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

PART-A
(Answer all the Questions **5 x 2 = 10** Marks)

1	**a**	What does hunting of synchronous motor mean?	**2M**
	b	What are the two types of 3-phase induction motor?	**2M**
	c	State the merits of three phase transformers over single-phase transformer.	**2M**
	d	Why is open circuit characteristics are also called magnetic characteristic?	**2M**
	e	Why the MMF method of estimating the voltage regulation is considered as the optimization method?	**2M**

PART-B
(Answer all Five Units **5 x 10 = 50** Marks)

UNIT-I

2 **a** A single phase transformer shows 63W core losses at 40Hz while 110W at 60Hz. **5M**
Both the tests are performed at same value of maximum flux density in the core.
Find hysteresis and eddy current losses at 50Hz frequency.

b Discuss various types of 3-phase transformer connections briefly. **5M**

OR

3 **a** In a Scott connection, calculate the values of line currents on the 3-phase side if the **5M**
loads on the 2-phase side are 300kW and 450kW both at 100V and 0.707 p.f(lag)
and the 3-phase line voltage is 3300V. The 300-kW load is on the leading phase on
the 2-phase side. Neglect Transformer losses.

b How do you separate hysteresis and eddy current losses of a Transformer. **5M**

UNIT-II

4 A 4-pole, 4-phase induction motor operates from a supply whose frequency is 50Hz. **10M**
Calculate
  i. Speed at which the magnetic field of the stator is rotating
  ii. Speed of the rotor when the slip is 0.04
  iii. Frequency of the rotor currents when the slip is 0.03
  iv. Frequency of the rotor currents at standstill
  v. Speed of the rotor when the slip is unity

OR

5 **a** A 3-Phase induction motor wound for 4 poles and is supplied from 50Hz system. **5M**
Calculate
  i. Synchronous speed
  ii. rotor speed when slip is 4% and
  iii. rotor frequency when runts at 600 rpm.

b Derive the expression for starting torque, maximum torque and hence obtain the **5M**
value of maximum torque of a 3-phase induction motor.

UNIT-III

6 A 3-phase,6-pole,50Hz induction motor takes 60A at full-load speed of 940rpm and **10M**
develops a torque of 150 N-m. The starting current at rated voltage is 300A. What is the
starting torque? If a star/delta starter is used, determine the starting torque and starting
current

OR

7   a   Write short notes on following.   **6M**
          i) V/f control of IM.
          ii) Injection of emf into the rotor circuit to control speed.
    b   Explain the following methods of starting of 3-phase IMs   **4M**
          i) Star-delta starter
          ii) Auto-Transformer starter

UNIT-IV

8   Find the synchronous impedance and reactance of an alternator in which a given field   **10M**
current produces an armature current of 200A on short-circuit and a generated emf of
50V on open-circuit. The armature resistance is 0.1 ohm. To what induced voltage must
be alternator be excited if it is to deliver a load of 100A at a p.f. of 0.8 lagging with a
terminal voltage of 200V

OR

9   a   With neat circuit diagram, Explain the procedural steps to find voltage regulation of   **5M**
synchronous generator by MMF method.
    b   With neat circuit diagram, Explain the procedural steps to find voltage regulation of   **5M**
synchronous generator by Synchronous Impedance Method.

UNIT-V

10   a   A 5MVA, 10KV, 1500rpm, 50HZ alternator runs in parallel with other machines. Its   **5M**
reactance drop is 20%. Find the synchronizing power per unit mechanical degree of
displacement and the corresponding torque at (i) No load (ii) Full load at 0.8PF
lagging
    b   Write short notes on following   **5M**
        i.   Synchronous condenser
        ii.   Damper Winding

OR

11   a   Compare between synchronous motor and 3Ø induction motor.   **5M**
    b   Explain in detail about 'V'curves and 'Λ'curves of a synchronous motor.   **5M**

END