BCA 3rd Semester Examination, 2019

MICROPROCESSOR PROGRAMMING AND NUMERICAL LAB

(Practical)

PAPER —2197

Full Marks : 100

Time : 3 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

SET — 1

Answer any **one** questions from each Group
on **lottery** basis :   25 × 2

GROUP — A

(*Microprocessor Programming*)

1. Write an assembly language program to generate triangular wave form using 8255. Use CRO to show the output.

2. Write an ALP to convert BCD number in memory to the equivalent HEX number.

3. Write an ALP to show 0 to 9 using 7 - segment display and delay between each number should be 10 sec.

4. Design a traffic control in which the red (signal) glow 10 sec, yellow glow 15 sec and green glow 5 sec.

5. Write an ALP to find 1's and 2's complement of any 8 bit number.

6. Write an assembly language program to display "TOPOLOGY" in 7-SEGMENT DISPLAY.

7. Write an ALP to perform the addition of two 16 bit numbers using 8051 microcontroller.

(Continued)

8. Write a program to generate triangular wave form using 8255. Use CRO to show the wave.

9. Write an ALP to generate square wave of 1ms delay using 8255A.

10. Add the numbers 86H and 81H. If the sum is greater than AAH, store FFH in memory location XX50H, otherwise store the sum to the specified memory location.

GROUP — B

(*Numerical Lab*)

11. Write a program to find the root of an equation by Newton-Raphson method of the function

$$f(x) = 3x - 3\cos x - 7 = 0$$

12. Write a program to find the value of a function $f(x)$ using given tabular values by Lagrange

Interpolation method. Test the program to find $f(2.18)$ using the following :

x	2	2.2	2.4	2.6	2.8	3
$f(x)$	0.30103	0.34242	0.38041	0.41497	0.44716	0.47721

13. Write a program to solve following system of equations by Matrix-inversion method

$$-27x - 6y + z = 85$$
$$6x + 15y + 27z = 72$$
$$x + y + 54z = 110$$

14. Write a program to solve following system of equation by Gauss-elimination method :

$$x + 2y + 3z = 7$$
$$2x + 7y + 15z = 26$$
$$3x + 15y + 41z = 26$$

15. Find the root of $x^3 - 8x - 4 = 0$ which lies between 3 and 4, by Newton-Rephson Method.

16. Find a root of the equation

$$3x - \cos x - 1 = 0,$$

by Regula-Falsi Method.

17. Solve following system of equation by Gauss-Jacobi iteration method (Iteration method)

$$20x_1 - x_2 + x_3 = 23.28$$
$$x_1 + 15x_2 - x_3 = 29.92$$
$$2x_1 + x_2 - 20x_3 = -55.64$$

18. Find one root of $10^x + \sin x + 2x = 0$ using Bisection method.

19. Evaluate

$$\int_0^5 \frac{dx}{1+x}$$

by trapezoidal rule, taking $h = 1$.

20. Given the following table, find $f(x)$ assuming it to be a polynomial of degree three in x

$$x \ : \ 0 \qquad 1 \qquad 2 \qquad 3$$

$$f(x) : 12 \qquad 11 \qquad 34$$

Using Lagrange interpolation formula.

Viva-voce — 15

Laboratory Note Book — 5

[*Internal Assessment* : 30 Marks]

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SET – 2

Answer any **one** questions from each Group on **lottery** basis : 25 × 2

GROUP – A

(*Microprocessor Programming*)

1. Write an ALP to perform the addition of two 16 bit numbers using 8051 microcontroller..

2. Write a program to generate triangular wave form using 8255. Use CRO to show the output.

3. Write an ALP to convert BCD number in memory to the equivalent HEX number.

4. Write an ALP to check whether a given year is leap year or not.

5. Write an ALP to generate square wave of 1ms delay using 8255A.

6. Write an assembly language program to find largest number in an array of data.

7. Write an ALP to scroll 'C' to four seven segment display.

8. Design a traffic control in which the red(signal) glow 20 sec, yellow glow 5 sec and green glow 15 sec.

9. Design and write an assembly language program to display "LIGHT" IN 7-<u>SEGMENT DISPLAY</u>.

10. Write a program to transfer a block of data from one memory zone to another.

GROUP – B

(*Numerical Lab*)

11. Find positive roots of $x^3 - 3x + 1.06 = 0$ using Bisection method.

12. Calculate the value of $\int_0^1 \frac{xdx}{1+x}$ correct up to three significant figures taking six intervals by Simpson's one third rule.

13. Evaluate

$$\int_0^5 \frac{dx}{1+x}$$

by trapezoidal rule, taking $h = 1$.

14. Write a program to solve a system of equation using Gauss-elimination method :

$$x + 2y + 3z = 7$$
$$2x + 7y + 15z = 26$$
$$3x + 15y + 41z = 26$$

15. Find the root between $(2, 3)$ of $x^3 + 2x - 5 = 0$, by using Regula-Falsi method.

16. Calculate $y(0.4)$ from the equation

$$\frac{dy}{dx} = x - y, \quad y(0) = 1, \text{ taking } h = 0.1$$

by Runga-Kutta method, correct up to five decimal places.

17. Solve the following system of equation Gauss-seidel iteration method :

$$x_1 + x_2 + 4x_3 = 9$$
$$8x_1 - 3x_2 + 2x_3 = 20$$
$$4x_1 + 11x_2 - x_3 = 33$$

18. Apply Gauss-Jacobi method to solve following system of equation

$$4x_1 - x_2 - x_3 = 3$$
$$-2x_1 + 6x_2 + x_3 = 9$$
$$-x_1 + x_2 + 7x_3 = -6$$

19. Given the following table, find by Lagrange's Formula the value of y when $x = 102$

x :	93.0	96.2	100.0	104.2	108.7
$f(x) = y$:	11.38	12.80	14.70	17.07	19.91

20. Write a program to solve following system of equations by Matrix-inversion method

$$-27x - 6y + z = 85$$
$$6x + 15y + 27z = 72$$
$$x + y + 54z = 110$$

Viva-Voce — 15

Laboratory Note Book — 5

[*Internal Assessment* : 30 Marks]