Total No. of Questions :8]

SEAT No. :

P1718

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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 IA. **[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 0.05 Ω and a shunt field resistance of 200 Ω. 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 Ω while series field winding resistance is 0.2 Ω. 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 breaking regions. **[8]**

b) A 3 Φ, 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

i) Slip

ii) Net ouput power

iii) Rotor copper loss per phase

iv) Rotor efficiency

v) 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]**