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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech III Year II Semester Supplementary Examinations Dec- 2019

POWER SEMICONDUCTOR DRIVES

(ELECTRICAL & ELECTRONICS ENGINEERING)

Time: 3 hours

Max. Marks:60

(Answer all Five Units 5 x 12 = 60 Marks)

UNIT-I

- 1 a Explain the operation of single phase semi-converter fed separately excited dc motor drive with necessary diagram. **7M**
- b A DC Shunt motor operating from a single phase half controlled bridge at a speed of 1450 rpm has an input voltage $330\sin 314t$ and a back emf 75v. The SCR's are fired symmetrically at $\alpha = \pi/3$ in every half cycle and the armature has a resistance of 5 ohms. Neglecting armature inductance, find the average armature current and torque. **5M**

OR

- 2 With relevant circuit diagram, explain the principle of operation of 3 phase full converter fed D.C. shunt motor? **12M**

UNIT-II

- 3 With necessary diagram, explain the operation of Plugging, Dynamic braking and Regenerative braking? **12M**

OR

- 4 Describe the single phase four quadrant operation of D.C. drive using dual converters. **12M**

UNIT-III

- 5 Explain the two quadrant operation of chopper fed separately excited D.C. motor. **12M**

OR

- 6 A 230 V, 1100 rpm, 220 Amps separately excited DC motor has an armature resistance of 0.02Ω . The motor is fed from a chopper, which provides both motoring and braking operations. Calculate: (i) The duty ratio of chopper for motoring operation at rated torque and 400 rpm. (ii) The maximum permissible motor speed obtainable without field weakening, if the maximum duty ratio of the chopper is limited to 0.9 and the maximum permissible motor current is twice the rated current. **12M**

UNIT-IV

- 7 With relevant circuit and characteristics, explain the operation of Static Kramer drive. **12M**

OR

- 8 With relevant circuit and waveforms, explain the operation of voltage source inverter fed induction motor drive. **12M**

UNIT-V

- 9 Describe the self controlled mode of operation of synchronous motor. **12M**

OR

- 10 A 7 MW, 3 phase, 12 KV star connected 6 pole, 50 Hz, 0.9 leading power factor synchronous motor has $X_s = 10 \Omega$, $R_s = 0 \Omega$. The rated field current is 40 A. The machine is controlled by variable frequency control at constant V/F ratio up to the base speed and at constant voltage above base speed. Determine, (i) Torque (ii) The field current for the rated armature current at 750 rpm and 0.8 leading power factor. **12M**

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