**18P272** (Pages: 2) Name:……………………..

Reg. No:…………………..

**SECOND SEMESTER M.Sc. DEGREE EXAMINATION, APRIL 2019**

(Regular/Improvement/Supplementary)

(CUCSS - PG)

(Computer Science)

**CC17P CSS2 E05 - NUMERICAL AND STATISTICAL METHODS**

(2017 Admission onwards)

Time: Three Hours Maximum: 36 Weightage

**PART A**

Answer ***all*** questions. Each question carries 1 weightage.

1. Write the formula for Bairstow's and Newton-Raphson methods.
2. Differentiate between linear and nonlinear equations.
3. Define Simpson's $3/8^{th}$ rule.
4. What is conditional probability?
5. What is an optimal solution?
6. What is an iterative method?
7. Differentiate between absolute and relative errors.
8. What is interpolation? State any three methods.
9. What is a random variable?
10. State the axioms of probability.
11. How to convert an asymmetric assignment problem to a symmetric problem?
12. Define degeneracy in transportation problem.

**(12 x 1 = 12 Weightage)**

**PART B**

Answer any ***six*** questions. Each question carries 2 weightage.

13. Obtain a root of the equation correct to four decimal places $x^3 - 4x - 9 = 0$ by False position method.
14. Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using Simpson's 1/3 rule taking h = 1/4
15. Consider a transportation problem in which the cost, supply and demand values are presented in the given table.

| | **1** | **2** | **3** | **Supply** |
|---|---|---|---|---|
| 1 | 5 | 4 | 3 | 100 |
| 2 | 8 | 4 | 3 | 300 |
| 3 | 9 | 7 | 5 | 300 |
| **Demand** | 300 | 200 | 200 | |

i) Is this a balanced problem? Why?

ii) Obtain the initial feasible solution using the North-West Corner rule.

16. Explain Newton's forward interpolation method with an example.
17. Solve the following system of equation using Gauss elimination method.

$$x + y + z = 3$$
$$2x + 3y + z = 6$$
$$x - y - z = -3$$

18. A bag contains 7 red, 12 white and 4 green balls. What is the probability of 3 balls drawn are all white?
19. Using Milne-Simpson's method solve $y' = 30 - 5y$ with $y(0) = 1$, over $0 \leq t \leq 5$
20. State and prove Bayes theorem.
21. Solve the linear equations using graphical method. $2x + y \geq 8, 2x + 2y \geq 10,$ $x \geq 0, y \geq 0$

**(6 x 2 = 12 Weightage)**

## PART C

Answer any ***three*** questions. Each question carries 4 weightage.

22. Solve the following system of equations using Secant method $2x - 3y + 10z = 3,$ $-x + 4y + 2z = 20, \quad 5x + 2y + z = 12$
23. Use Runge-Kutta $4^{th}$ order method to find the values of y (0.1) and y (0.2), given that $\frac{dy}{dx} = x + y^2$, y (0) =1, and h = 0.1
24. Estimate f (6) using Lagrange's interpolation formula from the following data

| x | 3 | 7 | 9 | 10 |
|---|---|---|---|---|
| f (x) | 168 | 120 | 72 | 63 |

25. Derive Gauss-Seidel formula.
26. Four jobs ($J_1$, $J_2$, $J_3$, and $J_4$) need to be executed by four workers ($W_1$, $W_2$, $W_3$, and $W_4$), one job per worker. The matrix below shows the cost of assigning a certain worker to a certain job. Minimize the total cost of the assignment.

| | **$J_1$** | **$J_2$** | **$J_3$** | **$J_4$** |
|---|---|---|---|---|
| **$W_1$** | 82 | 83 | 69 | 92 |
| **$W_2$** | 77 | 37 | 49 | 92 |
| **$W_3$** | 11 | 69 | 5 | 86 |
| **$W_4$** | 8 | 9 | 98 | 23 |

27. Explain dual simplex method with an example.

**(3 x 4 = 12 Weightage)**

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