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B.Tech DEGREE EXAMINATION, DECEMBER 2023

Fifth and Seventh Semester

18EEO305T - ELECTRICAL DRIVES

(For the candidates admitted during the academic year 2020 - 2021 & 2021 - 2022)

Note:

i. **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.

ii. **Part - B** and **Part - C** should be answered in answer booklet.

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

PART - A (20 × 1 = 20 Marks)

Answer **all** Questions

		Marks	BL	CO
1.	Which is the control unit in an electric drive? (A) DC Motor (B) DC Chopper (C) Digital Signal Processor (D) Tachogenerator	1	1	1
2.	Which type of braking satisfies the following conditions? (i) E > V and (ii) Negative armature current (A) Dynamic braking (B) Mechanical braking (C) Plugging (D) Regenerative braking	1	2	1
3.	Name the class of duty employed in crane drives. (A) Continuous duty (B) Intermittent duty (C) Continuous duty at constant load (D) Short time duty	1	1	1
4.	PLL stands for (A) Phase Locked Loop (B) Peripheral Locked Loop (C) Phase Logic Loop (D) Phase Locked Logic	1	1	1
5.	When the speed of a DC motor increases, its armature current will (A) increase (B) decrease (C) remains constant (D) becomes zero	1	3	2
6.	With a constant field current the flux can be assumed to be constant in (A) separately excited DC motor (B) separately excited and shunt DC motor (C) shunt DC motor (D) series DC motor	1	3	2
7.	Which of the following is dynamic braking? (A) Reversal of field connections (B) Reversal of armature connections (C) Addition of equal and opposite field (D) Removal of armature circuit from current machine circuit	1	1	2
8.	The type of chopper used for the four quadrant control is (A) Class A (B) Class B (C) Class D (D) Class E	1	1	2
9.	In the VSI fed induction motor the rectifier used along with the stepped wave inverter is (A) Diode bridge rectifier (B) Phase controlled rectifier (C) Chopper (D) Phase controlled rectifier and chopper	1	1	3

10.	In cyclo converter fed induction motor the stator supply is (A) Variable voltage fixed frequency supply (B) Fixed voltage fixed frequency supply (C) Fixed voltage variable frequency supply (D) Variable voltage variable frequency supply	1	1	3
11.	Disadvantage of static rotor resistance control of induction motor is (A) Stepless speed control is possible (B) Rotor resistance remain balanced in all the three phases (C) Improved power factor is possible with wide range of speed control (D) Speed control is inefficient	1	2	3
12.	Slip power in the rotor circuit resistance is converted to ac line power and fed back to the ac line in (A) Kramer drive system (B) Scherbius drive system (C) Static rotor resistance drive system (D) Kramer and Scherbius drive system	1	1	3
13.	Inverter fed trapezoidal PMAC motor is commonly known as (A) Synchronous Reluctance Motor (B) Stepper Motor (C) Brushless DC Motor (D) Switched reluctance Motor	1	1	4
14.	Which is not a speed control method of synchronous motor drive? (A) By reducing electrical frequency (B) With an external prime mover (C) With help of rotor resistance (D) By using damper windings	1	1	4
15.	Which of the following motor needs the help of pony motor for starting purpose? (A) Squirrel cage induction motor (B) Slipring induction motor (C) Synchronous motor (D) Universal motor	1	2	4
16.	The synchronous motor oscillations can be damped out by (A) maintaining constant excitation (B) running the motor on leading power factors (C) providing damper bars in the rotor pole faces (D) oscillations cannot be damped	1	2	4
17.	Reciprocating pump needs _____ times the rated torque to start. (A) 3 (B) 4 (C) 2 (D) 7	1	1	5
18.	Which motor is preferred for grinders of paper mill (A) Synchronous motor (B) Induction motor (C) Stepper motor (D) Switched reluctance motor	1	2	5
19.	Margin angle is (A) Lead angle of firing * overlap angle (B) Lead angle of firing / overlap angle (C) Lead angle of firing + overlap angle (D) Lead angle of firing - overlap angle	1	1	5
20.	The closed loop control of electrical drives has (A) inner current loop and outer speed loop (B) inner speed loop and outer current loop (C) inner voltage loop and outer speed loop (D) inner speed loop and outer voltage loop	1	1	5

PART - B (5 × 4 = 20 Marks)

Answer **any 5** Questions

		Marks	BL	CO
21.	Mention the different factors for the selection of electric drives.	4	2	1
22.	Compare AC drives and DC drives.	4	2	1
23.	What is meant by time ratio control in chopper? explain its significance.	4	2	2

		Marks	BL	CO
24.	Write short note on different types of DC motors.	4	2	2
25.	Draw the speed - torque characteristics of induction motor and write about its inferences.	4	2	3
26.	State various starting methods of synchronous motor drive.	4	1	4
27.	Discuss about solar pump drive with battery.	4	2	5

PART - C (5 × 12 = 60 Marks)

Answer **all** Questions

		Marks	BL	CO
28.	(a) Derive the thermal models of the motor for heating and cooling curves with neat diagrams.	12	4	1
	(OR)			
	(b) Explain the four quadrant operation of electrical drive using hoist load.Draw relevant diagrams			
29.	(a) With neat diagrams, explain the modes of operation of class-E chopper.	12	3	2
	(OR)			
	(b) Explain the working of single phase full converter fed DC separately excited drive and derive the expression for output voltage.			
30.	(a) With the neat block diagram, explain the concept of V/F control of induction motor drive.	12	2	3
	(OR)			
	(b) Discuss about the static scherbius based slip power recovery scheme with necessary diagrams.			
31.	(a) Discuss the working of cycloconverters fed synchronous motor drive with relevant sketches.	12	2	4
	(OR)			
	(b) Explain the closed loop control of synchronous motor drive with neat block diagram.			
32.	(a) With a neat diagram, explain the selection of drives and control schemes for lifts and cranes.	12	3	5
	(OR)			
	(b) Explain the microprocessor-based control of a synchronous motor using terminal voltage sensing control.			

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