

17415

21415

3 Hours / 100 Marks

Seat No.

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- 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) Use of Non-programmable Electronic Pocket Calculator is permissible.

Marks

1. **Attempt any TEN of the following:** **20**
- State Fleming's right hand rule.
 - Write e.m.f. equation of generator.
 - State significance of back emf.
 - Define armature torque and shaft torque.
 - 'D.C. series motor should never be started at no load'. Justify.
 - State the condition for maximum efficiency of a d.c. motor.
 - Draw the phasor diagram for practical transformer on no load.
 - Define all day efficiency.
 - Draw circuit diagram for polarity test on 1 ϕ transformer.
 - A 50 KVA transformer has iron loss of 2 KW on full load. Calculate its iron loss at 75% of full load.
 - List the types of transformer cooling using air.
 - State two advantages of 3-phase autotransformer.

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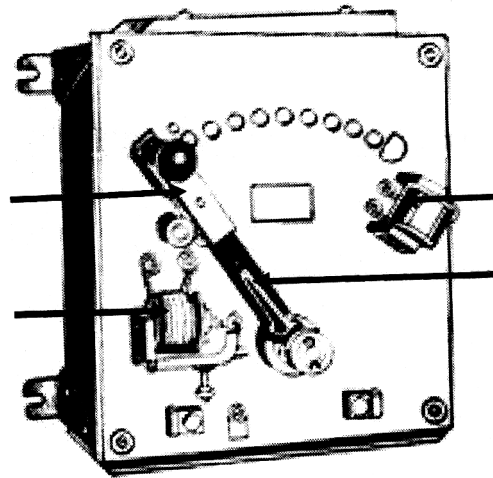
[2]

Marks

16

2. Attempt any FOUR of the following:

- a) Draw the connection diagrams of different types of DC generators.
- b) State function of following parts of d.c. machine.
 - (i) Yoke
 - (ii) Brush
 - (iii) Pole shoe
 - (iv) Commutator
- c) Describe $T_a - I_a$ characteristic for DC series and DC shunt motor.
- d) A 220 V dc shunt motor runs at a speed of 850 rpm and takes a current of 30 A from mains. Calculate speed if the torque is doubled. Armature resistance is 0.2Ω .
- e) Identify parts of d.c. motor starter shown in Figure No. 1. State function of each part.

**Fig. No. 1**

- f) List any four applications of D.C. shunt motor.

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

- a) Describe practical transformer on load with phasor diagram.
- b) “All day efficiency is more than ordinary efficiency of a transformer.” Justify.
- c) List the conditions for parallel operation of three phase transformer.
- d) Derive the emf equation of a transformer.
- e) List the advantages of O.C. and S.C. test. (any four)
- f) 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	06
300	0.75	12
200	0.8	04
No load	—	02

Calculate all day efficiency.

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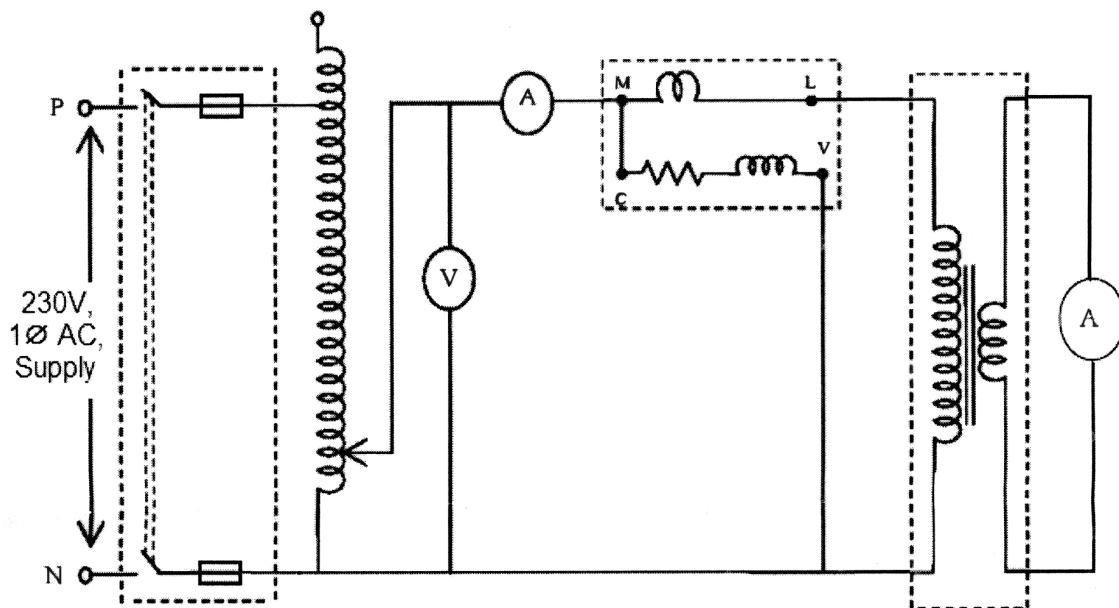
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Marks

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

- The efficiency of a 100 KVA, 11000 / 440 V, 1 ϕ transformer is 87% on half load at 0.8 (lag) and 89% on full load at unity p.f. Determine iron and copper losses.
- Identify the circuit diagram given in Figure No.2. Select proper range of all meters if the transformer is having rating of 220 / 110 V, 1 KVA.

**Fig. No. 2**

- Two single phase transformers of 250 KVA each are operated on parallel (both side). Their % drops are $(1 + j6) \Omega$ and $(1.2 + j4.8) \Omega$. The load connected across the bus bar is 500 KVA at 0.8 p.f. lag. Calculate load shared by each transformer.
- State advantages of parallel operation of transformers.
- Draw the equivalent circuit of a typical 1 ϕ transformer referred to primary.

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- f) Identify the parts shown in the diagram of a transformer in Figure No. 3.

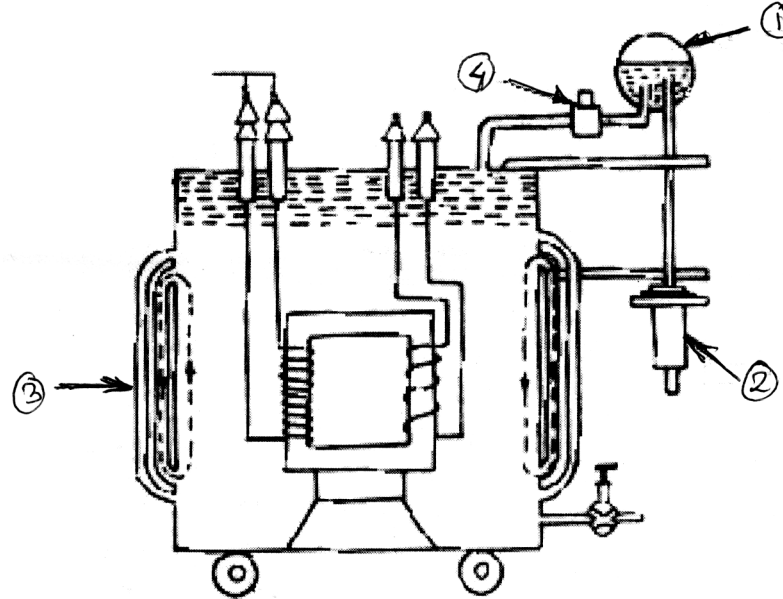


Fig. No. 3

5. Attempt any FOUR of the following:

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- List various losses in a transformer. State methods to minimize these losses.
- “O.C. test is performed on HV winding and S.C. test is performed on LV winding of a transformer”. Justify.
- Two transformers are having voltage regulation of 3% and 5% respectively. Which transformer is better in performance? Justify your answer.
- State criteria for selection of distribution transformer.
- Draw the construction of three phase autotransformer. State its two applications.
- Compare distribution transformer and power transformer on basis of voltage level, turns ratio, type of cooling and cost.
- Describe procedure to find polarity of windings of a three phase transformer.

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

- a) Describe the method of converting three phase to two phase transformer by neat diagram.
 - b) Describe working of isolation transformer.
 - c) List any four advantages of 1 ϕ Autotransformer.
 - d) Draw circuit diagram of connected CT and PT in a 1 phase circuit.
 - e) Compare single phase autotransformer with two winding transformer on basis of no. of windings, copper loss, voltage regulation and cost.
 - f) List special features of welding transformer.
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