MASTER OF ELECTRICAL ENGG 1ST SEM
EXAMINATION 2017

(1st/2nd Semester/Regular/~~Repeat/Supplementary/Spl. Supplementary/Old/Annual/Bi-Annual~~)

SUBJECT   Elective—I (Special PURPOSE Electrical
Machines)

(Name in full)

PAPER

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

Full Marks ~~30~~/ 100

(~~15~~/50 marks for each part)

Use a separate Answer-Script for each part

No. of questions	Part I /~~Part II~~ 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 measuer taken to duce armature reaction?	8
	What are the advantages of using rare earth magnet group of permanent materials instead of conventional ceramic material for rotating machine application.	8
2. a)	Drive power equation of P M D C motor and also draw its speed vs torque characteristics. What is EMF constant Ke and torque constant Kt ?How Kt and Ke 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 instead of P M D C 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 performance affected depending on construction.	10
b)	Why position sensors are required for switching different phase supply? 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

PART-II.

Answer *any Three* questions from this part.
Two marks are reserved for neat and well organised answer

6. Explain why reactive *power* is required for operation of induction motor as generator. Hence   16
deduce the expression for reactive power for induction generator with the help of its
steady state equivalent circuit. Also sketch the the same against operating slip.

7.   a) Draw the phasor diagram of an induction motor operating under generating mode.   6
Also explain the nature of its power factor.

   b) Show the grid connected scheme of a three phase squirrel cage induction motor   6+4
operating under generating mode. Also discuss how the optimum reactive power
management can be achieved for such scheme.

8.   a) Show how a squirrel cage induction machine can operate as a generator under grid   4+4
isolated mode of operation. Also discuss the voltage build-up phenomenon for such
scheme.

   b) Show the necessary steps to calculate the excitation capacitance for a standalone   8
wind generation system consisting of an Induction motor and a wind turbine.

9.   Show and explain the scheme for a grid connected synchronous generator operating for   10+6
wind power generation. Discuss the advantage and disadvantages of such scheme over
grid connected sq. cage induction generator scheme.

10.   Write short notes on: 8+8

   i) Thrust-speed characteristics of linear induction motor.
   ii) Grid connected doubly fed induction generator(DFIG)