23242

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.

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

Marks

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

(a) Define the following terms related to single stage common emitter amplifier

(i) Voltage gain

(ii) Bandwidth

(b) List the advantages of class B push pull amplifier over class A amplifier (any two).

(c) State advantages of negative feedback (any four).

(d) State the need of oscillator.

(e) State the condition in $(1 + A\beta)$ which a feedback amplifier must satisfy in order to be stable.

(f) State the working principle of SMPS. Also state any two merits of SMPS.

(g) List the applications of Direct coupled amplifier (any two).

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

(a) Answer the following questions with respect to double tuned voltage amplifier :

(i) Draw the circuit diagram for it.

(ii) State the advantages of double tuned voltage amplifier.

(b) Describe a single stage amplifier with current series feedback.

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

(d) In a simple UJT sweep circuit, the resistance and capacitance are 100 KΩ and 0.4 μF respectively. The ratio of the peak-point voltage and the supply voltage is 0.57. Find the frequency of sweep.

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

(a) Differentiate between voltage amplifier and power amplifier with respect to

(i) Definition (ii) Input resistance

(iii) Current gain (β) (iv) Type of coupling

(b) Describe transformer coupled Class A power amplifier with the help of circuit diagram and state the expression for dc power input, ac power output and efficiency.

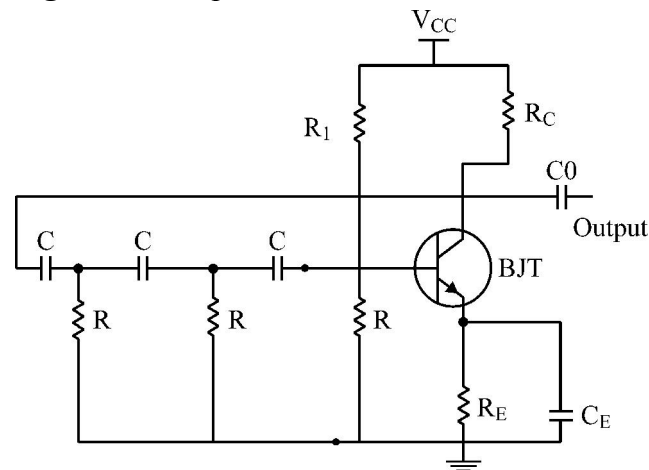(c) Study the **figure 1** of RC phase shift oscillator and answer the following questions :

Fig. No. 1

(i) State the working principle of it.

(ii) State the expression for the frequency of oscillations and the minimum gain of the amplifier for sustained oscillations.

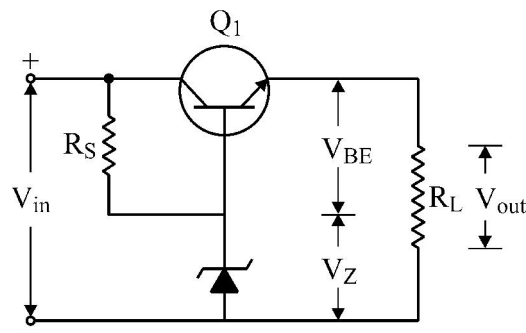(d) Study the **figure 2** and answer the following questions :

Fig. No. 2

(i) Identify the circuit.

(ii) How this circuit will regulate the output voltage if load is changed ?

4. **Attempt any THREE of the following :** 12
   (a) Describe Class-AB push pull power amplifier with the help of circuit diagram.
   (b) Describe two stage transformer coupled amplifier with the help of circuit diagram.
   (c) Describe voltage shunt feedback amplifier with the help of circuit diagram.
   (d) The ac equivalent circuit of a crystal has values : $L = 1$ H, $C = 0.01$ pF, $R = 1000$ Ω and $C_m = 20$ pF. Calculate series and parallel resonant frequencies of the crystal.
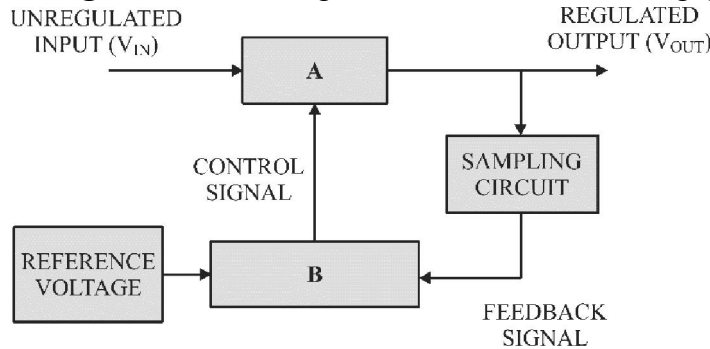   (e) Study the **figure 3** of series regulator and answer following questions :

Fig. No. 3

   (i) Identify the blocks A and B.
   (ii) State the function of sampling circuit and reference voltage.

5. **Attempt any TWO of the following :** 12
   (a) Describe the working of Miller Sweep circuit with the help of circuit diagram. Also draw the input and output waveforms.
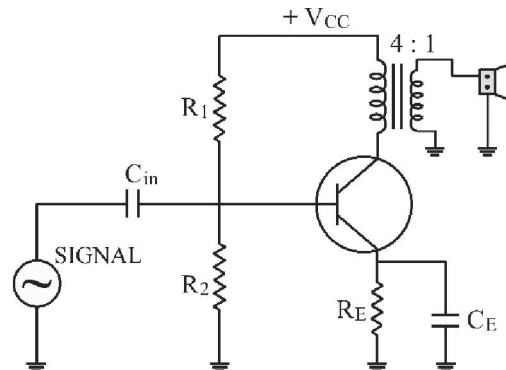   (b) Study the **figure 4** of direct coupled class A power amplifier and answer following questions :

Fig. No. 4

   (i) Draw the graphical representation to show the operation in terms of a.c. load line.
   (ii) State the functions of C_{in} and C_E.
   (iii) List the advantages and disadvantages of it (any two of each).

(c) Describe the working principle of common source FET amplifier with the help of circuit diagram. Also draw the a.c. equivalent circuit of a common source amplifier.

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

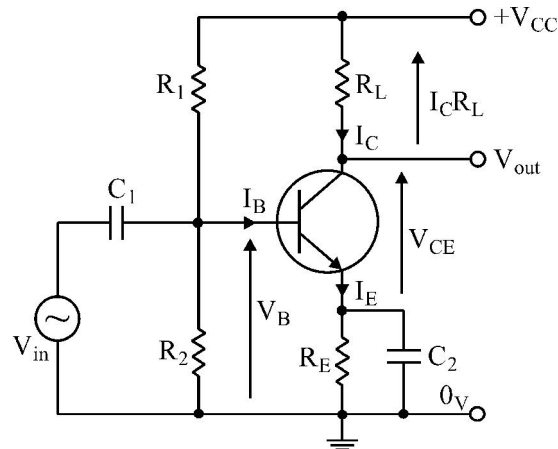(a) Study the **figure 5** and answer following questions :

Fig. No. 5

    (i) Identify and redraw the circuit diagram.

    (ii) State the functions of R_1, R_2, C_1 and C_2.

    (iii) Draw the input and output waveforms.

(b) Justify that the negative feedback amplifier increases bandwidth, decreases noise and decreases distortion.

(c) Differentiate between class-B and class-AB power amplifier with respect to

    (i) Angle of conduction

    (ii) Position of Q point

    (iii) Distortion in output voltage

    (iv) Efficiency

    (v) Power dissipation in transistor and

    (vi) Application