17415

21718

3 Hours / 100 Marks   Seat No.

Instructions –
(1) All Questions are *Compulsory.*
(2) Answer each next main Question a new page.
(3) Illustrate your answers with neat sketches wherever necessary.
(4) Figures to the right indicate full marks.
(5) Use of Non-programmable Electronic Pocket Calculator is permissible.
(6) Mobile Phone, Pager and any other Electronic communication devices are not permissible in Examination Hall.

Marks

1.   Attempt any <u>TEN</u> of the following: **20**

a) State Fleming's right hand rule.

b) Classify different types of generators.

c) Draw:

   (i)   Torque Vs. Armature current.

   (ii) Speed Vs. armature current.

   Characteristics for DC shunt motor.

d) State Fleming's left hand rule.

e) Which DC motor can be selected for following types of loads

   (i)   Electric Traction

   (ii) Lathe Machine

   (iii) Crane

   (iv) Printing Machine

f)   Give classification of DC motors.

g)   Classify types of transformers.

h)   Draw circuit diagram for short circuit test of single phase transformer.

i)   Why transformer rating is in KVA?

j)   Write difference between efficiency and all day efficiency of transformer.

k)   Draw connection diagram of transformer for Scott connection.

l)   State types of cooling arrangements used in transformer (Any four).

2.   Attempt any FOUR of the following: **16**

a)   State principle of operation of DC generator.

b)   Derive an e.m.f. equation of generator.

c)   "D.C. Series motor cannot operate on no load." – Justify the statement.

d)   Write power stages of DC motor with flow diagram.

e)   State the necessity of starter for D.C. motor. State various types of D.C. motor starter.

f)   A 220 V DC shunt motor runs at a speed of 850 rpm and takes a current 20 A from mains. Calculate the speed if the torque is doubled. Armature resistance is 0.2Ω.

3.   Attempt any FOUR of the following: **16**

a)   Draw practical transformer on load phasor diagram at lagging P.F.

b)   Estimate the percentage efficiency and regulation of a 100 KVA, 6600 V/250 V, 50hz 1ϕ transformer at full load and 0.8 lagging p.f. from following readings
O.C. test : 6600 V, 1.5 A, 900 W,
S.C. test : 290 V, 12 A, 860 W.

Marks

c) Compare distribution transformer with power transformer on any four points.

d) Draw the equivalent circuit of transformer referred to primary side.

e) State any two advantages of parallel operation of transformer. State the two conditions for connecting single phase transformers in parallel.

f) Identify the circuit diagram given in Fig. No. 1 Select proper range of all meters if the transformer is having rating of 440 V/ 220 V, 2 KVA.
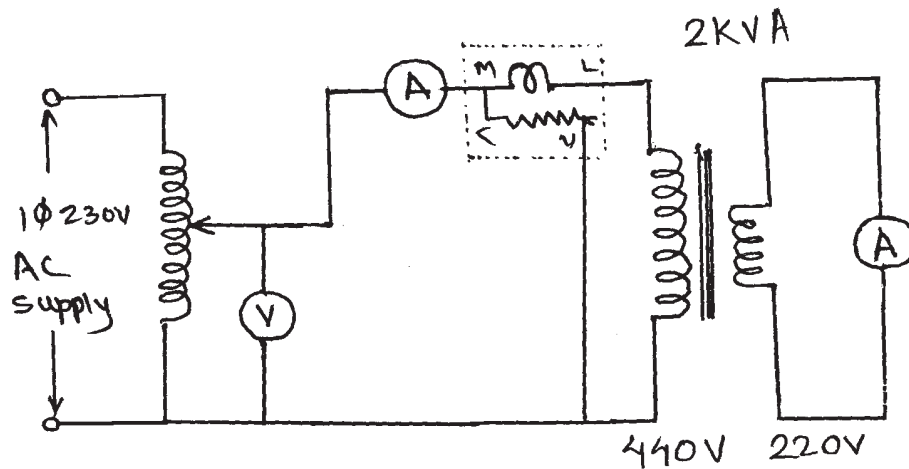

Fig. No. 1

Marks

4.   Attempt any FOUR of the following: **16**

a) A 40 KVA, single phase transformer with a ratio of 2000 /
    250 V has a primary resistance of 1.15 Ω and a secondary
    resistance of 0.01555 Ω. If the transformer is designed for
    75% of full load, find its efficiency when delivering full load
    at 0.8 power factor.

b) Fig. No. 2 shows the equivalent circuit of a 220/2200 V,
    single phase transformer as referred to the primary side.
    Calculate:

    (i)   Primary current

    (ii)   Power factor

    (iii) Secondary terminal voltage.
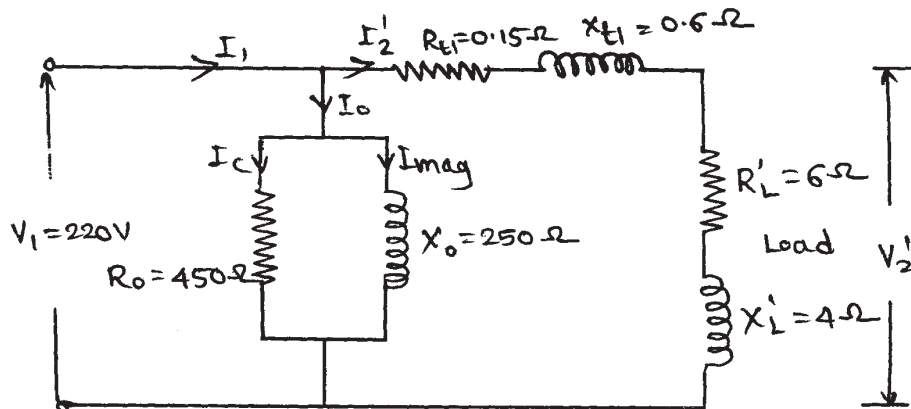
    (iv)   Output of transformer.

Fig. No. 2

c) Two transformers A of 40 KVA with %
    $Z_A = (3 + j4)$ Ω and B or 25 KVA. Share equaly a load of
    50 KVA. While working in parallel, Find how they will share
    a load of 40 KVA. Comment your answer.

d) The efficiency of 100 KVA, 1100/440 V. 1 ϕ transformer is
    87% on half load at 0.8 (lag) and 89% on full load at unity
    power factor. Determine iron and copper losses.

e) List various losses in a transformer and the places at which
    they occur.

f) Derive the condition for obtaining maximum efficiency of
    transformer.

Marks

5. **Attempt any FOUR of the following:**   **16**

a) Draw polarity test of 1ϕ transformer.

b) A 500 KVA, distribution transformer having copper and iron losses of 5 KW and 3 KW respectively. On full load. The transformer is loaded as shown below.

Loading (KW)	Power Factor (lag)	No. of hrs.
400	0.8	08
300	0.75	10
200	0.8	03
No load	——	03

c) State the advantages of a morphous core type distribution transformer.

d) State with neat sketch the construction of three phase auto transformer.

e) What is the aim of conducting phasing out test on three phase transformer? Draw diagrams for phasing out test.

f) Write selection criteria of distribution transformer with any four point.

6. **Attempt any FOUR of the following:**   **16**

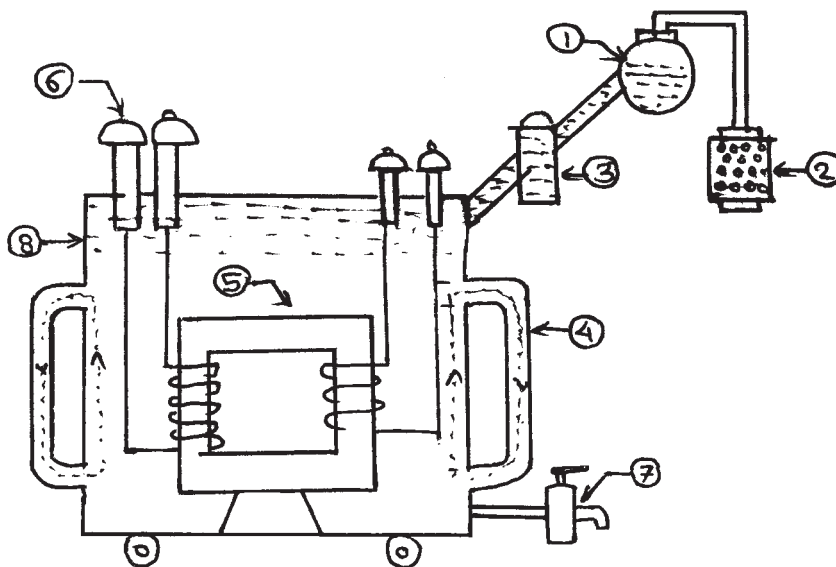a) Identify the parts shown in the diagram of a transformer in Fig. No. 3

Fig. No. 3

Marks

b) Compare auto transformer with two winding transformer. (Any four point.)

c) Explain construction and operation of current transformer. Draw a connection diagram for C.T. connection with 1ϕ load.

d) Explain construction and working of isolation transformer.

e) Compare single phase welding transformer with two winding transformer on the basis of construction, winding size.

f) List special features (any four) of isolation transformer with any four applications.

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