Quantitative Methods 16MBA14

1

(a) Central tendency is single value or location which is representative of all the items. Around this value all the individual items cluster. 3

In case of extreme observations, when dealing with qualitative characteristics, Median is used.

(b)

C.I	f	LCf
<120	6	6
120-130	25	31
130-140	48	79
140-150	72	151
150-160	116	267 Md class
160-170	60	327
170-180	38	365
180-190	22	387
190-200	3	390

$\frac{N}{2} = \frac{390}{2} = 195$

$Md = l + \frac{\frac{N}{2} - Cf}{f} \times h$

$Md = 150 + \frac{195-151}{116} \times 10$

$= 150 + \frac{440}{116}$

$= 150 + 3.793 = \underline{153.79}$

7

2.

Marks	X Scholarship	Tally Marks	f	fX
70-75	100	IIII	5	500
75-80	200	I	1	200
80-85	300	0	0	0
85-90	400	IIII	4	1600
90-95	500	IIII I	6	3000
95-100	600	IIII	4	2400
			20	7700

10

Total scholarship payable = ₹ 7700

Average " " = $\frac{7700}{20}$ = ₹ 385

3 (a) absolute measure - dependent of unit

Relative " - independent of units

relative measure are used when means are different and the variables are of different units. 3

(b) Regression gives mathematical relationship between two variables. There are two types of regression models

(i) Simple regression :- one dependent variable and one independent variable. 7

$y = a + bx$, $y = ae^{bx}$, ...

y - sales, x - adv. cost.

(ii) multiple regression :- one dependent variable and many independent variables

$y = b_0 + b_1 x_1 + b_2 x_2 - \cdots + b_n x_n$

sales dependents on adv, product quality, price ....

(4)

x	y	x-53 u	y-105 v	u^2	v^2
55	108	2	3	4	9
54	107	1	2	1	4
52	105	-1	0	1	0
53	105	0	0	0	0
56	106	3	1	9	1
58	107	5	2	5	4
52	104	-1	-1	1	1
50	103	-3	-2	9	4
51	104	-2	-1	2	1
49	101	-4	-4	16	16
530	1050	0	0	70	40

10

$\bar{x} = 53$, $\bar{y} = 105$

$\sigma_x^2 = \frac{1}{n}\Sigma(x-\bar{x})^2 = \frac{1}{n}\Sigma u^2 = 7$ $\quad \sigma_x = \sqrt{7}$

$= 2.646$

$\sigma_y^2 = \frac{1}{n}\Sigma v^2 = \frac{40}{10} = 4$ $\quad \sigma_y = 2$

$CV_x = \frac{2.646}{53} \times 100 = 4.99$, $\quad CV_y = \frac{100 \times 2}{105} = 1.9$

$\therefore$ Share 'B' is more stable.

(5) (a)

Correlation	Regression
1) Finds relation b/w two variables.	gives mathematical relation & can be used to estimate
2) r_{xy} is symmetric i.e $r_{xy} = b_{yx}$	regression coefficients are not symmetric $b_{xy} \neq b_{yx}$
3) $-1 \leq r_{xy} \leq 1$	regression coefficient can take any value. if $b_{xy} > 1$, $b_{yx} < 1$ ...
4) measures only linear relation	can be used for any type ...

3

5 (b)

x	y	R_x	R_y	$d = R_x - R_y$	d^2
39	47	8	10	−2	4
65	53	6	8	−2	4
62	58	7	7	0	0
90	86	2	2	0	0
82	62	3	5	−2	4
75	68	5	4	1	1
25	60	10	6	4	16
98	91	1	1	0	0
36	51	9	9	0	0
78	84	4	3	1	1
					30

$$\rho = 1 - \frac{6\Sigma d^2}{n(n^2-1)} = 1 - \frac{6 \times 30}{10 \times 99} = 1 - \frac{2}{11} = \frac{9}{11} = 0.82$$

There high degree of correlation b/w adv & sales.

(7)

(6)

part B.

x	y	$U = x - 8$	$V = y - 8$	U^2	V^2	UV
11	10	3	2	9	4	6
7	8	−1	0	1	0	0
9	6	1	−2	1	4	−2
5	5	−3	−3	9	9	9
8	9	0	1	0	1	0
6	7	−2	−1	4	1	2
10	11	2	3	4	9	6
56	56	0	0	28	28	21

$x = 13$, $y = ?$

$$\bar{x} = \frac{56}{7} = 8 \qquad \bar{y} = \frac{56}{7} = 8$$

$$r_{xy} = \frac{Cov(x,y)}{\sigma_x \sigma_y} = r_{uv} = \frac{Cov(u,v)}{\sigma_u \sigma_y}$$

$$Cov(u,v) = \frac{1}{n}\Sigma uv - \bar{u}\bar{v} = \frac{21}{7} = 3$$

(i) $r_{xy} = \frac{3}{\sqrt{4}\sqrt{4}} = \frac{3}{4} = 0.75$

(ii) $b_{yx} = b_{vu} = \frac{Cov(u,v)}{\sigma_u^2} = \frac{3}{4} = 0.75$

$b_{xy} = b_{uv} = \frac{Cov(u,v)}{\sigma_v^2} = \frac{3}{4} = 0.75$

$y - 8 = 0.75(x - 8)$

$y = 0.75x + 8 - 6$

$= 0.75x + 2$

$\therefore y = 0.75(13) + 2$

$= 11.75$

$\therefore$ Expected sales = 11.75 thousands.