Department of Data Science

Question Bank - Discrete Mathematics

Unit I – Sets and Relations

Ques. 1 (a) Out of 80 in a class, 60 play football, 53 play hockey, and 35 both the games. How many students

   (i)   do not play of these games,

   (ii)   play only hockey but not football,

   (iii)   draw the venn diagram

(b) In a group of 120 people, it was found that:

65 like *Newsweek* magazine,	20 read both *Newsweek* and *Time*,
45 read *Time*,	25 read both *Newsweek* and *Fortune*,
42 read *Fortune*,	15 read both *Time* and *Fortune*,
8 read all three magazines.	

(i) Find the number of people who read at least one of the three magazines.

(ii) Draw its Venn diagram.

(iii) Find the number of people who read exactly one magazine.

Ques. 2 (a) Using laws of set theory prove that

$$(A \cap B) = A - (A - B) \quad \text{and} \quad \overline{A \cup (B \cap C)} = (\overline{C} \cup \overline{B}) \cap \overline{A}.$$

(b) If $A = \{a,b,c,d\}$ and $B = \{x, y, z\}$. Let R be the following relation from A to B:

$$R = \{(a, x), (a, z), (d, y), (c, x), (b, z), (d, x)\}$$

(i) Determine the matrix of the relation.

(ii) Draw the arrow diagram of R.

(iii) Find the inverse relation R^{-1} of R.

Ques. 3 (a) Prove that for any positive integer m, the relation congruence modulo m is an equivalence relation on the integers.

(b) Let R is a relation on set of real numbers of and it is defined as $(a,b) \in R$ iff $x - y$ is an integer. Then show that R is an equivalence relation.

(c) Define POSET. Let R is a relation on set of integers ($\mathbb{Z}$) and defined as $R = \{(x, y) \mid x \mid y\}$ then prove that $\mathbb{Z}$ is POSET.

(d) Suppose $(a,b) \in R$ iff the price of book a is greater than or equal to the price of book b and the number of pages of book a greater than or equal to number of pages in b. Show that R is partially ordered relation.

(e) Show that the inclusion relation $\subseteq$ is a partial ordering on the power set of a set A. Also check R is totally ordered or not.

Ques. 4 (a) Prove that $f(x) = 5x^3 - 1$ is a one-one function from $R \to R$ where R is set of real numbers. Also, prove that $f^{-1} \circ g^{-1} = (g \circ f)^{-1}$ for $f, g : Q \to Q$ such that $f(x) = 2x$ and $g(x) = x + 2$.

(b) Show that the functions $f : R \to (1, \infty)$ *and* $g : (1, \infty) \to R$ defined by

$f(x) = 3^{2x} + 1, \ g(x) = \dfrac{1}{2} \log_3 (x-1)$ are inverses.

Ques. 5 (a) Define one-one and onto functions and explain the composition of functions with diagram. Let f and g are two functions from $R \to R$ where R is set of real numbers. Find $(f \circ f)(x)$ if $f(x) = 3x^2$ and $(f \circ g)(x)$, $(g \circ f)(x)$ if $f(x) = x^2 - 2$ and $g(x) = x + 4$.

(b) Define function and inverse functions and explain the concept of congruence modulo 'm'. Let I = {0, 1, 2} and define functions f and g from I to I as follows:
For all x in I, $f(x) = (x^2 + x + 1) \bmod 3$ and $g(x) = (x+2)^2 \bmod 3$. State whether $f = g$.

Ques. 6 (a) Let A, B and C be any three sets in the universal set U. Then prove the following associative laws:
(i) $A \cup (B \cup C) = (A \cup B) \cup C$
(ii) $A \cap (B \cap C) = (A \cap B) \cap C$
(iii) $A \times (B \cap C) = (A \times B) \cap (A \times C)$.

(b) If A = {1,1,2,2,2,3,3,3,3} and B = {1,1,1,0,0,2,2} then find

$(i)(A \cup B) \ (ii)(A \cap B) \ (iii)(A + B) \ (iv)(A - B)$

(c) If $A = \{1,2,3,4,5,6,7,8\}$, $B = \{2,3,4\}$ & $R = \{(a,b) \,|\, a \in A, b \in B$ & a is divisible by $b\}$ then find (i) elements in R (ii) find R^{-1} (iii) Domain (iv) Range.

Unit II – Mathematical Logic and Induction

Ques. 1 (a) Construct the truth tables of the following compound propositions
(i) $(p \wedge q) \to r$ (ii) $q \wedge (\square r \to p)$

(b) Define logical equivalence and show that $[p \to (q \wedge r)]$ and $[(p \to q) \wedge (p \to r)]$ are logically equivalent by using truth table and laws of logic.

(c) What are the contrapositive, the converse, and the inverse of the conditional statement "If the figure is square then it is quadrilateral."?

Ques. 2 Show that the following compound propositions using the laws of logic:
(a) $(p \wedge q) \to (p \vee q) = T_0$.

(b) $(p \vee q) \wedge \square (\square p \vee q) = p \wedge \square q$

(c) $(p \rightarrow q) \wedge [\square q \wedge (r \vee \square q)] = \square (q \vee p)$

Ques. 3 (a) Consider these statements, of which the first three are premises and the fourth is a valid conclusion.

"All hummingbirds are richly coloured."
"No large birds live on honey."
"Birds that do not live on honey are dull in colour."
"Hummingbirds are small."

Assuming that the domain consists of all birds, express the statements in the argument using quantifiers.

(b) Show that the premises

"It is not sunny this afternoon and it is colder than yesterday",
"We will go swimming only if it is sunny",
"If we do not go swimming then we will take a Hyderabad trip"
"If we take the Hyderabad trip then we will be home by sunset"
lead to the conclusion "We will be home by sunset."

Ques. 4 Define quantifiers and symbolize the following argument and check for its validity:

(a)   All integers are rational numbers
         Some integers are powers of 2
         Therefore, Some rational numbers are powers of 2

(b) Explain universal and existential quantifiers. Symbolize the following argument and check for its validity:

         Tigers are dangerous animals.
         There are Tigers.
         Therefore, there are dangerous animals.

Ques. 5 (a) Conjecture a formula for the sum of the first n positive odd integers. Then prove your conjecture using mathematical induction.

(b) Using strong mathematical induction prove that the function $b(n) = 2(3)^n - 5$ is the unique function defined by

     (1) $b(0) = -3, \; b(1) = 1$, and

     (2) $b(n) = 4b(n-1) - 3b(n-2)$ for $n \geq 2$.

Ques. 6 (a) Prove the formula $\left[\dfrac{n(n+1)}{2} \right]^2$, $\forall n \in \mathrm{N}$ using mathematical Induction.

(b) Show that

     (i) $(p \veebar q) \vee (p \leftrightarrow q)$ is a tautology,

     (ii) $(p \veebar q) \wedge (p \leftrightarrow q)$ is a contradiction,

(iii) $(p \veebar q) \wedge (p \to q)$ is a contingency.

UNIT III – Elementary Combinatorics

Ques. 1(a) How many ways can a committee of 4 or more can be chosen from 7 people.
(b) There are 25 females and 30 males in the junior class while there are 35 females and 30 males in the senior class. In how many ways can a committee of 12 be chosen so that there are exactly 6 females and 4 juniors on the committee?

Ques. 2(a) In how many ways can we draw a heart or a spade from an ordinary deck of playing cards? A heart or an ace? An ace or a king? A card numbered 2 through 10? A numbered card or a king?

(b) In how many ways can the letters of the English alphabet be arranged so that there are exactly 4 letters between the letters a and b.

(c) There are 30 females and 35 males in the junior class while there are 25 females and 20 males in the senior class. In how many ways can a committee of 10 be chosen so that there are exactly 5 females and 3 juniors on the committee?

Ques.3(a) Find the number non negative and positive integer solutions to $x_1 + x_2 + x_3 + x_4 = 8$.
(b) Enumerate the number of ways of placing 20 indistinguishable balls into 5 boxes where each box is nonempty.
(c) In how many ways can we distribute 9 apples and 7 mangoes among 5 children so that each child gets at least 1 mango?

Ques.4(a) There are 25 True or False questions on an examination, how many different can a student do the examination if he/she can also choose to leave blank answer.
(b) 5 different Mathematics books, 6 different Physics books and 4 different English books are to be arranged in shelf. How many different arrangements are possible if
(i) the books in each particular subject must all be together?
(ii) Only the Mathematics books must be together?
(iii) Only the English books must be together?

Ques.5(a) How many solutions will be possible for
$x_1 + x_2 + x_3 + x_4 + x_5 = 25$ with
$x_1 > 2, x_2 > 3, x_3 > 5, x_4 > 3, x_5 > 4$
(b) Find the coefficient of $x_1^2 x_3 x_4^3 x_5^4$ in $(x_1 + x_2 + x_3 + x_4 + x_5)^{10}$

Ques. 6 Prove that the following identities
(i) $P(n+1, r) = \dfrac{n+1}{(n+1-r)} P(n, r)$

(ii) $C(n+1, r) = C(n, r-1) + C(n, r)$

(iii) $C(m+n, 2) + C(m, 2) + C(n, 2) = mn$

Unit IV - Advanced Counting Techniques

Ques. 1 (a) Find the solution of the recurrence relation $a_n = a_{n-1} + \dfrac{1}{n(n+1)}$.

(b) Solve $a_n + a_{n-1} - 5a_{n-2} + 3a_{n-3} = 0$, $n \geq 3$ with $a_0 = 0, a_1 = 1$ and $a_2 = 0$.

(c) Write the solution of the recurrence relation $a_n = a_{n-1} + 2a_{n-2}$ with $a_0 = 2$ and $a_1 = 7$.

Ques. 2(a) Solve the recurrence relation $a_n - 5a_{n-1} + 6a_{n-2} = n^2.4^n$, $n \geq 2$.

(b) Solve $a_n - 7a_{n-1} + 10a_{n-2} = 7.3^n$, $n \geq 2$.

(c) Solve the Tower of Hanoi recurrence relation $a_n = 2a_{n-1} + 1$ with $a_1 = 1$.

Ques. 3 (a) Using generating function, solve the recurrence relation $a_n - 9a_{n-1} + 20a_{n-2} = 0$ for $n \geq 2$ with $a_0 = -3$, $a_1 = -10$.

(b) Solve the recurrence relation $a_k = 3a_{k-1}$ for $k = 1, 2, 3, \dots$ and initial condition $a_0 = 2$ using generating functions.

Ques. 4(a) Find an explicit formula for the Fibonacci numbers.

(b) Solve the Divide and Conquer recurrence relation $a_n = ca_{\frac{n}{d}} + e$ for $a_1 = e, c \neq 0$ & $n = d^k$ where c, d & e are constants.

Ques. 5(a) Find the coefficient of x^{18} in $\left(x + x^2 + x^3 + x^4 + x^5\right)\left(x^2 + x^3 + x^4 + \dots\right)^5$.

(b) Find the number of integral solutions of the equation $x_1 + x_2 + x_3 = 20$ such that $2 \leq x_1 \leq 5$, $4 \leq x_2 \leq 7$, $-2 \leq x_3 \leq 9$.

(c) In how many ways can 12 oranges be distributed among 3 children A, B, C so that A gets at least 4, B & C get at least 2, but C gets not more than 5.

Ques. 6(a) Suppose that there are 1807 freshmen at your school. Of these, 453 are taking a course in computer science, 567 are taking a course in mathematics, and 299 are taking courses in both computer science and mathematics. How many are not taking a course either in computer science or in mathematics?

(b) Determine the number of positive integers $'n'$ such that $1 \leq n \leq 100$ and $'n'$ is not divisible by 2 or 3 or 5.

Unit V – Graph Theory

Ques 1(a) Draw a graph with the adjacency matrix

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

with respect to the ordering of vertices *a, b, c, d*.

(b) Suppose that a connected planar simple graph has 20 vertices, each of degree 3. How many regions does a representation of this planar graph split the plane?

Ques. 2(a) In a graph, that has 21 edges, 4 vertices of degree 3 and all other vertices of degree 2. Find the total number of vertices in this graph.

(b) State and prove Euler's formula and show that the complete bipartite graph $K_{3,3}$ is not a planar graph.

Ques. 3(a) Use an adjacency matrix to represent the (a) graph and (b) the pseudo-graph shown below:
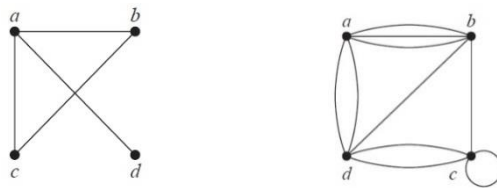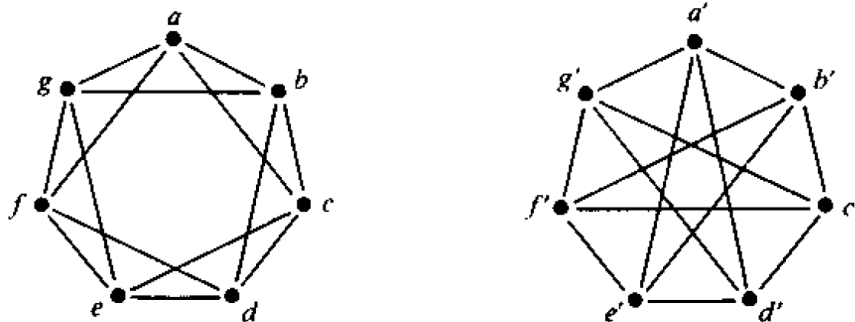


3(b) Find a Hamiltonian path for the following graph:
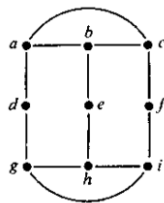
Ques 4(a) Form a binary search tree for the words *mathematics, physics, geography, zoology, meteorology, geology, psychology*, and *chemistry* (using alphabetical order).

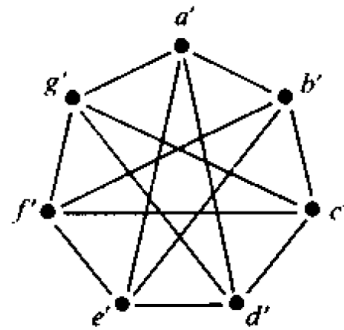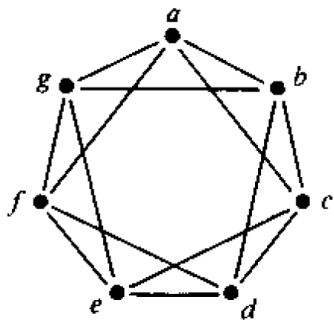**(b)** What are rooted trees? Prove that a tree with *n* vertices has $(n - 1)$ edges.

Ques. 5 Show that the following graphs are isomorphic:

Ques. 6(a) State Kruskal's algorithm and using this determine spanning tree for the following graph:
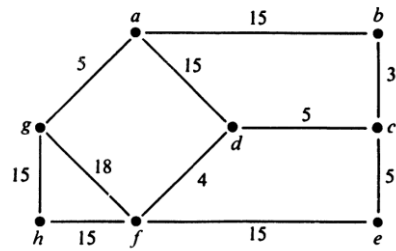
6(b) Find the Chromatic number of the following graphs

Question Bank - PROGRAMMING IN JAVA

UNIT-1

1. List and explain the features of object oriented programming.

2. a) What is Type Casting? List and explain types of type casting methods with suitable example.

   b)List the primitive data types available in Java and explain

3. Define Constructor. Illustrate various types of Constructors.

4. Explain about control statements in java with example.

5. a) Describe different levels of access specifies in Java

   b) Define an Array. How do you declare and access the array in java? Give an example.

UNIT-2

1. Define Inheritance. Explain the following with suitable example.

   a) has-a-relationship

   b) is-a-relationship

2. Explain about prevention of Inheritance with suitable example.

3. a) Explain Super and "this" key words with suitable example.

   b)Why Java does not support multiple Inheritance and Hybrid Inheritance? Explain it.

4. a) Illustrate method overloading and method overriding.

   b)What is Polymorphism? Explain the concepts of polymorphism with suitable example.

5. Define an abstraction. Illustrate abstract classes and its methods.

UNIT – 3

1. What is meant by interface? State its need and write syntax and features of interface with example program.

2. a) Explain how interface is used to achieve multiple Inheritances in Java with suitable example.

   b) Differentiate between interfaces and abstract class?

3. Define package. How to create and access user defined package in Java? Explain it with the java program.

4. a) What are the ways to access package from another package? Explain with an example.

   b) Write a java program to extend interface assuming suitable data.

5. a) Define inner classes. List and explain types of Inner Classes with suitable example.

   b) List any five built-in packages from Java API along with their use.

UNIT – 4

1. Define exception. How an exception can be handled in Java? And also List the benefits of Exception Handling.

2. a) What are try, catch, and finally keywords in java? Explain it with an example.

   b) Differentiate between Checked and Unchecked exceptions?

3. Explain the usage of throw and throws keyword in Exception Handling.

4. a) Explain in detail the process of creating thread with an example.

   b) What is a thread? Explain the states of a thread with a neat diagram. (Thread Life Cycle)

5. Discuss about producer consumer problem with a java program.

6. a) Distinguish between multi-tasking and multi-threading?

   b) How do we set priorities for threads? Explain it.

UNIT – 5

1. Explain the concept of Java collection framework. Write a brief overview on it.

2. a) Explain briefly about Vector class with an example.

   b) What is hash table? Explain with an example.

3. a) Demonstrate about stack class with an example.

   b) Explain briefly about Array List with an example.

4. a) Illustrate streams concept in detail with example programs

   b) Explain the hierarchy of text input/output in detail.

5. How a file can be managed using file class? Explain it.

Question Bank - Data Analytics with Python

Unit-1

1. Describe the classification of Data analytics with example in detail.

2. Explain the measure of Central Tendency and Dispersion

3. Differentiate Data Analysis and Analytics? Explain why Analytics is important

4. Explain the different types of data structures in pandas.

5. Discuss briefly about visual representation of data.

UNIT – 2

1. Explain the different types of probabilities with example

2. Differentiate between Random and Non Random Sampling and

Explain the random Sampling Techniques with example.

3. What is Sample Distribution ? Explain the Types of Sample Distribution with example.

4. .Describe the following with example

   i) Mutually Exclusive events

   ii) Independent Events

   iii) Complementary events

   iv) Collectively Exhaustive Events

   v) Bayes' Rule

   vi)Standard Deviation and Variance

5. Explain about Confidence interval and Confidence interval estimates

UNIT – 3

1. What is Hypothesis testing? Explain in detail developing of null and alternative

2. Describe in detail about three approaches for Hypothesis Testing

3. Describe about Type 1 error and Type 2 error

4 .Explain the concept of two-sample testing in statistical analysis, its purpose, and the difference between independent samples and paired samples.

5. Explain the decision rules for hypothesis testing of two population means.

Unit – 4

1. Describe different methods in one-way ANOVA in detail.

2. Explain two way ANOVA with example.

3. Expalin about Supervised and UnSupervised Machine Learning Techniques

4. Describe simple linear regression and multiple regression model with example.

5. Explain Logistic Regression model with example

Unit – 5

1. What is cluster analysis? How to handle the different types of variables in cluster analysis.

2. Explain K-means clustering with example

3. Explain the different steps in decision tree method.

4. Describe about CART and various Attribute Selection Measures

5. What is confusion matrix? Describe the following with example

       1.error rate

       2.accuracy

       3.Sensitivity

       4.Precision

# Question Bank - Design and Analysis of Algorithms

UNIT 1

1) What is Algorithm? Give the characteristics of algorithm. Explain how algorithmsperformance is analysed?

2) What are different mathematical notations used for algorithm analysis? Explain them indetail.

3) Illustrate the general method of divide and conquer technique.

4) Explain the divide and conquer Quick sort algorithm on given input and give the timecomplexity of quick sort algorithm

   10, 16, 8, 12, 15, 6,3,9,5

5) Explain the Merge Sort algorithm and trace this algorithm for n=8 elements.

   9, 3, 7, 5, 6, 4, 8, 2. Derive the time complexity of Merge sort algorithm for all cases.

6) Explain Strassen's matrix multiplication and its time complexity.

UNIT 2

1) Define: a) Disjoint set b) Articulation point c) Spanning Tree d) Biconnected components

2) a) Discuss about AND / OR graphs.

   b) Develop the algorithms for the following

   i) Simple UNION

   ii) Simple FIND

   iii) Weighted UNION.

   iv) Collapsing FIND.

3) What is a Backtracking?

   a) Give the 4 – Queens's solution. Draw the portion of the state space tree for n = 4 queensusing backtracking algorithm.

   b) How 8-Queen's problem can be solved using back tracking and explain with an example.

4) Construct the State Space Tree for Sum of Subset Problem, given weights area) w[1:6]={5,10,12,13,15,18} such that sum of subset is 30.

   b) w[1:4]={1,3,4,5} such that sum of subset is 8.

5) Explain the Graph – coloring problem. And draw the state space tree for m= 3 colors n=4vertices graph.

UNIT 3

1) Explain the general method and Control Abstraction of Greedy method.

2) Define Greedy knapsack. Give the optimal solution for 0/1 knapsack problem using greedymethod. (p1,p2,p3) = (30, 40, 35), (w1, w2, w3) = (20, 25, 10), M=40, n=3.

3) Write the algorithm for Job Sequencing with deadlines to find the optimal solution. Solvethe same when ,

    a) n=5 profits are (p1,p2,p3,p4,p5)=(20,15,10,5,1) and Deadlinesare(d1,d2,d3,d4,d5)=(2,2,1,3,3)

    b) n=7 profits are (p1,p2,p3,p4,p5,p6,p7)=(35,30,25,20,15,12,5) and Deadlines are (d1,d2,d3,d4,d5,d6,d7)=(3,4,4,2,3,1,2).

4) a) Explain Prim's algorithm for minimal spanning tree with an example.

    b) Write and explain Kruskal's algorithms to find minimum cost spanning tree:
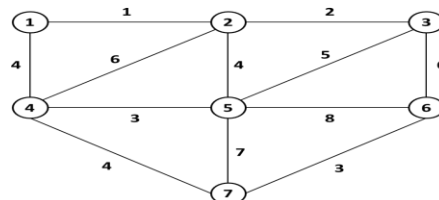
Discuss the single – source shortest paths (i.e. Dijkstra's) algorithm with suitable exampleand also find the time complexity

UNIT 4

1. a) Distinguish between Dynamic Programming and Greedy method.

b) Explain how Matrix – chain Multiplication problem can be solved using dynamic programming with suitable example.

2. Explain OBST.Draw an Optimal Binary Search Tree for n=4 identifiers (a1, a2, a3, a4) =(do, if, int, while) P(1:4)=(3,3,1,1) and Q(0:4)=(2,3,1,1,1).

3. Describe 0/1 Knapsack Problem using dynamic programming. Find an optimal solution for the dynamic programming 0/1 knapsack instance for n=3, m=6, profits are (p1, p2, p3) = (1,2,5), weights are (w1,w2,w3)=(2,3,4).

4. What is All Pair Shortest Path problem (APSP)? Write APSP algorithm and explain withthe help of an example.

5. Solve the following Travelling salesperson problem for the given cost Matrix and findthe optimal solution using dynamic programming.

	1	2	3	4
1	0	10	15	20
2	5	0	9	10
3	6	13	0	12
4	8	8	9	0

1. Explain Travelling Sales Person Problem (TSP)using LCBB procedure with the followinginstance and draw the portion of the state space tree and find an optimal tour.

∞	20	30	10	11
15	∞	16	4	2
3	5	∞	2	4
19	6	18	∞	3
16	4	7	16	∞

2. Explain the 0/1 knapsack problem using LCBB. Draw the portion of state space tree generated by LCBB for the 0/1 Knapsack instance: n = 4, (p1,p2,p3,p4) = (10,10,12,18), (w1,w2,w3,w4) = (2,4,6,9) and m=15. Find an optimal solution using fixed – tuple sizedapproach.

3. Give a note on FIFO branch and bound Solution.

4. a) Discuss in detail about the class P, NP, NP-hard and NP-complete problems. Giveexamples for each class.

b) Differentiate between NP - Hard and NP Complete classes.

5. a) Write and explain the Cooks theorem.

b) Explain non deterministic algorithm.

Question Bank - DATA WAREHOUSING AND DATA MINING

Unit-1

1. Define Data warehouse? Explain the features of data warehouse in detail.

2. Explain the difference between OLAP and OLTP.

3. Illustrate data warehouse architecture and explain its components.

    a) Explain 3-tier Architecture of data warehouse.

    b)Define data model and explain about Multi-dimensional data model?

4. a) Briefly explain about Types of OLAP servers.

   b) Explain about schema design in data warehouse.

Unit-2

1. a) Explain briefly about data mining?

  b) Explain about Knowledge discovery from data (KDD) process?

2. What are data mining functionalities? Explain in detail.

3. a) Explain about Classification of data mining?

   b) Explain in detail about data preprocessing?

4. a) What is integration of data mining with data base and data Warehouse?

   b) What are the major issues in data mining?

5. a) Explain about data mining task primitives?

   b) Explain about characteristics of data mining?

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UNIT – 3

1. a) Explain frequent pattern mining.

   b) Explain about frequent item sets and association rules

2. Explain about the Mining Multilevel Association rules with example.

3. Explain about the Apriori algorithm for finding frequent item sets with an example.

4. Explain about FP Growth Concept in Detail?

5. Write about market basket analysis with n example?

Unit – 4

1. Explain in detail about classification and predication

2. a) How does the Naïve Bayesian classification works? Explain in detail.

   b) Describe in detail about Rule based Classification.

3. a) Explain decision tree induction algorithm for classifying data tuples and with suitable example.

   b) Describe in detail about case based Classification

4. What is prediction? Explain about Regression analysis.

5. a) Explain about classification.

   b) How does the genetic algorithm works? Explain in detail.

Unit – 5

1. Explain briefly about cluster analysis.

2. Explain the following

   a) Density based clustering methods

   b) Grid based clustering methods

3. What are outliers? Discuss the methods adopted for outlier detection.

4. Explain the following

   a) Partitioning clustering methods

b) Hierarchical clustering methods

   5. Explain the following

        a) Model based clustering methods

        b) Constrain based clustering method

QUESTION BANK- Computer Networks

UNIT-I-INTRODUCTION TO COMPUTER NETWORKS

1   What is a computer network? Explain LAN, MAN and WAN with examples?

2   a) What is Topology? Discuss about various network topologies with suitable diagram?

     b) Explain the functions of various layers in ISO-OSI reference model

3   a) Explain about Protocol stack of TCP/IP with proper diagrams.

     b) Discuss about similarities and difference between TCP/IP and OSI Reference Model?

4   Discuss about mechanism of following devices:

        a) Hub   b) Bridge c) Router   d) Gateway e) Switch

5   Write a short notes on:

     a) NIC Card and MAC address

     b) Firewall and Proxies

UNIT-II-   DATA LINK LAYER

6   a) Elaborate the design issues of data link layer.

     b) What is the need for framing? What are the different framing techniques?

7   a) Explain in detail about the sliding window protocol using Selective Repeat ARQ.

     b) Explain in detail about the sliding window protocol using Go-Back-N.

8   Explain the CRC error detection technique using generator polynomial X^4+X^2+1

     & data 11100011.

9   a) What is the purpose of CSMA/CD explain with example.

     b) Compare and contrast pure aloha and slotted aloha.

10   a) Describe the stop and wait protocol with neat sketch.

     b) Explain flow control mechanism using Sliding window protocol.

UNIT-III-   NETWORK LAYER

11   a) Compare Virtual-Circuit and Datagram networks.

     b) Discuss about the concept of internetworking in detail.

12   a) Explain briefly about the shortest path routing algorithm

     b) Discuss the following: i) Broadcast Routing ii) Multicast Routing

     a) Explain about classes of IP addresses used in network layer

13   b) Explain Internet Protocol with the neat block diagram of IPv4 header format.

14 a) Explain leaky bucket and token bucket algorithm for traffic shaping.

b) Explain following Jitter Control with neat and clean diagram.

15 a)Explain Link State Routing with an example

b) Distance Vector Routing algorithm with suitable example.

UNIT-IV-   TRANSPORT LAYER

16 Explain in details about transport services and elements of transport layer?

17 a) Illustrate the connection establishment and release in transport layer.

b) Explain the Closed Loop Congestion Control.

18 What are the general principles of congestion control? Explain

19 What is TCP? Discuss about TCP connection establishment and Connection release phases.

20 a) Discuss about the network performance issues.

b) Describe Datagram Format of UDP.

UNIT-V-   APPLICATION LAYER

21 What is DNS? What are the services provided by DNS and explain how it works.

22 Write short notes on the following:

a.   FTP   b) BOOTP

23 What is electronic E-mail? Describe in brief about the two architectures of E-Mail.

24 Explain in detail about following

a) www   b) Firewalls

25 Briefly discuss about the operational model of HTTP.

Explain about SNMP protocol with example.

Question Bank - Design Thinking

UNIT -I

1. Explain the Characteristics of Successful Product Development.

2. Describe the Product Development Process in detail.

3. Define Product Planning. Describe the elements of Product Planning.

4. Explain the different steps to identify the Business Opportunities.

5. Write short note on innovation in product development.

UNIT –II

1. Explain different stages of Design Thinking process in detail.

2. Describe in detail about the principles of Design Thinking.

3. Write short note on benefits of Design Thinking.

4. Explain the seven key habits of effective Design Thinkers.

5. Write Short note on Loop and Keys.

UNIT -III

1. What is Iteration? Explain the different steps involved in Iteration.

2. Explain about the four reasons to use iteration design.

3. Explain about Observation? Explain in detail about different types of Observations.

4. Explain in detail about the importance of User Research in design thinking.

5. Why empathy important in Design Thinking?

UNIT –IV

1. How to observe and learn the ideation with a suitable example.

2. Write a short note on story boarding with example.

3. Write a short note on prototyping with an example.

4. What is user feedback? Explain the different types of user feedbacks.

5. Explain different types of Feedback with example.

UNIT –V

1. Explain about the ideation in generating ideas in Processing.

2. Explain what is practice ideation and prioritization in project planning.

3. How story boarding is important in fleshing out the ideas. Explain with an example

4. Why Prototyping is important and how it plays important role in implementing the Project

5. Explain the following (a) communicating an impactful story (b) consolidate storyboards

Question Bank –STRATEGIC MANAGEMENT

UNIT – 1

1. Define strategic management and explain the nature and dimensions ofstrategic management?

2. Explain the need of strategic management and vision and mission?

3. Analyse the strategic level typologies/Types /Layers of strategic management?

4. Explain the difference b/w strategic thinking and strategic planning?

5. Write a short note on the following:
   a. Concept of strategy
   b. Tactic
   c. Strategic plan

UNIT – 2

1. Write a short note on the following:
   a) Mission, b) Objectives, c) Goals and Ethics?

2. Explain about Concept of Mission and goal in detail?

3. What are Individual and Organization goals? Discuss with their impacton each other?

4. What are the ethical issues in business?

5. Write about the Strategic management Process in detail.

UNIT– 3

1. Analyse the decision making on business Information?

2. Write a short note on Business environment Analysis and appraisal?

3. ETOP: Techniques of diagnosis elaborate.

4. Explain the components of Business environment?

5. Discuss about SWOT analysis?

UNIT– 4

1. Analyse the Competitive Analysis and competitor analysis framework?

2. Explain Mc Kinsey's 7 S Framework.

3. Explain the Porter's five forces model?

4. Discuss about PESTLE analysis?

5. Describe about the stages in the Industry Life cycle.

UNIT – 5

1. What are resources of an organisation in strategic management?

2. Discuss how do resources and capabilities lead to competitiveadvantage?

3. What are the factors affecting internal environment of business?

4. Briefly explain about putting resources and capability analysis to work?

5. a. What do you mean by core competence?

   b. Discuss the process of preparing a strategy for competitive advantageusing core competence.