Q-1   Show that A.M. $\geq$ G.M. . $\geq$ H.M.

Q.2.   The following is the table which gives you the distribution of marks secured by some students in examination:

Marks	0-20	21-30	31-40	41-50	51-60	61-70	71-80
No. of students	42	38	120	84	48	36	31

Find i) median marks, ii) the percentage of failure if the minimum for a pass is 35 marks.

Q. 3.   Calculate the median and mode from the following data

Value	Frequency
less than 10	4
less than 20	16
less than 30	40
less than 40	76
less than 50	96
less than 60	112
less than 70	120
less than 80	125

Q. 4   Find the mean and standard deviation of first n natural numbers.

Q. 5.   Co-efficient of skewness = -0.375, mean = 62, median =65. Find the value of standard deviation.

Q.6   Find the appropriate measure of skewness for the following frequency distribution:

Under Years	10	20	30	40	50	60
No. of Persons	15	32	51	78	97	109

Q. 7.   The first two moments of a distribution about the value 4 are -1.5 and 2.7.

   a) Find the moments about zero.

   b)   Calculate the mean and standard deviation.

Q.8   Find the first four moments and the values of β_1 and β_2 from the following frequency distribution:

x	21-24	25-28	29-32	33-36	37-40	41-44
f	40	90	190	110	50	20

Also, find the measure of skewness and kurtosis.

PROBABILITY

1. If A and B are not mutually exclusive events then show that $P(A \cup B) = P(A) + P(B) - P(A \cap B)$.

2. If A and B are independent events then show that $\overline{A}$ and $\overline{B}$, $\overline{A}$ and B, A and $\overline{B}$ are independent.

3. A and B throw alternatively with a pair of dice. A wins if he throws 8 before B throws 5 and B wins if he throws 5 before A throws 8. Find the probability that A wins.

4. In a bolt factory machines A, B and C manufacture respectively 25%, 35% and 40% of the total of their output. 5%, 4% and 2% are defective bolts. A bolt is drawn at random from the product and is found to be defective. What are the probabilities that it was manufactured by machines A, B and C ?

5. A boy contains 5 white and 4 black balls. If 3 balls are drawn at random then what are the probabilities that : (i) two of them are white (ii) at most one of them is white (iii) at least two are white.

6. A box contains 5 defective and 10 non-defective lamps. 8 lamps are drawn at random in succession without replacement. What is the probability that 8th lamp is the 5th defective.

7. There are three identical urns containing white and black balls. The 1st urn contains 3 white, 4 black balls; the 2nd urn contains 4 white and 5 black balls; 3rd urn contains 2 white and 3 black balls. An urn is chosen at random and a ball is drawn from it. If the drawn ball is white, what is the probability that the 2nd urn is chosen.

8. A random variable X has the following p.m.f

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

(i) Determine the constant k.
(ii) Evaluate $P(X < 6)$, $P(X \geq 6)$, $P(3 < X \leq 6)$, $P(3 < X / X \leq 6)$.
(iii) Find the minimum value of x so that, $P(X \leq x) > \frac{1}{2}$.
(iv) Obtain the distribution function F(x).

9. The p.d.f of a random variable X is $f(x) = k(x - 1)(2 - x)$ for $1 \leq x \leq 2$. Determine (i) the value of constant k (ii) the distribution function F(x) (iii) $P(\frac{5}{4} \leq X \leq \frac{3}{2})$.

10. Show that the function $|x|$ in (-1, 1) and zero elsewhere is a possible p.d.f and find the corresponding distribution function.

11. A variable X has the density function $f(x) = \begin{cases} \frac{x}{2}, & 0 \leq x \leq 1 \\ \frac{1}{2}, & 1 < x \leq 2 \\ \frac{1}{2}(3 - x), & 2 < x \leq 3 \end{cases}$. Find mean and variance of X.