Roll No. [redacted]

Ajay Kumar Garg Engineering College, Ghaziabad

Department of ECE

Pre-University Test

Course: B.Tech
Session: 2024-25
Subject: Fundamental of Electronics Engineering
Max Marks: 70
Semester: I[st]
Section: S11-S20
Sub. Code: BEC101
Time:3Hrs.

OBE Remarks:

Q.No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
CO No.	1	1	3	2	3	4	5	1	2	3	1	2	4	4	5	5	3
Bloom's Level	L1	L1,L3	L1	L5	L2	L5	L6	L5	L4	L2	L3	L5	L5	L6	L5	L7	L6
Weightage CO4: 16 Weightage CO5: 16																	

Note: Answer **all** the sections.

Section-A

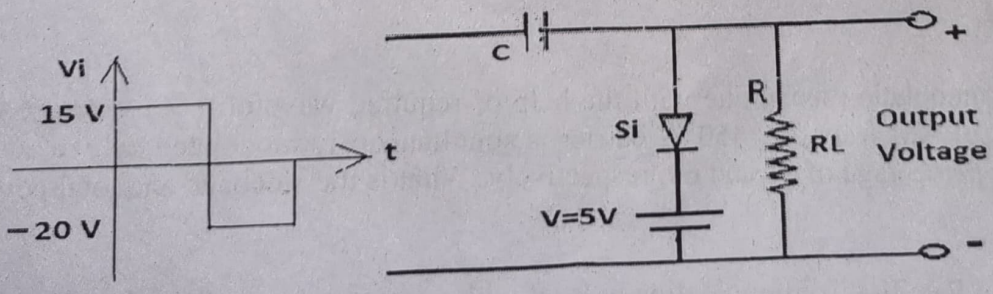
A. Attempt **all** the parts. **(7x2 =14)**

1. Explain Voltage tripler circuit in brief.
2. Compare between Avalanche breakdown and Zener breakdown
3. Define CMRR and Slew rate of Op-Amp
4. For a transistor $I_E = 10$ mA and $\alpha = 0.987$. Find I_C and I_B
5. Write down the characteristics of ideal Op-Amp.
6. Design EX-OR gate using NAND gate only
7. What is modulation. Explain modulation index used in AM.

Section-B

B. Attempt **Anythree.** **(3x7 = 21)**

8. Determine and draw the output voltage of given network.



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9. Draw and explain the construction and working of N-channel Depletion and Enhancement type MOSFET with characteristic graphs.
10. Draw the circuit diagram and explain the working of the Adder and Subtractor using OPAMP. Also, derive the expression for the output voltage.
11. Write short notes on the following topics
    (i) LED (ii) Photo Detector (iii) Varactor diode
12. Draw and explain the working of the N-P-N Transistor in Common-Emitter (CE) configuration with its characteristic graphs.

Section-C

C. Attempt **all** the parts. **(5x7 = 35)**

13. Attempt any one.

a) Convert the following:
i) $(53.625)_{10}$ to $(?)_2$
ii) Find the base x if $(211)_x = (152)_8$
iii) Subtract using 1's complement: $(10111)_2 - (110011)_2$
iv) find the 1's and 2's compliment of $(010100)_2$

b) Simplify the following Boolean expression using K-map.
$f(A, B, C, D, E) = \Sigma\, m\,(0,1,2,3,7,8,9,12,13,15,16,22,23,27,28,29,30,31) + d\,(5,6,19,20)$

14. Attempt any one.

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

b) Perform the following as mentioned:
(i) Convert $(63.250)_{10}$ to binary number.
(ii) Convert $(10010.101)_2$ to decimal number.
(iii) Convert $(A6B.0F)_{16}$ to octal number.
(iv) Perform subtraction using 2s complement $(111\text{-}1010)_2$.
(v) Design AND, OR, and NOT gates using only NOR gates

15. Attempt any one.

a) Define Amplitude modulation technique with the help of required waveform. Also derive the relation of total power of AM waves. A 450 W carrier is simultaneously modulated by two audio waves withmodulation percentage of 50 and 60, respectively. What is the sideband and total power radiated?

b) Explain RADAR and Satellite Communication in brief with necessary block diagram. Also explain Its application.

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16. Attempt any one.

a) An Audio frequency signal $10\text{Sin}(4\pi \times 500t)$ is used to amplitude modulate a carrier of $30\text{Sin}(4\pi \times 10^5 t)$. Calculate

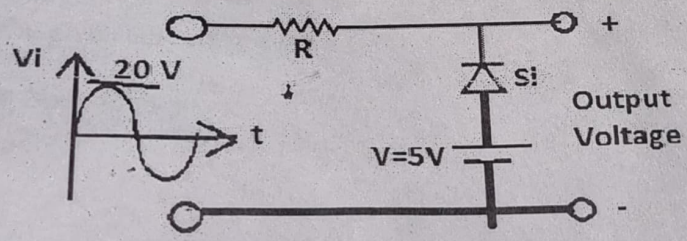
(i) Modulation Index
(ii) Amplitude of each side band
(iii) Total power delivered to the load of 1KΩ
(iv) Bandwidth
(v) Transmission efficiency

b) Explain why modulation is necessary in communication systems. Explain the demodulation techniques used to retrieve the original signal from an AM waveform.

17. Attempt any one.

a) Explain the working of op-amp as an Integrator, Unity Follower and differentiator and drive its output equation.

b) Determine and draw the output voltage of given network.



Faculty Sign

HoD Sign