22418

Seat No.

Instructions – (1) All Questions are *Compulsory.*

(2) Illustrate your answers with neat sketches wherever necessary.

(3) Figures to the right indicate full marks.

(4) Assume suitable data, if necessary.

(5) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. **Attempt any FIVE of the following:** **10**

a) State Fleming's right hand rule.

b) State working principal of DC generator.

c) "DC series motor should never be started at no load". Justify.

d) State why a transformer always have a efficiency of more than 90%.

e) Give the specification of three phase transformer as per IS 1180 (part 1) 1989 (any four)

f) State two applications of isolation transformer.

g) List two special features of welding transformer.

Marks

2. **Attempt any <u>THREE</u> of the following:** **12**

a) Explain the working principal of Induction motor.

b) State at least one function and material used for the following parts of DC motor.

c) A 3300 / 250V, 50Hz single phase transformer is built on a core having an effective cross sectional area of $125\,cm^2$ and 70 turns on the low voltage winding.

Calculate:

(i) the value of max flux density.

(ii) number of turns on the high voltage windings.

d) Draw the equivalent circuit of transformer refered to the primary state the meaning of each term related to equivalent circuit.

3. **Attempt any <u>THREE</u> of the following:** **12**

a) Explain the necessity of starter for DC motor. State various types of DC motor starter.

b) Derive the emf equation of a transformer.

c) A single phase transformer has 300 turns on its primary side and 750 turns on its secondary side, the maximum flux density in the cone is 1 wb/m^2. Calculate:

(i) the net cross sectional area of the cone.

(ii) the emf induced in the secondary side

d) Compare cone type and shell type transformer.

Marks

4. Attempt any THREE of the following: **12**

a) Give any four selection criteria for :

   (i)   Distribution transformer

   (ii)   Power transformer

b) With the help of neat diagram, describe the procedure to carry out phasing out test on 3 phase transformer. Also state the purpose of conducting this test on 3-phase transformer.

c) Explain with the neat circuit diagram only the scott connection scheme for conversion of three phase supply to two phase supply. Name one application of the same.

d) In 20kVA, 1000/400V, 1 ϕ 50Hz transformer iron and full load copper losses are 300 W and 500 W respectively. Calculate its efficiency at $\frac{3}{4}$ full load at unity power factor.

e) Explain with circuit diagram use of potential transformer to measure 33kV.

5. Attempt any TWO of the following: **12**

a) A 250V, shunt motor on no load runs at 1000 rpm and takes 5A. The total armature and shunt field resistance are respectively 0.2Ω and 250Ω. Calculate the speed when loaded and taking a current of 50A, if armature reaction weaken on the field by 3%.

b) List the conditions for parallel operation of three phase transformer.

c) A 500kVA distribution transformer having copper and iron losses of 5kW and 3kW respectively on full load. The transformer is loaded as shown below:

Loading (kW)	Power Factor (Lag)	No. of hours
400	0.8	06
300	0.75	12
100	0.8	03
No load	-	03

Calculate the all day efficiency.

Marks

6. **Attempt any TWO of the following:** **12**

   a) Explain with the help of neat diagram the following methods of speed control for DC series motor.

      (i)   Field diverter method.

      (ii) Tapped field method.

   b) Explain with the help of neat diagram working of 3 phase autotransformer. Write any two application.

   c) Explain the effects of Harmonics on the transformer.

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