

B.Electrical Engg(evening)5th yr 1st semester Examination2017

(1st Semester supplementary)

SUBJECT Elective—I (Special Electrical Machines & Drives)

(Name in full)

PAPER

Full Marks 30/ 100

Time : Two hours/Three hours/Four hours/Six hours

(15/50 marks for each part)

Use a separate Answer-Script for each part

No. of questions	Part I Answer any three from the following. Two marks for neatness.	Marks
1. a)	Discuss the advantage of use of moving coil P.M.D.C. motor over slotted and slot less construction. What are the advantages of using rare earth magnet group of permanent materials instead of conventional ceramic material for rotating machine application.	8 8
2. a)	Derive power equation of P M D C motor and also draw its speed vs torque characteristics and calculate back EMF constant K_e and torque constant K_t ? How K_t and K_e related with input output of any PM machine?	8
b)	Describe the different type of field construction of field construction used P M D C motor. and also discuss the advantage of using moving coil motors .	8
3. a)	Describe the operating principle of a 3 phase star connected BLDC motor. What are the different types of construction used depending on application? Compare how the performances affected depending on construction .	10
b)	Why NdFeB or samarium cobalt PM materials are normally preferred for BLDC field materials? Develop torque vs angular speed characteristic from its voltage and current vs. angular speed characteristics of the drive system and input from d c supply.	6
4.	Describe the operating principle of a SRM and also explain how the amount of mechanical work done takes place depending on its change of co-energy due to position changing of rotors. Draw rotor position vs permeance characteristics.	16
5.	Describe the principle of operation of hybrid stepper motor. Compare the performance of PM stepper with VR stepper motor. Describe dynamic characteristics of stepper motors .	16

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B. ELE. ENGG (EVENING) 5TH YEAR 1ST SEM. SUPPLE EXAMINATION, 2017
(1st / 2nd Semester/Repeat/Supplementary/Annual/Bi-Annual)

SUBJECT: - SPECIAL ELECTRICAL MACHINES & DRIVES

Time: Two hours/Three hours/ Four hours/ Six hours

Full Marks 100
(50 marks for each part)

Use a separate Answer-Script for each part

No. of Questions	PART II	Marks
	<p>Answer any Three Questions Two marks are for neat and systematic answers</p>	
Q6. (a)	Discuss the dynamic braking scheme and its PLC based implementation for separately excited dc machine with the help of ladder diagram. Also show the inputs and outputs for the same.	10+2
(b)	Discuss the different speed sensing techniques in a DC motor drive system.	4
Q7. (a)	Develop the model equations for DC separately excited motor and draw its block diagram.	8
(b)	A 5kW, 220V, 1150 rpm DC motor with $r_a=0.5$ ohm is operating with a step-down chopper fed from 350V dc supply. Find the duty ratio if the machine is operating at rated load at rated speed.	8
Q8. (a)	Develop the PLC based ladder diagram for plug braking of a three phase induction motor. Assume START, STOP, BRAKE, OVERLOAD as the available commands/input in the system	8
(b)	Discuss the PLC based implementation of DOL starter for a three phase induction motor. Show the power circuit, ladder diagram and mention the inputs and outputs for the same.	8
Q9. (a)	Develop the closed loop control scheme of a DC separately excited motor drive system considering both speed and current feedback.	12
(b)	Discuss different current sensing techniques in a dc drive system.	4
Q10.	<p>Write short notes on any Two:</p> <p>i) Regenerative braking in a dc drive system</p> <p>ii) speed control methods for three phase induction motor</p> <p>iii) Speed and current sensing techniques in ac drive system.</p>	8X2