

# 17404

16117

**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) 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) Define:
  - (i) maximum value
  - (ii) RMS value of ac supply
- b) State one application for each of PMMC and MI meters.
- c) State one application of clip on meter.
- d) State two applications of d.c. shunt motor.
- e) State the transformation ratio.
- f) State principle of transformer.
- g) Define slip of induction motor.
- h) State principle of energy conservation.
- i) Name any two safety tools used in industry for electrical wiring.

P.T.O.

- j) State how direction of 3 (three) phase induction motor can be reversed.
- k) State classification of single phase induction motor.
- l) State any two factors for selection of motors as drive.

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

16

- a) Define the terms related to a.c. supply
  - (i) cycle
  - (ii) frequency
  - (iii) period
  - (iv) amplitude
- b) Calculate
  - (i) reactance
  - (ii) impedance
  - (iii) current
  - (iv) phase angle

for the circuit shown below (Refer Figure No.1)

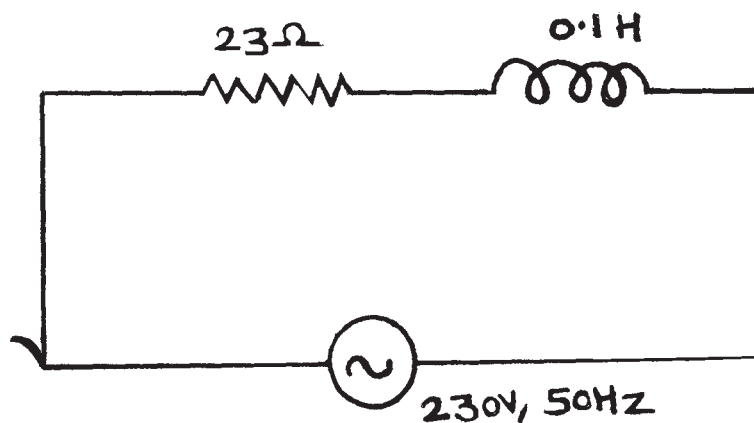


Fig. No. 1

- c) The current flowing in a circuit is  $i = 28.28 \sin \left( 314t - \frac{\pi}{6} \right)$   
Calculate:
- (i) amplitude
  - (ii) rms current
  - (iii) frequency
  - (iv) phase difference
- d) Draw a neat single line diagram of electrical power system.
- e) State any four advantages of 3 phase system over single phase system.
- f) Draw a neat labelled diagram of PMMC meter.

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

**16**

- a) Draw speed torque curve of d.c. series motor. Also state its two applications.
- b) Derive the equation of induced emf in a transformer.
- c) Draw a neat labelled diagram of autotransformer and state its any two applications.
- d) A coil having resistance  $6\Omega$  and reactance  $8\Omega$  is connected across 230V, 50Hz a.c. supply. Calculate
  - (i) inductance
  - (ii) impedance
  - (iii) current
  - (iv) active power
- e) An alternating current is given by equation  $i = 10\sqrt{2} \sin 314t$ . Calculate:
  - (i) Average value
  - (ii) instantaneous value of  $i$  at  $t = 5$  milisec.
- f) Draw an experimental set up for direct loading of single phase, 230/115v, 50Hz, 1KVA transformer with proper ranges of meters.

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

- a) Define efficiency and voltage regulation of a transformer. Also state their formulae.
- b) State two applications of each:
  - (i) Universal motor
  - (ii) Stepper motor
- c) Draw block diagram of variable frequency drive (VFD) for speed control of three phase induction motor.
- d) State types of enclosures of electric drives.
- e) Draw a neat labelled circuit diagram of 'Direct on-line' starter of three phase induction motor.
- f) State working principle of universal motor with the help of diagram.

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

- a) State working principle and applications of servo motor.
- b) Draw a circuit diagram of star-delta starter for three phase induction motor.
- c) State different types of electric welding methods. State working principle of any one method.
- d) A three phase, four pole, 50Hz induction motor runs at 1440 rpm at full load. Calculate slip and rotor current frequency.
- e) State which electric motors are generally used in electro agro system with reasons.
- f) Suggest electric motors for
  - (i) traction
  - (ii) crane
  - (iii) lathe machine
  - (iv) domestic fan

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

- a) State advantages of electric heating over other types of heating methods. (Any four advantages).
  - b) State necessity of earthing.
  - c) State types of tariffs and describe any one of them.
  - d) State functions of
    - (i) MCB
    - (ii) ELCB
    - (iii) Fuse
    - (iv) Switch
  - e) With proper reason suggest type of enclosure for electric drives used in coal mines.
  - f) Describe any one fire extinguishing method.
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