

**VPM's**  
**DR VN BRIMS, Thane**  
**Programme: MMS (2018-20)**  
**First Semester Examination December 2018**

<b>Subject</b>	<b>Business Statistics</b>		
<b>Roll No.</b>		<b>Marks</b>	<b>60 Marks</b>
<b>Total No. of Questions</b>	<b>7</b>	<b>Duration</b>	<b>3 Hours</b>
<b>Total No. of printed pages</b>	<b>3</b>	<b>Date</b>	<b>13.12.2018</b>

1. Q.1 ( A and B ) is compulsory and carries 20 marks
2. Attempt any four questions out of the remaining six questions
3. Each question carries 10 marks and each sub-question carries 5 marks
4. Use of scientific calculator is allowed

**Q1 Compulsory (20 Marks)**

a. The American Bar Association conducted a survey some years ago that showed that the mean household income for lawyers was \$ 120000. A researcher took a random sample of 64 lawyers recently that produced a mean household income of \$ 140500 with a standard deviation of 24500 Test at the 2.5 % significance level whether the current mean household income for all lawyers is greater than \$ 120000.

(For  $\alpha = 0.025$ ,  $Z = \pm 1.96$  for  $\alpha / 2 = 0.0125$ ,  $Z = \pm 2.24$ )

b. According to the records of the electric company serving the Boston Area ,the mean electric consumption for all households during winter is 1650 kilowatt hours per month. Assume that the monthly electric consumption during winter by all households in this area has a normal distribution with a mean of 1650 kilowatt hours and standard deviation of 320 kilowatt hours.

1. Find the probability that the monthly electric consumption during winter by randomly selected household from this area is less than 1800 kilowatt hours.
2. What percentage of the households in this area has a monthly electric Consumption of 900 to 1300 kilowatt hours?

(Area between  $Z=0$  and  $Z = + / - 0.4685 = 0.1808$

Area between  $Z=0$  and  $Z = + / - 2.343 = 0.4904$

Area between  $Z=0$  and  $Z = + / - 1.0937 = 0.3621$ )

**Q2. Answer Any two from the following**

- a) What are the arithmetic properties of Mean?
- b) Three machines producing 40 %, 35 % and 25 % of the total output are known to produce with defective proportion of items: 0.04, 0.06 and 0.03 respectively. On a particular day, a unit of output is selected at random and is found to be defective. What is the probability that it was produced by the second machine?
- c) Calculate Karl Pearson's coefficient of correlation between marks in Economics and marks in Accountancy of a group of 10 students and interpret it.

X	53	47	42	60	63	52	57	55	61	48
Y	72	61	62	85	80	65	79	75	84	73

**Q3. Answer Any two from the following**

- a) What are the various Sampling Techniques?
- b) The following data gives the marks obtained at the preliminary examination (X) and the final examination(Y) for a group of 10 students'. Obtain the regression equation of Y on X. Hence find the most probable marks at the final examination of a student who has scored 70 marks at the preliminary exam

X	54	65	75	82	57	59	60	64	58	62
Y	58	67	76	80	60	64	65	65	60	70

- c) A manufacturer of ball pens knows that 5% of his product is defective. If he sells pens in boxes of 100 and guarantees not more than 100 pens are defective, what is the approximate probability that the box will contain
- no defective pen
  - at least one defective pen (  $e^{-5} = 0.0067$  )

**Q4. Answer Any two from the following**

- What is Correlation? Explain the concept with a scatter diagram.
- The following data give the income distribution of workers in two factories. Which distribution is more consistent?

Income	No of workers	
	Factory 1	Factory 2
10-12	10	25
12-14	15	35
14-16	65	40
16-18	73	50
18-20	70	30
20-22	17	30
22-24	10	10

- A US car rental firm wants to estimate the average number of miles travelled per day by each of its cars rented in California. A random sample of 20 cars rented in California reveals that the sample mean travel distance per day is 85.5 miles. With a population standard deviation of 19.3 miles. Compute a 99% confidence interval to estimate population mean. (  $Z_{\alpha/2} = 2.575$  )

**Q5. Answer Any two from the following**

- Explain the following terms in probability with examples
  - Mutually Exclusive and Independent events
  - Conditional Probability
- Calculate the Karl Pearson Coefficient of Skewness from the following data and explain its significance

Class	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22
Frequency	35	40	48	100	125	87	43	22

- You are a marketing research analyst .You ask a random sample of 286 consumers if they purchase Diet Pepsi or Diet Coke.

Diet Coke	Diet Pepsi		
	No	Yes	Total
No	84	32	116
Yes	48	122	170
Total	132	154	286

At the 0.05 level of significance is there evidence of a relationship?

**Q6. Answer Any two from the following**

- What is Hypothesis Testing? What are the Type 1 and Type 2 errors?
- Ranking of ten trainees at the beginning (x) and the end (y) of a certain training course are given below :

Trainees	A	B	C	D	E	F	G	H	I	J
X	1	6	3	9	5	2	7	10	8	4
Y	6	8	3	7	2	1	5	9	4	10

Calculate the Spearman Rank correlation coefficient.

- Twenty one students at the autonomous university of Madrid were selected for an informal study about student study skills. 7 first years, 7 second year and 7 third year undergraduates were randomly selected. Use a one way ANOVA to determine whether there is a significant difference in mean test scores by year of student.

Year 1 Scores	Year 2 Scores	Year 3 Scores
82	71	64
93	62	73
61	85	87
74	94	91
69	78	56
70	66	78
53	71	87

(F at 0.05 df =2, 18 = 3.55)

**Q7. Answer Any two from the following**

- What are the steps of Hypothesis Testing Procedure?
- A Gallup survey found that 65 % of all financial consumers were very satisfied with their primary financial institution .Suppose that 25 financial consumers are sampled and if the Gallup survey result still holds true today, what is the probability that exactly 19 are very satisfied with their primary financial institution?
- In a distribution the difference of the two quartiles is 15 and their sum is 35. The median is 20. Find the Bowley coefficient of skewness.

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