

20P339

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Name.....

Reg.No.....

THIRD SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2021

(CBCSS-PG)

(Regular/Supplementary/Improvement)

CC19P CSS3 E01f – NUMERICAL AND STATISTICAL METHODS

(Computer Science)

(2019 Admission onwards)

Time: Three Hours

Maximum: 30 Weightage

PART A

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

1. Find the root of the equation $x^3 + x - 1 = 0$ using Bisection method
2. Explain different types of Errors with an example
3. Using Newton's backward formula find $\tan(0.26)$

x	0.10	0.15	0.20	0.25	0.30
tan x	0.1003	0.1511	0.2027	0.2553	0.3093

4. Solve the following system of equations using Gauss - Seidal iteration method

$$x + 4y - z = -5$$

$$x + y - 6z = -12$$

$$3x - y - z = 4$$

5. Evaluate $\int_4^{5.2} \log x \, dx$ using Trapezoidal rule. Take $h = 0.2$
6. A subcommittee of 6 members is to be formed out of a group of 7 men and 4 ladies. Obtain the probability that the subcommittee will consist of
 - i) Exactly 2 ladies
 - ii) At least 2 ladies
 - iii) At the most 2 ladies
7. State and prove Addition theorem of probability for mutually exclusive events

(4 × 2 = 8 Weightage)

PART B

Answer any **four** questions. Each question carries 3 weightage.

8. Using Newton – Raphson method compute the real root of the equation $3x = \cos x + 1$
9. Apply Gauss Jordan method to solve the following equations

$$2x - 3y + z = -1$$

$$x + 4y + 5z = 25$$

$$3x - 4y + z = 2$$

10. Use Runge-kutta method to find the value of $y(0.1)$ and $y(0.2)$ given that $\frac{dy}{dx} = x + y$,
 $y(0) = 1$ And $h = 0.1$
11. Evaluate $\int_1^3 (2x - 1) \, dx$ using Simpson's $\frac{1}{3}$ and $\frac{3}{8}$ rules taking $h = 0.25$

12. Define probability density function of with properties.

Examine whether the following is a probability density function

$$f(x) = 2x \quad \text{if } 0 < x \leq 1$$

$$= 4-2x \quad \text{if } 1 < x \leq 2$$

$$= 0 \quad \text{else where}$$

13. Solve the linear programming problem graphically

$$\text{Maximize } z = 2x_1 + 3x_2$$

Subject to

$$x_1 + x_2 \leq 30$$

$$x_2 \geq 3$$

$$0 \leq x_2 \leq 12$$

$$x_1 - x_2 \geq 0$$

$$0 \leq x_1 \leq 2$$

14. Explain Duality in linear programming problem with an example

(4 × 3 = 12 Weightage)

PART C

Answer any *two* questions. Each question carries 5 weightage.

15. Find the interpolating polynomial using Lagrange's formula. Hence find f (4.5)

x	1	3	4	6
f(x)	-3	0	30	132

16. Using Milne's Predictor- Corrector method evaluate y (0.4)

$$\frac{dy}{dx} = \frac{1}{3} (1+x^2) y^2, \quad y(0) = 1, \quad y(0.1) = 1.06, \quad y(0.2) = 1.12, \quad y(0.3) = 1.21$$

17. A company has 4 machines to do 3 jobs. Each job can be assigned to one and only one machine. The cost of each job on each machine is given in the following table

		Machines			
		1	2	3	4
Jobs	A	18	24	28	32
	B	8	13	17	19
	C	10	15	19	24

What are the job assignments which will minimize the cost?

18. Solve the following Transportation problem to minimize the total cost of transportation

Origin	Destination				Supply
	1	2	3	4	
1	14	56	48	27	70
2	82	35	21	81	47
3	99	31	71	63	93
Demand	70	35	45	60	

(2 × 5 = 10 Weightage)
