Total No. of Questions—**8**] [Total No. of Printed Pages—**2**

| **Seat No.** | |
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# [5559]-133

## S.E. (E & TC/Electronics) (I Sem.) EXAMINATION, 2019
## 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 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*) Draw a neat circuit diagram of Self-bias circuit. Derive the expression for $V_{CEQ}$ and $I_{CQ}$. [6]

(*b*) The transistor is connected in CE amplifier with bypassed $R_E$ has $R_1$ = 50 kΩ. $R_2$ = 2 kΩ, $R_C$ = 1 kΩ, $R_S$ = 1 kΩ. $R_L$ = 10 kW. Also *h*-parameters $h_{ie}$ = 1.1 kΩ, $h_{fe}$ = 50, $h_{oe}$ = 24 μA/V, $h_{re} = 2.5 \times 10^{-4}$. Determine the value of $A_v$, $A_{vs}$, $A_l$, $R_i'$. [6]

*Or*

**2.** (*a*) Explain in detail the three factors which contribute to thermal instability ? [6]

(*b*) Define hybrid parameters of CE configuration of BJT with formulas. Draw its hybrid equivalent circuit for CE configuration. [6]

**3.** (*a*) Define and derive expression for $f_\alpha$, $f_\beta$ and $f_T$. [6]

(*b*) Draw and explain the circuit diagram of Hartley Oscillator using BJT and give expression for frequency of oscillation. [6]

P.T.O.

*Or*

**4.** (*a*) Draw and explain CE short circuit current gain using Hybrid-π model. [6]

(*b*) In Hartley Oscillator $L_1$ = 15 mH, C = 50 pF. Calculate $L_2$, for frequency of 168 kHz. [6]

**5.** (*a*) Explain the following parameters of power BJT : [6]
(*i*) Safe operating area
(*ii*) Thermal resistance.

(*b*) Draw circuit diagram of class B push pull amplifier and explain its operation with neat waveforms. [7]

*Or*

**6.** (*a*) What is crossover distortion ? How is it reduced in complementary symmetry class AB amplifier ? [6]

(*b*) A class B push pull amplifier is supplied with $V_{CC}$ = 12 V and load resistance of 5 Ω. If input is sinusoidal, calculate : (*i*) Maximum power output (*ii*) Power dissipation in both transistors, (*iii*) Power dissipation in each transistor, (*iv*) percentage efficiency. [7]

**7.** (*a*) Draw and explain Bi-CMOS inverter. [6]

(*b*) Explain various non-ideal current voltage characteristics of EMOSFET. [7]

*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 (*i*) $V_{GS}$ = 2 V, (*ii*) $V_{GS}$ = 4 V. [6]

(*b*) Draw and explain constant current source biasing circuit for EMOSFET. [7]