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**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR**  
(AUTONOMOUS)

**B.Tech II Year I Semester Supplementary Examinations August-2022**

**ELECTRICAL MACHINES - I**

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

**UNIT-I**

- 1 a** How demagnetizing and cross magnetizing ampere turns per pole are calculated in a DC Machine? **L2 6M**
- b** The brushes of a certain lap connected 400kw, 6-pole generator are given a lead of  $18^\circ$  electrical. From the data given, calculate (i) the demagnetizing ampere-turns (ii) the cross-magnetizing ampere turns (iii) series turns required to balance the demagnetizing component. The full load current is 750A and total numbers of conductors are 900 and the leakage coefficient is 1.4. **L3 6M**

**OR**

- 2 a** What are the causes for the failure of self-excitation? **L2 6M**
- b** Distinguish between Lap and Wave windings? **L2 6M**

**UNIT-II**

- 3** A 25HP, 250V DC Series motor has armature resistance  $0.1\Omega$  and field resistance  $0.05\Omega$  and brush Contact drop 3V. When the line current is 80A, the speed is 600rpm. Find the speed when the line Current is 100A. **L3 12M**

**OR**

- 4** Explain the operation of four point starter for a DC motor with neat diagram. **L2 12M**

**UNIT-III**

- 5** Explain Swinburne's test on DC machines. What are its advantages and disadvantages? **L2 12M**

**OR**

- 6 a** Enumerate the losses in DC machine **L1 6M**
- b** Derive the condition for maximum efficiency. **L1 6M**

**UNIT-IV**

- 7 a In a transformer, derive the condition for maximum efficiency and thus find the load current at which the efficiency is maximum. **L3 6M**
- b A 20KVA, 2000/200V single phase transformer has the following parameters **L3 6M**  
H.V winding:  $R_1=3\Omega$ ,  $X_1=5.3\Omega$ , L.V winding:  $R_2=0.05\Omega$ ,  $X_2=0.1\Omega$ . Find the Voltage Regulation at (i) p.f of 0.8 lagging (ii) UPF (iii) 0.707 p.f leading.

**OR**

- 8 a Draw the Expression for Voltage regulation of a transformer from the simplified approximate equivalent circuits of 1- $\Phi$  transformer and also obtain condition for zero regulation. **L3 6M**
- b A 10KVA, 2000/400V single phase transformer has the following data:  $R_1=5\Omega$ ,  $X_1=12\Omega$ ,  $R_2=0.2\Omega$ ,  $X_2=0.48\Omega$ . Determine the secondary terminal voltage at full load, 0.8 power factor lagging when the primary supply voltage is 2000V. **L3 6M**

**UNIT-V**

- 9 a Draw and explain the Connection diagram of Y- Y &  $\Delta$ - $\Delta$  connected 3-phase transformer. **L2 6M**
- b Determine load shared by two transformers are each transformer when connected in parallel With unequal voltage ratios. **L2 6M**
- OR**
- 10 a Draw the equivalent circuit of an Auto transformer. **L2 5M**
- b In a 25-kVA, 2000/200V, single phase transformer, the iron and full-load copper losses are 350 and 400W respectively. Calculate the efficiency at unity p.f. on (i) full load (ii) half full-load. **L2 7M**

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