2019

COMPUTER SCIENCE

[Honours]

PAPER – I

Full Marks : 90

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

Illustrate the answers wherever necessary

GROUP – A

Answer any **two** questions : 15×2

1. (*a*) What is function prototype ? Explain with example.   3

   (*b*) Show that the degree of a vertex of a simple graph G on n vertices can not exceed $n - 1$.   3

(c) Write a programme in C to check a given number is Armstrong number.   5

(d) Solve the equation $x^3 - 9x + 1 = 0$ by iterative method for the root lying between 2 and 4.   4

2. (a) Use simplex method to solve the problem

$$\text{Min } z = x_1 - 3x_2 + 2x_3$$
$$\text{subject to } \quad 3x_1 - x_2 + 2x_3 \leq 7$$
$$-2x_1 + 4x_2 \qquad \leq 12$$
$$-4x_1 + 3x_2 + 8x_3 \leq 10$$
$$x_1, x_2, x_3 \geq 0.$$ 8

(b) What is regula-falsi method for numerical solution of the equation $f(x) = 0$? Interprete this geometrically.   7

3. (a) Solve the LPP using penalty method

$$\text{Maximize } \quad z = 2x_1 - 3x_2$$
$$\text{s. to,} \qquad -x_1 + x_2 \geq -2$$
$$5x_1 + 4x_2 \leq 46$$
$$7x_1 + 2x_2 \geq 32$$
$$x_1, x_2 \geq 0$$ 8

(*Continued*)

(b) Convert $(784 \cdot 16)_{10} = (?)_8$. 4

(c) Write down the difference between array and structure. 3

4. (a) Solve the following assignment problem 8

	M_1	M_2	M_3	M_4
J_1	18	17	12	11
J_2	19	15	11	16
J_3	25	21	17	11
J_4	16	14	11	11

(b) Prove that a simple graph with n vertices and K components can have at most $\dfrac{(n-k)(n-k+1)}{2}$ edges. 7

GROUP – B

Answer any **five** questions : 8×5

5. Use Lagrange's interpolation to find the value of $f(x)$ for $x = 0$ using the table

x	-1	-2	2	4
$f(x)$	-1	-9	11	69

8

6. Find the optimal solution and the corresponding cost of transportation in the following transportation problem.

8

	D_1	D_2	D_3	D_4	a_i
O_1	19	20	50	10	7
O_2	70	30	40	60	9
O_3	40	8	70	20	18
b_j	5	8	7	14	

7. (a) Solve the system of equations by using Gauss-elimination method.

5

$$x + 2y + 3z = 10$$
$$x + 3y - 2z = 7$$
$$2x - y + z = 5$$

(b) Write down the difference between array and structure.

3

8. (*a*) Evaluate the integral

$$\int_0^1 \sqrt{1-x^3}\, dx$$

by Simpson's $\frac{1}{3}$ rule taking six intervals.　5

(*b*) Write a flowchart to find largest among *n* numbers.　3

9. (*a*) Write a program which will find the sum of the series :

$$x - \frac{x^3}{\lfloor 3} + \frac{x^5}{\lfloor 5} - \frac{x^7}{\lfloor 7} + ...$$　6

(*b*) What is Assembly language ?　2

10. (*a*) Write a program to concatenate two strings without using strcat ( ) function.　5

(*b*) Write down the difference between primary memory and secondary .　3

11. What is Euler graph ? Prove that a connected graph is an Euler graph iff it can be decomposed into circuits.　8

12. (a) Write a C program to calculate sum of all digits into single digit of a integer.

Example : $872 \Rightarrow 8$

    or $97 = 7$ 4

(b) Differentiate &&, unary & and binary and operator in 'C'.   4

GROUP – C

Answer any **five** questions : 4×5

13. (a) Prove that

$$\Delta^m \cdot \Delta^n = \Delta^{m+n}$$ 2

(b) Calculate the error committed in composite trapezoidal.   2

14. Solve the LPP using graphical method :

Maximize $z = 2x_1 + 4x_2$

s. to, $x_1 + 2x_2 \leq 5$

                $x_1 + x_2 \leq 4$

                $x_1, x_2 \geq 0$ 4

15. What is flow chart ? Draw a flow chart to find highest numbers among three numbers. $1 + 3$

16. Write short notes about Cache memory and non-impact printer. 4

17. Calculate (i) $(4ABE)_{16} = (?)_{10}$
   (ii) $(333)_4 = (?)_5$ $2 + 2$

18. Write short note on ASCII and EBCDIC. $2 + 2$

19. Solve the LPP using graphical method

   Max $z = x_1 + 5x_2$
   subject to $\quad 3x_1 + 4x_2 \leq 6$
   $\quad\quad\quad\quad x_1 + 3x_2 \geq 3$
   $\quad\quad\quad\quad x_1, x_2 \geq 0.$ 4

20. Write a program in C to copy the contents of one file to another file ? 4

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