



17318

21415

3 Hours/100 Marks

Seat No.

--	--	--	--	--	--	--	--	--	--

- 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. A) Attempt **any six** of the following :

12

- a) Define crest factor for a sine wave. State its value.
- b) State the meaning of phase of an alternating quantity.
- c) State the concept of phase sequence.
- d) State the Fleming's Right Hand Rule.
- e) State the Faraday's law of electromagnetic induction.
- f) Define synchronous speed and slip in cage of induction motor.
- g) State the types of three-phase induction motor.
- h) State the types of earthing.

B) Attempt **any two** of the following :

8

- a) What are the advantages of A.C. over d.c. quantity ?
- b) Explain working of 3-phase induction motor.
- c) What is Stepper Motor ? State its any two applications.

P.T.O.



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

a) Define each of the following terms of A.C. voltage :

- i) Frequency
- ii) Time period
- iii) Amplitude
- iv) RMS value.

b) Represent the following circuit current graphically :

$$I_1 = I_m \sin \omega t, I_2 = I_m \sin(\omega t - 60), I_3 = I_m \sin(\omega t + 60).$$

c) What are the advantages of 3 phase system over 1 phase system ?

d) Define balanced load and unbalanced load. Show the same diagrammatically.

e) Draw a delta connection for three-phase power supply and show line current, line voltage, phase current and phase voltage on it and state the relation between currents and voltages. (Phase values and line values).

f) Compare two winding transformer with auto-transformer (any four points).

3. Attempt **any four** of the following :

16

a) Explain the generation of alternating voltages and alternating currents with the help of suitable diagram.

b) Three resistances of 25Ω each are connected in delta across 3-phase, 400 V, 50 Hz AC supply. Find

- i) Phase current
- ii) Line current
- iii) Phase voltage
- iv) Total active power.

c) State Lenz's law. Write the equation of energy stored in magnetic field and meaning of each term.

d) Define the following terms :

- i) Induced emf
- ii) Dynamically induced emf
- iii) Statically induced emf.

e) Explain the working principle of single phase transformer.

f) Justify why the rating of transformer is given in KVA and not in KW.



MARKS

4. Attempt **any four** of the following :

16

- a) An alternating current is represented by $i = 70.7 \sin 520 t$ determine
 - i) frequency
 - ii) rms value of current
 - iii) average value of current and
 - iv) find the current at 0.0015 seconds after passing through zero and increasing positively.
- b) State the meaning of impedance and impedance triangle.
- c) Define voltage regulation of transformer. Two transformers A and B have a voltage regulation of 10% and 20% respectively. Which transformer is better and why ?
- d) Compare three phase squirrel cage induction motor and slip ring induction motor based on starting torque, starting current, power factor and maintenance cost.
- e) Explain the torque-speed characteristics of three-phase induction motor.
- f) State the principle of operation of an universal motor. Give any two applications.

5. Attempt **any four** of the following:

16

- a) Draw the schematic diagram of AC flowing through pure inductance. Write the expression for voltage and current. Also draw the waveforms and write expression for power.
- b) A coil consists of 0.08 H inductance with resistance 40 ohm connected to 230 V, 50 Hz supply. Find impedance, reactance, current and power factor.
- c) A single phase transformer has 350 primary and 1050 secondary turns. The net cross-sectional area of core is 55 cm^2 . If primary winding is connected to a 400 V, 50 Hz, 1-phase supply. Calculate
 - i) Maximum value of flux density in the core.
 - ii) Voltage induced in the secondary.
- d) Explain any one method of speed control of S-phase induction motor.
- e) Explain the operation of A.C. servo motor and state its application.
- f) Compare resistance split phase induction motor with capacitor start motor.



6. Attempt **any four** of the following :

- a) An alternating voltage is expressed as $e = 200 \sin 314.16 t$ find
 - i) Rms value
 - ii) Maximum value
 - iii) Frequency
 - iv) Value of voltage after 5 m sec.
 - b) State specifications and two applications of isolation transformer and radio-frequency transformer.
 - c) Explain how direction of rotation of rotor is reversed in 3-phase induction motor.
 - d) Draw and explain capacitor start, capacitor run motor.
 - e) Define fuse. State the necessity of fuse. Write rating of fuses used in labs and mention the classification of fuses.
 - f) Explain why an electrical equipment is earthed.
-