



LOYOLA COLLEGE (AUTONOMOUS) CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – STATISTICS

SECOND SEMESTER – APRIL 2025

UST 2502 – APPLIED STATISTICS



Date: 29-04-2025

Dept. No.

Max. : 100 Marks

Time: 09:00 AM - 12:00 PM

SECTION A - K1 (CO1)

Answer ALL the Questions:

(10 x 1 = 10)

1. Fill in the blanks:

- The _____ method is used to measure seasonal variation in time series.
- The Consumer Price Index measures changes in the _____ of goods and services over time.
- The reliability of a test refers to its _____ over repeated measurements.
- The difference between Crude Birth Rate and General Fertility Rate is that the latter considers only women.
- Engel's law states that as income increases, the proportion spent on _____ decreases.

2. Definitions:

- Define Index Number.
- Define the Time Reversal Test.
- Define Test Reliability.
- Define Standardized Death Rate.
- Define Utility Function.

SECTION A - K2 (CO1)

Answer ALL the Questions:

(10 x 1 = 10)

3. MCQ:

- Which of the following is not a method of index number?
 - Laspeyres Index
 - Paasche's Index
 - Moving Average
 - Fisher's Ideal Index
- Which test is used to check the consistency of index number?
 - Unit Test
 - Time Reversal Test
 - Factor Reversal Test
 - Both b and c
- Which method is used for testing reliability of test scores?
 - Split-Half Method
 - Moving Average
 - Exponential Smoothing
 - Least Squares Method
- Which of the following is not a mortality measure?
 - Crude Death Rate
 - Specific Death Rate
 - Net Reproduction Rate
 - Engel Curve
- Which of the following methods is used for estimating demand functions?**
 - Least Squares Method
 - Leontief's Method
 - Moving Average Method
 - Fisher's Index Method

4.	True or False																																							
a)	Fisher's Index is the geometric mean of Laspeyres and Paasche's Index.																																							
b)	The Chain Base Method updates the base year periodically.																																							
c)	A high reliability coefficient implies a highly valid test.																																							
d)	The Gross Reproduction Rate (GRR) accounts for female mortality.																																							
e)	Pareto's Law states that 50% of income is earned by 50% of the population.																																							
SECTION B - K3 (CO2)																																								
Answer any TWO of the following:										(2 x 10 = 20)																														
5.	Compute the Laspeyres, Paasche's Price and Fisher's price Index for the given data and interpret the results.																																							
	<table><tr><td>Commodity</td><td>Price(2000)</td><td>Quantity(2000)</td><td>Price(2005)</td><td>Quantity(2005)</td></tr><tr><td>A</td><td>20</td><td>2</td><td>25</td><td>2</td></tr><tr><td>B</td><td>50</td><td>5</td><td>35</td><td>6</td></tr><tr><td>C</td><td>60</td><td>7</td><td>45</td><td>8</td></tr><tr><td>D</td><td>30</td><td>9</td><td>55</td><td>10</td></tr></table>										Commodity	Price(2000)	Quantity(2000)	Price(2005)	Quantity(2005)	A	20	2	25	2	B	50	5	35	6	C	60	7	45	8	D	30	9	55	10					
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D	30	9	55	10																																				
6.	Explain the five methods used to determine the reliability of test scores.																																							
7.	Discuss the importance of Life Table construction and its applications.																																							
8.	Write the algorithm of Holt Winter's method and Box-Jenkin's method.																																							
SECTION C – K4 (CO3)																																								
Answer any TWO of the following:										(2 x 10 = 20)																														
9.	Explain the basic problems involved in the construction of index numbers.																																							
10.	Given the data on mortality rates, compute the Standardized Death Rate using Direct and Indirect Methods.																																							
	<table><tr><td>Age Group(years)</td><td>Population in study Area</td><td colspan="2">Observed Death in study Area</td><td colspan="2">Standard population</td></tr><tr><td>0-14</td><td></td><td colspan="2">120</td><td colspan="2">60,000</td></tr><tr><td>15-44</td><td>80,000</td><td colspan="2">150</td><td colspan="2">90,000</td></tr><tr><td>45-64</td><td>40,000</td><td colspan="2">200</td><td colspan="2">50,000</td></tr><tr><td>65 and above</td><td>30,000</td><td colspan="2">500</td><td colspan="2">40,000</td></tr></table>										Age Group(years)	Population in study Area	Observed Death in study Area		Standard population		0-14		120		60,000		15-44	80,000	150		90,000		45-64	40,000	200		50,000		65 and above	30,000	500		40,000	
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11.	Derive the formula for Gross and Net Reproduction Rates and interpret their significance.																																							
12.	Fit a straight-line trend using the least squares method for the given time-series data.																																							
	<table><tr><td>Year</td><td>2000</td><td>2001</td><td>2002</td><td>2003</td><td>2004</td><td>2005</td><td>2006</td><td>2007</td><td>2008</td></tr><tr><td>Sales(in units)</td><td>150</td><td>165</td><td>170</td><td>180</td><td>190</td><td>192</td><td>198</td><td>200</td><td>205</td></tr></table>										Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	Sales(in units)	150	165	170	180	190	192	198	200	205										
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SECTION D – K5 (CO4)																																								
Answer any ONE of the following:										(1 x 20 = 20)																														
13.	Explain the concept of Base Shifting, Splicing and Deflating Index Numbers with numerical examples.																																							
14.	Discuss different methods used for estimating demand functions, emphasizing Leontief's and Pigou's approaches.																																							
SECTION E – K6 (CO5)																																								
Answer any ONE of the following:										(1 x 20 = 20)																														
15.	Using the Ratio to moving Average method, determine the seasonal index for the following:																																							
	<table><tr><td>Year/Quarter</td><td>I</td><td>II</td><td>III</td><td>IV</td></tr><tr><td>2020</td><td>30</td><td>32</td><td>38</td><td>37</td></tr><tr><td>2021</td><td>34</td><td>37</td><td>49</td><td>50</td></tr><tr><td>2022</td><td>40</td><td>58</td><td>60</td><td>57</td></tr><tr><td>2023</td><td>62</td><td>67</td><td>78</td><td>80</td></tr></table>										Year/Quarter	I	II	III	IV	2020	30	32	38	37	2021	34	37	49	50	2022	40	58	60	57	2023	62	67	78	80					
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16.	Complete the following Life table:																																							
	<table><tr><td>Age</td><td>l_x</td><td>d_x</td><td>p_x</td><td>q_x</td><td>L_x</td><td>T_x</td><td>e_x^0</td></tr><tr><td>0</td><td>100000</td><td>?</td><td>?</td><td>?</td><td>?</td><td>4000000</td><td>?</td></tr><tr><td>5</td><td>95000</td><td>-</td><td>-</td><td>-</td><td>?</td><td>?</td><td>?</td></tr></table>										Age	l_x	d_x	p_x	q_x	L_x	T_x	e_x^0	0	100000	?	?	?	?	4000000	?	5	95000	-	-	-	?	?	?						
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