods.

5. Compare CF lamps with tungsten filament lamps.

6. List any three advantages of remote operated power utility devices.

7. Mention the importance of speed time curve.

8. Define the terms *(a)* crest speed, *(b)* average speed and *(c)* schedule speed.

9. List the protective devices provided for fraction transformer.

10. List any three considerations for location of traction substation.

PART—B

10×5=50

Instructions : (1) Answer *any* **five** questions.

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

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

11. *(a)* Two street lamps are 20 m apart and are fitted with a 500 CP lamp at a height of 8 m above the ground each. Find the illumination at a point *(i)* under the lamps each and *(ii)* midway between the lamps. 3+3

(b) Define the terms *(i)* fluorescence and *(ii)* phosphorescence. 4

12. *(a)* List the types of lamp fittings and mention their applications of each fitting. 5

(b) Explain the laws of illumination. 5

13. Explain the different methods to control the temperature of resistance furnaces. 10

14. *(a)* Explain the concept of energy audit and management. 6

(b) List the advantages of using energy efficient systems for transformers. 4

15. Define tractive effort and derive an expression for total tractive effort for acceleration to overcome gravity pull and train resistance. 10

16. A 200 tonne motor coach having 4 motors each developing 6000 Nm torque during acceleration, starts from rest. If the gradient is 30 in 1000, gear ratio 4; gear transmission efficiency 90%; wheel radius 45 cm; train resistance 50 N/ tonne; addition of rotational inertia 10%, calculate the time taken to attain a speed of 50 kmph. If the line voltage is 3000 V DC and efficiency of motors is 85%, find the current during notching period. 10

17. *(a)* Explain direct core type induction furnace. 5

(b) Explain how constant power can be obtained using single battery system. 5

18. *(a)* List the requirements of railway coach air-conditioning. 5

(b) Explain MID-ON generation with necessary diagram. 5

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