14AC11A02C5

Code No: 117JJ **R13**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech IV Year I Semester Examinations, November/December - 2017
UTILIZATION OF ELECTRICAL ENERGY
(Electrical and Electronics Engineering)

Time: 3 Hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

Part- A

(25 Marks)

1.a) Give reason why the method of load equalization cannot be adopted with synchronous motors. [2]
b) What are the essential requirements of rolling mill drive? [3]
c) State the principle of Induction heating. [2]
d) Why is it necessary to use welding transformer? [3]
e) Define the following terms in connection with illumination.
i) Illumination ii) Luminous Intensity [2]
f) State and explain the laws of illumination. [3]
g) Define scheduled speed of a train? [2]
h) What is regenerative braking? [3]
i) Define tractive effort. [2]
j) Define the following terms: (1) dead weight (2) effective weight and (3) adhesive weight in a locomotive. [3]

Part-B

(50 Marks)

2.a) What type of drive is being used in modern day industry, 'A group drive or 'an individual drive? Discuss the advantages of one over the other.
b) A 50-hp, 400-volt, 500-rpm d.c shunt motor has a full-load current of 110 A. The armature has a moment of inertia of 20 kg-m^2. Find the time taken to attain full speed against full load if the maximum and minimum currents during starting are 150A and 120A. State the assumptions made, if any. [5+5]

OR

3.a) Distinguish between the following loads:
i) Continuous rating ii) intermittent and iii) variable loads
b) Assuming an exponential law of temperature rise , calculate the final steady state temperature on full load and the time constant for an electric motor whose temperature rise after one hour is 25^0C and after two hours is 45^0C. [6+4]

4.a) State the advantages of electrically produced heat by means of arc furnaces. Distinguish between the direct and indirect type of arc furnaces. State their field of application
b) Explain the applications of dielectric heating. [6+4]

OR

5.a) Discuss the various characteristics required of welding generator sets (Both of the ac and of the dc types) and state how arc stabilization is achieved in practical welding generator sets.

b) Explain the different welding processes under resistance welding. [6+4]

6.a) Describe what do you know about arc lamps? What are their advantages and disadvantages as light sources?

b) A 250 volt lamp has a total flux of 3000 lumens and takes a current of 0.8 amperes. Calculate (i) lumen per watt (ii) M.S.C.P per watt. [6+4]

OR

7.a) Describe the construction and working of high pressure mercury vapour lamp.

b) A factory space 33m ×13m is to be illuminated with an average illumination of 72 lumens/ m^2, by 200watt lamps. The coefficient of utilization is 0.4 and the depreciation factor is 1.4. Calculate the number of lamps required, the lumens output of 200 watt is 2730 lumens. [5+5]

8.a) State the main features for an ideal traction system. Explain the various systems of track electrification in India.

b) Explain how an actual speed-time curve for an electric train service can be replaced by a curve having a simple geometric shape. [5+5]

OR

9.a) A train is required to run between stations 1.2km apart a scheduled speed of 30 kmph, the duration of stops being 15 seconds. The braking retardation is 5kmphps. Assuming a trapezoidal speed-time curve, calculate the acceleration, if the ratio of maximum speed to average speed is to be 1.3.

b) Explain the advantages of electric braking used in traction. [5+5]

10.a) State the factors that affect the specific energy consumption and their influence on it.

b) Determine the maximum adhesive weight of a loco required to start a 2340 tonne (inclusive of loco) on 1:150 gradients and accelerate it at 0.1 kmphps. Assume coefficient of adhesion as 0.25, train resistance 4kg/tonne and rotary inertia as 8%. [5+5]

OR

11. Calculate the specific energy consumption if a maximum speed of 12.2 m/s and for a given run of 1525 meters, an acceleration of 0.366m /sec^2 is desired. Train resistance during acceleration is 52.6N/1000Kg and during coasting is 6.12N/1000Kg, 10% being allowable for rotational inertia. The efficiency of the equipment during the acceleration period is 50%. Assume a quadrilateral speed –time curve. [10]

--ooOoo--