H.T.No. | | | | | | | | | | |

Code No: EE1526 **GEC-R14**

III B. Tech II Semester Regular Examinations, April 2017

POWER SEMICONDUCTOR DRIVES

(Electrical and Electronics Engineering)

Time: 3 Hours **Max. Marks: 60**

Note: All Questions from **PART-A** are to be answered at one place.
Answer any **FOUR** questions from **PART-B.** All Questions carry equal Marks.

PART-A

6 × 2 = 12M

1. a) In a semi-converter operation, when armature current is continuous the back emf will be directly proportional to _____
   b) Write the expression for speed N, in terms of motor terminal voltage and armature current
2. a) How many thyristors are there in a three phase dual converter?
   b) Which methods of braking are difficult to employ a in series motor?
3. Define a D.C. chopper? List the various types of basic chopper configurations.
4. Write the two advantages of the V/f control method over voltage control method for controlling the speed of the motor.
5. "The three phase squirrel cage induction motor speed can be controlled through an external rotor resistance by using static rotor resistance control method", Mention true or false and justify your answer.
6. What is meant by self control mode of synchronous motor?

PART-B

4 × 12 = 48M

1. a) Describe the operation of singlephase Semi Controlled Converter connected to dc Series Motor . (6M)
   b) A 220V, 20A, 1500 rpm. DC separately excited motor with Armature Resistance of 0.2Ω is fed from a Three phase full converter. Available AC source has line voltage of 400V, 50Hz. A star- star connected Transformer is used to feed the Armature. Find the Firing angle of the converter when the motor is running at rated speed and supplying Rated Torque. (Assume continuous conduction mode) (6M)
2. Draw the circuit diagram and explain the operation of closed loop speed control of dc motor with inner-current loop and field weakening. (12M)

3. A 230V separately excited DC motor takes a 50A at speed of 800 r.p.m. It has armature resistance of 0.4Ω. This motor is controlled by a chopper with an input voltage of 230V and frequency of 500Hz. Assuming continuous conduction throughout.Find the Speed and Torque for motoring operation at duty ratios of 0.3. Find the Speed and Torque for Regenerative braking operation at duty ratio of 0.7. (12M)

4. a) Draw and explain the speed-torque curves with variable frequency control for operation with constant (V/f) ratio. (6M)

   b) A 440 V,50 Hz ,6 pole ,Y-connected squirrel cage induction motor has the following parameters :R_s=0.6Ω, R_r^1=0.3Ω, X_s=1Ω, X_r^1=1Ω and motor full load slip is 0.05. The motor is controlled by a voltage source inverter at constant V/f ratio. For an operating frequency of 10 Hz calculate the breakdown torque and speed at which it occurs. (6M)

5. A 3-phase slip ring induction motor has a chopper controlled resistance in the rotor circuit for speed control. With the chopper completely on always, the maximum torque occurs at a slip of 0.3. With the chopper completely off, the maximum torque occurs at a slip of 1. Determine the value of resistance in the chopper. (12M)

6. a) Describe separate control mode of Synchronous motor? (4M)

   b) Draw and explain the circuit diagram of a separate controlled synchronous motor fed from a three phase inverter. (8M)

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