Total No. of Questions – [06] Total No. of Printed Pages: [02]

G.R. No.	

DECEMBER 2021-ENDSEM EXAM

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

COURSE NAME: Engineering Circuit Analysis

COURSE CODE: ETUA21202

(PATTERN 2020)

Time: [1Hr] [Max. Marks: 30]

Instructions to candidates:

1) **Answer Q.1 OR Q.2, Q.3 OR Q.4, Q.5 OR Q.6.**
2) **Figures to the right indicate full marks.**
3) **Use of scientific calculator is allowed**
4) **Use suitable data where ever required**

Q.1 a Justify the following statements: [4]
a) JFET is a voltage controlled device.
b) The input resistance of JFET is higher than BJT.

Q.1 b The self-bias circuit using n-channel JFET has V_{DD}=18V, R_D=4.7KΩ,R_S=1.5KΩ and R_G=1MΩ. Determine the co-ordinates of Q point such as I_{DQ}, V_{GSQ} and V_{DSQ}. Assume JFET has V_P=-4V, I_{DSS}= 8mA and g_m= 5mS. [6]

OR

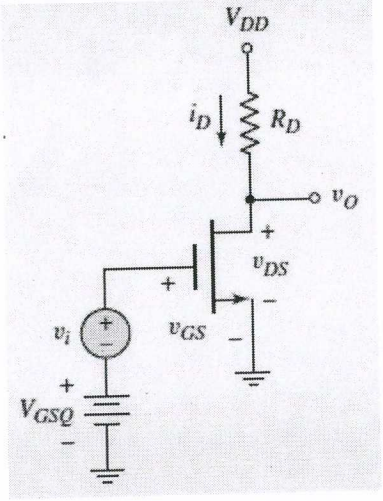
Q2 a For N channel JEFT, following data is given. [4]
I_{DSS}= 12mA, V_P= -6V. Determine the value of trans-conductance (g_m) and drain current I_D for V_{GS} = -2V.

Q2 b For self-biased N channel JFET CS amplifier with bypass capacitor has following parameters: V_{DD}= 20V, R_G=1MΩ, Rs = 500Ω, R_D= 3.3 KΩ, I_{DSS}= 16mA, V_P = -8V, V_{GS} = -4V and r_d = 50KΩ. Determine Av, R_i and R_o. [6]

Q.3 a Justify following statement [4]
1. MOSFET has finite output resistance
2. Current flows through the MOSFET below V_{TH}.

Q.3 b Determine the small-signal voltage gain (Av), transconductance ($g_{m)}$ and output resistance ($r_{o)}$ of a MOSFET circuit. For the circuit in figure, assume following parameters: V_{GSQ}= 2.12 V, V_{DD}= 5 V and R_D= 2.5 kΩ, V_{tn}= 1 [6]

V. K_n= 0.80 mA/V², and λ = 0.02 V⁻¹. Assume the transistor is biased in the saturation region.



OR

Q.4 a Calculate the transconductance of an n-channel MOSFET. Consider an n-channel MOSFET with parameters V_{tn} = 0.4 V, k'n = 100 μA/V², and W/L = 25. Assume the drain current is I_D = 0.40 mA. [4]

Q.4 b Derieve the expression of voltage gain, input impedance and outut impedance for N channel E-MOSFET CS amplifier with bypass capacitor. [6]

Q.5 a Calculate the voltage gain (Af), input impedance(Zif) and output impedance (Zof) for voltage-series feedback amplifier having A = -100, Ri = 10 kΩ, and Ro = 20 kΩ, feedback factor (β) = - 0.1. [4]

Q.5 b Illustrate with the neat circuit diagram Hartely oscillator and calculate oscillating frequency for L1=L2=100μH and C=0.05μF. [6]

OR

Q.6 a Sketch the block diagrams of current series and current shunt negative feedback topologies. [4]

Q.6 b Illustrate with the neat circuit diagram Colpitt Oscillator and calculate frequency of oscillations with C_1= 24nF, C_2= 240 nF and L= 10mH. [6]