U.G. 4th Semester Examination - 2022

MATHEMATICS

[HONOURS]

Skill Enhancement Course (SEC)

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

1. Answer any **five** questions: 2×5=10

   a) In a graph, define pendent vertex and degree of a vertex.

   b) Find the number of edges in $K_{m,n}$. Define component of a graph.

   c) Find the number of circuits in K_n $(n \geq 3)$.

   d) If a graph has exactly two odd vertices, then which of the following is true?

      i) There is an Euler's circuit.

      ii) There is an Euler path.

      Justify your answer.

   e) Draw the adjacency and incidence matrix of a square. Define weighted graph.

   f) Define regular graph with *n* vertices. Find the relation of regular graph with complete graph.

   g) If a graph has *x* vertices and *y* edges, then find the number of branches and chords with proper argument.

   h) Define vertex deleted and edge deleted subgraph of a graph.

2. Answer any **two** questions: 5×2=10

   a) Prove that in a graph if there is exactly two odd vertices then there must be a path joining them.

   b) Let $G(n, m)$ be a graph on vertices $v_i,\ i = 1, 2, \ldots, n$. Let $G - v_i$ has e_i edges for $i = 1, 2, \ldots, n$. Show that

      i) $m = \frac{\sum_{i=1}^{n} e_i}{n-2}$

      ii) $\deg(v_i) = \{\sum_{i=1}^{n} \frac{e_i}{n-2}\} - e_i,\ i = 1, 2, \ldots, n.$

c) Prove that a tree having n vertices contains $n-1$ edges.

3. Answer any **two** questions: 10×2=20

a) What do you mean by simple graph? Prove that a simple graph G has a spanning tree if and only if G is connected. Define Hamiltonian cycle. How it differs from normal cycle?

1+3+3+1+2

b) State Dijkstra's algorithm to find the shortest path. What do you mean by isomorphic graph? Draw all non-isomorphic trees of 6 vertices. Explain travelling salesman method.

4+2+2+2

c) Prove that a connected graph with n vertices and e edges contains a unique cycle if and only if $n = e$. Prove that the number of odd vertices in a graph is always even. 3+3+2+2

OPTION-B

MATH-H-SEC-T-2B

(Linux)

1. Answer any **five** questions: 2×5=10

a) Name two commercial distros of Linux operating system.

b) What is the difference between a command and a system call?

c) What is deadlock?

d) What is the use of *man* command in Linux?

e) Which Linux command can be used to show the status of a process? Give example.

f) What is the use of wild card characters? Give an example.

g) What is *umask*?

h) What is the use of *sudo* command?

2. Answer any **two** questions: 5×2=10

a) Write a short note on Linux user management.

b) Discuss the INODE file system structure in Linux.

c) Explain the use of environment variables with suitable examples.

3. Answer any **two** questions: 10×2=20

a) Explain different memory management commands in Linux with example.

b) Write the commands used for the following purposes with examples:

i) Displaying content of a text file

ii) Modifying access permissions of files

iii) Displaying disk space usage

iv) Deleting a directory

v) Searching some pattern from a file.

c) Explain the roles of the following system calls in Linux with examples:

i) exec ii) sleep iii) fstat iv) brk v) alarm

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