



C09-EE-402

3474

BOARD DIPLOMA EXAMINATION, (C-09)
OCT/NOV—2015
DEEE—FOURTH SEMESTER EXAMINATION

AC MACHINES—I

Time : 3 hours]

[Total Marks : 80

PART—A

3×10=30

Instructions : (1) Answer **all** questions.

(2) Each question carries **three** marks.

(3) Answers should be brief and straight to the point and shall not exceed *five* simple sentences.

1. Describe core type and shell type of transformers with neat sketches.
2. List the various losses in a single-phase transformer.
3. Draw the connection diagram for OC test of a single-phase transformer.
4. Write the functions of Breather in a transformer.
5. Briefly explain the principle of an auto transformer.
6. Briefly explain the necessity of instrument transformers.
7. Write the effect of armature reaction of alternator for ZPF lagging load.
8. Explain the working principle of an alternator.

- * 9. Define voltage regulation of an alternator.
10. What will be the effect of change in excitation to an alternator connected in parallel.

PART—B

10×5=50

Instructions : (1) Answer *any five* questions.
 (2) Each question carries **ten** marks.
 (3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. (a) Derive EMF equation of single-phase transformer.
 (b) The EMF per turn of a 260/117 V, 1 kVA single-phase power transformer is approximately 13 volts. Calculate—
 (i) The number of primary and secondary turns;
 (ii) The net cross sectional area of the core, for a maximum flux density of the core of 1.4 tesla.

12. Two single-phase transformers with an equal voltage ratio are running in parallel and supplying a load of 250 kW at 0.8 p.f. lag, the equivalent impedances of the transformers as referred to secondary are $(0.5 - j4)$ and $(0.7 - j9)$. Find the load shared by each transformer.

13. A transformer has a maximum efficiency of 98% at 15 kVA at UPF. During the day, it is loaded as follows :

- 10 hours—3 kW at 0.6 p.f.
- 5 hours—10 kW at 0.8 p.f.
- 5 hours—18 kW at 0.9 p.f.
- 4 hours—No load

Calculate the all-day efficiency of a transformer.

- * 14. A 230/460 V, single-phase transformer has a primary resistance of 0.2 and leakage reactance of 0.5 and the corresponding values for the secondary are 0.75 and 1.8 respectively. Find the secondary terminal voltage when it is supplying 10 A at 0.8 power factor lagging.

- * **15.** (a) (i) Draw the connection diagram of delta-star configuration of 3-phase transformer. 2
- (ii) Draw the connection diagram of delta-delta configuration of 3-phase transformer. 2
- (b) Explain about open-delta connection of 3-phase transformer with a neat figure. 6
- 16.** A 20 kVA, 415 V, 50 Hz, 3-phase alternator has effective armature resistance of 0.01 and an armature leakage reactance of 0.06. Compute the voltage induced in the armature winding when the alternator is delivering rated current at a load PF of (a) 0.8 lag and (b) 0.8 lead.
- 17.** A 3-phase, 16-pole alternator has 144 slots with 4 conductors per slot, the winding being double layer winding. Flux in the air gap is 50 mWb, sinusoidally distributed. The coil span is 150° (electrical). Find the EMF generated when the alternator shaft is driven at 375 r.p.m.
- 18.** Explain the procedure of synchronization of alternators using Lapms.
