

APJ ABDULKALAM TECHNOLOGICAL UNIVERSITY
08 PALAKKAD CLUSTER

Q. P. Code : PE0824118

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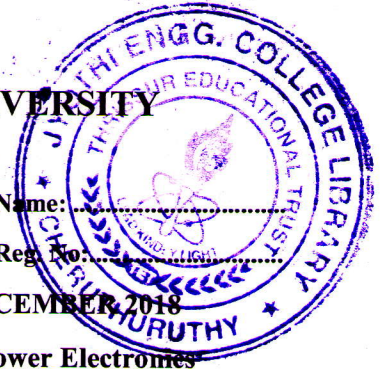
Name:

Reg. No:

FIRST SEMESTER M.TECH. DEGREE EXAMINATION DECEMBER 2018

Branch: Electrical & Electronics Engineering Specialization: Power Electronics

08EE6241 ELECTRIC DRIVES



Time:3 hours

Max.marks: 60

Answer all six questions.

Modules 1 to 6: Part 'a' of each question is compulsory and answer either part 'b' or part 'c' of each question.

(Add any other instruction specific to course here like the use of IS codes/design tables etc.)

Q.no.	Module 1	Marks
1.a	List the factors to be considered while designing an electric drive	3
	Answer b or c	
b	Explain the four quadrant operation of drive with an example	6
c	Derive the condition for stability of an equilibrium point	6
Q.no.	Module 2	Marks
2.a	What is meant by regenerative braking of dc motors	3
	Answer b or c	
b	A 230V, 1000 rpm.100 A dc separately excited motor has an armature resistance of 0.04Ω . Braking is applied by plugging from an initial speed of 1100 rpm. Calculate the series resistance in the armature circuit to be placed to limit armature current to twice the full load value and braking torque	6
c	Derive the equation for the motor input voltage in single phase fully controlled converter fed separately excited dc motor. Also derive the speed torque relation	6
Q.no.	Module 3	Marks
3.a	Derive the transfer function of PID controller	3

Answer b or c

- b Draw and explain the working of chopper fed separately excited dc motor and derive the equation for speed 6
- c Apply a Proportional controller to a first order system (Single Input Single Output). Derive the output equation of the system with proportional controller and draw the response curve 6

Q.no.	Module 4	Marks
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| 4.a | Explain the v/f control of speed of induction motor | 3 |
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Answer b or c

- b Explain the closed loop slip controlled Current source inverter drive with regenerative braking 6
- c Explain the block diagram of closed loop v/f control in induction motor drives. Draw the torque speed characteristics for different modes of operation showing torque and power limitations. Also plot the current, slip speed, torque and power with variations in frequency 6

Q.no.	Module 5	Marks
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| 5.a | What is the principle of slip power recovery? Draw the equivalent circuit of induction with an injected voltage in the rotor circuit | 4 |
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Answer b or c

- b A 400V, 50 Hz, 6 pole, Y connected wound rotor motor has the following parameters: $R_s = 0.5\Omega$, $R'_r = 0.4\Omega$, $X_m = 50\Omega$, $X_m = X'_r = 1.2\Omega$, Stator to rotor turns ratio is 4. Motor is controlled by static rotor resistance control. External resistance is chosen such that the breakdown torque is produced at standstill for a duty ratio of zero. Calculate the value of external resistance 8
- c Explain the principle of Static Scherbius drive with necessary figures 8

Q.no.	Module 6	Marks
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| 6.a | Derive the torque equation for cylindrical rotor wound field machine and draw the speed torque characteristics | 4 |
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Answer b or c

- b Draw and explain the block diagram of closed loop speed control of load commutated inverter fed synchronous motor drive 8
- c Explain the variable frequency control of multiple synchronous motors 8