

Total No. of Questions : 8]

SEAT No. :

PC2788

[Total No. of Pages : 2

[6352]-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 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 diagrams must be drawn wherever necessary.
- 4) Assume suitable additional data, if necessary.
- 5) Use of a non-programmable calculator is allowed.

Q1) a) Draw & Label a neat diagram showing constructional details of DC machine. Explain each parts. [9]

b) A 500V, 4 poles, wave connected DC shunt motor has 1200 armature conductors and useful flux/pole is 20 mWb. The armature and field winding resistance are 0.5ohm & 250ohm respectively. The Iron & Friction losses are 900W. At full load motor draw 20A. Calculate.

- i) Armature Torque
- ii) Shaft torque
- iii) Lost torque

[9]

OR

Q2) a) Explain Demagnetizing & Cross magnetizing effect of armature reaction on DC machine. [9]

b) Derive Torque equation of DC motor with usual notation. Write Voltage and Current equation of DC shunt motor. [9]

Q3) a) Draw and explain all three characteristics of DC shunt motors. [9]

b) A 500V, 6pole DC shunt motor have armature & field winding resistance of 0.5ohm and 250ohm respectively. It draws a full load current of 20A from supply. If the rotational losses are 900W, calculate efficiency of motor. [8]

OR

Q4) a) Draw and explain all three characteristics of DC series motors. [9]

b) What is necessity of starter for DC motor? Draw and explain Three point starter [8]

P.T.O.

- Q5) a)** Compare squirrel cage rotor & wound rotor three phase induction motor [6]
- b) A 3 phase, 50Hz, 4pole induction motor had slip of 4%. Calculate
- Synchronous speed
 - Frequency of rotor emf: If the rotor has a resistance of 1 ohm & standstill reactance of 4ohm calculate the rotor power factor.
 - Speed of motor
 - Power factor at standstill. [8]
- c) Explain effect of slip on rotor frequency and rotor current. [4]

OR

- Q6) a)** Derive the torque of three phase induction motor and obtain the condition for maximum torque. [6]
- b) Three phase, 50Hz, 6pole induction motor develop a shaft torque of 150Nm at full load slip of 4%. The rotating losses are 300W & that of stator losses are 1.5KW Calculate
- Rotor copper loss
 - Rotor gross output.
 - Efficiency at full load. [8]
- c) Draw and explain the torque-slip characteristics of three phase induction motor. [4]

- Q7) a)** Draw and explain approximate and exact equivalent circuit of an induction motor along with required equation. [9]
- b) Enlist the various types of starters for three phase induction motor. Explain Star- Delta starter along with merits and demerits. [8]

OR

- Q8) a)** Explain V/f method of speed control of three phase induction motor.[8]
- b) With neat connection diagram explain No load & Blocked rotor test on three phase induction motor. [9]