20U5114 (Pages: 3) Name: ……..……..

Reg. No…….

FIFTH SEMESTER B.Voc. DEGREE EXAMINATION, NOVEMBER 2022

(Regular/Supplementary/Improvement)

CC18U GEC5 OT15 – NUMERICAL ANALYSIS AND OPTIMIZATION TECHNIQUES

(Information Technology – Common Course)

(2018 Admission onwards)

Time: Three Hours Maximum: 80 Marks

PART A

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

1. Name any two errors in computation.
2. What is a transcendental equation? Give an example.
3. What do you mean fixed point system?
4. Using Bisection method find first two iteration of x^3-3 x -5 = 0
5. Write Regula –Falsi Formula.
6. Define shift operator E.
7. Give an equation connecting ∇ and E
8. Write Lagrange's formula.
9. Define Slack variable.
10. What is an optimum solution of Linear programming problem?

(10 × 1 = 10 Marks)

PART B

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

11. What do you mean by rate of convergence in Numerical method?
12. Prove that Δ = E ∇
13. Explain Truncation error and Absolute error.
14. Write the relation between divided differences forward differences.
15. Using Newton Raphson's method find the real root of the equation x e^X – 2 = 0
16. Construct the Newton's backward difference table based on the following data

X	:	60	70	80	90
F(x)	:	226	250	276	304

17. Using Trapezoidal Rule evaluate $\int_0^4 e^x$ dx considering 4 subintervals
18. Using Picard's method solve $\frac{dy}{dx} = y$, given Y(0) =1

19. Compute $\frac{dy}{dx}$ at X = 1 from the following table given below

X :	1	2	3	4	5	6
Y :	1	8	27	64	125	216

20. Explain Travelling sales man problem

21. Find the Dual of the following linear programming problem

Minimize $Z = 2x_1 + x_2$

Subject to

$3x_1 + x_2 \geq 3$

$4x_1 + 3x_2 \geq 6$

$x_1 + 2x_2 \geq 3$

$x_1, x_2 \geq 0$

22. Obtain an initial basic feasible solution to the following transportation problem

		Destination			
		A	B	C	Supply
Origin	1	2	7	4	5
	2	3	3	1	8
	3	5	4	7	7
	4	1	6	2	14
Demand		7	9	18	34

(8 × 2 =16 Marks)

PART C

Answer any ***six*** questions. Each question carries 4 marks.

23. Using relaxation method solve the system of equations

$5x - y - z = 3$

$-x + 10y - 2z = 7$

$-x - y + 10z = 8$

24. Using Gauss seidal method solve the equations

$4x + 0y + 2z = 4$

$0x + 5y + 2z = -3$

$5x + 4y + 10z = 2$

25. Using Newton's Divided difference formula evaluate f (25)

X :	20	30	40	50
f(x):	512	439	346	243

26. Using Taylor's series method compute y (0.1) to three decimal places $\frac{dy}{dx} = 1+xy$ given y(0) = 1

27. Evaluate $\int_0^{0.6} e^x$ dx correct to five significant digits with n =6 by using

a) Simpson's ⅓ Rule b) Simpson's ⅜ Rule

28. Compute $f^{I}(x)$ and $f^{II}(x)$ at x = 1.05

X :	1	1.05	1.1	1.15	1.20	1.25	1.3
Y :	1	1.025	1.049	1.072	1.095	1.118	1.140

29. Solve the following linear programming problem

Maximize $Z = 3x_1 + 9x_2$

Subject to $x_1 + 4x_2 \leq 8$

$x_1 + 2x_2 \leq 4$

and $x_1, x_2 \geq 0$

30. Explain Dual simplex method

31. The assignment cost of assigning any one operator to any one machine is given in the following table. Determine optimum assignment cost

		Operators			
		I	II	III	IV
Machine	A	10	5	13	15
	B	3	9	18	3
	C	10	7	3	2
	D	5	11	9	7

(6 × 4 = 24 Marks)

PART D

Answer any ***two*** questions. Each question carries 15 marks.

32. Using Croute's triangularization method solve the equations

$x_1 + x_2 + x_3 = 1$

$4x_1 + 3x_2 - x_3 = 6$

$3x_1 + 5x_2 + 3x_3 = 4$

33. Given $\frac{dy}{dx} = 1+ y^2$ where y(0) =0 use fourth order Runge kutta formula to find y(0.2) , y(0.4) and y(0.6)

34. Given $\frac{dy}{dx} = x^2 + y$, y(0) = 1 determine y(0.02) , y(0.04) and y(0.06) using Euler's formula.

35. Using Sterling's formula find f (32)

X :	20	25	30	35	40	45
Y :	14.035	13.674	13.257	12.734	12.089	11.309

(2 × 15 = 30 Marks)

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