Shree H.N.Shukla College of Science

MATHEMATICS

T.Y.B.Sc. (Sem.VI) (CBCS)

PAPER- 603

Optimization & Numerical Analysis-II

QUESTION BANK

☑ Answer the following: [1 mark questions]

1) Define: Slack variables
2) Define: Optimum solution of LPP
3) What is Surplus variable with respect to the LPP?
4) Define: Basic Feasible Solution of LPP
5) Which three methods are used to obtain an initial solution of transportation problem?
6) What is the full form of NWCM?
7) What is the name of the method to find optimum solution of transportation problem?
8) What is the name of the method to solve Assignment problems?
9) Write formula for Gauss forward interpolation formula.
10) The first order divided difference $f(x_0, x_1)$=_____
11) If $f(x) = x^3$ then what is the value of f(1, 3)?
12) Write Lagrange's formula for inverse interpolation.
13) To derive Simpson's $1/3$ rule we can take n=_____ in general quadrature formula.
14) What is numerical integration?
15) General Quadrature formula is also known as _____.
16) Write Trapezoidal rule.
17) Write Taylor formula to solve Ordinary Differential Equation.
18) Write Picard's formula to solve Ordinary Differential Equation.
19) Write Range's formula to solve Ordinary Differential Equation.
20) Write Milne's Predictor formula to solve Ordinary Differential Equation.
21) Define: Convex Linear Combination
22) Define: Interpolation

23) What is the special case of Bessel's formula?

24) Which formula involves only even differences on & below the central line?

25) What is the fifth divided difference of the polynomial of degree four?

☑ Answer the following: [2 mark questions]

1) Write the Matrix form of Linear Programming Problem.
2) State the Fundamental Theorem of Linear Programming.
3) State the general mathematical form of assignment problem.
4) Write full form of LCM & VPM?
5) Derive relation between divided difference and forward difference.
6) Define inverse interpolation and write Lagrange's formula for inverse interpolation.
7) Derive Simpson's $^1/_3$ rule.
8) Write General Quadrature formula.
9) Using Picard's formula to find y(0.1) given that

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

10) Find the value of y at x=0.2 by Euler's method

$\frac{dy}{dx} = 2x + y, y(0) = 1$

11) What is the drawback of Lagrange's formula?
12) In usual notation prove that

$$D^3 = \frac{1}{h^3}\left[\nabla^3 + \frac{3}{2}\nabla^4 + \frac{7}{4}\nabla^5 + \ldots\ldots\ldots\right]$$

13) Find the value of $\int_2^6 \frac{dx}{x}$ by Trapezoidal rule.
14) Find the value of y at x=0.2 by Taylor's method

$y' = 2y + 3e^x, y(0) = 0$

☑ Answer the following: [3 mark questions]

1) Obtain the dual of following;

Minimize: $Z = 5x_1 + x_2 - 6x_3$

Subject to the constraints

$-2x_1 + x_2 + 11x_3 \leq -2$

$-x_1 + 7x_2 + x_3 \geq 7$

$3x_1 - x_2 + 4x_3 \leq 5 \quad and\ x_1, x_2, x_3 \geq 0$

2) Write summary of the general relationship between Primal & Dual LPP.
3) Obtain the initial solution of given transportation problem using LCM method;

		TO				**Supply**
		D_1	**D_2**	**D_3**	**D_4**	
FROM	**P_1**	2	3	11	7	**6**
	P_2	1	0	6	1	**1**
	P_3	5	8	15	9	**10**
Demand		**7**	**5**	**3**	**2**	

4) Solve the following Assignment problem;

		Subordinates			
		I	**II**	**III**	**IV**
Task	**A**	**8**	**26**	**17**	**11**
	B	**13**	**28**	**4**	**26**
	C	**38**	**19**	**18**	**15**
	D	**19**	**26**	**24**	**10**

5) Derive Stirling's formula.
6) Prove that divided difference is symmetrical in their arguments.
7) Derive Trapezoidal rule.
8) Derive Simpson's $^3/_8$ rule.
9) Explain Euler's method to solve Ordinary Differential Equation.
10) Use Range's method to find y(0.2) given that $y' = x + y, y(0) = 1.$
11) If $f(x)=x^3$ then find f(1, 3, 5, 7)

☑ Answer the following: [5 mark questions]

1) Explain the steps of Graphical method to solve the LPP.
2) Find only BFS and construct only first table to solve the following LPP using SIMPLEX METHOD (complete solution is not required)

   Maximize: $Z = 3x_1 + 5x_2 + 4x_3$

   Subject to the constraints

   $2x_1 + 3x_2 \leq 8$

   $2x_2 + 5x_3 \leq 10$

   $3x_1 + 2x_2 + 4x_3 \leq 15 \quad and\ x_1, x_2, x_3 \geq 0$
3) Explain the steps of Hungarian method to solve the Assignment problem.
4) Obtain the Optimum solution of given transportation problem using MODI method;

		TO				**Supply**
		D_1	**D_2**	**D_3**	**D_4**	
FROM	**S_1**	5	3	6	4	**30**
	S_2	3	4	7	8	**15**
	S_3	9	6	5	8	**15**
Demand		**10**	**25**	**18**	**7**	60

5) Use Sterling's formula to find f(1.63) given

x	1.50	1.60	1.70	1.80	1.90
f(x)	17.609	20.412	23.045	25.527	27.875

6) Derive Gauss Backward interpolation formula.
7) Evaluate $\int_0^{10} \frac{dx}{1+x^2}$ by using Simpson's $3/8$ rule.
8) Derive General Quadrature formula.
9) Derive Milne's Predictor-Corrector formula.
10) Use Range-Kutta's method to find y(0.1), y(0.2) and y(0.3) given that $y' = xy + y^2, y(0) = 1$
11) Explain Taylor's method to solve ODE.
12) Explain Range-Kutta's formula to solve ODE.

13) State and prove Gauss forward interpolation formula.

14) Write the steps of Lowest Cost Entry Method to find initial solution of transportation problem.

15) Explain steps of Big M method to solve the LPP.

16) State and prove Laplace Everett's formula.

17) Write the steps of Vogel's Approximation Method to find initial solution of transportation problem.

****BEST OF LUCK****