R20 Regulation *Subject code: 3P4BC*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A' Grade)

B.Tech IV Semester Regular/Supplementary Examinations, September 2023

ELECTRICAL MACHNIES – II

(EEE)

Maximum Marks: 70 Date:19.09.2023 Duration: 3 hours

Note: 1.This question paper contains two parts A and B.
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit which carries 10M.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10x2M=20 Marks)

1 Define per unit slip.
2 What is meant by full load torque.
3 Draw the speed-torque characteristics of a double cage induction motor.
4 What are the limitations of speed control by conventional methods?
5 Write about the causes of triple harmonics in voltage waves in electric machinery?
6 List the various applications of synchronous motors.
7 Distinguish between synchronous motor and induction motor.
8 What is hunting? How it can be eliminated?
9 Draw the equivalent circuit of single -phase induction motor.
10 List the merits and demerits of shaded pole induction motor

Part-B

Answer All the following questions. (5X10M=50Marks)

11 a) Explain the rotating mathematic field in 3-phase induction motor. [5]
b) Deduce the torque equation of 3-phase induction motor. [5]

OR

12 A 3-phase, 400 V, 6 pole, 50Hz induction motor takes a power input of 35 KW at its full load speed of 980rpm. The total stator losses are 1 KW and the friction and windage losses are 1.5 KW. Calculate a) Slip b) Rotor ohmic losses c) Shaft power d) shaft torque e) Efficiency. [10]

13 a) Draw and explain Torque-slip characteristics of induction motor. [5]
b) Explain the Voltage/frequency control of Induction Motor. [5]

OR

14 a) Explain the conducting procedure blocked rotor test on three phase induction motor. [5]
b) Explain the speed control of induction motor using Rotor resistance control. [5]

15 a) Draw and explain Synchronous Generator on Load for lagging and UPF loads along with phasor diagram. [5]
b) Derive the expression for both distribution factor and coils span factor. [5]

OR

16 The following test results are obtained on 150MW, 13kV, 50Hz, 3-phase alternator.

OC (Line) Voltage (kV)	4	8.7	10.8	13.3	15.4
Field Current (A)	200	450	600	850	1200 A

Field current of 750A is found necessary to circulate 8000A on short circuit of the armature. Calculate the full load voltage regulation by i) Synchronous impedance method and ii) MMF method at 0.85 p.f lagging. Neglect resistance and leakage reactance. [10]

17 a) Why is synchronous motor not a self-starting motor? [5]

b) Explain any one starting method of starting synchronous motor. [5]

OR

18 a) What is a Synchronous condenser? Explain. [5]

b) A three-phase, star-connected synchronous motor has $Z=0.5+j5$ and taking an input power of 1500 kW when back emf is 4000V. Calculate (i) Line current (ii) power factor for the above conditions. [5]

19 a) Draw and discuss the constructional details of a capacitor start single-phase induction motor. [5]

b) Discuss the various applications of single-phase motors. [5]

OR

20 a) Explain the double revolving field theory. [5]

b) Explain the shaded pole motor with circuit diagram. [5]