



R22 Regulation

Subject code:4E7BA

# TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

## B.Tech VII Semester Regular Examinations, November 2025

### ELECTRIC DRIVES

(EEE)

Maximum Marks: 60

Date: 03.12.2025

Duration: 3 hours

- Note:**
1. This question paper contains two parts A and B.
  2. Part A is compulsory which carries 10 marks. Answer all questions in Part A.
  3. Part B consists of 5 Units. Answer any one full question from each unit.
  4. Each question carries 10 marks and may have a, b, c, d as sub questions.

#### Part-A

All the following questions carry equal marks (10X1M=10 Marks)		Marks	CO	BloomTx
1.a)	Write any one application of single-phase rectifier controlled fed d.c. series motor drive	1M	1	BO1
b)	Draw-speed torque characteristics of 1-phase separately excited DC motor drive	1M	1	BO2
c)	Define Plugging.	1M	2	BO1
d)	List the advantages of chopper-controlled drives over rectifier-controlled drives.	1M	2	BO2
e)	Write two methods of speed control of induction motor drives from stator side.	1M	3	BO1
f)	What are the advantages of variable frequency control of induction motor drives?	1M	3	BO2
g)	Write one advantage of rotor resistance control.	1M	4	BO1
h)	Write the application of static Scherbius drive.	1M	4	BO1
i)	What are the methods available to control the speed of synchronous motor drive?	1M	5	BO1
j)	Differentiate true and self-synchronous modes in synchronous motor drives.	1M	5	BO3

#### Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BloomTx
2	Describe the operation of a separately excited dc motor when it is supplied from a single-phase fully controlled rectifier. Draw and explain its current and voltage waveforms for continuous conduction.	10M	1	BO2
OR				
3	Explain the operation of dc separately excited motor fed from three phase half-controlled rectifier. Draw and explain its speed torque characteristics for continuous mode of operation.	10M	1	BO2
4	a) Explain the operation of 1-phase dual converter fed separately excited DC motor.	5M	2	BO3
	b) What is regenerative braking? Discuss its relevant advantages and disadvantages when compared to dynamic braking.	5M		

	OR			
5	a) A 230V, 960 rpm and 200A separately excited D.C. motor has $R_a=0.02 \Omega$ . The motor is fed from a chopper which provides both motoring and braking operations. Assume continuous conduction. Calculate duty ratio of chopper: i) for motoring at rated torque and 350 rpm; ii) for braking operation at rated torque and 350 rpm. b) Explain with circuit and waveforms of first quadrant chopper fed separately excited D.C. motor.	5M  5M	2	BO4  BO1
6	a) With a suitable circuit diagram, explain the speed control method of inductor motor drive using stator voltage control. Discuss the limitations of this method. b) A 2.8 KW, 400 V, 50 HZ, 4 pole, 1370 rpm delta connected squirrel - cage induction motor has following parameters referred to the stator: $R_s = 2\Omega$ ; $R_r^1 = 5\Omega$ ; $X_s = X_r^1 = 5\Omega$ , $X_m = 80\Omega$ . Motor speed is controlled by stator voltage control. When driving a fan load it runs at rated speed and at rated voltage. Calculate motor terminal voltage, current and torque at 1200 rpm.	5M  5M	3	BO2  BO1
	OR			
7	a) Compare VSI and CSI controlled drives. b) Explain the speed-control operation of cycloconverter fed induction motor drive.	5M 5M	3	BO2 BO3
8	Explain the concept of slip power recovery scheme by Static-Schebius drive with neat circuit diagram. Draw the speed- torque characteristics.	10M	4	BO4
	OR			
9	Explain the concept of slip power recovery scheme by Static-Karmer drive with neat circuit diagram. Draw the speed- torque characteristics.	10M	4	BO2
10	Explain the operation of self-controlled synchronous motor drive employing load commutated inverter.	10M	5	BO2
	OR			
11	What are the open-loop and closed loop methods of speed control of a synchronous motor using VSI? Explain.	10M	5	BO3