

22418

23242

3 Hours / 70 Marks

Seat No. 

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- Instructions* –
- (1) All Questions are *Compulsory*.
  - (2) Answer each next main Question on a new page.
  - (3) Illustrate your answers with neat sketches wherever necessary.
  - (4) Figures to the right indicate full marks.
  - (5) Assume suitable data, if necessary.
  - (6) Use of Non-programmable Electronic Pocket Calculator is permissible.
  - (7) 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 the function of the parts of DC motor
    - i) Commutator
    - ii) Pole core.
  - b) State the working principal of DC generator.
  - c) Name two materials used for the cores of transformers.
  - d) State the reason for the transformer rating to be mentioned in kVA
  - e) Define an instrument transformer.
  - f) State any two application of pulse transformer.
  - g) State two applications of isolation transformer.

P.T.O.

2. Attempt any THREE of the following:

12

- a) Write the labels of numbers 1 to 11 of Figure No. 1 (any eight)

Note : No need to redraw the diagram.

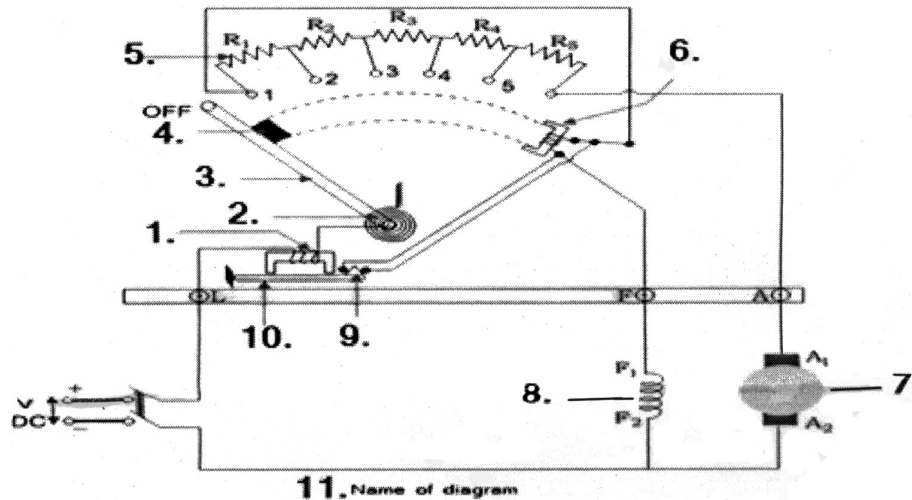


Fig. No. 1

- b) Draw schematic dia for DC shunt, DC series motor and DC compound motor.
- c) State different methods of speed control of DC shunt motor. Describe any one method.
- d) Explain the significance of back emf for proper working of the DC motors.

3. Attempt any THREE of the following:

12

- a) Explain the necessity of starter for DC motor. State various types of DC motor starter.
- b) A single phase transformer has 300 turns on its primary side and 750 turns on its secondary side, the maximum flux density in the core is  $1 \text{ Wb/m}^2$  and frequency is 50 Hz Calculate -  
 i) Cross sectional area of the core. If voltage/turn = 10V  
 ii) Total EMF induced in the secondary side.
- c) Explain with circuit diagram, the direct loading tests on single phase transformer. How the efficiency and regulation at given load condition is determined?
- d) Derive the emf equation of a transformer.

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

- a) Give any four selection criteria for:
  - i) Distribution transformer
  - ii) Power transformer
- b) List the condition for parallel operation of three phase transformer.
- c) Describe working of the single phase welding transformer with simple circuit diagram.
- d) In a no load test of a single phase transformer, The following test data was obtained :  
 $V_1 = 230V$ ,  $V_2 = 110V$ ,  $I_0 = 0.5A$ ,  
Input power = 30 watts.  
Find the following :
  - i) Turns ratio
  - ii) Magnetising current  $I_m$
  - iii)  $I_w$  Ironloss component
  - iv) Iron lossThe resistance of the primary winding is 0.6 ohm.
- e) Explain working of 3 phase autotransformer with the neat sketch. Write it's any two application.

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

- a) A 250V shunt motor on no load runs at 1000 rpm and takes 5 A. The total armature and shunt field resistance are respectively  $0.2 \Omega$  and  $250 \Omega$ . Calculate the speed when loaded and taking a current of 50A.
- b) Compare distribution transformer and power transformer.
- c) Give the specification of three phase transformer as per IS 1180 (part 1) 1989 (any six)

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

- a) Two 1-phase transformers A and B rated at 25KVA each are operated in parallel on both sides. Percentage impedance 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 500KVA at 0.8 p.f. lagging.
  - b) Explain the effect of Harmonics on the Transformer.
  - c) A 4 KVA, 230/115V, single phase, 50Hz transformer give the following results :  
O.S. Test : 230V, 1.5A, 100 W  
S.C. Test : 45V, 17.4A, 500 W  
Calculate the efficiency of the transformer at 0.8 p.f. lagging when the transformer is loaded.
    - i) 100%
    - ii) 150%
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