

International Islamic University Chittagong (IIUC)
Department of Electronic and Telecommunications Engineering
Final Examination, Spring 2019

Course Code: ETE-1205
 Full Marks: 50

Course Title: Electronic Devices
 Time: 2 Hours 30 Minutes

(Figures in the margin indicate full marks)

Group-A

[Answer any two sets of the following questions]

1. (a) Why Transistor is known as bipolar device? 1
- (b) Explain the transistor action in details. 3
- (c) Draw the input and output characteristics of common collector connection. 3
- (d) For the common base circuit shown in Fig.1, determine I_C and V_{CB} . Assume the transistor to be of silicon. 3

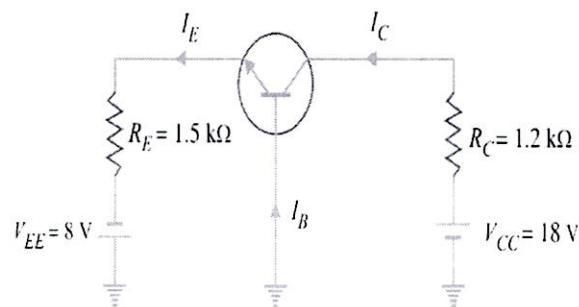


Figure 1

2. (a) Show that $\beta = \frac{\alpha}{1 - \alpha}$ 2
- (b) It is desired to set the operating point at 2V, 1mA by biasing a silicon transistor with collector feedback resistor R_B . If $\beta = 100$, find the value of R_B . 4

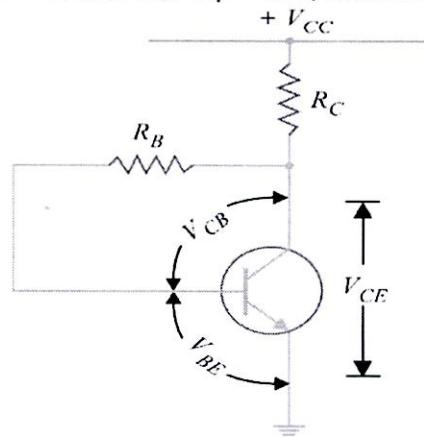


Figure 2

- (c) Fig.3 shows the voltage divider bias method. Draw the d.c. load line and determine the operating point. Assume the transistor to be of silicon. 4

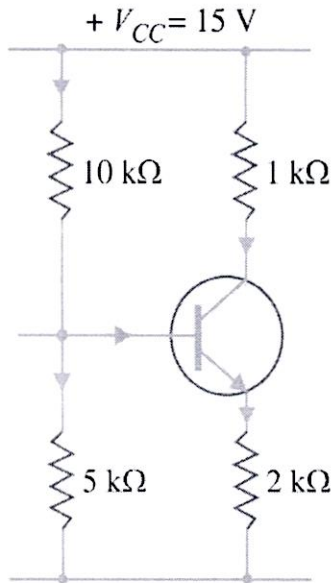


Figure 3

3. (a) What is the significance of arrow in the transistor symbol? 1
 (b) What is faithful amplification? Write the conditions to be fulfilled to achieve faithful amplification in a transistor amplifier. 2
 (c) Fig. 4 shows the open circuit failures in a transistor. What will be the circuit behavior in each case? 3

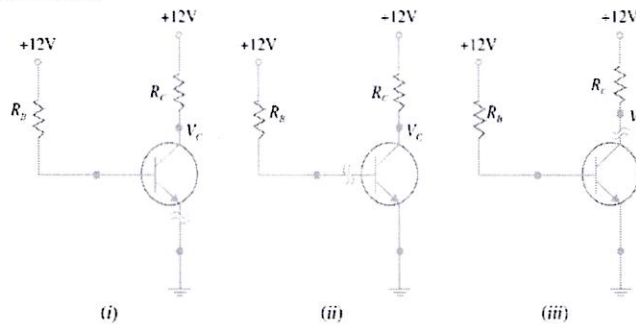


Figure 4

- (d) Fig.5 shows biasing with base resistor method. (i) Determine the collector current I_C and collector-emitter voltage V_{CE} . Neglect small base-emitter voltage. Given that $\beta = 50$. (ii) If R_B in this circuit is changed to $50 \text{ k}\Omega$, find the new operating point. 4

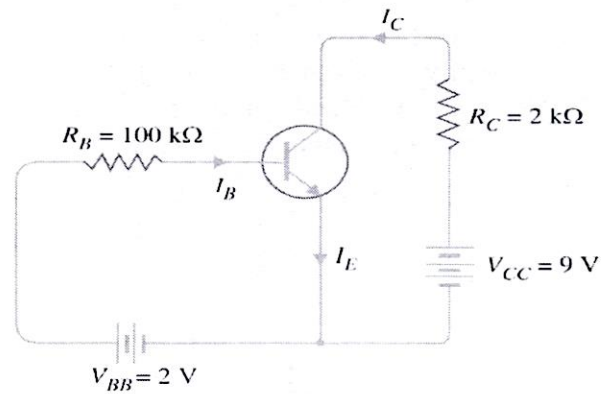


Figure 5

Group-B

[Answer any three sets of the following questions]

4. (a) How will you measure h parameters of a linear circuit? Describe the steps. 3
- (b) A transistor used in an amplifier has a h- parameter values of $h_{ie} = 600 \Omega$ to 800Ω and $h_{fe} = 110$ to 140 . Using approximate hybrid formula, determine the voltage gain for the circuit. The AC collector load, $r_L = 460$. 3
- (c) Appraise the voltage divider bias of JFET. 4

5. (a) Distinguish between FET and BJT? 3
- (b) Explain the operation of P-channel JFET 4
- (c) A JFET has a drain current of 5 mA. If $I_{DSS} = 10$ mA and $V_{GS}(\text{off}) = -6$ V, find the value of (i) V_{GS} and (ii) V_P . 3

6. (a) Draw the ac equivalent network for the fig. 8 4

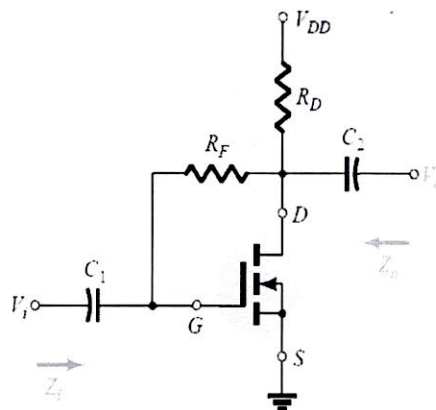


Figure 5

- (b) The self-bias configuration of Fig. 9 has an operating point defined by $V_{GSQ} = -2.6$ V and $I_{DQ} = 2.6$ mA, with $I_{DSS} = 8$ mA and $V_P = -6$ V. The applied signal for network is V_i . The value of y_{os} is given as $20 \mu S$. (i) Determine g_m . (ii) Find r_d . (iii) Find Z_i . (iv) Calculate Z_o with and without the effects of r_d . Compare the results. (v) Calculate A_v with and without the effects of r_d . Compare the results.

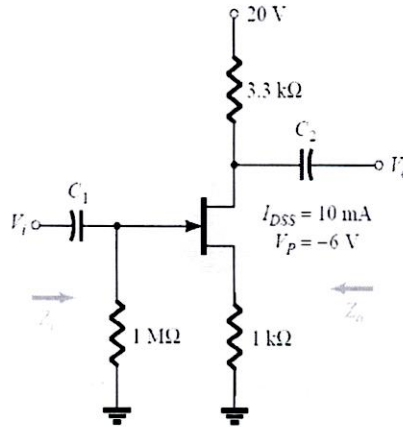


Figure 6

7. (a) What is the basic difference between D-MOSFET and E-MOSFET? 2
 (b) Determine the following for the network of Fig. 10. (i) I_{DQ} and V_{GSQ} , (ii) V_D . 4

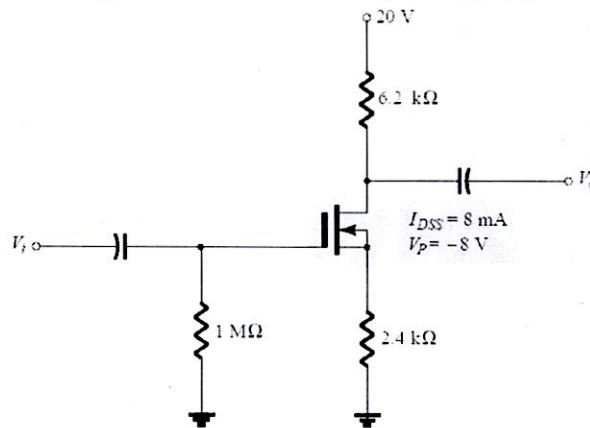


Figure 7

- (c) Draw the basic construction of a CMOS and explain how a CMOS work as an inverter. 4