

Internal Assessment Test - I

Sub:	QUANTITATIVE METHODS						Code:	16MBA14	
Date:		Duration:	90 mins	Max Marks:	40	Sem:	I	Branch:	MBA

Marks	OBE	
	CO	RB T

Part A - Answer Any Two Full Questions (16*02=32 Marks)

- 1 (a) What is dispersion? Write any 2 characteristics of dispersion [02] CO1 L1
- (b) Calculate the median from the following distribution using step deviation? [06] CO2 L2
- Marks: 4-7 8-11 12-15 16-19 20-23 24-27
F : 12 23 40 65 17 3
- (c) From the data given below state which of the two series is more variable? [08] CO2 L5
Infer based on Co-efficient of variation.

Variable	10-20	20-30	30-40	40-50	50-60	60-70
Frequency A	10	12	32	40	22	18
Frequency B	18	22	40	32	18	10

- 2 (a) Define Mode? Give any 2 examples of mode. [02] CO2 L1
- (b) If the average wages paid to 25 workers is 79.60, find the missing frequencies. [06] CO2 L2

Wages	50	60	70	80	90	100	110
Workers	1	3	-	-	6	2	1

- (c) From the following data find out the simple and weighted average of the pass percentages and comment upon the performance of the students of the three universities [08] CO2 L3

Courses	Bangalore University		Delhi University		Chennai University	
	Pass %	No of students	Pass %	No of students	Pass %	No of students
BA	60	3	50	4	80	7
B.Sc	70	4	60	5	30	6
B.COM	65	5	70	2	60	5
M.A.	40	2	80	3	50	3
M.Sc	55	3	40	4	70	2
M,Com	40	1	30	5	40	1

3 (a) What is Mean? Write the formula for calculating mean

[02] CO2 L1

(b) An incomplete frequency distribution is given below.
Find the missing frequencies if Median – 46 Total frequency – 230

[06] CO2 L3

C.I	10-20	20-30	30-40	40-50	50-60	60-70	70-80
f	12	30	-	65	-	25	19

(c) A Manager is actively considering the following two mutually exclusive projects for adoption.

[08] CO2 L5

Year	Project M Cash profit (Rs in lakhs)	Project N Cash profit (Rs in lakhs)
1	10	5
2	5	25
3	20	45
4	40	30
5	60	30

Which is the riskier project? Which product should be considered for adoption?

Part B - Compulsory (01*08=08 marks)

4

(a) i) Find the value of mean, median, mode, standard deviation and co-efficient of variation from the below data.

[08] CO2 L4

Class Interval	No of Students
43-47	2
48-52	5
53-57	12
58-62	17
63-67	14
68-72	6
73-77	3
78-82	1

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
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CO1:								
CO2:	To introduce statistics as a tool for business decision making		3a, 1a	3c		3b		1 c
CO3:								
CO4:								
CO5:								
CO6:								

Cognitive level	KEYWORDS
L1	List, define, tell, describe, identify, show, label, collect, examine, tabulate, quote, name, who, when, where, etc.
L2	summarize, describe, interpret, contrast, predict, associate, distinguish, estimate, differentiate, discuss, extend
L3	Apply, demonstrate, calculate, complete, illustrate, show, solve, examine, modify, relate, change, classify, experiment, discover.
L4	Analyze, separate, order, explain, connect, classify, arrange, divide, compare, select, explain, infer.
L5	Assess, decide, rank, grade, test, measure, recommend, convince, select, judge, explain, discriminate, support, conclude, compare, summarize.

Key Answers

1) a) The word dispersion literally means deviation or spread over of certain values from their central value or the difference between any 2 extreme values of the series.

(i) it deals with a statistical series

(ii) it indicates the degree or extent to which the various items of a series deviate from its central value.

2) (a) Mode is an average of position. It is defined as the value around which the items are most heavily concentrated.

ex:- The average height of Indian male is 5ft 6 inches
Average shoe sold in a shoe shop is of number 7.

3) (a) An arithmetic average may be defined as the quotient obtained by dividing the total of the values of a variable by total of their observations or items.

$$\bar{X} = \frac{\sum X}{N}$$

1) b)	C I	f	Modified C I	C.f
	4-7	12	3.5 - 7.5	12
	8-11	23	7.5 - 11.5	35
	12-15	40	11.5 - 15.5	75
	16-19	32 65	15.5 - 19.5	140
	20-23	18 17	19.5 - 23.5	157
	24-27	10 3	23.5 - 27.5	160

$$\sum f = 160$$

Median is $\frac{n}{2}$ th term $\frac{160}{2} = 80$

$$\begin{aligned} \text{Mean} = \bar{X} = Md &= l + \frac{N/2 - Cf}{f} \times h \\ &= 15.5 + \frac{80 - 75}{65} \times 7 \\ &= 15.8 \end{aligned}$$

1) c) Variable

C.I	f(A)	x	d = $\frac{A-A}{h}$	fd	fd ²	f(B)	fd	fd ²
10-20	10	15	-2	-20	40	18	-36	72
20-30	12	25	-1	-12	12	22	-22	22
30-40	32	35	0	0	0	40	0	0
40-50	40	45	1	40	40	32	32	32
50-60	22	55	2	44	88	18	36	72
60-70	18	65	3	54	162	10	30	90
	<u>140</u>			<u>100</u>	<u>348</u>	<u>140</u>	<u>40</u>	<u>288</u>

27(b)

$$\bar{X}_A = A + h\bar{d}$$

$$\bar{d} = \frac{\sum fd}{\sum f} = \frac{100}{140}$$

$$= 35 + 10(0.71)$$

$$= 42.14$$

$$= 0.71$$

$$\bar{X}_B = A + h\bar{d}$$

$$\bar{d} = \frac{40}{140}$$

$$= 35 + 10(0.285)$$

$$= 37.85$$

$$= 0.285$$

Series B is more variable as its C.V is higher

$$\sigma_A = \sqrt{\frac{1}{n} \sum fd^2 - (\bar{d})^2} \times h$$

$$= \sqrt{\frac{348}{140} - (0.71)^2} \times 10$$

$$= 14$$

$$\sigma_B = \sqrt{\frac{288}{140} - (0.28)^2} \times 10$$

$$= 14$$

$$C.V_A = \frac{\sigma}{\bar{X}} \times 100 = \frac{14}{42.14} \times 100 = 33.35\%$$

$$C.V_B = \frac{14}{37.85} \times 100 = 37.12\%$$

2) (b)

wages (x)	No of workers (f)	fx
50	1	50
60	3	180
70	A	70A
80	B (12-A)	960 - 8A
90	6	540
100	2	200
110	1	110

$$\text{Total } f = 25$$

$$\sum f = 1 + 3 + A + B + 6 + 2 + 1$$

$$25 = A + B + 13$$

$$A + B = 12$$

$$B = 12 - A$$

$$\sum fx = 2040 - 10A$$

$$\bar{x} = \frac{\sum fx}{N} = \frac{2040 - 10A}{25}$$

$$79.60 = \frac{2040 - 10A}{25}$$

$$1990 = 2040 - 10A$$

$$10A = 50$$

$$A = 5$$

$$B = 12 - 5$$

$$B = 7$$

$$A = 5, B = 7$$

(2) (c) Courses	Bangalore University			D.U			C.U		
	Pass % (x)	w	wx	pass %	w	wx	pass %	w	wx
B.A	60	3	180	50	4	200	80	7	560
B.Sc.	70	4	280	60	5	300	30	6	180
B.Com	65	5	325	70	2	140	60	5	300
M.A	40	2	80	80	3	240	50	3	150
M.S.C	55	3	165	40	4	160	70	2	140
M.Com	40	1	40	30	5	150	40	1	40
	<u>330</u>	<u>18</u>	<u>1070</u>	<u>330</u>	<u>23</u>	<u>1190</u>	<u>330</u>	<u>24</u>	<u>1370</u>

Simple A.M

$$\bar{X} = \frac{\sum X}{N} \Rightarrow \bar{X}_{BU} = \frac{330}{6} = 55$$

$$\bar{X}_{DU} = \frac{330}{6} = 55$$

$$\bar{X}_{CU} = \frac{330}{6} = 55$$

Thus, in all the three Universities the simple avg % of pass comes to be 55%. Thus the performance of students are all the same.

using weights

$$X_w = \frac{\sum WX}{\sum W}$$

$$\bar{X}_{BU} = \frac{1070}{18} = 59.44 = 60 \text{ approx}$$

$$\bar{X}_{DU} = \frac{1190}{23} = 51.73 = 52 \text{ approx}$$

$$\bar{X}_{CU} = \frac{1370}{24} = 57.08 = 57 \text{ approx}$$

For the above results of the weighted averages it is inferred that the students of B.U have performed better than the other two.

It is to be noted that the conclusion derived from simple averages will be wrong & the conclusion derived from the weighted averages will give the right information

3) b)

C.I	f	C.f	
10-20	12	12	
20-30	30	42	$12+30+x+65+y+25+19$
30-40	$-(x)$	$42+x$	≈ 230
40-50	65	$107+x$	$x+y=79$
50-60	$-(y)$	$107+x+y$	
60-70	25	$132+x+y$	
70-80	19	$151+x+y$	
	<u>230</u>		

gives Median = 46

Total frequency = 230

$$Md = l + \frac{\frac{n}{2} - cf}{f} \times h$$

$$46 = 40 + \frac{230 - 42 + x}{65} \times 10$$

$$6 = 115 - \frac{42 + x}{65} \times 10$$

$$\frac{65 \times 6}{10} = 73 - x$$

$$39 = 73 - x$$

$$x = 34$$

$$y = 45$$

3) (c)

To compute C.O.V for project X

X	$d = X - \bar{X}$	d^2
10	-17	289
5	-22	484
20	-7	49
40	13	169
60	33	1089
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135	0	2080

$$\bar{X} = \frac{\sum X}{N} = \frac{135}{5} = 27$$

$$S.D \text{ of } X = \sqrt{\frac{\sum d^2}{n} - \left(\frac{\sum d}{n}\right)^2}$$

$$= \sqrt{\frac{2080}{5} - \left(\frac{0}{5}\right)^2} = \sqrt{416} = 20.4$$

$$C.V \text{ for } X = \frac{S.D}{\bar{X}} \times 100 = \frac{20.4}{27} \times 100 = 75.54\%$$

To compute C.O.V for project Y

Y	$d = Y - \bar{Y}$	d^2
5	-22	484
25	-2	4
45	18	324
30	3	9
30	3	9
<hr/>	<hr/>	<hr/>
135	0	830

$$\bar{X} = \frac{\sum X}{N} = \frac{135}{5} = 27$$

$$S.D \text{ for } Y = \sqrt{\frac{830}{5} - \left(\frac{0}{5}\right)^2} = 12.88$$

$$C.V \text{ for } Y = \frac{12.88}{27} \times 100 = 47.7\%$$

Since C.V for X is more than C.V for Y - X is Risky project Y should be adopted

(4) a)

CI

43-47

48-52

53-57

58-62

63-67

68-72

73-77

78-82

(4) a)	(f)	(m) midpoint	(modified) C.I	c.f	fm	fd	$d = \frac{x-A}{h}$	d^2	fd ²
					90	-6	-3	9	18
C.I	2	45	42.5-47.5	7	250	-10	-2	4	20
43-47	5	50	47.5-52.5	19	660	-12	-1	1	12
48-52	12	55	52.5-57.5	36	1020	0	0	0	0
53-57	17	60	57.5-62.5	50	910	14	1	1	14
58-62	14	65	62.5-67.5	56	420	12	2	4	24
63-67	6	70	67.5-72.5	59	225	9	3	9	27
68-72	3	75	72.5-77.5	60	80	3	4	16	16
73-77	1	80	77.5-82.5						
78-82					<u>3655</u>	<u>20</u>		<u>44</u>	<u>131</u>
	<u>60</u>								

$$\bar{x} = \frac{\sum fm}{N} = \frac{3655}{60} = 60.91$$

$$\text{Median} = \frac{N}{2} = \frac{60}{2} = 30^{\text{th}} \text{ item}$$

lies in C.I 57.5 - 62.5

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

$$= 57.5 + \frac{60 - 19}{17} \times 5$$

$$= 57.5 + 3.23$$

$$= 60.73$$

$$Mo = l + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h$$

$$= 57.5 + \frac{17 - 12}{2(17) - 12 - 14} \times 5$$

$$= 60.625$$

$$S.D = \sqrt{\frac{1}{n} \sum fd^2 - (\bar{d})^2} \times h$$

$$= \sqrt{\frac{131}{60} - (0.33)^2} \times 5$$

$$= \sqrt{2.183 - 0.108} \times 5$$

$$= 1.44 \times 5$$

$$= 7.20$$

$$\bar{d} = \frac{\sum fd}{\sum f}$$

$$= \frac{20}{60}$$

$$= 0.33$$

$$\bar{x} = A + h\bar{d}$$

$$= 65 + 5(0.33)$$

$$= 66.65$$

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

$$= \frac{7.20}{66.65} \times 100$$

$$= 10.80$$