

Total No. of Questions—8]

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[5152]-132

S.E. (E&TC/Electronics) (First Semester) EXAMINATION, 2017
ELECTRONIC DEVICES AND CIRCUITS
(2012 PATTERN)

Time : Two Hours**Maximum Marks : 50**

N.B. :- (i) Attempt Q. No. 1 or 2, Q. No. 3 or 4, Q. No. 5 or 6, Q. No. 7 or 8.

(ii) Neat diagram must be drawn wherever necessary.

(iii) Figures to right indicate full marks.

(iv) Use of Scientific calculator is allowed.

(v) Assume suitable data, if necessary.

1. (A) What is thermal runaway ? How to overcome thermal runaway in BJT ? [6]
- (B) Determine, A_v , R_i , R_o for the circuit as shown in fig.(1). Assume $h_{fe} = 100$, $h_{ie} = 1.1 \text{ k}\Omega$, $h_{re} = h_{oe} = 0$, $R_1 = 10 \text{ k}\Omega$, $R_2 = 1 \text{ k}\Omega$, $R_C = 1 \text{ k}\Omega$, $R_E = 500\Omega$, $C_1 = C_2 = 10\mu\text{F}$, $C_E = 100 \mu\text{F}$ and $V_{CC} = 10 \text{ V}$. [6]

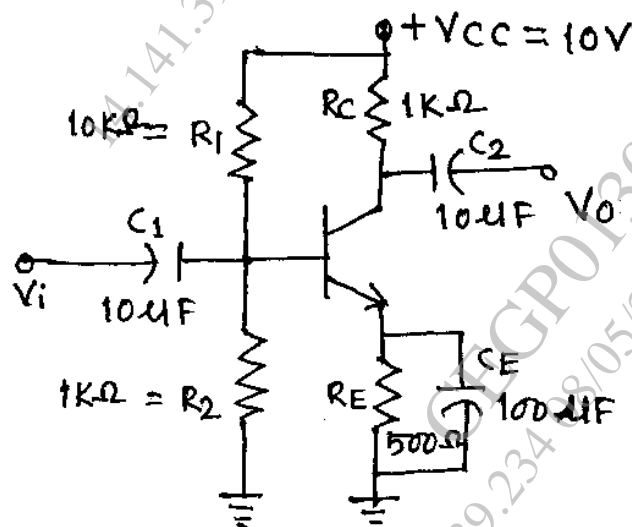


Fig. 1

P.T.O.

Or

2. (A) Compare CE, CB and C.C. BJT configurations based on A_v , A_i , R_i and R_o . [6]
- (B) Determine d.c. operating point parameters for the circuit as shown in Fig. (2). Assume $V_{BE} = 0.7 \text{ V}$, $I_{CEO} = 0$, $\beta_{dc} = 100$. [6]

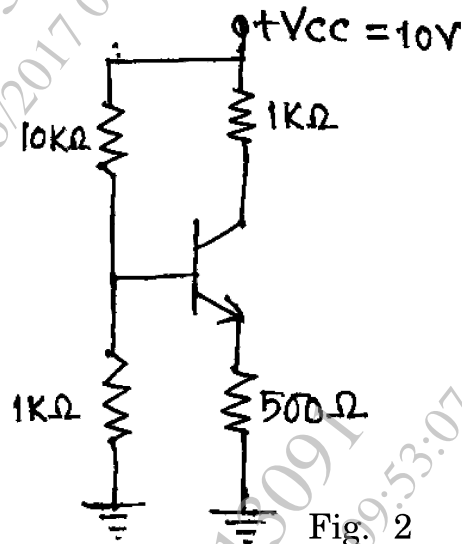


Fig. 2

3. (A) Plot the frequency response curve for C.E. amplifier and explain the effect of various capacitances on the cut-off frequencies. [6]
- (B) Draw any one LC oscillator circuit and explain its working by stating its formula for frequency of oscillation. [6]

Or

4. (A) A step response of an amplifier is as shown in the figure (3) at 1 kHz. Calculate f_L , f_H and BW for $V_o = 2.5 \text{ V}$, $V_o' = 1 \text{ V}$, $t_r = 20 \text{ } \mu\text{s}$. [6]

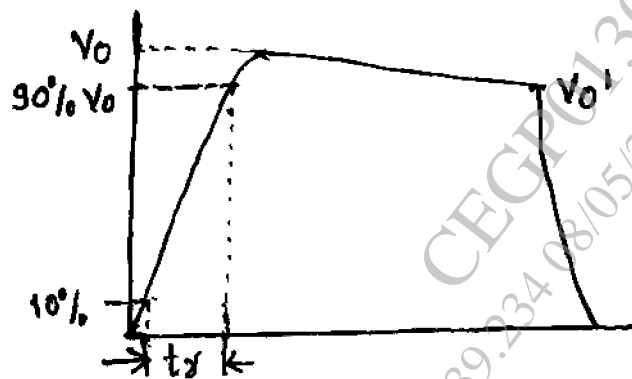


Fig. 3

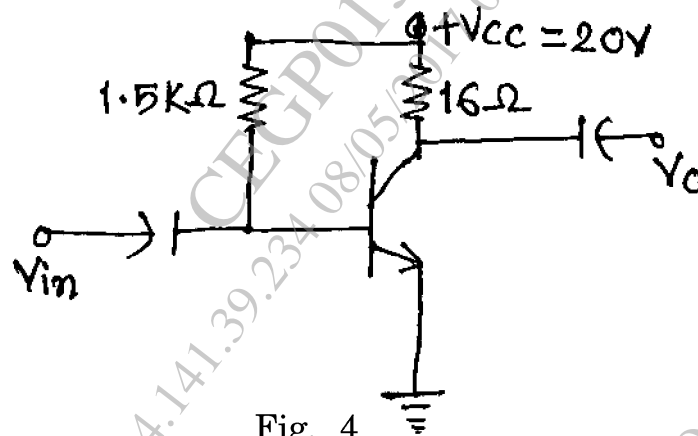
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2

- (B) Compare various feedback amplifiers on the basis of R_i , R_o and gain. [6]
5. (A) Classify large signal amplifiers on the basis of 2 point, collector efficiency and distortions. [6]
- (B) Draw and explain complementary symmetry push-pull amplifier with neat waveforms. [7]

Or

6. (A) In a power amplifier reading for distortions are $D_2 = 0.14$, $D_3 = 0.005$ and $D_4 = 0.003$ with $I_1 = 3.1$ A for $R_C = R_L = 4\Omega$. Then calculate (i) THD (ii) fundamental power component & (iii) total power. [6]
- (B) For a series fed class-A amplifier as shown in Fig. (4)



Calculate d.c. power, a.c power and efficiency.

Given $V_{CC} = 20$ Volt, $I_{CQ} = 643.5$ mA and $V_o(p-p) = 18$ Volt.

7. (A) Draw the constructional diagram of N-channel E-MOSFET and explain with transfer and drain or O/P characteristics. [8]
- (B) Explain Bi-CMOS with suitable circuit diagram.

Also state its advantages.

[5]

Or

8. (A) Explain any *two* non-ideal effects in E-MOSFET with suitable diagrams or characteristic curves. [4]
- (B) Draw small signal a.c. equivalent model of common source configured *n*-channel E-MOSFET. [3]
- (C) Determine A_v , R_i , R_o for the C.S. amplifier as shown in Fig. (5). Given parameters for E-MOSFET are $g_m = 1.41 \text{ mA/V}$, $V_{Th} = 1.5\text{V}$ and $K = 0.5 \text{ mA/V}^2$. [6]

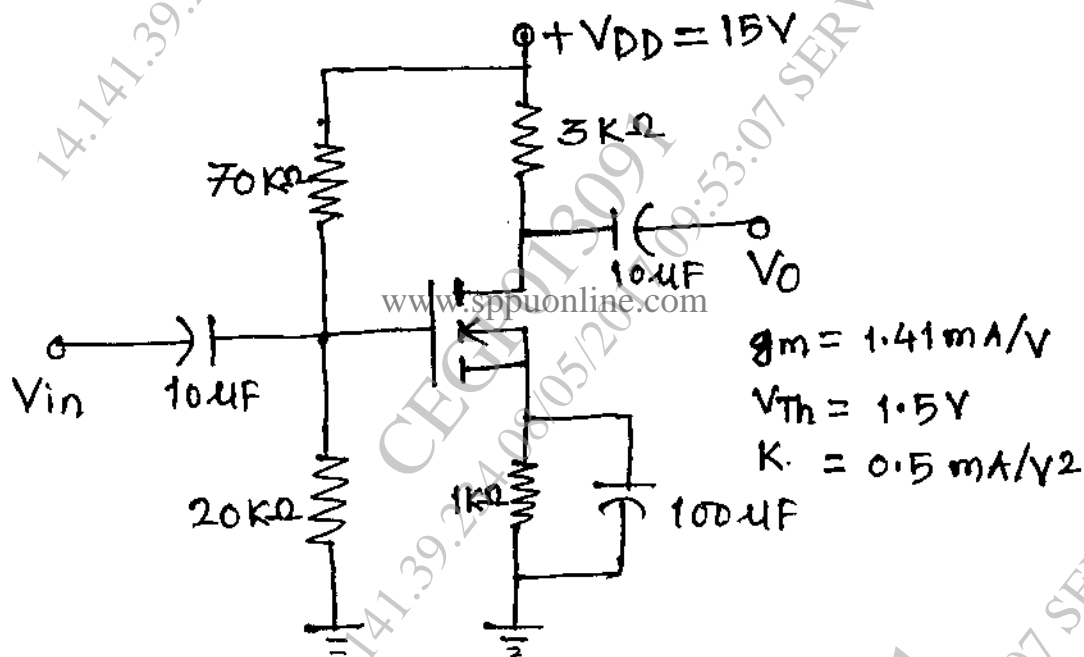


Fig. 5