



C14-EE-402

4462

BOARD DIPLOMA EXAMINATION, (C-14)
MARCH/APRIL—2016
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) Answer should be brief and straight to the point and shall not exceed *five* simple sentences.

1. Classify the transformers basing on number of phases and construction.
2. A 100/200 V transformer takes 0.3 A at p.f. of 0.2 lag on open circuit. Find the magnetizing and iron loss component of the no-load current.
3. Explain why the transformer should not be connected to a DC supply.
4. Distinguish between core-type and shell-type transformers.
5. What is the necessity of tap changing in transformer?
6. Write any three advantages of autotransformer.
7. Draw the phasor diagram of an alternator for a lagging power factor load.

- * 8. What are the factors that cause a change of alternator terminal voltage as it is loaded?
9. Define (a) pitch factor and (b) breadth factor.
10. State the conditions for synchronization of an alternator.

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 33 kV/240 V single-phase transformer is supplied at 240 V on no-load and on low-voltage side. It takes no-load current of 2 A and the power of 60 W. The resistance of the low-voltage winding is 0.8 Ω. Find—

- (a) the power factor on no-load;
 (b) active current;
 (c) magnetizing current;
 (d) copper loss in the LV winding;
 (e) core loss.

12. A 5 kVA, 220/110 V transformer has the efficiency of 96.97% at 0.8 power factor lagging. Its core loss is 50 W and full-load regulation at 0.8 power factor lag is 5%. Find the efficiency and regulation at $\frac{3}{4}$ full-load and 0.9 power factor lagging.

13. Draw the equivalent circuit diagram for a 4 kVA, 200/400 V and 50 Hz single-phase transformer from the test results as follows :

OC test : 200 V, 0.8 A, 80 W on LV side

SC test : 20 V, 10 A, 100 W on HV side

Also find the secondary terminal voltage when delivering 10 A at 0.8 power factor lag.

- * **14.** (a) State the necessity of parallel operation of single-phase transformers. 5
- (b) Develop the equivalent circuit of a single-phase transformer. 5
- 15.** State the locations and functions of the following with neat sketches :
- (a) Breather
- (b) Explosion vent
- (c) Conservator
- (d) Oil level indicator
- 16.** (a) Explain the working principle of an alternator. 5
- (b) For a 3-phase winding with 4-slot per pole per phase and with the coil span of 10 slots, evaluate the distribution factor and pitch factor. 5
- 17.** A 500 V, 50 kVA, 1-phase alternator has an effective resistance of $0.2 \ \Omega$. A field current of 10 A produces an armature current of 200 A on short circuit and e.m.f. of 450 V on open circuit. Calculate—
- (a) the synchronous impedance and reactance;
- (b) full-load regulation at 0.8 power factor lagging.
- 18.** Two single-phase alternators operating in parallel have induced e.m.fs. on open circuit of $230 \angle 0^\circ$ and $230 \angle 10^\circ$, and having reactances of $j2 \ \Omega$ and $j3 \ \Omega$ respectively. Calculate—
- (a) terminal voltage;
- (b) power delivered by each of the alternators to a resistive load of $6 \ \Omega$.
- Neglect alternator resistances.
