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Code No. : 17154 (B) N

**VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD**

Accredited by NAAC with A++ Grade

**B.E. (Civil Engg.) VII-Semester Main Examinations, Dec.-23/Jan.-24****Applications of Artificial Intelligence & Machine Learning in Civil Engineering**

(PE-IV)

Time: 3 hours

Max. Marks: 60

Note: Answer all questions from **Part-A** and any **FIVE** from **Part-B****Part-A (10 × 2 = 20 Marks)**

Q. No.	Stem of the question	M	L	CO	PO														
1.	What is meant by "learning" in the context of machine learning?	2	1	1	3														
2.	List out the types of machine learning.	2	1	1	3														
3.	Explain supervised learning with an example.	2	1	2	3														
4.	Distinguish between classification and regression.	2	1	2	3														
5.	Explain what makes clustering different from classification.	2	1	3	3														
6.	What is agglomerative hierarchical clustering?	2	1	3	3														
7.	What is the role of an agent in the reinforcement learning?	2	2	4	3														
8.	What type of problems can be solved by using reinforcement learning?	2	2	4	3														
9.	List applications of supervised learning in civil engineering.	2	2	5	3														
10.	Write the applications of unsupervised learning in civil engineering.	2	2	5	3														
<b>Part-B (5 × 8 = 40 Marks)</b>																			
11. a)	Describe the basic components of the machine learning process.	3	2	1	4														
b)	Describe 'Perceptron' used in the Neural Network.	5	2	1	4														
12. a)	What is a binary classification problem? Explain with an example.	3	2	2	4														
b)	Obtain a linear regression model for the data in the Table assuming that y is the independent variable.	5	3	2	4														
<table border="1"> <tr> <td>x</td> <td>1.0</td> <td>2.0</td> <td>3.0</td> <td>4.0</td> <td>5.0</td> </tr> <tr> <td>y</td> <td>1.0</td> <td>2.0</td> <td>1.3</td> <td>3.75</td> <td>2.25</td> </tr> </table>						x	1.0	2.0	3.0	4.0	5.0	y	1.0	2.0	1.3	3.75	2.25		
x	1.0	2.0	3.0	4.0	5.0														
y	1.0	2.0	1.3	3.75	2.25														
13. a)	What is a dendrogram? Explain by taking an example.	3	2	3	4														
b)	Use k-means clustering algorithm to divide the following data into two clusters and also compute the representative data points for the clusters.	5	3	3	4														
<table border="1"> <tr> <td>X1</td> <td>1.0</td> <td>2.0</td> <td>2.0</td> <td>3.0</td> <td>4.0</td> <td>5.0</td> </tr> <tr> <td>X2</td> <td>1.0</td> <td>1.0</td> <td>3.0</td> <td>2.0</td> <td>3.0</td> <td>5.0</td> </tr> </table>						X1	1.0	2.0	2.0	3.0	4.0	5.0	X2	1.0	1.0	3.0	2.0	3.0	5.0
X1	1.0	2.0	2.0	3.0	4.0	5.0													
X2	1.0	1.0	3.0	2.0	3.0	5.0													
14. a)	What do you understand by reinforcement learning? Explain in detail.	3	2	4	4														
b)	Explain Bellman's equation of reinforcement learning with an example.	5	3	4	4														

15. a)	Supervised learning is useful in predicting the 28 day compressive strength of concrete cubes. Explain in detail in support of the statement.	3	2	5	4
b)	Take one AI & ML application from each of the following fields of civil engineering and explain in detail. (a) Structural Engineering (b) Soil Mechanics (c) Hydrology or Water Resources Engineering.	5	3	5	4
16. a)	Distinguish between supervised, unsupervised and reinforcement learning.	4	2	1	4
b)	Describe how linear and multinomial regression models are useful in supervised learning.	4	3	2	4
17.	Answer any <i>two</i> of the following:				
a)	Explain the different types of linkages in clustering.	4	3	3	4
b)	List and explain the stages in reinforcement learning.	4	3	4	4
c)	Take one AI & ML application from each of the following fields of civil engineering and explain in detail. (a) Environmental Engineering (b) Construction Management	4	3	5	4

M : Marks; L: Bloom's Taxonomy Level; CO; Course Outcome; PO: Programme Outcome

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	40%
iii)	Blooms Taxonomy Level – 3 & 4	40%

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