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DEPARTMENT OF INFORMATION TECHNOLOGY

II Year B. Tech – II Semester – 2022-2023

Course: Probability and Statistics Code: MR20–1BS0103

Question Bank

Unit – I: Probability and Random Variables

1. **A)** Of 500 employees, 280 were participating in Company's profit sharing plan (P), 400 have a Major Medical Insurance Coverage (M) and 200 employees participate in both programmes.
   (i) What is the probability that a randomly selected employee will be a participant in atleast one of the two programmes?
   (ii) Determine the probability that an employee will be a participant in the plan (P) given that he has insurance coverage (M).

   B) A bag contains 10 gold and 8silver coins. Two successive drawings of 3 coins are made such: (i) coins are replaced before the second trail (ii)coins are not replaced before the second trail. In each case, find the probability that the first draw will give3 gold coins and the second draw will give 3 silver coins.

2. **A)** The probability that an American industry will locate in Shanghai, China is 0.7, the probability that it will locate in Beijing, China is 0.4 and the probability that it will locate in either Shanghai or Beijing or both is 0.8. What is the probability that the industry will locate (i) in both cities (ii) in neither cities?

   B) The probability that a regularly scheduled flight departs on time is 0.83; the probability that it arrives on time is 0.82; and the probability that it departs and arrives on time is 0.78. Find the probability that a flight:
   a) arrives on time, given that it departs off time
   b) Departed on time, given that it has arrived off time.

3. **A)** In a bolt factory, machines A, B and C manufactures respectively 20% , 30% and 50% of the total output. Of their outputs 5, 4 and 2 percent are known to be defective bolts. A bolt is drawn at random from the product and is found to be defective. What are the probabilities that it was manufactured by (i) Machine A (ii) Machine B?
   B) A factory produces a certain type of outputs by three types of machine. The respective production figures are:
   Machine – I: 3,000 Units; Machine – II: 2,500 Units; Machine – III: 4,500 Units. Past experience shows that 1% of the output produced by the Machine – I is defective. The corresponding data for the other two machines are 1.2% and 2% respectively. An item is drawn at random from the day's production run and is found to be defective.
   (i) What is the probability of getting a defective item?
   (ii) What is the probability that it comes from the output of: a) Machine-I b) Machine-II.

4. **A)** A random variable X has the following probability distribution function

Values of X, x	0	1	2	3	4	5	6	7	8
P(X=x)	k	3k	5k	7k	9k	11k	13k	15k	17k

   a) Determine the value of k
   b) Find P(X>3), P(X: at least 3), P(0<X<5)
   c) Construct the cumulative distribution function of X
   d) Calculate the mean, variance and standard deviation of X

B) The random variable X representing the number of errors per 100 lines of software code, has the following probability distribution

X	2	3	4	5	6
f(x)	0.01	0.25	0.40	0.30	0.04

Verify whether it can be considered as the probability distribution or not. Determine the expected number of errors per 100 lines of code, along with variance and standard deviation. Also construct the cumulative distribution of number of errors per 100 lines of software code.

5. **A)** The diameter of an electric cable, say X is assumed to be a continuous random variable with probability density function

$$f(x) = \begin{cases} 6x(1-x), & 0 \le x \le 1 \\ 0, \textit{ else where} \end{cases},$$

a) Verify that the f(x) is a probability density function or not
b) Determine a number 'b' such that P(X<b) = P(X>b)
c) Determine the mean, variance and standard deviation of the random variable.

B) The amount of bread (in hundreds of pounds) x that a certain bakery is able to sell in a day is found to be a numerical valued random phenomena, with a probability function as specified by f(x) and is given by:

$$f(x) = \begin{cases} kx, & 0 \le x < 5, \\ (\quad -x), & 5 \le x < 10, \\ k\ 10 & \\ 0, \textit{ else where} \end{cases}$$

a) Find the value of k such that f(x) is a probability density function
b) What is the probability that the number of pounds of bread that will be sold tomorrow is (i) more than 500 pounds, (ii) less than 500 pounds and (iii) between 250 and 750 pounds?

Unit – II: Probability Distributions

1. **A)** For a binomial distribution mean is 6 and the standard deviation isparameters $\sqrt{2}$. Write down the of the distribution.

Find (i) P(X= exactly 2 Successes)
(ii) P(X= at least 2 Successes)
(iii) P(X= at most 2 Successes)

B) A multiple choice test consists of 8 questions with three answers to each question (of which only one is correct). A student answers each question by rolling a balanced die and checking the first answer if he gets 1 or 2, the second answer if he gets 3 or 4, the third answer if he gets 5 or 6.

a) To get a distinction, a student must secure at least 75% correct answers. If there is no negative marking, what is the probability that the student secures a distinction?
b) Find the probability of getting:
   (i) Exactly 3 correct answers
   (ii) No correct answer
   (iii) at least 6 correct answers

2. **A)** In a certain town 20% of the population is literate, and assume that 200 investigators take a sample of 10 individuals, each to see whether they are literate. How many investigators would you expect to report that three people or less are literates in the sample?

B) In a binomial distribution consisting of 6 independent trails, probabilities of 3and 4 successes are 0.2457 and 0.0819 respectively. Find the parameter 'p' of the distribution. Also find the mean, variance and standard deviation of the distribution.

3. **A)** The number of breakdowns of a computer is a random variable having Poisson distribution with a mean of 1.8 per month. Find the probability that the computer will function for a month

a) without any breakdowns
b) with only one breakdown
c) with at least 2 breakdowns.

B) In a given city, 6% of all drivers get at least one parking ticket per year. Use the Poisson approximation to the binomial distribution to determine the probabilities that among 80 drivers (i) 4 will get at least one parking ticket in any given year
(ii) at least 3 will get at least one parking ticket in any given year (iii) anywherefrom 3 to 6, inclusive, will get at least one parking ticket in any given year.

4. **A)** On the average, 3 traffic accidents per month occur at a certain intersection. What is the probability that in any given month at this intersection
    a) exactly 5 accidents will occur
    b) fewer than 3 accidents will occur
    c) at least 2 accidents will occur?

   B) A manufacturer of cotter pins knows that 2% of his product is defective. If he sells cotter pins in boxes of 200 and guarantees that not more than 5 pins will be defective. What is the probability that a box will fail to meet the guaranteed quality by using (i) formula for binomial distribution (ii) Poisson approximation to the binomial distribution?

5. **A)** Given a standard normal distribution, find the area under the curve that lies:
    a) to the left of z = -1.85;
    b) to the right of z = 2.06;
    c) between z = -1.16 and z = -0.87
    d) between z = -1.08 and z = 2.04
    e) between z = 0.25 and 1.75

   B) In a distribution exactly normal, 10.03% of items are under 25kilogram weight and 89.97% of items are under 70kilogram weight. What are the mean and standard deviation of the distribution?

Unit – III: Sampling Theory and Testing of Hypothesis-I

1. A population consists of observations 2, 3, 6, 8 and 11. Determine the mean and variance of the population. Write all the possible samples of size 2 (with replacement and without replacement). Construct the sampling distribution about mean. Show that the mean of sample means is equal to the population mean.
2. The manufacturer of television tubes knows from the past experience that the average life of a tube is 2000 hours with a standard deviation of 200 hours. A sample of 100 tubes has an average life of 1950 hours. Test at 0.05 level of significance if this sample came from a normal population of mean 2000hours. Also construct the confidence interval for the true value of the mean life of the television tubes at 0.05 level.
3. A manufacturer claims that the average tensile strength of Thread-A exceeds the average tensile strength of Thread-B by at least 12 kilograms. To test this claim, 50 pieces of each type of thread were tested under similar conditions. Type A thread had an average strength of 86.7 kilograms with a standard deviation of 6.28 kilograms, while Type B thread had an average tensile strength of 77.8 kilograms with a standard deviation of 5.61kilograms. Test the manufacturer's claim using a 0.05 level of significance.
4. In a sample of 1000 people in Maharastra, 540 are rice eaters and the rest are wheat eaters. Can we assume that both rice and wheat eaters are equally popular in this State at 1% level of significance? Also construct the confidence interval for the true values of the proportion of rice eaters at 0.01 level.
5. A company has the head office at Kolkata and a branch office at Mumbai. The personnel director wanted to know if the workers at the two places would like the introduction of a new plan of work and a survey was conducted for this purpose. Out a sample of 500 workers at Kolkata, 62% favoured the new plan. At Mumbai out of a sample of 400 workers, 41% were against the new plan. Is there any significant difference between the two groups in their attitude towards the new plan at 5% level?

Unit – IV: Testing of Hypothesis-II

1. Ten specimens of copper wires drawn from a large lot have the following breaking strength (in kg weight):578, 572, 570, 568, 572, 571, 570, 572, 596, and 548.Test whether the mean breaking strength of the lot may be taken to be 578kg weight? Also construct the confidence interval for the true value of the mean breaking strength of the copper wire at 0.05 level.
2. The following data represent the running times (in minutes) of films produced by two motion- picture companies:

Company-1	102	86	98	109	92		
Company-2	81	165	97	134	92	87	114

   Test the hypothesis that the average running time of films produced by company-2 exceeds the average running time of film produced by the company- 1 by 10 minutes. Use a 0.01 level of significance.

3. Two random samples drawn from two normal populations are:

Sample-I	20	16	26	27	23	22	18	24	25	19		
Sample – II	27	33	42	35	32	34	38	28	41	43	30	37

Obtain the estimates of variances of the populations and test whether the populations have same variances.

4. The demand for a particular spare part in a factory was found to vary from day-to-day. In a sample study the following information was obtained:

Day (x)	Mon	Tue	Wed	Thurs	Fri	Sat
No of parts demanded (f)	1124	1125	1110	1120	1126	1115

Test the hypothesis that the number of parts demanded does not depend on the day of the week.

5. A college infirmary conducted an experiment to determine the degree of relief provided by three cough remedies. Each cough remedy was tried on 50 students and the following data recorded:

		Cough Remedy		
		NyQuil	Robitussin	Triaminic
Relief	No relief	11	13	9
	Some relief	32	28	27
	Total relief	7	9	14

Test the hypothesis that the three cough remedies are equally effective.

Unit-V: Correlation, Regression and Curve Fitting

1. a) Briefly illustrate various types of correlation with examples
   b) Calculate the correlation coefficient between X and Y from the following data:

X	1	3	4	5	7	8	10
Y	2	6	8	10	14	16	20

2. A sample of 12 students scores in Psychological test (X) and Arithmetic ability (Y) are given below. Calculate the rank correlation coefficient between X and Y.

X	65	63	67	64	68	62	70	66	68	67	69	71
Y	68	66	68	65	69	66	68	65	71	67	68	70

3. Obtain the two lines of regression for the following bivariate data and use to determine the value of Y corresponding to the value of X=6.2 and the value of X when Y=14.5

X	1	2	3	4	5	6	7	8	9
Y	9	8	10	12	11	13	14	16	15

4. Fit a second degree parabola to the following data by using least squares method to the following data:

X	1	2	3	4	5	6	7	8
Y	1.0	1.2	1.8	2.5	3.6	4.7	6.6	9.1

5. Fit an exponential curve of the form $Y = ae^{bX}$ to the following data by using least squares method

X	1	2	3	4	5	6
Y	14	33	40	63	76	85

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.

Design and Analysis of Algorithms

UNIT 1:

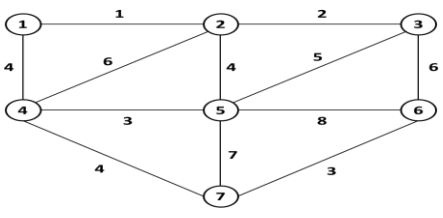
1) What is Algorithm? Give the characteristics of algorithm. Explain how algorithms performance is analysed?
2) What are different mathematical notations used for algorithm analysis? Explain them in detail.
3) Illustrate the general method of divide and conquer technique.
4) Explain the divide and conquer Quick sort algorithm on given input and give the time complexity 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 queens using 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 are
   a) 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=4 vertices 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 greedy method. (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 Deadlines are(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:



5. Discuss the single – source shortest paths (i.e. Dijkstra's) algorithm with suitable example and 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 with the help of an example.
5. Solve the following Travelling salesperson problem for the given cost Matrix and find the 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

UNIT 5:

1. Explain Travelling Sales Person Problem (TSP)using LCBB procedure with the following instance 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 sized approach.
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. Give examples 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.

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

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

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

2 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.

3 Explain the CRC error detection technique using generator polynomial X^4+X^2+1 & data 11100011.

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

b) Compare and contrast pure aloha and slotted aloha.

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

b) Explain flow control mechanism using Sliding window protocol.

UNIT-III-NETWORK LAYER

1 a) Compare Virtual-Circuit and Datagram networks.

b) Discuss about the concept of internetworking in detail.

2 a) Explain briefly about the shortest path routing algorithm

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

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

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

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

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

5 a) Explain Link State Routing with an example

b) Distance Vector Routing algorithm with suitable example.

UNIT-IV-TRANSPORT LAYER

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

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

b) Explain the Closed Loop Congestion Control.

3 What are the general principles of congestion control? Explain

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

5 a) Discuss about the network performance issues.

b) Describe Datagram Format of UDP.

UNIT-V-APPLICATION LAYER

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

2 Write short notes on the following:

a. FTP b) BOOTP

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

4 Explain in detail about following

a) www b) Firewalls

5 Briefly discuss about the operational model of HTTP.

Explain about SNMP protocol with example.

LINUX PROGRAMMING

UNIT I

1) i)Why are text editors required? Write brief notes on the text editors supported by Linux.
   ii) Explain GNU id detail and describe advantages of Linux in detail.
2) i) What are the different shell responsibilities? Write a shell script to find factorial of the given number.
   ii) Explain the following commands with syntax, options and examples:
   a)cat b) cp c) mv d) chmod e) cd f) ls
3. i) Tabulate few popular Linux Distributions and their special features.
   ii) Discuss in detail about various types of shell and illustrate with proper examples about shell met characters.
4. i) Explain about Arithmetic in shell
   ii) Describe about I/O Redirection operations and built in variables in Shell.
5 i) Explain briefly about the conditional statements and control structures in Shell Programming depicting their syntax and an illustration.
   ii) Compare shell command substitution and shell file name substitution.

UNIT II

1. i) Explain about link, unlink and symlink ( ) function with their syntax.
   ii) Differentiate soft link and hard links.
2. i) Briefly explain about File types and File attributes.
   ii) Discuss in detail about file system structure.
3. Explain about the following system calls with example:
   i. a)lseek b)stat c)fstat d)lstat e)dup() f)dup2().
4. i) Write about File and Directory maintenance system calls? Give Syntax and examples.
   ii) Write a program to list files in a directory.

5 (i) Differentiate the functions of chmod and chown functions.
(ii) Write the syntax for the following
a) opendir() b) readdir() c) closedir() d) seekdir() e)telldir()

UNIT III

1. What is a process? Write brief notes on the structure of a process.
2. i) Define zombie process and orphan process. Illustrate the same with a C Coding.
   ii) List out the supports given by the kernel towards the management of process and signals.
3. i) Describe about different signal functions in Linux with proper examples and also explain about signal generation and handling.
   ii). Discuss in detail about process waiting and process termination.
4. Explain process creation with necessary routines. What are the possible states a process could enter before its termination?
5. i) Write detailed notes on the system calls for process management.
   ii) Write the syntax for the following
   a) kill() b) raise() c) abort() d) alarm() e) pause()

UNIT IV

1. Define IPC. Categorize and explain different approaches of IPC on processes over same computer and different computer.
2. What are pipes? List out their limitations. Explain how pipes are created and used in IPC with suitable coding.
3. How are named pipes created? How does it overcome the limitations of anonymous pipes? Explain how reading and writing operations are performed in a named pipe with an example.
4. Define semaphore. Explain how wait and signal operations are used to control the access to shared resources with an example.
5. Write notes on the following:
   i) Semctl() semaphore function
   ii) Semget() semaphore function
   iii) emop() semaphore function
   iv) Popen and pclose library functions

UNIT V

1. i) Write a program which implements IPC via Shared memory. What are the supports given by the Kernel for Shared Memory?
   ii) List out and explain the basic steps to create a socket and establish a network connection using Berkeley Sockets. (Client-Server)

2. i) Classify and give brief notes on APIs for Shared memory. List out few merits and demerits of Shared memory.
   ii) Differentiate Pipes and Named Pipes.

3. i) Differentiate message passing and message queue IPC mechanisms.
   ii) Write a Socket Program for Linux with a Server and Client example Code.

4. Differentiate between connection oriented and connectionless socket protocols. Write brief notes on the system calls which support the IPC using these protocols.

5. i) How could you create and destroy a Berkeley socket.
   ii) “Each socket domain requires its own address format: Justify the statement by illustrating different address formats for different domains.

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.
4. Explain 3-tier Architecture of data warehouse.
5. Define data model and explain about Multi-dimensional data model?
6. Briefly explain about Types of OLAP servers.
7. 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?

.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 andwith 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

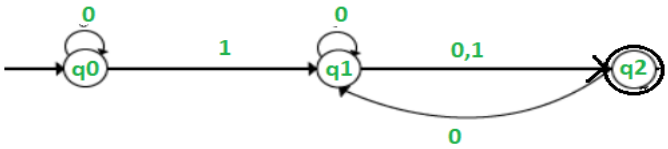
a) Model based clustering methods

b) Constrain based clustering method

Compiler Design

Unit 1

1) A) Define Finite Automata with a neat block diagram?
   B) Explain the Difference between DFA and NFA?
2) A) Explain the 3 preferred notations for describing a Finite Automata for the following diagram? (Transition Diagram, Transition Table, Transition Function)



   B) Construct the Finite Automata where all the strings which start with {a}?

3) A) Define Regular Language and Explain about the operations on Regular Language?
   B) Draw NFA for the Regular Expression a(a+b)*ab ?

4) Design a DFA from given regular expression 10 + (0 + 11)0* 1?

5) A) Define Context Free grammar with an Example?

   B) Given the Production Rules as

$S \rightarrow aSa$

$S \rightarrow bSb$

$S \rightarrow c$

Check that “abbcbba” string can be derived from the given CFG?

6) A) Define Derivative Tree in CFG and Explain about the properties of the derivative tree?

   B) Check whether the grammar G with production rules $-X \rightarrow X+X \mid X*X \mid X \mid a$ Is ambiguous or not for the string "a+a*a"?

7) Convert the given grammar to Chomsky Normal Form-

$S \rightarrow aAD$

$A \rightarrow aB / bAB$

$B \rightarrow b$

$D \rightarrow d$

Unit 2

1) Define Compiler and Interpreter and explain the difference between Compiler and Interpreter?

2) Explain the Phases of the Compiler with a neat Diagram?

3) What is Boot Strapping explain in detail with a Diagram?

4) A) what is Lexical Analyser explain with a block diagram?
   B) Explain the Functions of Lexical Analyser?

5) A) Define Lexeme, Token, Pattern with an example?
B) Count the number of Tokens for the following Code?

```
int main()
{
 int a = 10, b = 20;
 printf("sum is :%d",a+b);
 return 0;
}
```

6) a) Explain in detail about input buffering with example.
b) Discuss about bootstrapping with example.

Unit-3

1) Write recursive procedures for each non terminal by taking suitable example.

2) Construct the Predictive parsing LL (1) table for the grammar
G : S → iEtS|iEtSeS|a

3) What is an LR(0) item? Construct SLR parsing table for the grammar
G: E → E+T | T,
T → T*F | F,
F → (E) | id

4) Show that the following grammar is LALR(1).
S → AA,
A → aA | b.

5) Construct CLR parsing table for the following grammar.
S → CC,
C → aC | d

Unit -4

1) What are different intermediate code forms?
Discuss different Three Address code types and implementations of Three Address statements.

2) Construct a Three-address code, quadruples, triples and Syntax tree for the following expression: a = b* - c + b * - c .
3) Write SDD for the following
a) Simple desk calculator.
b) Simple type declarations.

4) Discuss about Boolean expressions and Flow of Control statements.

5) a) Distinguish between synthesized attributes and inherited attributes.
b) Write SDT for a=x+y*z and while-statements.

Unit 5

1) What is the role of code Optimizer in compiler?
   Explain various machine independent code optimization techniques.

2) Explain in detail about various peephole optimizations.

3) Explain the role of DAG in optimization with suitable example.

4) Illustrate loop optimization with suitable example.

5) Define Block? Explain about basic block recognition with a suitable Example?

6) Write the SDD for the Boolean express in. a<b or c<d and p<f ?

7) Explain in detail about problems of Top-down parsing with example?

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

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. Analyze 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. Analyze 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. Analyze 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 organization 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.