Total No. of Questions: 10] [Total no. of pages: 02

II/IV B. TECH DEGREE EXAMINATIONS, JULY/AUGUST-2023

First Semester

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

ANALOG & DIGITAL ELECTRONICS

Time: Three Hours **Maximum: 70 Marks**

Answer ONE Question from each unit. **5 x 14 = 70 M**

All Questions carry equal marks.

UNIT-I

1. a) Explain how a NPN transistor can acts as an amplifier such that derive the voltage gain.
   b) Why is it preferred to locate the Q point at the centre of the active region for amplification purpose? Describe.

(OR)

2. Explain about CE amplifier and derive the expression for h parameters of the same. Also derive the expression for gain, input impedance and output impedance of CE Amplifier,

UNIT-II

3. a) Draw and describe the various functional blocks of an operational amplifier IC. Explain each block.
   b) Determine the output voltage for the inverting amplifier if the gain and the input voltage of the Op amp is 1000 and 20 mV dc respectively.

(OR)

4. a) The differential amplifier has the following values R_c= 50KΩ, R_e= 100KΩ, and R_s =10KΩ. The transistor parameters are $r\pi$ =50KΩ=h_{ie}, h_{fe}=V_o= 2x10^3, r_o= 400KΩ. Determine A_d, A_c and CMRR in dB
   b) Draw the equivalent circuit diagram of Op amp and derive the expression for gain of inverting amplifier.

UNIT-III

5. a) (i) Convert the given Decimal number $(242.75)_{10}$ into equivalent Binary form.

   (ii) Convert the given number $(AF.2B)_{16}$ into equivalent octal number.

   b) (i) Find the Complement of the functions $F_1 = x'yz'+x'y'z$

   (ii) Write the following Boolean expression in canonical form. (b+d) $(a'+b'+c)$

(OR)

6. a) Draw and explain the full adder circuit with required logic gates, and also draw the full adder with the NAND logic.

   b) Explain about r's and r-1 complement with example and convert the given $(AF.2B)_{16}$ into equivalent octal number.

UNIT-IV

7. a) What is 8x1 multiplexer? Design 8x1 multiplexer using 2x1.

   b) Simplify the Boolean function using K-MAP. F(w,x,y,z) = Σ(0,1,2,4,5,6,8,9,12,13,14)

(OR)

8. a) Realize the Boolean expression Σm(0,3,4,6,7,9,11,12,14,15) using 8:1 Multiplexer.

   b) What is the function of the decoder? Implement the 4:16 decoder.

UNIT-V

9. a) Explain what is the active high and active low S-R Flip Flop.

   b) What is the counter? Explain about ring counter.

(OR)

10. Explain the following with neat sketch and example.

    (a) Write the truth table of clocked T-flip flop.

    (b) Define shift registers?

    (c) Write the differences between latches and flip flops?

    (d) Write the differences between synchronous and asynchronous counters.

AM 212 (R-20)

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II/IV B. Tech. DEGREE EXAMINATIONS, FEB / MAR - 2023

First Semester

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Time : **Three Hours** Maximum : **70** Marks

Answer All Questions

Answer ONE question from each Unit. **5x14=70 M**

UNIT - I

1. a) Draw and explain the characteristics of CC configuration.

   b) Explain the construction of N channel JFET and also explain the drain and transfer characteristics of the same.

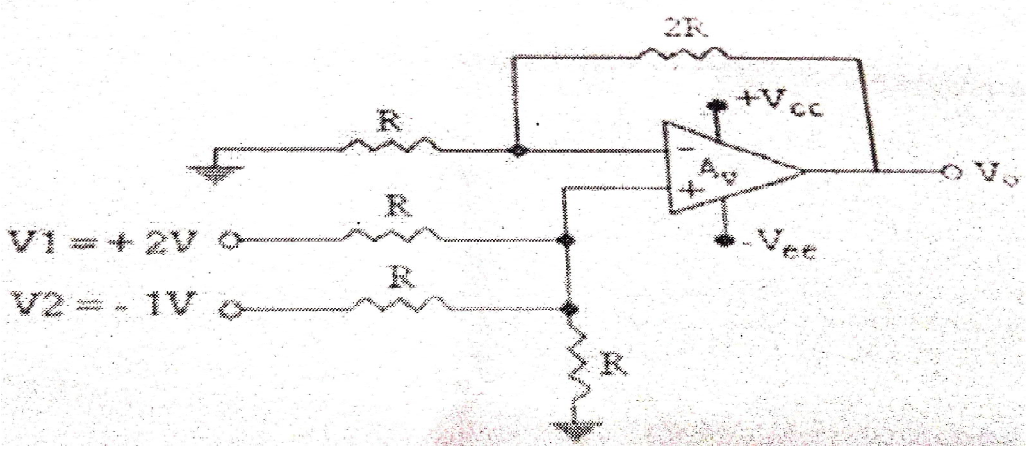
(OR)

2. a) With a neat diagram explain about Hartley oscillator & derive the expression for frequency of oscillation and condition of oscillation.

   b) A colpitt oscillator is designed with C1 = 100pf and C2 = 7500pf. The inductance is variable. Determine the range of inductance values, if the frequency of oscillation is to vary between 950 KHz and 2050 KHz.

UNIT - II

3. a) Calculate the output voltage V0 for the following non-inverting op amp summer.



P.T.O.

b) What is inverting amplifier ? Derive the expression for the gain for inverting amplifier with feedback.

(OR)

4. a) Explain the following (i) CMRR (ii) Offset current (iii) Offset voltage.

b) Discuss how op-amp works as integrator ? Derive its formulation.

UNIT - III

5. Give the two binary numbers X = $(1010100)_2$ and Y = $(1000011)_2$. Perform the (a) X-Y and (b) Y-X by using 2's complement.

(OR)

6. a) Minimize the Boolean expression F(A,B,C,D) = A'BC'D'+BCD'+BC'D'+BC'D.

b) Find the complement of the functions F1 = x'yz'+x'y'z.

UNIT - IV

7. a) What is the significance of carry look ahead adder ? Explain.

b) Explain about full subtractor with suitable example.

(OR)

8. a) Design the full adder circuit using multiplexer.

b) Simplify the Boolean function using K-MAP.
F(a,b,c,d) = Σ(0,1,2,4,5,6,8,9,12,13).

UNIT - V

9. Discus about JK flip-flop ? Write characteristics equation, state diagram of it and excitation table with its timing diagram ?

(OR)

10. Explain about serial in to parallel out converter with example.