



17318

15162

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) *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 ten :

20

- a) Define w.r.t. sinusoidal a.c. cycle
 - i) waveform
 - ii) instantaneous value
- b) What are the advantages of AC over DC any two ?
- c) Draw the voltage waveform of three phase AC supply for 0 to 2π .
- d) Draw the vector diagram and impedance triangle for R.C series circuit.
- e) Give any two application of squirrel cage induction motor.
- f) State E.M.F. equation of transformer and write meaning of each term in the formula.
- g) State Faraday's law of electromagnetic induction.
- h) State two application of permanent capacitor induction motor.
 - i) List any four safety tools used in electrical work shop.
 - j) Define phase sequence in three phase AC supply.
- k) Draw only neat sketch of core type and shell type transformer.
 - l) Why should a transformer be never connected to DC supply.
- m) List speed control methods for three phase I.M.
- n) Write the equation of V and I in pure capacitive circuit.

P.T.O.



2. Attempt any four :

16

- a) Draw the waveform and phasor diagram for current and voltage when AC flows through a pure inductive circuit and write the equation for V and I.
- b) An alternating current is represented by $i = 70.7 \sin 520t$. Determine :
 - i) Frequency
 - ii) I_{RMS}
 - iii) I_{Avg}
 - iv) Find the current at $t = 0.0015$ sec. after passing through zero and increasing positively.
- c) Explain with diagram how megger is used as earth tester.
- d) Define :
 - i) Zero phase difference
 - ii) Leading phase difference
 - iii) Lagging phase difference
 - iv) Active power.
- e) Balanced star connected load supplied from three phase 415 V, 50 Hz system, current in each phase is $20 \angle -30^\circ$, 30° being w.r.t phase voltage. Determine
 - i) V_{ph}
 - ii) I_L
 - iii) $\cos \phi$
 - iv) Power
- f) Compare squirrel cage motor with slip ring three phase I.M. (any four points).

3. Attempt any four :

16

- a) Why transformer rating in terms of KVA not in kW ?
- b) State any two application of each
 - i) Auto transformer
 - ii) Intermediate frequency transformer.
- c) What are the different types of power in AC circuit ? State its formula.
- d) Draw neat sketch and write working principle of slip ring I.M.
- e) Compare single phase and three phase system (Any 4 points).
- f) Draw the voltage phasor diagram of R-L-C series circuit when
 - i) $V_L > V_C$
 - ii) $V_L < V_C$

4. Attempt any four :

16

- a) What are the different ways of interconnection phase in a three phase system ? Why is it required ?
- b) A coil of resistance 15Ω and inductance of 0.05 H connected in series with $100 \mu F$ capacitor across 230 V, 50 Hz ac supply find
 - i) Current
 - ii) Power factor of circuit
 - iii) Voltage drop across coil
 - iv) Voltage across capacitor
- c) Define :
 - i) Dynamically induced emf and
 - ii) Statically induced emf.



- d) Explain the process of generation of single phase AC by elementary generator.
- e) What is auto transformer ? Write any three application of auto transformer.
- f) Define :
 - i) Slip
 - ii) Rotor frequency
 - iii) Synchronous
 - iv) Slip speed

5. Attempt any four :**16**

- a) Name various type of statically induced emf. Give the mathematical equation for energy stored in magnetic field.
- b) For AC sinusoidal waveform define
 - i) Cycle
 - ii) Frequency
 - iii) Phase
 - iv) Amplitude.
- c) $v = 150 \sin (314t)$ and $i = 10 \sin \left(314t + \frac{\pi}{4} \right)$ find circuit component connected in series.
- d) Draw torque-speed characteristic of three phase IM and explain it.
- e) Explain the working principle of AC servo motor and state its any two applications.
- f) Give any two applications of following motors
 - i) Universal motor
 - ii) Stepper motor

6. Attempt any four :**16**

- a) Three identical coils each of impedances $(4.2 + j 5.6) \Omega$ are connected in delta across 415 V, 50 Hz three phase power supply. Determine
 - i) V_{ph}
 - ii) I_{ph}
 - iii) Power factor
 - iv) Power absorbed by each coil
 - b) A 20 KVA, 3300/240 V, 50 Hz single phase transformer has 80 turns on secondary winding. Calculate numbers of primary turns, full load primary and secondary currents and maximum value of flux in the core.
 - c) Differentiate between core type and shell type transformer (any four points).
 - d) State an electric motors suitable for
 - i) Table fan
 - ii) Blowers
 - iii) Washing machine
 - iv) Centrifugal pumps.
 - e) List the different types of single phase I.M. Draw neat sketch for any one.
 - f) State the type of earthing. Draw schematic diagram of plate earthing.
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