

B.Sc. 5th Semester (Honours) Examination, 2019-20**COMPUTER SCIENCE****Course ID : 51516****Course Code : SH/CSC-503-DSE-I****Course Title: Numerical Methods****Time: 1 Hour 15 Minutes****Full Marks: 25**

*The figures in the right hand side margin indicate full marks.
Candidates are required to give their answers in their own words
as far as practicable.*

1. Answer *any five* questions: 1×5=5
- What do you mean by the rate of convergence?
 - What do you mean by the order of a numerical method?
 - Write the ordinary format for floating point representation.
 - Which method for root finding is most effective?
 - Distinguish between Gauss and Gauss-Jordan method for solving a system of linear equations.
 - Why interpolation is needed?
 - Distinguish between interpolation and extrapolation.
 - Name some methods for numerical integration.
2. Answer *any two* questions: 5×2=10
- Why Regula-Falsi method is used? Write an algorithm for Regula-Falsi method. 1+4=5
 - Why Gauss-Seidel method is used? Discuss the method. 1+4=5
 - Use Newton-Raphson method, with 3 as starting point, to find a fraction that is within 10^{-8} of $\sqrt{10}$. Show that your answer is indeed within 10^{-8} of the truth. 4+1=5
 - Discuss various approaches for numerical differentiation.
3. Answer *any one* question: 10×1=10
- From the following data, estimate the number of persons earning weekly wages between Rs. 60 and Rs. 70:
- | | | | | | |
|------------------------------|------|-------|-------|--------|---------|
| Wages (Rs.) | < 40 | 40–60 | 60–80 | 80–100 | 100–120 |
| No. of persons (in thousand) | 250 | 120 | 100 | 70 | 50 |
- Name some extrapolation techniques. 8+2=10

- (b) Using Rk method of fourth order, solve $\frac{dy}{dx} = 3x + y/2$ with $y(0) = 1$, at $x = 0.2$, taking $h = 0.1$. 10×1=10

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Course Title: Operational Research

Time: 1 Hour 15 Minutes**Full Marks: 25**

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as far as practicable.*

1. Answer *any five* questions: 1×5=5
- State some demerits of OR.
 - In which century OR started to develop as a new field?
 - What is convex set?
 - What do you mean by linear independence of vectors?
 - Define dual problem.
 - Why sensitivity analysis is done?
 - Why big-M method is so important?
 - When phase switching is done in two phase method?
2. Answer *any two* questions: 5×2=10
- Prove that every convex polyhedron is a convex set.
 - What are the various phases of OR? Discuss.
 - Briefly discuss how OR may be used in decision making at management level.
 - Consider the problem:

$$\text{Max } z = 3x_1 + 4x_2 \text{ subject to}$$

$$4x_1 + 3x_2 \geq 12, x_1 + 2x_2 \leq 2, x_1 \geq 0, x_2 \geq 0$$
 Show graphically that the problem has no feasible extreme points. What can be concluded regarding its solution?
3. Answer *any one* question: 10×1=10
- Solve the following problem using big-M Method:

$$\text{Min } Z = 2x_1 - 3x_2 + 6x_3 \text{ subject to}$$

$$3x_1 - 4x_2 - 6x_3 \leq 2$$

$$2x_1 + x_2 + 2x_3 \geq 11$$

$$x_1 + 3x_2 - 2x_3 \leq 5$$

$$x_1, x_2, x_3 \geq 0$$

(b) Solve the following problem by solving its dual:

Max $Z = y_1 + y_2 + y_3$ subject to

$$2y_1 + y_2 + 2y_3 \leq 2$$

$$4y_1 + 2y_2 + y_3 \leq 2$$

$$y_1, y_2, y_3 \geq 0$$
