19U5105 (Pages: 3) Name: ……………………

Reg. No: ………………….

FIFTH SEMESTER B.Voc. DEGREE EXAMINATION, NOVEMBER 2021

(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. What are the different types of errors in computation?
2. Give an example of algebraic equation and transcendental equation
3. Write Regula - Falsi formula
4. Using bisection method find first two iterations of $x^3 - 5x + 1 = 0$
5. Define average operator μ
6. Give an equation connecting E and Δ
7. Write Newton's backward formula
8. Define feasible solution to general linear programming problems
9. Examine whether $x_1 = 2$, $x_2 = 1$ are basic feasible solution of the equations

   $x_1 + 2x_2 = 4$

   $2x_1 + x_2 = 5$
10. Define Artificial variable

(10 x 1 = 10 Marks)

PART B

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

11. Solve the equation using Newton –Raphson method $x^3 – 6x + 4 = 0$
12. Explain Round off error and Absolute error
13. Prove that $\delta E^{1/2} = \Delta$
14. Construct Newton's forward difference table

X	0	1	2	3
Y	1	2	1	10

15. Using Trapezoidal Rule evaluate $\int_1^2 x^2\, dx$ considering 4 subintervals
16. Find f (5) using Lagrange's interpolation formula

X	1	3	4	6
Y	-3	0	30	132

17. Using Euler's method find $y(0.2), \frac{dy}{dx} = \log(x + y), y(0) = 1$ take h = 0.1

18. Compute $f^{I}(2.2)$ from the following table

X	1.4	1.6	1.8	2	2.2
f(x)	4.0552	4.9530	6.0496	7.3981	9.0250

19. Explain Duality concept in linear programming problems with an example

20. What is Transportation Problem?

21. Solve the following minimal Assignment problem

		Programmes		
		A	B	C
	1	120	100	80
Programmers	2	80	90	110
	3	110	140	120

22. When is Charne's method used to solve linear programming problems?

(8 × 2 = 16 Marks)

PART C

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

23. Gauss Seidal method solve the equations

$4x + 2z = 4$

$5y + 2z = -3$

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

24. Using Sterling's formula find f (25)

X	20	30	40	50
Y	24	32	35	40

25. Show that $\mu\,\delta = \frac{\Delta+\nabla}{2}$

26. Using Picard's method find y (0.1) , $\frac{dy}{dx} = x + x^4 y$, y(0) = 3

27. Using Taylor's series, solve $\frac{dy}{dx} = x - y^2$, y(0) = 1 .Also find y(0.1)

28. Compute the first and second derivative of the function tabulated below at $x = 1.2$

X	1	1.2	1.4	1.6	1.8	2	2.2
Y	2.7183	3.3201	4.0552	4.9530	6.0496	7.3891	9.0250

29. Explain Dual simplex method

30. State the difference between transportation problem and assignment problem

31. Obtain an initial basic feasible solution to the following transportation problem using North West Corner Rule.

		Stores				
		S_1	S_2	S_3	S_4	Supply
Warehouses	A	5	1	3	3	12
	B	3	3	5	4	15
	C	6	4	4	3	17
	D	4	1	4	2	11
	Demand	18	9	16	12	

(6 × 4 = 24 Marks)

PART D

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

32. Using Crout's triangularization method solve the equations

$x_1 - x_2 + x_3 = 1$

$-3x_1 + 2x_2 - 3x_3 = -6$

$2x_1 - 5x_2 + 4x_3 = 5$

33. Using Newton's divided difference formula find f(x) as a polynomial in x

X	-1	0	3	6	7
Y	3	-6	39	822	1611

34. 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

35. Evaluate $\int_o^1 \frac{dx}{1+x^2}$ using.

a) Trapezoidal Rule taking $h = \frac{1}{4}$

b) Simpson's ⅓ Rule taking $h = \frac{1}{4}$

c) Simpson's ⅜ Rule taking $h = \frac{1}{4}$

(2 × 15 = 30 Marks)

****