**16172**

**3 Hours / 100 Marks**          Seat No.

***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)     Use of Non-programmable Electronic Pocket Calculator is permissible.

                 (7)     Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

**Marks**

1.     (A)     **Attempt any SIX :**                                                                                **12**

        (a)     What is transistor ? State any two applications of transistor.

        (b)     Define operating point (Q) of the transistor as an amplifier.

        (c)     Draw the circuit diagram and waveforms of single stage CE amplifier.

        (d)     Draw the symbol of N-channel MOSFET. State any two application of MOSFET.

        (e)     Define tuned amplifier. State types of resonant circuit.

        (f)     What is cross-over distortion ?

        (g)     Draw the transfer characteristics of N-channel JFET.

        (h)     Draw the symbol and equivalent circuit of UJT.

    **(B) Attempt any TWO :**                                              **08**

      (a)  Explain how transistor works as a switch. Also draw its input and output waveforms.

      (b)  Explain the concept of DC load line and operating point for biasing circuit.

      (c)  Describe the action of zener voltage regulator with neat diagram. Write any two limitations of unregulated power supply.

**2.  Attempt any FOUR :**                                              **16**

    (a)  List the types of biasing method of transistor. Explain any one method.

    (b)  What is thermal runaway ? How it can be avoided ?

    (c)  Sketch the drain characteristics of N-channel JFET for various values of VGS. State the condition at which the drain current essentially becomes constant.

    (d)  Draw and explain the input and output characteristics of CE configuration.

    (e)  List different types of negative feedback. Draw their diagrams.

    (f)  Explain the block diagram of regulated power supply and also state its need.

**3.  Attempt any FOUR :**                                              **16**

    (a)  Compare CB,CC & CE configurations (any 4 points).

    (b)  With the help of neat circuit diagram explain the working of self bias method for FET.

    (c)  Draw and explain the working of miller sweap generator.

    (d)  Describe how excellent impedance marching is achieved with transformer coupling.

    (e)  State load and line regulation.

    (f)  Draw the dual power supply capable of giving $\pm$ 12 V using three terminal regulator IC's and describe its working.

4. **Attempt any FOUR :** 16

    (a)    Explain the construction and working of N-channel JFET.

    (b)    Draw the circuit diagram and frequency response of two stage RC coupled amplifier.

    (c)    Differentiate the MOSFET and FET for the following points :

        (i)    Schematic symbol

        (ii)    Trans conductance curve

        (iii)    Modes of operation

        (iv)    Input impedance

    (d)    Compare the small signal amplifier and power amplifier w.r. to following points :

        (i)    Input voltage

        (ii)    output power

        (iii)    output impedance

        (iv)    Applications

    (e)    Sketch the output waveforms of class A, class AB and class C with respect to operating point on load line.

    (f)    Draw V-I characteristics of UJT. State any two applications of UJT.

5.   **Attempt any FOUR :**                                              **16**

   (a)   Derive relation between $\alpha$ & $\beta$ with respect to BJT.

   (b)   The phase shift oscillator uses equal resistances of 1 M$\Omega$ & equal capacitances of 68 PF. At what frequency does the circuit oscillate ? And also find value of resistance to produce a frequency of 800 kHz if phase shift oscillator uses 5 PF capacitor.

   (c)   Explain the working of class-B push-pull amplifier.

   (d)   Explain with neat sketch how FET can be used as an amplifier.

   (e)   State Barkhausen criterion of oscillation.

   (f)   Draw the functional block diagram of IC 723. State any two features of 723.

6.   **Attempt any FOUR :**                                              **16**

   (a)   Discuss steps to be taken to design transistor biasing and stabilizing circuit.

   (b)   Draw circuit diagram of transistorised series voltage regulator and explain its working.

   (c)   State the meaning of positive and negative feedback with neat sketch.

   (d)   Plot frequency response of doubled tuned amplifier and explain it.

   (e)   The ac equivalent circuit of crystal has these values L = 1H, C = 0.01 PF, R = 1000 $\Omega$ & $C_m$ = 20 PF. Determine the series resonant and parallel resonant frequencies.

   (f)   Draw circuit diagram & waveforms of voltage sweep generator using UJT.

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