

**IV B.Tech II Semester Supplementary Examinations, April/May 2005**  
**UTILIZATION OF ELECTRICAL ENERGY**  
**(Electrical & Electronic Engineering)**

Time: 3 hours

Max Marks: 70

Answer any FIVE Questions  
All Questions carry equal marks

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1. (a) Why and where is an individual drive recommended.  
(b) The speed of a 15 h.p. (Metric) 400 V d.c. Shunt motor is to be reduced by 25% by the use of a controller. The field current is 2.5 amps and the armature resistance is 0.5 Ohm. Calculate the resistance of the controller, if the torque remains constant and the efficiency is 82%.
2. (a) Discuss the various factors that govern the size and the rating of a motor for a particular service.  
(b) A motor has to deliver a load rising uniformly from zero to a maximum of 1500 Kw in 20 sec during the acceleration period, 1,000 Kw for 50 sec during the full load period and during the deceleration period of 10 sec when regenerative braking takes place the K w returned to the supply falls from an initial value of 500 to zero uniformly. The interval for decking before the next load cycle starts is 20 sec. Estimate the rating of the motor in KW.
3. (a) Give relative advantages and disadvantages of direct and indirect electric arc furnaces.  
(b) An electric arc furnace consuming 5KW takes 15 minutes to just melt 1.5Kgs of aluminum, the initial temperature being  $15^{\circ}\text{C}$ . Find the efficiency of the furnace. Specific heat of aluminum is 0.212, melting point  $658^{\circ}\text{C}$  and latent heat of fusion is 76.8 Cal per gram.
4. (a) What are the requirements of an ideal traction system?  
(b) What are the advantages and disadvantages of electric traction?
5. (a) Discuss inverse square law & cosine law of Illumination.  
(b) A lamp fitted with 120 degrees angled cone reflector illuminates circular area of 200 metres in diameter. The illumination of the disc increases uniformly from 0.5 metre-candle at the edge to 2 metre-candle at the centre. Determine
  - i. the total light received
  - ii. Average illumination of the disc
  - iii. Average c.p. of the source
6. Along the center of a line of a corridor, number of lamps are fitted with reflectors. The distance between the two adjacent lamps is 7.5cm and the height of each lamp from the floor is 5m. The candlepower of each lamp is 100 in all directions below the horizontal. Determine the maximum and minimum illumination along the

centerline of the floor and draw a graph showing the variation of the illumination along this line between the two lamps.

7. (a) Describe about duplication of railway transmission lines.  
(b) Write short notes on feeding and distributing system on A.C Traction and for d.c tram ways.
8. (a) For a trapezoidal speed-time curve of an electric train, derive expression for maximum speed and distance between stops.  
(b) A mail is to be run between two stations 5kms apart at an average speed of 50km/hr. If the maximum speed is to be limited to 70km/hr, acceleration to 2km/hr/sec, braking retardation to 4km/hr/sec and coasting retardation to 0.1km/hr/sec, determine the speed at the end of coasting, duration of coasting period and braking period.

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