

Total No. of Questions : 8]

SEAT No. :

P2007

[Total No. of Pages : 2

[5059] - 603
B.E. (Electronics)
ADVANCED POWER ELECTRONICS
(2012 Pattern) (End Semester)

Time : 2½ 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) Write down the causes and effects of EMI problems in controlled rectifiers. [6]
- b) A single phase dual converter is operated from a 120 V, 60 Hz supply and load resistance is $R = 10\Omega$. The circulating inductance is $L_r = 40$ mH, delay angles are $\alpha_1 = 60^\circ$ and $\alpha_2 = 120^\circ$. Calculate the peak circulating current and the peak current of converter 1. [7]
- c) Explain following power factor improvement (any one) techniques for single phase converters with suitable waveforms and equations. [7]
- i) Extinction Angle Control (EAC)
 - ii) Symmetrical Angle Control (SAC)
 - iii) Pulse Width Modulation Control (PWM)

OR

- Q2)** a) Compare Circulating and non-Circulating current type dual converters. [6]
- b) Explain three phase IGBT based PWM rectifiers along with its advantages. [7]
- c) With the help of neat circuit diagram and waveforms explain the operation of single phase bridge Diode Clamped Multilevel inverter. State its features, advantages and disadvantages. [7]
- Q3)** a) What is braking? Explain Regenerative braking of DC machine. Mention its advantages and disadvantages. [6]

P.T.O.

- b) A DC drive system uses a full converter in armature circuit and second full converter in field circuit in the case of separately excited dc motor. Calculate percentage change in the speed of the motor, if armature converter delay angle is changed from 60 to 50. Input supply voltage is 220 V, 60 Hz, armature resistance $R_a = 0.27 \Omega$, motor armature current is 15 A, motor voltage constant $K_b = 1.2 \text{ V/A rad /sec}$. [6]
- c) Draw transfer function block diagram of DC motor. [4]

OR

- Q4)** a) Explain and draw the curve torque and power versus speed separately excited dc motor. [6]
- b) Draw and explain the power circuit of single phase semi-converter feeding a separately excited DC motor. Explain with typical waveforms, the operation in continuous and discontinuous armature current modes. [6]
- c) Compare converter fed and chopper fed drive. [4]
- Q5)** a) Explain variable square wave VSI Drives along with block diagram and application. [8]
- b) What is the need of vector control in Induction Motors? Briefly explain Vector control of induction motors. [10]

OR

- Q6)** a) Explain different types of braking of induction motor. [8]
- b) With the help of suitable circuit diagram and waveforms explain the working of Variable frequency PWM VSI Drives. [10]
- Q7)** a) Compare variable reluctance motor with permanent magnet stepper motor. [8]
- b) Explain block diagram of volts/hertz control of synchronous motor drive along with the torque slip characteristics and the applications. [8]

OR

- Q8)** a) Explain the working principle of permanent magnet BLDC motor drive with constructional diagram. [8]
- b) Explain the operation of a switched reluctance motor drive. [8]

