

17415

11718

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

Marks

1. Attempt any TEN of the following:

20

- a) State significance of back emf.
- b) State Fleming's right hand rule.
- c) List the types of D.C. generator.
- d) State the condition for maximum efficiency of a D.C. motor.
- e) Draw the block diagram showing power stages of D.C. motor.
- f) Define armature torque and shaft torque of D.C. motor.
- g) Define all day efficiency of transformer.
- h) A 100 KVA transformer has iron loss 3kW on full load. Calculate its iron loss at 50% of full load.
- i) A 1 phase transformer has 500 primary and 1200 secondary turns calculate transformation ratio.
- j) State any four properties of an ideal transformer?
- k) State the different types of (any four) cooling system used for 3ϕ transformer.
- l) State conditions for parallel operation of 3-phase transformer. (any four)

P.T.O.

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

- Derive the E.M.F. equation of D.C. generator?
- A 4 pole generator having wave wound armature winding has 51 slot each slot containing 20 conductors. What will be the voltage generated in machine when driven at 1500 rpm assuming flux per pole tube 7 mWb?
- Explain the necessity of starter for D.C. motor. List the types of D.C. motor starter.
- Explain with suitable diagram flux control method for speed control of D.C. series motor?
- Draw Torque verses armature current and speed verses torque characteristics of D.C. shunt motor.
- Explain working of Brushless D.C. motor with neat sketch.

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

- Derive E.M.F. equation of transformer.
- Compare core type and shell type transformers. (any 4 points)
- Compare distribution transformer and power transformer on any four points.
- Draw the equivalent circuit of transformer referred to primary state the meaning of each term.
- A 10 KVA, 1 Phase, 50 Hz, 500 / 250 V transformer have following result:

OC test (LV side) - 250 V, 3 A, 200 W

SC test (HV side) - 15 V, 30 A, 300 W

Calculate efficiency and regulation at full load 0.8 P.F. lagging.

- Find the all day efficiency of 500 KVA distribution transformer whose copper loss and iron loss at full load are 4.5 kW and 3.5 kW respectively. During a day of 24 Hrs. its loaded as under:

No. of Hrs.	Load in kW	P.F.
06	400	0.8
10	300	0.75
04	100	0.8
04	0	-

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

- a) A 500 KVA transformer has 2500 watt iron loss and 7500 watt copper loss at full load. Calculate its efficiency at full load unity p.f. and 0.8 p.f. lagging.
- b) Draw a complete phasor diagram of transformer for lagging p.f. load condition.
- c) List various losses in a transformer and explain the places at which they occur and methods to minimize these losses.
- d) State the advantages of parallel operation of transformers.
- e) Two 1 phase transformers A and B rated at 250 KVA each are operated in parallel on both side. Percentage impedances for A and B are $(1 + j6)$ and $(1.2 + j 4.8)$ respectively. Compute the load shared by each when the total load is 500 KVA at 0.8 p.f. lagging.
- f) Explain with neat sketch polarity test of 1ϕ transformer.

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

- a) State why transformer rating is in KVA.
- b) State the advantages of amorphous core type distribution transformer.
- c) "OC test is performed on HV winding and SC test is performed on LV winding of a transformer" Justify.
- d) Explain with neat sketch the procedure of conducting phasing out test on 3 phase transformer?
- e) State criteria for selection of distribution transformer.
- f) Explain construction and working of three phase auto 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) Compare single phase auto transformer and two winding transformer on basis of no. of winding, copper loss, vtg regulation and cost.
 - d) List the special features of welding transformer.
 - e) Explain construction and working of potential transformer.
 - f) Give the specification of 3 ph distribution transformer as per IS : 1180 (Part - I) - 1989.
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