Total No. of Questions – [4]

Total No. of Printed Pages 02

U218-134 (T1)

G.R. No.	

OCTOBER 2018/IN-SEM (T1)

S. Y. B. TECH. (E&TC) (SEMESTER - I)

COURSE NAME:SEMICONDUCTOR DEVICES & CIRCUITS

COURSE CODE: ETUA21174

(PATTERN 2017)

Time:[1 Hour] **[Max. Marks: 30]**

(*) Instructions to candidates:

1) **Answer Q.1 OR Q.2, Q.3 OR Q.4**
2) **Figures to the right indicate full marks.**
3) **Use of scientific calculator is allowed**
4) **Use suitable data where ever required**

Q1 **a)** For voltage divider biasing circuit using silicon BJT with V_{CC}=12 V, R_1=40KΩ, R_2= 5KΩ, R_C=5 KΩ and R_E=1KΩ and β= 60. Calculate I_B, I_C and V_{CE}. **[6]**

b) Explain the need of bias stabilization in BJT amplifier circuit. Derive the expression for stability factor S for voltage divider biasing circuit for CE amplifier. **[6]**

c) Draw h parameter model of CE amplifier and state the significance of each parameter. **[4]**

OR

Q2 **a)** Compare CE, CB and CC amplifier with respect to performance parameters. **[6]**

b) Determine the operating point parameters such as I_{BQ}, I_{CQ} and V_{CEQ}, if V_{CC}=12 V, R_1=8KΩ, R_2=4KΩ, R_C=1KΩ, R_E=1KΩ, R_C= 1KΩ and β=50.Assume V_{BE}=0.7 V. Also draw DC load line. **[6]**

c) What is meant by thermal runaway? Explain in detail. **[4]**

Q3 **a)** Self-biased n-channel JFET CS amplifier with bypass capacitor shown in figure 3a has following specifications: V_{DD}=20V, R_D=3.3KΩ,R_G=1MΩ, Rs=500 Ω, I_{DSS}=16 mA, V_p= -8V, V_{GS}= -4Vand r_d=50KΩ. Calculate Av, Ri and Ro. **[6]**

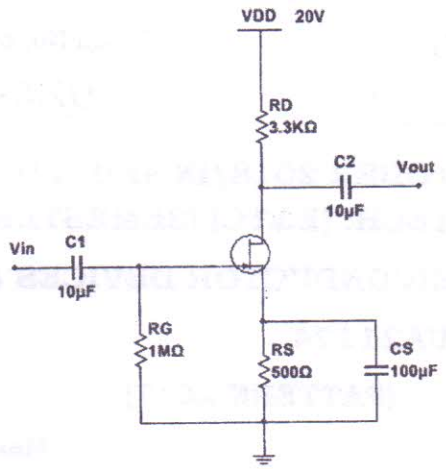

Fig. 3a

b) For a n-channel JFET the data is as follows: **[4]**
I_{DSS}=12 mA, V_p= -6V,Calculate the value of transconductance (g_m) and drain current I_D for V_{GS}= -2V.

c) Draw neat drain characteristic and transfer characteristic for n-channel JFET. **[4]**

OR

Q4 a) Self-bias circuit using n channel JFET has following parameters: **[6]**
V_{DD}=18V, R_D=4.7KΩ, Rs=1.5KΩ, R_G=1MΩ, V_p= -4V, I_{DSS}=8 mA. Determine operating point parameters such as V_{DSQ}, $V_{GSQ}$and I_{DQ}.

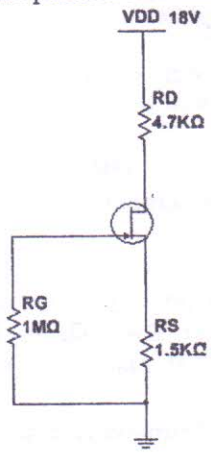

Fig. 4a

b) With the help of ac equivalent circuit, derive the expressions for input impedance, output impedance and voltage gain for CS amplifier with bypassed Rs. **[4]**

c) Justify the following statements: **[4]**
i) JFET is a voltage controlled device.
ii) The input resistance of JFET is higher than BJT.