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**GAYATRI VIDYA PARISHAD COLLEGE OF ENGINEERING FOR WOMEN****(Autonomous)**

(Affiliated to Andhra University, Visakhapatnam)

II B.Tech. - I Semester Regular Examinations, Nov – 2025**ELECTRICAL MACHINES -1**

(Electrical and Electronics Engineering)

1. All questions carry equal marks
2. Must answer all parts of the question at one place

Time: 3Hrs.**Max Marks: 70****UNIT-I**

1. a. Name the different parts of a dc machine and state the function of each part. 7M
- b. A short-shunt dc compound generator supplies 150 A at 100 V. The resistance of armature, series field and shunt field windings are 0.04, 0.03 and 60 ohms respectively. Find the e.m.f generated. Also find the e.m.f generated if same machine is connected as a long shunt machine. 7M

OR

2. a. Describe the process of voltage build up in self-excited generators. 7M
- b. Explain the phenomenon of Armature reaction in DC machine and state the importance of compensating windings. 7M

UNIT-II

3. a. Explain the principle of torque production in a dc motor and derive an expression for it. 7M
- b. Describe the armature control and field control methods for speed variations in dc shunt motor. 7M

OR

4. a. What are the losses that occur in dc machines? Derive the condition for maximum efficiency in a dc machine. 7M
- b. A dc shunt motor is running at 1200 rpm and it has an armature resistance of 0.15 ohms. The current taken by the armature is 60 A when the applied voltage is 220 V. If the load is increased by 30%, find the variation in the speed. 7M

UNIT-III

5. a. Explain with diagram how Hopkinson's test is performed on dc machines. 7M
- b. A DC shunt generator delivers 45KW to the load at 220V. The armature resistance is 0.01 Ohms, the shunt field resistance is 50 Ohms, and the stray losses are 1200 W. Determine the total losses and efficiency of the generator at full load. 7M

OR

6. a. Distinguish between core-type and shell-type transformer. 4M
- b. Why is the low voltage winding placed near the core? 4M
- c. A single-phase transformer supplies a load of 20 kVA at a p.f. of 0.8 lag. The iron loss of the transformer is 200 W and the copper losses at this load is 180 W. Calculate (i) the efficiency (ii) the new efficiency if the load is now changed to 30 kVA at a p.f. of 0.9 lag. 6M

UNIT-IV

7. a. Discuss about Sumpner's test on a single-phase transformer. 7M
b. A 400/100 V, 5 kVA, single-phase two winding transformer is to be used as an auto-transformer to supply 400 V from a 500 V voltage source. When tested as a two winding transformer at rated load and 0.8 p.f. lagging, its efficiency was found to be 0.95.
i) Determine its kVA rating as an Auto-transformer.
ii) Find its efficiency as an auto-transformer at rated load and at 0.8 p.f. lagging. 7M

OR

8. a. Explain why parallel operation of transformers are necessary. 4M
b. State the essential and desirable conditions which would be satisfied before two single-phase transformers may be operated in parallel. 4M
c. The OC test (LV side) and SC test (HV side) results of a single-phase 6 kVA, 250/500 V transformer are 250 V, 1.2 A, 80 W and 25 V, 10 A, 95 W respectively. Determine the circuit parameters referred to LV side and also calculate the regulation and efficiency of the transformer at full-load at 0.8 p.f. lagging. 6M

UNIT-V

9. a. Draw the connection diagrams and explain the features of Y-Y, Y- Δ , Δ -Y and Δ - Δ three phase connections. 7M
b. What are the advantages of a single three-phase transformer over three single phase transformer banks of the same kVA rating? 7M

OR

10. a. Explain with the help of connection and phasor diagrams, how a Scott connection is used to obtain two-phase supply from three-phase supply. 7M
b. A 3 Phase Step-Down transformer takes 12 Amps when connected to 11KV mains. The turns ratio per phase is 12. Neglect losses, find the secondary line voltage, line current and output KVA if the transformer windings are connected in Star/Delta. 7M