

2018

COMPUTER SCIENCE

[Honours]

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

Illustrate the answers wherever necessary

GROUP – A

Answer any two questions : 15 × 2

1. (a) Show that connected graph G is an Euler graph if and only if it can be decomposed into circuits.

(b) Write a program in C to check a number is palindrome or not. 8 + 7

(Turn Over)

2. (a) Evaluate :

$$\int_0^6 x \sin x^2 dx$$

by Simpson's 1/3 rule on taking $h = 0.1$.

(b) Determine the optimal sequence of jobs that minimizes the total elapsed time based on the following information (processing time on machines is given in hours and passing not allowed) :

	Job						
	A	B	C	D	E	F	G
Machine M_1	3	8	7	4	9	8	7
Machine M_2	4	3	2	5	1	4	3
Machine M_3	6	7	5	11	5	6	12
							7 + 8

3. (a) Prove that a simple graph with n vertices and k components can have atmost

$$\frac{(n-k)(n-k+1)}{2}$$

edges.

(3)

(b) Solve the LPP using Big-M method :

$$\text{Maximize } Z = x_1 + 2x_2$$

$$\text{subject to, } x_1 - 5x_2 \leq 10$$

$$2x_1 - x_2 \geq 2$$

$$x_1 + x_2 = 10$$

$$x_1, x_2 \geq 0.$$

7 + 8

4. (a) What do you mean by conditional operator ?
Give an example.

(b) When register storage class is mostly useful ? What is the use of the 'extern' keyword ? Illustrate with an example.

(c) Find the optimal (minimum) solution of the following transportation problem :

	D_1	D_2	D_3	D_4	a_i
O_1	10	7	3	6	3
O_2	1	6	8	3	5
O_3	7	4	5	3	7
b_j	3	2	6	4	3 + 5 + 7

GROUP – B

Answer any five questions : 8×5

5. (a) Perform the subtraction with the following binary numbers using :
- (i) 2's Complement } $10010-10011$
(ii) 1's complement }
- (b) What is the purpose of an adder ? Draw the circuit of half adder using NAND gates. $4 + 4$
6. What is Comma Operator ? Illustrate with examples. Write down syntax of switch statement and discuss the working principle of this statement. Differentiate $i++$ and $++i$ with appropriate examples. $2 + 3 + 3$
7. Using Newton's divided difference formula find the value of $f(8)$ and $f(6)$ from the following data : 8

x	:	4	5	7	8	11	13
$f(x)$:	48	98	273	374	409	1034

8. Solve the following assignment problem : 8

	<i>M1</i>	<i>M2</i>	<i>M3</i>	<i>M4</i>
<i>J1</i>	18	17	12	11
<i>J2</i>	19	15	11	16
<i>J3</i>	25	21	17	11
<i>J4</i>	16	14	11	11

9. (a) Write short notes on :
- (i) for loop in C
 - (ii) do-while loop in C.
- (b) Discuss the Kruskal's algorithm for finding the shortest spanning tree in a connected graph. 4 + 4
10. (a) What are the differences between
- (i) source program and object program and
 - (ii) compiler and interpreter.
- (b) What kind of information is represented by a pointer variable ? What is the relationship between the address of a variable *v* and the corresponding pointer variable *pv* ? 4 + 4

11. (a) Derive Newton's backward interpolation formula for equispaced nodes.
- (b) Define spanning tree of a connected graph. 6 + 2
12. (a) Describe machines assembly and high level languages. Compare them.
- (b) Convert an octal number $(3502.65)_2$ to its equivalent binary number. 6 + 2

GROUP – C

Answer any five questions : 4 × 5

13. What are ASCII codes ? Discuss the utility of ASCII codes. 4
14. (a) State the respective rates of convergence of the Regula-falsi and the Newton-Raphson methods.
- (b) What is Word ? 2 + 2
15. Write a C program to calculate \sqrt{x} without using `sqrt ()`. 4

16. (a) What do you mean by getch () ?
(b) Differentiate between '=' and '==' operator in C. 2 + 2
17. Write an algorithm to find GCD and LCM between two numbers. 4
18. What is the difference between a positional and a non-positional number system ? Give examples of both types of number systems . 4
19. (a) When Gauss-Elimination method fails ?
(b) What is the condition for the convergence of Gauss-Seidel method ? 2 + 2
20. Show that the number of odd degree vertices in a graph is always even. 4

[*Internal Assessment* : 10 Marks]

