PAPER ID-411440

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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

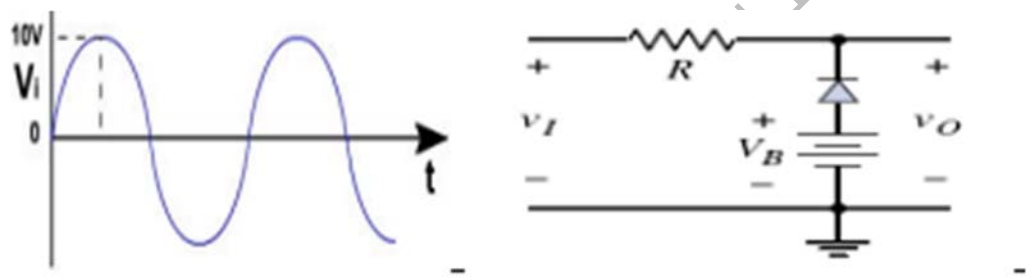
1. Attempt *all* questions in brief. 2 x 10 = 20

a. Determine β, if I_E = 5 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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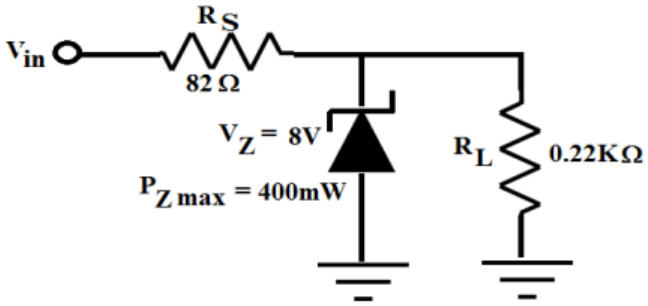
exceeded the maximum power rating of the Zener diode.



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

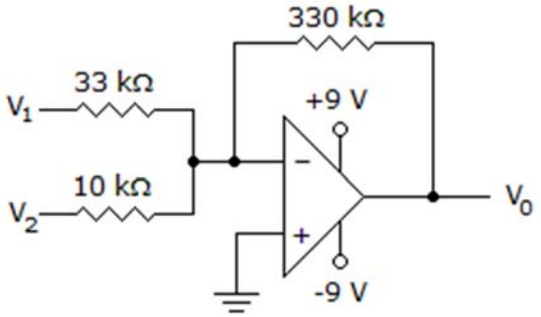
(a) Describe the construction and working of a NPN transistor in CE configuration with respect to size and doping. Also, draw the input and output characteristic graph.

(b) Define α and β with respect to BJT and derive the relationship between them. A transistor having α = 0.975 and reverse saturation current I_{CBO}= 10μA is operated in CE mode. If the base current is 250μA. 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=150μV and V_2=140μV. 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*(2π×500t) is used to amplitude modulate a carrier of **25***Sin*(2π×10^5t). 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) = ΠM (3, 4, 5, 7, 9, 13, 14, 15). d(0, 2, 8).

(b) F (A, B, C, D, E) = Σm (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.