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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

B.Tech II Year I Semester Supplementary Examinations June 2019

ELECTRICAL MACHINES – I

(EEE)

Time: 3 hours

Max. Marks: 60

(Answer all Five Units 5 x 12 = 60 Marks)

UNIT-I

- 1 a With the help of neat diagram obtain the expression for the energy stored in a Magnetic system for a simple attracted type armature type relay. Explain the operation system. 7M
- b The magnetic flux density on the surface of an iron face is 1.45T, Find the force density on the iron face. 5M

OR

- 2 a Deduce the expression for torque in a singly – excited system with help of neat sketch. 7M
- b Define Co-energy? Explain the classification of energy conversion devices. 5M

UNIT-II

- 3 a Explain the process of commutation in DC generators. Describe the methods to improve it. 7M
- b A 75KW, 500V, 4-pole wave wound DC generator has 72 armature conductors. If the brushes are given an actual lead of 90 at full load. Calculate cross magnetizing and Demagnetizing AT/Pole. 5M

OR

- 4 a Explain the construction details of DC Generator. 7M
- b Explain clearly the process of commutation in a DC machine. What causes sparking at the Commutator surface? 5M

UNIT-III

- 5 a Explain the load characteristics of DC series Generator. 7M
- b A separately excited generator when running at 1200 rpm supplies a current of 200A at 125V to circuit of constant resistance. What will be the current when the speed drops to 1000 rpm if the field current is unaltered? Armature resistance is 0.04 ohm and the total voltage drop at the brushes is 2V. Ignore the change in armature reaction. 5M

OR

- 6 a Two DC shunt generators each with an armature of 0.01Ω and field resistance of 20Ω runs parallel and supplies a total load of 5000A. The EMFs are respectively 210V and 130V. Calculate the terminal voltage and output voltage of each machine. 7M
- b Explain the principle of parallel operation of shunt generator. 5M

UNIT-IV

- 7 a Derive an expression for the torque of a DC motor. 7M
- b A 200V DC shunt motor with armature and field resistances 0.25 ohm and 100 ohm respectively, takes 30A and runs at a speed of 1000 rpm. To reduce the speed of motor to 600 rpm, find the amount of resistance to be added in armature control method, torque remaining the same. 5M

OR

- 8 a Explain the speed control methods of DC series motor with neat sketches. 7M
- b A 230V DC shunt motor takes 32A at full load. Find the back EMF on full load if $R_a=0.2\Omega$ and $R_f=115\Omega$ respectively. 5M

UNIT-V

- 9 a** Explain Swinburne's test on DC machines. Also state its advantages & disadvantages. 7M
b A 200V DC shunt motor with armature and field resistances of 0.25 ohm and 200 ohm respectively, takes a no load current of 5A under loaded conditions, find its efficiency as generator. 5M

OR

- 10 a** Derive a condition to obtain maximum efficiency for DC machine. Also explain various losses which take place in a DC machine. 7M
b A 440V DC shunt motor takes a current of 3A at no-load. The armature resistance including brushes is 0.3Ω and the field current is 1A. Calculate the output and efficiency when the input current is 20A. 5M

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