

3. (a) Fit a second degree parabola to the following data : 8

x	y
1.0	1.1
1.5	1.3
2.0	1.6
2.5	2.0
3.0	2.7
3.5	3.4
4.0	4.1

- (b) A coin was tossed 400 times and the head turned up 216 times. Test the hypothesis that the coin is unbiased. 7

4. (a) The average marks in mathematics of a sample of 100 students was 51 with a S.D. of 6 marks. Could this have been a random sample from a population with average marks 50 ? 8

18B1

B.Tech. EXAMINATION, 2024

(Second Semester)

(C Scheme) (Main & Re-appear)

(CSE)

MATH102C

MATHEMATICS-II

Time : 3 Hours]

[Maximum Marks : 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Five* questions in all, selecting *one* question from each Unit. Q. No. **9** is compulsory. All questions carry equal marks.

Unit I

1. (a) The distribution of marks in physics of 60 students of undergraduate class is as follows :

Marks	Frequency
0-10	2
10-20	3
20-30	12
30-40	8
40-50	10
50-60	17
60-70	4
70-80	3
80-90	1

Calculate measure of skewness from moments. **8**

- (b) During war, 1 ship out of 9 was sunk on an average in making a certain voyage. What is the probability that exactly 3 out of a convoy of 6 ships would arrive safely ? **7**

2. (a) Assume that the probability distribution is normal. The 31% of items are under 45 and 8% are over 64. Find mean and standard deviation of the distribution. **8**

- (b) What do you mean by correlation and regression ?

Two judges gave the following ranks (from highest to lowest) to 11 girls in a beauty contest competition :

Girls No.	Judge I	Judge II
1	3	2
2	4	4
3	1	3
4	2	1
5	5	7
6	10	9
7	11	6
8	7	11
9	9	10
10	8	5
11	6	8

Is there an agreement between judges with regard to beauty of girls ? **7**

8. (a) Let the random variables X and Y have the joint pdf :

$$f(x, y) = \begin{cases} x + y & 0 < x < 1, \quad 0 < y < 1 \\ 0 & \text{elsewhere} \end{cases}$$

Find correlation coefficient of X and Y.

8

- (b) A bag X contains 2 white and 3 red balls and a bag Y contains 4 white and 5 red balls. One ball is drawn at random from one of the bags and is found to be red. Find the probability that it was drawn from bag Y.

7

(Compulsory Question)

9. (a) What is 2nd moment around mean ? What is it called ?
(b) In a normal distribution, 31% of the items are under 45 and 8% are over 64. Find the mean and standard deviation of the distribution.

- (b) Discuss Chi-square test for goodness of fit. A die is thrown 270 times and the results of these throws are given below :

No. appeared on the dice	Frequency
1	40
2	32
3	29
4	59
5	57
6	59

Test whether the die is biased or not. 7

Unit III

5. (a) Three bags A, B and C contain 4 red, 3 black, 2 white; 3 red, 4 black, 4 white; and 5 red, 2 black, 6 white balls respectively. If a bag is selected at random and a ball is drawn from it, find the probability that the ball drawn is red.

- (b) A random variable X has the following probability function :

x	$p(x)$
0	0
1	k
2	$2k$
3	$2k$
4	$3k$
5	k^2
6	$2k^2$
7	$7k^2 + k$

- (i) Find k .
(ii) Find minimum value of x so that :

$$P(X \leq x) > \frac{1}{2}.$$

6. (a) A bag contains 5 red balls, 4 white balls and 3 blue balls. A ball is selected at random from the bag, its colour is noted and the ball is replaced. Find the

probability that out of 6 balls selected in this manner, 3 red, 2 are white and one is blue. 7

- (b) Determine the smallest value of k in the Chebyshev's theorem for which the probability is : 8

- (i) at least 0.95
(ii) at least 0.99.

Unit IV

7. (a) A continuous random variable X having values only between 0 and 4 has density function given by $P(X) = \frac{1}{2} - ax$, where a is constant : 8
- (i) Calculate a
(ii) Find $P(1 < X < 2)$.
- (b) Discuss continuous random variable and their properties. 7

- (c) Find the straight line that best fits the following data :

x	y
12	50
15	70
21	100
25	120

- (d) State Chebyshev's inequality.
 (e) Find the moment generating function of

the exponential distribution $f(x) = \frac{1}{c} e^{-\frac{x}{c}}$,
 $0 \leq x \leq \infty, c > 0.$ **5×3=5**

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