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

B.Tech II Year I Semester Supplementary Examinations August-2021

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 Deduce an expression for e.m.f equation of DC Generator? **6M**
 b An 8-pole lap connected armature has 960 conductors, a flux of 40 m Wb per pole and a speed of 400 r.p.m. Calculate the emf generated on open circuit. If the armature were wave connected, at what speed it must be driven to generate 400 V. **6M**

OR

- 2 a What is meant by armature reaction? **2M**
 b Enumerate all the parts of a DC machine and indicate their function? **10M**

UNIT-II

- 3 a Write the working principle of a DC motor. **2M**
 b Draw and explain the characteristics of DC series and DC Shunt Motors. **10M**

OR

- 4 a The speed of a motor falls from 1100 r.p.m at no-load to 1050 r.p.m at rated load. The speed regulation of motor is. **2M**
 b Why is a starter necessary for a DC motor? Explain the working of a three-point starter with the help of a neat diagram? **10M**

UNIT-III

- 5 a Name the methods of direct and indirect testing? **2M**
 b A Shunt generator delivers 195A at terminal Voltage of 250V. The armature resistance and shunt Field resistances are 0.02 Ω and 50 Ω respectively. The iron and friction losses equal 950W. Find (i) EMF generated (ii) Copper losses (iii) output of the prime mover (iv) commercial, mechanical and electrical Efficiencies. **10M**

OR

- 6 a Enumerate the losses in DC machine. **6M**
 b Derive the condition for maximum efficiency. **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. **6M**
 b A 20KVA, 2000/200V single phase transformer has the following parameters 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. **6M**

OR

- 8 a Draw the Expression for Voltage regulation of a transformer from the simplified approximate equivalent circuits of 1- Φ transformer and also obtain condition for zero regulation. **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. **6M**

UNIT-V

- 9 Explain the Scott connection of two single phase transformers with neat circuit diagram. **12M**

OR

- 10 a Draw the equivalent circuit of an Auto transformer **6M**
- 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. **6M**

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