QP CODE: 24000617

Reg No : Name :

B.Sc DEGREE (CBCS) REGULAR / REAPPEARANCE EXAMINATIONS, MARCH 2024 Sixth Semester

CHOICE BASED CORE COURSE - PH6CBT03 - COMPUTATIONAL PHYSICS

Common for B.Sc Physics Model I, B.Sc Physics Model II Applied Electronics, B.Sc Physics Model II Computer Applications & B.Sc Physics Model III Electronic Equipment Maintenance

2017 Admission Onwards

B4B9506E

Time: 3 Hours

Max. Marks : 80

Part A

Answer any **ten** questions. Each question carries **2** marks.

- 1. Write down the formula for Newton-Raphson method.
- 2. What is Crout's Method?
- 3. Which are the two iterative methods for the solution of a system of linear algebraic equations?
- 4. What is Gauss-Seidel iterative method?
- 5. What do you mean by least square fitting?
- 6. What do you mean by interpolating polynomial?
- 7. What is displacement operator?
- 8. State second order Newton's divided difference interpolation polynomial.
- 9. Write the ways to find maxima and minima of the function given the tabular values.
- 10. When does Simpson's rule give exact result?
- 11. Write Taylor's series formula.
- 12. What is the other name for Heuns method?

(10×2=20)

Part B

Answer any **six** questions. Each question carries **5** marks.

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13. Find a real root of the equation $x^3-x-11=0$ by using bisection method.



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- ^{14.} Use the secant method to estimate the root of the equation x^2 -4x-10=0 with the initial estimates of x_1 =4 and x_2 =2.
- 15. Solve the following system of equation by Gauss elimination method, 2x+3y=5; 3x-y=2.

| 16. | Find Newton's for | orward interpolation | polynomial | for the given data. |
|-----|-------------------|----------------------|------------|---------------------|
|-----|-------------------|----------------------|------------|---------------------|

| Х | 0 | 1 | 2 | 3 |
|---|---|---|---|----|
| Y | 2 | 4 | 8 | 14 |

17. From the following values evaluate $\sqrt{155}$ using Lagrange's interpolation formula.

| X 150 | | 152 | 154 | 156 | |
|-------|--------|--------|--------|--------|--|
| Y=√x | 12.247 | 12.329 | 12.410 | 12.490 | |

18. Find the first two derivatives of $x^{1/3}$ at x=50 and x=56 given the table below:

| х | 50 | 51 | 52 | 53 | 54 | 55 | 56 |
|--------------------|--------|--------|--------|--------|--------|--------|--------|
| y=x ^{1/3} | 3.6840 | 3.7084 | 3.7325 | 3.7563 | 3.7798 | 3.8030 | 3.8259 |

- 19. Evaluate the integral $I = \int_{4}^{5.2} log_e x \, dx$ using Trapezoidal rule.
- 20. Solve $y'+y=e^x$, y(0)=0 by Picard's method.
- Apply Runge's method to find an approximate value of y when x=0.2, given y'=x+y and y (0)=1.

(6×5=30)

Part C

Answer any **two** questions.

Each question carries **15** marks.

- Find the real root lying between 1 and 2 of the equation x³-3x+1=0 upto 3 places of decimals by using Regula-falsi method.
- Solve the following system of equations by Gauss Jordan method: x+y+z=9, 2x-3y+4z=13, 3x+4y+5z=40.
- ^{24.} Fit an equation of the form $y = ax^b$ for the following data

| x | 2 | 3 | 4 | 5 | 6 |
|---|-----|-------|-------|-------|-------|
| у | 142 | 172.8 | 207.4 | 248.8 | 298.6 |

25. Explain modified Euler method. Using this method , find y(0.2), y(0.1), given $\frac{dy}{dx} = x^2 + y^2$, y(0)=1.

(2×15=30)

