QP Code: S253A035 | Reg. No | | | | | | | | | | | AY 24

Gandhi Institute of Engineering and Technology University, Odisha, Gunupur
(GIET University)

B. Tech (Third Semester – Regular & Supplementary) Examinations, November 2025

23BECPC23001– Analog Electronic Circuits

(ECE, EE(VLSI))

Time: 3 hrs | Maximum: 60 Marks

Answer ALL questions

(The figures in the right hand margin indicate marks. Provide two graph papers.)

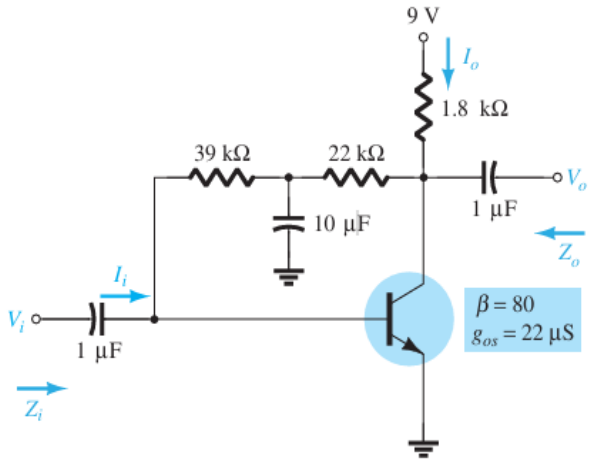
PART – A **(2 x 5 = 10 Marks)**

Q.1. Answer ***ALL*** questions	CO #	Blooms Level
a. Define how a BJT is a current-controlled device, whereas FET is a voltage-controlled device?	CO1	K2
b. Why the fixed bias is called so? Justify.	CO1	K2
c. Show that $g_m = g_{m0}\sqrt{I_{Ds}/I_{DSS}}$	CO2	K2
d. Define CMRR and Slew Rate (SR).	CO5	K1
e. Why are the cutoff frequencies known as half-power frequencies?	CO4	K2

PART – B **(10 x 5 = 50 Marks)**

Answer ***ALL*** the questions	Marks	CO #	Blooms Level
2. a. In the self-bias circuit of BJT, determine: R_C, R_E, R_B, V_{CE}, V_B. Here V_{CC}=12 V, I_C= 2mA, V_C=7.6V, V_E=2.4V, β=80,	5	CO1	K4
b. Determine V_{CC}, R_B and R_C for the fixed bias circuit, where I_{Csat}=8mA, V_{CC}=20V, I_B=40μA.	5	CO1	K4
(OR)			
c. For the Voltage divider Bias network, V_{CC}=12V, β=80, R_1=62KΩ, R_2=3.9KΩ, R_C=3.9KΩ, R_E=0.68KΩ determine: i. S(I_{CO}) ii. S(V_{BE}) iii. S(β) using T_1 as the temperature at which the parameter values are specified and $\beta(T_2)$ as 25% more than $\beta(T_1)$. Determine the net change in I_C if a change in operating conditions results in I_{CO} increasing from 0.2 to 10 μA, V_{BE} drops from 0.7 to 0.5 V and β increases 25%.	7	CO1	K4
d. Draw the dc load line for a fixed bias circuit with V_{CC} = 22V, β = 100 and R_B = 560KΩ that uses a silicon transistor.	3	CO1	K3
3.a. Determine the following for a common-emitter voltage divider bias amplifier, V_{CC}=16V, R_1=62KΩ, R2=9.1KΩ, R_C=3.9KΩ, R_E=0.68KΩ if β = 80, and $r_o = \infty$ Ω. a. Z_i b. Z_o c. A_v with R_L = 1.2 KΩ	7	CO2	K4
b. Draw the r_e equivalent circuit for the emitter follower configuration.	3	CO2	K2
(OR)			

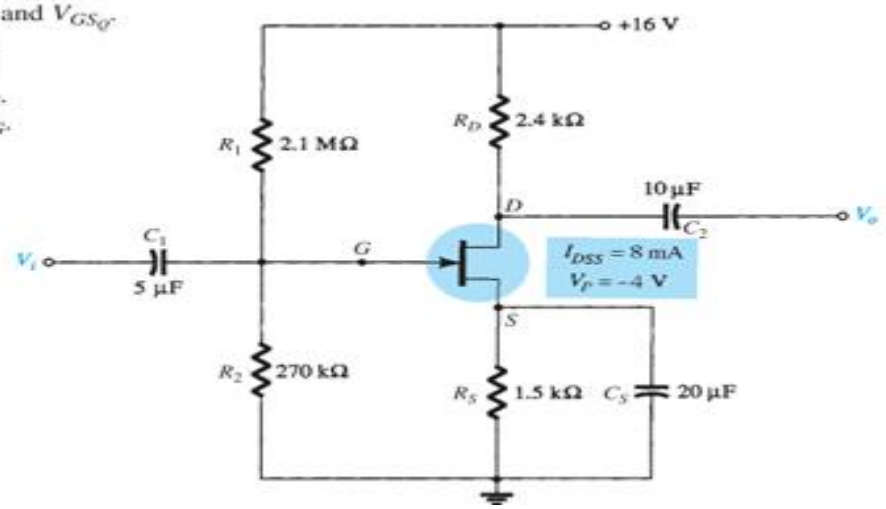
c. Determine Z_i, Z_o, A_v



7 CO2 K4

d. Using system approaches, determine A_{VNL}, $A_{VL\ (with\ RL)}$ and $A_{VS\ (with\ RL\ and\ RS)}$. 3 CO1 K4

4.a. a. I_{D_Q} and V_{GS_Q}.
b. V_D.
c. V_S.
d. V_{DS}.
e. V_{DG}.



6 CO1 K4

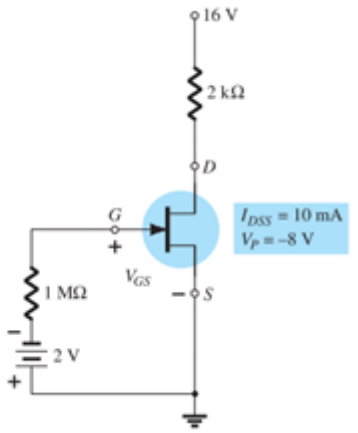
Determine the above DC parameters.

b. Explain the operation and application of a CMOS circuit with diagrams. 4 CO1 K2

(OR)

c. Determine the above DC parameters.

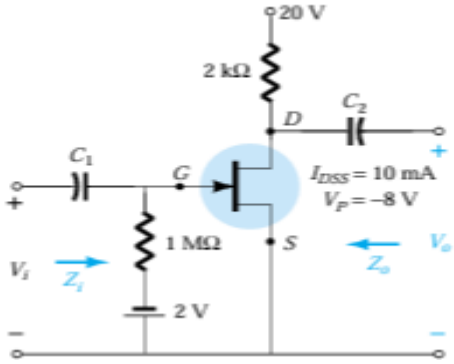
a. V_{GS_Q}.
b. I_{D_Q}.
c. V_{DS}.
d. V_D.
e. V_G.
f. V_S.



5 CO1 K4

d. Briefly explain the principle and operation of an n-channel EMOSFET with its transfer characteristics and proper diagrams. 5 CO1 K2

5.a. Determine Z_i, Z_o, and A_V.



6 CO2 K4

b. Write down short notes on any **one** of the following:

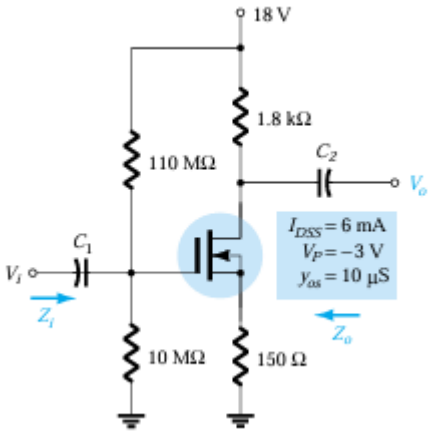
a. Square wave Testing

b. Multistage Frequency Response

4 CO4 K3

(OR)

c. Determine Z_i, Z_o, and A_V.



8 CO2 K4

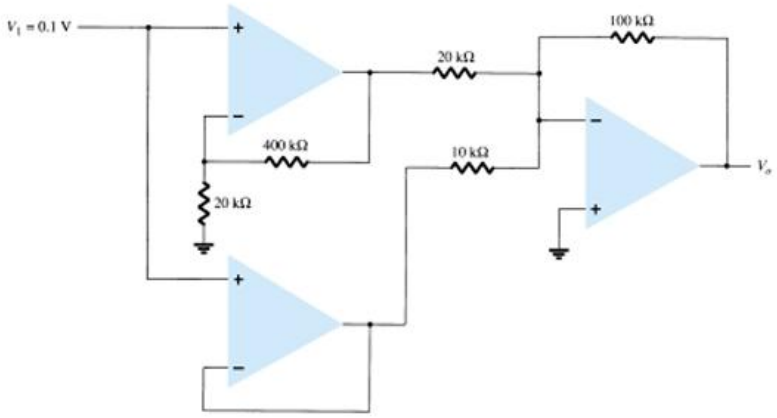
d. State the application of the Emitter-Follower circuit. 2 CO2 K1

6. a. Draw the circuit diagram and explain the working principle of RC phase shift oscillator. Also derive the expression for frequency of oscillation and condition for sustained oscillation. 8 CO6 K3

b. For the RC Phase Shift Oscillator, if the value of R is 33 KΩ, and the value of capacitor C is 10 pF. Find the frequency of oscillation. 2 CO6 K3

(OR)

c. Calculate the output voltage for the above circuit.



5 CO5 K3

d. Derive the output voltage expressions for the inverting and non-inverting Op-Amps. 5 CO5 K3

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