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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belgaum)

Seventh Semester, B.E. - Electrical and Electronics Engineering

Semester End Examination; Dec - 2016/Jan - 2017

Utilization of Electrical Power

Time: 3 hrs *Max. Marks: 100*

***Note**: Answer **FIVE** full questions, selecting **ONE** full question from each unit.*

UNIT - I

1 a. List the properties of good heating element. 4

b. Explain with the help of a neat sketch, the working of Ajax Wyatt furnace. What is its field of application? 10

c. Compare AC and DC Welding. 6

2 a. Discuss the methods of temperature control of resistance ovens. 4

b. A cubic water tank has surface area of 5.4 m^2 and is filled to 92 percent capacity five times daily. The water is heated from 15ºC to 60ºC. The losses per square metre of tank surface per 1ºC temperature difference are 5.9 watts. Calculate; 6

(i) Loading in kW (ii) Efficiency of tank.

Assume specific heat of water = 4.186 kJ/kgºC and 1 kWh = 3600 kJ.

c. With neat sketch, explain the various methods of resistance welding. 10

UNIT - II

3 a. Explain the laws of Illumination. 6

b. Define the following : 4

(i) Luminous Intensity (ii) Space Height Ratio

(iii) Utilization Factor (iv) Waste Light Factor.

c. Explain the construction and working principle of Fluorescent lamp. 10

4 a. A room 17 m x 6 m is illuminated by twenty 200 watt lamps. The MSCP of each lamp is 250. Assuming a depreciation factor of 1.2 and utilization factor of 0.6. Find the average illumination produced in the floor. 4

b. Explain how flood lighting is provided and the design considerations involved. 6

c. Explain the principle and operation of a sodium vapour lamp giving its neat sketch. Mention its uses. 10

UNIT - III

5 a. What do you mean by Electric Traction? Mention its uses. 4

b. Mention the requirements of an ideal traction system. 6

c. Explain briefly the systems of railway electrification. 10

Contd….2

6 a. Explain the different systems of Traction and mention its advantages and disadvantages. 10

b. Compare the DC and AC systems of railway electrification from the point of main line and suburban line railway service. 10

UNIT - IV

7 a. Draw and explain a typical speed time curve for an electric train movement. 10

b. Derive an expression for the tractive effort developed by a train unit. 10

8 a. Define the following : 8

(i) Crest speed (ii) Schedule speed

(iii) Coefficient of Adhesion (iv) Tractive effort.

b. A schedule speed of 45 km/h is required between two stops 1.5 km apart. Find the maximum speed over the run, if the stop is 20 seconds duration. The values of acceleration and retardation are 2.4 km/h/s and 3.2 km/h/s respectively. Assume a simplified trapezoidal speed-time curve. 6

c. What is specific energy consumption? Enumerate the factors which affect the specific energy consumption of trains operating at a given schedule speed. 6

UNIT - V

9 a. Explain briefly desirable properties of traction motors. 10

b. Mention the requirements of a braking system and explain briefly rheostatic braking method. 10

10 a. Discuss the suitability of series motors of traction duties with the help of characteristic curves. 8

b. Mention the advantages and disadvantages of electrical braking over mechanical braking. 6

c. Explain briefly the thrystor control of DC motor. 6

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