2021

COMPUTER APPLICATION

[MAJOR]

Paper : I

Full Marks : 100   Time : 4 Hours

The figures in the right-hand margin indicate marks.

Candidates are required to give their answers in their own words as far as practicable.

SECTION-A

1. Answer any **five** questions: 1×5=5

    a) Differentiate between 1's complement and 2's complement.

    b) Represent $(8620)_{10}$ in Hexadecimal.

    c) What is the function of a decoder?

    d) Write down the names of two useful functions in C.

    e) Define algorithm.

    f) What is "function call" in C?

    g) What is Half adder?

    h) What is toggle?

SECTION-B

2. Answer any **ten** questions: 2×10=20

    a) Outline the utility of getc( ) and putc( ) functions.

    b) Differentiate between Half adder and a Full adder.

    c) Explain the degree of a vertex with an example.

    d) Realize following Boolean function using NAND-NAND representation:

    $$Y = ab + \overline{ac} + (b+c)$$

    e) Draw an inverter using an Exclusive OR gate (two inputs).

    f) Convert the following decimal number to their respective target base:

        i) $(1525)_{10} = (?)_2$

        ii) $(2586)_{10} = (?)_8$

    g) Differentiate between combinational circuit and sequential circuit.

    h) Discuss type casting in C with example.

    i) State the difference between flowchart and algorithm.

j) Prove that the probability of the complementary event $\bar{E}$ of E is given by $P(\bar{E}) = 1 - P(E)$.

k) Obtain Gray Code for the input '1010110010'.

l) Define a complete graph.

SECTION-C

3. Answer any **five** questions: $6 \times 5 = 30$

a) Write a C program to add the upper diagonal elements of a 4×4 matrix.

b) Discuss different Loop structure in C.

c) Explain the operation of a JK flip-flop with the help of a suitable diagram.

d) Simplify the following expression using k-map:

$$F(X_1, X_2, X_3, X_4) =$$

$$\sum m(0, 1, 2, 5, 9, 10, 14)$$

e) Draw a 4-bit Two's complement adder and explain its function.

f) Realise following truth table using a multiplexer:

A	B	C	Y
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	0

g) Construct a 8×1 Multiplexer and describe its operation.

SECTION-D

4. Answer any **three** questions: $15 \times 3 = 45$

a) Prepare a flowchart to varify whether a given number is prime or net and write the corresponding program in BASIC/C. How much static memory is required by the variables in your program? $5+8+2=15$

b) i) Write a C program to create a copy of a text file "file 1. text" into another "file 2. text".

ii) What is the difference between opening a file in 'rt' and 'wt' modes?

iii) Write a BASIC program to find the number of vowels and consonants in online text.   8+3+4=15

c) i) Write a BASIC program to generate the following series:

$$1 \times 2^2 + 3 \times 4^2 + 5 \times 6^2 + ... + n \times m^2$$

ii) Write a BASIC program which will take temperature in Celsius Scale as input and give its Farenheit equivalent and vice-versa.   7+8=15

d) Write short notes on the following:
                 5×3=15

i) Pointers

ii) Structure and union in C language

iii) Enumerated data types

e) i) Why registers are used in a digital system?

ii) Describe the major four types of shift registers with block diagrams.

iii) What is a universal shift register?
                 1+12+2=15

f) i) Design a full adder circuit and implement it using NAND gates only.

ii) Design a counter to go through states 0, 1, 2, 3, 4, 5, 6, 0

iii) Simplify using Boolean Algebra.

$$A\overline{B}C + \overline{A}BC + \overline{\overline{A}\overline{B}}C$$ 6+6+3=15

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