22U522S (Pages: 3) Name: ……..

Reg. No: …….

FIFTH SEMESTER B.Voc. DEGREE EXAMINATION, NOVEMBER 2024

(Supplementary)

CC18U GEC5 OT15 – NUMERICAL ANALYSIS AND OPTIMIZATION TECHNIQUES

(Information Technology – Common Course)

(2018 to 2020 Admissions)

Time: Three Hours Maximum: 80 Marks

PART A

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

1. What do you mean by fixed point system? Give an example.
2. What is Percentage error?
3. Write Newton – Raphson formula
4. What is algebraic equation? Give an example.
5. Using bisection method find first two iterations of x^3 -x -1 1 = 0
6. Give an equation connecting E and Δ
7. Write Newton's forward interpolation formula
8. Define average operator μ
9. Define Surplus variable
10. What is an optimal solution?

(10 × 1 = 10 Marks)

PART B

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

11. Explain rates of convergence in numerical methods with an example
12. Explain Round off error and Absolute error
13. Prove that Δ = Eμ
14. Construct Newton's backward difference table

X	:	10	20	30	40
Y	:	1.1	2	4.4	7.9

15. Using method of false position solve the equation Cos x = 3x -1
16. Using Trapezoidal Rule evaluate $\int_1^2 x \ dx$ considering 4 subintervals
17. Find f (2) using Lagrange's interpolation formula

X	:	0	1	3	4
Y	:	-12	0	12	24

18. What is interpolation formula?

19. Explain assignment problem

20. Using Picard's method Solve $\frac{dy}{dx} = x + y$ Y(0) = -1

21. Find the dual of the following L.P.P

Minimise Z = $2x_1 + 9x_2 + x_3$

Subject to $x_1 + 4x_2 + 2x_3 > 5$

$3x_1 + x_2 + 2x_3 > 4$

$x_1, x_2, x_3 \geq 0$

22. Obtain initial basic feasible solution for the trasportation proble.

		To				
		D	E	F	G	
	A	11	13	17	14	250
From	B	16	18	14	10	300
	C	21	24	13	10	400
		200	225	275	250	

(8 × 2 = 16 Marks)

PART C

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

23. Gauss Seidel method solve the equations

5x + 2y + z = 12

X + 4y + 2z = 15

x + 2y + 5z = 20

24. Using Sterling's formula find f (1.22)

X:	1	1.1	1.2	1.3	1.4
Y:	0.841	0.891	0.932	0.963	0.985

25. Using Simpson's rules estimate the integral $\int_{-1}^{1} 1 + x^2\, dx$

26. Find Y (1.1) using Taylor's series method $\frac{dy}{dx}$ = x + Y, y = 1 when x = 0

27. Find f^{I} (1) and f^{II} (1)

X :	1	1.05	1.10	1.15	1.20	1.25	1.30
Y :	1	1.0247	1.0488	1.0723	1.0954	1.1180	1.1401

28. Explain assignment problem

29. Solve the following L.P.P

Maximise Z = $3x_1 + 9x_2$

Subject to $x_1 + 4x_2 \leq 8$

$x_1 + 2x_2 \leq 4$

$x_1, x_2 \geq 0$

30. Explain dual simplex method.

31. Write a short note on Travelling salesman problem.

(6 × 4 = 24 Marks)

PART D

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

32. Using Croute's triangularization method solve the equations.

$x_1 - x_2 + x_3 = 1$

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

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

33. Use fourth Runge-kutta method to find the value of y (0.2) and y (0.4) given that

$\frac{dy}{dx} = x^2 + y^2$ y (0)= 1 And h = 0.1

34. Using Newton's divided difference formula find f(2)

X :	5	7	11	13	17
Y :	150	392	1452	2366	5202

35. Find the solution of $\frac{dy}{dx}$ = y (x+ y), Y (0) = 1 using Millen's predictor corrector formula.

Given Y (0.1) = 1.11689, Y (0.2) = 1.27739 and Y (0.3) = 1.50412

(2 × 15 = 30 Marks)

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