

17318

16117

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 the meaning of the term phase difference.
- (b) Define crest factor and form factor, state its value.
- (c) Define RMS value of an electrical quantity.
- (d) State the meaning of Impedance and Impedance triangle.
- (e) Draw the voltage waveform of a 3 phase supply with respect to time.
- (f) State the concept of phase sequence.
- (g) What is meant by 3 phase balanced and unbalanced load ?
- (h) State Faraday's law of electromagnetic induction.
- (i) State two applications of "Power transforms".
- (j) Define transformation ratio of transformer.
- (k) Define (i) slip (ii) slip speed.
- (l) Write any four applications of 3 phase slip ring induction motor.
- (m) State the types of single phase induction motor.
- (n) State the types of Earthing.

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

- (a) Write any four advantages of “AC” over “DC” supply.
- (b) Define each of the following terms :
 - (i) Frequency
 - (ii) Time period
 - (iii) Amplitude
 - (iv) Cycle
- (c) What is power factor ? State its significance. What is the condition for unity power factor ?
- (d) Draw the schematic diagram of AC flowing through pure inductance. Write the expression for voltage and current. Draw phasor diagram.
- (e) Draw a star connected 3 phase load and show line voltages and phase voltages on it. Also write the relation between line and phase values of voltage and current.
- (f) Compare Star and Delta connected system. (any four points)

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

- (a) Define quality factor and bandwidth of a series resonant circuit and give expression of the same.
- (b) An alternating current is represented by
 $i = 70.7 \sin 520 t$, determine its
 - (i) Frequency
 - (ii) RMS value of current
 - (iii) Average value of current
 - (iv) Find the current at 0.0015 sec. after passing through zero and increasing positively.
- (c) Three impedances of $(8 + j6)$ ohms each are connected in star to 3 phase, 440 V, 50 Hz balance a.c. supply. Calculate line voltage, phase voltage, line current, phase current, power, power factor.
- (d) State Fleming’s Right hand rule.
- (e) Give the classification of transformer based on construction.
- (f) Draw the speed-torque characteristics of 3 phase induction motor and explain the same.

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

- (a) A series R-L circuit takes a current of 2.7A when connected to 240 V, 50 Hz, ac supply and consumes 350 watts. Calculate resistance, inductance, impedance and power factor.
- (b) Explain the generation of alternating voltage and alternating currents with the help of suitable diagram.
- (c) Explain :
 - (i) Dynamically induced emf
 - (ii) Statically induced emf
- (d) Compare electric and magnetic circuit on any four points.
- (e) A 3 kVA, 230 V/115 V, 50 Hz, 1 ϕ transformer has following losses :
constant loss = 100 watts, variable loss = 350 watts
Calculate full load efficiency at 0.8 p.f. lagging
- (f) Explain V/F speed control method of 3 phase induction motor.

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

- (a) State the different types of power in A.C circuit. Write the expression and units for the same.
- (b) What is kVA rating of transformer ? Why transformer rating is in kVA ?
- (c) Compare two winding transformer with auto transformer. (any 4 points)
- (d) What will happen if transformer is connected to D.C. supply ?
- (e) A 3300/200 V, 100 kVA, single phase transformer has 80 turns on secondary winding. Calculate current in both winding, flux and primary turns.
- (f) Explain in brief the working principle of 3 phase induction motor.

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

- (a) Explain the necessity of starter in 3 phase induction motor.
 - (b) Explain with neat sketch working of universal motor.
 - (c) Why single phase motors are not self starting ? How is it made self starting ?
 - (d) Draw neat sketch and write working principle of shaded pole 1 ϕ motor.
 - (e) Define : (i) Minimum fusing current (ii) fusing factor
 - (f) Write any four safety precautions while working with electrical system.
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