

	P.E.S. COLLEGE OF ENGINEERING (AN AUTONOMOUS INSTITUTE) CHH. SAMBAJINAGAR-431002 Summer Examination – 2026 Course: F.Y.M. Tech. Branch : Structural Engineering Semester : II Subject Code & Name: MTPESSEO205AT, Research Methodology Max Marks: 60 Date:11/07/2026 Duration: 3 Hr.																										
	Instructions to the Students: 1. All the questions are compulsory. 2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question. 3. Use of non-programmable scientific calculators is allowed. 4. Assume suitable data wherever necessary and mention it clearly.																										
		(Level/CO)	Marks																								
Q. 1	Solve Any one of the following.																										
A)	Explain the Formulating the Research Problem. Solution:- Marking Scheme <table border="1"><tr><td>Content</td><td>Marks Distribution</td></tr><tr><td>Meaning</td><td>2</td></tr><tr><td>Formulating the Research Problem.</td><td>10</td></tr></table>	Content	Marks Distribution	Meaning	2	Formulating the Research Problem.	10	K3	12																		
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B)	Explain Research Process. Solution:- Marking Scheme <table border="1"><tr><td>Content</td><td>Marks Distribution</td></tr><tr><td>Research Process flow chart</td><td>6</td></tr><tr><td>Research Process description</td><td>6</td></tr></table>	Content	Marks Distribution	Research Process flow chart	6	Research Process description	6	K3	12																		
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Q.2	Solve Any one of the following.																										
A)	The distribution of annual revenues of 100 firms in a district is presented in table. Find the mean of the annual revenue of the firms <table border="1"><tr><td>Annual Revenue in crores of Rupees</td><td>No. of Firms</td><td>Annual Revenue in crores of Rupees</td><td>No. of Firms</td></tr><tr><td>Less than 2</td><td>10</td><td>10 – 12</td><td>5</td></tr><tr><td>2 – 4</td><td>15</td><td>12 – 14</td><td>4</td></tr><tr><td>4 – 6</td><td>20</td><td>14 - 16</td><td>3</td></tr><tr><td>6 - 8</td><td>30</td><td>More than 16</td><td>5</td></tr><tr><td>8 – 10</td><td>8</td><td></td><td></td></tr></table> Solution:- Marking Scheme – 12marks Mean = Rs.6.1825 crores/-	Annual Revenue in crores of Rupees	No. of Firms	Annual Revenue in crores of Rupees	No. of Firms	Less than 2	10	10 – 12	5	2 – 4	15	12 – 14	4	4 – 6	20	14 - 16	3	6 - 8	30	More than 16	5	8 – 10	8			K3	12
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Q. 3	Solve Any one of the following.																							
A)	How would you differentiate between simple random sampling and complex random sampling design? Explain clearly giving examples. Solution:- Marking Scheme <table><tr><td>Content</td><td>Marks Distribution</td></tr><tr><td>simple random sampling</td><td>5</td></tr><tr><td>complex random sampling</td><td>5</td></tr><tr><td>Examples</td><td>2</td></tr></table>	Content	Marks Distribution	simple random sampling	5	complex random sampling	5	Examples	2	K4	12													
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B)	Differentiate between Restricted and Unrestricted sampling. Solution:- Marking Scheme <table><tr><td>Content</td><td>Marks Distribution</td></tr><tr><td>Restricted sampling.</td><td>6</td></tr><tr><td>Unrestricted sampling.</td><td>6</td></tr></table>	Content	Marks Distribution	Restricted sampling.	6	Unrestricted sampling.	6	K4	12															
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Q.4	Solve Any one of the following.																							
A)	What do you mean by ‘Hypothesis’? Distinguish between Null hypothesis and alternative hypothesis? Solution:- Marking Scheme <table><tr><td>Content</td><td>Marks Distribution</td></tr><tr><td>Meaning of Hypothesis</td><td>2</td></tr><tr><td>Null Hypothesis</td><td>5</td></tr><tr><td>Alternative Hypothesis</td><td>5</td></tr></table>	Content	Marks Distribution	Meaning of Hypothesis	2	Null Hypothesis	5	Alternative Hypothesis	5	K4	12													
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B)	Describe briefly χ^2 -test. Solution:- Marking Scheme <table><tr><td>Content</td><td>Marks Distribution</td></tr><tr><td>Key Idea</td><td>2</td></tr><tr><td>Formula</td><td>3</td></tr><tr><td>Steps in χ^2 -test.</td><td>3</td></tr><tr><td>Use</td><td>2</td></tr><tr><td>Conclusion</td><td>2</td></tr></table>	Content	Marks Distribution	Key Idea	2	Formula	3	Steps in χ^2 -test.	3	Use	2	Conclusion	2	K4	12									
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Q. 5	Solve Any one of the following.																							
A)	The annual sales revenue (in crores of rupees) of a product as a function of sales force (number of salesman) and annual advertising expenditure (in lakhs of rupees) for the past 10 years are summarized in table below. Design a regression model to forecast the annual sales revenue of the product. Table: Details of Annual Sales Revenue, Sales Force and Annual Advertising Expenditures <table><tr><td>Annual Sales revenue (Y)</td><td>Sales force (X₁)</td><td>Annual advertising expenditures (X₂)</td></tr><tr><td>20</td><td>8</td><td>28</td></tr><tr><td>23</td><td>13</td><td>23</td></tr><tr><td>25</td><td>8</td><td>38</td></tr><tr><td>27</td><td>18</td><td>16</td></tr><tr><td>21</td><td>23</td><td>20</td></tr><tr><td>29</td><td>16</td><td>28</td></tr></table>	Annual Sales revenue (Y)	Sales force (X₁)	Annual advertising expenditures (X₂)	20	8	28	23	13	23	25	8	38	27	18	16	21	23	20	29	16	28	K5	12
Annual Sales revenue (Y)	Sales force (X₁)	Annual advertising expenditures (X₂)																						
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	Solution:- a) $Y = 5.1483 + 0.619X_1 + 0.4304X_2$																
B)	The demand values (in lakh of tons) of a product during the past 6 years are summarized in table below. Table: Summary of Demand Values <table><tr><th>Year (X)</th><th>Demand (Y)</th></tr><tr><td>1997</td><td>50</td></tr><tr><td>1998</td><td>60</td></tr><tr><td>1999</td><td>50</td></tr><tr><td>2000</td><td>80</td></tr><tr><td>2001</td><td>72</td></tr><tr><td>2002</td><td>90</td></tr></table> a) Fit a linear regression to estimate the demand of the product in future. b) Compute the demand of the product for the year 2008. Solution:- a) $Y = 70.8 + 7.6 (x - 2000)$ b) 1,31,60,000 Tons	Year (X)	Demand (Y)	1997	50	1998	60	1999	50	2000	80	2001	72	2002	90	K5	12
Year (X)	Demand (Y)																
1997	50																
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