Code No: A4304,A5404/C4304, C5404,C4204,
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.Tech I Semester Examinations, October/November-2011
POWER ELECTRONICCONTROL OF DC DRIVES
(COMMON TO POWER ELECTRONICS, POWER ELECTRONICS AND ELECTRIC DRIVES
POWER AND INDUSTRIAL DRIVES,)
Time: 3hours   Max. Marks: 60
Answer any five questions
All questions carry equal marks
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1.   Explain in detail the operation of a single phase full converter, feeding a separately exited dc motor for both continuous and discontinuous modes of operation.   [12]

2.   Explain the operation of a three – phase full converter drive. Also sketch and explain the output voltage and current wave forms for $\alpha = 60^0, 90^0$ and 120^0. [12]

3.   Draw the block diagram and explain the operation of a two quadrant converter-controlled separately exited dc motor drive.   [12]

4.   A chopper controlled dc motor has the following parameters: 200V, 6.3A, 1000rpm, $R_a = 4\,\Omega$; $L_a = 0.018H$, $K_6 = 1.86$ V/rad/sec. J= 0.1 kg – $m^{2,}$ B = 0.0162 N-m/rad/sec; $f_c = 500HZ$, $V_{S =} 285V$ Determine
      a) Torque - speed Characteristics for duty cycles of 0.2 and 0.6 in the forward motoring.
      b) The average current at 500rpm, using averaging and instantaneous steady State evaluation techniques (Assume suitable duty cycle.)   [12]

5.   Explain in detail the dynamic simulation of the speed controlled dc motor drive.
                                                                                                                  [12]

6.   Explain in detail the sinusoidal pulse – width modulation control scheme for power factor improvement. Also derive the expressions for Displacement angle, Supply power factor, displacement factor and harmonic factor.   [12]

7.   Discuss the impact of the choice of the current controller on the dynamic performance of the dc motor drive system.   [12]

8.   Write short notes on the following.
   a)   Addition of free wheeling diode in three phase converters.
   b)   Sixth harmonic torque.
   c)   Hysteresis current controller.   [12]

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