

Roll No.

Total Pages : 4

451102

December, 2019

M.Tech. (PED) I SEMESTER

**MODELLING AND ANALYSIS OF ELECTRICAL
MACHINES (MPED102)**

Time : 3 Hours]

[Max. Marks : 75

Instructions :

1. *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*
2. *Answer any four questions from Part-B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*
4. *Use of graph sheets is allowed.*

PART - A

1. (a) What is the meaning of doubly excited machine?
Where from these excitations are obtained and to which part of the machine each such excitation is supplied? (1.5)
- (b) Are the air gap m.m.f.s of salient pole and cylindrical rotor machines same? If not, what are the causes of differences? (1.5)

451102/30/111/189

[P.T.O.
12/12

- (c) In a practical large scale synchronous generator, whether the field is the rotor or the armature is the rotor? Is it also so for small synchronous generators? (1.5)
- (d) What is the operating principle of switched reluctance motor? Cite its most important application(s) also. (1.5)
- (e) What is the cause of machines exhibiting dynamic response? (1.5)
- (f) What is meant by direct axis and quadrature axis? In the context of which machines are these terms defined? (1.5)
- (g) What, if any, are the differences between the surface permanent magnet machine and interior permanent magnet machine? (1.5)
- (h) Can a single winding (of the type installed in a single phase induction machine) fed with a single phase voltage produce a rotating torque? If not, then what type of torque it intrinsically produces? (1.5)
- (i) What is (are) the main advantage(s) of switched reluctance motor? (1.5)
- (j) State the basic principle of electromagnetic energy conversion. (1.5)

PART - B

2. (a) Derive an expression each for stored magnetic energy and co-energy for a singly-excited linear magnetic circuit. (10)

(b) Cite examples of doubly-excited machines. How is torque produced in such machines? (5)

3. (a) The pole core of a D.C. machine has pole face of a larger cross section as well as laminated whereas its pole shoe has smaller cross section and is not laminated; reason out why? (5)

(b) A 4-pole machine with 60 slots and 8 conductors per slot has a total flux per pole of 20 mWb. If it has a relative speed of 1500 r.p.m. between field flux and armature winding, what is the generated e.m.f. in armature if the machine is (i) a D.C. machine with lap-connected winding, and (ii) the machine is a 3-phase star-connected machine with winding factor of 0.96 and all turns in each phase are in series. (10)

4. Derive a model in phase variable form of a symmetrical induction machine. (15)