



Chhattisgarh Swami Vivekanand Technical University

University Teaching Department

B.Tech (Honours) (Data Science/ Artificial Intelligence)

Class Test - II, Feb, 2023

Probability and Statistics (B000371(022))

Time Allowed: 2 hours

Maximum Marks: 40

Minimum Pass Marks: 14

- Note: (i) Each question contains four parts. Part (a) of each question is compulsory. Attempt any two parts from (b), (c), and (d) of each question.  
(ii) The figure in the right-hand margin indicates marks.

1. (✓) Explain Joint, Marginal, and Conditional Probability.

[4]

(✓) Suppose A and B are two independent events for which  $P(A) = 0.20$  and  $P(B) = 0.60$ .

- Find  $P(A/B)$ . • Find  $P(B/A)$ . • Find  $P(A \text{ and } B)$ . • Find  $P(A \text{ or } B)$ .

$P(A)$

$P(B)$

$P(A) \cdot P(B)$

$P(A \cap B)$  [8]

- (✓) This imaginary data represents the Attendance and CT-1 Marks for the Students of CSVTU, Bhilai for 9 students. Predict the marks for 10<sup>th</sup> student using regression method.

Attendance	CT-1 Marks for PS
29.97	10
59.42	35
28.12	11
67.11	37
76.66	39
43.77	23
44.83	14
53.58	14
75.07	35
52.25	?

[8]

regression

4 test  
1 test

(d) Given Below are packages that was obtained by Students in LPA of three branches AI, CSE & DS respectively from normal populations with equal variances. Test the hypothesis at 5% level ( $F_{tab}=3.88$ ) that population mean is equal.

AI	CSE	DS
8	7	12
10	5	9
7	10	13
14	9	12
11	9	14

2-way ANOVA

[8]

II. (a) What is Hypothesis Testing? Explain in Brief.

[4]

(b) Can it be concluded that average life span of an Indian is more than 70 years if a random sample of 100 Indians has an average life span of 71.8 years with standard deviation of 7.8 years. ( $z(\alpha)/z(tab)=1.64$ )

[8]

(c) In a survey of 200 boys of which 75 were intelligent, 40 had educated father while 85 of the unintelligent boys had uneducated fathers. Do these figures Support the Hypothesis that educated fathers have intelligent boys?  $\chi^2_{tab} = 3.841$

[8]

(d) A farmer applies three types of fertilizers on 4 separate plots. The figures on yield per acre are tabulated as following-

Test for two Null Hypothesis Test Cases-

a) Plots do not differ Materially.

b) Fertilizers do not differ Materially.

(Column(tab)=4.76, Row(tab)=5.14)

2 way ANOVA

Fertilizers	A	B	C	D
Nitrogen	6	4	8	6
Potash	7	6	6	9
Phosphate	8	5	10	9

[8]





# Chhattisgarh Swami Vivekanand Technical University

## University Teaching Department

### B.Tech (Honours) (Data Science/ Artificial Intelligence)

Class Test - II, FEB, 2023

Subject: Analysis & Design of Algorithm

B000372 (022)

Time Allowed: 2 hours

Maximum Marks: 40

Minimum Pass Marks: 14

Note: (i) Each question contains four parts. Part (a) of each question is compulsory. Attempt any two parts from (b), (c), and (d) of each question.

(ii) The figure in the right-hand margin indicates marks.

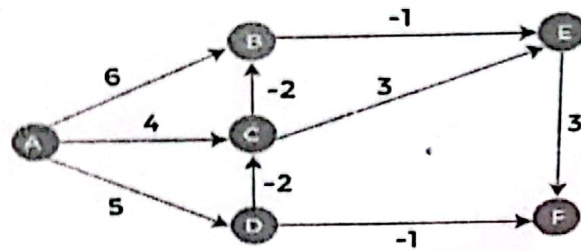
I. (a) Define Characteristics, Components and Applications of Greedy Methods. [2]

(b) Define Fractional Knapsack Problem. Let us consider that the capacity of the knapsack  $W = 60$  and the list of provided items are shown in the following table & find the best approach (From all 3 ways).

Item	A	B	C	D
Profit	280	100	120	120
Weight	40	10	20	24
Ratio ( $\frac{p}{w}$ )	7	10	6	5

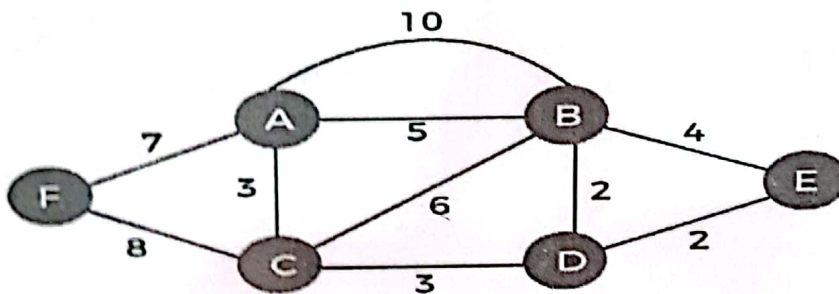
[6]

(c) Define Bellman Ford Algorithm & find the shortest distance from the single vertex (A) to all the other vertices of a weighted graph



[6]

(d) Define Kruskal Algorithm & find the minimum cost of a spanning tree.



[6]

II. (a) Define the approach of Dynamic Programming. [2]

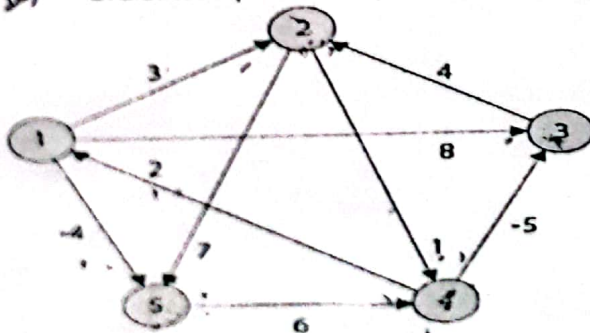
(b) Explain LCS & Find the longest common subsequence's to both string  
X: 10010101 Y: 010110110

[6]

(c) Explain MCM & find minimum cost of given sequence  
{4, 10, 3, 12, 20, and 7}

[6]

(d) Evaluate All-pair shortest path Floyd's Warshall algorithm



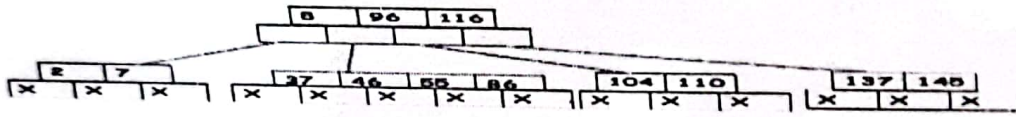
[6]

III. (a) Define String Matching.

[2]

(b) Explain B Tree & Insert and then Delete (7) the Items in given Tree.

## 5-Way Search Tree



Insert 4, 5, 58, 6 in the order

- (c) Explain NP-Completeness. [5]
- (d) Difference between Approximation Algorithm and Randomized Algorithms. [5]
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# Chhattisgarh Swami Vivekanand Technical University

University Teaching Department

B.Tech (Honours) (Data Science/ Artificial Intelligence)

Class Test - II, FEB, 2023

Discrete Structure (B000374(022))

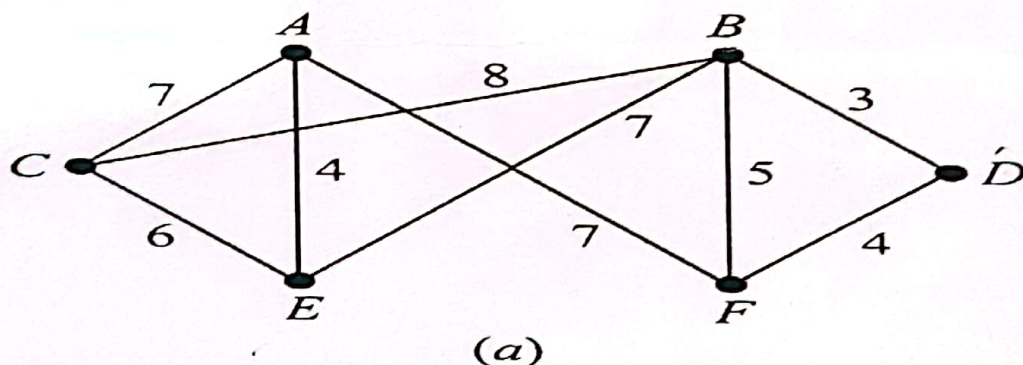
Time Allowed: 2 hours

Maximum Marks: 40

Minimum Pass Marks: 14

- Note: (i) Each question contains four parts. Part (a) of each question is compulsory. Attempt any two parts from (b), (c), and (d) of each question.  
(ii) The figure in the right-hand margin indicates marks.

- I. (a) Explain complete graphs and Bipartite Graphs with examples? [4]  
(b) Explain Kruskal's algorithm and find minimal spanning tree by using Kruskal's algorithm? [8]

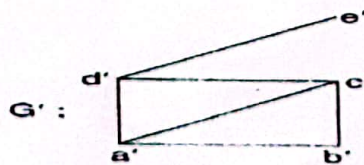
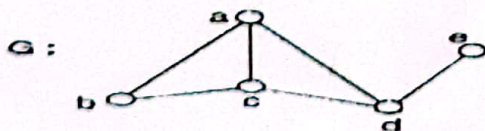


Prove that :

[8]

If a connected planar graph  $G$  has  $n$  vertices,  $e$  edges and  $r$  region, then  $n - e + r = 2$ . [4 marks]

- (i) Show that the graph  $K_5$  is not planar graph. [2 marks]  
(ii) Show that the graph  $K_{3,3}$  is not planar graph. [2 marks]  
(d) Show that the following graphs are isomorphic: [8]



- II. (a) (i) Write Chinese Remainder theorem. [1]  
(ii) Find the remainder when  $2^{100}$  divided by 7. [1]  
(iii) Find the remainder obtained by dividing  $1! + 2! + 3! + \dots + 1000!$  by 20. [1]  
(iv) Prove that the number 1571427 is divisible by 11. [1]
- (b) Explain Euler's  $\phi$  - function, Tau - function, Sigma function with properties? [8]
- (c) Prove that  $(P(N), *)$ ,  $X * Y = X \Delta Y = (X - Y) \cup (Y - X)$  is a group under symmetric difference? [8]
- (d) [8]  
(i) Write an example of non-abelian group in which every proper subgroup is normal and explain it?  
(ii) Write an example of abelian group in which every proper subgroup is normal and explain it?
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# Chhattisgarh Swami Vivekanand Technical University

## University Teaching Department

### B.Tech (Honours) (Data Science/ Artificial Intelligence)

#### Class Test - II, FEB, 2023

Subject: Database Management System

B000375 (022)

Time Allowed: 2 hours

Maximum Marks: 40

Minimum Pass Marks: 14

- Note: (i) Each question contains three parts. Part (a) of each question is compulsory. Attempt any one part from (b), (c) of each question.  
(ii) The figure in the right-hand margin indicates marks.

- I. (a) Define Stored Procedure, Dynamic and Static SQL. [3]  
(b) Employee Table: [10]

EmpID	EmpFname	EmpLname	Department	Project	Address	DOB	Gender
1	Sanjay	Mehra	HR	P1	Hyderabad(HYD)	01/12/1976	M
2	Rohan	Diwan	Admin	P2	Delhi(DEL)	01/1/1968	M
3	Sonia	Kulkarni	Account	P3	Mumbai(BOM)	02/5/1980	F
4	Ankit	Kapoor	HR	P1	Hyderabad(HYD)	02/5/1992	M
5	Ananya	Mishra	Admin	P2	Delhi(DEL)	03/7/1994	F

Employee\_Position Table:

EmpID	EmpPosition	DOB	Salary
1	Manager	01/05/2022	500000
2	Executive	02/05/2022	75000
3	Manager	01/05/2022	90000
2	Lead	02/05/2022	85000
1	Executive	01/05/2022	300000

Write a SQL for the following questions:

- (i) Find number of employees whose DOB is between 02/05/1970 to 31/12/1975 and are grouped according to gender.  
(ii) Fetch details of employees whose EmpLname ends with an alphabet 'A' and contains five alphabets.



- (iii) Fetch all employees who also hold the managerial position.
  - (iv) Write a query to retrieve the list of employees working in the same department.
  - (v) Write a query to retrieve the EmpFname and EmpLname in a single column as "FullName". The first name and the last name must be separated with space.
- (c) (i) Why we use view in DBMS? Write about their creation, updation and deletion with brief details and examples. [10]

(ii) Write about Group by, having and order by clauses with an example.

- II. (a) Define RAID in DBMS. [3]
- (b) Explain functional dependency, trivial functional dependency and decomposition in DBMS. Consider a relational schema  $R(A, B, C, D, E, H)$  on which the following FDs holds –  $\{A \rightarrow B, BC \rightarrow D, E \rightarrow C, D \rightarrow A\}$  What are the candidate keys of R? [10]
- (c) Define normalization with their various types. Insert the keys 79, 69, 98, 72, 14, 50 into the Hash Table of size 13. Resolve all collisions using Double Hashing where first hash-function is  $h_1(k) = k \bmod 13$  and second hash-function is  $h_2(k) = 1 + (k \bmod 11)$  [10]

- III. (a) Define Shadow paging with an example. [4]
- (b) Consider the 2 transactions T1 and T2 and four schedules S1, S2, S3 and S4 of T1 and T2 are given below:
- T1: R1[X] W1[X] W1[Y]  
 T2: R2[X] R2[Y] W2[Y]
- S1: R1[X] R2[X] R2[Y] W1[X] W1[Y] W2[Y]  
 S2: R1[X] R2[X] R2[Y] W1[X] W2[Y] W1[Y]  
 S3: R1[X] W1[X] R2[X] W1[Y] R2[Y] W2[Y]  
 S4: R2[X] R2[Y] R1[X] W1[X] W1[Y] W2[Y]
- Which schedules is/are conflict serializable? [10]
- (c) Write about various concurrency control protocols in brief details. [10]