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BOARD DIPLOMA EXAMINATION, (C-20)

MAY—2023

DEEE - FOURTH SEMESTER EXAMINATION

ELECTRICAL MACHINES—II (TRANSFORMERS AND ALTERNATORS)

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 number of phases and construction.

2. Define transformation ratio.

3. List the losses in transformer.

4. List different types of special transformers.

5. Draw the connection diagram of delta-star configuration of 3-phase transformers.

6. State the reasons for voltage variations on load in alternator.

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

8. List the different methods of finding the regulation of alternator.

9. List the methods of synchronisation of 3-phase alternators.

10. State the conditions for synchronisation of alternators.

PART—B

8×5=40

Instructions : (1) Answer **all** questions.

(2) Each question carries **eight** marks.

(3) Answers should be comprehensive and criterion for valuation is the content but not the length of the answer.

11. *(a)* Draw the vector diagram of a practical transformer on load for unity power factor and lagging power factor.

(OR)

(b) Draw a neat sketch of approximate equivalent circuit of a 1-φ transformer referred to primary side.

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

(OR)

(b) A 50 kVA transformer has a full load copper loss of 600 watts and iron loss of 500 watts. Calculate the maximum efficiency and the load at which it occurs. (Assume any missing data)

13. *(a)* Explain the function of the following parts of a power transformer :

(i) Breather

(ii) Buccholz relay

(iii) Explosion vent

(OR)

(b) State the expression for saving of copper in auto transformer and also write the advantages and disadvantages of auto transformers.

14. *(a)* Derive expressions for pitch factor and distribution factor of an alternator.

(OR)

(b) A 3-φ, 16-pole alternator has 144 slots with 4 conductors per slot. The winding being double layered winding, flux in the air gap is 50 mWb sinusoidally distributed. The coil span is 150° (electrical). Find the emf generated when the alternator shaft is driven at 375 rpm.

15. *(a)* Explain the procedure of synchronization of an alternator using synchroscope.

(OR)

(b) Two 24 MVA, 3-φ alternators operate in parallel to supply a load of 35 MVA at 0.8 p.f lagging. If the output of one machine is 22 MVA at 0.9 p.f lagging, find the output and power factor of the other machine.

PART—C

10×1=10

Instructions : (1) Answer the following question.

(2) The question carries **ten** marks.

(3) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

16. Derive the emf equation of a single-phase transformer.

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