(i) Printed Pages : 4 Roll No. .....

(ii) Questions : 9 Sub. Code : 1 3 4 2 1

Exam. Code : 5 0 4 2

**Bachelor of Computer Application (FYUP) 2nd Semester**

**(2056)**

**COMPUTER ORGANIZATION**

**Paper–NBCA201**

**Time Allowed : Three Hours]** **[Maximum Marks : 90**

**Note :—** Attempt **five** questions in all, including Question No IX (Unit-V), which is compulsory and select **one** question from each Unit-I to Unit-IV.

**UNIT–I**

I. (a) What is information representation? Explain fixed-point representation and floating-point representation. Write two differences between them?

(b) Solve the following:

(i) Convert $(745)_8$ into binary and decimal

(ii) Perform binary multiplication: $(1011)_2 \times (101)_2$

(iii) Represent -52 using 2's complement (8-bit)

(iv) Convert binary (1011) into Gray code

(v) Convert $(330.375)_{10}$ to its octal equivalent

(vi) Give the ASCII-7 equivalent for the word 'QUEEN'. 18

II. (a) Explain the need for error detection and correction? Describe CRC and Checksum codes briefly with the help of examples?

(b) Solve the following:

(i) What is the Full form of ASCII and what is the ASCII code for 'A' and 'a'?

(ii) Convert $(392.5)_{10}$ into its equivalent hexadecimal number.

(iii) Write Gray code for $(327)_{10}$.

(iv) Subtract $(1101.001)_2$ from $(11011.11)_2$.

(v) Represent the decimal number 1024 in Excess-3 Code.

(vi) Divide $(111100)_2$ by $(101)_2$. 18

## UNIT–II

III. (a) Explain logic gates and describe the following characteristics in detail:

(i) Fan-in

(ii) Fan-out

(iii) Propagation delay.

(b) Define minterms and maxterms? How are Boolean functions expressed using the *sum of minterms* and *product of maxterms*? Convert the following *Sum-of-Products* (SOP) expression into its equivalent *Product-of-Sums* (POS) expression:

F(A, B, C) = AB'C + AB'C' + A'B'C + A'B'C' + ABC' 18

IV. (a) State and prove De Morgan's theorems using Boolean algebra expressions and logic gate diagrams.

(b) What is a Karnaugh Map (K-map)? Explain its importance in simplifying Boolean expressions and digital circuits. Simplify the following Boolean function into Sum-of-Products (SOP) form using a four-variable Karnaugh Map and draw the logic diagram using AND-OR gates:

$F(A, B, C, D) = \Sigma m(0,2,4,5,6,7,8,10,13,15)$. 18

## UNIT–III

V. (a) Explain the Full Adder circuit. Draw the logic diagram and truth table, and explain how it differs from a Half Adder.

(b) Explain chip cascading. Design: 5×32 decoder using Four 3×8 decoders and one 2×4 decoder. (Use block diagrams).

(c) Implement the given Boolean function $F(A, B, C) = \Sigma (1, 2, 5, 7)$ using 3:8 Decoder. 18

VI. (a) What is an Encoder? Explain the working of a 8×3 Encoder with the help of a logic diagram and truth table.

(b) Differentiate between Combinational and Sequential circuits.

(c) Draw a logic diagram of 8 by 1 Multiplexer. 18

## UNIT–IV

VII. (a) Explain JK flip flop with the help of block diagram, truth table, circuit diagram, excitation table, characteristic equation and timing diagram.

(b) Differentiate between Synchronous and Asynchronous Counters.

(c) Draw a block diagram of Master Slave flip flop. 18

VIII. (a) Explain the working of registers. Describe shift registers SISO, SIPO, PISO, and PIPO with diagrams and applications.

(b) Define Counters. Write a note on MOD-8 Asynchronous DOWN counter with the help of block and timing diagrams. 18

## UNIT–V

IX. (a) Write truth table for 3-bit X-NOR operation.

(b) Convert binary to Hexadecimal. $(10001010)_2 = ?_{16}$

(c) What is 2's complement? Why is it preferred over 1's complement?

(d) Determine value of x if $(132)_x = (72)_8$.

(e) Explain universal gates. Show how AND, OR, and NOT gates can be implemented using only NAND gates.

(f) What are IC logic families? Explain any one logic family with their main characteristics and applications.

(g) Simplify the Boolean Expression $XY + X(Y + Z) + Y(Y + Z)$.

(h) Define propagation delay and hold time of a flip-flop.

(i) What is a Ripple Counter? 18