16172

3 Hours / 100 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.

(8) Use of steam tables, logarithmic, Mollier's chart is permitted.

Marks

1. Attempt any TEN of the following : **20**

(a) Define (i) Form factor (ii) Peak factor.

(b) Draw the waveforms of voltage and current of pure capacitive circuit.

(c) Define phase sequence in 3-phase ac supply.

(d) Define the bandwidth of a series resonant circuit and give expression of the same.

(e) Draw Torque – Slip characteristics of induction motor.

(f) State specification and two applications of Isolation transformer.

(g) State Fleming's Right Hand Rule.

(h) State an electric motor suitable for table fan.

(i) Give classification of types of wires used in electrical installation.

(j) Give any two differences between AC and DC quantity.

(k) List the factors considered for selection of intermediate frequency transformer.

(l) Draw neat constructional sketch of auto transformer.

(m) List the speed control methods of 3-phase induction motors.

(n) Alternating current is given by $i = 28.28 \sin (2\pi 50 \times t)$ Find R.M.S. value of current.

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

(a) Equations for current and voltage in a circuit are given by :

$V = V_m \sin \omega t$

$i = I_m \sin (\omega t + 90°)$

State what type of circuit is it ? Draw waveforms of voltage, current and power for the circuit.

(b) Explain why 1-ϕ I.M. (induction motors) do not have starting torque.

(c) Explain the necessity of earthing.

(d) Define and explain the meaning of Q-factor and give expression for Q-factor in RLC series circuit.

(e) A delta connected balanced load has impedance of $(3 + j\ 4)\ \Omega$ connected to a 230 V, 3ϕ, 50 Hz A.C. supply. Calculate value of line and phase currents line and phase voltages, power consumed by each impedance and total power consumed.

(f) Draw Torque-Speed characteristics of 3ϕ induction motor and explain.

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

(a) Differentiate between core type and shell type transformer.

(b) Explain the working principle of a single phase transformer.

(c) State the necessity of starter in case of three phase induction motor.

(d) Draw the schematic representation of split phase induction motor. State its applications.

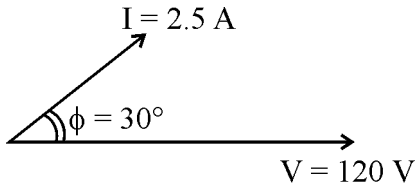
(e) Draw a 3-phase star connected supply system and state the relation between V_{ph} and V_L, I_{ph} and I_L. State an expression to determine power in the circuit.

(f) Explain the phenomenon of resonance in R-L-C series circuit.

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

(a) State four advantages of polyphase circuits over single phase circuits.

(b) For a phasor diagram shown in Fig., find (i) Impedance (ii) Power factor (iii) Total power (iv) Values of components connected in series. Assume f = 50 Hz.



(c) Compare statically induced emf to dynamically induced emf.

(d) State different types of powers in Electrical Circuit. Draw power triangle and write units for each power.

(e) Explain the concept of lagging and leading of I or V by waveform and mathematical equation in AC circuit.

(f) Compare universal motor with servomotor on the basis of (1) Construction (2) Size (3) Cost (4) Torque developed (5) Application.

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

(a) What are the different ways of interconnection of phases in a 3-phase system ? Why is it required ?

(b) Define efficiency and % voltage regulation of a transformer.

(c) State and explain Faraday's laws of electromagnetic induction and its two applications in electrical engineering.

(d) Why transformer rating is given in terms of kVA and not in kW ?

(e) Explain the working of A.C. servo motor with a neat diagram.

(f) For a R-C circuit

(i) Draw circuit diagram

(ii) Write voltage and current equations

(iii) Draw vector diagram

(iv) Draw impedance triangle

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

(a) Compare squirrel cage induction motor and slipring induction motor.

(b) State and explain Fleming's Right hand rule.

(c) Define synchronous speed, slip and rotor frequency.

(d) Explain working of 3 ph induction motor.

(e) What is power factor ? State its significance.

(f) Explain the necessity of earthing and state any four safety precautions while working with electrical system.
