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BOARD DIPLOMA EXAMINATION, (C–16)

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. Distinguish between shell-type and core-type transformers in any three aspects.

2. Draw a neat vector diagram of a practical transformer working on load at u.p.f.

3. Draw a neat curve showing the effect of load power factor on voltage regulation.

4. Differentiate between distribution transformer and power transformer in any three aspects.

5. State the advantages of 3-phase transformer over single-phase transformer.

6. State the conditions for parallel operation of 3-phase transformer.

7. State the advantages of stationary armature over rotating-type armature of an alternator.

8. State the need of an exciter in an alternator.

9. State the causes of terminal voltage variations on loaded alternator.

10. State the necessity for parallel operation of alternators.

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PART—B 10×5=50

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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)* Explain the working principle of a single-phase transformer in brief. 4

(b) Derive the EMF equation of a single-phase transformer. 6

12. *(a)* A 2200 V/200 V, single-phase transformer takes 1A on the HV side on no-load at a p.f. of 0·385 lagging. If a load of 50 A at a p.f. of 0·8 lagging is taken from the secondary of the transformer, calculate the primary current and its power factor. 6

(b) Explain briefly the polarity test on single-phase transformer. 4

13. A 50 kVA, 2400 V/240 V, 50 Hz single-phase transformer gave the following test results :

OC test : 240 V, 5·41 A, 186 W (on LV side)

SC test : 48 V, 20·83 A, 617 W (on HV side)

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

14. A 500 kVA distribution transformer whose copper loss and iron loss at full load are 4·5 kW and 3·5 kW respectively. During a day of 24 hours, it is loaded as follows :

Number of hours	Load (in kW)	Power factor
6	400	0·8
10	300	0·75
4	100	0·8
4	0	—

Calculate its all-day efficiency.

15. Explain any two methods of cooling of power transformer in brief.

16. Explain the effect of power factor on armature reaction in an alternator with neat diagrams.

17. Define the distribution factor in an alternator. Derive an expression for distribution factor with neat vector diagrams.

18. Two 25 MVA, 3-phase alternators operate in parallel to supply a load of 35 MVA at 0·8 p.f. lagging. If the output of one machine is 25 MVA at 0·9 p.f. lagging, find the output and p.f. of the other machine.

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