EE73

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NEW SCHEME

Seventh Semester B.E. Degree Examination, May 2007
Electrical and Electronics Engineering
Electrical Power Utilization

3 hrs.] [Max. Marks:100

Note : ***Answer any FIVE full questions.***

1 a. State and explain Slefan's law of heat radiation. **(04 Marks)**

b. A 15 kW, 220V, single phase resistance oven employs nickel chrome wires. If the wire temperature is not to exceed 1000^0C and temperature of charge is 600^0C, calculate the diameter and length of wire. Assume radiating efficiency as 0.6 and emissivity as 0.9. **(08 Marks)**

c. With a neat sketch explain Ajax – Wyatt furnace. **(08 Marks)**

2 a. Explain the electric welding process. What are the different types of resistance welding? Explain each of them with neat sketches. **(08 Marks)**

b. Explain modern welding techniques like ultrasonic welding and laser welding. **(08 Marks)**

c. Explain what is meant by "negative resistance characteristic of an arc" as applied to welding processes using electric arc. **(04 Marks)**

3 a. Explain the following terms : i) Solid angle ii) Luminous Intensity iii) Candle power iv) Lumen v) Brightness vi) Inverse square law vii) MHCP viii) MSCP. **(08 Marks)**

b. Find the height at which a light having uniform spherical distribution should be placed over a floor in order that the intensity of illumination at a given distance from its vertical line may be greatest. **(08 Marks)**

c. Explain how "mean spherical candle power" can be obtained using integrating sphere. **(04 Marks)**

4 a. State and explain Faraday's laws of electrolysis. **(06 Marks)**

b. State and explain different factors that would affect the process of electroplating. **(06 Marks)**

c. Explain the term current efficiency and energy efficiency as applied to electrolytic processes. How much of aluminum will be produced from aluminum oxide in 24 hours, if the average current is 3500 A and current efficiency is 90%? Aluminum is trivalent and its atomic weight is 27. **(08 Marks)**

5 a. Explain the disadvantages of low power factor and causes of low power factor and mitigating techniques. **(06 Marks)**

b. A single phase motor connected to 400V, 50 Hz supply takes 31.7 A at a power factor of 0.7 lagging. Calculate the value of the capacitance required in parallel with the motor to raise the P.F to 0.9 lagging. (Draw circuit diagram and vector diagram). **(08 Marks)**

c. Discuss the different tariff structures for i) Domestic, ii) Industrial consumers. Discuss the P.F penalty provisions in the tariff structure for industrial consumers. **(06 Marks)**

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6 a. Distinguish between average speed and scheduled speed of a suburban train. Derive an expression for maximum speed for a simplified trapezoidal speed time curve with usual notations. **(10 Marks)**

b. What is meant by specific energy consumption? An electric train has an average speed of 42 kmph, on a level track between stops 1400 meters apart. It is accelerated at 1.7 kmphps and braked at 3.3 kmphps. Draw the speed time curve for the run. Estimate the energy consumption at the axles of the train per tonne –km. Take tractive resistance at 50 Newtons per tonne of train mess and allow 10% for rotational inertia. **(10 Marks)**

7 a. Explain series parallel storting. Show that efficiency of storting is 66.6%, when the numbers of motors are two and 73%, when the number of motors are equal to four. **(10 Marks)**

b. Explain the working of Rosenberg's generator with its application to traction lighting application.

OR

Discuss shunt and Bridge transition in series parallel control. **(10 Marks)**

8 Write short notes on any four of the following :

a. Regenerative Braking.
b. Systems of current collection.
c. Linear Induction Motor.
d. High frequency Eddy current heating.
e. Polar curves.
f. Flood lighting.
g. Adhesion as applied to traction. **(20 Marks)**

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