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First Semester MBA Degree Examination, Dec.2024/Jan.2025

Business Statistics

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer any FOUR full questions from Q.No.1 to 7.
 2. Q.No. 8 is compulsory.
 3. M : Marks, L: Bloom's level, C: Course outcomes.

Q.1	a.	Define Statistics.	M 3	L L1	C CO1																																	
	b.	Mean and standard deviations of two distribution of 100 and 150 items were 50, 5 and 40, 6 respectively, find the mean and standard deviation of all the 150 items taken together.	7	L2	CO1																																	
	c.	Prices of a particular commodity in 5 years in two cities are given below: <table><tr><td>Price in city A :</td><td>20</td><td>22</td><td>19</td><td>23</td><td>10</td></tr><tr><td>Price in city B :</td><td>10</td><td>20</td><td>18</td><td>12</td><td>15</td></tr></table> Find which city has more stable prices.	Price in city A :	20	22	19	23	10	Price in city B :	10	20	18	12	15	10	L3	CO2																					
Price in city A :	20	22	19	23	10																																	
Price in city B :	10	20	18	12	15																																	
Q.2	a.	Define types of correlation with an example.	3	L1	CO1																																	
	b.	The measure of skewness for a certain distribution is -0.8. If the lower and upper quartiles are 44.1 and 56.6 respectively, find the median.	7	L2	CO1																																	
	c.	Find out Karl Pearson's co-efficient of correlation from the following data of marks obtained by 10 students in a class test. <table><tr><td>Marks in economics:</td><td>45</td><td>70</td><td>65</td><td>30</td><td>90</td><td>40</td><td>50</td><td>75</td><td>85</td><td>60</td></tr><tr><td>Marks in accountancy :</td><td>35</td><td>90</td><td>70</td><td>40</td><td>95</td><td>40</td><td>60</td><td>80</td><td>80</td><td>50</td></tr></table>	Marks in economics:	45	70	65	30	90	40	50	75	85	60	Marks in accountancy :	35	90	70	40	95	40	60	80	80	50	10	L3	CO2											
Marks in economics:	45	70	65	30	90	40	50	75	85	60																												
Marks in accountancy :	35	90	70	40	95	40	60	80	80	50																												
Q.3	a.	Explain the significance of measuring dispersion.	3	L1	CO1																																	
	b.	Discuss difference between parametric and non-parametric test.	7	L1	CO1																																	
	c.	Ten competitors in a chess tournament are ranked by three judges in the following order: <table><tr><td>Judge 1 -</td><td>1</td><td>5</td><td>4</td><td>8</td><td>9</td><td>6</td><td>10</td><td>7</td><td>3</td><td>2</td></tr><tr><td>Judge 2 -</td><td>4</td><td>8</td><td>7</td><td>6</td><td>5</td><td>9</td><td>10</td><td>3</td><td>2</td><td>1</td></tr><tr><td>Judge 3 -</td><td>6</td><td>7</td><td>8</td><td>1</td><td>5</td><td>10</td><td>9</td><td>2</td><td>3</td><td>4</td></tr></table> Use the rank correlation coefficient to discuss which pair of judges have the nearest approach.	Judge 1 -	1	5	4	8	9	6	10	7	3	2	Judge 2 -	4	8	7	6	5	9	10	3	2	1	Judge 3 -	6	7	8	1	5	10	9	2	3	4	10	L3	CO2
Judge 1 -	1	5	4	8	9	6	10	7	3	2																												
Judge 2 -	4	8	7	6	5	9	10	3	2	1																												
Judge 3 -	6	7	8	1	5	10	9	2	3	4																												

1 of 3

Q.4 a. Define mode and give 2 suitable examples.

b. Define the following terms:
i) Independent events
ii) Mutually exclusive events
iii) Equally likely event.

c. Calculate seasonal indices for the rainfall (in mm) in Karnataka given by simple average method.

Years	I	II	III	IV
2017	118.4	260	379.4	70
2018	85.8	185.4	407.1	8.7
2019	129.8	336.5	403.1	12
2020	283.4	360.7	472.1	14.3
2021	849.1	308.5	828.8	15.9

Q.5 a. Define Hypothesis.

b. A factory has two machines, machine I produces 30% of the items of output and machine II produces 70% of the items. Further 5% of the items produced by the machine I were defective and only 1% produced by machine II were defective. If the defective item is drawn at random, what is the probability that it was produced by machine I?

c. Random samples drawn from normal population are:

Sample 1:	20	16	26	27	23	22	18	24	25	19		
Sample 2:	27	33	42	35	32	34	38	28	41	43	30	37

Obtain estimate of variance of 2 population and test whether 2 populations are same.

Q.6 a. Define normal distribution.

b. An intelligent quotient of 16 students from one area of a city showed a mean of 107 and SD of 10. While the IQ of 14 students from another area of the city showed mean of 112 and SD of 8. Is there a significance difference between the IQ's of the 2 groups at 0.01 level of significance?

c. Explain steps in formulation of hypothesis.

Q.7 a. Define time series analysis.

b. Below are given figures of production (in 000's tons) of a sugar factory.

Year :	1999	2000	2001	2002	2003	2004	2005
Production :	77	88	94	85	91	98	90

i) Fit a straight line by the least square and show the trend values.
ii) What is the monthly increase in production?

MD/110

9. On an average a printer makes 4 printing mistakes while printing one page. What is the probability that a randomly observed page is free from mistakes? Among 300 pages, how many pages would you expect mistakes [$e^{-4} = 0.0183$].

10

L1

CO2

Q.8

CASE STUDY (Compulsory)

a. Construct 5 year moving average of number of students studying in the college, they are:

Years :	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
No. of students :	332	317	357	392	402	405	410	427	405	431

10

L1

CO2

b. Solve the problem using 3years moving average method.

Years :	1999	2000	2001	2002	2003	2004	2005
Duration :	-3	-2	-1	0	1	2	3

10

L3

CO2

FIRST SEMESTER MBA DEGREE EXAM
Dec. 2024 / Jan 2025
BUSINESS STATISTICS

1. a) Statistics

It is a branch of mathematics that deals with the collection, organization, analysis, interpretation and presentation of data, often numerical.

b) Combined mean = 45

Combined S.D = 5.35

c) $\bar{x}_A = 18$, $\bar{x}_B = 15$

$G_A = 3$, $G_B = 4$

Cov. of Variation = $\frac{G}{\bar{x}} \times 100$

$\bar{x} / \text{Cov. of Var A} = 6.23$

Cov of Var B = 3.64

Price in Security B is more stable.

(1)

2.9) Correlation

Statistical relationship or association between two or more variables.

Example: Ice cream sales and homicide rates.

b)

$$r = -0.8 \quad ; \quad Q_3 = 56.6.$$

$$Q_1 = 44.8$$

$$\text{Median} = \boxed{50.25}$$

c)

$$r = \frac{N \sum XY - \sum X \sum Y}{\sqrt{N \sum X^2 - N (\sum X)^2} \sqrt{N \sum Y^2 - N (\sum Y)^2}}$$

$$= 0.73$$

There is a positive correlation between the marks in Economics and marks in Accountancy.

3.9)

Significance of measuring dispersion
It provides a more complete understanding of a dataset than simply looking at central tendency. This is essential for making informed decisions.

4)

parametric & non-parametric Test

✓ P.T. assumes the underlying pop. distn. is known and uses parameters like mean and std. deviation. Tests are t-test, Z test, F test, etc.

✓ non. P.T. makes minimal or no assumptions about the population distribution. Tests are Mann-Whitney U Test, Kruskal-Wallis test, chi-square test.

c) Rank Correlation = $1 - \frac{6 \sum D^2}{n^3 - n}$

$r_{1,2} = 0.35$; $r_{2,1} = 0.68$

$r_{2,3} = 0.45$

Among all Judge 3 and Judge 1 have high rate of correlation

(2)

4.9) Define mode
value that appears most often in
a set of data values.

b) Independent Events
I.E in probability are events where the
occurrence of one event doesn't affect
the probability of the other event.

Mutually Exclusive Events

Events that cannot occur at the
same time. This is also called
Disjoint Events.

Equally Likely Events

Events that have an equal probability
of occurring.

c) Seasonal Variation

Year	I	II	III	IV
2017	-	-	93%	96%
2018	92%	97%	98%	93%
2019	94%	93%	95%	96%
2020	98%	96%	94%	92%
2021	94%	96%	-	-

6.9

Hypothesis

Set of assumption to pass through the Statistical Test.

Two types of Hypothesis are null & Alternate Hypothesis.

5)

H_0 : Defective item was not produced by mach. ?

H_1 : Defective item ————— " —————
—————" —————.

Two tail test @ 5% level of significance

$$t = \frac{\bar{x} - \mu}{\sigma / \sqrt{n}} = 3.25$$

0.2

TV

3.25 > 1.96

0.2 is more than TV as a result H_0 is rejected.

c)

Sample 1 variance = 2.64

Sample 2 variance = 3.65

$$F_{test} = \frac{3.65}{2.64} = 1.38 \quad \text{at } \alpha = (9, 7 = 3.68)$$

1.38 < 3.68 $\therefore H_0$ is Accepted

b.9) Normal distribution where data points tend to cluster around the mean (Average) with a symmetrical, bell-shaped curve.

b) H_0 : There is no sig diff between the 30's of the 2 groups.

H_1 : There is a sig diff between the 30's of the 2 groups.

Two tail test @ 10% level of significance

$$t = \frac{\bar{x} - \mu}{\sigma / \sqrt{n}}$$

$$= 3.68$$

$$; df = n - 1$$

$$= 14 - 1$$

$$= 13 \Rightarrow \underline{\underline{2.45}}$$

		Conclusion	
CV	TV	CV is more than TV	
3.68	2.45	$\therefore H_0$ is Rejected.	

c) Steps in Formulation of Hypothesis:

- ✓ Setting the Hypothesis
 - ✓ Confidence level and tail
 - ✓ Application of Statistical test
 - ✓ Comparison of test value with table value
 - ✓ Conclusion
- } critical points
marks
expt. marks

7.9) Time Series Analysis
 used to analyse data points collected
 over a period of time, typically at
 consistent intervals.

6)

Year	Actual	Trend values (Least sq)
1999	77	84
2000	89	86
2001	94	88
2002	85	90
2003	91	92
2004	98	94
2005	90	96

$$y_c = a + bx$$

$$\Sigma y = na + b \Sigma x \quad \text{--- (1)}$$

$$\Sigma xy = a \Sigma x + b \Sigma x^2 \quad \text{--- (2)}$$

$$y_c = 82 + 2(1)$$

$$= 82 + 2 = 84 \Rightarrow 1999$$

(4)

7. c)

$$P(\text{zero mistakes}) = P(4)$$

$$= \frac{e^{-4} 4!}{4!} = \frac{0.0183 \times 24}{24} = 0.0183$$

$$= 1.83\%$$

$$4! = 4 \times 3 \times 2 \times 1 = \underline{24}$$

1.83 % is the i.e. 0.0183 is the probability that it will be free from the mistakes.

CASE STUDY

Q8

9) 5 YEARLY MOVING AVERAGES

YEAR	no. of students	S.Y.M.T.	S.Y.M.A.
1996	332	-	-
1997	317	1800	-
1998	357	1800	360
1999	392	1803	361
2000	402	1808	361
2001	405	1825	365
2002	410	1805	361
2003	427	1808	362
2004	407	-	-
2005	431	-	-

8.6) 3 YEARS MOVING AVERAGE METHOD

YEARS	deviation	3.Y. M. Total	3 Y. M. Avg
1999	-3	-	-
2000	-2	-6	-2
2001	-1	-3	-1
2002	0	0	0
2003	1	0	0
2004	2	3	1
2005	3	-	-

X ————— X ————— X

25/4/2025

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