18035(J)

B. Tech 3rd Semester Examination

Electrical Machines-I (CBS)

EE-301

Time : 3 Hours   Max. Marks : 60

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt one question from each unit I, II, III & IV. Unit V is compulsory.

UNIT - I

1. (a) A 600KVA, 1–ph. Transformer has an efficiency of 92% at both full-load and half-load at unity power factor. Determine the efficiency at 60% of full load power factor lag. (4)

   (b) Explain, in detail the Sumpner's or Back-to-Back test on 1-phase transformer. (6)

2. (a) For an auto transformer, show that the saving in Cu is given by Saving in Cu = (1– K) Saving in Cu in Two winding transformer. (4)

   (b) Discuss the operation of transformer under various load conditions (**resistive, inductive as well as capacitive**). Show them with phasor diagrams. (6)

UNIT - II

3. (a) With help of neat diagram, describe the construction of a three phase Transformer. (4)

   (b) Explain the equivalent circuit and operation of 3-winding transformer. (6)

4. (a) Explain why the wave shape of magnetizing current of a transformer is non-sinusoidal? Explain its phenomenon of inrush of magnetizing current. (6)

   (b) State the necessary conditions for parallel operation of 1-phase as well as 3-phase transformers. (4)

UNIT - III

5. (a) Explain the process of building of voltage of DC shunt generator and give the conditions to be satisfied for the voltage build up. (6)

   (b) Draw a neat sketch of a d.c. generator. State the function of each part & derive the emf equation of d.c. generator. (4)

6. (a) A d.c. generator has an armature e.m.f. of 100V when the useful flux per pole is 20mWb and the speed is 800r.p.m. Calculate the generated emf (a) with the same flux and a speed of 100r.p.m. (b) With a flux per pole of 24nWb and a speed of 900r.p.m. (6)

   (b) Draw the external characteristics of d.c. shunt generator? Why they are more dropping in nature? (4)

UNIT - IV

7. Discuss the various methods of speed control of DC shunt motor. (10)

8. Explain the necessity of a starter in dc motor and describe three-point starter with a neat sketch. (10)

UNIT - V
(Short Answer Questions)

9. Explain the following:-

(i) Derive the conditions of maximum efficiency of 1-phase transformer.

(ii) Distinguish between Power and distribution transformers.

(iii) What is inrush phenomenon in a transformer?

(iv) State the applications of Current transformer.

(v) Draw the configuration of separately and self-excited generators.

(vi) Explain why the cooling methods are used in a transformer. Write the names of cooling methods in a transformer.

(vii) Explain why starter is needed for a dc motor?

(viii) Why DC series motor is not started on no-load?

(ix) Define the critical resistance in DC generator.

(x) Why armature resistance in DC machines are kept low?

(10×2=20)