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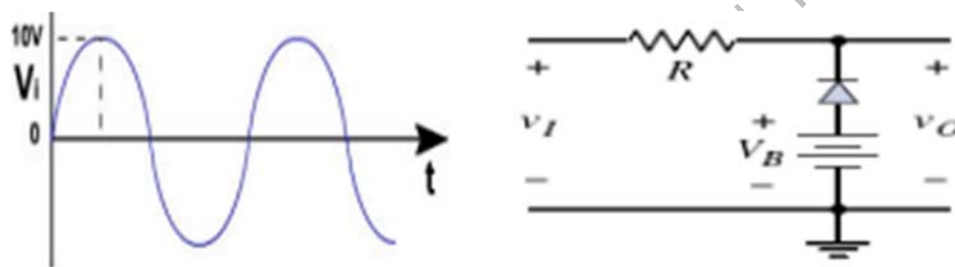
BTECH
(SEM I) THEORY EXAMINATION 2021-22
EMERGING DOMAIN IN ELECTRONICS ENGINEERING

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 $I_E = 5 \text{ mA}$, $I_C = 4.95 \text{ mA}$.
- 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:
 $A B C' + A B C' + A B C' + A B C'$
- 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**

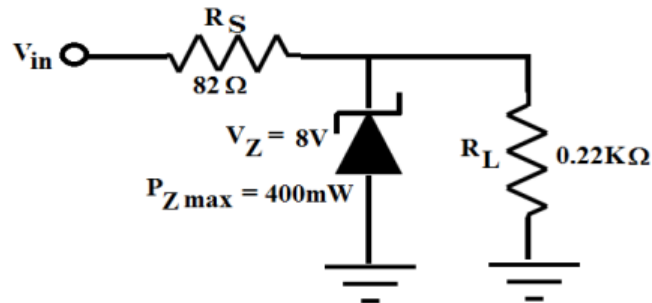
- (a) Define Voltage Multiplier. Draw the circuit and explain the working of voltage Tripler and Quadrupler circuit.
- (b) Draw the V-I characteristics of zener diode. Determine the network of figure given below, determine the range of V_{in} that will maintain V_L at 8V and not

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exceeded the maximum power rating of the Zener diode.

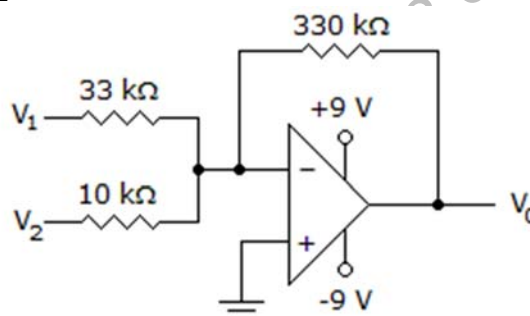


4. Attempt any *one* part of the following: 10 x 1 = 10

- (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 $I_{CBO} = 10\mu\text{A}$ is operated in CE mode. If the base current is $250\mu\text{A}$. 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 $V_1 = 150\mu\text{V}$ and $V_2 = 140\mu\text{V}$. The amplifier has differential gain $A_d = 4000$ and CMRR is 100.
(ii) Determine the output of the following circuit.
Given $V_1 = V_2 = 0.15\text{V}$



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 $5\text{Sin}(2\pi \times 500t)$ is used to amplitude modulate a carrier of $25\text{Sin}(2\pi \times 10^5 t)$. 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.

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