

Second Semester B.C.A. Degree Examination
October / November 2019
(2016-17 Syllabus)
(BCB 410) MATHEMATICS - II FOR COMPUTER APPLICATION

Time : 3 Hours

Max. Marks : 80

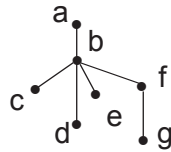
I. Answer the following questions: (5x1=5)

1. Define order of an element in groups.
2. Define Graph.
3. Define Directed Graph.
4. Write any two advantages of Operation Research.
5. What is an assignment problem.

II. Answer any FIVE of the following: (5x15=75)

6. a) Prove that $G = \{1, 2, 3, 4\}$ is an abelian group under the binary operation of multiplication mod 5 **(5 Marks)**
 $\boxed{\text{or}} (\otimes_5).$
 - b) Find the order of each element of the following groups.
 - (i) $G = \{1, w, w^2\}$
 - (ii) $G = \{1, 2, 3, 4\} \times_5$ **(5 Marks)**
 - c) Define cyclic group. Find all the left co-set of $H = \{0, 4, 8\}$ in $(Z_{12}, +_{12})$ **(5 Marks)**
7. a) Explain the incidence matrix with example. **(5 Marks)**
 - b) Define the different types of graphs with example. **(5 Marks)**
 - c) Prove that, in any graph the number of vertices of odd degree is even. **(5 Marks)**
8. a) Explain isomorphic graphs with example. **(5 Marks)**
 - b) Define self loop & explain the different types of digraphs. **(5 Marks)**
 - c) Show that the maximum no. of edges in a simple graph with n vertices is $n(n+1)/2$. **(5 Marks)**

9. a) Find the Eccentricity of each point of the graph given below & obtain the centre.

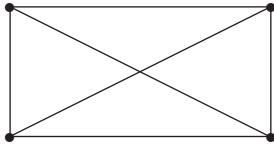


(5 Marks)

- b) Prove that a tree with 'n' vertices has (n - 1) edges.

(5 Marks)

- c) Define spanning trees and find all the spanning trees of the graph.



(5 Marks)

10. a) Explain the scope & applications of Operation Research.

(5 Marks)

- b) Explain the model characteristics in Operation Research.

(5 Marks)

- c) Explain the Monte-Carlo method.

(5 Marks)

11. a) Solve the following LPP using graphical method.

(5 Marks)

Maximize: $Z = 8000 x^1 + 7000 x^2$

Subject to constraints: $3x^1 + x^2 \leq 66$

$x^1 + x^2 \leq 45$

$x^1 \leq 20$

$x^2 \leq 40$

& $x^1, x^2 \geq 0$

- b) (i) Define LPP.

(5 Marks)

- (ii) Find the initial basic feasible solution of the following transportation problem using North West Corner rule.

Warehouse factory	w1	w2	w3	w4	Factory capacity
F1	1	2	3	4	6
F2	4	3	2	0	8
F3	0	2	2	1	10
Requirements	4	6	8	6	24

(5 Marks)

- c) Find the initial basic feasible solution of the following transportation problem using Vogel's approximation method.

Factory	S_1	S_2	S_3	Capacity
F_1	2	7	4	5
F_2	3	3	1	8
F_3	5	4	7	7
F_4	1	6	2	14
Requirements	7	9	18	34

(5 Marks)

12. a) Solve the assignment problem.

	I	II	III	IV	V
A	10	3	3	2	8
B	9	7	8	2	7
C	7	5	6	2	4
D	3	5	8	2	4
E	9	10	9	6	10

(5 Marks)

- b) Solve travelling salesman problem.

		To				
		A	B	C	D	E
From	A	∞	4	7	3	4
	B	4	∞	6	3	4
	C	7	6	∞	7	5
	D	3	3	7	∞	7
	E	4	4	5	7	∞

(5 Marks)

- c) Find all the basic solutions of the following system of equations.

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

$$3x_1 + 2x_2 + 5x_3 = 22$$

(5 Marks)