বিদ্যাসাগর বিশ্ববিদ্যালয়

VIDYASAGAR UNIVERSITY

Question Paper

B.Sc. Honours Examinations 2022

(Under CBCS Pattern)

Semester - IV

Subject : MATHEMATICS

Paper : SEC 2 - T

Full Marks : 40

Time : 2 Hours

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.

[GRAPH THEORY]

Group - A

1. Answer any ***four*** questions : 5×4=20

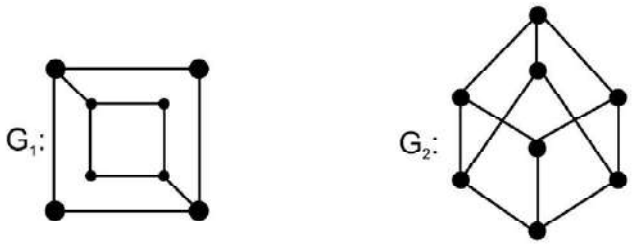
(a) Let G be a graph of order three with the vertex set $V(G)=\{v_1,v_2,v_3\}$. The adjacency matrix is given below :

$A(G)=\begin{pmatrix}2 & 2 & 0\\ 2 & 0 & 0\\ 0 & 0 & 1\end{pmatrix}$. Show that the graph is disconnected. Draw the graph.

P.T.O.

(b) A connected graph G is an Eulerian graph if and only if every vertex of G has even degree. 5

(c) Define graphs isomorphism. Check whether the following two graphs are isomorphic or not. 2+3



(d) Define Hamiltonian cycle. Draw a graph which is Hamiltonian but not Eulerian. Show that in a complete graph with n vertices there are $(n - 1) / 2$ edge-disjoint Hamiltonian cycles. 2+1+2

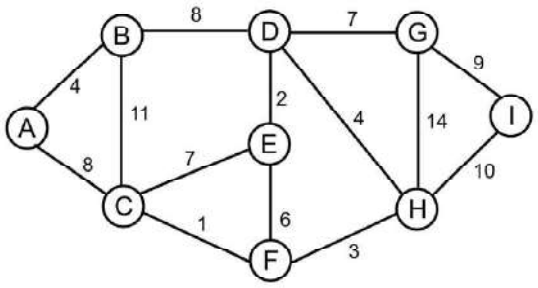
(e) Define a tree. Prove that a tree with n vertices has $n - 1$ edges. 1+4

(f) Define spanning tree of a graph G. Show that every connected graph has at least one spanning tree. 1+4

Group - B

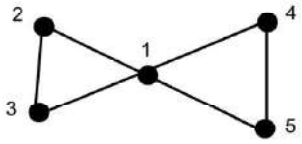
2. Answer any ***two*** questions : 10×2=20

(a) Define weighted shortest path between two vertices. Apply Dijkstra's algorithm to the graph given below and find the shortest path from the vertex 0 to the vertex 4. 2+8



(b) Define a weighted graph. Describe Warshall algorithm to find all-pairs shortest paths. 2+8

(c) Define the root of a rooted tree. Prove that there is one and only one path between every pair of vertices in a tree. Draw all spanning trees from the following graph. 1+3+6



(d) Define an Eulerian graph. Write a short note on travelling salesman's problem. Prove that a simple (having no self-loops and parallel edges) graph with n vertices and k components can have at most $(n-k)(n-k+1)/2$ edges. 1+3+6

OR

[COMPUTER GRAPHICS]

1. Answer any ***four*** questions : 5×4=20

   (a) Discuss raster scan approach.

   (b) Explain the concept of Pixel, Aspect Ratio, and Resolution.

   (c) Describe CMYK Color Model.

   (d) Briefly discuss the Flood Fill algorithm.

   (e) What is meant by Anti-Aliasing?

   (f) Define convex and concave polygon.

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

   (a) Consider the line from (0, 0) to (4, 6). Use DDA algorithm to rasterize this line.

   (b) Discuss Midpoint Circle Drawing algorithm.

   (c) Explain 2D transformations with its basic types.

   (d) Write algorithm to clip line using Cohen Sutherland line clipping algorithm.

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OR

[OPERATING SYSTEM : LINUX]

1. Answer any ***four*** questions : 5×4=20

(a) (i) What is a partition table?

(ii) Compare multitasking and multiuser OS. 2+3

(b) Discuss kernel approach OS structure. 5

(c) Write short note of CPU scheduler. 5

(d) (i) What is scheduling context of process management?

(ii) State the task of fork () and exec () comment? 3+2

(e) Discuss general characteristics of the Ext3 file system. 5

(f) (i) What are the three main purposes of an OS?

(ii) UNIX is multitasking operating system. Why? 3+2

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

(a) (i) Explain demand paging.

(ii) There is no external fragmentation in paging. Why?

(iii) Compare paging and segmentation scheme. 4+2+4

(b) (i) What is a virtual memory?

(ii) Explain Belady's anomaly with example.

(iii) What is the functionality of ''pipes'' in shell? 2+6+2

(c) (i) What is cooperating process?

(ii) Compare shared memory system and message passing system in process communication model.

(iii) Compare process and thread.

(iv) What is the difference between virtual address space and physical address space? 2+4+2+2

(d) (i) Why TLB uses in paging memory management scheme?

(ii) Discuss the basic method of paging.

(iii) When paging also suffers from internal fragmentation? 2+5+3