International Islamic University Chittagong (IIUC)

Department of Electronic and Telecommunications Engineering

Final Examination, Autumn- 2018

Course Code: ETE-1205 | Course Title: Electronic Devices

Full Marks: 50 | Time: 2 Hours 30 Minutes

(Figures in the margin indicate full marks)

Group-A

[Answer any two sets of the following questions]

1. (a) Justify the characteristics of transistor from its name. 2
   (b) Why Transistor known as bipolar device? 3
   (c) Draw and describe the input and output characteristics of common emitter configuration. 5

2. (a) What is faithful amplification? What are the conditions for achieving it? 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

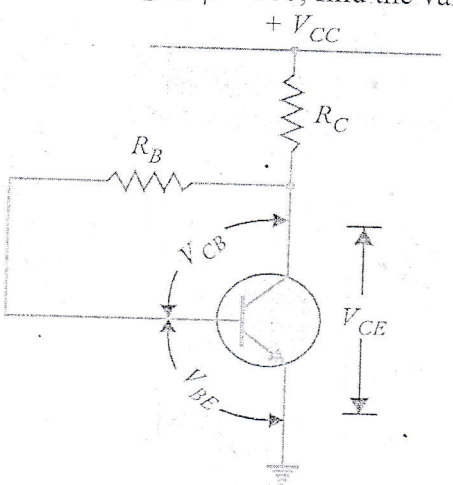

Figure 1

(c) Figure 2 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

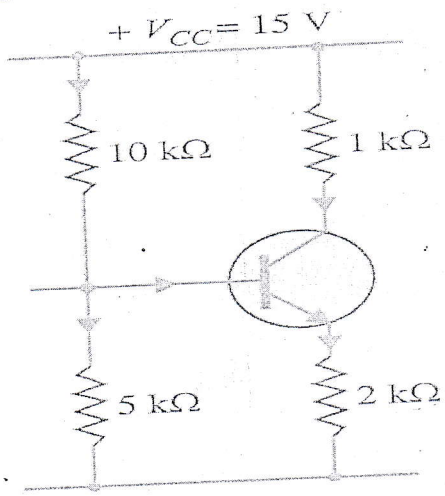

Figure 2

3. (a) What are the stability factors? If we have a lower value of stability factor, will the circuit be more sensitive to temperature variation? 2

(b) How does emitter bias, voltage feedback bias physically offer higher stability than fixed bias configuration? Discuss by mentioning corresponding equations. 4

(c) Determine the operating point for the following voltage divider bias configuration using exact and approximate analysis and comment on the results obtained: 4

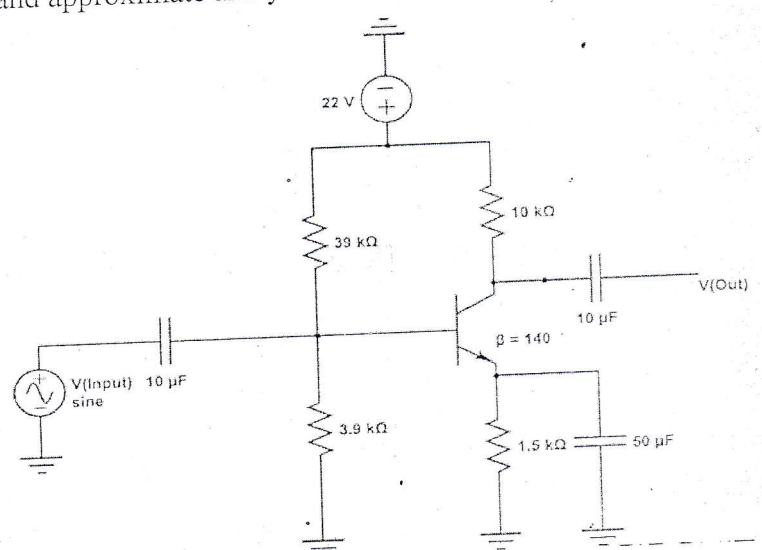

Figure 3

Group-B
[Answer any three sets of the following questions]

4. (a) Draw the ac equivalent network for the figure 4 — 4

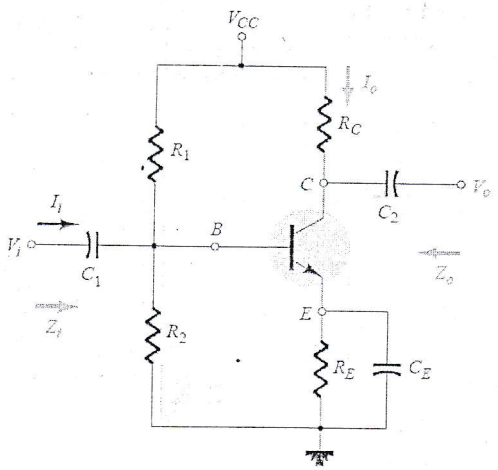

Figure 4

(b) For the network of Figure **5**: (i) Determine $\mathbf{r_e}$. (ii) Find $\mathbf{Z_i}$ (with $\mathbf{r_o}=\alpha\ \Omega$). (iii) Calculate **Zo**(with $\mathbf{r_o}=\alpha\ \Omega$). (iv) Determine **Av** (with $\mathbf{r_o}=\alpha\ \Omega$). (v) Find **Ai** (with $\mathbf{r_o}=\alpha\ \Omega$). (vi) Repeat parts (c) through (e) including $\mathbf{r_o}=\mathbf{50\ k\Omega}$ in all calculations and compare results. — 6

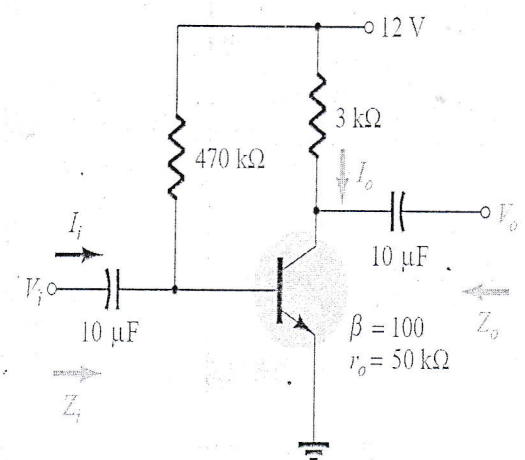

Figure 5

5. (a) What is the basic difference between Depletion and enhancement type MOSFET? 2
   (b) Why MOSFET is named so? Describe in brief the operation of NMOS with its transfer characteristics. (Draw necessary Figures) 5
   (c) Determine for the figure 6: V_{GS} (Quiescent), I_D (Quiescent), V_{DS}, V_D, V_G and V_S. 3

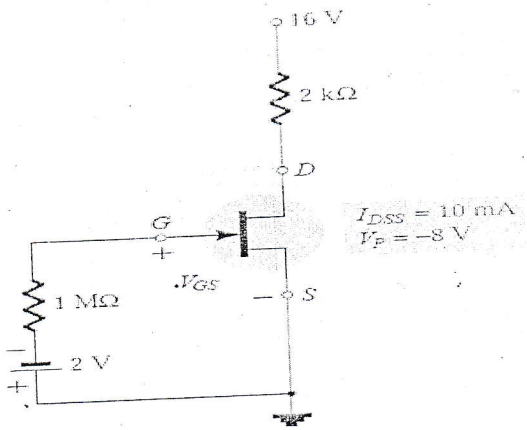

Figure 6

6. (a) Derive the hybrid parameter of an amplifier. 5
   (b) Find out the hybrid parameter of CB configuration and its application in a circuit. 5

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

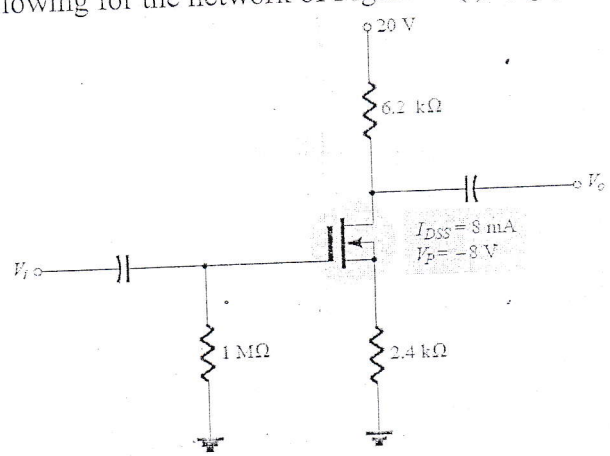

Figure 7

   (c) Explain how a CMOS work as an inverter. 4