24026

B. Tech. 3rd Semester (EE)
Examination, December – 2021
ELECTRICAL MACHINE–I

Time allowed : 3 hours] *[Maximum marks : 75*

Note : ***Question No. 1 is compulsory*** *and attempt any* ***one*** *question from each of four sections.*

1. (a) Why compensating winding is used in DC generator ?

(b) Describe Zig Zag connection in transformer.

(c) What do you understand by self excitation mode of dc machine ? Name two machines working in this mode.

(d) Draw and explain approximate equivalent circuit diagram for an auto transformer.

(e) Why it is not advisable to fully load a dc shunt generator until its voltage builds up to the rated value ?

Section–A

2. (a) Explain open circuit test and short circuit test for transformer.

(b) Explain the principle of the operation of transformer. Draw the phasor diagram for transformer on no load.

P.T.O.

3. (a) Define transformer efficiency as a function of load. Develop the expression for the same.

   (b) Draw the equivalent circuit of a single phase transformer and derive expressions for all its parameters.

Section–B

4. (a) Explain Tap changing transformer.

   (b) Give the merits and demerits of a delta/star connected three phase transformer.

5. (a) State the necessary conditions for satisfactory operation of two transformer in parallel. Derive expression for the load shared by two transformers in parallel, when the voltage ratios are equal.

   (b) Explain different connection for conversion of 3 phase to 2 phase in transformer.

Section–C

6. (a) Illustrate with suitable diagrams the patterns of (i) lap winding (ii) wave winding of the armature of a dc machine. Explain merits applications of these windings.

   (b) With a suitable diagram, give the constructional features of dc machine. Explain working of commutator.

7. (a) A 4 pole dc generator with 1200 conductors generates 250V on open circuit, when driven at 500 rpm. The pole shoes have a Bore of 35cm and ratio of pole arc to pole pitch is 0.7 while the length of pole shoe is 20 cm. Find the mean flux density in the air gap.

   (b) Explain the armature reaction in a dc motor, indicating also a few remedies to its adverse effects.

Section–D

8. (a) Explain speed-current, torque-current and speed–torque characteristics of dc series motor.

   (b) Describe different methods for speed control of DC shunt motor.

9. (a) Why is electric braking of electric motors superior to mechanical braking ? How is dynamic braking of DC shunt motor done ?

   (b) Derive efficiency equation of DC motor.