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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S6 (S, FE) Examination January 2024 (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		List different types of stepper motors	(3)
2		Describe the advantages of electric drives	(3)
3		Define latching current and holding current	(3)
4		Explain the light triggering of SCR	(3)
5		Describe the armature control method for speed control of DC motor	(3)
6		Explain the step up mode operation of chopper	(3)
7		Discuss about sinusoidal PWM control	(3)
8		Compare methods to control output voltage of inverter.	(3)
9		Explain the principle of microcontroller based permanent magnet synchronous motor drives	(3)
10		What are the components of a servo system?	(3)

PART B

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

11	a)	Explain the construction and working of a permanent magnet type stepper motor	(8)
	b)	Deduce characteristics of dc series motor from suitable equations	(6)

OR

12	a)	Explain the working of a 4-point starter used in dc motor	(9)
	b)	Explain the significance of back emf in DC motor	(5)

Module II

13	a)	Describe the operation of R-triggering circuit used in SCR	(8)
	b)	Explain the different turn on methods of SCR	(6)

OR

14	a)	Discuss the different isolation methods used for power semiconductor devices.	(8)
	b)	Explain the switching characteristics of Power BJT	(6)

Module III

15	a)	Describe the four quadrant operation of chopper	(8)
	b)	With suitable diagrams, explain the operation of a single phase full converter with RL load	(6)

OR

16	a)	Explain the inverter mode of operation of a single phase fully controlled converter drive	(9)
	b)	Write a short note on regenerative braking control of choppers.	(5)

Module IV

17	a)	Explain the working of 3-phase bridge inverter with R load and 120^0 conduction mode using circuit diagram and waveforms.	(12)
	b)	Differentiate CSI and VSI	(2)

OR

18	a)	Describe the working of single phase full bridge voltage source inverter with R-load using necessary diagrams.	(8)
	b)	Compare single pulse width and multiple pulse width modulation	(6)

Module V

19	a)	Explain how hall sensors are used to achieve speed control in BLDC motors	(8)
	b)	Write a short note on closed loop control of stepper motors.	(6)

OR

20	a)	What is a self-controlled motor? How is self-control achieved in synchronous motors?	(8)
	b)	What is the principle behind sensorless control of motor speed ?	(6)

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