

III B.Tech II Semester(RR) Supplementary Examinations, May 2010
UTILIZATION OF ELECTRICAL ENERGY
(Electrical & Electronic Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
 All Questions carry equal marks

1. (a) " If a high degree of speed control is required, d.c. is preferable to a.c. for an electric drive"
-Justify. [6]
- (b) A 200 V shunt motor has an armature resistance of 0.5 Ohm. It takes a current of 16 amps on full load and runs at 600 r.p.m. If a resistance of 0.5 Ohm is placed in the armature circuit, find the ratio of the stalling torque to the full load torque. And derive the expression used. [10]
2. (a) Explain what you mean by Load Equalization and how it is accomplished. [8]
- (b) A motor fitted with a flywheel supplies a load torque of 150 Kg-m for 15 sec. During the no load period the flywheel regains its original speed. The motor torque is required to be limited to 85 Kg-m. Determine the moments of inertia of the flywheel. The no load speed of the motor is 500 r.p.m and it has a slip of 10% on full load. [8]
3. (a) Explain about various losses in Resistance oven. Write the expression for efficiency of resistance oven. [8]
- (b) A 50KW, 3 phase, 440V, resistance oven is to provide nichrome strip 0.3mm thick for the three phase star connected heating elements. If the temperature of the wire is to be $1500^{\circ}C$ and that of charge is to be $1000^{\circ}C$, calculate the suitable width of the strip. Assume emissivity=0.91 and radiation efficiency = 0.6. [8]
4. (a) What are the requirements of an ideal traction system? [8]
- (b) What are the advantages and disadvantages of electric traction? [8]
5. (a) Explain how you will measure the candlepower of a source of light. [8]
- (b) Explain the Rosseau's construction for calculating M.S.C.P. of a lamp. [8]
6. (a) Enumerate various factors which have to be considered while designing any lighting scheme [7]
- (b) Six lamps are used to illuminate a certain room. If the luminous efficiency of each lamp is 11 lumens/watt and the lamps have to emit a total flux of 10,000 lumens, calculate [9]
 - i. the mean spherical luminous intensity
 - ii. the cost of energy consumed in 4hours if the charge for electrical energy is 50 paise per unit.
7. (a) Discuss the merits and demerits of the D.C and 1 - ϕ A.C systems for the main and suburban line electrification of the railways. [8]
- (b) Which system you consider to be the best for the suburban railways in the vicinity of large cities? Give reasons for your answer. [8]
8. (a) A train maintains the scheduled speed of $V_s = 40\text{km/hr}$ while running the distance of 3.2km with 30sec stops. It accelerates at 2.4 km/hr/sec and brakes at 3.6km/hr/sec . Assuming a simplified trapezoidal speed-time curve, calculate [8]
 - i. the maximum speed
 - ii. average energy output of the motor in watt-hr/tonne-km, if the tractive resistance averages 45newtons/tonne and additional rotational inertia 8%.
- (b) Derive expression for the specific energy output for a trapezoidal speed-time run of an electric train. Also write the factors affecting specific consumption. [8]
