C09–EE–**605 A**

3766

BOARD DIPLOMA EXAMINATION, (C–09)

MARCH/APRIL—2014

DEEE—SIXTH SEMESTER EXAMINATION

ELECTRICAL UTILISATION AND AUTOMATION

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 luminous flux and illumination.

2. State the requirements of good lighting.

3. State the advantages of electric heating.

4. List the applications of direct arc furnace.

5. Compare group drive and individual drive in any three aspects.

6. Select and give the motors for the following load :

(a) Paper mills

(b) Lathe machine

(c) Flour mills

7. Define *(a)* maximum speed, *(b)* average speed and *(c)* schedule speed.

8. State the factors affecting specific energy consumption.

9. Write any three advantages of PLC-based control panel over relay-based control panel.

10. State the applications of SCADA.

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

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

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

11. *(a)* State the laws of illumination. 4

(b) Two street lamps 20 m apart and are fitted with a 500 CP lamp at a height of 8 m above the ground. Find the illumination at a point *(i)* under each lamp and *(ii)* mid-way between the lamps. 6

12. *(a)* Explain direct resistance heating with a neat sketch. 5

(b) Explain the principle of dielectric heating. 5

13. Draw the electrical circuit of an air conditioner and explain each part.

14. *(a)* Explain plugging method of electric breaking. 5

(b) Explain jump (JMP) and return (RET) instructions used in ladder diagram. 5

15. Derive an expression for the maximum speed, acceleration and retardation for a trapezoidal speed-time curve. 10

16. A 500 tonne goods train is to be hauled by an electric locomotive up a gradient of 2 in 100 with an acceleration of 1·2 kmphps. Determine the adhesive weight and number of axles on locomotive, if the axle load is not to exceed 21 tonne. Take rotational inertia to be 5% for coaches and 10% for locomotive, tractive resistance is 40 N/tonne and coefficient of adhesion is 0·25. 10

17. An electric train has an average speed of 45 kmph on a level track between stops 3 km apart. It is accelerated at 1·5 kmphps and braked at 2·5 kmphps. Draw the speed-time curve for the run and find the specific energy consumption. Take tractive resistance 50 N/tonne and allow 12% for the rotational inertia. Assume efficiency of the motor as 90%. 10

18. Draw the block diagram of PLC and explain each part. 10

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