

Internal Assessment Test - III

Sub:	Business Statistics	Code:	20MBA14
Date:	19/05/2022	Duration:	90 mins
		Max Marks:	50
		Sem:	I
		Branch:	MBA

		OBE																																					
		CO	RBT																																				
Part A - Answer Any Two Full Questions (2* 20 = 40 marks)																																							
1 (a)	What is time series? Mention the methods of measuring secular trend.	[03]	CO1 L1																																				
(b)	Intelligence test given to two groups of boys and girls gave the following information. Is the difference in the mean score of boys and girls statistically significant? Test at 1% level of significance.	[07]	CO5 L3																																				
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th></th> <th>Mean score</th> <th>Standard deviation</th> <th>Number</th> </tr> </thead> <tbody> <tr> <td>Girls</td> <td style="text-align: center;">75</td> <td style="text-align: center;">10</td> <td style="text-align: center;">50</td> </tr> <tr> <td>Boys</td> <td style="text-align: center;">70</td> <td style="text-align: center;">12</td> <td style="text-align: center;">100</td> </tr> </tbody> </table>			Mean score	Standard deviation	Number	Girls	75	10	50	Boys	70	12	100																										
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(c)	There is a coaching class for CET 10 randomly selected students were given a test before coaching and they also were given a test after coaching. The test scores are as follows. Can we conclude that coaching is effective?	[10]	CO5 L4																																				
<table border="1" style="margin: auto; border-collapse: collapse;"> <tbody> <tr> <td style="padding: 2px;">Before coaching</td> <td style="padding: 2px;">35</td> <td style="padding: 2px;">39</td> <td style="padding: 2px;">47</td> <td style="padding: 2px;">53</td> <td style="padding: 2px;">27</td> <td style="padding: 2px;">19</td> <td style="padding: 2px;">36</td> <td style="padding: 2px;">46</td> <td style="padding: 2px;">8</td> <td style="padding: 2px;">17</td> </tr> <tr> <td style="padding: 2px;">After coaching</td> <td style="padding: 2px;">41</td> <td style="padding: 2px;">37</td> <td style="padding: 2px;">45</td> <td style="padding: 2px;">56</td> <td style="padding: 2px;">31</td> <td style="padding: 2px;">21</td> <td style="padding: 2px;">47</td> <td style="padding: 2px;">41</td> <td style="padding: 2px;">5</td> <td style="padding: 2px;">12</td> </tr> </tbody> </table>		Before coaching	35	39	47	53	27	19	36	46	8	17	After coaching	41	37	45	56	31	21	47	41	5	12																
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2 (a)	What is normal distribution? Give the meaning of standard normal variate.	[03]	CO3 L2																																				
(b)	Calculate the 5 yearly and 6 yearly centered moving averages for the following data of a number of commercial industrial failures in a country during 1999 to 2014.	[07]	CO4 L3																																				
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(c)	A random sample of 20 daily workers of State 'A' was found to have average daily earnings of Rs.44 with sample variance 900. Another sample of 20 daily workers in State 'B' was found to earn an average of Rs.30 per day with sample variance 400. Test whether the workers in State A are earning more than the workers in State B?	[10]	CO5 L4																																				
3 (a)	Fit a straight line trend equation by the method of least squares:	[05]	CO4 L3																																				
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(b)	In an intelligence test administered to 500 students, the average score was 42 and standard deviation was 24. Find: a) The number of students whose score exceeded 50 b) The number of students who got a score between 30 and 40 c) The number of students who got a score above 60	[15]	CO3	L4
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Part B - Compulsory (01*10=10 marks)

4 The following data show the percentage of females who are managers from 2006 to 2013.

Year	2006	2007	2008	2009	2010	2011	2012	2013
Percentage	6.7	5.3	6.1	5.6	7.9	5.8	4.3	6.1

(a) Develop a linear trend line for this time series. (b) Use this trend to estimate the percentage of females who are managers in 2015.

CO4	L3

Course Outcomes (COs)		PO1	PO2	PO3	PO4	PO5
CO1:	Facilitate objective solutions in business decision making under subjective conditions.	1a				
CO2:	Demonstrate different statistical techniques in business/real-life situations.					
CO3:	Understand the importance of probability in decision making.	2a			3b	
CO4:	Understand the need and application of analytics.				2b,3a,4	
CO5:	Understand and apply various data analysis functions for business problems.				1b,1c,2c	

Cognitive level	KEYWORDS
L1 - Remember	list, define, tell, describe, recite, recall, identify, show, label, tabulate, quote, name, who, when, where, etc.
L2 - Understand	describe, explain, paraphrase, restate, associate, contrast, summarize, differentiate interpret, discuss
L3 - Apply	calculate, predict, apply, solve, illustrate, use, demonstrate, determine, model, experiment, show, examine, modify
L4 - Analyze	classify, outline, break down, categorize, analyze, diagram, illustrate, infer, select
L5 - Evaluate	asses, decide, choose, rank, grade, test, measure, defend, recommend, convince, select, judge, support, conclude, argue, justify, compare, summarize, evaluate
L6 - Create	design, formulate, build, invent, create, compose, generate, derive, modify, develop, integrate

PO1–Theoretical Knowledge; PO2–Effective Communication Skills; PO3–Leadership Qualities; PO4 –Sustained Research Orientation; PO5 –Self-Sustaining Entrepreneurship

CI

CCI

HOD

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Note: Part A - Answer Any Two Full Questions (20*02=40 Marks)

Part B - Compulsory (01*10= 10marks)

Part	Question #	Description	Marks Distribution		Max Marks
A	1	a) Time series is an arrangement of statistical data in a chronological order i.e. in accordance with its time of occurrence. It reflects the dynamic pace of movements of a phenomenon over a period of time. Time Series Methods ☆ Free hand curve method ☆ Method of semi averages ☆ Method of moving averages ☆ Method of least squares	1 mark	3	20 M
		b) i) Null hypothesis (H ₀) ii) Alternative Hypothesis (H ₁) Here the test is TWO- Tailed iii) Test statistic is Z test for equality of means Z cal = 2.6958 iv) Identify critical values (For 1% level of significance z ₁ = 2.58 z ₂ = - 2.58 v) Making decision: Here Z _{cal} > Z ₁ H ₀ is rejected vi) Conclusion: H ₁ accepted.	2 marks		
		c) i) Null hypothesis (H ₀) ii) Alternative Hypothesis (H ₁) Here the test is Lower - Tailed iii) Test statistic is t- test for equality of means (Paired observation) mean of d = - 0.9 s = 4.949 t cal = - 0.5456 iv) Identify critical values (For 5% level of significance t ₁ = - 1.833 v) Making decision: Here t _{cal} > t ₁	1 mark	2 marks 2 marks	

		H0 is accepted vi) Conclusion: Coaching is effective	1 mark		
2	a)	A probability distribution which has the following probability density function (p.d.f) is called Normal distribution. $f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-1/2\left(\frac{x-\mu}{\sigma}\right)^2} \quad -\infty < x < \infty, \sigma > 0$ <p>Here the variable X is continuous and it is called Normal Variate. A normal variate with mean $\mu = 0$ and standard deviation $\sigma = 1$ is called standard normal variate. It is denoted by Z. Let X be a normal variate with mean μ and standard deviation σ then, $Z = \frac{X - \mu}{\sigma}$</p>	1.5 marks 1.5 marks	3	20 M
	b)	Calculation table 5 yearly moving averages – 26, 24.2, 21.6, 17.6, 13.2, 11.8, 11.2, 11, 11.6, 11.4, 9.4, 7.4 6 yearly moving averages – 23.16, 20.91, 17.91, 9.75, 12.41, 11.5, 11.25, 11.16, 10.58, 9	3 marks 4 marks	7	
	c)	i) Null hypothesis (H0) ii) Alternative Hypothesis (H1) Here the test is Upper - Tailed iii) Test statistic is t- test for equality of means t cal = 1.693 iv) Identify critical values (For 5% level of significance d.f = 38, t1 = 1.684 v) Making decision: Here tcal > t1 H0 is rejected vi) Conclusion: H1 is accepted	1 mark 3 marks 2 marks 3 marks 1 mark	10	
3	a)	The straight line trend is given by $Y_c = a + bx$ Calculation table Where a = 5.975 b = -0.0617 $Y_c = 5.975 - 0.0617x$	1 mark 2 marks	5	20 M
	b)	Given Mean = 42, S.D. = 24, N = 500 SNV = $\frac{X - \mu}{s.d.}$ i) Probability = 0.3707	5 marks	15	

			<p>The number of students whose score exceeded 50 = 185</p> <p>ii) Probability = 0.1596</p> <p>The number of students who got a score between 30 and 40 = 80</p> <p>iii) Probability = 0.2266</p> <p>The number of students who got a score above 60 = 114</p>	5 marks		
				5 marks		
B	4	a)	<p>The straight line trend is given by $Y_c = a + bx$</p> <p>Calculation table</p> <p>Where $a = 5.975$ $b = -0.0617$</p> <p>$Y_c = 5.975 - 0.0617x$</p> <p>Trend values</p> <p>$Y_{2015} = 5.6048$</p>	<p>1 mark</p> <p>3 marks</p> <p>2 marks</p> <p>4 marks</p>	10	10 M