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**GIET UNIVERSITY, GUNUPUR – 765022**

M. Sc (First Semester) Examinations, May – 2021

**20PHPC103 – COMPUTER PROGRAMMING AND NUMERICAL ANALYSIS
(Physics)**

Time: 2 Hours

Maximum: 50 Marks

(The figures in the right hand margin indicate marks.)**PART – A****(2 x 10 = 20 Marks)**Q.1. Answer **ALL** questions

- a. What will be the output of the following C program?

```
#include<stdio.h>
int main()
{
    char num = '\010';
    printf("%d", num);
    return 0;
}
```

- b. Comment on the statement “In C language all function except main() can be recursive?”. Justify your answer.
- c. What kind of data type is used in the following program line?

```
#include<stdio.h>
#include<math.h>
float f(float x)
{
    return x*log10(x) - 1.2;
}
float df (float x)
{
    return log10(x) + 0.43429;
}
```

- d. Infer the polynomial that is employed in the following program and what does the variable ‘df’ does in this program?

```
double f(double x)
{
    return x*x*x-27;
}

double df(double x){
    return 3*x*x;
}
```

- e. Distinguish between Newton Raphson’s method and bisection method.

- f. Brief the procedure employed in Gauss elimination method.
- g. Can matrix inversion method be applied when the coefficient matrix of the linear simultaneous system is singular? Justify your answer.
- h. What is merit of using Runge-Kutta method of order 4 over Euler's method in solving an initial value problem?
- i. Compare and contrast: Trapezoidal rule and Simpson's (3/8)th rule.
- j. State the procedure involved in finding the numerically largest Eigen value of the given matrix.

PART – B

(6 x 5 = 30 Marks)

Answer **ANY FIVE** questions

Marks

2. Define array. What is the advantage of using it in numerical analysis? (6)
3. Write a C program to evaluate the root of the equation $f(x) = 3x - \cos(x) - 1$ by using Newton - Raphson's method. (6)
4. Write a C program to construct a Newton's forward difference table for any given set of data. (6)
5. The following table gives melting point of an alloy of zinc and lead, 'Y' is the temperature and 'X' is the percentage of lead. Using Newton's backward interpolation formula, find 'Y' as a polynomial in 'X'. Also estimate the value of 'y' when $X = 84$. (6)

X	40	50	60	70	80	90
Y	184	204	226	250	276	304

6. Solve the following system of equation by Gauss Elimination Method. (6)
 $2x + y + 4z = 12$, $8x - 3y + 2z = 20$, $4x + 11y - z = 33$.
7. Find numerically largest Eigen value of $A = \begin{bmatrix} 1 & 6 & 1 \\ 1 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix}$ and its corresponding Eigen vector by power method. (6)
8. Using Runge-Kutta method of order 4 solve the initial value problem (6)
 $\frac{dy}{dx} = \frac{5x^2 - y}{e^{x+y}}$, $y(0) = 1$ by assuming $h = 0.5$.

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