Code No. : 5520   **Sub. Code : PKCM 12/**
ZKCM 12

M.Com. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2021

First Semester

Commerce — Core

ADVANCED BUSINESS STATISTICS/STATISTICS

(For those who joined in July 2017–2020)

Time : Three hours   Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answers :

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

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

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

2. If in a binomial distribution mean is 10 and standard deviation 2, q will be

   (a) 0   (b) 1

   (c) 0.4   (d) 0.8

3. Large sample theory is applicable when

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

   (c) $N = 30$ (d) N is at least 100

4. In a statistical hypothesis testing experiment, a ———————— is committed by rejecting the null hypothesis when it is true.

   (a) Sampling error   (b) Type I error

   (c) Type II error   (d) Standard error

5. In a contingency table degree of freedom determined by

   (a) $(r-1)\,;\,(c-1)$ (b) $(r-1)\,;\,(c+1)$

   (c) $(c-1)$ (d) $(r+1)\,;\,(c-1)$

6. A statistical test that partially circumvents the loss by utilizing the relative magnitude of the observations was proposed by

   (a) Wilcoxon   (b) Kruskal - Wallis

   (c) Mann Whitney   (d) Spearman

7. In all decision problems ————— is found to be a common element.

   (a) Decision criteria

   (b) Payoffs

   (c) Uncertainty

   (d) Alternative course of action

8. This principle is used only when consequences are given in the form of opportunity losses which is same as loss table

   (a) The Baye's principle

   (b) The minimax principle

   (c) The maximini principle

   (d) Decision tree analysis

9. While preparing control charts, we generally have

   (a) 2 sigma limits   (b) 1 sigma limit

   (c) 1.96 sigma limit   (d) 3 sigma limits

10. SQC helps in detecting

    (a) Chance variance

    (b) Assignable variance

    (c) Both chance and assignable variance

    (d) Neither of these

PART B — (5 × 5 = 25 marks)

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

11. (a) List the chief properties of the normal distribution.

Or

(b) There are 600 students in the post graduate department of a university and the probability for any student to need a copy of a particular text book from the university library on any day is 0.05. How many copies of the book should be kept in the university library so that the probability may be greater than 0.90 that none of the students needing a copy from the library has to come back disappointed. (Use normal approximation to the binomial prodigality law).

12. (a) Explain the properties of a good estimator.

Or

(b) In a random sample of 1000 persons from U.P. 510 were found to be consumers of cigarettes. In another sample of 800 persons from Rajesthan, 480 were found to be consumers of cigarettes. Does the data reveal a significant difference between U.P and Rajestan so far a s the proportion of consumers of cigarettes is concerned?

13. (a) Describe the uses of chi-square test.

Or

(b) State the advantages of non-parametric tests.

14. (a) What do you mean by statistical decision theory? What is the differences between decision making under certainty and risk?

Or

(b) Explain the criteria of maximin and minimax regret in the context of decision theory.

15. (a) Ten pieces of cloth out of different roll of equal length contained the following number of defects: 1, 3, 5, 0, 6, 0, 9, 4, 4, 3. Draw the control chart for the number of defects and state whether the process is in a state of statistical control.

Or

(b) What are the advantages of Statistical Quality Control?

PART C — (5 × 8 = 40 marks)

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

16. (a) Eight coins are tossed at a time 256 times. Number of heads observed at each throw is recorded and the results are given below. Find the expected frequencies. What are the theoretical value of mean and standard deviation? Calculate also mean and S.D. of the observed frequencies.

No. of heads at a throw 0 1 2 3 4 5 6 7 8

Frequency 2 6 30 52 67 56 32 10 1

Or

(b) The following table shows the number of customers returning the products in a marketing territory. The data is for 100 stores.

No of returns 0 1 2 3 4 5 6

No of stores 4 14 23 23 18 9 9

17. (a) Slim-Trim an agency conducting a weight reduction programme, claims that participants in their programme achieve a weight reduction of at least 5 Kg after two weeks of the programme. In evidence there of they have given the following data on 10 participants who had undergone this programme about their weights in Kg prior to

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the programme and two weeks after the programme. On the basis of this sample evidence, can the claim of the agency on weight reduction be sustained? Test at the significance level of 5%.

Before (Kg)	86	92	100	93	88	80	88	92	95	106
After (Kg)	77	84	92	87	80	74	80	85	95	96

Or

(b) Perform two-way ANOVA on the data given below.

Plot of land	Treatment			
	A	B	C	D
I	38	40	41	39
II	45	42	49	36
III	40	38	42	42

(Use coding method subtracting 40 from the given number)

18. (a) 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 obtain the following results.

Age group	Under 20	20-39	40-59	60 and above	Total
Liked the movie	146	78	48	28	300
Dislike 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?

Or

(b) A company's trainees are randomly assigned to groups which are taught a certain industrial inspection procedure by three different methods. At the end of the instructing period they are tested for 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 H test to determine at the 0.05 level of significance whether the three methods are equally effective.

19. (a) Explain with the help of an example, the concept of sampling distribution of a statistics

and point out its role in managerial decision making.

Or

(b) A basket produces a certain type of special pastry at a total average cost of Rs. 3 and sales it a price of Rs. 5. This 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 be thrown 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, payoff table and loss table.

20. (a) Construct a control chart for the proportion of defectives obtained in repeated random samples of size 100 from a process which is considered to be under control when the proportion of defective p is equal to 0.20. Draw the control line and the upper and the lower limits on graph paper.

Or

(b) Ten samples each of size 5 are drawn at regular intervals from a manufacturing

process. The sample mean (X) and their ranges (R) are given below.

Sample No	1	2	3	4	5	6	7	8	9	10
Mean X	49	45	48	53	39	47	46	39	51	45
Range (R)	7	5	7	9	5	8	8	6	7	6

Calculate the control limits in respect of X chart and R chart (You are given : A_2 =0.58, D_3 =0, D_4 = 2.15) comment on the state of control, chart need not be drawn.

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