**24225**

**3 Hours / 70 Marks**     Seat No.

**Instructions :**
(1) All Questions are *compulsory.*

(2) Answer each Section on separate answer sheet.

(3) Answer each next main Question on a new page.

(4) Illustrate your answers with neat sketches wherever necessary.

(5) Figures to the right indicate full marks.

(6) Assume suitable data, if necessary.

**Marks**

## SECTION - I

**1.** **Attempt any SIX of the following :**                              **12**

(a) Define (i) Potential difference (ii) Permeability.

(b) Define average value & RMS value. Give its mathematical formula.

(c) State the Faraday's law of electromagnetic induction.

(d) Draw B-H curve.

(e) State the types of transformer.

(f) Define transformation ratio of transformer. Give its mathematical formula.

(g) Give the applications of single phase motor. (any four)

**2.** **Attempt any THREE of the following :**                            **12**

(a) Explain the working of Autotransformer.

(b) Compare star connected system & delta connected system.

(c)  A capacitor of capacitance 100 µF is connected in series with resistor of resistance 20 Ω. If the combination is connected across 200 V, 50 Hz AC supply, calculate - (i) Impedance of circuit (ii) Current in the circuit.



R = 20 Ω     C = 100 µF

I

200 V, 50 Hz
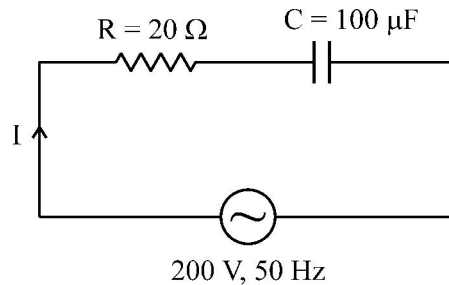
(d)  Explain the construction & working of single phase AC motor.

**3.  Attempt any TWO of the following :**                                **12**

(a)  Derive the EMF equation of single phase transformer. State the applications of single phase transformer.

(b)  Derive the equations of self inductance & mutual inductance.

(c)  A sinusoidal voltage with equation V = 173 sin (314 t – 30°) Volt is applied to load. Calculate –

    (i)    Maximum voltage

    (ii)   RMS voltage

    (iii)  Frequency

    (iv)  Time period

    (v)   Phase

    (vi)  Angular frequency

**SECTION - II**

**4.  Attempt any FIVE of the following :**                               **10**

(a)  Give the examples of Active components & Passive components.

(b)  Compare analog IC & digital IC.

(c)     Draw a symbol of capacitor & inductor.

(d)     Define rectifier. State the types of rectifier.

(e)     Compare PN junction diode & Zener diode.

(f)     State the operating regions of transistor.

**5.     Attempt any THREE of the following :**                                    **12**

(a)     Draw the following signals and explain the parameters of each signal :

(i)     Sinusoidal signal

(ii)    Square

(b)     Compare half-wave rectifier, full-wave centre tap rectifier & bridge rectifier.
        (4 points)

(c)     Draw & explain V-I characteristics of zener diode.

(d)     Explain transistor as a switch with circuit diagram.

**6.     Attempt any TWO of the following :**                                      **12**

(a)     Calculate values of resistor using following colour codes :

(i)     orange orange brown gold

(ii)    brown black green gold

(iii)   yellow violet yellow silver

(b)     Draw a circuit diagram of bridge rectifier with capacitor filter and explain its
        operation with waveforms.

(c)     (i)     Define $\alpha$ & $\beta$ of transistor. Derive the relation between $\alpha$ & $\beta$.

        (ii)    Draw output characteristics of BJT in Common Emitter (CE)
                configuration & show all the operating regions.

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