PG Odd Semester (CBCS) Exam., December—2016

COMMERCE

(1st Semester)

Course No. : COMCC–102

(Business Statistics)

Full Marks : 70
Pass Marks : 28

Time : 3 hours

The figures in the margin indicate full marks for the questions

Answer **five** questions, taking **one** from each Unit

UNIT—I

1. *(a)* Define probability. 3

(b) State and prove the theorem of addition of probability. 6

(c) A problem in statistics is given to three students *A*, *B* and *C* whose chances of solving it are $\frac{1}{3}$, $\frac{1}{4}$ and $\frac{1}{5}$ respectively. Find the probability that the problem will be solved if they all try independently. 5

2. *(a)* Mention the characteristics of binomial distribution. 5

(b) Mention three practical situations where Poisson distribution can be used. 3

(c) If 5% of the electric bulbs manufactured by a company are defective, use Poisson distribution to find the probability that in a sample of 100 bulbs—
(i) none is defective;
(ii) 5 bulbs are defective. 6

UNIT—II

3. *(a)* Write short notes on any *two* of the following : 4×2=8
(i) Null hypothesis and alternative hypothesis
(ii) Type I error and Type II error
(iii) *Z* test

(b) Given the following information relating to two places, *A* and *B*, test whether there is any significant difference between their mean wages : 6

	A	*B*
Mean wages (₹)	47	49
Standard deviation (₹)	28	40
Number of workers	1000	1500

4. *(a)* Write short notes on any *two* of the following : 4×2=8

(i) Simple random sample

(ii) Stratified random sampling

(iii) Judgement sampling

(b) A machine is designed to produce insulating washers for electrical device of average thickness of 0·025 cm. A random sample of 10 washers was found to have an average thickness of 0·024 cm with a standard deviation of 0·002 cm. Test the significance of the deviation value of t for 9 d.f. at 5% level of significance is 2·262. 6

UNIT—III

5. *(a)* Write a note on test of independence of two attributes by ^{2}. 5

(b) In an experiment on the immunization of goats from anthrax, the following results were obtained. Derive your inference on the efficacy of the vaccine : 7

	Died of anthrax	*Survived*	*Total*
Inoculated with vaccine	8	40	48
Not inoculated	24	24	48

[Value of ^{2} for 1 d.f. at 5% level of significance is 3·841]

(c) What do you mean by degrees of freedom (d.f.)? 2

6. *(a)* Name four non-parametric tests. 2

(b) Write a note on run test or Kruskal-Wallis H-test. 5

(c) A dietician wants to test three different types of diet plans to see if all these plans have similar weight reducing effects or not. He selected a homogenous group of 23 persons and placed them into 3 subgroups, each subgroup trying a different diet plan. Each plan was tried for a period of 30 days. The following observations of weight losses in pounds were recorded for members of each group after this period of 30 days :

Diet Plan–1	*Diet Plan–2*	*Diet Plan–3*
4·0	3·6	6·5
3·8	5·2	7·2
3·7	2·8	5·9
6·2	3·0	5·5
5·6	3·8	6·8
4·2	5·0	7·7
	3·9	8·0
	5·5	8·2
		7·0

Test the null hypothesis that effectiveness of three diet plans is the same by using Kruskal-Wallis H-test. 7

UNIT—IV

7. *(a)* Mention the importance of using multiple regression. 4

(b) A product viz. 'Mind readers' developed by a company 'Innovator' sold at the store. The company realizes that there are many factors that might help to explain sales, but believes that advertising and price are major determinants. The following data were collected :

Sales (Units sold)	*Advertising* (No. of Ads)	*Price* (₹)
33	3	125
61	6	115
70	10	140
82	13	130
17	9	145
24	6	140

(i) Find the regression equation to predict sales from advertising and price. 5

(ii) If advertising is 7 and price is ₹ 132, what sales would you predict? 2

(iii) Write down the formula of $r_{12\ 3}$. Also write down the meaning of the term $r_{12\ 3}$. 1+2=3

8. *(a)* Distinguish between partial correlation and multiple correlation. 4

(b) If r_{12} 0 70, r_{13} 0 61 and r_{23} 0 40, find *(i)* $r_{23\ 1}$ and *(ii)* $r_{13\ 2}$. 6

(c) Write down the meaning of r, r^2 and R^2. 4

UNIT—V

9. *(a)* Write down five advantages of using statistical quality control technique in business. 5

(b) The following data provide the values of sample mean $\overline{X}$ and the range R for the samples of size 5 each. Calculate the values for central line and control limits for mean chart and range chart, and determine whether the process is in control : 7

Sample No.	:	1	2	3	4	5
Mean ($\overline{X}$)	:	11·2	11·8	10·8	11·6	11·0
Range (R)	:	7	4	8	5	7
Sample No.	:	6	7	8	9	10
Mean ($\overline{X}$)	:	9·6	10·4	9·6	10·6	10·0
Range (R)	:	4	8	4	7	9

(Conversion factors for n 5, A_2 ·577, D_3 0 and D_4 2·115)

(c) A plant produces rolls of paper. The numbers of defects disclosed by the inspection of 20 rolls are as follows :

12, 6, 18, 4, 5, 2, 4, 7, 12, 14,
8, 11, 14, 21, 21, 10, 12, 9, 13, 10

Find $\overline{C}$. 2

10. *(a)* Write a note on statistical quality control charts. How can these charts be constructed? Mention the steps. 3+6=9

(b) The following data show the number of defects in carpets manufactured :

Carpet Serial No.	:	1	2	3	4	5	6	7	8	9	10
No. of Defects	:	3	4	5	6	3	3	5	3	6	2

Determine the central line and control limits for *C*-charts. 5

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