



C14-EE-402

4441

BOARD DIPLOMA EXAMINATION, (C-14)

MARCH / APRIL - 2019

DEEE - IV SEMESTER EXAMINATION

A. C. 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) Answer should be brief and straight to the point and shall not exceed five simple sentences.

- 1 A 33 KVA 2200/220V, 50Hz, 1- ϕ transformer has following parameters :
HV side - $R_1 = 2.4\Omega$, $X_1 = 6\Omega$
LV side $R_2 = 0.03\Omega$, $X_2 = .707\Omega$
Find
 - (a) Equivalent Resistance referred to the LV side R_{02}
 - (b) Equivalent Reactance referred to the LV side X_{02}
- 2 List out losses taking place in a transformer.
- 3 Why Transformer rating is expressed in KVA ?
- 4 Define all day efficiency of a transformer.
- 5 State the conditions for parallel operation of 3 phase transformer.
- 6 State the advantages of 3 phase transformer over bank of 3 single phase transformers.

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- 7 Compare the salient pole and non-salient pole type rotors in any four aspects.
- 8 A 3 phase, 4 pole, alternator running at 1500 RPM, calculate the frequency of induced EMF.
- 9 Define regulation of an alternator and mention required formulae.
- 10 What is necessity for parallel operation of alternators ?

PART - B**10×5=50**

Instructions :

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

- 11 (a) Derive the approximate equation for voltage drop of transformer at lagging P.F. with vector diagram. **5**
- (b) A 50 KVA transformer has on full load copper loss of 600 W and iron loss of 500 W. Calculate the **2+2+1**
- (i) The KVA load at which maximum efficiency occurs.
 - (ii) Copper loss at maximum efficiency.
 - (iii) Maximum efficiency.
- 12 (a) Distinguish between shell type and core type transformers. **6**
- (b) A 50 KVA, 2000/200V, 50 Hz single phase transformer has impedance drop of 5% and resistance drop of 3%. Find :
- (i) Voltage regulation at full load 0.8 Pf lagging. **2+2**
 - (ii) P.f. at which voltage regulation is zero.

- 13 Explain the short circuit test on single phase transformers with neat circuit diagram and find the parameters. 10
- 14 (a) Derive the condition for maximum efficiency of single phase transformers. 4
- (b) Develop the vector diagram of a single phase transformer for lagging power factor load. 2+2+2=6
- 15 Explain the 'on load' and 'off load' tap changing transformer with neat diagram. 10
- 16 (a) 16 pole, 3 phase, 144 slots alternator has 10 conductor per slot with star connected armature winding. The air gap is sinusoidally distributed having a flux of 0.03 wb/pole. If alternator runs at 375 RPM, Calculate (i) Frequency of induced EMF (ii) The phase voltage and (iii) line voltage generated 1+2+1=4
- (b) Draw the vector diagram of smooth cylindrical alternator for different power factors (unity, lagging and leading) 2+2+2=6
- 17 (a) Derive EMF equation of an alternator taking into account distribution factor and pitch factor. 6
- (b) Draw the open circuit and short circuit characteristics of alternator. 2+2
- 18 Explain in detail effect of change in input and excitation of an alternator connected to infinite bus. 10