

**ANURAG Engineering College**  
(An Autonomous Institution)

III B.Tech II Semester Regular/ Supplementary Examinations, June/July – 2024

**POWER SEMICONDUCTOR DRIVES**  
(ELECTRICAL AND ELECTRONICS ENGINEERING)

Time: 3 Hours

Max.Marks:75

**Section – A (Short Answer type questions)**

(25 Marks)

Answer All Questions

	Course Outcome	B.T Level	Marks
1. What is the difference between half controlled converter and full controlled converter	CO1	L1	2M
2. Draw the voltage waveform of single phase semi controlled converter fed series dc motor for firing angle $90^\circ$	CO1	L2	3M
3. What is voltage and current expressions of a Three phase fully controlled converters connected to d.c separately excited motors	CO2	L1	2M
4. Sketch the Speed – Torque characteristics of a Three phase semi controlled converters connected to d.c separately excited motors	CO2	L2	3M
5. Compare circulating and non-circulating mode of dual converters	CO3	L2	2M
6. Draw the speed-torque characteristics of series dc motor fed using a one quadrant chopper.	CO3	L2	3M
7. Give the disadvantages of AC voltage controller fed induction motor drive	CO4	L1	2M
8. Compare the Scherbius and Kramer's drive systems.	CO4	L2	3M
9. Compare between VSI and CSI.	CO5	L2	2M
10. How thyristors are commutated in load commutated inverter?	CO5	L1	3M

**Section B (Essay Questions)**

Answer all questions, each question carries equal marks.

(5 X 10M = 50M)

11. A) i) With a neat circuit diagram and wave form, Analyze the different modes of operation of $1-\phi$ semi controlled rectifier-fed separately excited motor.	CO1	L4	5M
ii) A 200 V, 875 rpm, 150 A separately excited dc motor has an armature resistance of $0.06\Omega$ . It is fed from a single-phase fully controlled rectifier with an ac source voltage of 220 V, 50 Hz. Assuming continuous conduction, Find firing angle for rated motor torque and 750 rpm.			5M
<b>OR</b>			
B) Analyze the speed control of single phase fully controlled converter to separately excited DC Motor and write the speed torque expressions for this motor.	CO1	L4	10M
12. A) Describe the working of a three-phase full converter fed dc separately excited motor with output voltage and current waveforms and expressions. Assuming continuous condition.	CO2	L4	10M
<b>OR</b>			
B) i) Compare between semi-converters and full-converters.	CO2	L4	5M
ii) The speed of a separately excited dc motor is controlled by means of a 3-phase semi converter from a 3 phase 415 V, 50 Hz supply. The motor constants are inductance 12 mH, resistance $0.8\Omega$ and armature constant 1.3 V/rad/s. calculate speed of the motor at a torque of 60 N-m when the converter is fired at $45^\circ$ . Neglect losses in the converter.		L3	5M

13. A) i) What are the advantages of electric braking over mechanical braking? Explain any one of the electric braking used for DC motors with neat circuit  
ii) What is four quadrant operation of DC motor? Explain
- OR**
- B) Develop the expressions for average motor current, RMS motor currents, Torque, and average motor voltage, for chopper fed D.C separately excited motor.
14. A) i) Analyze in detail with speed-torque characteristics of variable voltage and variable frequency (V/F) control of induction motor drive.  
ii) A 3-phase, 4-pole, 50 Hz induction motor has rotor resistance of 0.2 ohms and standstill reactance of 0.1 ohm. At full load it operates at a slip of 4%. If the voltage is reduced to 50% at Choose speed will the motor operates with full load torque applied.
- OR**
- B) i) Draw a suitable circuit diagram and analyze the working of slip-power recovery scheme using static Scherbius drive.  
ii) Analyze static rotor resistance control of induction motor with a circuit diagram.
15. A) i) Analyze self-control operation of VSI fed synchronous motor drives.  
ii) List the merits and demerits of separate and self-control operations of Synchronous Motor.
- OR**
- B) i) Analyze self-controlled and load-commutated inverter controlled synchronous motor drives in detail.  
ii) List advantages of self-controlled synchronous motor drive and applications.