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C09–EE–402

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BOARD DIPLOMA EXAMINATION, (C–09)

MARCH/APRIL—2018

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. Draw the phasor diagram of a single-phase transformer when it is supplying lagging power factor load.

2. List the various losses in the transformer.

3. State the necessity of parallel operation of transformers.

4. State the types of a three-phase transformer connections.

5. Write any three applications of auto transformers.

6. State the methods of cooling of power transformers.

7. What are the advantages of stationary armature over rotating-type of armature of an alternator?

8. Write any three advantages of short pitch winding in alternators.

9. Define synchronous reactance and synchronous impedance of an alternator.

10. State the conditions for synchronization of three-phase alternators.

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)* Define transformation ratio in a transformer. 3

(b) A single-phase transformer has 400 turns on the primary winding and 1000 turns on the secondary winding. If it is operating at 50 Hz supply with a maximum flux of 0·045 Wb, find the *(i)* primary and secondary induced e.m.f., and *(ii)* e.m.f. induced per turn. 7

12. *(a)* Derive the condition for maximum efficiency in a single-phase transformer. 5

(b) A 400/200 V single-phase transformer is supplying a load of 120 A at a power factor of 0·8 lagging. On no-load the current and the power factor are 5 A and 0·2 lagging respectively. Find the primary current. 5

13. Explain the construction and working of a single-phase transformer.

14. A 10 kVA, 200/400 V, 50 Hz transformer gave the following test results :

OC test : 200 V, 1·3 A, 120 W on LV side
SC test : 22 V, 30 A, 200 W on HV side

Calculate the efficiency and voltage regulation for 0·8 p.f. lagging at full load.

15. Explain the Scott connection of transformers with phasor diagram.

16. Explain with a neat sketch, the construction details of a salient pole synchronous machine.

17. *(a)* What is an armature reaction in alternators? 3

(b) Find the synchronous impedance and reactance of an alternator in which a given field current produces an armature current of 250 A on short circuit and generates an e.m.f. of 1500 V on OC. The armature resistance is 2 . 7

18. Explain the procedure of synchronization of alternator by using synchroscope with neat sketch.

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