MANAV RACHNA
vidyanatariksha
MANAV RACHNA UNIVERSITY
(FORMERLY MANAV RACHNA COLLEGE OF ENGINEERING
NAAC ACCREDITED 'A' GRADE INSTITUTION)
Declared as State Private University under section 2f of the UGC act, 1956

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

"T3-Examination, May-2018"

Semester:2nd	**Date of Exam**:15/05/2018
Subject:Fundamentals of Electrical & Electronics Engg.	**Subject Code**:ECH103-T
Branch: ME	**Session**:I
Course Type: Core	**Course Nature:**Hard
Time: 3 Hours	**Program: B.Tech**
Max.Marks: 80	**Signature: HOD/Associate HOD:**

PART-A

All questions are compulsory.

Q1(a). What do you mean by Zener effect? (10*2=20)

(b). Draw the ideal and non-ideal I-V characteristic curve of a p-n junction diode.

(c). Derive the terms- Ripple factor and efficiency.

(d). Derive the relation between α and β of a BJT.

(e). List any four ideal characteristics of an op-amp.

(f). Find the expression for voltage gain of an inverting amplifier using op-amp.

(g). Convert: $(1456)_{16} = (?)_8$.

(h). Simplify the Boolean Function: $Y = \overline{(\bar{A}B\bar{C})} + \overline{(A\bar{B}C)}$

(i). Perform using 2's complement: $(11010010)_2 - (01101001)_2$.

(j). Write the truth table for XOR and XNOR gates.

PART-B

Attempt any two questions.

Q2(a). Draw and explain the I-V characteristic curve of a simple p-n junction diode. (5)

(b). Differentiate between Zener and avalanche breakdown mechanism. (5)

(c). Anac voltage of 230V is applied to a half-wave rectifier through a transformer of turns ratio 10:1. Find (i) Output Voltage (ii) PIV (iii) Efficiency. Assuming diodes to be ideal. (5)

Q3(a). A 10V zener diode is used to regulate the voltage across a variable load resistor taking current from 10mA to 85mA. The input voltage varies between 13V to 16V. Calculate the value of series resistor if the minimum Zener current is 15mA. (7.5)

(b). Explain the input and output characteristics of a BJT operating in CE configuration. (7.5)

Q4(a). The emitter current I_E in a transistor is 2mA. If the leakage current I_{CBO} is 5μA and α = 0.985, calculate I_B and I_C. (5)

(b). With the help of circuit diagram explain the operation of an operational amplifier as- (i) Integrator (ii) Summing Amplifier (iii) Difference Amplifier. (10)

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PART-C

Attempt any two questions.

Q5(a). Give the truth table of Full Adder circuit. Draw its circuit diagram using basic gates. Also, Implement using half-adder only. (10)

(b). Simplify using K-Map: F(A,B,C,D) = Σm(0,2,4,6.8,10,12,14). (5)

Q6(a). Simplify and draw the logic diagram for the given expression:

$F = \overline{ABC} + \overline{AB}C + \bar{A}B\bar{C} + A\overline{BC} + A\bar{B}C$ (10)

(b). Give the IC numbers of the following gates:

NOT gate, NAND gate, NOR gate, XOR gate, OR gate. (5)

Q7(a). The capacity of 2K×16 PROM is to be expanded to 16K×16. Find the number of PROM chips required and the number of address lines in the expanded memory. (7.5)

(b). Compare the memory devices: RAM and ROM. (7.5)

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