B. INS. & ELEC. ENGINEERING 2ND YEAR 1ST SEMESTER SUPPLEMENTARY

EXAMINATION 2024

ELECTRONIC CIRCUITS

TIME: 3 HOURS   FULL MARKS: 100

Attempt all the questions from the following

1.

    (a) What is the full form of PIV? What is its importance in rectification?

    (b) Define ripple factor.

    (c) Find out the rectification efficiency of a full wave rectifier.

    (d) Draw the diagram of a positive clipper circuit.

    (e) Draw and explain the working principle of a zener regulator circuit.

(1+2)+2+5+2+3

2.

    (a) For a CE amplifier with voltage divider bias, draw the DC load line.

    (b) On which factors, does the stability of any amplifier circuit depend?

    (c) Explain how a collector-base resistor improve the bias stability in an amplifier circuit.

5+2+3

3. Show that the small-signal voltage and current gain of a common-base amplifier are respectively given by:

$$A_v = g_m \left(\frac{R_C \parallel R_L}{R_S}\right)\left[\left(\frac{r_\pi}{1+\beta}\right) \parallel R_E \parallel R_S\right]$$
$$A_i = g_m \left(\frac{R_C}{R_C + R_L}\right)\left[\left(\frac{r_\pi}{1+\beta}\right) \parallel R_E\right]$$

10

4. For the common emitter amplifier shown in Fig. 1, calculate the mid-band gain & the lower and the higher 3-dB cut-off frequencies using appropriate graph paper. The transistor's datasheet provides the following: $\beta_{dc} = \beta_{ac} = 100, V_A = \infty, c_\pi = 10\, pF, c_\mu = 1.5\, pF$. Consider

appropriate number of frequency points both in the low and high frequency range in drawing the frequency response. Assume $V_T = 25\ mV$.

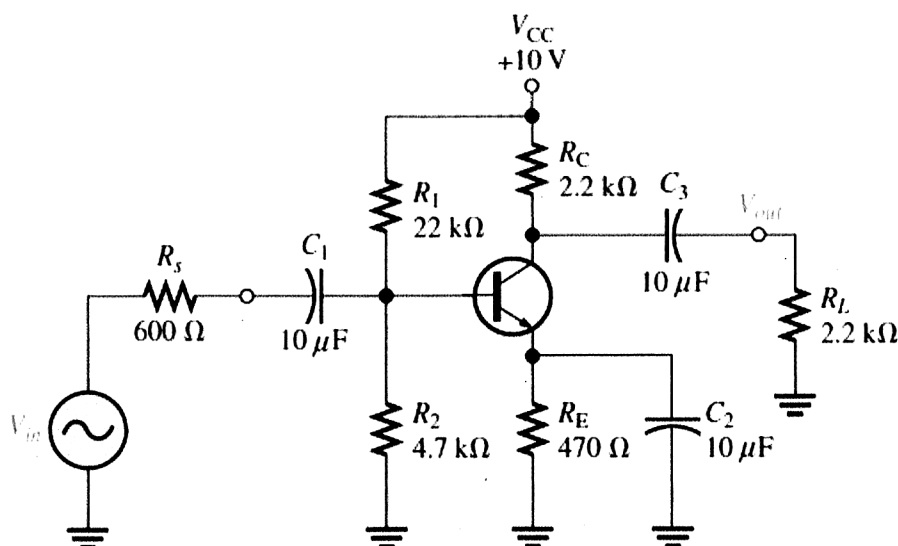Fig. 1

35

5.

    (a) Draw the diagram of a differential amplifier circuit.

    (b) Demonstrate the large signal characteristics of such amplifier with proper mathematical illustrations.

3+7

6. Draw the schematic diagram of a voltage-shunt feedback amplifier. Realize the same using discrete components.

4+6

7. Determine the condition for sustained oscillation of an LC oscillator. Realize Colpitts oscillator using amplifier and discrete components and hence find out the frequency of oscillation.

7+3

---------------X---------------