

22418

22223

3 Hours / 70 Marks

Seat No.

--	--	--	--	--	--	--	--

- 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 Fleming's Left Hand Rule.
 - b) State Working Principle of DC Motor.
 - c) Write Voltage Equation of DC Motor. State meaning of each term.
 - d) State losses in transformer.
 - e) A 3kVA 220/110 V transformer has 500 turns on it's primary. Find its transformation Ratio and Secondary Turns.
 - f) State any two applications of Single phase Auto-Transformer.
 - g) Give Technical specification of Isolation Transformer.

P.T.O.

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

- a) Draw a neat sketch of construction of DC Machine and Label the following components.
- i) Eye Bolt
 - ii) Yoke/Body
 - iii) Field Pole
 - iv) Field Winding
 - v) Pole Shoe
 - vi) Air Gap
 - vii) Armature winding
 - viii) Commutator and Brushes
- b) State types of DC motors and Draw a neat sketch of types of DC motor.
- c) The readings of direct loading test on a Single Phase Transformer are

Load	On primary side			On secondary side		
Condition	V_1	I_1	W_1	V_2	I_2	W_2
No Load	220	0.7	40	102	0	0
Full Load	220	4.45	960	98	8.8	862.4

Find efficiency and Regulation at a given load condition.

- d) Draw the equivalent circuit of transformer. State the meaning of each term related to it.

3. Attempt any THREE of the following: 12

- a) Derive EMF equation of DC Generator.
- b) Distinguish between core type and shell type transformer on the basis of following points
 - i) Figure
 - ii) Winding
 - iii) Window
 - iv) limb
 - v) Mechanical Protection
 - vi) Cooling
 - vii) Repair
 - viii) Magnetic Circuit
- c) A 5kVA, 230/110V, 1- ϕ Transformer is operating at Full load condition. Determine primary and secondary current I_1 , I_2 and secondary turns N_2 ; if primary winding is having 80 Turns.
- d) Derive EMF equation of Transformer.

4. Attempt any THREE of the following: 12

- a) Describe Bank of 3 - single phase transformer with neat labelled diagram. State its advantages and disadvantages.
- b) Distinguish between power transformer and distribution transformer on the basis of -
 - i) Use
 - ii) Typical Voltage
 - iii) Power Rating
 - iv) Load
 - v) Insulation Level
 - vi) Flux Density
 - vii) Maximum Efficiency
 - viii) Turns Ratio

- c) Explain need of parallel operation of 3- ϕ transformer. Also state condition of parallel operation.
- d) A 100kVA transformer has iron loss of 2kW and full load Copper loss 1kW. Calculate the efficiency of transformer at
 - i) F. L. Unity P.F.
 - ii) H. L. Unity P.F.
- e) Explain with circuit diagram use of C.T. to measure high value current in a line.

5. Attempt any TWO of the following:

12

- a) A 230V DC shunt motor has field resistance of 230Ω and Armature resistance of 0.25Ω , running at 1500 RPM taking 20A from supply. Calculate Back emf in armature of motor.
- b) List the selection Criteria for distribution transformer as per IS10028 : Part I : 1985
- c) Find the all-Day efficiency of 500kVA distribution transformer whose Cu-losses and Iron loss at full load are 4.5kW and 3.5kW resp. During a day of 24 Hrs. it is loaded as under

No. of Hours	Loading (kW)	Power factor
06	400	0.8
10	300	0.75
04	100	0.8
04	0	– 0 –

6. Attempt any TWO of the following:

12

- a) Explain with the help of neat sketch “Brake test of DC shunt motor.” State its advantages and disadvantages.
- b) Draw a neat labelled diagram of construction of 3- ϕ amorphous transformer. State material and function of each part.
- c) Explain K-Factor transformers. State its significance. Also write effect due to harmonics and overheating due to non-linear load.