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

Seat No.	

[5252]-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* Q. No. **2**, Q. No. **3** *or* Q. No. **4**, Q. No. **5** *or* Q. No. **6** and 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 scientific calculator is allowed.
(*v*) Assume suitable data, if necessary.

1. (*a*) What is operating point ? Explain its significance with d.c. load line. Also, state why voltage divider bias with emitter resistor is preferred over other biasing methods. [6]

(*b*) Calculate Av, Ri, Ro for the CE amplifier as shown in Fig. 1. Given : $h_{re} = h_{oe} = 0$, $h_{ie} = 1$ kΩ, $h_{fe} = 350$. [7]

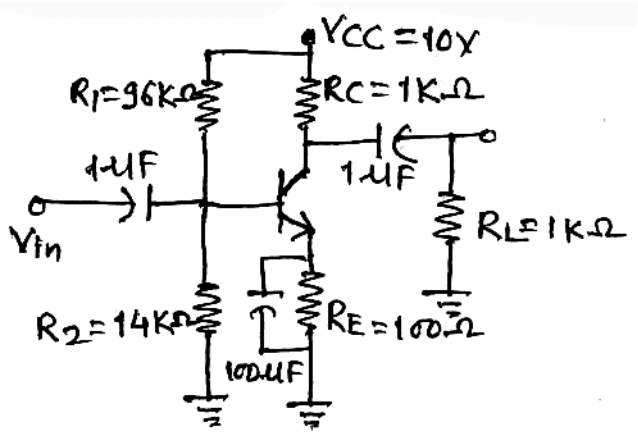

Fig. 1

P.T.O.

Or

2. (*a*) Define various stability factors and explain its significance with necessary equations. [6]

(*b*) Explain the significance of hybrid parameters in BJT. [3]

(*c*) Compare CE, CB, CC on the basis of Ri, Ro and their applications. [4]

3. (*a*) For a cascaded two stage amplifier using identical transistors, find lower and higher cutoff frequencies and bandwidth. The *h*-parameters for the transistors are h_{ie} = 1.1 kΩ, h_{fe} = 250, h_{re} = h_{oe} = 0. The lower cutoff frequency of single stage is 100 Hz and higher cutoff frequency in 15 KHz. [6]

(*b*) Draw all the four topological block diagram for –ve feedback amplifiers. State application of each of the amplifier. [6]

Or

4. (*a*) The parameters of the transistors in the ckt shown in Fig. 2 are h_{fe} = 50, h_{ie} = 1.1 kΩ, h_{re} = h_{oe} = 0. Find : [6]

(*i*) Value of C_b for 3-dB frequency response of 20 Hz

(*ii*) Value of C_b necessary to ensure less than 10% till for 100 Hz square wave 1/p.

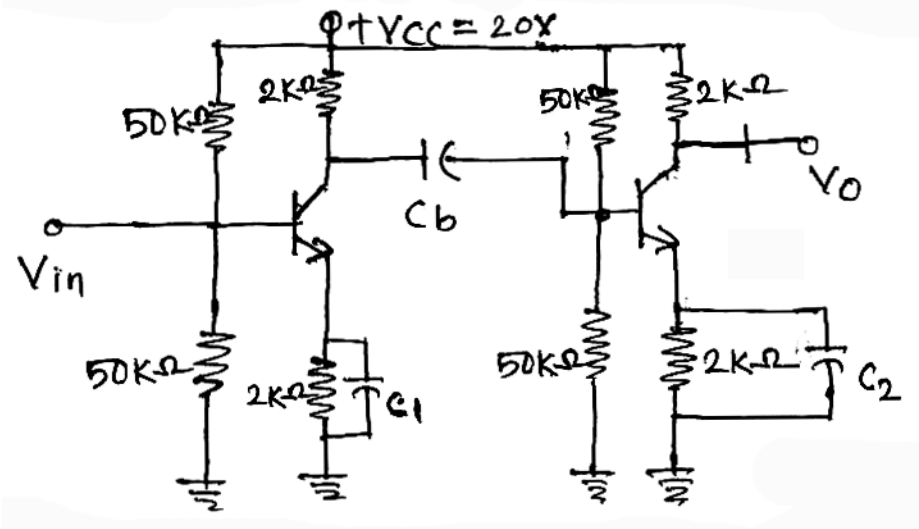

Fig. 2

(*b*) State Barkhousen criterion. Find frequency of oscillation for LC oscillator with L_1 = 1 μH, L_2 = 3 μH, C = 0.01 μF. Also identify the name of oscillator and state the application of the oscillator. [6]

5. (*a*) Write a short note on power BJTs. [6]

(*b*) For class-B amplifier providing 20 V peak signal to 16 Ω load (speaker) and power supply of 30 V. Determine the 1/P power, O/P power and efficiency. [7]

Or

6. (*a*) A sinusoidal signal V_s = 1.95 sin 400 t is applied to a power amplifier. The resulting current is

$$i_0 = 12 \sin 400\ t + 1.2 \sin 800\ t + 0.9 \sin 1200\ t + 0.4 \sin 1600\ t.$$

Calculate :

(*i*) total harmonic distortion

(*ii*) %age increase in power due to distortion. [7]

(*b*) Draw a single power supply class AB complimentary push-pull amplifier and explain how cross-over distortion is eliminated in this amplifier with wave forms. [6]

7. (*a*) Plot transfer and drain characteristics of n-channel E-MOSFET with necessary static and dynamic parameters. State equation for saturated current. [7]

(*b*) What is constant current source biasing ? Explain with circuit diagram in detail. [6]

Or

8. (*a*) Explain the effect of substrate potential in MOS based on integrated circuits. Also, explain the effect of channel length modulation. [6]

(*b*) Find I_D, V_{DS}, V_{GS} for the circuit shown in Fig. 3. Given V_{Th} = 0.8 V, K = 1 mA/V^2, λ = 0. [7]

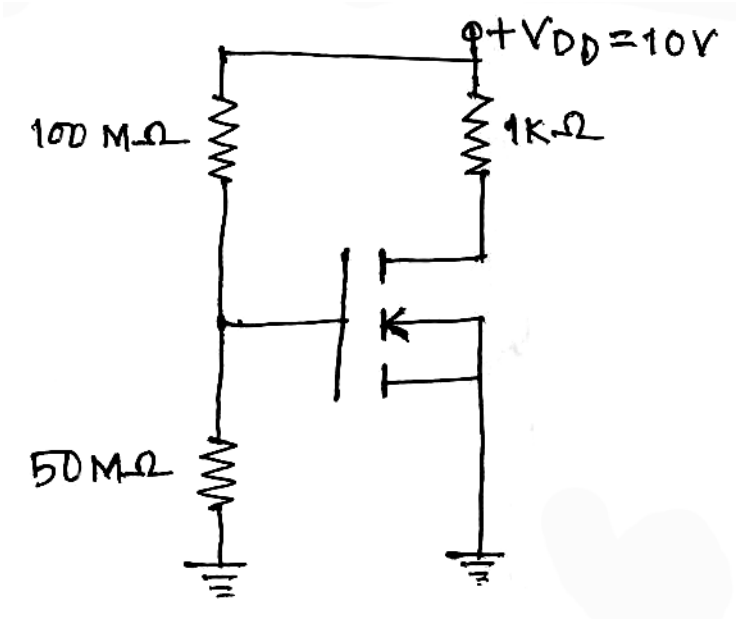

Fig. 3