Reg. No. : .....

Code No. : 5542 **Sub. Code : PKCM 12**

M.Com. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2019.

First Semester

Commerce – Core

ADVANCED BUSINESS STATISTICS

(For those who joined in July 2017 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. If two events A and B are dependent, the conditional probability of B given A ie $P(B/A)$ is calculated as:

(a) $P(AB)/P(B)$ (b) $P(A)/P(B)$

(c) $P(AB)/P(A)$ (d) $P(A)/P(AB)$

2. The standard deviation of Binomial distribution is

(a) $\sqrt{nqp}$ (b) npq

(c) $n^2p^2q^2$ (d) np

3. The difference of two means in case of small samples is tested by the formula

(a) $t = \dfrac{\overline{x_1} - \overline{x_2}}{s}$

(b) $t = \dfrac{\overline{x_1} - \overline{x_2}}{s}\sqrt{\dfrac{n_1 + n_2}{n_1 n_2}}$

(c) $t = \dfrac{\overline{x_1} - \overline{x_2}}{s}\sqrt{\dfrac{n_1 n_2}{n_1 + n_2}}$

(d) $t = \sqrt{\dfrac{n_1 n_2}{n_1 + n_2}}$

4. Large sample theory is applicable when

(a) $N > 30$ (b) $N < 30$

(c) $N = 30$ (d) N is atleast 100

5. The calculated value of χ^2 is

(a) always positive

(b) always negative

(c) can be either positive or negative

(d) none of these

6. The χ^2 test was devised by

(a) Fisher (b) Gauss

(c) Laplace (d) Karl Pearson

7. Statistical decision theory introduces a set of procedures by which statistical data can be used for making ———— decision

(a) Minimum (b) Maximum

(c) Optimal (d) Zero

8. Decision problem can also be solved using decision ———— analysis

(a) Path (b) Tree

(c) Theory (d) Process

9. The upper control limit for R-chart is given by

(a) D_3R (b) D_3, R

(c) D_4R (d) D_5R

10. In a control chart the upper control limit

(a) can be negative

(b) is always positive

(c) cannot be negative nor positive

(d) is always zero

PART B — (5 × 5 = 25 marks)

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

11. (a) If the probability of defective bolts is 0.1. Find (i) the mean and standard deviation for the distribution of defective bolts in a total of 500 and (ii) the moment co-efficient of skewness and kurtosis of the distribution.

Or

(b) Explain the uses of poisson distribution.

12. (a) A machine produced 20 defective articles in a batch of 400. After overhauling it produced 10 defectives in a batch of 300. Has the machine improved?

Or

(b) Test the significance of the correlation $r = 0.5$ from a samolea of size 18 against hypothesis correlation $P = 0.7$.

13. (a) What are the steps followed for testing the goodness of best fit?

Or

(b) Based on information on 1,000 randomly selected fields about the tendency status of the cultivation of these fields and use of fertilizers, collected in an agro economic survey the following classification was noted

	Owned	Rental	Total
Using fertilizer	416	184	600
not using fertilizer	64	336	400
Total	480	520	1000

Would you conclude that owner cultivators are more inclined towards the use of fertilizers at 5% level?

Carryout Chi-square test as per testing procedure.

14. (a) What are the steps used in decision – making?

Or

(b) A bakert produces a certain type of special pastry at a total average cost of Rs.3 and sell it at a price of Rs.5. Then pastry is produced over the weekend and is sold during the following week; such pastry being produced but not sold during a week's time are totally spoiled and have to throw away. According to past experience the weekly demand for these pastries is never less than 78 or greater than 80. You are required to formulate action, space, pay off table and loss table.

15. (a) Explain the role of acceptance sampling.

Or

(b) Ten pieces of cloth out of different rolls of equal length contained the following number of defects:

1, 3, 5, 0, 6, 0, 9, 4, 4, 3

Draw a control chart for the number of defects and state whether the process is in a state of statistical control.

PART C — (5 × 8 = 40 marks)

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

16. (a) The screws produced by certain machine were checked by examining samples of 12. The following table shown the distribution of 128 samples according to the number of defective items they contained

No. of defective in a sample of 12	0	1	2	3	4	5	6	7	Total
No of samples	7	6	19	35	30	23	7	1	128

Fit a binomial distribution and find the expected frequencies if the chance of machine being defective is $\frac{1}{2}$. Find the mean and variance of the fitted distribution.

Or

(b) The distribution of typing mistakes committed by a typist is given below: Assuming a poisson mode, find out the expected frequencies

No. of mistakes per page	0	1	2	3	4	5
No. of pages	142	156	69	27	5	1

17. (a) The following data give sample sizes and correlation coefficients. Test the significance of the difference between two values using Fisher's Z-transformation.

Sample size	value of r
5	0.870
12	0.560

Or

(b) The following related to the number of units sold in five different area by four salesmen

	Number of units			
Area	A	B	C	D
1	80	100	95	70
2	82	110	90	75

Number of units

Area	A	B	C	D
3	88	105	100	82
4	85	115	105	88
5	75	90	80	65

Is there a significant difference in the efficiency of these salesmen? The value of $F_{0.05}$ for $V_1 = 3, V_3 = 16$ is 3.24.

18. (a) The samples are taken comprising 120 doctors, 150 advocates and 130 university teachers. Each person choosen is asked to select one of the three categories that best represents his feeling towards a certain national policy. The three categories are in favour of policy (F) against policy (A) and indifferent toward the policy (I) The results of the interviews are given below:

	Reaction			
Occupation	F	A	I	Total
Doctors	80	30	10	120
Advocates	70	40	40	150
University teachers	50	50	30	130
Total	200	120	80	400

On the basis of this data can it be concluded that the views of Doctors, Advocates and University teachers are homogeneous in so far as National Policy under discussion is concerned.

Or

(b) A company's trainees are randomly assigned to group which are taught a certain industrial inspection Performance quality. The following are their scores.

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.

19. (a) Explain the following terms, as used in decision making, with suitable examples: (i) Pay off table (ii) opportunity loss or Regret Table (iii) Under certainity (iv) Under uncertainity.

Or

(b) Suppose that a decision maker is faced with three decision alternatives and four states of nature, given the following profit pay off table.

Acts ↓ State of nature →	S_1	S_2	S_3	S_4
a_1	16	10	12	7
a_2	13	12	9	9
a_3	11	14	15	14

Assuming that he has no knowledge of the probabilities of occurence of the states of nature, find the decisions to be recommended under each of the following criteria.

(i) Maximin

(ii) Maximax

(iii) Minimax Regret

20. (a) The following data refer to visual defects found in the inspection of the first 10 samples of size 100. Use the data to obtain upper and lower control limits for percentage defective in samples of 100. Represent the first 10 sample result in the chart you prepare to show the central line and control limits

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

Or

(b) Explain the role of acceptance sampling. What are the types of acceptance sampling plans?
