

Hall Ticket Number:

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Code No. : 17332 S

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD*Accredited by NAAC with A++ Grade***B.E. (E.E.E.) VII-Semester Supplementary Examinations, July-2022****Electrical Drives and Static Control (PE-I)**

Time: 3 hours

Max. Marks: 60

*Note: Answer all questions from Part-A and any FIVE from Part-B***Part-A (10 × 2 = 20 Marks)**

Q. No.	Stem of the question	M	L	CO	PO
1.	List the modes of operation of electrical drive.	2	1	1	1
2.	Sketch the torque- speed characteristics of fan load.	2	1	1	1
3.	Draw the circuit diagram of a class-E chopper fed DC motor.	2	1	2	1
4.	Sketch the torque – speed characteristics of separately excited DC motor fed from chopper.	2	1	2	1
5.	Compare phase-controlled rectifier fed dc motor and chopper controlled fed dc motor.	2	4	3	2
6.	Draw the circuit diagram of a dual converter fed dc motor.	2	1	3	1
7.	Sketch the torque-speed characteristics of three phase induction motor fed from ac voltage controller.	2	1	4	1
8.	Draw the circuit diagram of cyclo-converter fed induction motor drive.	2	1	4	1
9.	Give any two applications of stepper motor.	2	1	5	2
10.	Compare Brushless DC motor with Conventional DC motor.	2	4	5	2
Part-B (5 × 8 = 40 Marks)					
11. a)	With a neat block diagram, explain the closed loop speed control of electrical drive.	4	2	1	1
b)	Explain the multi quadrant operation of electrical drive for hoist load with help of torque-speed characteristics.	4	2	1	1
12. a)	Derive an expression for armature current ripple of a chopper fed separately excited DC motor drive under continuous conduction mode.	4	3	2	2
b)	A dc chopper is used to control the speed of a separately excited dc motor. The dc supply voltage is 220V, armature resistance is 0.2Ω and motor constant is 0.08 V/rpm . This motor drives a constant load requiring an average armature current of 25A. Determine (a) the range of speed control (b) the range of duty cycle. Assume that the motor current is continuous.	4	4	2	2

13. a)	Explain the operation of single phase fully controlled rectifier control of DC separately excited motor under continuous and discontinuous conduction.	4	2	3	2
b)	A 220V, 1000 rpm, 10A separately excited dc motor has an armature resistance and inductance of 2Ω and 150 mH, respectively. It is fed from a single phase half-controlled bridge rectifier with an ac source voltage of 230V, 50 Hz. Assuming continuous load current, compute i) Developed torque at the firing angle of 45° and speed of 750 rpm. ii) Motor speed at the firing angle of 30° and torque of 20 N-m.	4	4	3	2
14. a)	With a neat schematic and torque-speed characteristics, explain the operation of static rotor resistance control of induction motor with chopper control.	4	2	4	2
b)	Compare Voltage source inverter (VSI) fed Induction motor and Current source inverter (CSI) fed Induction motor.	4	4	4	2
15. a)	Describe the constructional details of stepper motor, explain the operation of a four phase, 8/6pole Variable Reluctance stepper motor.	4	2	5	2
b)	Discuss the converter circuits of switched reluctance motor.	4	3	5	2
16. a)	Explain the functions of power modulator in an electrical drive.	3	2	1	1
b)	A 230V, 960 rpm and 100A separately excited dc motor has an armature resistance of 0.02Ω . The motor is fed from a chopper which provides both motoring and braking operations. The source has a voltage of 230V. Assuming continuous conduction. i) Calculate the duty ratio of chopper for motor operation at rated torque and 600 rpm. ii) Calculate the duty ratio of chopper for braking operation at rated torque and 600 rpm.	5	4	2	2
17.	Answer any <i>two</i> of the following:				
a)	Draw the block diagram of outer speed control loop of motor drive and derive the transferfunction of speed controller.	4	2	3	1
b)	Compare static Scherbius drive and static Kramer's drive.	4	4	4	2
c)	Describe the constructional details and operation of brushless DC (BLDC) motor.	4	2	5	1

M : Marks; L: Bloom's Taxonomy Level; CO; Course Outcome; PO: Programme Outcome

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	40%
iii)	Blooms Taxonomy Level – 3 & 4	40%
