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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, October - 2020
ELECTRICAL MACHINES - I
(Electrical and Electronics Engineering)

Time: 2 hours   Max. Marks: 75

Answer any five questions
All questions carry equal marks
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1.   Show that the torque developed in a doubly excited magnetic system is equal to the rate of increase of filed energy with respect to displacement at constant currents.   [15]

2.   For a singly excited magnetic system, derive the relation for the magnetic stored energy in terms of reluctance.   [15]

3.a) Explain about demagnetizing Ampere turn per pole and Cross magnetizing Ampere Turn per pole.
  b) An 8 pole DC generator has per pole flux of 30 mWb and winding is connected in lap with 960 conductors. Calculate the generated EMF on open circuit when it runs at 500 rpm. If the armature is wave wound at what speed must the machine be driven to generate the same voltage.   [8+7]

4.a) Derive the expression for EMF generated in DC generator.
  b) A 10 kW, 240 V, 6-pole, 1200 r.p.m lap-connected d.c. generator has 500 armature conductors. At rated voltage and current, armature ohmic losses are 200 watts. Compute the useful flux per pole? Take 3 V as the brush drop at full load?   [8+7]

5.   What is critical field resistance? How do you calculate critical field resistance from magnetic characteristics in the laboratory?   [15]

6.a) Explain the procedure of parallel operation of d.c. generators.
  b) Six DC generators are running in parallel, each having an armature resistance of 0.15 ohm, running at the same speed and excited to give equal induce e.m.f(s). All generators share load equally at a terminal voltage of 500V. The total load is 360KW. If the field current of one generator is raised by 5% and the speed remains constant, Calculate new Terminal Voltage.   [8+7]

7.   Describe and compare various methods of speed control of dc motors.   [15]

8.   A 400 V d.c. shunt motor takes 5 A at no-load. R_a=0.5 Ω and R_{sh}=200 Ω. Estimate the kW output and efficiency when the motor takes 50 A on full load.   [15]

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