

- Note:
1. All questions are compulsory with internal choice.
 2. Draw neat diagrams wherever necessary.
 3. Figures to the right indicate full marks.
 4. Use of scientific calculator fx 82 series and below is only allowed.

Q.1 Answer the following (any FOUR) [20]

- (a) Two cards are drawn from the pack of 52 well shuffled cards. Find the probability that the selected cards are of different colour.
- (b) A problem is given to three persons A, B, C whose respective chances of solving it are $\frac{1}{3}, \frac{2}{5}, \frac{3}{7}$ respectively. What is the probability that the problem is solved?
- (c) For the following probability mass function of X, find k. Hence find $P(X < 4)$.

X	1	2	3	4	5	6
P(X=x)	k	3k	2k	4k	5k	7k

- (d) Let $f(x) = \begin{cases} 2e^{-2x}, & 0 \leq x \\ 0, & x < 0 \end{cases}$, be probability density function.

Find C. Hence Find cumulative distribution function.

- (e) Three urns contain red and black balls as mentioned below:

	Urn 1	Urn 2	Urn 3
Red ball	6	5	4
Black ball	4	5	6

One ball is selected from some urn and it is found to be red. Find the probability that the ball is selected from the urn 1.

- (f) Let $P(A) = \frac{3}{10}, P(B) = \frac{1}{2}, P(A \cap B) = \frac{1}{10}$, then find (i) $P(A \cup B)$, (ii) $P\left(\frac{A}{B}\right)$, (iii) $P\left(\frac{A^c}{B}\right)$

Q.2 Answer the following (any FOUR) [20]

- (a) If $E(X) = 3$ and $E(X^2) = 10$. Find the mean and variance of $Y = 3X - 2$.

- (b) Find the value of χ^2 for the following data

	Dead	Surviving	Total
Inoculated	46	24	70
Not-inoculated	36	44	80
Total	82	68	150

- (c) For the following probability density function, $f(x) = \begin{cases} 4x^3, & 0 \leq x \leq 1 \\ 0, & \text{otherwise} \end{cases}$.

Find $E(X)$ & $V(X)$

- (d) 100 students of a class were given an aptitude test. Their marks were found to be normally distributed with mean 80 & standard deviation 5. Find number of students scored (i) more than 80 marks (ii) between 75 & 85 marks.
- (e) In a box of 100 bulbs, 20 are defective. If 10 bulbs are selected randomly, then find the probability that (i) at least 2 is defective, (ii) at most 2 is defective
- (f) A quiz consists of 10 MCQ's, each question has five possible answers, only one of which is correct. Rahul wants to guess the answer to each question. Find the probability that Rahul gets
- one answer corrects.
 - all 10 answers correct

Q.3

Answer the following (any **FOUR**)

[20]

- (a) Supposed 50% of 400 men and 60% of 600 women surveyed favored stronger pollution control does this indicate that women fed more concern about pollution than men?
- (b) The means of two samples of 10 and 15 members are 67.5 and 68 with standard deviation 2.4 and 2.5 respectively. Can the samples be regarded as drawn from the same population.
- (c) The mean lifetime of sample of 100 light bulbs produced by a company is found 1570 hrs with a standard deviation of 120 hrs. Test the hypothesis that the mean lifetime of bulbs produced by the company is 1600 hrs at 5% level of significance.
- (d) Calculate the ANOVA coefficient and ANOVA table for the following data:

A	B	C
3	4	7
4	9	9
5	5	8

- (e) The table below shows the hours of relief provided by two drugs in 12 patients suffering from headache. Is there any evidence that one drug provides longer relief than the other?

Case	1	2	3	4	5	6	7	8	9	10	11	12
Drug A	2.0	3.6	2.6	2.6	7.3	3.4	14.9	6.6	2.3	2.0	6.8	8.5
Drug B	3.5	5.7	2.9	2.4	9.9	3.3	16.7	6.0	3.8	4.0	9.1	20.9

Perform Wilcoxon Signed Rank Test. (Table value: $W_{0.05,12} = 18$)

- (f) Calculate the value of Kruskal-Wallis Coefficient, H for the following data:

Products		
A	B	C
25	60	50
70	20	70
60	30	60
85	15	80
95	40	90
90	35	70
80		75

Q.4

Answer the following (any **FIVE**)

[15]

- (a) Write properties of cumulative distribution function of a discrete random variable.
- (b) Check whether the following run is random or not. AAABBBABBBBBBAABBAAB
- (c) Write a difference between parametric test and non-parametric test.
- (d) Write a short note on Type - I error & Type - II error
- (e) Write 5 Properties of Chi-square distribution.
- (f) Explain steps of testing of hypothesis.

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