Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S6 (R,S) Exam April 2025 (2019 Scheme)

Course Code: RAT304

Course Name: ELECTRIC DRIVES AND CONTROL

Max. Marks: 100 **Duration: 3 Hours**

PART A

Answer all questions, each carries 3 marks. Marks

1		Outline the working principle of stepper motor.	(3)
2		List the starting methods of DC motors.	(3)
3		Draw any one gate isolation method for SCRs.	(3)
4		Brief the merits of RC triggering over R triggering.	(3)
5		Sketch the circuit of class 'C' chopper.	(3)
6		Differentiate rectifier and inverter mode control of converters.	(3)
7		Identify the concept of harmonics elimination in inverters using PWM method.	(3)
8		List the features of variable voltage variable frequency drive.	(3)
9		Write a short note on position control of stepper motor.	(3)
10		Name and justify an application where servo motor is more suitable compare to stepper motor.	(3)

PART B

Answer any one full question from each module, each carries 14 marks.

Module I

11	a)	Outline the selection of motors for typical applications based on speed torque characteristics.	(5)
	b)	Draw the characteristics curves of shunt, series and compound motors.	(9)

OR

12	a)	Explain the working principle of stepper motors.	(5)
	b)	Distinguish the types of stepper motors.	(9)

Module II

13	a)	Sketch and label the ON-OFF characteristics of IGBT.	(4)
	b)	We have an application where voltage levels vary in 5 -10 KV and current is approximately 1000A. If the frequency is 60KHz, propose a power semiconductor device that suits this application. Also, justify your answer.	(10)

OR

14 a) Brief the need of synchronisation in gate drive circuits. (6)

b) Compare the turn on methods of SCRs and identify the best suits high voltage applications with your justifications. (8)

Module III

15 a) With suitable diagram and graphs, explain single phase fully controlled bridge rectifier with RL and RLE loads. (12)

b) List the merits of phase controlled rectifiers over diode rectifiers. (2)

OR

16 a) Differentiate armature control and phase control in DC motors. (7)

b) Illustrate a speed control system for DC motors. (7)

Module IV

17 a) Explain 3-phase bridge inverter with 180° conduction mode, Also sketch output line voltage and phase voltage waveforms. (14)

OR

18 a) Describe various PWM techniques in inverters. (9)

b) Sketch the block diagram and list the merits of variable frequency drives. (5)

Module V

19 a) Describe the working of a servo system with feedback. (7)

b) Illustrate the control of stepper motor. (7)

OR

20 a) Summarise the microcontroller based permanent magnet synchronous motor drives with neat block diagram. Also, mention the merits of this control type. (10)

b) Compare full step mode and half step mode excitation in stepper motors. (4)

****