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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 2022
ELECTRICAL MACHINES–I
(Electrical and Electronics Engineering)

Time: 3 Hours   **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
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1.a)   Derive the expression for force in a singly excited Magnetic system.
  b)   Explain the Co-Energy. For a linear magnetic circuit, derive the relation between stored
       magnetic energy and co-energy.   [8+7]

2.a)   Explain the constructional features of DC machine.
  b)   Calculate the voltage induced in the armature winding of a 4-pole, lap wound DC
       machine having 728 active conductors and running at 1800 rpm. The flux per pole is
       30 mwb.   [8+7]

3.a)   Develop an expression for the demagnetizing and cross magnetizing ampere turns in a
       DC generator.
  b)   Explain the importance of compensating windings in DC machines.   [8+7]

4.a)   Describe the process of voltage build up in a DC shunt generator.
  b)   Explain the classification of the DC Generators.   [8+7]

5.a)   What are the conditions for parallel operation of DC series generators? Explain.
  b)   Two DC shunt generators are connected in parallel to supply a load of 5000A. Each
       machine has an armature resistance of 0.03Ω and field resistance of 60Ω but emf of one
       machine is 600V and that of the other machine is 640V. What power does each machines
       supply?   [8+7]

6.a)   Draw and explain the performance characteristics of DC Shunt motor.
  b)   A 230 volts d.c series motor is taking 50A. Resistance of armature and series field
       winding is 0.2Ω and 0.1Ω respectively. Calculate i) Brush voltage, ii) Back EMF
       iii) Mechanical power developed.   [8+7]

7.a)   Write short notes on Ward-Leonard method of speed control in dc motors.
  b)   A 250 V dc shunt motor has an armature resistance of 0.5 Ω and a field resistance of
       250 Ω. When driving a constant torque load at 600 rpm, the motor draws of 21A. What
       will be the new speed of the motor if an additional 250 Ω resistance is inserted in the
       field circuit?   [8+7]

8.   Explain the Swinburne's test on DC machine and give the procedure to calculate the
      efficiency of both generator and motor.   [15]

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