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BOARD DIPLOMA EXAMINATION
MARCH/APRIL - 2019
DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING
A.C. MACHINES -I
FOURTH SEMESTER EXAMINATION

Time: 3 Hours

Total Marks: 80

PART - A **(3m x 10 = 30m)**

Note 1: Answer all questions and each question carries 3 marks

2: Answers should be brief and straight to the point and shall not exceed 5 simple sentences

1. A single phase 4 KVA, 200/400 V, 50 Hz transformer gave the following test results.
 O.C. Test : 200V, 0.7A, 70W.

Find the R_0 and X_0 of equivalent circuit

2. Define all-day efficiency of a transformer
3. State the function of the following parts of a transformer
- (a) Core (b) transformer oil
4. A single phase transformer with a ratio of 440/110 V takes a no load current of 5A at 0.2 power factor lagging. Find the voltage transformation ratio
5. State the function of following parts of 3-phase power transformer
- (a) Buchholz relay (b) Silica gel
6. State the applications of (i) delta-delta (ii) delta –star connected 3-phase transformers
7. Compare the salient pole type and non-salient pole type alternators in any three aspects
8. List the main parts of an alternator and state the materials used
9. Draw the vector diagram of a loaded Alternator for leading power factor
10. State the conditions for synchronization of alternators

PART - B **(10m x 5 = 50m)**

**Note 1: Answer any five questions and each carries 10 marks*

2: The answers should be comprehensive and the criteria for valuation is the content but not the length of the answer

11. A 5 KVA, single phase transformer has a core loss of 40 W and full-load Copper loss of 100 W. During the day, the transformer is loaded as under.

7 A.M to 1 P.M: 3 KW at 0.6 p.f.lagging

1 P.M to 6 P.M: 2 KW at 0.8 p.f.lagging

6 P.M to 1 A.M: 6 KW at 0.9 p.f.lagging

1 A.M to 7 A.M: No-load.

Determine the all day efficiency of the transformer

12. A single phase transformer has 350 primary turns and 1050 secondary turns. The primary is connected to 400 V, 50 Hz, AC supply. Calculate (i) the maximum value of flux density in the core and (ii) the induced e.m.f. in the secondary winding if the net cross-sectional area of the core is 50 cm^2 .
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13. A 100 KVA transformer has iron loss of 1000 W and full load copper Loss of 1500 W. If the power factor of the load is 0.8 lagging, calculate

(i) full load efficiency (ii) the load KVA corresponding to maximum Efficiency (iii) the maximum efficiency

14. A 33 KVA, 2200/220 V, 50Hz single phase transformer has the following parameters:

Primary winding (HV side): $R_1=2.4 \Omega$, leakage reactance $X_1=6 \Omega$

Secondary winding (LV side): $R_2=0.03 \Omega$, leakage reactance $X_2=0.07 \Omega$

- (a) Find the primary resistance and leakage reactance referred to secondary.
 (b) Find the secondary resistance and leakage reactance referred to primary.
 (c) Find the equivalent resistance and equivalent leakage reactance referred to primary.
 (d) Find the equivalent resistance and equivalent leakage reactance referred to secondary
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15. a) Explain OFF-Load tap changing of power transformer with neat sketch.
 b) Derive the condition for maximum efficiency of a transformer.
16. a) Define pitch factor in an alternator. Derive expression for pitch factor with neat vector diagrams.

* b) Explain various types of exciters used in Alternators.

17. A 3-phase, 16 pole alternator has 144 slots with 4 conductors per slot, the winding being double layer winding. Flux in the air gap is 50 mwb, Sinusoidally distributed. The coil span is 150° electrical. Find the e.m.f generated, when driven at 375 r.p.m
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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
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