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BOARD DIPLOMA EXAMINATION, (C-16)

MAY/JUNE—2023

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. Classify transformers based on (a) number of phases and (b) construction.
2. Draw the vector diagram of a single-phase transformer on load for leading power factor.
3. Define all-day efficiency of a transformer.
4. State the necessity of parallel operation of a transformer.
- * 5. State any three advantages of auto transformer.
6. State the necessity of cooling in a power transformer.
7. Compare salient pole type and non-salient pole type rotor of an Alternator in any three aspects.
8. Define the terms (a) chording fact and (b) distribution factor of an alternator.
9. Define voltage regulation of an alternator.
10. State the conditions for synchronization of alternators.

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PART—B

10×5=50

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

11. (a) Explain the working Principle of a single-phase transformer with a neat sketch. 5

(b) Derive the EMF equation of a single-phase transformer. 5

12. (a) A single-phase transformer with a ratio of 440/110 V takes a no-load current of 5 A at 0.2 p.f lagging. If the secondary supplies a current of 120 A at a p.f of 0.8 lagging, find the current taken by the primary. 5

(b) Explain the polarity test on single-phase transformer. 5

13. A 10 kVA, 450/120 V, 50 Hz single-phase transformer gave the following test results : 10

O.C test : 120 V, 4.2 A, 80 W on L.V. side

S.C test: 9.65 V, 22.2 A, 120 W on H.V. side

Calculate the efficiency and voltage regulation for 0.8 p.f lagging at full load.

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14. 100 kVA distribution transformer has iron loss of 1.5 kW and full load copper loss of 1.5 kW, the transformer is supplying a lighting load, the load cycle is as under full-load for 3 hours, half load for 4 hours and no-load for 18 hours. Calculate the all-day efficiency of the transformer. 10

15. (a) Explain off-load tap changing of power transformer with a neat sketch. 5

(b) State the function of (i) breather, (ii) explosion vent and (iii) conservator of power transformer. 5

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- 16.** (a) Explain various types of exciters used in alternators. 5
- (b) Calculate the EMF induced per phase in a 3-phase, 8-pole, 50 Hz star connected alternator. The stator has 160 slots and 6 conductors per slot. Assume $K_p = 1$ and $K_d = 0.96$. The flux per pole is 0.16 wb. Assume any missing data. 5
- 17.** Explain the effect of power factor on armature reaction in an alternator with a neat sketch. 10
- 18.** A lighting load of 600 kW and a motor load of 707 kW at 0.707 p.f are supplied by two alternators running in parallel. One of the machine supplies 900 kW at 0.9 p.f lagging. Find the load and p.f of the second machine. 10

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