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BOARD DIPLOMA EXAMINATION, (C-16)

MARCH / APRIL — 2021

DEEE — FOURTH SEMESTER EXAMINATION

A.C. MACHINES - I

Time : Three Hours]   [*Maximum Marks* : 80

PART-A

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

3×10=30

(*ii*) Each question carries **three** marks.

(*iii*) Answers should be brief and straight to the point and shall not exceed *five* simple sentences.

1.   State the function of

(i)   conservator

(ii) breather

(iii) explosion vent

2.   Draw the vector diagram for a transformer working on no load.

3.   Define regulation of a transformer.

4.   Differentiate between distribution and power transformer:

5.   State the advantages of 3-phase transformers over 1-phase transformers.

6.   State the necessity of cooling of power transformers.

7.   Define chording factor and state its equation.

8.   Define Exciter and list the various types of exciters.

9.   Define synchronous impedance and synchronous reactance.

10. State the conditions for synchronization of alternators.

PART-B   10×5=50

Instructions :   (*i*)   Answer any **five** questions.

   (*ii*)   Each question carries **ten** marks.

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

11. (*a*) Explain the working of a 1-phase transformer.

   (*b*) The maximum flux density in the core of 250/3000-volts, 50-Hz single phase
   transformer is 1.2 Wb/m^2. If the E.M.F. per turn is 9 volts, determine

   (*i*) Primary and secondary turns

   (*ii*) Area of the core.

12. A 20 kVA, 2500/250, 50 Hz, 1-phase transformer has the following test results:

   O.C. test (L.V. side): 250 V, 1.4 A, 105 W

   S.C. test (H.V. side): 104 V, 8 A, 320 W

   Compute the parameters of the approximate equivalent circuit referred to the low
   voltage side and draw the circuit.

13. A 150 kVA single phase transformer has a core loss of 1.5 kW and a full load
   copper loss of 2 kW. Calculate the efficiency of the transformer i) at full-load,
   0.8 p.f. lagging ii) at half-load, unity p.f. Determine also the secondary current
   at which the efficiency is maximum if the secondary voltage is maintained at
   its rated value of 240 V.

14. Find all-day efficiency of a transformer having maximum efficiency of 99% at
   15 KVA at unity power factor and loaded as follows :

   12 hours — 2 kW at 0.5 power factor lag.

   06 hours — 12 kW at 0.8 power factor lag.

   06 hours — at No-load

15. Draw a legible sketch of a power transformer and explain each part.

16. Explain armature reaction in an alternator at different power factors.

17. A 60 kVA, 220 volts, 50Hz, 1-Phase alternator has effective armature resistance of 0.016 ohms and an armature leakage reactance of 0.07ohms. Compute the voltage induced in the armature, when the alternator is delivering rated current at a load power factor of (i) 0.7 lagging (ii) 0.7 leading.

18. Explain the procedure of synchronization by using lamps with neat diagram.

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