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C14–EE–402

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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 . 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 . 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 0º and 230 10º, and having reactances of $j2$ and $j3$ respectively. Calculate—

(a) terminal voltage;

(b) power delivered by each of the alternators to a resistive load of 6 .

Neglect alternator resistances.

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