

II B. Tech I Semester Regular Examinations, March - 2021**ELECTRICAL MACHINES-I
(Electrical and Electronics Engineering)****Time : 3 Hours****Max. Marks : 60****Note : Answer ONE question from each unit (5 × 12 = 60 Marks)**
~~~~~**UNIT-I**

1. a) Define Co-energy and Deduce the expression for torque in a singly – excited system with help of neat sketch? [8M]  
b) Explain the classification of energy conversion devices. ? [4M]

**(OR)**

2. a) Explain the reasons for failure of build-up of EMF in self-excited generators with remedies? [6M]  
b) Explain armature reaction and its effects in DC generators with neat sketches? [6M]

**UNIT-II**

3. a) Discuss in detail about the significance of back E.M.F that is produced in a DC motor? [6M]  
b) A six pole, lap-wound 400 V series motor has the following data: Number of armature conductors=820, flux per pole=0.065 Wb, total motor resistance = 0.6 ohms and frictional losses = 2 kW. If the current taken by the motor is 70 A, find: (i) Total torque (ii) useful torque at the shaft (iii) power output? [6M]

**(OR)**

4. a) Explain speed-current, torque-current and speed-torque characteristics of DC Compound Motor? [6M]  
b) A 500V D.C Shunt Motor takes a current of 4A on no-load. The resistances of the armature and field circuits are 0.42ohms and 350ohm respectively. Find (a) the efficiency when loaded and taking a current of 500A (b) the percentage change of speed. State precisely the assumptions made? [6M]

**UNIT-III**

5. a) Why starters are required in DC Motor? With a neat diagram, explain the operation of a 4-point starter? [8M]  
b) Discuss the advantages of 4-point starter over 3-point starter? [4M]

**(OR)**

6. a) If a brake test is conducted on a DC shunt motor the full load readings are observed as tension on tight side is 9.1 kg tension on slakes side is 0.8 kg. Total current is 10A. Supply voltage is 110 v. Speed is 1320 rpm. Radius of the pulley is 7.5 cm. Calculate the full load efficiency. [6M]  
b) Explain the Hopkinson's test for determination of efficiency of shunt machines? [6M]

**UNIT-IV**

7. a) Derive the E.M.F equation of the transformer? [6M]  
b) The No-Load current of a 4400/440 V, 1- $\Phi$ , 50 Hz transformer is 0.04 A. It consumes power 80 W at no-load when supply is given to LV side and HV side is kept open. Calculate the following: (i) Power factor of no-load current. (ii) Iron loss component of current. (iii) Magnetizing component of current? [6M]

**(OR)**

8. a) Draw the exact and approximate equivalent circuits of 1-Phase Transformer and Explain? [6M]  
b) Explain in detail about the different types of losses that occur in transformers? [6M]

**UNIT-V**

9. a) Following readings were obtained from O.C. and S.C. tests on a 8 kVA, 400/120V, 50 Hz transformer: O.C. Test: (l.v. side) : 120 V; 4 A; 75 W S.C. Test: (h.v.side) : 9.5 V; 20 A; 110W Obtain i) Voltage regulation and efficiency for 0.8 lagging power factor load, and ii) The efficiency at half full – load and 0.8 power factor load? [8M]  
b) Explain Sumpner's test on single phase transformer and also list its advantages? [4M]

**(OR)**

10. a) What is the total load capacity of V-V bank as compared with a delta-delta bank? [6M]  
b) A balanced 3-phase, 100 kW load at 400V and 0.8 p.f. lag is to be obtained from a balanced 2-phase, 1100V lines. Determine the kVA rating of each unit of the Scott-connected transformer? [6M]

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