Page No.
Date

FYBBI - Quantitative Methods - I

Q.P Code :- 57613 Date :- 30/3/2019

(75 marks)

Q1A] Multiple Choice Question (8)

01 → (b) ; 02 → (a) ; 03 → (a) , 04 → (b)
05 → (a) ; 06 → (b) ; 07 → (a) ; 08 → (a)
09 → (b) ; 10 → (a) .

Q1B) Match the following (7)

01 → (i) ; 02 → (c) ; 03 → (a) ; 04 → (b)
05 → (d) ; 06 → (e) ; 07 → (f) ; 08 → (g)
09 → (j) ; 10 → (h)

(08)

Q2A)

CI	freq	C.f	
10-20	9	9	
20-30	5	14	→ Q_1
30-40	11	25	
40-50	12	37	→ Q_3
50-60	3	40	
	40		

$$q_1 = \frac{N}{4} = \frac{40}{4} = 10$$

$$Q_1 = l_1 + \frac{q_1 - c}{f}(l_2 - l_1)$$

$$= 20 + \frac{10-9}{5}(30-20)$$

$$= \underline{\underline{22}}$$

(P.T.O)

$q_3 = \frac{3N}{4} = \frac{3 \times 40}{4} = 30$

$Q_3 = l_1 + \frac{q_3 - c}{f}(l_2 - l_1)$

$= 40 + \frac{30 - 25}{12}(50 - 40)$

$= \underline{44.17}$

Quartile Deviation $= \frac{Q_3 - Q_1}{2}$

$= \frac{44.17 - 22}{2} = \underline{11.09}$

Co-eff. of QD $= \frac{Q_3 - Q_1}{Q_3 + Q_1} = \frac{44.17 - 22}{44.17 + 22}$

$= \underline{0.34}$

(07)

Q2B]

wt in kg.	No of men	fx	$\lvert x - \bar{x} \rvert$	$f\lvert x - \bar{x} \rvert$
50	20	1000	12	240
55	15	825	7	105
60	25	1500	2	50
65	10	650	3	30
70	30	2100	8	240
	100	6175		665

$\bar{x} = \frac{\Sigma fx}{\Sigma f} = \frac{6175}{100} = 61.75$ ie 62.

M.D $= \frac{\Sigma f\lvert x - \bar{x} \rvert}{\Sigma f} = \frac{665}{100} = \underline{6.65}$

Date

Q2C]

x Demand Index	y Price Index	$(x-\bar{x})$	$(y-\bar{y})$	$(x-\bar{x})^2$	$(y-\bar{y})^2$	$(x-\bar{x})(y-\bar{y})$
100	98	-3	-11	9	121	33
102	115	-1	6	1	36	-6
104	108	1	-1	1	1	-1
106	115	3	6	9	36	18
412	436			20	194	44

$$\bar{x} = \frac{\Sigma x}{n} = \frac{412}{4} = 103 \quad ; \quad \bar{y} = \frac{\Sigma y}{n} = \frac{436}{4} = 109$$

$$\sigma_x = \sqrt{\frac{\Sigma (x-\bar{x})^2}{n}} \quad ; \quad \sigma_y = \sqrt{\frac{\Sigma (y-\bar{y})^2}{n}}$$

$$= \sqrt{\frac{20}{4}} \qquad = \sqrt{\frac{194}{4}}$$

$$= 2.24 \qquad = 6.96$$

$$r = \frac{\Sigma (x-\bar{x})(y-\bar{y})}{n \cdot \sigma_x \cdot \sigma_y} = \frac{44}{(4)(2.24)(6.96)}$$

$$= \frac{44}{62.36} = 0.71$$

Page No.
Date

Q2D]

$$b_{xy} = \frac{\Sigma (x-\bar{x})(y-\bar{y})}{\Sigma (y-\bar{y})^2}$$

$$= \frac{350}{240} = \underline{\underline{1.46}}$$

$$b_{yx} = \frac{\Sigma (x-\bar{x})(y-\bar{y})}{\Sigma (x-\bar{x})^2}$$

$$= \frac{350}{280} = \underline{\underline{1.25}}$$

$$\bar{x} = \frac{\Sigma x}{n} = \frac{200}{5} = 40$$

$$\bar{y} = \frac{\Sigma y}{n} = \frac{110}{5} = 22$$

i) Regression equation X on Y

$$(x-\bar{x}) = b_{xy}(y-\bar{y})$$
$$(x-40) = 1.46(y-22)$$
$$\therefore x = 1.46y + 7.88$$

ii) Regression equation Y on X

$$(y-\bar{y}) = b_{yx}(x-\bar{x})$$
$$(y-22) = 1.25(x-40)$$
$$y = 1.25x - 28$$

(P.T.O)

Q3A) (8)

$E(x) = \sum x_i P_i$

$= 0 \times 0.20 + 1 \times 0.25 + 2 \times 0.30 + 3 \times 0.15 + 4 \times 0.10$

$= \underline{1.7}$

$V(X) = E(X^2) - [E(X)]^2$

$E(X^2) = \sum (x_i)^2 P_i$

$= (0)^2 \times 0.20 + (1)^2 \times 0.25 + (2)^2 \times 0.30 + (3)^2 \times 0.15 + (4)^2 \times 0.10$

$= \underline{4.4}$

$\therefore V(X) = 4.4 - (1.7)^2$

$= 4.4 - 2.89$

$= \underline{1.51}$

Q3B] (7)

$n(S) = {}^{52}C_1 = 52.$

(i) Let A be the event of getting a heart

$n(A) = {}^{13}C_1 = 13 \therefore P(A) = \frac{n(A)}{n(S)} = \frac{13}{52}$

ii) Let B be the event of getting a Queen $n(B) = {}^{4}C_1 = 4 \therefore P(B) = \frac{n(B)}{n(S)} = \frac{4}{52}$

Page No.
Date

iii) ~~n(A∩B) =~~

$n(A \cap B)$ = a event of getting a Queen of hearts.

$n(A \cap B) = {}^1C_1 = 1$

$\therefore P(A \cap B) = \frac{n(A \cap B)}{n(S)} = \frac{1}{52}$

$\therefore P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$\Rightarrow$ Addition Theorem

$\therefore P(A \cup B) = \frac{13}{52} + \frac{4}{52} - \frac{1}{52}$

$= \frac{16}{52} = \underline{\underline{0.31}}$

Q3 c] (8)

CI	F	CF	
100-150	4	4	
150-200	7	11	— D_2
200-250	20	31	
250-300	9	40	— P_{80}
300-350	6	46	
350-400	4	50	
	50		

$d_2 = \frac{2N}{10} = \frac{2 \times 50}{10} = 10$

$$D_2 = l_1 + \frac{d_2 - c}{f}(l_2 - l_1)$$

$$= 150 + \frac{10-4}{7}(200-150)$$

$$= 192.86$$

$$P_{80} = \frac{80 \times 50}{100} = 40$$

$$P_{80} = l_1 + \frac{P_{80} - c}{f}(l_2 - l_1)$$

$$= 250 + \frac{40-31}{9}(300-250)$$

$$= 300$$

Q3D] (7)

Commodity	P_0	P_1	Q_0	$I = \frac{P_1}{P_0} \times 100$	$W = P_0Q_0$
A	2	4	2	200	4
B	3	5	5	167	15
C	10	15	10	150	100
					119

iw
800
2505
1500
4805

$$\therefore P_{01} = \frac{\Sigma iw}{\Sigma w}$$

$$= \frac{4805}{119} = 40.38$$

Q4A

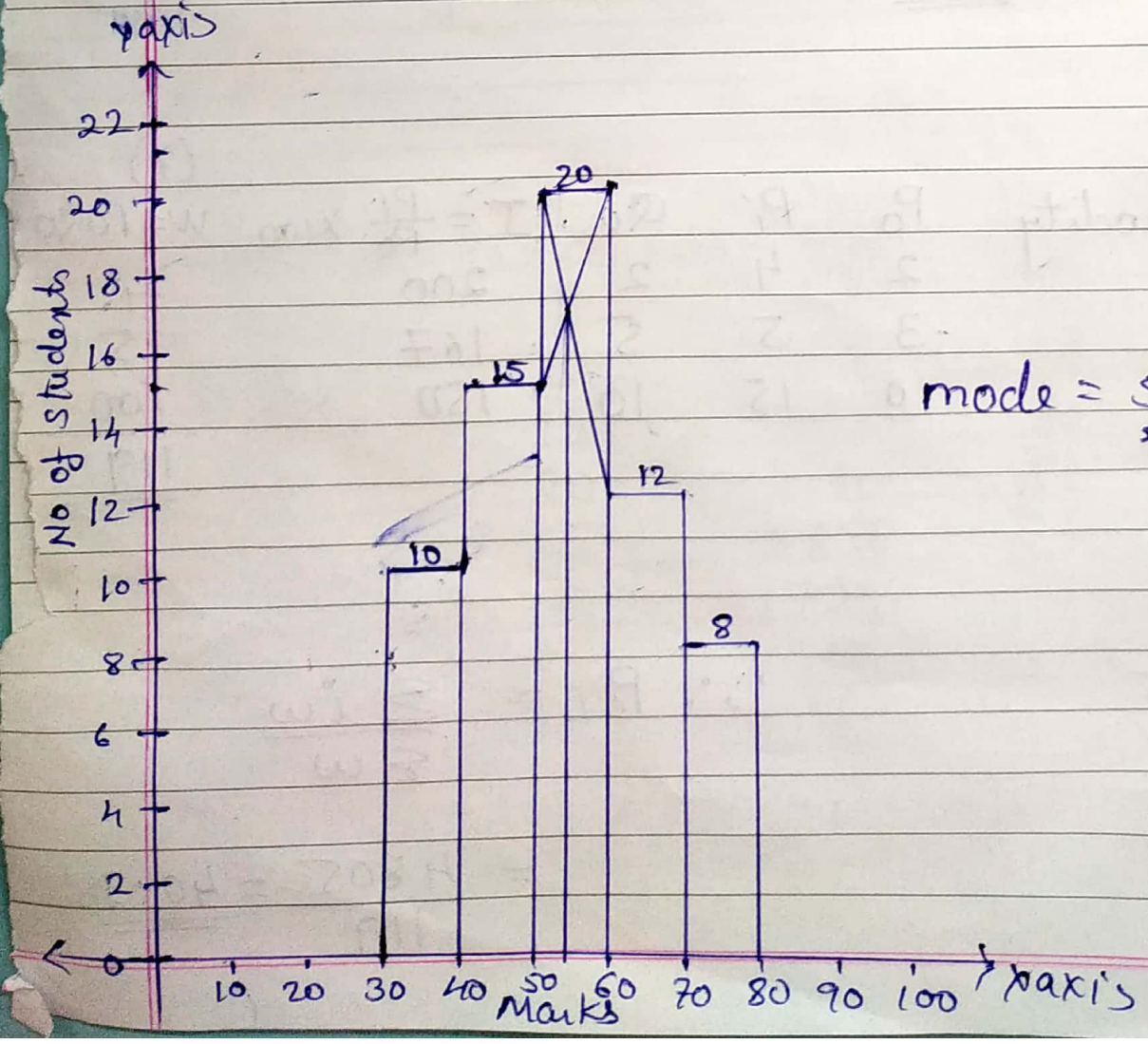
CI	F	class width	class Mark	less than c.f.	more than c.f	% frequency
100-105	15	5	102.5	15	40	37.5 %
105-110	12	5	107.5	27	25	30 %
110-115	7	5	112.5	34	13	17.5 %
115-120	6	5	117.5	40	6	15 %
	40					100 %

Q4B

Scale :-

x-axis = 1cm = 10 mark

y-axis = 1cm = 2 student



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Q4C)

Tabulated rate per ₹1000	55·30
(–) 4% Reduction	(2·212)
(–) ₹2 reduction per ₹1000	(2)
Annual premium per ₹1000	51·09

Annual premium for ₹3,00,000

$$= \frac{51.09}{1000} \times 3,00,000$$

$$= ₹\ 15,327$$

Monthly premium $= \frac{15,327}{12} = ₹\ 1277.25$

Q4D)

Ht. in cm	No. of children	fx	cf	
110	8	880	8	
111	10	1110	18	
112	13	1456	31	
113	20	2260	51	– M
114	25	2850	76	
115	15	1725	91	
116	9	1044	100	
	100	11325		

$$(A.M)\ \bar{X} = \frac{\Sigma fx}{\Sigma f} = \frac{11325}{100} = 113.25$$

Page No.
Date

Median :- $\frac{N}{2} = \frac{100}{2} = 50$

∴ cumulative frequency greater than $\frac{N}{2}$ i.e 50 is 51 and the value of x corresponding to 51 is 113

∴ Median is 113