



Daffodil International University
 Department of Electrical and Electronic Engineering
 Faculty of Engineering
Final Examination, Summer – 2026

Course Code: 0714-211

Section: A, B, C, D, E, F, G

Full Marks: 40

Course Title: Electronics I

Level-Term: L2-T1

Exam Date: August 27, 2025

Teacher's Initial: SD, KNA, KAH, MH

Time: 2.0 Hours

[Q1 and Q2 are mandatory; Answer any three (03) from questions Q3, Q4, Q5, Q6.]

[The second right most column indicates the COs with respective Bloom's level.]

[The right most column indicates the assigned marks.]

[All the symbols carry their usual meaning.]

- Q1. (a)** Write the names of BJT modes of operation and mention the biasing conditions of the junctions for each of the operating modes. CO1, C1 [2]
- (b)** For a BJT, show that $\beta = \frac{\alpha}{1-\alpha}$. CO1, C2 [2]
- (c)** Explain the operation of an n-channel MOSFET with necessary diagrams. CO1, C2 [4]
- Q2.** For the circuit of Fig. Q2, (i) Calculate the value of R_C if the collector voltage is 3.4V at dc operating point, (ii) Draw the small signal equivalent circuit; (iii) Derive the expressions and find values for Z_i , Z_o and A_v . CO2, C3 [8]

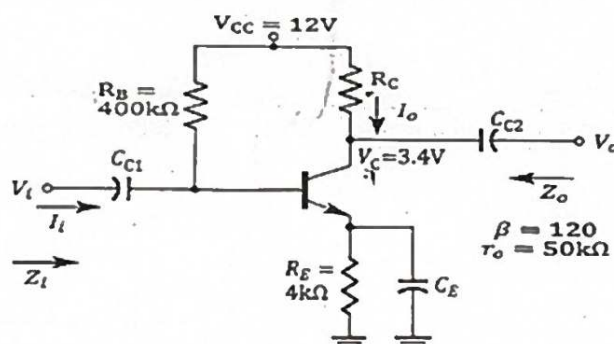


Fig. Q2

- Q3.** Given that $V_B = 4V$ for the following circuit of Fig. Q3, determine (i) V_E , (ii) V_C , (iii) β . CO2, C3 [8]

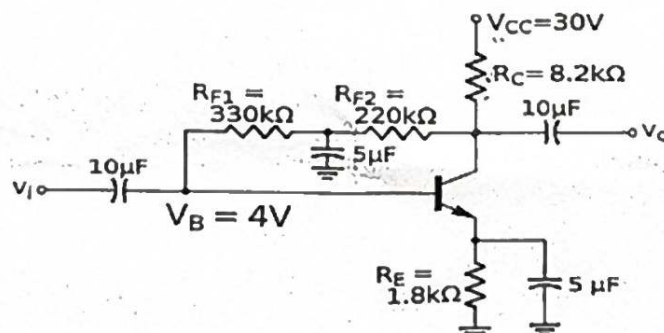


Fig. Q3

- Q4. Given the device characteristics in Fig. Q4(b), determine R_1 , R_2 , R_C and $I_{C_{sat}}$ for the circuit CO2, C3 [8]
in Fig Q4(a). Assume $\beta = 150$.

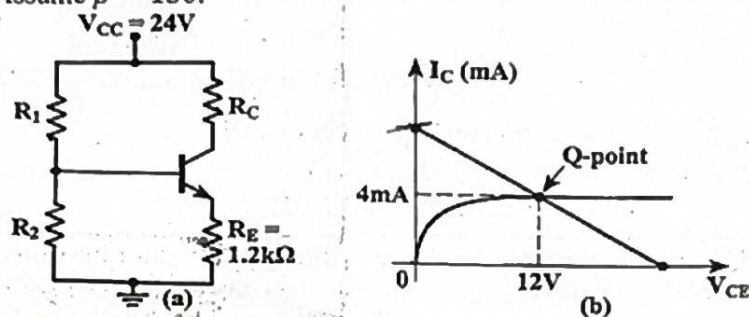


Fig. Q4

- Q5. It is required to design the following circuit for biasing a MOS Amplifier. The design requirements are $V_{DD} = 5V$, $I_D = 0.32mA$, $V_S = 1.6V$, $V_D = 3.4V$ with a $1\mu A$ current through R_{G1} and R_{G2} . Assume $V_t = 1V$ and $k'_n \frac{W}{L} = 1mA/V^2$. Determine the values of all the resistances in the circuit. CO2, C3 [8]

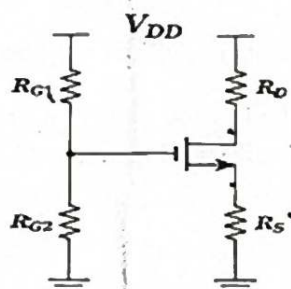


Fig. Q5

- Q6. (a) Draw the small-signal ac equivalent circuit for the following Common-Source (CS) amplifier. CO2, C2 [4]

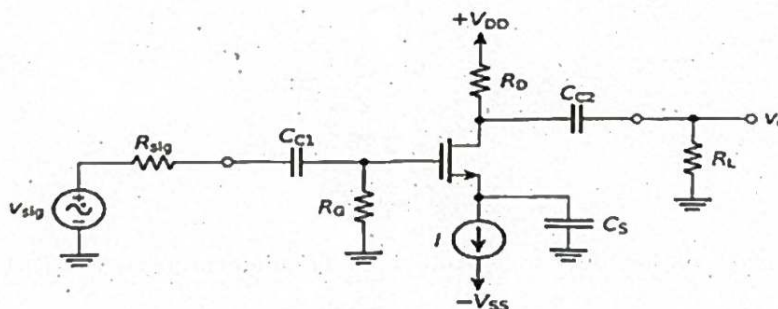


Fig. Q6 (a)

- (b) The MOSFET in the following circuit of Fig. Q6(b) has $V_t = 1V$, $k'_n \frac{W}{L} = 0.4mA/V^2$ and $\lambda = 0$. Determine the drain voltage. CO2, C3 [4]

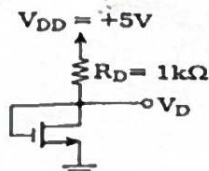


Fig. Q6(b)