



'সমানো মন্ত্র: সমিতি: সমানী'

**UNIVERSITY OF NORTH BENGAL**

BCA Honours 5th Semester [Special] Examination, 2022

**DSE-P2-BACHELOR OF COMPUTER APPLICATION (54)**

Time Allotted: 2 Hours

Full Marks: 40

*The figures in the margin indicate full marks.*

**The question paper contains DSE54:E1, DSE54:E2 and DSE54:E3.  
The candidates are required to answer any *one* from *three* courses.  
Candidates should mention it clearly on the Answer Book.**

**DSE54:E1 (BCADSE4)**

**OPERATIONAL RESEARCH**

**GROUP-A**

**Answer any *five* questions**

1×5 = 5

1. What is the relationship between Primal and Dual?
2. What is the basic feasible solution?
3. What is operations research?
4. Define slack and surplus variable.
5. Define duality in L.P. with an example.
6. What is unbalanced transportation problem?
7. What is meant by optimal solution?
8. Define rank of a matrix.

**GROUP-B**

**Answer any *three* questions**

5×3 = 15

9. Explain the steps of graphical method to obtain an optimal solution in a linear programming problem. 5
10. Solve the following LPP using Simplex Method: 5

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

$$\text{Subject to constraints: } x_1 + x_2 \leq 4$$

$$x_1 - x_2 \leq 2$$

$$x_1, x_2 \geq 0$$

11. Find the rank of the matrix

5

$$A = \begin{bmatrix} 2 & -1 & 1 \\ 3 & 1 & -5 \\ 1 & 1 & 1 \end{bmatrix}$$

12. Use the Hungarian method to solve the following assignment problem:

	$J_1$	$J_2$	$J_3$	$J_4$
$M_1$	10	9	7	8
$M_2$	5	8	7	7
$M_3$	5	4	6	5
$M_4$	2	3	4	5

13. What is Queuing System Model? Differentiate between Exponential and Poisson distribution.

5

**GROUP-C**

Answer any *two* questions

10×2 = 20

14. Explain the steps in North West corner rule. Find the initial basic feasible solution of the following transportation problem using the North West corner rule:

	$D_1$	$D_2$	$D_3$	$D_4$	Supply
$O_1$	6	4	1	5	14
$O_2$	8	9	2	7	16
$O_3$	4	3	6	2	5
Demand	6	10	15	4	35

15. Define transportation problem and assignment problem. Use Vogel's Approximation Method (VAM) to obtain an initial basic feasible solution of the given transportation problem:

2+8

DESTINATION

	$D_1$	$D_2$	$D_3$	$D_4$	Supply
Factory $F_1$	3	3	4	1	100
$F_2$	4	2	4	2	125
$F_3$	1	5	3	2	75
Demand	120	80	75	25	300

16. Difference between PERT and CPM. Calculate the earliest start, earliest finish, least start, least finish of each activity of the project given below:

2+8

Activity	1-2	1-3	2-4	2-5	3-4	4-5
Duration (in days)	8	4	10	2	5	3

17. What is the principle of dominance and explain the modified dominance property. Explain two persons zero sum game.

3+3+4

**DSE54:E2 (BCADSE5)**  
**(COMBINATORIAL OPTIMIZATION)**

**GROUP-A**

**Answer any *five* from the following**

**1×5 = 5**

1. What are local optima?
2. Given an example of convex set.
3. Where do you use simple tableau?
4. Is a convex function a convex set? Justify.
5. What is degeneracy?
6. What is duality?
7. Give an example of Simplex Method.
8. What is optimization?

**GROUP-B**

**Answer any *three* from the following**

**5×3 = 15**

9. Explain counting problem with the help of an example.
10. Explain the application of design optimization.
11. Explain the different parts of the optimization problem.
12. Explain neighborhood in combinatorial optimization with the help of an example.
13. Discuss dual simplex algorithm.

**GROUP-C**

**Answer any *two* from the following**

**10×2 = 20**

14. Explain branch and bound technique and approximation algorithms for travelling salesman problem.
15. Explain cutting plane algorithm.
16. Why the solver of a problem does not find the smallest minimum? How do you search for a smaller minimum?
17. Explain Dantzig-Wolfe algorithms.

**DSE54:E3 (BCADSE6)**  
**(NUMERICAL METHODS)**

**GROUP-A**

**Answer any *five* from the following**

**1×5 = 5**

1. What is Round-off error?
2. Give an example of convergence.
3. Name one iterative method.
4. What is interpolation?

5. Why do you use Euler's method?
6. What is Gaussian Quadrature?
7. Give an example of ordinary differential equation.
8. What is floating point?

**GROUP-B**

**Answer any *three* from the following**

5×3 = 15

9. Using Bisection method find the root of  $\cos(x) - x * e^x = 0$  with  $a = 0$  and  $b = 1$
10. Find the positive root of the equation  $3x - \cos x - 1$  using Regula Falsi method and correct upto 4 decimal places.
11. Discuss the significance of Gauss-Seidel iterative methods.
12. Discuss Simpson's Rule.
13. Discuss the properties of Eigen Values.

**GROUP-C**

**Answer any *two* from the following**

10×2 = 20

14. Using Lagrange's interpolation formula find  $y(10)$  from the following table:

$x$	5	6	9	11
$y$	12	13	14	16

15. Find the first 4 terms in the Taylor series for  $(x-1)e^x$  near  $x=1$ .
16. Explain Runge-Kutta second method with the help of an example.
17. Write short notes on *two*:
  - (i) Least square method of curve fitting
  - (ii) Trapezoid rule
  - (iii) Matrix inversion.

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