

B.Tech II Year I Semester (R13) Supplementary Examinations June 2017

ELECTRICAL MACHINES – I
(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 70

PART – A
(Compulsory Question)

1 Answer the following: (10 X 02 = 20 Marks)

- (a) Why all the energy conversion devices use magnetic field as coupling medium rather than electrical field?
- (b) Write the energy balance equation for generator.
- (c) How shunt generators be self protective in nature against accidental short circuits?
- (d) Define critical resistance in case of DC series generator.
- (e) What is the role of interpole?
- (f) When flux is increased by 20% and speed is decreased by 20%. Find the percentage increase or decrease in generated EMF.
- (g) State applications of series motors.
- (h) Can series motor be started under no load conditions? Why?
- (i) Explain the effect of speed of the machine on iron losses.
- (j) Name various losses in a DC machine.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

- 2 (a) Deduce the expression for torque in a singly – excited system with help of neat sketch.
- (b) Define Co-energy.
- (c) Explain the classification of energy conversion devices.

OR

- 3 Deduce the expression for force in a doubly – excited system with help of neat sketch.

UNIT – II

- 4 (a) Explain the process of commutation in D.C generators. Describe the methods to improve it.
- (b) Explain the reasons for failure of build-up of EMF in self excited generators with remedies.

OR

- 5 (a) Explain armature reaction and its effects in DC generators with neat sketches.
- (b) A 75 kW, 500 V, 4-pole wave wound DC generator has 72 armature conductors. If the brushes are given an actual lead of 9° at full load, calculate cross magnetizing and Demagnetizing AT / pole.

UNIT – III

- 6 (a) Explain parallel operation of DC series generators in detail with neat sketches.
- (b) Deduce the expression for shaft torque in DC motors.

OR

- 7 (a) Can momentary changes in the loads effect the parallel operation of DC shunt generators? Why?
- (b) Explain the internal and external characteristics of DC series and shunt generators.

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UNIT – IV

- 8 (a) Explain the speed control methods of DC series motor with neat sketches.
(b) Explain the necessity of having 4-point starter.

OR

- 9 (a) Why starter is needed for starting DC motors? Explain 3-point starter with neat sketch.
(b) A 200 V DC shunt motor with armature and field resistances 0.25 ohm and 100 ohm respectively, takes 30 A and runs at a speed of 1000 r.p.m. To reduce the speed of motor to 600 r.p.m, find the amount of resistance to be added in armature resistance control method, torque remaining the same.

UNIT – V

- 10 (a) Explain Swinburne's test on DC machines. Also state its advantages & disadvantages.
(b) A 200 V DC motor takes 25 A while running at a speed of 1000 r.p.m during brake test. If the spring balances read 5 kg and 25 kg, find the output and efficiency. Diameter of the brake drum is given as 40 cm.

OR

- 11 (a) Explain Hopkinson's test on DC motor. Also state the advantages and disadvantages of it.
(b) A 200 V DC shunt motor with armature and field resistances of 0.25 ohm and 200 ohm respectively, takes a no load current of 5 A. If it takes 50 A under loaded conditions, find its efficiency as generator.
