7E 4174

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B.Tech. VII Semester (Main/Back) Examination - 2014
Electrical Engineering
7EE4 Utilization of Electrical Power

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

Instructions to Candidates:

*Attempt any **five** questions, selecting **one** question from each **unit**. All questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)*

Unit - I

1. a) What is Welding? Explain different types of electric Welding? (8)

   b) An insulating slab 2 cm thick of 150 Sq cm. in area is to heated by dielectric heating. The power required is 300W and frequency 30M C.P.S. is to be used. The material has relative permittivity of 5 and power factor of 0.05. Determine the voltage necessary and current that will flow through material. If voltage is Limited to 600 determine frequency to get same loan. (8)

OR

1. a) Give Classification of various electric heating methods along with brief account of their working principle. (8)

   b) A piece of an insulating material is to be heated by dielectric heating. The size of the piece is 12cm×12cm×3cm A frequency of 20 Mhz is used and the power absorbed is 450w. If the material has a relative permittivity of 5 and a power factor of 0.05, Calculate the voltage necessary for heating and current that follows in the material. If the voltage were Limited to 1700 volts, What will be frequency to get same loan? (8)

Unit - II

2. **a)** State the law of illumination? Compare the metal filament Lamp and discharge Lamp? Also explain polar curve and its usefulness to illumination engineering?**(8)**

b) A Filament Lamp of 500w is suspended at a height of 4.5 meters above the working plane and gives uniform illumination over an area of 6m diameter. Assuming an efficiency of the reflector as 70% and efficiency of Lamp as 0.8 watt per candle power. Determine the illumination on the Working plane. **(8)**

OR

2. **a)** Describe fluorescence properties of material and why is its used in Lighting equipments? Explain working of function of Choke and a starter influorescent tube Light? **(8)**

b) A hall 30m long and 12m wide is to be illuminated & illumination required is 50m - candles. Five types of Lamps having Lumen output as given below are available

Watts	100	200	300	500	1000
Lumens	1615	3650	4700	9950	21500

Taking a depreciation factor of 1.3 and utilization coefficient of 0.5, calculate the number of Lamps needed in each case to produce required illumination. Out of the above five Lamps select most suitable type and design a suitable scheme and make a sketch showing location of Lamp. Assume a suitable mounting height and Calculate space - height ratio of Lamp. **(8)**

Unit - III

3. **a)** What is an electrolysis? Discuss various Law of electrolysis explain different application of electrolysis? rtuonline.com **(8)**

b) Calculate the quantity of aluminium produced from aluminium oxide in 24 hr. if the average current is 2800 A and efficiency is 95%. Aluminium is trivalent and atomic weight is 27. The chemical equivalent weight and E.C.E. of silver are 107.98 and 111×10^{-8} Kg/C respect. **(8)**

OR

3. **a)** What is electro - deposition? Explain in detail various factor which have effect on the appearance and Quality of deposited surface. **(8)**

b) Its required to repair a Worn out circular shaft 15cm in diameter and 32cm Long by coating it with a layer of 1.6 mm of nickel. Determine the theoretical value of quantity of electricity required and time taken if the current density used is 210 A/m². Electro - chemical equivalent of nickel is 30.4×10^{-8} Kg/c of electricity and density of nickel is 8.9×10^{3} Kg/m³. **(8)**

Unit - IV

4. **a)** What are the merits & demerits of DC System track electrification. **(8)**

b) What are the requirement of an ideal traction system? How are they met/achieve in an electric traction system? **(8)**

OR

4. **a)** What do you mean by Electric traction? Discuss various factor on which final choice of traction depends. **(8)**

b) What are advantage of composite system of traction employing 25 kV AC supply and DC traction motors? **(8)**

Unit - V

5. **a)** How and where are induction motor used in traction state the merits & demerits of induction motor for traction duties. **(8)**

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 of 20 sec. during. The values of acceleration and retardation are 2.4 Km/hr/s and 3.2 Km/h/s respectively. Assume a simplified trapezoidal speed - time curve. **(8)**

OR

5. **a)** A 2400 tonnes train (including loco) proceeds down a gradient of 1 in 80 for 5min, during which period, its speed get reduced from 60 Km/h to 36 Km/h by application of regenerative braking. Find the energy returned to the Lines, if the tractive resistance is 49 N/tonne, rotational inertia 10% and overall efficiency of the motor during regeneration as 75%. **(8)**

b) Discuss method of electric braking in traction motors? Explain how regenerative braking can be obtained in DC Locomotive. **(8)**