Total No. of Questions—**8**] [Total No. of Printed Pages—**4+1**

Seat No.	

[4957]-1042

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. Nos. **1** *or* **2**, Q. Nos. **3** *or* **4**, Q. Nos. **5** *or* **6**, Q. Nos. **7** *or* **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*) Compare C_E, C_B and C_C amplifier on the basis of the following : [6]

(*i*) A_v

(*ii*) A_i

(*iii*) R_i

(*iv*) R_o

(*v*) *h*-parameter model

(*vi*) Application.

P.T.O.

(*b*) For the ckt. shown in Fig. 1, Si transistor with β = 100 is used. Calculate I_B, I_C and V_{CE}. [6]

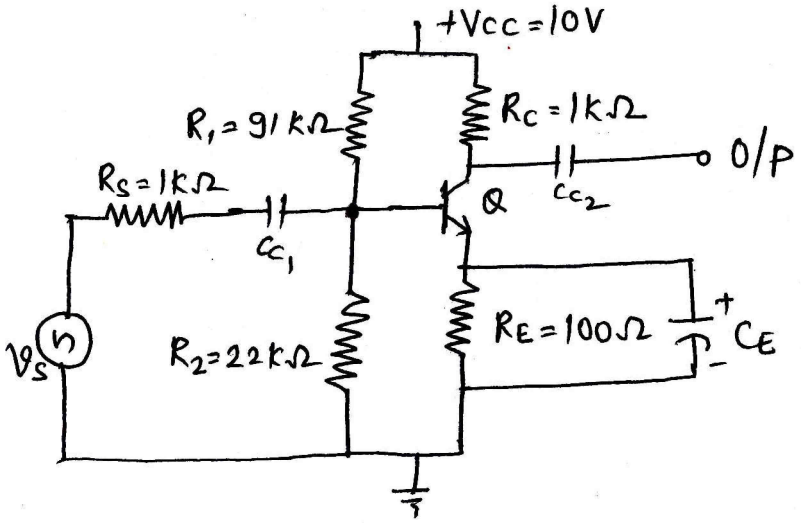

Fig. 1

Or

2. (*a*) For the ckt. shown in Fig. 1, Si transistor with h_{ie} = 1.1kΩ, h_{fe} = 50, h_{re} = 2.5 × 10^{-4}, h_{oe} = 25 μA/V is used. Calculate A_i, A_v, R_i, R_i', R_o and Ro'. [6]

(*b*) Derive the expression for stability factor S′ for the voltage divider bias circuit. [6]

3. (*a*) For the amplifier shown in Fig. 2, determine the overall low frequency response. The transistor used has h_{ie} = 1kΩ, h_{fe} = 100, h_{re} = h_{oe} = 0. [6]

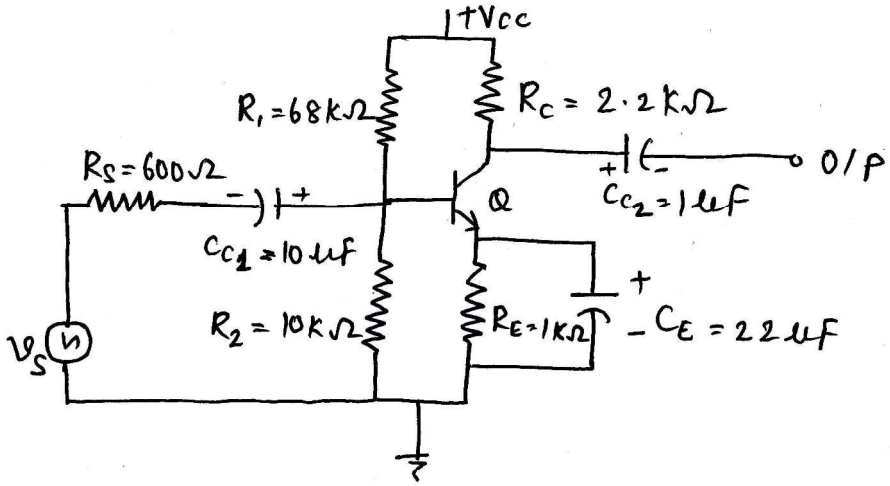

Fig. 2

(*b*) Draw and explain Colpitts' oscillator using BJT. Calculate the frequency of oscillation when C_1 = 0.001 μF, C_2 = 0.001 μF and L = 5 μH. [6]

Or

4. (*a*) Explain the effect of internal capacitances of transistor used in amplifier ckt. on bandwidth of amplifier with frequency response curve. Define F_α and F_β separately. [6]

(*b*) Determine the bandwith of a feedback amplifier with an open loop gain A = 10^4, an open loop bandwidth BW(ω) = 2π × 100 rad/s. and a closed loop gain A_f = 50. Comment on the effect of decrease in gain on bandwidth. [6]

5. (*a*) Draw transformer coupled class A power amplifier and show that maximum efficiency is 50%. [6]

(*b*) A class B complementary-symmetry power amplifier operates with V_{CC} = 12V, R_L = 4Ω. If the input is sinusoidal, calculate : [7]

(*i*) Maximum power output

(*ii*) Efficiency for maximum output

(*iii*) Power dissipation in both transistors

(*iv*) Power dissipation in each transistor.

Or

6. (*a*) Explain with ckt. diagram, how even harmonics are eliminated in class B push pull power amplifier. [6]

(*b*) The following measurements were taken on output of a class A power amplifier to estimate second harmonic distortion.

I_{CQ} = 1.5 A, I_{max} = 2.9 A, I_{min} = 0.2 A.

Calculate : [7]

(*i*) Shift of Q-point in terms of collector current

(*ii*) Percentage second harmonic distortion.

7. (*a*) Give comparison between MOSFET and BJT. [6]

(*b*) For the circuit shown in Fig. 3, the MOSFET parameters are V_T = 1.5 V, k = 0.8 mA/V^2.

Determine V_{GS}, V_{DS} and I_D, and show that MOSFET is biased in the saturation region. [7]

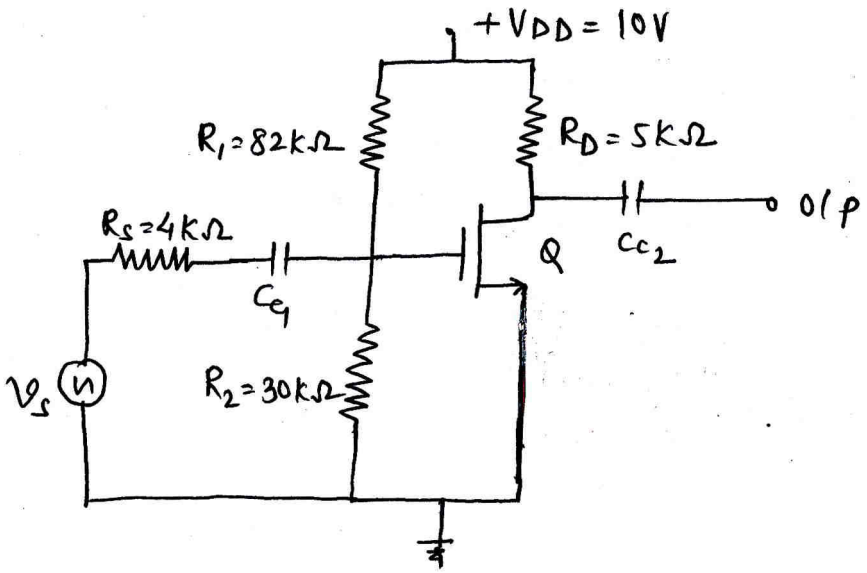

Fig. 3

Or

8. (*a*) For the ckt. shown in figure 3, determine :

g_m, A_v, R_i, R_i', R_o and R_o'.

Given, V_T = 1.5V, k = 0.8 mA/V^2 and r_0 = 40kΩ. [7]

(*b*) Explain various non-ideal current-voltage characteristics of EMOSFET. [6]