

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI**  
**(MID SEMESTER EXAMINATION SP/2024)**

**CLASS:** B.TECH.  
**BRANCH:** CSE

**SEMESTER :** VI  
**SESSION :** SP/2024

**SUBJECT: AI303 UNSUPERVISED LEARNING**

**TIME:** 02 Hours

**FULL MARKS:** 25

**INSTRUCTIONS:**

1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates

			CO	BL
Q.1(a)	Why should you standardize the data when doing cluster analysis?	[2]	1	3
Q.1(b)	What is an ordinal variable? Using an example, discuss how a dissimilarity measure can be defined for an ordinal variable.	[3]	2	3
Q.2(a)	Define a similarity measure for nominal variables.	[2]	2	2
Q.2(b)	Suppose we have three students A, B and C. They enroll for the courses like; A(male) for Java, DBMS, OS, B(female) for C++, DBMS, OS and C(male) for Java, C++, DSA. What is the similarity score between (i) A & B (ii) A & C	[3]	2	3
Q.3(a)	What advantage is there for average link clustering as compared to single linkage clustering or complete link clustering? Explain.	[2]	2	3
Q.3(b)	Describe the Ward's method for hierarchical clustering. Write it's merits and demerits.	[3]	2	2
Q.4	Given the ordinal proximity matrix for n = 5:	[3+2]	2	4

	$x_1$	$x_2$	$x_3$	$x_4$	$x_5$
$x_1$	0	6	2	8	7
$x_2$	6	0	1	5	3
$x_3$	8	1	0	10	9
$x_4$	2	5	10	0	4
$x_5$	7	3	9	4	0

- a) Generate the hierarchical clusters using single linkage method.
- b) Demonstrate the clusters using a proximity dendrogram.

Q.5(a)	"K-means algorithm is sensitive to outliers", Justify using an example.	[2]	3	3
Q.5(b)	Describe the Iterative K -means clustering using an example. Write different methods for initialization of seed point in K-means clustering.	[3]	3	3

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