

Reg. No. :

Code No. : 7454 N Sub. Code : PKCM 12

M.Com. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2020.

First Semester

Commerce — Core

ADVANCED BUSINESS STATISTICS

(For those who joined in July 2020 only)

Time: Three hours

Maximum: 75 marks

PART A — ($10 \times 1 = 10$ marks)

Answer ALL questions.

Choose the correct answer :

1. If $P(AB)$ is equal to 0.24 and $P(A)$ is equal to 0.60. then $P(A/B)$ is
 - (a) 0.16
 - (b) 0.36
 - (c) 0.84
 - (d) None of these
2. In case of normal distribution β_2 is
 - (a) greater than 3
 - (b) less than 3
 - (c) zero
 - (d) 3

3. Students ' t ' distribution was discovered by
- (a) Karl Pearson
 - (b) Laplace
 - (c) Fisher
 - (d) Gosset
4. Mean square between column mean. i.e MSC equal to
- (a) SSE (c-1)
 - (b) SSE (n-c)
 - (c) SSC (r-1)
 - (d) SSC (c-1)
5. In a contingency table, degree of freedom are determined by
- (a) $(r-1);(c-1)$
 - (b) $(r-1);(c+1)$
 - (c) $(c-1);(r)$
 - (d) $(r+1);(c+1)$
6. All data are ranked as if they were in one sample, from lowest to highest is called.
- (a) Sign test
 - (b) Kruskal- Wallis test
 - (c) Mann Whitney 'U' test
 - (d) Run test

7. EVPI refers to _____
- (a) Expected volume of price Index
 - (b) Expected value of price Index
 - (c) Expected value of performance information
 - (d) Expected value of perfect information
8. In a decision problem; the choice of a specific act from set of alternative acts should be based on the _____ of the possible consequences.
- (a) Optimal
 - (b) Opportunity
 - (c) Evaluation
 - (d) Expectation
9. While preparing control chart; we generally have
- (a) 2 sigma limits
 - (b) 1 sigma limit
 - (c) 3 sigma limits
 - (d) 1.96 sigma limits
10. The lower control limit for c - chart is given by
- (a) $\bar{c} + \sqrt{c}$
 - (b) $\bar{c}\sqrt{c}$
 - (c) $\bar{c} - 3\sqrt{c}$
 - (d) $\sqrt{c} + 3\bar{c}, \sqrt{c} - \sqrt{c}$

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions choosing either (a) or (b).

11. (a) Explain the properties of the Normal distribution.

Or

- (b) The mean weight of 500 male students in a certain college is 151 *lb*, and the standard deviation is 15 *lb*. Assuming the weight are normally distributed find how many students weight

- (i) between 120 and 155 *lb* and
(ii) more than 185 *lb*.

12. (a) What are the limitations of Test of significance?

Or

- (b) Two Samples of 6 and 5 items respectively gave the following data:

Mean of 1 st sample	40
Standard deviation of 1 st sample	8
Mean of the second sample	50
Standard deviation of the second sample	10

Is the difference of means significant? The value of ' τ ' for 9 degree of freedom at 5% level is 2.26.

13. (a) State the steps in testing the goodness of fit.

Or

- (b) Use the sign test to see if there is a difference between the number of days until collection of an account receivable before and after a new collection policy. Use the 0.05 significance level.

Before 30 28 34 35 40 42 33 38

After 32 29 33 32 37 43 40 41

Before 34 45 28 27 25 41 36

After 37 44 27 33 30 38 36

14. (a) Discuss the Ingredients of decision problem.

Or

- (b) A management is faced with the problem of choosing one of the three products for manufacturing. The potential demand for each product may turn out to be good, moderate or poor. The probabilities for each of the state of nature were estimated as follows:

Product	Nature of demand		
	Good	Moderate	Poor
X	0.70	0.20	0.10
Y	0.50	0.30	0.20
Z	0.40	0.50	0.10

The estimated profit or loss under the three states may be taken as:

X	30,000	20,000	10,000
Y	60,000	30,000	20,000
Z	40,000	10,000	15,000(Loss)

Prepare the expected value table and advice the management about the choice of product.

15. (a) What are the types of Acceptance Sampling plans?

Or

- (b) In a glass factory the task of quality control was done with the help of mean (\bar{x}) and standard deviation (σ) charts 18 samples of 10 items each were chosen and Σx and $\Sigma \sigma$ were found to be 595.8 and 8.28 respectively. Determine 3σ limits for mean and standard deviation charts. You may use the following control factors for your calculation:

n	A ₁	B ₂	B ₄
10	1.03	0.28	1.72

PART C — ($5 \times 8 = 40$ marks)

Answer ALL questions choosing either (a) or (b).

16. (a) The following data show the number of seeds germinating out of 10 an damp filter for 80 set of seeds. Fit a Binomial distribution to this data:

x	0	1	2	3	4	5
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y	6	20	28	12	8	6
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x	6	7	8	9	10
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y	0	0	0	0	0
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Or

- (b) In Delhi with 100 municipal wards, each having approximately the same population the contribution of typhoid cases in 2008 was as follows:

No. of cases	0	1	2	3	4
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No. of wards	63	28	6	2	1
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Fit a Poisson distribution for the above.

17. (a) For a random sample of 10 persons, fed on diet A, the increased weight in pounds in a certain period were :

10 6 16 17 13 12 8 14 15 9

For another random Sample of 12 persons. fed on diet 'B' the increase in the same period were:

7 13 22 15 12 14 18 8 21 23 10 17

Test whether the diet 'A' and 'B' differ significantly as regards their effect on increase in weight. Given the following.

Degree of freedom	19	20	21	22	23
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Vale of 't' at 5% level	2.09	2.09	2.08	2.07	2.07
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Or

- (b) A manufacturing company has purchased three new machines of different makes and wishes to determine whether one of them is faster than the others in producing a certain output. five hourly production figures are

observed at random from each machine and the result are given below:

observation	A ₁	A ₂	A ₃
1	25	31	24
2	30	39	30
3	36	38	28
4	38	42	25
5	31	35	28

Use analysis of variance and determine whether the machines are significantly different in their mean speed. (given at 5% level $F_{2,12} = 3.89$)

18. (a) A company trainees are randomly assigned to groups which are taught a certain industrial inspection procedure by three different method: At the end of the instructing period they are tested for inspection performance quality. The following are their stores.

Method A: 80 83 79 85 90 68

Method B: 82 84 60 72 86 67 91

Method C: 93 65 77 78 88

Use the 'H' test to determine at the 0.05 level of significance whether the three methods are equally effective.

Or

- (b) A movie producer is bringing out a new movie. In order to map out his advertising campaign. He wants to determine whether the movie will appeal most to particular age group or whether it will appeal equally to all age groups. The producer takes a random sample from persons attending preview of the new movie, and obtains the following results:

Age groups.

	under 20	20-39	40-59	60 s over	Total
Liked the movie	146	78	48	28	300
Disliked the movie	54	22	42	22	140
indifferent	20	10	10	20	60
Total	220	110	100	70	500

What inference will you draw from this data?

19. (a) Under an employment promotion programme, it is proposed to allow sale of news papers on the buses during off-peak hours. The vendor can purchase the news papers at a special concessional rate of 25 paise per copy against the selling price of 40 paise. Any unsold copies are, however, a dead loss. A vendor has estimated the following probability distribution for the number of copies demanded.

Number of copies	15	16	17	18	19	20
Probability	0.04	0.16	0.33	0.26	0.11	0.07

How many copies should he order so that his expected profits will be maximum?

Or

- (b) A food product company is contemplating the introduction of a revolutionary new product with new packaging to replace the existing product at much higher price (s_1) or a moderate change in the composition of the existing product with a new packaging at a small increase in price (s_2) or small changes in the composition of the existing except the word. 'New with a negligible increase in price (s_3) the three possible states of nature of events are

- (i) High increase in sales (N_1)
- (ii) no change in sales (N_2) and
- (iii) decrease in sales (N_3). The marketing department of the company worked out the payoff in terms of yearly net profit for each of the strategies for these events (expected sales) Then is represented in the following table

State of nature strategies	Pay off (in Rs)		
	N_1	N_2	N_3
S_1	7,00,000	3,00,000	1,50,000
S_2	5,00,000	4,50,000	0
S_3	3,00,000	3,00,000	3,00,000

Which strategy should the executive concerned choose on the basis of

- (1) Maximum criterion
- (2) Maxi max criterion
- (3) Mini max Regret criterion
- (4) Laplace criterion

20. (a) What are the advantages of statistical quality control?

Or

- (b) A machine is set to deliver packets of a given weight 10 samples of size each were recorded. Below are given relevant data:

Sample No:	1	2	3	4	5	6	7	8	9	10
Mean \bar{x} :	15	17	15	18	17	14	18	15	17	16
Range (R) :	7	7	4	9	8	7	12	4	11	5

Calculate the values for the central line and the control limits for mean chart and then comment on the state of control.

(conversion factors for $n = 5$, as $A_2 = 0.577$, $D_3 = 0$; $D_4 = 2.115$).