University Of Mumbai

T.Y. B.Sc. Sem VI (Computer Science) Rev 21 Practical Examination – April 2025

Duration: 2 hrs **Marks:** 50

Date: 15 April 2025 **Time:** 9:00 - 11:00

Course: USCSP601 Data Science – Practical

Candidate's University Seat Number: _____

1.	Implement **Decision Tree Model** using Iris dataset using Python/R and interpret decision rules of classification.	40
2.	Viva	05
3.	Journal	05

University Of Mumbai

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1.	Load Iris Dataset. Apply **K-means Algorithm** using Python/R to group similar data points into clusters. Determine optimal number of clusters using **Elbow Method**. Visualize clustering results and analyze cluster characteristics.	40
2.	Viva	05
3.	Journal	05

University Of Mumbai

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Date: 15 April 2025 **Time:** 9:00 - 11:00

Course: USCSP601 Data Science – Practical

Candidate's University Seat Number: _____

1.	Load Iris Dataset. Apply **K-means Algorithm** using Python/R to group similar data points into clusters. Determine optimal number of clusters using **Silhouette analysis**. Visualize clustering results and analyze cluster characteristics.	40
2.	Viva	05
3.	Journal	05

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1.	A. Consider a scenario where you have test scores from a sample of students and you want to compare the mean of these scores with hypothesized population mean. Student Score = [72, 88, 64, 74, 67, 79, 85, 75, 89,77] Apply **One Sampled T-Test** using Python/R for above problem. Assume hypothesized mean as 70. Formulate Null and Alternative Hypothesis for a given problem. Interpret the results and draw the conclusion. [20] B. Apply **Feature Scaling** technique like standardization and normalization using Python/R to Boston Housing dataset. [20]	40
2.	Viva	05
3.	Journal	05

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<table>
<tr><td>1.</td><td>A. The employee's aptitude and job proficiency score is as follows.
<table><tr><td>aptitude</td><td>85</td><td>65</td><td>50</td><td>68</td><td>87</td><td>74</td><td>65</td><td>96</td><td>68</td><td>94</td><td>73</td><td>84</td><td>85</td><td>87</td><td>91</td></tr><tr><td>jobprof</td><td>70</td><td>90</td><td>80</td><td>89</td><td>88</td><td>86</td><td>78</td><td>67</td><td>86</td><td>90</td><td>92</td><td>94</td><td>99</td><td>93</td><td>87</td></tr></table>Perform Chi-Square Test to study correlation between aptitude and job proficiency of employee. Formulate Null and Alternative Hypothesis for a given problem. Interprete results and draw conclusions based on test outcome. [20]

B. Perform Logistic Regression on the Iris dataset using Python/R to predict binary outcome. Evaluate model's performance using classification metrics. [20]</td><td>40</td></tr>
<tr><td>2.</td><td>Viva</td><td>05</td></tr>
<tr><td>3.</td><td>Journal</td><td>05</td></tr>
</table>

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1. A. Create CSV file from given data. Read the data from CSV files into a data frame. Perform **Data pre-processing** tasks such as handling missing values and outliers using Python/R [20] — 40

Country	Age	Salary	Purchased
France	44	72000	No
Spain	27	48000	Yes
Germany	30	54000	No
Spain	38	61000	No
Germany	40		Yes
France	35	58000	Yes
Spain		52000	No
France	48	79000	Yes
Germany	50	83000	No
France	37	67000	Yes

B. Implement **Multiple Linear Regression** using Python/R on the below housing dataset to predict price of a house. Evaluate model's performance using classification metrics. [20]

Bedrooms	Bathrooms	Sqft_living	Floors	Grade	Sqft_above	Sqft_basement	Price
3	1	1180	1	7	1180	0	221900
3	2.25	2570	2	7	2170	400	538000
2	1	770	1	6	770	0	180000
4	3	1960	1	7	1050	910	604000
3	2	1680	1	8	1680	0	510000
4	4.5	5420	1	11	3890	1530	267800
3	2.25	1715	2	7	1715	0	257500
3	1.5	1060	1	7	1060	0	291850
3	1	1780	1	7	1050	730	229500
3	2.5	1890	2	7	1890	0	323000
3	2.5	3560	1	8	1860	1700	662500

2. Viva — 05

3. Journal — 05

University Of Mumbai

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Course: USCSP601 Data Science – Practical

Candidate's University Seat Number: _____

1.	A. Apply **Feature Scaling** technique like standardization and normalization using Python/R to numerical features of below dataset. [20] B. Implement **Multiple Linear Regression** on the "Pima Indian Diabetes dataset" using Python/R. [20]	40
2.	Viva	05
3.	Journal	05

Make	Model	Color	Mileage	Sell Price
Honda	Accord	Red	63,512	4000
Honda	Accord	Blue	95,135	2500
Toyota	Camry	Black	75,006	45000
Nissan	Altima	Green	69,847	3826
Toyota	Corolla	Black	87,278	2224
Honda	Civic	White	1,38,789	2723
Ford	F-150	Black	89,073	3950
Chevrolet	Silverado	Green	1,09,231	4959
Chevrolet	Impala	Silver	87,675	3791
Dodge	Charger	Silver	34,853	4349
Dodge	Charger	Silver	58,173	4252

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Course: USCSP601 Data Science – Practical

Candidate's University Seat Number: _____

1.	A. Consider the dataset given below.	40

Make	Model	Color	Mileage	Sell Price	Buy Price
Honda	Accord	Red	63,512	4000	3000
Honda	Accord	Blue	95,135	2500	2000
Toyota	Camry	Black	75,006	45000	44000
Nissan	Altima	Green	69,847	3826	3000
Toyota	Corolla	Black	87,278	2224	2100
Honda	Civic	White	1,38,789	2723	1900
Ford	F-150	Black	89,073	3950	3000
Chevrolet	Silverado	Green	1,09,231	4959	4500
Chevrolet	Impala	Silver	87,675	3791	3500
Dodge	Charger	Silver	34,853	4349	3500
Dodge	Charger	Silver	58,173	4252	4000

Create Pivot Table in Excel for following analysis and visualize the data using PivotChart: [20]

- How many cars do you have by make and model and by color?
- Find out profit margin of all different Make of cars.
- Find out average cost of vehicles.
- Find out percentage of cars of each color.

B. Perform **Logistic Regression** on the Iris dataset using Python/R to predict binary outcome. Evaluate model's performance using classification metrics. [20]

2.	Viva	05
3.	Journal	05

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Candidate's University Seat Number: _____

1.	A. Apply **Feature Scaling** technique like standardization and normalization using Python/R to numerical features of below dataset. [20] B. Load the Iris dataset. Perform **Principal component Analysis (PCA)** using Python/R on a dataset to reduce dimensionality**.** Select appropriate number of principle components. Visualize the data in the reduced-dimensional space. [20]	40
2.	Viva	05
3.	Journal	05

Country	Age	Salary	Purchased
France	44	72000	No
Spain	27	48000	Yes
Germany	30	54000	No
Spain	38	61000	No
Germany	40	85000	Yes
France	35	58000	Yes
Spain	31	52000	No
France	48	79000	Yes
Germany	50	83000	No
France	37	67000	Yes

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<table>
<tr><td>1.</td><td>A. Convert Categorical Column to numerical representation (Feature Dummification) of below dataset using Python/R. [20]

<table>
<tr><th>Country</th><th>Age</th><th>Salary</th><th>Purchased</th></tr>
<tr><td>France</td><td>44</td><td>72000</td><td>No</td></tr>
<tr><td>Spain</td><td>27</td><td>48000</td><td>Yes</td></tr>
<tr><td>Germany</td><td>30</td><td>54000</td><td>No</td></tr>
<tr><td>Spain</td><td>38</td><td>61000</td><td>No</td></tr>
<tr><td>Germany</td><td>40</td><td>85000</td><td>Yes</td></tr>
<tr><td>France</td><td>35</td><td>58000</td><td>Yes</td></tr>
<tr><td>Spain</td><td>31</td><td>52000</td><td>No</td></tr>
<tr><td>France</td><td>48</td><td>79000</td><td>Yes</td></tr>
<tr><td>Germany</td><td>50</td><td>83000</td><td>No</td></tr>
<tr><td>France</td><td>37</td><td>67000</td><td>Yes</td></tr>
</table>

B. Perform Logistic Regression on the Iris dataset using Python/R to predict binary outcome. Evaluate model's performance using classification metrics. [20]</td><td>40</td></tr>
<tr><td>2.</td><td>Viva</td><td>05</td></tr>
<tr><td>3.</td><td>Journal</td><td>05</td></tr>
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Candidate's University Seat Number: _____

1.	A. Create CSV file from given data. Read the data from CSV files into a data frame.	40

Make	Model	Color	Mileage	Sell Price	Buy Price
Honda	Accord	Red	63,512	4000	3000
Honda	Accord	Blue	95,135	2500	2000
Toyota	Camry	Black	75,006	45000	44000
Nissan	Altima	Green	69,847	3826	3000
Toyota	Corolla	Black	87,278	2224	2100
Honda	Civic	White	1,38,789	2723	1900
Ford	F-150	Black	89,073	3950	3000
Chevrolet	Silverado	Green	1,09,231	4959	4500
Chevrolet	Impala	Silver	87,675	3791	3500
Dodge	Charger	Silver	34,853	4349	3500
Dodge	Charger	Silver	58,173	4252	4000

Perform transformation functions on given data using Python/R. [20]

- Display records of the car having Sell Price greater than 4000.
- Sort the car data in ascending order.
- Group the data according the "Make" of car.

B. Load the Iris dataset. Perform **Principal component Analysis (PCA)** using Python/R on a dataset to reduce dimensionality**.** Select appropriate number of principle components. Visualize the data in the reduced-dimensional space. [20]

2.	Viva	05
3.	Journal	05

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1.	A. Consider you have a dataset that contains the exam scores of students from three different classes: A, B, and C. Class A = [85, 90, 88, 82, 87] Class B = [76, 78, 80, 81, 75] Class C= [92, 88, 94, 89, 90] Perform **One Way ANOVA Test** using Python/R to determine if there is a significant difference in the mean exam scores among these classes. Formulate Null and Alternative Hypothesis for a given problem. Interpret results and draw conclusions based on test outcome. [20] B. Load the Wine Quality dataset. Perform **Principal component Analysis (PCA)** using Python/R on a dataset to reduce dimensionality**.** Select appropriate number of principle components. Visualize the data in the reduced-dimensional space. [20]	40
2.	Viva	05
3.	Journal	05

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1.	A. The company is accessing the difference in time to complete the task between two groups of employees. State the hypothesis and do the **Two Sampled T-Test** using Python/R for the given dataset. [20] Group-I: Experience(0-1 year) Group-II: Experience(1-2 year) Time taken by Group1: 85,95,100,80,90,97,104,95,88,92,94,99 Time taken by Group2: 83,85,96,92,100,104,94,95,88,90,93,94 B. Perform **Multiple Linear Regression** on the "Pima Indian Diabetes dataset" using Python/R. [2-]	40
2.	Viva	05
3.	Journal	05

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1.	Construct a **Decision Tree** using Python/R to classify whether a person can play tennis or not. Test the model and check prediction of the model is correct or not. The following data set recorded whether or not a person played tennis depending on the outlook and wind conditions. • Each instance (example) is represented by the three attributes. o Outlook: a value of {Sunny, Overcast, Rain}. o Wind: a value of {Weak, Strong}. o PlayTennis: the classification attribute (i.e., Yes- the person plays tennis; No - the person does not play tennis).	40
2.	Viva	05
3.	Journal	05

Date	Outlook	Wind	PlayTennis	Date	Outlook	Wind	PlayTennis
1	Sunny	Weak	No	11	Sunny	Strong	Yes
2	Sunny	Strong	No	12	Overcast	Strong	Yes
3	Overcast	Weak	Yes	13	Overcast	Weak	Yes
4	Rain	Weak	Yes	14	Rain	Strong	No
5	Rain	Weak	Yes	15	Sunny	Strong	Yes
6	Rain	Strong	No	16	Overcast	Strong	No
7	Overcast	Strong	Yes	17	Overcast	Weak	Yes
8	Sunny	Weak	No	18	Rain	Weak	No
9	Sunny	Weak	Yes	19	Sunny	Weak	No
10	Rain	Weak	Yes	20	Rain	Strong	Yes

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1.	A. Implement **Decision Tree Model** on Titanic dataset using Python/R and interpret decision rules of classification. Perform **Linear Regression** on the following dataset in Python/R for predicting the weight of the person depending on height. [20]	40

Height	151	174	138	186	128	136	179	163	152
weight	63	81	56	91	47	57	76	72	62

B. Create CSV file from given data. Read the data from CSV files into a data frame.

Make	Model	Color	Mileage	Sell Price	Buy Price
Honda	Accord	Red	63,512	4000	3000
Honda	Accord	Blue	95,135	2500	2000
Toyota	Camry	Black	75,006	45000	44000
Nissan	Altima	Green	69,847	3826	3000
Toyota	Corolla	Black	87,278	2224	2100
Honda	Civic	White	1,38,789	2723	1900
Ford	F-150	Black	89,073	3950	3000
Chevrolet	Silverado	Green	1,09,231	4959	4500
Chevrolet	Impala	Silver	87,675	3791	3500
Dodge	Charger	Silver	34,853	4349	3500
Dodge	Charger	Silver	58,173	4252	4000

Perform transformation function on given data using Python/R. [20]

- Display records of the car having Buy Price greater than equal to 3000.
- Sort the car data in ascending order.
- Group the data according to the "Model" of car.

2.	Viva	05
3.	Journal	05

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1. A. Perform **Linear Regression** on the following dataset in Python/R for predicting the salary of the person depending on his/her years of experience. [20] — 40

Years of Experience	Salary
2	30000
10	95000
4	45000
20	178000
8	84000
12	120000
22	200000

B. Consider dataset given below.

Supplier ID	Part Number	Part Name	Part Price	Status
SP301	A001	water	6800	In
SP302	A002	altenator	3800	In
SP303	A003	air filter	4500	In
SP304	A004	wheel bearing	3582	In stock
SP305	A005	muffler	1600	In
SP306	A006	oil pan	1005	Out of stock
SP307	A007	brake pads	6500	In
SP308	A008	brake rotors	8549	Out of stock
SP309	A009	headlight	6500	In
SP310	A010	brake	1500	In
SP311	A011	Strut	4500	In
SP312	A012	Deive	1580	In
SP313	A013	CV Boot Kit	2650	In stock
SP314	A014	Oil Pump	4660	In
SP315	A015	Oil Filter	4350	In
SP316	A016	Fuel Filter	1280	In
SP317	A017	Tie Rod End	1800	In stock
SP318	A018	Ball Joint	2500	In
SP319	A019	Steering Rack	2700	Out of stock
SP320	A020	Piston	4500	Out of stock

Apply VLOOKUP function to retrieve information for the following queries. Also write down the steps for the same. [20]

- Find the Part Name for Part Number "A002".
- Find the Supplier ID for the Part Name "Ball Joint".
- Find the Part Price for Part Name "muffler".
- Find the Status of Part Number "A008".

2. Viva — 05

3. Journal — 05

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<table>
<tr><td>1.</td><td>A. Perform Linear Regression on the Iris dataset of R/Python for predicting petal.width on petal.length. [20]

B. A student is enrolled in the class. His /Her current grade is 65 which is average of all type of work during the semester and he/she needs atleast 72 to pass this class. Final exam is not yet completed. Apply what-if analysis using Goal seek to determine the marks need to obtained in Final Exam to complete the goal. [20]

<table>
<tr><th>Semester Work</th><th>Grade</th></tr>
<tr><td>Paper Presentation</td><td>58</td></tr>
<tr><td>Case Study</td><td>70</td></tr>
<tr><td>Assignment</td><td>72</td></tr>
<tr><td>Practical</td><td>60</td></tr>
<tr><td>Final Exam</td><td>60</td></tr>
<tr><td>Final Grade</td><td>65</td></tr>
</table>
</td><td>40</td></tr>
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1.	A. Perform Linear Regression on the Iris dataset of R/Python for predicting petal.width on petal.length. [20] B. Consider the dataset given below. Apply VLOOKUP function to retrieve information for the following queries. Also write down the steps for the same. [20] 1. Find the Part Name for Part Number "A016" . 2. Find the Supplier ID for the Part Name "Oil Pump". 3. Find the Part Price for Part Name "Brake". 4. Find the Status of Part Number "A020".	40
2.	Viva	05
3.	Journal	05

Supplier ID	Part Number	Part Name	Part Price	Status
SP301	A001	water	6800	In
SP302	A002	altenator	3800	In
SP303	A003	air filter	4500	In
SP304	A004	wheel bearing	3582	In stock
SP305	A005	muffler	1600	In
SP306	A006	oil pan	1005	Out of stock
SP307	A007	brake pads	6500	In
SP308	A008	brake rotors	8549	Out of stock
SP309	A009	headlight	6500	In
SP310	A010	brake	1500	In
SP311	A011	Strut	4500	In
SP312	A012	Deive	1580	In
SP313	A013	CV Boot Kit	2650	In stock
SP314	A014	Oil Pump	4660	In
SP315	A015	Oil Filter	4350	In
SP316	A016	Fuel Filter	1280	In
SP317	A017	Tie Rod End	1800	In stock
SP318	A018	Ball Joint	2500	In
SP319	A019	Steering Rack	2700	Out of stock
SP320	A020	Piston	4500	Out of stock

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1.	A. Create CSV file from given data. Read the data from CSV files into a data frame. Perform data pre-processing tasks such as handling missing values and outliers. [20]	40
	B. Implement **Linear Regression** on the Iris dataset using Python/R for predicting petal.width on petal.length. [20]	
2.	Viva	05
3.	Journal	05

Rollno	Name	Age	Marks	Class
1	Sudin	44	47	FY
2	Shaima	46	86	SY
3	Raina	27	45	TY
4	Paul	38		SY
5	Rahul	46	45	FY
6	Gopal		67	TY
7	Yatin	59	45	FY
8	Jim	36	34	FY
9	Nima	45	32	TY

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<table>
<tr><td>1.</td><td>A. Perform Logistic Regression on the Iris dataset using Python/R to predict binary outcome. Evaluate model's performance using classification metrics. [20]

B. Consider the dataset given below.
<table><tr><th>Date</th><th>Color</th><th>Region</th><th>Units</th><th>Sales</th></tr><tr><td>03-Jan-20</td><td>Red</td><td>West</td><td>1</td><td>110000</td></tr><tr><td>14-Jan-20</td><td>Blue</td><td>South</td><td>8</td><td>96000</td></tr><tr><td>21-Jan-20</td><td>Green</td><td>West</td><td>2</td><td>26000</td></tr><tr><td>30-Jan-20</td><td>Blue</td><td>North</td><td>7</td><td>84000</td></tr><tr><td>07-Feb-20</td><td>Green</td><td>North</td><td>8</td><td>25000</td></tr><tr><td>13-Feb-20</td><td>Red</td><td>South</td><td>2</td><td>60000</td></tr><tr><td>22-Feb-20</td><td>Blue</td><td>East</td><td>5</td><td>35000</td></tr><tr><td>01-Mar-20</td><td>Green</td><td>West</td><td>2</td><td>87000</td></tr><tr><td>13-Mar-20</td><td>Blue</td><td>East</td><td>8</td><td>69000</td></tr><tr><td>23-Mar-20</td><td>Blue</td><td>North</td><td>7</td><td>54000</td></tr></table>Create Pivot Table in Excel for following analysis and visualize the data using PivotChart: [20]

● Find out the total Sales.
● Find out the Sum of Sales color-wise.
● Find out the Sum of Units.
Find out Region-wise total sales and total units.</td><td>40</td></tr>
<tr><td>2.</td><td>Viva</td><td>05</td></tr>
<tr><td>3.</td><td>Journal</td><td>05</td></tr>
</table>