PAPER ID-411440

Roll No:

BTECH
**(SEM I) THEORY EXAMINATION 2021-22**
EMERGING DOMAIN IN ELECTRONICS ENGINEERING

Time: 3 Hours   *Total Marks: 100*

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1.   **Attempt *all* questions in brief.**   **2 x 10 = 20**

a.   Determine β, if $I_E = 5$ mA, $I_C = 4.95$ mA.
b.   Define transconductance of JFET.
c.   What do you mean by CMRR?
d.   Differentiate the BJT and JFET.
e. $(1010110100.110)_2 = ( )_{16}$?
f.   Differentiate between Avalanche and Zener breakdown.
g.   Simplify the Boolean function using Boolean Algebra theorems:
        $A'B'C' + A'BC' + AB'C' + ABC'$
h.   Differentiate between Microprocessor and Microcontroller.
i.   What is Doping? What is the need of Doping?
j.   What is RADAR? Write down two applications of RADAR.

SECTION B

2.   **Attempt any *three* of the following:**   **10 x 3 = 30**

a.   What do mean by clipper? Draw the output waveform of the given circuit.
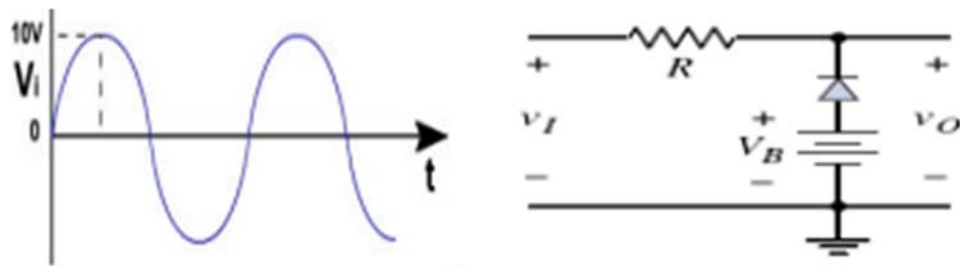
b.   Draw the Structure of Depletion type N-MOSFET. Explain its operation with characteristic graph.
c.   i)   Subtract using 10's complement: $(9754)_{10} - (364)_{10}$
        ii)   Subtract using 1's complement: $(10111)_2 - (110011)_2$
d.   Describe AM modulation and Demodulation technique with adequate diagram.
e.   Write down the characteristics of ideal OP-AMP. Derive the expression for gain of OP-AMP as non-inverting amplifier.

SECTION C

3.   **Attempt any *one* part of the following:**   **10 x 1 = 10**

(a)   Define Voltage Multiplier. Draw the circuit and explain the working of voltage Tripler and Quadrupler circuit.
(b)   Draw the V-I charateristics of zener diode. Determine the network of figure given below, determine the range of Vin that will maintain V_L at 8V and not

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exceeded the maximum power rating of the Zener diode.
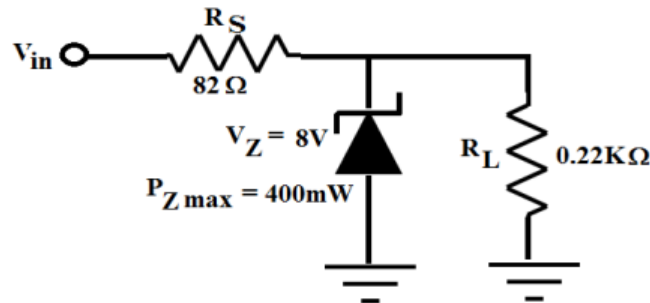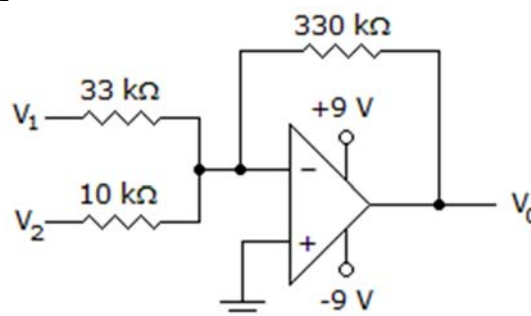

4.   **Attempt any *one* part of the following:**   10 x 1 = 10

(a)   Describe the construction and working of a NPN transistor in CE configuration with respect to size and doping. Also, draw the input and output characteristic graph.

(b)   Define α and β with respect to BJT and derive the relationship between them. A transistor having $\alpha = 0.975$ and reverse saturation current $I_{CBO} = 10\mu A$ is operated in CE mode. If the base current is $250\mu A$. Calculate I_E and I_C.

5.   **Attempt any *one* part of the following:**   10 x 1 = 10

(a)   (i) Draw and explain the working of Integrator and Differentiator using OP-AMP.
(ii) Write Short note on basic elements of communication system.

(b)   (i) Determine the output voltage of an OPAMP for the input voltage of $V_1 = 150\mu V$ and $V_2 = 140\mu V$. The amplifier has differential gain $A_d = 4000$ and CMRR is 100.
(ii) Determine the output of the following circuit.
Given $V_1 = V_2 = 0.15V$

6.   **Attempt any *one* part of the following:**   10 x 1 = 10

(a)   i) Describe briefly Satellite Communication.
ii) Explain Positive and Negative Clamper using suitable circuit diagram and input/output waveform.

(b)   An audio frequency signal **5**$Sin(2\pi \times 500t)$ is used to amplitude modulate a carrier of **25**$Sin(2\pi \times 10^5 t)$. Calculate:
(i)   Modulation index
(ii)   Amplitude of Each side band

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    (iii)   Total power
    (iv)   Bandwidth
    (v)   Transmission efficiency

7.   **Attempt any *one* part of the following:**   **10 x 1 = 10**

    (a)   Minimize using K-map and realize using NOR gates only. $F(A, B, C, D) = \Pi M(3, 4, 5, 7, 9, 13, 14, 15)$. $d(0, 2, 8)$.

    (b) $F(A, B, C, D, E) = \Sigma m(0,1,2,4,5,6,10,13,14,18,21,22,24,26,29,30)$. Simplify the function with help of K-map and realize the simplified function using basic logic gates.