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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) Define : (i) Magnetomotive force

(ii) Permeability

(b) State any two advantages of AC over DC.

(c) Draw three phase voltage waveform of AC supply with respect to time.

(d) Define : (i) Transformation ratio

(ii) Voltage ratio

(e) Write any two applications of DC Shunt motor and DC Series motor.

(f) Give classification of 1 ϕ induction motor.

(g) List the types of fuses.

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

(a) Compare Electric circuit and Magnetic circuit. (any four points)

(b) Define following terms :

(i) Instantaneous Value

(ii) Frequency

(iii) Time Period

(iv) Amplitude

(c) State advantages of 3 ϕ supply over 1 ϕ supply.

(d) Draw schematic diagram for :

(i) DC Shunt motor

(ii) DC Series motor

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

(a) State Fleming's Right Hand Rule and Lenz's law for deciding the direction of induced emf.

(b) For pure inductive circuit :

(i) Draw circuit diagram

(ii) Phasor diagram

(iii) Write equation for voltage and current.

(iv) State relation between voltage and current.

(c) Compare two winding transformer with auto-transformer. (any two points)

(d) With neat construction explain working principle of linear induction motor, also state any two applications of it.

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

(a) An iron ring 15 cm in diameter and 10 cm^2 in cross-sectional area is wound with 300 turns for a flux density of 1 Wb/m^2 and permeability of 500 find :

(i) Reluctance of the iron ring

(ii) Flux in ring

(iii) mmf required for iron ring

(iv) Exciting Current

(b) With the help of construction, explain working principle of isolation transformer.

(c) State working principle of Universal motor with neat diagram, also state how its direction of rotation reversed.

(d) What is stepper motor ? State its any two applications.

(e) Write two applications for each :

(i) MCB

(ii) MCCB

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

(a) An alternating current is represented by $i = 70 \sin (520t + \pi/3)$. Determine :

(i) Frequency (ii) Time period (iii) Angular frequency (iv) Phase angle (v) R.M.S. value of current (vi) Average value of current

(b) Draw schematic diagram and write any two applications of following :

(i) Split phase Induction motor

(ii) Capacitor Start Capacitor Run motor

(c) State need of earthing. Explain any one type of earthing with neat diagram.

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

(a) Three similar coils each of resistance 15 Ω and inductance of 0.1 H connected in Delta to a 3 ϕ, 440 V, 50 Hz AC supply : Calculate :

(i) Phase Current (ii) Line Current

(iii) Phase Voltage (iv) Line Voltage

(v) Power Factor (vi) Active Power

(b) With neat sketch, explain the working of ELCB. Write its any two applications.

(c) Draw the construction diagram of DC motor and also state the function of the following parts :

(i) Yoke

(ii) Field Winding

(iii) Brushes
