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**S.E. (E&TC/Electronics) (First Semester) EXAMINATION, 2016
ELECTRONIC DEVICES AND CIRCUITS
(2012 PATTERN)**

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

- N.B. :-** (i) Attempt Q. No. 1 or Q. No. 2, Q. No. 3 or Q. No. 4, Q. No. 5 or Q. No. 6, Q. No. 7 or Q. No. 8.
(ii) Neat diagrams must be drawn wherever necessary.
(iii) Figures to the right indicate full marks.
(iv) Use of calculator is allowed.
(v) Assume suitable data, if necessary.

1. (a) Define Bias Compensation. Draw and explain circuit of Diode Compensation against change in I_{CO} . [6]
(b) Calculate the values of A_V , A_{V_S} , R_i , R_i' , R_o' for BJT CE amplifier as shown in Fig. 1. [6]
The h-parameter values are $h_{ie} = 1.1 \text{ k}\Omega$, $h_{fe} = 50$, $h_{re} = 2.5 \times 10^{-4}$, $h_{oe} = 25 \text{ A}\mu\text{V}$.

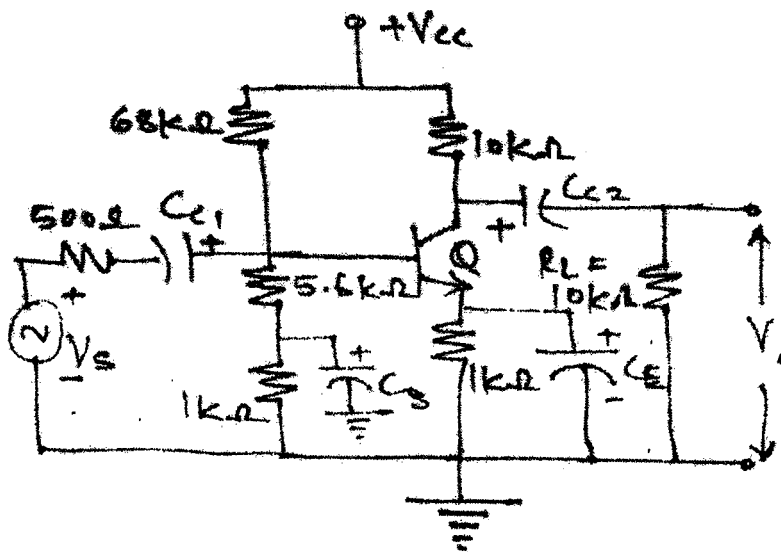


Fig. 1

P.T.O.

Or

- 2.** (a) A Ge transistor is used in voltage divider bias circuit has $V_{CE} = 8 \text{ V}$, $I_C = 4 \text{ mA}$, $\beta = 50$, $V_{CC} = 16 \text{ V}$, $R_C = 1.5 \text{ } \Omega$. If $S = 12$ is desired, then calculate values of R_1 , R_2 and R_E . [6]
- (b) Give comparison of CE, CB and CC amplifiers performance parameters. [6]
- 3.** (a) Define and derive the expression for f_{α} , f_{β} and f_T . [6]
- (b) Draw and explain circuit diagram of transistorized Colpitt's oscillator. Calculate the frequency of oscillations of a Colpitt's oscillator with $C_1 = C_2 = 500 \text{ pF}$ and $L = 1 \text{ mH}$. [6]

Or

- 4.** (a) The following measurements were taken while testing an amplifier using square wave input waveform : [6]
- (i) For square wave input frequency of 5 kHz the rise time of output waveform is 20 μsec ,
- (ii) For square wave input frequency of 100 Hz, there is sag of 1 V in 2.5 V amplitude observed on CRO.

Determine the bandwidth of an amplifier under test.

(b) Mention the effect of negative feedback on amplifiers performance such as : [6]

- (i) Gain
- (ii) lower cut-off frequency
- (iii) upper cut-off frequency
- (iv) Noise,
- (v) Non-linear distortion
- (vi) Frequency distortion.

5. (a) The dynamic transfer characteristic curve of transistor is :

$$i_c(\text{mA}) = 50 i_b + 1000 i_b^2.$$

Where i_b (mA) = $10 \cos 2\pi (100 t)$.

Calculate the percentage second harmonic distortion. [6]

(b) Prove that the maximum possible efficiency of a Class B amplifier is 78.5%. [7]

Or

6. (a) Explain the following parameters of Power BJT : [6]

- (i) Thermal Resistance
- (ii) Safe Operating Area.

(b) For a Class B power amplifier providing a 22 V peak signal to 8 Ω load and power supply of 25 V. Determine : [7]

(i) P_{dc}

(ii) P_{ac}

(iii) % η .

7. (a) Write a short note on : Bi-CMOS Inverter. [6]

(b) For the transistor shown in Fig. 2 has the parameter $V_T = 0.8$ V, $k = 0.5$ mA/V². Determine the values of V_{DS} and I_D . [7]

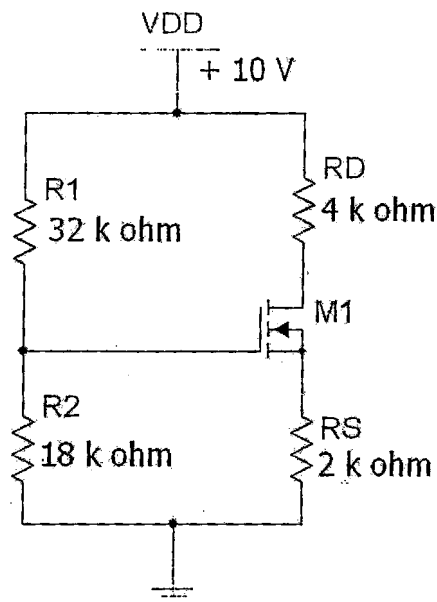


Fig. 2

Or

8. (a) The parameters of NMOSFET are $k = 0.2 \text{ mA/V}^2$, $\lambda = 0.01 \text{ V}^{-1}$, $V_T = 1.2 \text{ V}$. Calculate output resistance for : [6]
- (i) $V_{GS} = 2 \text{ V}$,
 - (ii) $V_{GS} = 4 \text{ V}$.
- (b) Explain the following non-ideal current voltage characteristics of EMOSFET : [7]
- (i) Finite output resistance
 - (ii) Channel Length Modulation
 - (iii) Body Effect.

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