

[5058] - 351

T.E. (Electronics)

ELECTRICAL MACHINES & POWER DEVICES

(2012 Course) (End Semester) (Semester - V) (304201)

Time : 2 ½ Hours]

[Max. Marks :70

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.*
- 2) Neat diagrams must be drawn wherever necessary.*
- 3) Figures to the right side indicate full marks.*
- 4) Assume suitable data, if necessary.*

- Q1)** a) Explain switching characteristics of power diode. [6]
- b) Explain the two transistor analogy for SCR and derive an expression for anode current I_A . [7]
- c) Why snubber circuits are required? Also explain the protection of power devices by snubber circuit. [7]

OR

- Q2)** a) Draw and explain switching characteristics of IGBT. [6]
- b) Explain the need for protection of power devices and State different types of protections required to ensure safety of power devices. [7]
- c) Write note on triggering circuit of TRIAC using DIAC. [7]

- Q3)** a) Explain the basic action of a commutator with the help of neat sketches. [6]
- b) Write a short note on permanent magnet DC motor. State advantages, disadvantages and applications. [6]
- c) A 20 KW, 200 V shunt generator has a armature resistance of 0.05Ω and a shunt field resistance of 200Ω . Calculate the power developed in the armature when it delivers rated output. [4]

OR

P.T.O.

- Q4)** a) Why starter is necessary for a DC motor? Explain the working of three-point starter with the help of neat diagram. [6]
- b) Distinguish between self excited and separately excited DC generator. [6]
- c) A 4 pole, 250 V, DC series motor has a wave connected armature with 200 conductors. The flux per pole is 25mWb when motor is drawing 60A from the supply. Armature resistance is $0.15\ \Omega$ while series field winding resistance is $0.2\ \Omega$. Calculate the speed under this condition. [4]

- Q5)** a) Explain the principle of operation of a 3-phase induction motor in detail. [8]
- b) Explain the procedure for no load test and blocked rotor test on a three phase induction motor. How are the parameters of equivalent circuit determined from test results? [10]

OR

- Q6)** a) Explain the complete torque-slip characteristics of a three phase induction motor including motoring, generating and braking regions. [8]
- b) A $3\ \Phi$, 4 Pole, 50 Hz, star connected induction motor running on full load develops a useful torque of 300 N-m. The rotor emf is completing 120 cycles per minute. If the torque lost in friction is 50 Nm, calculate
- Slip
 - Net output power
 - Rotor copper loss per phase
 - Rotor efficiency
 - Rotor resistance per phase if rotor current is 60 A in running condition. [10]

- Q7)** a) Compare variable reluctance motor with permanent magnet stepper motor. [8]
- b) Explain the principle of operation of capacitor start and capacitor run single phase induction motor along with the torque slip characteristics and the applications. [8]

OR

- Q8)** a) Write a short note on: DC servomotor. [8]
- b) Explain the operation of a variable reluctance motor. [8]

