

Day: MTWTFSS

Date: 17/4

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ID 13919

Programme Radiology

Subject Bio-statistic

Submitted to Sir Anwar Shamim

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①

Q. No 1

Food
Fruit
Rice

G.

ID = 13919

Hazrat OMER

Radiology:

(a) To calculate the overall mean consumption of fresh vegetables, fruits, rice, fish, and meat for man

$$\text{Fresh Veg} \Rightarrow 204 + 259 + 266 + 317 = 1046$$

$$\text{Fruits} \Rightarrow 31 + 45 + 69 + 105 = 250$$

$$\text{Rice} \Rightarrow 367 + 337 + 269 + 246 = 1219$$

$$\text{Fish} \Rightarrow 23 + 28 + 31 + 44 = 126$$

$$\text{Meat} \Rightarrow 70 + 61 + 69 + 77 = 277$$

Now to add the overall mean consumption

$$\text{Overall mean consumption} = 1046 + 250 + 1219 + 126 + 277$$

$$\boxed{\text{Overall mean consumption} = 2918} \text{ ANS}$$

Now to calculate the overall mean consumption of fresh vegetables, fruits, rice, fish and meat for women.

$$\text{Fresh Veg} \Rightarrow 178 + 235 + 266 + 304 = 983$$

$$\text{Fruits} \Rightarrow 28 + 46 + 70 + 121 = 265$$

$$\text{Rice} \Rightarrow 315 + 276 + 243 + 220 = 1054$$

$$\text{Fish} \Rightarrow 19 + 21 + 28 + 46 = 114$$

$$\text{Meat} \Rightarrow 48 + 43 + 54 + 63 = 208$$

(2)

Now to calculate the overall mean consumption

$$\text{Overall mean consumption} = 983 + 265 + 1054 + 114 + 208$$

$$\text{Overall mean consumption} = 2624 \quad \text{ANS}$$

To give underlying standard deviation.

~~SE~~ SE column for man.

$$SE = 0.9, 0.5, 1.0, 0.2, 0.4$$

Now SE for women.

$$SE = 0.8, 0.4, 0.8, 0.2, 0.3$$

As from result standard deviation for women is more ~~envi~~ convenient than man.

Now to calculate overall mean consumption of fresh vegetable, rice, fish, and meat for men and women combined.

Combined consumption \Rightarrow

$$\text{Fresh veg} = 1043 + 983 = 2026$$

$$\text{Rice} \Rightarrow 1219 + 1054 = 2273$$

$$\text{Fish} \Rightarrow 126 + 114 = 240$$

$$\text{Meat} \Rightarrow 277 + 208 = 485$$

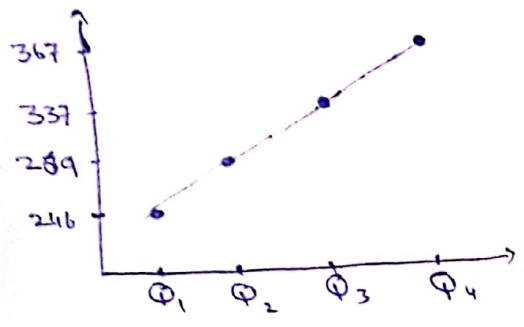
$$\text{Combined mean consumption} = 2026 + 2273 + 240 + 485$$

$$\text{Combined mean consumption} = 5024$$

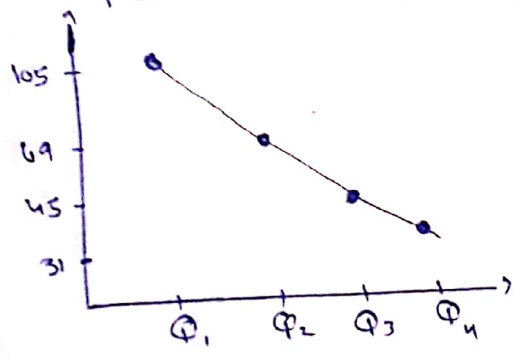
(b) The figures for milk, root vegetable, wheat flour consumption gives us that wheat flour is more necessary for our diet as compare to milks and root vegetable.

Because from the table of survey at Q_4 Column the consumption of wheat flour is 79 and for milks and root vegetables are 2, 7
 So $79 \gg 2$ and $79 \gg 7$

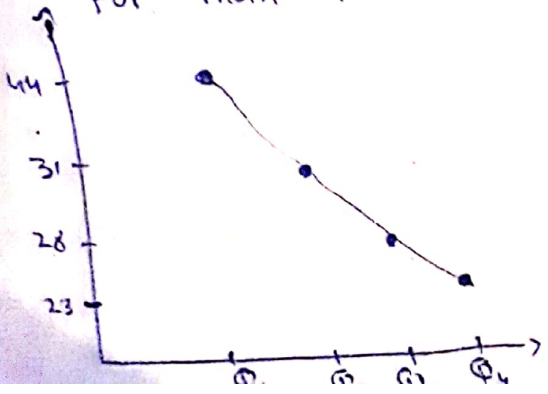
(c) For man Pattern Rice



For man Pattern Fruit

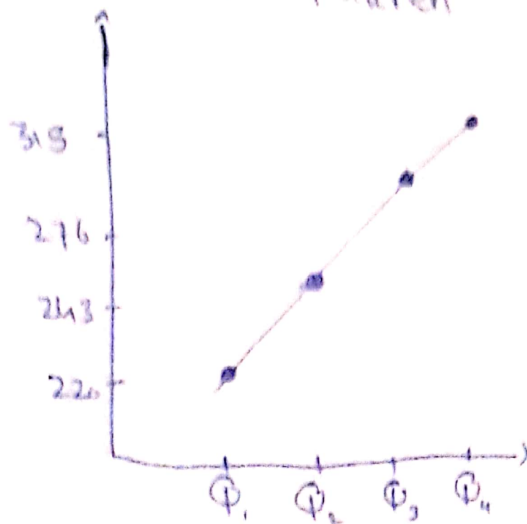


For man Pattern Fish

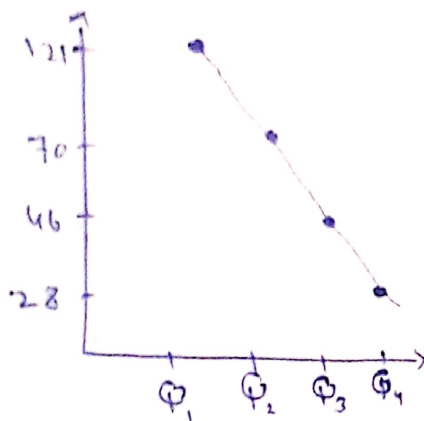


(4)

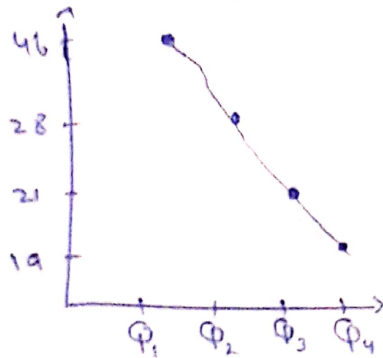
For women Pattern Rice



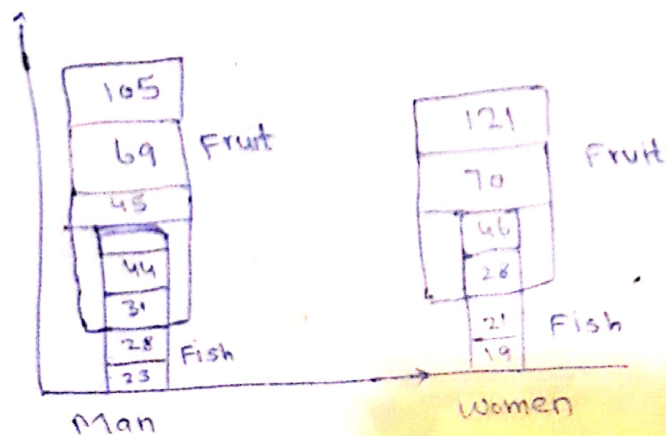
For women Pattern Fruit



For women Pattern Fish



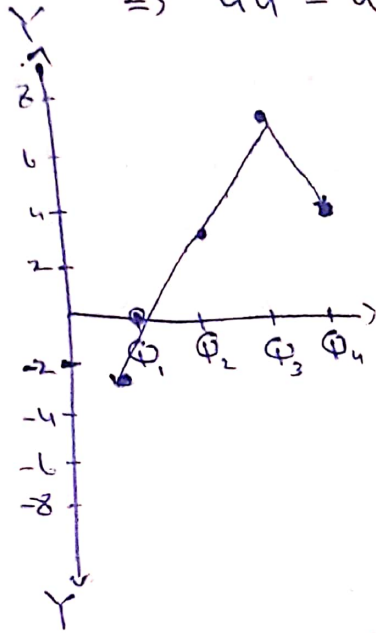
(d)



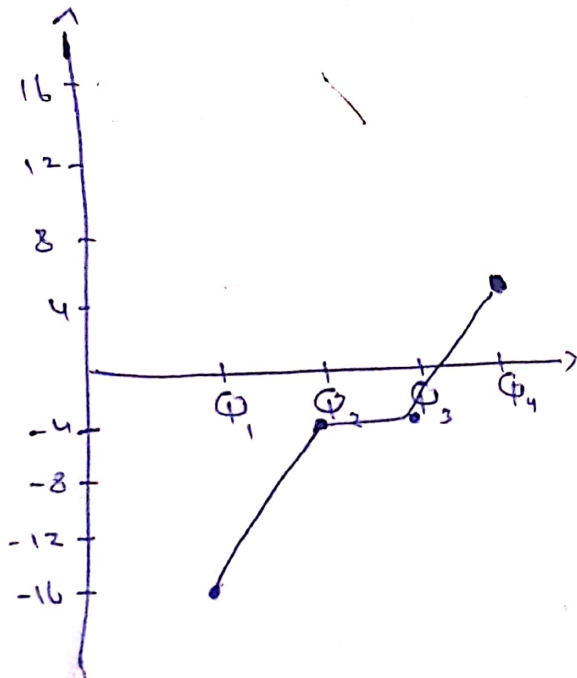
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To show the difference blw man and women.

$$\begin{aligned} \text{Fish} &\Rightarrow 23 - 19 = 4 \\ &\Rightarrow 28 - 21 = 7 \\ &\Rightarrow 31 - 28 = 3 \\ &\Rightarrow 44 - 46 = -2 \end{aligned}$$



$$\begin{aligned} \text{Fruit} &\Rightarrow 31 - 28 = 3 \\ &45 - 46 = -1 \\ &69 - 70 = -1 \\ &105 - 121 = -16 \end{aligned}$$



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(F) The standard deviation of the given commodities shows for men and women that which group consume the average diet on which rate. So after calculation we concluded that the standard deviation answers of the female group is too much small, so female shows better result.

"Q. NO 2"

(a) The purpose of census is that when census is done through online service then no error should occur on this census. another purpose of census is that to know about population of the UK.

(b) ∴ online survey is too much differ from sample survey. because in sample survey and from routine collection of data by

⑦
error is more than online survey.
and on online survey the accuracy
is 99%.

(c) :: In 2011 UK census when
response rate is 94% of the
population and yes that is a
problem for the accuracy of
the census.

(d) :: When 170000 people stated
their religion as "Jedi Knight"
Then responses of the members
are not good and attitude of
of the public to the census.
The responses of this type invalid
asking question are not good.
because people hate this types
of questions.

(e) :: internet availability is the
potential problem of census conducting
in 2021, because internet is not
available at any point to complete the
census.

and this problem might be
overcome when internet provide
to the people of UK.

(P) 1. The main Potential Problem in incorporating additional data held by govt agencies is that govt agencies not provide data by time on which it was required.

∴ Q. NO 3 ∴

Rainfall	X	f	$\sum fx$
20 — 24	22	1	22
25 — 29	27	3	81
30 — 34	32	5	160
35 — 39	37	8	296
40 — 44	42	5	210
45 — 49	47	2	94
50 — 54	52	0	0
55 — 59	57	1	57
		25	$\sum fx = 920$

$$A.M = \frac{\sum fx}{n}$$

$$A.M = \frac{920}{25}$$

$$A.M = 36.8$$

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Rain fall	x_i	f_i	$\log x_i$	$f_i \log x_i$
20 — 24	22	1	1.34	1.34
25 — 29	27	3	1.43	4.29
30 — 34	32	5	1.50	7.5
35 — 39	37	8	1.56	12.48
40 — 44	42	5	1.62	8.1
45 — 49	47	2	1.67	3.34
50 — 54	52	0	1.71	0
55 — 59	57	1	1.75	1.75
Σ	--	25	--	$\Sigma f_i \log x_i = 38.8$

$$\log G = \frac{1}{n} \Sigma f_i \log x_i$$

$$\log G = \frac{38.8}{25}$$

$$\log G = 1.552$$

Taking antilog on both side

$$\text{antilog} \times \log G = \text{Antilog}(1.552)$$

$$G = .$$

$G.M = 35.6$	ANS
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Rain fall	x_i	f_i	$\frac{f_i}{x_i}$
20-24	22	1	0.045
25-29	27	3	0.11
30-34	32	5	0.15
35-39	37	8	0.21
40-44	42	5	0.11
45-49	47	2	0.04
50-54	52	0	0.00
55-59	57	1	0.01
Σ	--	25	$\Sigma \frac{f_i}{x_i} = 0.67$

$$H = \frac{n}{\Sigma \frac{f_i}{x_i}}$$

$$H = \frac{25}{0.67}$$

$$H.M = 37.31 \text{ ANS}$$

To find Median:

class boundaries	x_i	f	C.F
19.5 — 24.5	22	1	1
24.5 — 29.5	27	3	4
29.5 — 34.5	32	5	9
34.5 — 39.5	37	8	17
39.5 — 44.5	42	5	22
44.5 — 49.5	47	2	24
49.5 — 54.5	52	0	24
54.5 — 59.5	57	1	25

(11)

Median = Rainfall $(\frac{n}{2})$ th inches

$$M = \frac{25}{2} = 12.5 \text{th inches}$$

which corresponds to the class

② 34.5 — 39.5. Therefore

$$\text{Median} = l + \frac{h}{f} \left(\frac{n}{2} - c \right)$$

$$M = 34.5 + \frac{5}{8} (12.5 - 9)$$

$$\text{Median} = 34.5 + 0.625 \times 3.5$$

$$\text{Median} = 34.5 + 2.18$$

$$\text{Median} = 36.68 \text{ ANS}$$

To find Mode:

class boundaries	X_i	f	c.f
19.5 — 24.5	22	1	1
24.5 — 29.5	27	3	4
29.5 — 34.5	32	5	9
34.5 — 39.5	37	8	17
39.5 — 44.5	42	5	22
44.5 — 49.5	47	2	24
49.5 — 54.5	52	0	24
54.5 — 59.5	57	1	25
Σ	--	--	--

(12)

$$\text{Mode} = 1 + \frac{f_m - f_1}{(f_m - f_1) + (f_m - f_2)} \times h$$

$$\text{Mode} = 34.5 + \frac{8 - 5}{(8 - 5) + (8 - 5)} \times 5$$

$$\text{Mode} = 34.5 + \frac{3}{3+3} \times 5$$

$$\begin{aligned} \text{Mode} &= 34.5 + \frac{3}{6} \times 5 \\ &= 34.5 + 0.5 \times 5 \\ &= 34.5 + 2.5 \end{aligned}$$

$$\boxed{\text{Mode} = 37}$$

To find quartiles

$$Q_1 = \frac{(n+1)}{4} = \frac{25+1}{4} = \frac{26}{4} = \boxed{6.5}$$

$$Q_2 = \frac{2(n+1)}{4} = \frac{2(25+1)}{4} = \frac{26}{2} = \boxed{13}$$

↓
ANS

$$Q_3 = \frac{3(n+1)}{4} = \frac{3(25+1)}{4} = \frac{3(26)}{4}$$

$$Q_3 = \frac{3 \times 26}{4} = \frac{78}{4} = \boxed{19.5}$$

↓
ANS

To find variance

Rainfall	x_i	f_i	$x_i - \bar{x}$	$(x_i - \bar{x})^2$	$f_i (x_i - \bar{x})^2$
20-24	22	1	-14.8	219.04	219.04
25-29	27	3	-9.8	96.04	288.12
30-34	32	5	-4.8	23.04	115.2
35-39	37	8	0.2	0.04	0.32
40-44	42	5	5.2	27.04	135.2
45-49	47	2	10.2	104.04	208.08
50-54	52	0	15.2	231.04	0.00
55-59	57	1	20.2	408.04	408.04
Σ	--	25	--	--	$\Sigma f_i (x_i - \bar{x})^2 = 1374$

$$S^2 = \frac{\Sigma f_i (x_i - \bar{x})^2}{n}$$

$$S^2 = \frac{1374}{25}$$

$$S^2 = 54.96 \quad \text{ANS}$$

Now to find standard deviation.

\Rightarrow The square root of variance is called standard deviation.

So, $S^2 = 54.96$

Taking square root on both sides

$$\sqrt{S^2} = \sqrt{54.96}$$

$$S = 7.41 \quad \text{ANS}$$

To find Q.D

As we know that

$$Q.D = \frac{Q_3 - Q_1}{2}$$

$$Q.D = \frac{19.5 - 6.5}{2} \quad \frac{42 - 32}{2}$$

$$Q.D = \frac{13}{2}$$

$$Q.D = \frac{10}{2}$$

$$Q.D = 6.5$$

$$ANS \quad Q.D = 5 \quad ANS$$

To find mean deviation (M.D)

Rain Fall	X_i	f_i	$ x_i - \bar{x} $	$f_i x_i - \bar{x} $
20-24	22	1	14.8	14.8
25-29	27	3	9.8	29.4
30-34	32	5	4.8	24
35-39	37	8	0.2	1.6
40-44	42	5	5.2	26
45-49	47	2	10.2	20.4
50-54	52	0	15.2	0.0
55-59	57	1	20.2	20.2
Σ	--	25	--	$\Sigma f_i x_i - \bar{x} = 136.4$

$$M.D = \frac{\Sigma f_i |x_i - \bar{x}|}{n}$$

$$M.D = \frac{136.4}{25}$$

$$M.D = 5.45 \quad ANS$$

(15)

To find Co-efficient of variation
AS we know that.

$$C.V = \frac{S}{\bar{x}} \times 100$$

$$C.V = \frac{7.41}{36.8} \times 100$$

$$C.V = 20.13\% \quad \text{ANS}$$

To find skewness

$$SK = \frac{\text{Mean} - \text{Mode}}{S.d}$$

$$SK = \frac{36.8 - 37}{7.41}$$

$$SK = \frac{-0.2}{7.41}$$

$$SK = -0.02 \quad \text{ANS}$$

To find Range

$$R = X_m - X_o$$

$$R = 59.5 - 19.5$$

$$R = 40$$

To Find Decile:-

The divided the data to 10 equal parts.

$$D = \frac{1(N+1)^{\text{th}}}{10}$$

$$D_1 = \frac{1(25+1)}{10}$$

$$D = \frac{25+1}{10} = D = \frac{26}{10}$$

$$D = 2.6 \text{ ANS.}$$

$$D_2 = 2 \frac{N+1}{10}$$

$$D_2 = 2 \frac{25+1}{10}$$

$$D_2 = \frac{2 \times 26}{10}$$

$$D_2 = \frac{26}{5}$$

$$D_2 = 5.2 \text{ ANS.}$$

$$D_3 = \frac{3(N+1)^{\text{th}}}{10}$$

$$D_3 = \frac{3(25+1)}{10}$$

$$D_3 = \frac{3 \times 26}{10} = D_3 = \frac{78}{10}$$

$$D_3 = 7.8 \text{ ANS.}$$

(17)

To Find Percentile:

The divided the data to 100 equal Parts.

$$\text{formula: } P_i = i \left(\frac{N+1}{100} \right)$$

$$P_1 = \frac{25+1}{100}$$

$$P_1 = \frac{26}{100}$$

$$P_1 = 0.26 \quad \text{ANS.}$$

$$P_{10} = \frac{10 \times N+1}{100}$$

$$P_{10} = \frac{10 \times (25+1)}{100}$$

$$P_{10} = \frac{10 \times 26}{100}$$

$$P_{10} = \frac{260}{100}$$

$$P_{10} = 2.6 \quad \text{ANS.}$$

$$P_{20} = \frac{20 \times N+1}{100} = P_{20} = \frac{20 \times 25+1}{100}$$

$$P_{20} = \frac{20 \times 26}{100} = P_{20} = \frac{520}{100} = P_{20} = 5.2$$

PART B:

Now the ungrouped data is

22, 27, 27, 27, 32, 32, 32, 32, 32, 37, 37, 37
37, 37, 37, 37, 37, 42, 42, 42, 42, 42,
47, 47, 57,

x	Log x	1/x	x-36.8	x ²
22	1.3424	0.0454	14.8	484
27	1.4313	0.0370	9.8	729
27	---	---	---	---
27	---	---	---	---
32	1.5051	0.03125	4.8	1024
32	---	---	---	---
32	---	---	---	---
32	---	---	---	---
32	---	---	---	---
37	1.5682	0.0270	0.2	1369
37	---	---	---	---
37	---	---	---	---
37	---	---	---	---
37	---	---	---	---
37	---	---	---	---
37	---	---	---	---
37	---	---	---	---
42	1.6232	0.0238	5.2	1764
42	---	---	---	---
42	---	---	---	---
42	---	---	---	---
42	---	---	---	---
47	1.6720	0.0212	10.2	2209
47	---	---	---	---
57	1.7558	0.0175	20.2	3249
$\Sigma 920$	1.6232 38.9241	0.7081	136.4	35230

To Find ARITHMETIC MEAN

$$\Rightarrow A.M = \frac{\sum x}{n}$$

$$A.M = \frac{920}{25}$$

$$A.M = \boxed{36.8 \text{ inches}} \text{ ANS.}$$

GEOMETRIC MEAN:

$$G.M = \text{Antilog} \left[\frac{\sum \log x}{n} \right]$$

$$G.M = \text{Antilog} \left[\frac{38.9241}{25} \right]$$

$$\text{Antilog} (1.5569)$$

$$G.M = \boxed{36.05 \text{ inches}} \text{ ANS.}$$

HARMONIC MEAN:

$$H.M = \frac{n}{\sum \frac{1}{x}}$$

$$H.M = \frac{25}{0.7081}$$

$$H.M = \boxed{35.30 \text{ inches}} \text{ ANS.}$$

T-MEDIAN: ~~(20)~~ (14) (20)

$$\text{Median} = \frac{(n+1)}{2}$$

$$n = 25$$

$$= \frac{25+1}{2} = \frac{26}{2}$$

$$\text{Median} = 13$$

$$= 13 + 25 = \boxed{37} \text{ ANS.}$$

MODE:

Most repeated value 37

$$\text{Mode} = 37$$

Quartiles:

$$Q_1 = \frac{(n+1)}{4}$$

$$Q_1 = \frac{25+1}{4} = Q_1 = \frac{25+1}{4} = Q_1 = \frac{26}{4}$$

$$Q_1 = 6.5$$

$$Q_1 = 6^{\text{th}} + 0.5 (\text{term} - 6^{\text{th}})$$

$$= 32 + 0.5 (32 - 32) = 32 + 0$$

$$\boxed{Q_1 = 32 \text{ inches}}$$

(21)

Q₂ =

Median = 37 inches
because Q₂ - also called
Median.

Q₃ =

$$3 \left(\frac{n+1}{4} \right)^{\text{term}}$$

$$Q_3 = 3 \left(\frac{26}{4} \right)^{\text{term}}$$

$$Q_3 = \frac{78}{4} = 19.5 \text{ term}$$

$$= 19.5^{\text{term}} + 0.5 (20^{\text{term}} - 19^{\text{term}})$$

$$= 42 + 0.5 (42 - 42)$$

$$= 42 + 0$$

$$Q_3 = \boxed{42 \text{ inches}} \text{ inches}$$

Deciles

$$D_1 = \frac{1(n+1)}{10}$$

$$D = \frac{1(25+1)}{10}$$

$$D_1 = \frac{25+1}{10} = D_1 = \frac{26}{10}$$

2nd term + 0.6 (3rd term - 2nd term)

D₁ =

$$D_1 = 27 + 0.6 (27 - 27)$$

$$\boxed{D_1 = 27 \text{ inches}} \text{ ANS.}$$

Percentile

Divided the data into
100 Parts

$$P_{10} = 10 \frac{(n+1)^{\text{th}}}{100}$$

$$P_{10} = 10 \frac{(25+1)}{100} = P_{10} = \frac{10 \times 26}{100}$$

$$P_{10} = \frac{10 \times 26}{100}$$

$$P_{10} = \frac{260}{100}$$

$$P_{10} = 2.6 \text{ term}$$

$$P_{10} = 2^{\text{nd}} + 0.6(3^{\text{rd}} - 2^{\text{nd}} \text{ term})$$

$$= 27 + 0.6(27 - 27)$$

$$= 27 + 0$$

$$P_{10} = 27 \text{ inches}$$

$$P_{20}$$

$$P_{30}$$

So on

(23)

Range

$$\text{Range} = \text{Max} - \text{Min}$$

Here maximum = 57

Min = 22

$$\text{Range} = \boxed{135 \text{ inches}} \text{ ANS.}$$

Mean Deviation:-

$$\text{M.D} = \frac{\sum |x - \bar{x}|}{n}$$

$$\text{M.D} = \frac{136.4}{25}$$

$$\text{M.D} = \boxed{5.45 \text{ inches}} \text{ ANS.}$$

Variance

$$\text{Variance} = \frac{\sum x^2}{n} - \left(\frac{\sum x}{n}\right)^2$$

$$\rightarrow \frac{35230}{25} - \left(\frac{920}{25}\right)^2$$

$$= 1409.2 - (36.8)^2$$

$$\boxed{\text{Variance} = 54.96}$$

ANS.

(24)

STANDARD DEVIATION:

$$S.D = \sqrt{\text{variance}}$$

$$S.D = \sqrt{54.96}$$

$$S.D = 7.4135 \text{ inches} \text{ ANS.}$$

Co-efficient of Variation.

$$C.V = \frac{S.D}{\bar{x}} \times 100$$

$$C.V = \frac{7.4135}{36.8} \times 100$$

$$C.V = 20.14\% \text{ ANS.}$$

Skewness.

$$SK = \frac{Q_3 + Q_2 + 2Q_2}{Q_3 - Q_1}$$

$$SK = \frac{42 + 32 - 2(37)}{42 - 32}$$

$$SK = \frac{74 - 74}{10} = SK = 0 \text{ its normal}$$