

- Q-1 (a) i) Published data is secondary data (P. Code 1-59248) 1
- ii) The Age of students is not attribute (is variable) 2
- iii) Mode is located using Histogram (Median - Ogive curve) 2
- iv) Mean deviation about mean is minimum 2
- v) Range is measures of dispersion (Absolute) 2
- (b) i) Relationship between two attributes. 2
- No relation - independent attributes
- Present or absent together - Positive Association
- Presence of one attribute & absence of other attribute - Negative Asso.
- ii) Methods - 1) Personal observation 2
- (Any two) 2) Interview 3) Questionnaire 4) Online survey
- iii) Mode = 16 2
- iv) Merit - Rigidly defined
- Demerit - cannot be located graphically (Any one) 2
- v) Types of Skewness - 1) +vely 2) -vely 3) Symmetric 2
- Mean > Mode Mode > Mean Mean = Mode = Med.

Q-2 (a) Note - classification - Defⁿ - objective - (5)

Types of classification - simple, multiple

Note - Tabulation - Defⁿ, requirement of good table (5)

Components of Table

(b) Consistency of data - All ultimate class frequencies are positive (2)

Derive Eight conditions for three attributes (8)

i.e) $(ABC) \geq 0$

$\& (AB\bar{C}) \geq 0 \Rightarrow (AB) - (ABC) \geq 0 \Rightarrow (AB) \geq (ABC)$

so on.

- (c) 1) Time series data (2.5)
- 2) Cross Section data (2.5)
- 3) Discrete data (2.5)
- 4) Continuous data (2.5)
- Meaning with example

(d)

	B	P	
A	85	335	420
α	585	1495	2080
	670	1830	2500

$$Y = \frac{(AB)(\alpha P) - (AP)(\alpha B)}{(AB)(\alpha P) + (AP)(\alpha B)}$$

$$= \frac{85 \times 1495 - 335 \times 585}{85 \times 1495 + 335 \times 585}$$

$$= -0.257$$

Q-3 (a)


CLASS	60-80	80-100	100-120	120-140	140-160	Total
Req	3	5	9	6	2	25

A.M = $\bar{X} = \frac{\sum X}{n}$ or $\frac{\sum fm}{N} = 108.16$ (3)

Median = size of $(\frac{n+1}{2})^{th}$ item = size of 13th item

Ascending order = 109 (3)

- 66, 70, 76, 82, 84, 86, 92, 95, 100, 106, 107, 109, 109, 111, 115, 119
- ↑

(b) 1) Frequency curve (4) 

2) Ogive curve & use (6) 

(c) 1) A.M = 2) G.M. 3) H.M. (6)

$G.M^2 = A.M \times H.M$

$(\sqrt{ab})^2 = (\frac{a+b}{2}) \times (\frac{2ab}{a+b})$ (4)

(d) Measures of Central Tendency - Mean, mode, Median (Any two) - 2 G.M, H.M

Merits & Demerits (5+5)

Q-4 (a) S.D = $\sqrt{\frac{\sum (X - \bar{X})^2}{n}}$ or in words. (2)

No effect in change of origin $S.D.(X+a) = S.D.(X)$

There is effect of change in scale $S.D.(\frac{X}{h}) = \frac{1}{h} S.D.(X)$

Merits of S.D. — (2)

Demerits of S.D. — (2)

(b) Defⁿ of Dispersion — (2)

Absolute Measures of Dispersion - Range, Q.D., M.D, S.D. (4)

Relative Measures of Dispersion - Coeff of Range, Coeff. of Q.D, Coeff. of M.D., C.V. (4)

Q-4 (c) $\bar{x} = 30$ $6 = 9$ $n = 100$ $\therefore \Sigma X = 3000$ $6^2 = 81$

3

Correct $\Sigma X = 3000 + 54 - 45 = 3009$

Correct $\bar{x} = 30.09$

~~Correct~~ $\Sigma X^2 = 98100$

$6^2 = \frac{\Sigma X^2}{N} - \bar{x}^2$

$81 = \frac{\Sigma X^2}{100} - 900$

Correct $\Sigma X^2 = 98100 - 45^2 + 54^2 = 98991$

Correct S.D = $\sqrt{\frac{\text{Correct } \Sigma X^2}{n} - \text{Correct } \bar{x}^2}$
 $= \sqrt{\frac{98991}{100} - (30.09)^2} = 9.1924$ (6)

(d) Raw Moments

$\mu'_1 = \frac{\Sigma (X-A)^1}{n} = \frac{\Sigma f(X-A)^1}{n}$

Central Moments

$\mu_2 = \frac{\Sigma X^2}{n} = \frac{\Sigma f X^2}{N}$ (4)

Relationship.

$\mu_2 = \mu_2' - \mu_1'^2$

$\mu_3 = \mu_3' - 3\mu_2'\mu_1' + 2\mu_1'^3$ (6)

$\mu_4 = \mu_4' - 4\mu_3'\mu_1' + 6\mu_2'\mu_1'^2 - 3\mu_1'^4$

Q-5 (a)

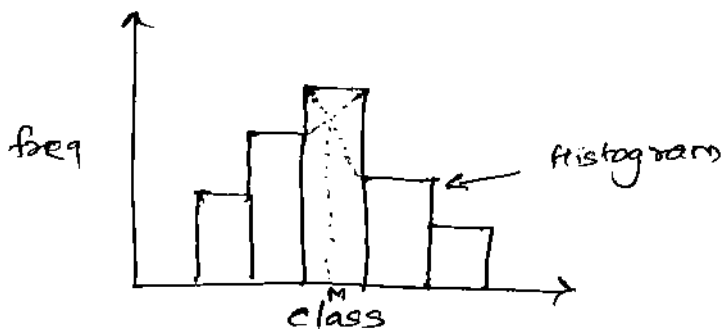
$Y = \frac{(AB)(\alpha\beta) - (A\beta)(\alpha B)}{(AB)(\alpha\beta) + (A\beta)(\alpha B)} = \frac{14000 - 4000}{14000 + 4000} = 0.5555$

	B	β	
A	200	80	280
α	50	70	120
	250	150	400

Positive Association

(5)

(b)



M = Mode

(5)

Q-5 (c) Random Sampling — 1) SRSWR

(5) (4)

2) SRSWOR

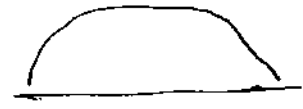
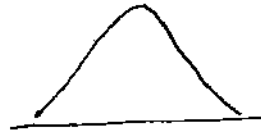
$$(d) \text{ S.D.} = \sqrt{\frac{\sum (x - \bar{x})^2}{n}} = \sqrt{\frac{\sum x^2}{n} - \bar{x}^2} \quad (5)$$
$$= \sqrt{\frac{\sum f(x - \bar{x})^2}{N}} = \sqrt{\frac{\sum fx^2}{N} - \bar{x}^2}$$

(e) Kurtosis — Detⁿ — Peak of curve (5)

1) Lepto kurtic

2) Mesokurtic

3) Platykurtic



(f) Modal class = 70-80 (1)

$$\text{Mode} = L + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h = 70 + \frac{17 - 14}{34 - 14 - 13} \times 10$$

$$= 70 + \frac{30}{7} = 74.28$$

(g) Combined mean = $\frac{n\bar{x} + m\bar{y}}{n+m} = \bar{z}$ (2)

$$\text{Combined S.D.} = \frac{n(d_1^2 + d_1^2) + m(d_2^2 + d_2^2)}{n+m} \quad (3)$$

$$d_1 = \bar{x} - \bar{z}$$

$$d_2 = \bar{y} - \bar{z}$$