4E4175

Roll No. Total No of Pages: 4

4E4175

B. Tech. IV Sem. (Back) Exam., May - 2019

Electrical Engineering

4EE5A Electrical Machines - II

Time: 3 Hours **Maximum Marks: 80**

 Min. Passing Marks: 26

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. Graph Paper 2. NIL

UNIT- I

Q.1 (a) How can we eliminate r^{th} normonic by using short pitch winding? [4]

(b) What are the advantages of distributed winding? [4]

(c) 3ϕ, 16 poles, Synchronous Generator has resulting air gap flux of 0.06 wb/pole. The flux is distributed sinusoidally over the pole. The stator has 2 slots per pole per phase and 4 conductors per slot are accommodated in two layers the coil span is 150° electrical. Calculate the phase and line voltage when machine rms at 325 rpm. [8]

OR

Q.1 (a) Proof - [8]

$Q_m = \frac{2}{p} Q_e$

Q_m = Angle of rotation (mechanical)

Q_m = ,, ,, ,, (electrical)

(b) Also proof graphically if we interchange the terminal of 2 – phase supply the direction of R.M.F. (rotating magnetic field) [8]

UNIT-II

Q.2 (a) Why iron losses are neglected on rotor side in 3 - ϕ I. M. [4]

(b) How can we separate the iron losses and friction and wind age losses in 3 - ϕ I. M.? [4]

(c) Why starter is not used in slip ring induction motor? [2]

(d) Why low slip region is called stable region and high slip region is called unstable region in torque slip characteristic? [6]

OR

Q.2 Draw the circle diagram from no load to and S.C. test of a 3 - ϕ, 14.92 kW, 400V, 6 pole I. M. from the following test result (lime values) [16]

No load :	400 – V	11A	p.f. = .2
Short Circuit	100 – V	25 A	p.f. = .4

Rotor cu – losses at stand – still the half the total cu – losses.

From the diagram find out –

(a) line current slip, efficiency and p.f. at full load

(b) Max torque

UNIT- III

Q.3 (a) How can we perform block rotor test in 1 -ϕ inducation motor. Also draw the equivalent electrical circuit diagram during this condition? [8]

(b) Explain the basic principle of stapper motor. [8]

OR

Q.3 (a) What is the reason that single phase induction motor is not self starting? [4]

(b) What is the use of copper ring in pole show in phase split induction motor? [4]

(c) Explain the basic principle of single phase synchronous motor. [8]

UNIT- IV

Q.4 (a) What is the operating region of synchrmonous generator during full load condition. (according to B – H curve) [4]

(b) Proof $X_d \geq X_q$ [4]

Where X_d = direct axis reactance

X_q = Quadrature axis reactance

(c) Write down the all step of MMF methods. Also draw the phasor diagram if we igone the armature resistance. [8]

OR

Q.4 (a) Draw the graph between Z_s v/s I_f [4]

Where Z_s = synchronous impedance

I_f = field current

(b) Also explain the reason why is "passimastic result" obtained in the voltage regulation by using synchronous impedance method. [4]

(c) What are the necerrary and sufficient conditions for synchronizing of altermators. [8]

UNIT- V

Q.5 (a) Why synchronous motor is not self starting? [6]

(b) Draw the torque slip characteristic of synchronous motor. [4]

(c) What is the impact of change in load on armature current and P. F. (Power factor) during normal excitation. Draw the phasor diagram [6]

OR

Q.5 (a) 20 pole, 693V, 50 Hz, 3 ϕ, y connected synchronous motor is operating at no load and synchronous reactance of 10Ω (assuming $R_a = 0$) if rotor is returned by 0.5° (mech.) from its synchronous position. Compute [14]

(i) Rotor displacement in electrical degree.

(ii) Armature EMF/phase

(iii) Armature current.

(iv) Power drawn by motor

(v) Power develop by armature.

How will these quantities change when motor is lodded and displaced by 5° (mech.)

(b) If the load is dead constant on operating condition then how much induced E.M.F. is induced in damper bar/winding. [2]