22523

23242

3 Hours / 70 Marks Seat No. | | | | | | | | |

Instructions – (1) All Questions are *Compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any FIVE of the following: **10**

a) Define synchronous speed and slip speed.

b) State suitable single phase motor for following applications -

i) Table fan

ii) Mixers and Griders

c) Define synchronous impedance and synchronous reactance.

d) State any four types of single phase induction motor.

e) Compare salient Rotor and cylindrical Rotor for alternator.

f) Define:

i) Pull-in torque

ii) Pull-out torque in case of synchronous motor.

g) List applications of servo motor.

Marks

2. Attempt any THREE of the following: **12**

a) Draw block diagram showing power stages of 3–ϕ induction motor.

b) Derive the condition for maximum torque under running condition of a 3–ϕ induction motor.

c) Draw the phasor diagram of loaded alternator when load is capacitive and also write the equation of no-load induced emf.

d) Explain the principle of operation of 3ϕ synchronous motor.

3. Attempt any THREE of the following: **12**

a) The power input to a 500V, 50HZ, 6 pole, 3ϕ induction motor running at 975 rpm is 40 kW. The stator losses are 1kW and friction and windage losses are 2kW. Calculate:

i) Slip

ii) Rotor copper loss

iii) Shaft Power

iv) Efficiency

b) State why 3ϕ induction motor never runs on synchronous speed.

c) Compare resistant split phase motor with capacitor split phase motor on the basic of:

i) Output

ii) Starting torque

iii) Power Factor

iv) Applications

d) Define and explain distribution factor of a winding with neat diagram.

4. Attempt any THREE of the following: **12**

a) Explain working of auto transformer starter for a 3ϕ induction motor with neat diagram.

b) Describe with neat sketch working of hysteresis motor.

c) Derive the EMF equation of alternator. State the meaning of each term.

d) Draw schematic diagram of a DC servo motor. Draw a speed Torque characteristics of DC servo motor.

e) Explain working principle of BLDC motor.

Marks

5. Attempt any TWO of the following: **12**

a) A 6 pole, 50 Hz, 3ϕ induction motor running on fuel load develops a useful torque of 150 N-m at a rotor frequency of 1.5 Hz. Calculate the shaft power output. If the mechanical torque lost in friction be 10 N-m.

Determine:

i) Rotor copper loss

ii) The input to the motor

iii) Efficiency

b) Why single phase induction motor is not self starting? Justify with the help of double field revolving theory.

c) List different starting methods of 3ϕ synchronous motor. Explain any one of them.

6. Attempt any TWO of the following: **12**

a) Define voltage regulation of an alternator. Explain synchronous impedance method for finding regulation of alternator.

b) Draw and explain V and inverted V curves of synchronous motor.

c) i) Find the no-load line voltage of a star connected 3ϕ, 6 pole alternator which runs at 1200 rpm, having flux per pole is 0.1 Wb sinusoidally distributed. Its stator has 54 slots having double layer winding. Each coil has 8 turns and coil is chorded by one slot.

ii) State any four advantages of rotating field over rotating armature of 3ϕ alternator.

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