R09

Code No:C4304, C5404,C4204,

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH I SEMESTER EXAMINATIONS, APRIL/MAY-2012
POWER ELECTRONIC CONTROL 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. Draw and explain the power circuit of semi converter feeding a separately excited dc motor for both continuous and discontinuous armature current modes.

2. Draw the circuit diagram and explain the operation of a three – phase semi converter drive. Also sketch and explain the following wave terms.
   i) Output voltage and current at $\alpha = 90^0$.
   ii) Output voltage and current at $\alpha = 120^0$.

3.a) Draw the flow chart for the simulation of a single quadrant phase – controlled dc motor drive.
   b) For speed controller design, the fourth order inner current loop has been approximated in to a first – order transfer function. Discuss the merits and demerits of the approximation.

4. Explain in detail the steady state analysis of chopper controlled dc drive.

5.a) Draw the flow chart for the dynamic simulation of the chopper controlled dc motor drive.
   b) Discuss the control circuit design for a two – quadrant chopper circuit.

6. A 220V, 1500rpm 12 A separately excited motor is controlled by a single phase fully controlled converter with an ac source voltage of 230V, 50HZ. Assume the current continuous and ripple free for any torque greater than 25% of rated torque Ra=2.5Ω.
   a) What should be the firing angle to get the rated torque at 1000rpm?
   b) Determine the firing angle for the rated braking torque at 1500rpm.

7. Discuss the harmonics and its associated problems in phase controlled Dc motor drives.

8. Discuss the following
   a) First quadrant operation of a Four – Quadrant chopper.
   b) Applications of chopper controlled dc motor drives.
   c) Displacement factors, harmonic factor, Supply power factor.

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