

U.G. 4th Semester Examination - 2022

MATHEMATICS

[PROGRAMME]

Skill Enhancement Course (SEC)

Course Code : MATH-G-SEC-T-2(A&B)

Full Marks : 40

Time : 2 Hours

The figures in the right-hand margin indicate marks.

The symbols and notations have their usual meanings.

Answer all the questions from selected Option.

OPTION-A

MATH-G-SEC-T-2A

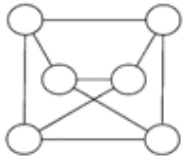
1. Answer any **five** questions: $2 \times 5 = 10$
- a) How many undirected graphs (not necessarily connected) can be constructed out of a given set $V = \{v_1, v_2, \dots, v_n\}$ of n vertices?
 - b) What is the number of edges present in complete graph K_n having n vertices.
 - c) If I is an independent set in a graph, find the sub graph induced by I .
 - d) Define complement of tree.

[Turn Over]

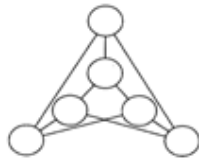
- e) What is the number of vertices in an undirected connected graph with 27 edges, 6 vertices of degree 2, 3 vertices of degree 4, and the remaining of degree 3?
- f) What is the determinant of the adjacency matrix of C_4 ?
- g) Find the maximum number of edges in a bipartite graph of 12 vertices.
- h) Let T be a tree with 10 vertices. Find the sum of the degrees of all the vertices in T .

2. Answer any **two** questions: $5 \times 2 = 10$
- a) A graph is connected if and only if it has a spanning tree.
 - b) Show that if every edge in a graph joins an odd vertex and an even vertex, the graph is bipartite. Is the converse true?
 - c) Show that a graph is Hamiltonian if and only if its closure is Hamiltonian.
 - d) Prove that in a finite graph, the number of vertices of odd degrees is always even.
3. Answer any **two** questions: $10 \times 2 = 20$
- i) a) Prove that the complement of a bipartite graph need not be a bipartite graph.

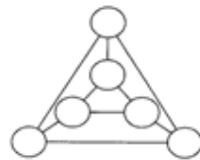
- b) Determine whether the three graphs are isomorphic.



(a)

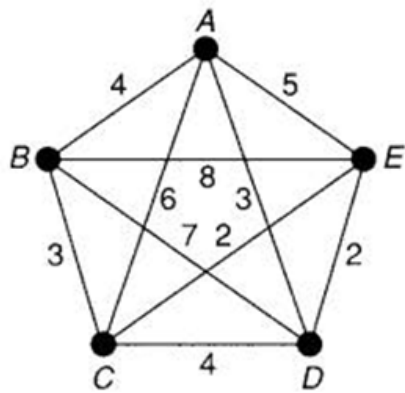


(b)



(c)

- ii) Solve the following travelling salesman problem for the weighted graph:



- iii) Write short notes on Eulerian graph and Warshall algorithm on graph.

OPTION-B

MATH-G-SEC-T-2B

[Operating System (Linux)]

1. Answer any **five** questions: 2×5=10
 - a) What do you mean by system call?
 - b) Define BASH and GRUB.
 - c) What are the main differences between a user process and a system process?
 - d) Define KDE and GNOME.
 - e) What is Linux Kernel?
 - f) What is a swap space in Linux operating system?
 - g) What is CLI?
 - h) Explain the purpose of a boot loader.

2. Answer any **two** questions: 5×2=10
 - a) Explain the file system and directory structure of Linux operating system in detail. 5
 - b) Explain **cd, find, cp, mv, rm** commands of Linux operating system in detail with examples. 5
 - c) Explain the system memory management function in Linux. 5

3. Answer any **two** questions: 10×2=20
- a) i) Which commands are used for creating and maintaining user accounts in Linux? Explain with examples.
 - ii) Write a short note on Linux file permissions. 5+5
 - b) i) Explain any two core system services of Linux.
 - ii) What is **vi** used for? Explain different **vi** commands and modes in detail. 5+5
 - c) i) Explain the **pipe** feature in Linux with examples.
 - ii) Write down the differences between **ext2** and **ext3** file systems in Linux. 5+5
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