

## QUESTION BANK

SUB : P&S and CA

### UNIT-1

#### Short Questions:

1. Explain Discrete random variables
2. If  $X_1, X_2$  are two random variables and  $a, b$  are constants then  $E(aX_1 + bX_2)$  ?
3. The mean and variance of a binomial distribution are 6 & 3 respectively find the mode of the binomial distribution.
4. If  $X$  is a poisson variate such that  $p(x=0) = p(x=1) = K$ . Determine  $K$ .
5. If  $X = B(n, p)$  then write the conditions under which  $X$  tends to a poisson distribution
6. Define a Random Variable.
7. Define binomial distribution
8. If the mean and variance of the binomial variate are 12 and 4 then write binomial distribution
9. List the property of probability distribution function
10. Define Poisson distribution.
11. If  $K$  is a constant , then what is the value of  $E(9X+K)$ ?
12. Define Poisson distribution

#### Long Questions :

1. A random variable 'x' has the following probability function

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

- i) Find the value of 'k'
  - ii) Evaluate  $p(x < 6)$  ,  $p(x \geq 6)$
  - iii)  $p(0 < x < 5)$  iv) Mean v) Variance.
2. The probability density function of a variable 'x' is

x	0	1	2	3	4	5	6
P(x)	k	3k	5k	7k	9k	11k	13k

Find (i) 'k'

(ii)  $p(x < 4)$  (iii)  $p(3 < x \leq 6)$  iv) Mean v) Variance.

3. Let 'X' denote the sum of the two numbers that appear when a pair of fair dice is tossed

Determine the (i) Distribution function (ii) Mean and (iii) Variance

4. Let X denote the maximum of the two numbers that appears when a pair of dice is thrown once .Determine the i) Discrete probability distribution ii) Expectation iii) variance iv)  $v(3X + 4)$  and  $E(3X + 4)$ .

5. If 10% of the rivets produced by a machine are defective, find the probability that out of 5 rivets chosen of random (i)Non will be defective (ii) one will be defective (iii) at most two rivets will be defective

6. It has been found that 2% of the tools produced by a certain machine are defective what is the probability that in a shipment of 400 such tools

(a) 3% of more (b) 2% or less will prove defective

7. Out of 800 families with 5 children each how many would you expect to have (i) 3 boys (ii) 5 girls (iii) either 2 or 3 boys (iv) at least one boy ? Assume equal probabilities for boys and girls.

8. Derive the mean and variance of binomial distributions.

9. Derive the mean and variance of poison distributions.

## UNIT :2

### Short Questions:

1. . Explain Continuous random variables.

$$2. \text{ If } f(x) = \begin{cases} \frac{1}{2}(x+1) & -1 < x < 1 \\ 0 & \text{elsewhere} \end{cases}$$

Find  $E(x)$

3. If  $f(x) = k e^{-x/5}$ ,  $x > 0$  is a probability density function then find k?

4. If  $f(x) = k(2x + 3)$  in  $0 < x < 2$ , then find k?

5. Write two application of normal distribution.
6. Write the probability density function of Normal distribution.
7. If  $\mu = 5$ , and  $\sigma = 2$ , then write the p.d.f of the normal distribution.
8. Write the probability density function for the standard normal variate.
9. If  $f(x) = k(2x^2)$  in  $0 < x < 2$ , then find k?

### Long Questions :

1. A continuous random variable 'X' is defined by

$$f(x) = \begin{cases} \frac{1}{16} (3+x)^2, & \text{if } -3 \leq x \leq -1 \\ \frac{1}{16} (6-2x^2), & \text{if } -1 \leq x < 1 \\ \frac{1}{16} (3-x)^2, & \text{if } 1 \leq x \leq 3 \\ 0 & \text{elsewhere} \end{cases}$$

Verify that  $f(x)$  is a density function & also find the Mean of 'x'

2. The cumulative distribution function for a continuous random variable 'x' is

$$F(x) = \begin{cases} 1-e^{-2x}, & x \geq 0 \\ 0, & x < 0 \end{cases} \quad \text{Evaluate (i) density function (ii) Mean (iii) Variance}$$

3. Probability density function of random variable 'x' is

$$f(x) = \begin{cases} \frac{1}{2} \sin x, & \text{for } 0 \leq x \leq \pi \\ 0 & \text{elsewhere} \end{cases}$$

Find mean , median and mode?

4. Probability density function of random variable 'x' is

$$f(x) = e^{-x} \quad x \geq 0 \\ = 0 \quad \text{other wise.}$$

Find mean , Variance ?

5. Probability density function of random variable 'x' is

$$f(x) = K(1-x^2) ; 0 < x < 1.$$

= 0 other wise.

Find K, mean , Variance ?

6. Find the mean and S.D of the normal distribution in which 7% of the items are under 35 and 89% are under 63

7. 1000 students has written an examination the mean of left is 35 and standard deviation is 5.

Assuming the distribution to be normal find

(i)How many students to marks lie between 25 and 40.

(ii)How many get more than 40

(iii)How many students get below 20

8. If mean = 70, standard deviation is 16. Find (i)  $p(38 \leq x \leq 46)$  , (ii)  $p(62 \leq x \leq 86)$

9. Derive variance and mean of the Normal distribution.

10. Derive mode of the Normal distribution.

11. Derive Median of the Normal distribution.

### **UNIT : III Sampling Distribution & Hypothesis Theory**

#### **Short Questions :**

1. Define population and sample?

2. Define parameter and Statistic?

3. Define standard error of a statistic?

4. Define Estimator and estimate?

5. Define point estimation and interval estimation?

6.Find population correction factor if  $n=5$  and  $N=30$

7. Define type I error

8.Write the test statistic of single mean in large samples

9.Write about Null Hypothesis

10.What is mean by level of significance

11.Define Left tailed test

12. Write about alternative hypothesis.
13. Define critical region.
14. Define type II error.
15. Write the test statistic for difference of two means in large samples.

### **LONG QUESTIONS:**

1. Explain sampling and some important methods of sampling?
2. A population consists of five numbers 2,3,6,8, and 11. Consider all possible samples of size two which can be drawn with replacement from this population. Find i) The population mean. ii) The standard deviation of the population. iii) The mean of the sampling distribution of means. iv) standard deviation of the sampling distribution of means.
3. A population consists of five numbers 5,2,6,12, and 11. Consider all possible samples of size two which can be drawn without replacement from this population. Find i) The population mean. ii) The standard deviation of the population. iii) The mean of the sampling distribution of means. iv) standard deviation of the sampling distribution of means.
4. A population consists of five numbers 3,6,9,15 and 27. Consider all possible samples of size three which can be drawn without replacement from this population. Find i) The population mean. ii) The standard deviation of the population. iii) The mean of the sampling distribution of means. iv) standard deviation of the sampling distribution of means.
5. A population consists of six numbers 4,8,12,16,20 and 24. Consider all possible samples of size two which can be drawn without replacement from this population. Find i) The population mean. ii) The standard deviation of the population. iii) The mean of the sampling distribution of means. iv) standard deviation of the sampling distribution of means.
6. a) A sample of size 300 was taken whose variance is 225 and mean 54. Construct 95% confidence interval for the mean. And also find maximum error of mean at 95% confidence?  
  
b) A sample of 64 students have a mean weight of 70 kgs. Can this be regarded as a sample from a population with mean weight 56 kgs and standard deviation 25 kgs.
7. a) A sample of size 100 was taken whose variance is 16 and mean 4. Construct 99% confidence interval for the mean. And also find maximum error of mean at 95% confidence?  
  
b) A sample of 60 students have a mean weight of 50 kgs. Can this be regarded as a sample from a population with mean weight 25 kgs and standard deviation 12kgs.
8. The means of two large sample of sizes 1000 and 2000 members are 67.5 inches and 68.0

inches respectively. Can the samples be regarded as drawn from the same population of S.D 2.5 inches.

9. Random samples of 400 men and 600 women were asked whether they would like to have a flyover near the residence, 200 men and 325 women were in favour of the proposal. Test the hypothesis that proportions of men and women in favor of the proposal are same, at 5% level.

10. A simple sample of the heights of 6400 English men has a mean of 67.585 inches and a S.D of 2.56 inches while a simple sample of height of 1600 Australians has mean of 68.55 and a S.D of 2.52. Do the data indicate the Australians are on the average taller than Englishmen use 1% l.o.s.

## UNIT :4

### Short Questions:

1. Find  $t_{0.05}$  when  $v = 16$
2. Find  $F_{0.01}(24,19)$
3. Write the one assumption of student's t- test
4. Write the one use of t-test
5. Write the one use of chi – square test
6. Find  $F_{0.05}$  with  $V_1 = 7$  and  $V_2 = 15$
7. Write the formulae for significance of single mean in t-test.
8. Write the formulae for significance of two means in t-test.
9. Write the formula for chi- square test.
10. Write the formula for F- test.
11. Define small sample.
12. Find chi- square value for 1 degree of freedom at 5% level of significance.

### LONG QUESTIONS:

1. To compare two kinds of bumper guards 6 of each kind were mounted on a car and then the car was run in to a concrete wall the following are the costs of repairs.

Guard1	107	148	123	165	102	119
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Gaurd2	134	115	112	151	133	129
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Use the 0.01 level of significance to test whether the difference between two sample means is significant

2.The number of automobile accidents per week in a certain community are as follows: 12,8,20,2,14,10,15,6,9,4. Are these frequencies in agreement with the belief that accident conditions were the same during this 10 week period.

3.A random sample of 10 boys had the following I.Q's : 70,120,110,101,88,83,95,98,107,100.

Do these data support the assumption of a population mean I.Q of 100

4.In one sample of 8 observations from a normal population,the sum of the squares of deviations of the sample values from the sample mean is 84.4 and in another sample of 10 observations it was 102.6.Test at 5% level whether the populations have the same variance

5.The means of two random samples of sizes 9 and 7 are 196.42 and 198.82 respectively. The sum of the squares of the deviations from the mean are 26.94 and 18.73 respectively ,can the sample be considered to have been from the same normal population

6.Use F- test to the following data to test the significance of variances

X	67	24	57	55	63	54	56	68	33	43
Y	70	38	58	58	56	67	68	75	42	38

7. Use F test to test the significance difference variances of two diets. At 5% level of significance.

DietA	25	32	30	34	24	14	32	24	30	31	35	25	-	-	-
DietB	44	34	22	10	47	31	40	30	32	35	18	21	35	29	22

8. Given the following contingency table for hair colour and eye colour .find the value of Chi-square Is there good association between the two.

Hair colour					
Eye colour		Fair	Brown	Black	Total
	Blue	15	5	20	40
	Grey	20	10	20	50
	Brown	25	15	20	60
	total	60	30	60	150

9. From the following data ,find whether there is any significant liking in the habit of taking soft drinks among the categories of employees.

	clerk	Teachers	Officers
Pepsi	10	25	65
Thumsup	15	30	65
Fanta	50	60	30

## UNIT -5

### Short Questions:

1. Write C-R equations in Cartesian form
2. Write the definition Harmonic function
3. Define Analytic function
4. Write the C-R equations in polar form.
5. Write the statement of Cauchy's theorem
6. Evaluate  $\int_0^{1+i}(x^2-iy)dz$  along the path  $y=x^2$
7. Write Generalized Cauchy's Integral formula
8. Find the value of  $\oint_C \frac{e^z}{z-4} dz$  where C is  $|z| = 2$
9. Write the definition Conjugate Harmonic function.
10. Define Laplace equation.
11. Show that  $u(x, y) = x^3 - 3xy^2$  is harmonic
12. Find 'k' such that  $f(x,y) = x^3 + 3kxy^2$  be harmonic.
13. Using Milne-Thomson method find  $f(z)$  given that  $f'(z) = 3x^2 - 3y^2 + 6ixy$

### LONG QUESTIONS:

1. Show that  $u(x,y) = e^x \cos y$  is harmonic and find its harmonic conjugate  $v(x,y)$ , also the analytic function
2. Prove that  $u = x^2 - y^2 - 2xy - 2x + 3y$  is harmonic. Find  $f(z)$ .



3. Prove that the function  $f(z)$  defined by  $f(z) = \begin{cases} \frac{x^3(1+i)-y^3(1-i)}{x^2+y^2} & z \neq 0 \\ 0 & z = 0 \end{cases}$

is continuous and the C-R equations are satisfied at the origin yet  $f'(0)$  does not exist.

4. If  $u+v = e^x (\cos y + \sin y)$  then find the analytic function  $f(z)$

5. Find the analytic function  $f(z)$  if  $u-v = (x-y)(x^2 + 4xy + y^2)$ .

6. Evaluate  $\int_C \frac{1}{z^8(z+4)} dz$  where  $C$  is the circle  $|z| = 2$

7. Evaluate the integrals around  $C: |z-1|=3$  i)  $\int_C \frac{e^z}{(z+1)^2} dz$  ii)  $\int_C \frac{e^z}{(z+1)^4} dz$

8. Evaluate the integrals around  $C: |z|=3$  ,  $\int_C \frac{e^{2z}}{(z-1)(z-2)} dz$

9. Evaluate the integrals around  $C: |z|=2$  ,  $\int_C \frac{e^z}{(z-1)(z-4)} dz$

