

B.E. Sixth Semester (Electro. & Power. Elect. & Power, Electrical Engg.) (CGS)  
**10565 : Electrical Energy Utilisation : 6 EP 06 / 6 EL 06 / 6 EE 06**

P. Pages : 2

Time : Three Hours



AU - 2760

Max. Marks : 80

- Notes :
1. Answer **three** question from Section A and **three** question from Section B.
  2. Due credit will be given to neatness and adequate dimensions.
  3. Assume suitable data wherever necessary.
  4. Illustrate your answer necessary with the help of neat sketches.
  5. Use of pen Blue/Black ink/refill only for writing the answer book.

**SECTION - A**

1. a) Classify Electrical drives in detail. 7  
b) Draw duty cycle of centrifuge motor and explain briefly the drives used in Sugar Mills. 7

**OR**

2. a) Explain briefly the various factors to be considered in selection of Electric Motors for different industrial application. 7  
b) Explain briefly different process & drives used in paper mill. 7
3. a) Derive an expression for temperature rise of an electric motor after time  $t$  sec From the instant of switching it ON. 7  
b) List out different duties of an Electrical Machine & explain in detail continuous, short time and intermittent periodic duty with out starting. 6

**OR**

4. a) The enclosure of a 10kW motor is equivalent to a cylinder of 70cm diameter & 100cm length. The motor weight is 500kg. Assume that the specific heat is  $700\text{J/kg}^\circ\text{C}$  and the peripheral surface of the enclosure of the motor alone is capable of heat dissipation of  $12.5\text{W/m}^2/^\circ\text{C}$ . Efficiency of motor is 90%. Estimate heating time constant of the motor. 7  
b) What is rating of Electric motor. Derive an expression for short time rating of an Electric Motor. 6
5. a) What do you mean by braking? List various methods of braking of electric motors. Explain Plugging operation of DC shunt motor. 7  
b) 25HP, 230Volt D.C. Series motor has armature resistance of  $0.1\Omega$  and Field resistance of  $0.05\Omega$  and brush drop of 3 volt. When the line current is 80 Amp, the speed is 600 rpm. Estimate the speed when the line current is 100 Amp. Assume Flux is proportional to current. 6

**OR**

6. a) Draw and explain slip-torque characteristics of 3 phase induction motor and show the effect of increase in rotor resistance on the characteristics. 7
- b) D.C. Series motor runs at 500rpm on 220V, takes a current of 50Amp. Total Resistance of the m/c is  $0.15\Omega$ . Estimate the value of extra resistance to be connected in series with the motor circuit that the speed will deduce to 300rpm. The load torque being half of the previous value. Assume Flux proportional to current. 6

**SECTION - B**

7. a) What are the different systems of Track electrification? Give any two salient points of each of them. 7
- b) An electric train has an average speed of 42km/hr on a level track between stops 1400m apart. It has accelerated at 1.7 km/hr/sec, braked at 3.3km/hr/sec. Estimate duration of acceleration, braking & Free running periods. Also Estimate specific energy consumption. Assume resistance as 50N/tonne and allowed 10% rotational Inertia & efficiency is 90%. 7

**OR**

8. a) What is speed-time curve? Draw speed-time curve for urban & main line railway service. 7
- b) State & Explain the advantages of Electric traction system. 7
9. a) List out advantages of series-parallel starting of traction motors. 7
- b) Two DC series motors of a motor coach have resistance of  $0.1\Omega$  each. These motors draw a current of 500Amp from 600volt mains during series - parallel, starting period of 20 sec. If the acceleration during starting period remains uniform. Estimate a) Period of series operation b) Period of parallel operation c) speed at which the series connections are to be changed if the speed just after starting period is 70km/hr. 6

**OR**

10. a) Explain series parallel control with two motors also determine overall starting efficiency. 7
- b) Describe briefly. 6
- i) Pantograph collector ii) Bow collector
11. a) Define the following terms as applied to illumination. 7
- i) Luminous Intensity ii) Candle Power
- iii) M.H.C.P.
- b) Explain the different factors while designing the Lighting scheme. 6
12. a) Explain different types of Lighting scheme. 7
- b) What is induction heating? State the Factors affecting choice of freq<sup>n</sup> in induction heating. 6

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