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

1. Draw and explain the power circuit of semi converter feeding a separately excited dc motor for both continuous and discontinuous armature current modes.

- 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 α = 90°.
 ii) Output voltage and current at α = 120°.
- 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.
- 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=2.5 Ω.
 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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