

# 314322

**12526**

**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 working principle of D.C. Generator.
- b) Give any two applications of –
- i) dc series motor
- ii) d.c. shunt motor
- c) State Fleming's Left hand rule used for d.c. motor.
- d) Draw the labelled circuit diagram of d.c. shunt motor.
- e) State the principle of operation of a transformer.
- f) State any two advantages of 3 ph. transformer over bank of the three single phase transformers.
- g) Draw schematic labelled diagram of step down transformer.

P.T.O.

2. Attempt any THREE of the following : 12
- Draw neat labelled diagram showing constructional parts of D.C. machine.
  - State different types of DC motors and draw a neat labelled diagram for each type of DC motor.
  - Derive the emf equation of transformer.
  - Compare core type and shell type transformer. (Any four points)
3. Attempt any THREE of the following : 12
- State the function of following parts of D.C. machine.
    - Yoke
    - Brush
    - Pole Shoe
    - Commutator
  - What is the back emf ? Also explain its significance in DC motor.
  - State the advantages of parallel operation of transformers.
  - Explain with circuit diagram the use of CT and PT for measurement of high current and high voltage.
4. Attempt any THREE of the following : 12
- Define armature torque and shaft torque of D.C. motor and State the factors on which torque developed in DC motor depends.
  - State different types of losses occurring in single phase transformer and explain them in brief.
  - A 3300/250 V, 50 Hz single phase transformer is built on a core having an effective cross sectional area of  $125\text{ cm}^2$  and 70 turns on the low voltage winding.  
Calculate –
    - The value of maximum flux density
    - Number of turns on the high voltage windings.

- d) Explain different connections of three phase transformers.
- e) Describe working of welding transformer with neat diagram.

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

- a) A 200 V, 4 pole lap wound, dc shunt motor has 800 conductors of armature winding. Armature and field winding resistances are 0.5 and 200 $\Omega$  respectively. The motor takes 18A and flux/pole is 30 mWb. Find speed and torque developed.
- b) State any four properties of an ideal transformer and draw phasor diagram for –
  - i) Ideal transformer
  - ii) Practical transformer on no load and on load conditions.
- c) A 500 kVA, 3 phase, 50 Hz transformer has a voltage ratio (line voltage) of 33/11/ KV and is Delta/Star connected. The resistance per phase are high voltage 40 $\Omega$  low voltage 0.876  $\Omega$  and iron loss is 3050 W. Calculate the value of efficiency at full load.

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

- a) DC series motor can not be started on no load. Justify the statement and draw the characteristics of dc series motor and explain why it is used in traction.
  - b) In open circuit test of single phase transformer the following test data was obtained. Primary voltage = 250 V, secondary voltage = 125 V, Primary current = 0.5 A and power input = 50 watts. Draw equivalent circuit of transformer under open circuit condition and calculate circuit components value.
  - c) Give any two advantages of open delta connection of 3- $\phi$  transformer and explain V–V connection of 3- $\phi$  transformer.
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