

17318

21819

3 Hours / 100 Marks

Seat No.

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- Instructions* –
- (1) All Questions are *Compulsory*.
 - (2) Illustrate your answers with neat sketches wherever necessary.
 - (3) Figures to the right indicate full marks.
 - (4) Assume suitable data, if necessary.
 - (5) Use of Non-programmable Electronic Pocket Calculator is permissible.
 - (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) State any two differences between AC and DC quantity.
 - b) Define w.r.t sinusoidal a.c cycle:
 - (i) Amplitude
 - (ii) Time period
 - c) State any two advantages of 3 phase supply system over single phase supply system.
 - d) State the meaning of the term phase difference connected across Ac supply.
 - e) List the speed control methods for 3- phase induction motors.
 - f) Draw neat constructional sketch of shell type transformer.
 - g) State Flemings right hand rule.

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- h) State any two applications of squirrel cage induction motor.
- i) State the two types of earthing.
- j) Draw a 3 phase star connected supply system.
- k) Enlist two losses that occur in a transformer.
- l) State condition for maximum efficiency of a transformer.
- m) Define w.r.t three phase induction motor:
 - (i) Synchronous speed
 - (ii) Slip
- n) For $V = 50 \sin \omega t$ and $i = 5 \sin (\omega t - \phi)$ represent the equations using phasor diagram.

2. Attempt any **FOUR** of the following:

16

- a) Draw waveform and phasor diagram for current and voltage when AC flows through a pure capacitive circuit.
- b) A coil having a resistance of 4.5Ω and inductance of 0.03 henry is connected across 230 V , 50 Hz , I-phase supply mains. Find current taken by the coil.
- c) Describe the safety tools in order to avoid shocks.
- d) Define:
 - (i) Active power
 - (ii) Reactive power
 - (iii) Apparent power
 - (iv) Power factor
- e) Three resistances each of 20Ω are connected in delta across a 3 phase 440 V , 50 Hz supply. Calculate the phase current, line current and active power in the circuit.
- f) Draw and explain torque speed characteristics of induction motor.

- 3. Attempt any FOUR of the following:** **16**
- a) Differentiate between two winding transformer and autotransformer with four points.
 - b) A 2000/200 V, 1 ϕ 50 Hz transformer has the maximum flux density of 20 mWb. Find the number of turns on the primary and secondary windings if cross sectional area of the core is 1.1 cm².
 - c) An alternating voltage is expressed as $e = 200 \sin 314.16t$. Find:
 - (i) Rms value
 - (ii) Maximum value
 - (iii) Frequency
 - (iv) Value of voltage after 5 m sec
 - d) State necessity of starter in induction motor.
 - e) State the principle of three phase e.m.f generation and sketch three phase voltage waveform.
 - f) An ac circuit draws a current of 0.5 Amp At 0.707 pf lag from 230 V, 50 Hz ac supply. Find an impedance, resistance, inductive reactance and power in the circuit.
- 4. Attempt any FOUR of the following:** **16**
- a) State the relation between line current and phase current line voltage and phase voltage of star connected system.
 - b) For R-C circuit:
 - (i) Draw the circuit diagram
 - (ii) Write the voltage and current equations
 - (iii) Draw the vector diagram
 - (iv) Draw the impedance triangle.
 - c) State Faraday's law of electromagnetic induction and write the expression for the induced emf.
 - d) With suitable example state equation and sketch vector diagram of R-L-C series circuit.

- e) Define:
 - (i) Efficiency
 - (ii) Voltage regulation of a transformer.
- f) Describe constructional details of slip ring induction motor.

5. Attempt any FOUR of the following: 16

- a) Give difference between dynamically induced emf and statistically induced emf with four points.
- b) Define w.r.t ac circuit:
 - (i) Average value
 - (ii) Rms value
 - (iii) Form factor
 - (iv) Peak factor
- c) For pure inductor circuit calculate reactance if inductance value is 10 mH and frequency is 100 Hz
- d) Draw constructional sketch of squirrel cage induction motor.
- e) State the types of single phase induction motor and explain any one with neat diagram.
- f) State four applications of AC servo motors.

6. Attempt any FOUR of the following: 16

- a) Three impedances of $(6 + 4j)$ ohms each are connected in star to 3 phases 440 V, 50 Hz balance a.c supply. Calculate line voltage, phase voltage, line current phase current.
 - b) A transformer does not operate on dc supply. State reason.
 - c) A 63 kVA, 4401/220 V transformer is supplying a current of 20 A at a power factor of 0.8 lagging. Find secondary current flux current, primary turns, secondary turns.
 - d) Give comparison of polyphase induction motor on any four points.
 - e) List out speed control methods of three phase induction motor. Explain any one.
 - f) Describe the principle of operation of a megger.
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