22225

**12223**

**3 Hours / 70 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.

**Marks**

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

(a) Define Active and Passive Components.

(b) Draw V-I characteristics of an ideal P-N junction diode.

(c) Define Rectifier. List the types of Rectifiers.

(d) Define $\alpha$ and $\beta$ of Transistor.

(e) Define transducers and name any two active transducers.

(f) Draw constructional diagram of a photodiode.

(g) State two advantages of Integrated circuits.

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

   (a) List the types of signals. State the expression for frequency f and wavelength λ, of an A.C. signal.

   (b) Derive the relationship between α and β of transistor.

   (c) State and explain the operating principle of P-N junction diode under forward bias condition.

   (d) Draw the construction of Cup Type LED. List any two applications of it.

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

   (a) Compare FET and BJT (Any Four points).

   (b) Explain the working principle of phototransistor. State any two advantages of phototransistor.

   (c) Determine the value of resistance with following colour code :

      (i) Brown Black Black Sliver

      (ii) Red Red Orange Gold

   (d) Describe the working principle of n-p-n transistor with the help of neat diagram.

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

   (a) State any four selection criteria for transducers.

   (b) Define the following terms with respect to Rectifier :

      (i) Ripple Factor

      (ii) Rectification Efficiency (h)

      (iii) Transformer Utilization Factor (TUF)

      (iv) Peak Inverse Voltage (PIV)

(c) Draw the circuit diagram of single stage RC coupled CE amplifier. State any two advantages of it.

(d) Draw and explain Drain characteristics of n-channel JFET.

(e) Draw and explain the working of CLC filter.

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

(a) Calculate peak to peak amplitude, Frequency and wavelength of waveforms shown in Figure-1.
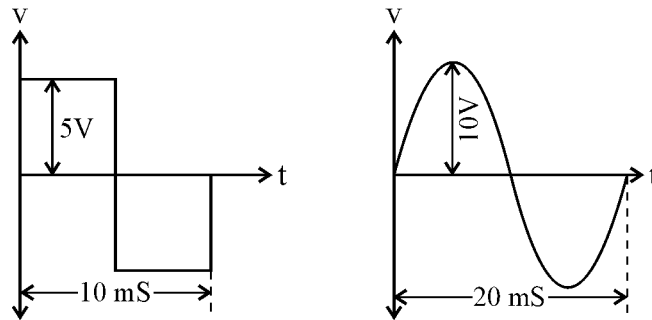


**Figure – 1**

(b) In CE configuration of transistor, if B = 50, leakage current $I_{CEO} = 100$ μA. If the Base current is 0.2 mA. Calculate the value of $I_C$, $I_E$ and α.

(c) (i) Sketch the Full Wave Bridge Rectifier and draw the waveforms of Load Voltage and Load Current.

(ii) State any two advantages of FWR over HWR.

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

(a) (i) A JFET has a drain curret of 10 mA. If $I_{DSS} = 20$ mA and $V_{GS}$ (off) = – 8V. Find the value of : (i) $V_{GS}$ (ii) $V_P$

(ii) Draw the symbol of N-channel and P-channel MOSFET.

(b) Observe the given frequency response of RC coupled amplifier, shown in Figure-2. Calculate :

(i) Lower cutoff frequency $(f_L)$

(ii) Higher cutoff frequency $(f_H)$ and
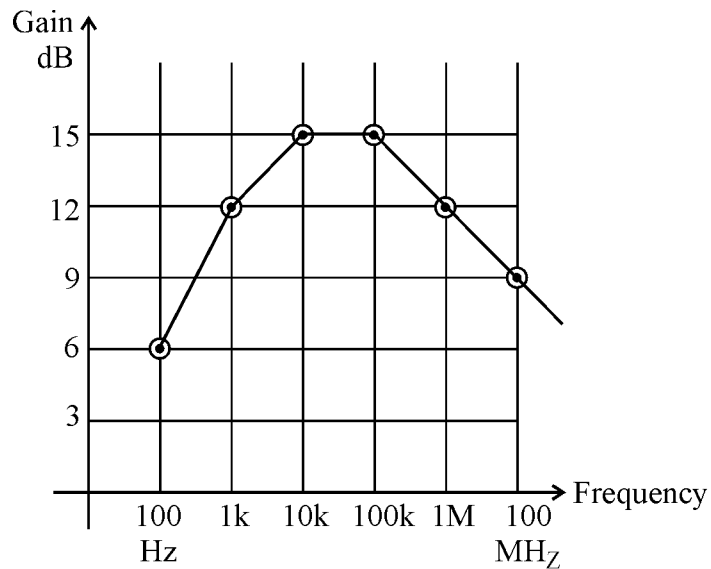
(iii) Bandwidth (BW)



**Figure – 2**

(c) List four types of electrical pressure transducers and state one application of each type.

———————————