**SET-3**

# INDIRA UNIVERSITY, PUNE

***SCHOOL OF INFORMATION TECHNOLOGY- BSC CS***

***Backlog Examination (2025 Pattern) April/ May – 2026 - Semester – I***

**Subject Name: Numerical Methods** **Max. Marks: 25**
**Subject Code: 25BSC103T** **Time: 1:30 Hrs.**

**Instructions**

- All Questions are Compulsory.

| CO # | Cognitive Ability | Course Outcome |
|---|---|---|
| **CO2** | **Understand** | Explain the logic and reasoning behind numerical methods used in solving equations, interpolation, integration, and differential equations |
| **CO3** | **Apply** | Analyze the behavior, limitations, and suitability of various numerical methods in different scenarios. |
| **CO6** | **Create** | Design and construct computational approaches using numerical techniques to solve applied science or engineering problems. |

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| Q1. | **Attempt any 5 out of 7. (1 mark each) (5 Marks)**<br>a) Round off the number 0.004837 to three decimal digits, Illustrate its absolute error.<br>b) Define the following terms. Percentage error<br>c) Write the newton's forward interpolation formula.<br>d) Write the Lagrange's interpolation formula.<br>e) Write the Simpson's 1/3rd rule for numerical integration.<br>f) Illustrate the conditions must be satisfied for Simpson's 3/8th rule<br>g) Write any two application of interpolation in real word. | CO2 |
| Q2. | **Attempt any 2 out of 4. (5 marks each) (10 Marks)**<br>a) By using Newton-Raphson method, Construct the root of $x^2 - 2x - 1 = 0$ which is near to $x_0 = 1$ Correct to 2 decimal places<br>b) Construct the forward difference table of the following data<br>x: 1, 2, 3, 4<br>y: 1, 0, 1, 10 | CO6 |

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| | c) Solve $\int_0^6 2x\, dx$ by trapezoidal rule. Take h = 1<br>d) Given that $\frac{dy}{dx} = 2(x + y)$ , with y(0)=1 ,Construct y(0.1) by Euler's Method, h=0.1. | |
| Q.3.<br>Q.3.A | **Attempt all questions. (5 marks each) (10 Marks)**<br>i. Use the Runge-Kutta second order method to construct y at x =0.1. Given that $\frac{dy}{dx} = 2x + 2y$, y (0) = 2, Take h = 0.1<br>ii. Using Simpson's 1/3rd rule to solve $\int_0^6 2x^2\, dx$ with h=1.<br>**OR** | **CO3** |
| Q.3.B | Solve $\int_0^6 2x^2\, dx$ by using simpson's 3/8th rule, take h=1 | |

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