

$$c) \quad \bar{p} + \sqrt{\frac{\bar{p} \cdot \bar{q}}{n}}$$

$$d) \quad 3\sqrt{\frac{\bar{p} \cdot \bar{q}}{n}}$$

PART B (10 x 2 = 20 Marks)

(Not more than 40 words)

11. The mean of 30 items is 18 and their standard deviation is 3. Find the sum of all the items and also the sum of the squares of all items.
12. Find the coefficient of variation of the following data 18, 20, 15, 12, 25.
13. Find the probability distribution of X. If the random variable X takes the values 1, 2, 3, 4 such that $2P(X = 1) = 3P(X = 2) = P(X = 3) = 5P(X = 4)$.
14. A and B are two events with $P(A) = \frac{3}{8}$, $P(B) = \frac{1}{2}$ and $P(A \cap B) = \frac{1}{4}$. Find $P(A^c \cap B^c)$.
15. Determine the binomial distribution whose mean is 9 and whose standard deviation is $3/2$.
16. In a book of 520 pages, 390 hypo-graphical errors occur. Assuming Poisson law for the number of errors per page, find the probability that a random sample of 5 pages will contain no error.
17. Define Type I error and Type II error.
18. State the applications of Chi-square test.
19. State the basic principles of design of experiments.
20. What is a control chart?

PART C (5 x 14 = 70 Marks)

(Not more than 400 words)

Q. No. 21 is compulsory

21. (i) Calculate the mean and standard deviation for the following (7)

Size of item	6	7	8	9	10	11	12
Frequency	3	6	9	13	8	5	4

- (ii) Calculate the coefficient of correlation for the following data. (7)

X	62	64	65	69	70	71	72	74
Y	126	125	139	145	165	152	180	208

22. a) (i) One factory produces 1000 articles, 20 of them being defective, second factory produces 4000 articles, 40 of them being defective and third factory produces 5000 articles, 50 of them being defective. All these articles are put in one stock file. One of them is chosen and found to be defective. What is the probability that it is from the first factory. (7)
- (ii) Find the moment generating function of the random variable X with probability (7)

density function $f(x) = \begin{cases} x & \text{for } 0 \leq x \leq 1 \\ 2 - x & \text{for } 1 \leq x \leq 2 \\ 0 & \text{otherwise} \end{cases}$. Hence find mean and variance.

(OR)

b) (i) X is a continuous random variable with pdf given by (7)

$$f(x) = \begin{cases} kx & \text{in } 0 \leq x \leq 2 \\ 2k & \text{in } 2 \leq x \leq 4 \\ 6k - kx & \text{in } 4 \leq x \leq 6 \\ 0 & \text{elsewhere} \end{cases}$$
. Find the value of k and also the cdf of X.

(ii) A random variable X has density function given by $f(x) = \begin{cases} \frac{1}{k}, & \text{for } 0 < x < k \\ 0, & \text{otherwise} \end{cases}$. (7)

Find mgf, rth moment, mean and variance.

23. a) Fit a Poisson distribution to the following data:

x	0	1	2	3	4	5	Total
f	142	156	69	27	5	1	400

(OR)

b) (i) Given that X is distributed normally, if $P(X < 45) = 0.31$ and $P(X > 64) = 0.08$. Find (7) the mean and standard deviation of the distribution.

(ii) Out of 800 families with 4 children each how many families would be expected to (7) have (1) 2 boys and 2 girls. (2) At least one boy. (3) No girl. (4) At most two girls? Assume equal probabilities for boys and girls.

24. a) (i) Random samples drawn from two countries gave the following data relating to the (7) heights of adult males. Is the difference between two means significant?

	Country A	Country B
Mean height(in inches)	67.42	67.25
S.D(in inches)	2.58	2.50
Number in samples	1000	1200

(ii) 1000 students at college level were graded according to their I.Q and their (7) economic conditions. What conclusion can you draw from the following data?

Economic conditions	I.Q Level	
	High	Low
Rich	460	140
Poor	240	160

(OR)

b) Two random samples gave the following results:

Sample	Size	Sample Mean	Sum of the square of deviations from the mean
1	10	15	90
2	12	14	108

Examine whether the samples come from the same normal population.

25. a) (i) The following data represent the number of units of production per day turned out by 5 different workers using 4 different types of machines. (7)

Workers	Machine Type			
	A	B	C	D
1	44	38	47	36
2	46	40	52	43
3	34	36	44	32
4	43	38	46	33
5	38	42	49	39

- (1) Test whether the mean production is the same for the different machine types.
- (2) Test whether the five men differ with mean productivity.

(ii) Given below are the values of sample mean \bar{X} and sample range R for 10 samples, each of size 5, draw the appropriate mean and range charts comment on the state of control of the process. (7)

S.No	1	2	3	4	5	6	7	8	9	10
Mean	43	49	37	44	45	37	51	46	43	47
Range	5	6	5	7	7	4	8	6	4	6

(OR)

b) Analyze the following Latin square experiments.

A(12)	D(20)	C(16)	B(10)
D(18)	A(14)	B(11)	C(14)
B(12)	C(15)	D(19)	A(13)
C(16)	B(11)	A(15)	D(20)
