

Total No. of Questions : 8]

SEAT No. :

P-1503

[Total No. of Pages : 3

[6002]-131

S.E. (Electrical Engineering)

ELECTRICAL MACHINES - I

(2019 Pattern) (Semester - IV) (203146)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right indicate full marks.
- 3) Neat diagram must be drawn wherever necessary.
- 4) Assume suitable data, if necessary.
- 5) Use of non-programmable calculator is allowed.

Q1) a) State four features of LAP winding of DC machine. [4]

b) Draw the diagram showing constructional details of a DC motor, clearly mark all parts. State the details of any two parts (name of part, material used for it, its function). [6]

c) Draw and explain power stage diagram (power flow diagram) of DC motor. [8]

OR

Q2) a) State any four applications of DC Series motor. [4]

b) State the significance of back emf in dc motor. [6]

c) Draw the connection diagram of shunt, series DC motors. Write their current & voltage distribution equations. [8]

Q3) a) Explain in detail what precaution is necessary to be taken while operating DC Series motor. [3]

b) Sketch & explain the Torque-Armature current characteristics of DC shunt motor. [6]

P.T.O.

- c) A 250 V d.c. shunt motor has an armature circuit resistance of 0.5 Ohm and a field circuit resistance of 125 Ohm. It drives a load at 1000 r.p.m. and takes 25 A. The field circuit resistance is then slowly increased to 150 Ohm. If the load torque remains constant, calculate the new speed and armature current. [8]

OR

- Q4)** a) What is meant by reactance voltage in case of commutation in DC machine? [3]
- b) Draw the circuit diagram & explain the speed control of DC shunt motor by flux control also draw the nature of graph (Field current Vs. Speed). [6]
- c) Draw the connection diagram of 3 point starter used for DC shunt motor & explain the function of (i) Hold on coil & (ii) Over load coil. [8]

- Q5)** a) Draw the power flow diagram of 3-ph Induction motor. [4]
- b) A 6 pole, 3 phase induction motor is connected to 400 volt, 50 Hz ac supply. Calculate- [6]
- i) the speed of rotating magnetic field of the motor
 - ii) speed of motor at 2% slip
 - iii) the rotor emf frequency at 2% slip
- c) Compare 3 phase slip-ring induction motor with Squirrel cage induction motor (Minimum 4 points of comparison expected) [8]

OR

- Q6)** a) Derive the condition for maximum torque under running of 3 phase induction motors with usual notations. [4]
- b) With suitable diagram explain constructional details of 3 phase slipring induction motor. [6]
- c) Explain concept of rotating magnetic field in case of 3 phase induction motor.

Draw respective phasor diagrams and write respective equations [8]

- Q7) a)** With a suitable diagram explain rotor resistance starter for three-phase induction motor. [7]
- b)** With suitable circuit diagram explain no load and blocked rotor test on 3 phase induction motor. Also write respective formulae involved in calculation part for determining the respective parameters. [10]

OR

- Q8) a)** Obtain the approximate equivalent circuit diagrams of 3-ph induction motor step by step. Also draw the phasor diagram of 3 phase induction motor. [7]
- b)** Using data from No load & Blocked rotor test on 3-ph induction motor, write down the calculations and draw circle diagram. Indicate different losses and point of maximum torque in the circle diagram. [10]

