4TH SEM./ ELECTRICAL/ 2022(S)

TH-1   Energy Conversion-I

Full Marks: 80   Time- 3 Hrs

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

1.   Answer **All** questions   2 x 10

   a.   What is the number of parallel paths in lap winding and wave winding in DC machines?

   b.   What is the role of back emf in DC motor running?

   c.   Why breather is used in transformer?

   d.   What are the factors which affect the torque of DC motor?

   e.   State the two methods of improving commutation in DC Generator.

   f.   What do you mean by burden in instrument transformers?

   g.   State any two cooling methods of transformer.

   h.   What is 'all day efficiency' in distribution transformers?

   i.   Why the C.T. secondary should not be kept open?

   j.   Write any two applications of Auto transformer.

2.   Answer Any **Six** Questions   6 x 5

   a.   Describe the armature control method in speed control of DC shunt Motors.

   b.   Write the differences between core type transformer and shell type transformer.

   c.   Explain the role of compensating windings in DC generator.

   d.   A 4-pole, lap wound DC shunt generator has a useful flux per pole of 0.07 Wb. The armature winding consists of 220 turns each of 0.004Ω resistance. Calculate the terminal voltage when running at 900 RPM if the armature current is 50 A.

   e.   Explain the operation of ON Load Tap changer in transformer using resistor transition.

   f.   Write a short note on potential transformer (PT).

   g   A 25 kVA transformer has 500 turns on the primary and 50 turns on the secondary winding. The primary is connected to 3000V, 50Hz supply. Find the full load primary and secondary currents, the secondary e.m.f and the maximum flux in the core. Neglect leakage drops and no load primary current.

3   Explain the saving of copper in auto transformer as compared to ordinary two winding transformer.   10

4   The armature winding of a 4-pole, 250V DC shunt motor is lap connected. There are 120 slots in each slot containing 8 conductors. The flux per pole is 20 mWb and current taken by the motor is 25A.The resistances of armature and field circuit are 0.1Ω and 125Ω respectively if the rotational losses amount to be 810W. Find (i) Gross torque   10
          (ii) Useful torque and
          (iii) Efficiency.

5   Describe the process of commutation in DC Generator along with sketch diagram in details.   10

6   Explain about the care and the maintenance of transformer on daily, monthly and yearly basis.   10

7   A 25 kW, 250V, DC shunt generator has armature and field resistances of 0.06 ohm and 100 ohm respectively. Determine the total armature power developed when working (i) as a generator delivering 25 kW output and (ii) as a motor taking 25 kW.   10