

4E4161

Roll No.

Total No of Pages: 4

4E4161

B. Tech. IV Sem. (Back) Exam., May - 2019
Computer Science & Engineering
4CS2A Discrete Mathematical Structures
CS, IT

Time: 3 Hours

Maximum Marks: 80

Min. Passing Marks: 26

ersahilkagyan.com

Instructions to Candidates:

Attempt any five questions, selecting one question from each unit. All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in form No. 205)

1. NIL

2. NIL

UNIT-I

Q.1 (a) Define power set. If S be a finite set of order n then prove that power set $p(s)$ is a finite set of order 2^n [8]

(b) Define the following –

(i) Cross partition of a set

(ii) Duality

(iii) Floor function or greatest integer function

(iv) Bijection [8]

OR

Q.1 (a) What is the Pigeonhole and Generalized Pigeonhole principle, Explain and prove with example. [8]

(b) Explain the following functions –

(i) Floor and ceiling

(ii) Mod and Div function

(c) Prove $n(A \cup B) = n(A) + n(B)$ for two finite sets A and B which are disjoint. [8]

UNIT- II

- Q.2 (a) Compute the number of partitions of a set with- [8]
- (i) Four elements
 - (ii) Five elements
- (b) Explain different properties of a relation with example. [8]

OR

- Q.2 (a) Explain the Warshall's algorithm with example. [8]
- (b) Show that in the set I of integers, the relation R defined by (aRb) if $a \equiv b \pmod{2}$ or $(a-b)$ is a multiple of 2, is an equivalence relation. [8]

UNIT- III

- Q.3 (a) Prove that the sum- ersahilkagyan.com [8]

$$1^2 + 2^2 + \dots + n^2 = \frac{n(n+1)(2n+1)}{6}$$

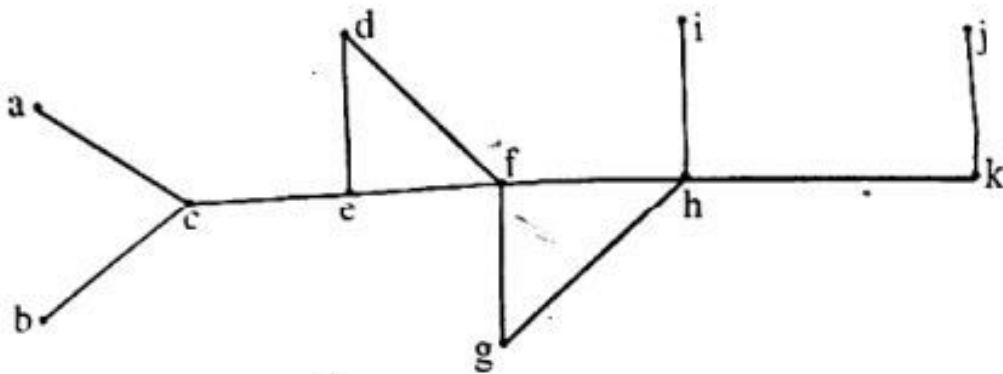
- (b) Show that for any integer $n \geq 1$, [8]
- $(11)^{n+2} + (12)^{2n+1}$ is divisible by 133.

OR

- Q.3 (a) Sort the list $X = [64, 25, 12, 22, 11]$ using selection sort algorithm. [8]
- (b) Write short notes on - [8]
- (i) Vacuous proof
 - (ii) Trivial proof
 - (iii) Constructive proof
 - (iv) Non-constructive proof

UNIT- IV

Q.4 (a) Use Depth-first search to find a spanning tree for the following graph G- [8]



(Graph G)

(b) Explain the following graph operations with examples – [8]

(i) Union

(ii) Intersection

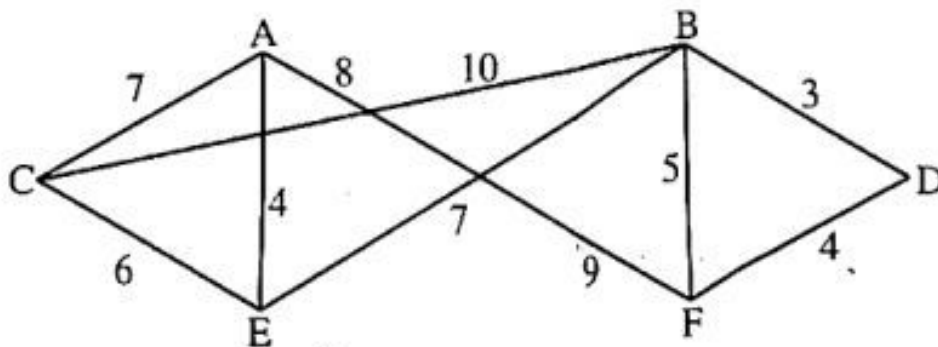
(iii) Ring sum

(iv) Complementary graph

ersahilkagyan.com

OR

Q.4 (a) Explain the minimal Spanning Tree. Find minimum spanning tree of the following graph – <http://www.rtuonline.com> [8]



(b) Define the following with example – [8]

(i) Eulerian graph

(ii) Hamiltonian Graph

(iii) Complete bipartite graph

(iv) Isomorphic Graphs

(b) Define the following with example –

[8]

- (i) Eulerian graph
- (ii) Hamiltonian Graph
- (iii) Complete bipartite graph
- (iv) Isomorphic Graphs

[4E4161]

Page 3 of 4

[2540]

UNIT- V

Q.5 (a) Write contrapositive, converse and inverse of the statement

“The home team wins whenever it is raining” Also construct the truth table for each statement. [8]

(b) Obtain Disjunctive Normal form (DNF) of the statement - $\sim (p \vee q) \leftrightarrow p \wedge q$ [8]

OR

Q.5 (a) Define Tautology, Contradiction and Contingency. Determine the contrapositive of each statement – [8]

- (i) If John is a poet, then he is poor.
- (ii) Only if Mary studies will she pass the exam.

(b) (i) Show that $(p \wedge q) \rightarrow (p \vee q)$ is a tautology. [8]

(ii) Find PCNF of a statement S whose PDNF is -

$$(p \wedge q \wedge r) \vee (p \wedge q \wedge \sim r) \vee (\sim p \wedge \sim q \wedge r)$$