**B.Sc. 6th Semester (Programme) Examination, October 2020**

**Subject: Mathematics**

**Course ID: 62110**             **Course Code: SP/MTH/604/SEC-4**

**Course Title: Numerical Analysis with Practical**

**Full Marks: 13**             **Time: 1 Hour**

## <u>The figures in the margin indicate full marks</u>

1. **Answer *any <u>one</u>* of the following questions:**       **(1×2=2)**

   **a)** What are the different types of errors in Numerical Analysis?

   **b)** Given $y' = x + y$ , $y(0) = 1$. Find $y(0.1)$ by Euler's Method.

   **c)** If $\phi(x)$ is continuous in $[a,b]$ then under what condition in $[a,b]$ the iterative method $x = \phi(x)$ will have a unique solution in $[a,b]$?

2. **Answer *any <u>one</u>* of the following questions:**       **(1×5=5)**

   **a)** Find the cubic polynomial which takes the following values:

   $y(1) = 24$ , $y(3) = 120$ , $y(5) = 336$ , $y(7) = 720$ . Deduce the value of $y(8)$.

   **b)** Evaluate $I = \int_{0}^{\pi/2} \sqrt{\sin x}\,dx$, using Simpson's $\frac{1}{3}$ rule using $h = \frac{\pi}{12}$.

   **c)** Solve by Gauss Elimination method:

   $2x + y + z = 10$ ,

   $3x + 2y + 3z = 18$ ,

   $x + 4y + 9z = 16$ .

3. **Answer *any* _two_ of the following questions either from (a) or from (b):**

**(2×3=6)**

**a)** i) Deduce the Newton's forward interpolation formula.

ii) Find $\dfrac{dy}{dx}$ and $\dfrac{d^2y}{dx^2}$ at $x = 0.4$ from the following table:

| x | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 |
|---|---|---|---|---|---|
| y | 1.5836 | 1.7974 | 2.0442 | 2.3275 | 2.6511 |

iii) Describe Newton-Raphson iteration process to find real roots of algebraic and transcendental equation.

iv) What is the difference between local and global variable declaration? What is the purpose of using 'return' statement in C function subprogram?

**b)** i) Evaluate $I = \int\limits_{0}^{1} \dfrac{1}{1+x}\,dx$ , using Trapezoidal rule with $h = 0.125$.

ii) Find the missing term in the following data:

| x | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| y | 1 | 3 | 9 | - | 8 |

iii) Discuss the process of Gauss–Seidel iteration method for solution of system of linear equations.

iv) Write down a C-program to find the sum $\sum \dfrac{1}{n}$ for finite number of terms.

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**B.Sc. 6<sup>th</sup> Semester (Programme) Examination, October 2020**

**Subject: Mathematics**

**Course ID: 62110**                               **Course Code: SP/MTH/604/SEC-4**

**Course Title: Computer Graphics**

**Full Marks: 20**                                       **Time: 1 Hour**

**<u>The figures in the margin indicate full marks</u>**

1. **Answer *any two* of the following questions:**                               **(2×2=4)**

   a) What is computer graphics?

   b) What is the full form of CRT?

   c) Define aspect ratio.

   d) Which algorithm is the faster method for calculating pixel positions?

   e) What is scan conversion?

   f) What is Pixel?

   g) What is translation?

   h) What is frame?

2. **Answer *any two* of the following questions:**                               **(5× 2 =10)**

   a) Express a line from (10,12) to (20,16) on a raster screen using Bresenham's straight line drawing algorithm.                               (5)

   b) What do you mean by resolution? A screen has 1024 scan lines with aspect ratio 4:3 and bit depth 16, how many bit per pixel are required to show 60 frames per second?

                                                            (2+3=5)

**c)** How much time is spent scanning across each row of pixels during screen refresh on a raster system with resolution of 1280 X 1024 and a refresh rate of 60 frames per second.                    (5)

**d)** Write down the anti-clockwise and clockwise rotation matrices.                    (5)

**e)** Define image and object. How an image is represented mathematically?                    (2+3=5)

**f)** Explain DDA line drawing algorithm with an example.                    (5)

**3. Answer *any two from either a) or b)*:**                    **(2×3=6)**

a)   (i) Write a short note on scaling.

(ii) Write a short note on scan-conversion of a line.

(iii) Write a detailed note on the basic two-dimensional transformations.

(iv) What is line clipping? Explain Cohen-Sutherland line clipping algorithm with suitable example.

b) (i) How color is handled in RGB color model? Explain the use of indexed color for setting color attribute.

(ii) What are input and output devices in computer graphics?

(iii) Write short notes on raster graphics and vector graphics.

(iv) What are point and line?

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