WINTER – 2022

UNIT-1

Q.1 a) Explain the following terms **(7)**

i) Ideal diode

ii) Knee voltage

iii) Dynamic Resistance or AC resistance

iv) Reverse saturation

v) Zoner breakdown

vi) Avalanche Breakdown

b) Determine the value of emitter current and collector current of a transistor having $\alpha = 0.98$ and collector to base leakage current $IC_{BO} = 4\mu A$. The current is $50\mu A$. **(6)**

Q.2 a) Discuss the behavior of P-N junction under forward & reverse biasing. **(6)**

b) Name the three possible transistor connection. Explain the operation of transistor as an amplifier. **(7)**

UNIT-2

Q.3 a) In case of FET, the following readings are obtained

V_{GS}	–0.1V	–0.1V	–0.4V
V_{DS}	5V	14V	14V
I_D	8mA	8.3mA	7.1mA

Obtain a) A.C. Drain Resistance b) Transconductance c) Amplification factor. **(7)**

b) Define

a) The pinch-off voltage b) Channel ohmic region

c) Drain Resistance d) transconductance

e) IDSS **(6)**

Q.4 a) Draw static drain characteristics and transfer characteristic curve for N – Channel depletion type MOSFET. **(7)**

b) Sketch a typical transfer characteristics from N – channel JEFT. Show how the transconductance gm, can be derived from transfer characteristics. **(6)**

UNIT-3

Q.5 a) Determine the decimal numbers respresented by the following Binary numbers.

a) 110101 b) 101101 c) 11111111 d) 00000000 **(7)**

b) Find two's (2's) complement of the following

i) 011001000 ii) 10010010 iii) 11011000 iv) 01100111 **(6)**

Q.6 a) Convert following decimal into octal number

i) $(247)_{10}$ ii) $(0.6875)_{10}$ iii) $(2387.5100098)_{10}$ **(7)**

b) Convert following hex number into octal number

i) A72E ii) 0.BF85 **(6)**

UNIT-4

Q.7 a) Show that

$(A+B)(\overline{A}+C)(B+C)=(A+B)(\overline{A}+C)$ **(7)**

b) Draw the logic diagram and construct the truth table for

i) $X=A+B+\overline{CD}$ ii) $X=\overline{\overline{AB}+C\overline{D}+ABC}$ **(7)**

Q.8 a) Prove the following

a) $A\oplus B=\overline{A}\oplus\overline{B}$ b) $\overline{A\oplus B}=A\oplus\overline{B}$ **(8)**

c) $\overline{A+B}=A\oplus B$ d) $B\oplus(B\oplus AC)=AC$

b) Minimize the four – variable logic function using k-map F(A,B,C,D) = ∑M(0,2,3,6,8,9,12,14) **(6)**

UNIT-5

Q.9 a) Realize the logic function using

i) 16:1 Mux ii) 8:1 Mux **(6)**

b) Implement the expression using multiplexer f(A,B,C,D) = ∑(0,2,3,6,8,9,12,14) **(7)**

Q.10 a) Design 40:1 mux using 8:1 mux. **(7)**

b) Design 32:1 mux using 2 16:1 mux. **(6)**

UNIT-6

Q.11 a) Design a 3 – bit synchronous counter using j-K flip-flop. **(7)**

b) Design a 3 – bit up/down counter with a direction control M. use j-K flip-flop. **(6)**

Q.12 a) Explain 3 – bit counter using flip-flop with the help of waveforms. **(7)**

b) Identify Q and $\overline{Q}$ outputs of the clocked J-K flipflop as shown in figure **(6)**