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**R11/R13**

**Code: 1G281**

IV B.Tech. II Semester Regular & Supplementary Examinations September 2020

# Power Semiconductor Drives

(Electrical & Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer any five questions

All Questions carry equal marks (14 Marks each)

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1. a) Explain speed-torque characteristics of a 1- Φ fully controlled converter connected to separately excited D.C motor with continuous current operation. Draw the relevant wave forms. 7M

   b) Explain the operation of single phase semi-converter fed separately excited D.C. series motor drive with necessary diagrams. 7M

2. a) Derive the output voltage expression and Speed Torque characteristics for a three phase fully controlled rectifier fed DC separately excited motor with neat circuit diagram and wave forms 10M

   b) Discuss the reason for the neglecting of discontinuous conduction in three phase rectifier fed motors? 4M

3. a) Define Braking? And give brief discussion on various types of braking. 4M

   b) A 220V, 1000rpm, 60A separately excited motor with armature resistance of 0.6Ω fed from a Circulating current dual converter with AC source voltage line voltage=165V. Determine converter firing angles for the following operating points:
      i. Motoring operation at rated motor torque and 900rpm
      ii. Braking operation at rated motor torque at 900 rpm
      iii. Motoring operation at rated motor torque and –900rpm
      iv. Braking operation at rated motor torque at –900rpm 10M

4 a) Discuss with the suitable diagrams I quadrant and II quadrant choppers. 7M

   b) A 220 V, 24 A, 1000 rpm separately excited dc motor having an armature resistance of 2 Ω is controlled by a chopper. The chopping frequency is 500 Hz and the input voltage is 230 V. Calculate the duty ratio for a motor torque of 1.2 times rated torque at 500rpm 7M

5. a) Explain with relevant equations and circuit diagrams of equallent circuit of a Induction Motor ? 4M

   b) Explain with neat circuit diagram about single phase & three phase AC Voltage controller fed Induction motor 10M

6. a) Brief the concept of v/f control for the speed control of Induction motor 7M

   b) Discuss in detail about the Variable Frequency control from Voltage Source with v-f relation ,speed – torque characteristics and relevant equations 7M

7. a) What is slip power recovery scheme? Explain with relevant diagrams. 7M

   b) Discuss the static Scherbius drive with relevant diagrams 7M

8. Describe the open-loop and closed loop methods of speed control of a synchronous motor using VSI 14M

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