

U.G. 4th Semester Examination - 2021

MATHEMATICS

[HONOURS]

Skill Enhancement Course (SEC)

Course Code : MATH-H-SEC-T-2A&B

Full Marks : 20

Time : 1 Hour

*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-H-SEC-T-2A

1. Answer any **five** questions: $1 \times 5 = 5$
- A graph G has vertices of degree 1, 4, 3, 7, 3 and 2. Find the number of edges in the graph.
 - Define Path and Circuit.
 - Define complete graph.
 - Draw $K_{3,4}$.
 - Give an example of a graph which has Euler circuit but not Hamiltonian circuit.

- When does the complete graph K_n possess an Euler circuit?
- Does there exist a tree G with 10 vertices such that the total degree of G is 24? Justify your answer.
- Find the graph that has the following adjacency matrix:

$$\begin{bmatrix} 1 & 0 & 2 \\ 0 & 0 & 1 \\ 2 & 1 & 0 \end{bmatrix}$$

2. Answer any **one** question: $5 \times 1 = 5$
- Show that the number of edges in a complete graph with n vertices is $\frac{n(n-1)}{2}$. 5
 - If the degree of each vertex of a graph G is greater than or equal to 2, then show that G contains a cycle. 5
 - Prove that a connected graph with n vertices and n-1 edges is a tree. 5
3. Answer any **one** question: $10 \times 1 = 10$
- What is an Eulerian graph? If a graph has an Euler circuit, then prove that every vertex of the graph has even degree. Is the converse true? Justify your answer. 1+6+3

- b) What do you mean by a spanning tree? Find all the spanning trees of K_4 . 2+8
- c) Write short notes on: 5+5
 - i) Hamiltonian graph,
 - ii) Minimal spanning tree.

OPTION-B

MATH-H-SEC-T-2B

(Linux)

- 1. Answer any **five** questions: 1×5=5
 - a) What command is used to delete a directory in Linux?
 - b) What is LILO?
 - c) Name two Linux distributions.
 - d) Which Linux command is used to show the hidden files under a directory?
 - e) What is the use of fork() system call?
 - f) What do you understand by swap space?
 - g) What is i-node?
 - h) What is semaphore?

- 2. Answer any **one** question: 5×1=5
 - a) Differentiate between the responsibilities of kernel and shell.
 - b) Compare and contrast between the ext2 and ext3 file systems.
 - c) Explain the command of changing file permissions with examples.
- 3. Answer any **one** question: 10×1=10
 - a) Write down the purposes of the following Linux directories:
 - i) /etc ii) /bin iii) /home
 - iv) /sbin v) /var
 - b) Write down the purposes of following system calls:
 - i) sleep() ii) pipe() iii) umask()
 - iv) wait() v) ioctl()
 - c) Discuss the different IPC mechanisms in Linux.