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

**B.Tech II Year II Semester Supplementary Examinations February-2022**

**ELECTRICAL MACHINES-II**

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 60

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

**UNIT-I**

- 1 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**

- 2 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. **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-II**

- 3 Explain the procedure for conducting Sumpner's test along with all precautions to be taken while Conducting the test with neat diagram. **12M**
- OR**
- 4 The primary and secondary windings of a 50KVA, 6600/220V transformer have resistances of  $7.8\Omega$  and  $0.0085\Omega$  respectively. The transformer draws no load current of 0.328A at power factor of 0.3 lagging. Calculate the efficiency at full load if the power factor of the load is 0.8 lagging. **12M**

**UNIT-III**

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

**OR**

- 6 a Explain how rotating magnetic field of constant amplitude is produced. **8M**
- b A 4 pole, 3-phase induction motor operates from a supply whose frequency is 50Hz. Calculate. **4M**
- i. the speed at which the magnetic field of the stator is rotating.
  - ii. the speed of the rotor when the slip is 0.04
  - iii. the frequency of the rotor currents when the slip is 0.03
  - iv. the frequency of the rotor currents at standstill.

**UNIT-IV**

- 7 Derive the following (i) Torque equation of an induction motor (ii) Condition for Maximum Torque under running condition? **12M**

**OR**

- 8 A 6-pole, 50HZ, 3-phase induction motor runs at 960rpm when the torque on the shaft is 200Nm. If the stator losses are 1500W and the friction and windage losses are 500W. Find (i) rotor copper loss and (ii) the efficiency of the motor. **12M**

**UNIT-V**

- 9 a Explain the V/f control methods of the speed control of induction motor is achieved from stator side? **6M**
- b A cascaded set consists of 2 motors 4-pole and 6-poles respectively. The Supply frequency is 50 Hz , While the frequency in rotor circuit of 6 pole motors 1Hz.Determine the slip of each machine and combined speed of the set. **6M**

**OR**

- 10 a With the help of circuit diagram and equations, explain Auto Transformer starting of Induction motor. **6M**
- b A Three phase induction motor has a ratio of maximum torque to full load torque as 2.5:1 . determine the ratio of starting torque to full load torque if star-delta starter is used. The rotor resistance and standstill reactance per phase are  $0.4\Omega$  and  $4\Omega$  respectively. **6M**

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