

17318

11819

3 Hours / 100 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) 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) Define terms frequency & time period related to A.C. quantity.
- (b) Draw the waveform of voltage & current of purely capacitive circuit.
- (c) Draw the waveform of 3 ϕ a.c.-supply.
- (d) Define phase sequence.
- (e) State Faraday's law of electromagnetic induction.
- (f) Define dynamically induced emf & statically induced emf.
- (g) State the working principle of transformer.
- (h) Define kVA rating of a transformer.

- (i) What changes should be done in supply system in order to reverse the direction of rotation of 3 ϕ I.M.
- (j) Define synchronous speed. Which speed is greater synchronous speed or slip speed ?
- (k) Draw the voltage and current waveform for following equation $i = 200 \sin (314 t + \pi/4)$. Also find I_m & phase angle.
- (l) List any two applications of stepper motor & servo motor.
- (m) What is the role of centrifugal switch in split phase motors ?
- (n) State the need of fuse.

2. Attempt any FOUR of the following :

16

- (a) Explain the concept of lagging & leading by waveform & mathematical equation in ac circuits.
- (b) Draw a circuit diagram for series R-L circuit. Also draw vector diagram & waveforms & write down expression for impedance.
- (c) If a.c. current is represented by equation $i = 25 \sin (314t)$. Calculate rms value, average value, frequency & time period of current.
- (d) A circuit consist of a resistance of 4 Ω & inductance of 0.5 H & variable capacitance in series across a 100 V, 50 Hz supply. Calculate 1. value of capacitance to produce resonance 2. voltage across capacitor 3. the Q-factor of the circuit.
- (e) Equation for current and voltage in a circuit are given by $V=v_m \sin \omega t$ $i = I_m \sin (\omega t + 60)$. State what type of circuit it is ? Draw waveform of voltage & current & power in the circuit.
- (f) What is power factor ? State its significance. What is condition for unity power factor ?

3. Attempt any FOUR of the following :

16

- (a) A coil of resistance 10Ω & inductance 0.1 H is connected in series. Calculate :
- (i) impedance (ii) current
- (iii) power factor (iv) power consumed
- (b) For the fig. 1 shown below.

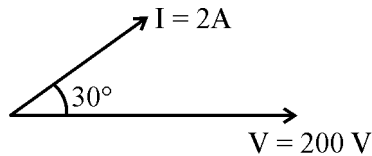


Fig. 1

Find : (i) impedance (ii) nature of circuit (iii) power consumed.

- (c) Three impedances of $(8 + j6) \Omega$ each are connected in star to 3 ϕ , 440 50 Hz balance a.c. supply. Calculate line & phase values of voltage & currents, & power consumed.
- (d) What is phase sequence ? What is its physical significance ?
- (e) State and explain Fleming's Right hand rule & Lenz's law for deciding the direction induced emf.
- (f) State the advantages of AC over DC.

4. Attempt any FOUR of the following :

16

- (a) Compare electric circuit & magnetic circuit on any four points.
- (b) State the advantages of 3 phase system over 1 phase system.
- (c) State specification of isolation transformer, power transformer, pulse transformer & R.F. transformer.
- (d) A $3300 / 200 \text{ V}$, 100 kVA , 1ϕ transformer has 80 turns on secondary winding, calculate full load current in both the windings, flux & primary turns.
- (e) What are the various types of losses in transformer and explain.
- (f) Define regulation & efficiency of transformer. Which transformer will be said to be quality transformer :
- (i) transformer regulation 2% or 4%.
- (ii) transformer efficiency 89% or 92%

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

- (a) Explain working principle of 3 ϕ I.M.
- (b) Compare auto-transformer & two winding transformer.
- (c) Explain the effect of change in rotor resistance on starting torque & maximum torque of induction motor.
- (d) Give the various types of speed control methods of 3 ϕ I.M. and explain any two methods.
- (e) Explain the necessity of starter in induction motor. State any four starters used in 3 ϕ I.M.
- (f) What is the value of slip when 3 ϕ I.M. is in (1) stand still position (2) runs with synchronous speed ? Why 3 ϕ I.M. stops when it is made to run at synchronous speed ?

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

- (a) Explain working of stepper motor with neat diagram.
 - (b) Draw circuit diagram of 1 ϕ resistance split phase induction motor & explain its working.
 - (c) Which type of single phase induction motor is used in domestic ceiling fans, why ?
 - (d) Draw a neat diagram of AC servo motor and give its operation.
 - (e) Explain the necessity of earthing.
 - (f) What is MCCB, ELCB, Megger ? Is fuse is necessary in wiring even if MCB or MCCB is connected ?
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