

Total No. of Questions : 8]

SEAT No. :

PB-3607

[Total No. of Pages : 3

[6261]-12

S.E.(Electrical Engineering)
ELECTRICAL MACHINES - I
(2019 Pattern) (Semester - IV) (203146)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Use of non-programmable calculator is allowed.
- 5) Assume suitable additional data if necessary.

- Q1)** a) State features of wave winding. [4]
- b) Derive the torque equation of DC motor by usual notations. [6]
- c) A 6 pole, Lap wound DC shunt motor takes armature current of 110 Ampere at 480 volt. It has armature resistance of 1 Ohm and total 864 armature conductors. The flux per pole is 0.05 Weber. Calculate- [8]
- i) Mechanical power developed in armature
 - ii) Gross torque
 - iii) Speed of the motor

OR

- Q2)** a) State the material used and function of following parts of a DC machine- [4]
- i) Armature core
 - ii) Brushes
- b) Draw the power flow diagram of DC motor. Write respective expressions of power and power loss for respective blocks. [6]
- c) What is armature reaction in DC Machines? Explain the effects of armature reaction with suitable diagrams. Suggest the remedial measure on it. [8]

P.T.O

- Q3)** a) Explain why DC Series motor should not be started on - No load condition? [3]
- b) Sketch & explain the Torque - Armature current characteristics of DC shunt motor. [6]
- c) Draw the connection diagram of 4 point starter used for DC shunt motor & explain the function of [8]
- Hold on coil &
 - Over load coil.

OR

- Q4)** a) What is meant by reactance voltage in case of commutation in DC machines? [3]
- b) Draw the connection diagram & explain the speed control of DC shunt motor by flux control method. [6]
- c) A DC series motor is running at 350 rpm at 220V, taking a current of 25Amp. The motor armature plus field resistance is 1 Ohm. Calculate - [8]
- the resistance to be added in series to reduce the speed to 250 rpm at constant torque.
 - The power wasted in the resistor.

- Q5)** a) A 4-pole, 3phase induction motor connected to 50 HZ supply. If the machine runs at 3% slip at full-load, determine [4]
- Rotor speed
 - Frequency of rotor currents
 - Frequency of rotor currents at stand still
 - Speed of rotating magnetic field
- b) Obtain the torque equation of induction motor under running condition & there of derive the condition of maximum torque under running condition [6]
- c) Draw torque-slip characteristics of 3-ph induction motor & explain [8]
- Stable and unstable operating region
 - maximum torque
 - torque ,when slip is one.

OR

- Q6)** a) Draw a neat sketch of squirrel cage induction motor, label all the parts and explain its constructional details. [4]
- b) With suitable phasor diagrams elaborate the concept of rotating magnetic field in case of 3 phase induction motor [6]
- c) A 4 - pole, 50 Hz, 3 - phase induction motor gives output power of 14710 Watt. It has friction and windage losses of 2% of the output. The full - load slip is 3%. Calculate the [8]
- i) Rotor cu. loss and
 - ii) Rotor input
- Q7)** a) Draw equivalent circuit of 3 Phase induction motor, name all parameters involved in it. [3]
- b) With the help of circuit diagram explain procedure to conduct - No load test and blocked rotor test on 3 phase squirrel cage induction motor.[6]
- c) Draw the connection diagram of star-delta starter & explain the starting and running operation of 3-ph induction motor. [8]

OR

- Q8)** a) Compare star-delta starter and Rotor Resistance starter on any 4 points. [8]
- b) Draw the circle diagram & write the procedure to find full load current, p.f, full load slip, locate the points for slip = 0 and slip = 1. Assume rotor Cu loss = stator Cu loss. [9]

