Total No. of Questions : 8]

SEAT No. :

P2396

[Total No. of Pages :3

[4758] - 556
T.E. (Electronics)
ELECTRICAL MACHINES & POWER DEVICES
(2012 Course) (Semester - I) (Theory) (End-Sem.) (304201)

Time :2 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 the V-I characteristics of the following. **[6]**

i) Power BJT

ii) MOSFET

iii) IGBT

b) Draw and explain construction and operation of power BJT. **[7]**

c) Explain switching characteristics of power MOSFET. **[7]**

OR

Q2) a) Explain construction & operation 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) Derive the EMF expression of a DC generator. **[6]**

b) Explain the working and performance characteristics of a permanent magnet DC motor. State advantages, disadvantages and applications.**[6]**

P.T.O.

c) A 230 V dc shunt motor takes 32A at full load. Find the back emf on full load if $R_a = 0.2\,\Omega$ and $R_{sh} = 1\,\Omega$ respectively. **[4]**

OR

Q4) a) Derive the expression for torque of a DC motor. **[6]**

b) Distinguish between self excited and separately excited DC generator. **[6]**

c) A 4 pole dc motor is having induced EMF 188 V across armature. Find the torque and gross mechanical power developed when the motor is drawing 25A and running at 1500 rpm. **[4]**

Q5) a) Explain the effect of slip on **[8]**

i) Frequency

ii) Induced EMF

iii) Current

iv) Power factor

v) Reactance

vi) Impedance

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) State various losses that occur in an induction motor. Explain how they vary with frequency, voltage and load. **[8]**

b) A 6 pole, 50Hz, 3-phase induction motor running on full load develops a useful torque of 160Nm when the rotor EMF makes 120 complete cycles per minute. Calculate the shaft power output. If the mechanical torque lost in friction and that for core loss is 10 Nm. Compute **[10]**

i) the copper loss in the rotor winding

ii) the input to the motor

iii) the efficiency.

The total stator loss is given to be 800W.

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) Explain the working principle of permanent magnet stepper motor with constructional diagram. **[8]**

b) Explain the operation of a variable reluctance motor. **[8]**

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