Total No. of Questions—**8**] [Total No. of Printed Pages—**5**

Seat No.	

[5057]-243

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_{VS}, Ri, Ri′, Ro′ for BJT CE amplifier as shown in Fig. 1. [6]
The h-parameter values are h_{ie} = 1.1 kΩ, h_{fe} = 50, h_{re} = 2.5 × 10^{-4}, h_{oe} = 25 Aμ/V.

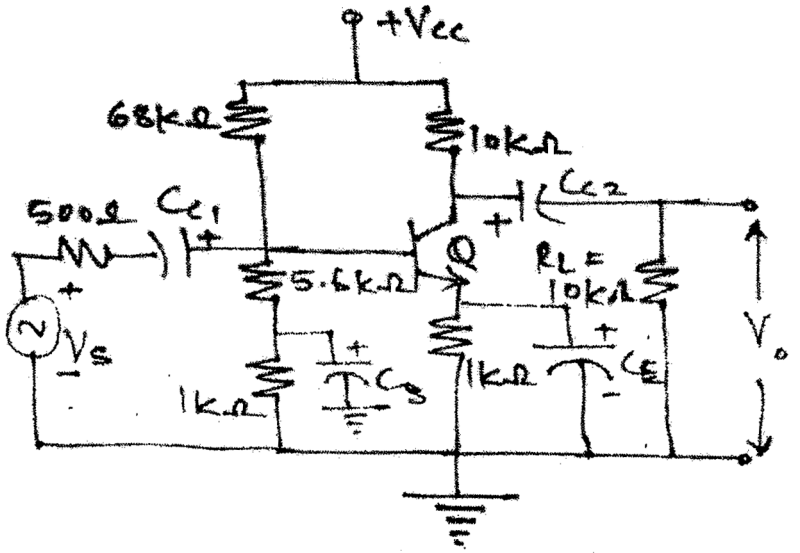

Fig. 1

P.T.O.

Or

2. (*a*) A Ge transistor is used in voltage divider bias circuit has V_{CE} = 8 V, I_C = 4 mA, β = 50, V_{CC} = 16 V, R_C = 1.5 Ω. 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 pF and L = 1 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 2π (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/V_2. Determine the values of V_{DS} and I_D. [7]

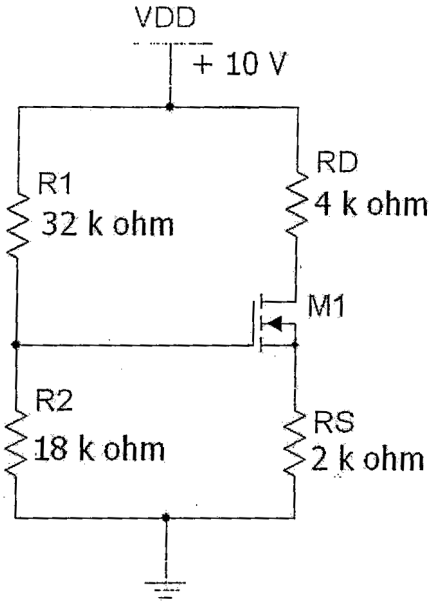

Fig. 2

Or

8. (*a*) The parameters of NMOSFET are k = 0.2 mA/V^2, λ = 0.01 V^{-1}, V_T = 1.2 V. Calculate output resistance for : [6]

(*i*) V_{GS} = 2 V,

(*ii*) V_{GS} = 4 V.

(*b*) Explain the following non-ideal current voltage characteristics of EMOSFET : [7]

(*i*) Finite output resistance

(*ii*) Channel Length Modulation

(*iii*) Body Effect.