Total No. of Questions : **08** Roll No. : 0701.....

B.Tech THIRD SEMESTER EXAMINATION JUNE-2025

(Branch : Computer Science & Engineering)

CS-3401 STATISTICAL DATA ANALYSIS USING R

Time : Three Hours ***Maximum Marks : 70***
Min. Pass Marks : 22

Note : Attempt any five questions. Each question carries equal marks.

1(a) Find mean of the following frequency distribution : ***07***

Weight (in kg)	40-44	44-48	48-52	52-56	56-60	60-64
Frequency	2	3	5	7	2	1

(b) What are the levels of measurement? Why they are important? ***07***

2(a) Calculate variance for the given data, ***07***

x	10	4	6	8
f	1	3	5	1

(b) What are the methods of data collection? Explain briefly. ***07***

3(a) Find mean and variance of Binomial distribution. ***07***

(b) Find the probability that at most 5 defective fuses will be found in a box of 200 fuses, if experience shows that 2 percent of such fuses are defective. ***07***

4(a) The mean height of 500 students is 151 cm and standard deviation is 15 cm. Assuming that the heights are normally distributed; find how many students have heights between 120 and 155 cm? (Given P(2.07) = 0.4808, P(0.27) = 0.1064). ***07***

(b) There are two groups of subjects, one of which consists of 5 science subjects and 3 Engineering subjects and the other consists of 3 science and 5 Engineering subjects. An unbiased die is cast. If number 3 or 5 turns up, a subject is selected at random from the first group, otherwise a subject is selected at random from the second group. Find the probability that an Engineering subject is selected ultimately. ***07***

5(a) What do you mean by point estimation? Write its properties with brief explanation. ***07***

(b) From the following table, test the hypothesis that the flower color is independent of flatness of leaf: ***07***

	Flat Leaves	Curled Leaves	Totals
White Flowers	99	36	135
Red Flowers	20	5	25

Use the following table giving value of chi^2 for 1 d.f. for different values of P :

P	0.5	1	0.05
X^2	0.453	2.706	3.841

P.T.O.

6(a) Define variables in R and explain the differences among numeric, character and logical data types with examples. ***07***

(b) Compare and contrast the use of the c() function for combining different data types in R. What happens if you mix numeric and character values? Provide code and interpret the output. ***07***

7(a) What are data vectors and data frames in R? How do they differ in structure and use? ***07***

(b) Perform a T-test in R on two numeric vectors representing the scores of two groups. Write the code and explain the output (p-value, confidence interval and conclusion). ***07***

8 Write short note on **any four** : ***14***

(i) Measures of Dispersion (ii) Exponential Distribution (iii) T-test
(iv) Overview of R studio (v) Data Visualization features in R

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Total No. of Questions : **08** Roll No. : 0701.....

B.Tech THIRD SEMESTER EXAMINATION JUNE-2025

(Branch : Computer Science & Engineering)

CS-3402 / CS-3301 DATA STRUCTURES

Time : Three Hours ***Maximum Marks : 70***
Min. Pass Marks : 22

Note : Attempt any five questions. Each question carries equal marks.

1(a) Define the data structure. Discuss the primitive and non primitive data structures.

(b) Explain Circular linked lists. Write a function to insert a node after a given node in a one-way circular linked list.

2(a) Define stack and write structure of stack and functions for insertion of element in stack of integer values.

(b) Explain the following :

(i) Multidimensional Array
(ii) Multiple stacks in single array.

3(a) Convert the following infix expression into postfix and prefix expressions :

(i) (A+B)*C/D+E*F^G
(ii) A*(-B)/C+D^E

(b) Differentiate between linear queue and circular queue. Write functions or algorithms to delete an element in an array based circular queue.

4(a) Define the following terms :

(i) Binary tree
(ii) Full binary tree
(iii) Tree path
(iv) Siblings
(v) Depth of a tree.

(b) What do you understand by tree search and tree traversal? Given the tree traversals :

In-order : CBAEDFG; Pre-order : ABCDEFG

Where A,B,C,D,E,F,G are the nodes of the tree. Construct the binary tree.

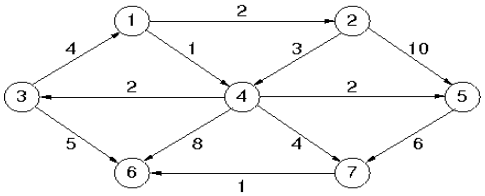
5(a) Define the B-tree and write the properties of a B-tree. Construct a B-Tree of order 5 using following keys : 7,3,14,1,8,5,11,17,13,6,23,12,20,26,4,16,18,24,25,19.

(b) Differentiate between the following and give example :

(i) Tree and Graph (ii) Adjacency Matrix and Adjacency List representation of graph

P.T.O.

6(a) Apply Prim's algorithms to make spanning tree of the given graph. Consider node 1 as start/source node.



(b) Differentiate between Depth First and Breadth First graph traversals by giving an example of a graph.

7(a) Explain the Quick Sort method and sort the following list using this algorithm :

45,20,30,40,10,5,40,50,60,55,65,25

(b) What is Merge Sort? Sort the following list using Merge Sort:

6,15,50,3,33,45,40,80,80,10,2,18,20,5

8 Write short notes on ***any three*** :

(i) Two way Linked list
(ii) Expression tree
(iii) Rotation in AVL tree
(iv) Kruskal's algorithm
(v) Bubble Sort

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Total No. of Questions : **08** Roll No. : 0701.....

B.Tech THIRD SEMESTER EXAMINATION JUNE-2025

(Branch : Computer Science & Engineering)

CS-3403 / CS-3303 DISCRETE STRUCTURES

Time : Three Hours ***Maximum Marks : 70***
Min. Pass Marks : 22

Note : Attempt any five questions. Each question carries equal marks.

1(a) Determine the number of integers between 1-100 that are divisible by 2, 3, 5 and 7. Solve the above using principle of inclusion and exclusion. ***07***

(b) What is Job Scheduling Problem explain with example. ***07***

2(a) Show by mathematical induction : ***07***

$$1^2 + 3^2 + 5^2 + ... + (2n - 1)^2 = \frac{n(2n+1)(2n-1)}{3}$$

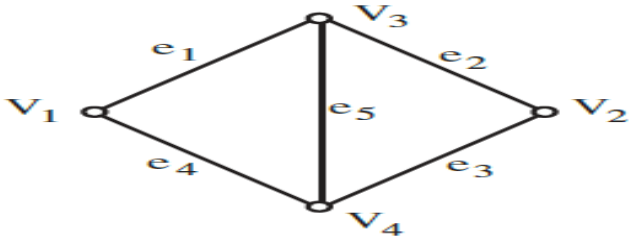
(b) Show that the relation R = {(a,b) : a,b ∈ I and a-b is divisible by 3} is an equivalence relation. ***07***

3(a) Define Semi group. Write its properties. ***07***

(b) Prove that every subgroup of a cyclic group *G* is cyclic. ***07***

4(a) Prove the theorem "The sum of the degrees of all vertices in a graph is equal to twice the number of edges". ***07***

(b) Consider the undirected graph G as shown in ***figure*** below. Find in incidence matrix. ***07***



5(a) Explain Homomorphism and Isomorphism of groups with an example. ***07***

(b) Expalin Graph Coloring and Chromatic Number in detail. ***07***

6(a) Prove that $p \wedge q \Rightarrow p \vee q$ is a tautology. ***07***

(b) Draw hasse diagram for the "less than or equal to" relation on set : ***07***

$$A = \{0, 2, 5, 10, 11, 15\}$$

7(a) Determine the particular solution of the recurrence relation : ***07***

$$a_r + 5a_{r-1} + 6a_{r-2} = 3r^2$$

(b) Define Euler and Hamiltonian graph with example. ***07***

8 Explain briefly (**any three**) : (i) Multigraph (ii) Pseudograph ***07***
(iii) Pigeonhole principle (iv) Inverse function

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Total No. of Questions : **08** Roll No. : 0701.....

B.Tech THIRD SEMESTER EXAMINATION JUNE-2025

(Branch : Computer Science & Engineering)

CS-3404 SOFTWARE DEVELOPMENT USING JAVA

Time : Three Hours ***Maximum Marks : 70***
Min. Pass Marks : 22

Note : Attempt any five questions. Each question carries equal marks.

1(a) Define class and object in JAVA. Illustrate with a simple class. ***07***

(b) Write a JAVA program using if-else and for loop to print prime numbers from 1 to 20. ***07***

2(a) What are vectors in JAVA? Mention any two differences from arrays. ***07***

(b) Write a JAVA program using an interface Animal with a method sound() and implement it in classes Dog and Cat. ***07***

3(a) Differentiate between primitive and wrapper classes. ***07***

(b) What is method overriding? How is it implemented in JAVA? ***07***

4(a) Define inheritance. Explain single and multilevel inheritance with diagrams. ***07***

(b) What is the need for exception handling in JAVA? Explain checked vs. unchecked exceptions. ***07***

5(a) What is the difference between finally and final in JAVA? ***07***

(b) Write a JAVA program to handle both Array Index out of Bounds Exception and Null Pointer Exception. ***07***

6(a) What is synchronization? Why is it required in multithreading? ***07***

(b) Explain the role of Buffered Reader and Print Writer in JAVA I/O. ***07***

7(a) Distinguish between File Input Stream and File Reader. ***07***

(b) Write an applet program to display “HELLO JAVA”. ***07***

8(a) What is JSP? List its key features. ***07***

(b) Write code to connect JAVA to a database and execute a SELECT query. ***07***

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Total No. of Questions : **08** Roll No. : 0701.....

B.Tech THIRD SEMESTER EXAMINATION JUNE-2025

(Branch : Computer Science & Engineering)

EC-3491 (OEL-I) / CS-3302 DIGITAL SYSTEM

Time : Three Hours ***Maximum Marks : 70***
Min. Pass Marks : 22

Note : Attempt any five questions. Each question carries equal marks.

1(a) What is gray code? How gray code is converted to binary explain with an example?

(b) Minimize the Boolean function and implement with only NAND gates.

$F = (A'B + ACD)(ABC + A'D + C)$

2(a) What is half adder? Design half adder with truth table and give logic diagram.

(b) Implement the function using multiplexer.

$F(A,B,C,D) = \sum(0, 1, 3, 4, 8, 9, 15)$

3(a) Explain S-R and D flip flop with truth table and diagram.

(b) How many types of shift registers? Explain all types of shift registers in detail.

4(a) What is multivibrator? Explain monostable and bistable multivibrator.

(b) Explain NMOS and PMOS inverter in detail with circuit diagram.

5(a) Discuss about BPSK and BFSK modulation scheme. Also draw it's waveform.

(b) Explain Time division multiplexing in detail.

6(a) Using K-map simplify the following function.

$F(A,B,C,D) = \sum m(2, 3, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15)$

(b) Convert the number $(350.25)_{10}$ to base 4,8,16.

7(a) Differentiate between synchronous and asynchronous counters.

(b) Explain decimal to BCD encoder.

8 Write short note on **any three** :

(i) DRAM (ii) PLA (iii) PCM (iv) ECL and TTL

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