PG Odd Semester (CBCS) Exam., December—2017

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, selecting **one** from each Unit

UNIT—I

1. *(a)* Write notes on the following : 2×2=4
(i) Equally likely events
(ii) Complementary events

(b) What is the probability of obtaining a sum of 10 in a single throw with five dice? 3

(c) If events A and B are independent, prove that $\overline{A}$ and $\overline{B}$ are also independent. 3

(d) Given :

$$P(A) \quad \frac{1}{2}, \; P(B) \quad \frac{1}{3}, \; P(AB) \quad \frac{1}{4}$$

Find the values of $P(\overline{A})$, $P(A \quad B)$, $P(A / B)$ and $P(\overline{A} \quad B)$. 4

2. *(a)* Write a note on Bayes' theorem. 4

(b) A random variable has the following probability distribution :

x	:	4	5	6	8
Probability	:	0·1	0·3	0·4	0·2

Find the expectation and the standard deviation of the random variable. 4

(c) The mean of a normal distribution is 50 and 5% of the values are greater than 60. Find the standard deviation of the distribution. (Given the area under standard normal curve between z 0 and z 1 64 is 0 45) 3

(d) State the properties of normal distribution. 3

UNIT—II

3. *(a)* Write a short note on standard error. 4

(b) Given, size of a sample = 100, mean in the sample is 50 units and standard deviation of the sample is 10 units. Can it be said that the sample has come from a population with a mean 54 units? 5

(c) Given that $\overline{X}_1$ 20, $\overline{X}_2$ 25, n_1 200, n_2 150, $_1$ 10, $_2$ 9. Can it be said that there is no significant difference between two sampled means? 5

4. *(a)* Write short notes on the following : 2+2+4=8

(i) Null hypothesis
(ii) Type–II error
(iii) Multistage sampling

(b) From the following results regarding eye-colour of fathers and sons, test if the colour of son's eyes is associated with that of father's :

Father's eye colour	*Son's eye colour*	
	Light	*Not light*
Light	47	16
Not light	14	23

(Given $^{2}_{05}$ 3 84 for 1 d.f.) 6

UNIT—III

5. *(a)* Distinguish between parametric and non-parametric tests. 6

(b) Given :

Shop	*Sales before Advertisements* (in units)	*Sales after Advertisements* (in units)
1	36	37
2	35	36
3	34	34·5

Shop	*Sales before Advertisements* (in units)	*Sales after Advertisements* (in units)
4	33·5	34
5	36·5	36
6	35·5	36
7	36	36
8	35	35·5
9	34·5	33·5
10	35	32·5
11	34	34·5
12	36	35·5
13	34·5	34
14	33	34·5
15	36·5	37
16	35·5	36·5
17	35	35
18	36	37
19	35	34
20	34·5	35·5
21	36	37
22	36·5	37

Shops were selected randomly. Test the null hypothesis that advertisement campaign had no effect on the sales volumes using sign test. 8

6. *(a)* State the conditions for application of non-parametric test. 6

(b) Given :

Increase in Production		
Sample—I	*Sample—II*	*Sample—III*
9·3	8·9	7·8
9·7	9·0	8·0
9·3	8·5	7·5
7·9	7·6	8·1
9·2	8·4	9·1
9·9	9·5	8·8
9·8	8·2	8·6
7·1	7·2	9·4
8·7	7·3	6·9
	6·8	10·0

Test the null hypothesis that increases in production relative to three different methods of production has identical distribution. (For y 2, $^{2}_{05}$ 5 9919) 8

UNIT—IV

7. *(a)* State the characteristics of partial correlation analysis. 3

(b) State the limitations of multiple correlation analysis. 3

(c) Given :

X_1	:	4	6	7	9	13	15
X_2	:	15	12	8	6	4	3
X_3	:	30	24	20	14	10	4

Find the multiple linear regression equation of X_1 on X_2 and X_3. 8

8. *(a)* Describe briefly the different components of a time series. 6

(b) Using 1964 as the origin, obtain a straight line trend equation by the method of least squares. Find the trend value of the missing year 1961 : 8

Year :	1960	1962	1963	1964	1965	1966	1969
Value :	140	144	160	152	168	176	180

UNIT—V

9. *(a)* Write a note on control chart for *P*. 4

(b) State the limitations of statistical quality control. 3

(c) The following data refer to usual defects found at inspection of the first 10 samples of size 100. Use the data to obtain upper and lower control limits for percentage defectives in sample of 100. Represent the first ten sample results in the chart. Show the central line and control limits : 7

Sample No. :	1	2	3	4	5	6	7	8	9	10	Total
No. of defectives :	2	1	1	3	2	3	4	2	2	0	20

10. *(a)* Write a note on acceptance sampling. 5

(b) Discuss briefly the need of statistical quality control. 4

(c) Twenty pieces of cloth out of different rolls contained respectively 1, 4, 3, 2, 5, 4, 6, 7, 2, 3, 2, 5, 7, 6, 4, 5, 2, 1, 3 and 8 imperfections. Ascertain whether the process is in a state of statistical control. 5

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