

Enrollment No.....



Faculty of Management  
End Sem (Odd) Examination Dec-2017  
MS3CO02 Business Mathematics and Statistics  
Programme: BBA Branch/Specialisation: Management

Duration: 3 Hrs.

Maximum Marks: 60

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

- |     |       |   |   |
|-----|-------|---|---|
| Q.1 | i.    | The value of ${}^{10}c_3 =$   | 1 |
|     |       | (a) 110      (b) 30      (c) 120      (d) 27  |   |
|     | ii.   | The 25 <sup>th</sup> term of the A.P. 9, 6, 3, 0, -3 is                                 | 1 |
|     |       | (a) 72      (b) 80      (c) -63      (d) 75   |   |
|     | iii.  | Subset of a finite set is   | 1 |
|     |       | (a) Finite set    (b) Infinite set    (c) Empty set    (d) None of these                |   |
|     | iv.   | The inverse of matrix exist if :  | 1 |
|     |       | (a) $ A =0$ (b) $ A =1$ (c) $ A \neq 0$ (d) None of these                               |   |
|     | v.    | In an exclusive type distribution , the limits excluded are                             | 1 |
|     |       | (a) Upper limit                          (b) Lower limit                                |   |
|     |       | (c) Both (a) and (b)                          (d) None of these                         |   |
|     | vi.   | A study based on complete enumeration is known as                                       | 1 |
|     |       | (a) Sample survey                                  (b) Census survey                    |   |
|     |       | (c) Pilot survey    (d) None of these             |   |
|     | vii.  | Which one of the given measures of dispersion is considered best :                      | 1 |
|     |       | (a) Range    (b) Standard deviation       |   |
|     |       | (c) Mean deviation    (d) None of these           |   |
|     | viii. | If modal value is not clear in a distribution, it can be ascertained by the method of : | 1 |
|     |       | (a) Guessing    (b) Trial and error       |   |
|     |       | (c) Grouping    (d) None of these         |   |
|     | ix.   | The range of simple correlation coefficient lies between                                | 1 |
|     |       | (a) 0 to $\infty$ (b) $-\infty$ to $\infty$ (c) 0 to 1    (d) -1 to 1                   |   |

[2]

- x. The regression line cut each other at the point of  
 (a) Average of X and Y      (b) Average of X  
 (c) Average of Y      (d) None of these

1

- Q.2 i. If  ${}^{11}p_r = 7920$ , then find the value of r.  
 ii. Differentiate between Ratio and Proportion. Two figures are in the ratio of 6:7. If 5 are subtracted from each of the figures, the new ratio will be 5:6. Find the figures.

3

7

- OR iii. From 6 gentlemen and 4 ladies a committee of 5 is to be found. In how many ways can this be done if  
 (a) There is no restriction about its formation?  
 (b) The committee is to include at least one lady?

7

- Q.3 i. Define union, intersection and complement of sets with examples?  
 ii. Solve by Cramer's rule the following system of equations:

$$\begin{aligned}x + 6y - z &= 10 \\2x + 3y + 3z &= 17 \\3x - 3y - 2z &= -9\end{aligned}$$

3

7

- OR iii. In a survey of 100 persons it was found that 28 read magazine A, 30 read magazine B, 42 read magazine C, 8 read magazine A and B, 10 read magazine A and C, 5 read magazine B and C and 3 read all the three magazines. Find  
 (a) How many read none of three magazines?  
 (b) How many read magazine C only?

7

- Q.4 i. "Statistics does not study individual". Comment by giving suitable example?  
 ii. Define sub-divided bar diagram. Show the given data through a sub-divided bar diagram:

3

7

	Models		
Quarters	A	B	C
1	200	100	300
2	150	150	300
3	125	100	225
4	200	225	500

[3]

- OR iii. Draw histogram and frequency polygon for the following data: 7

Class	10-20	20-30	30-40	40-60	60-80	80-110
Frequency	7	13	20	30	20	13

- Q.5 i. Write difference between absolute and relative measure of dispersion.  
 ii. An analysis of monthly wages paid to the workers of two firms A and B belonging to the same industry gives the following results : 7

	Firm A	Firm B
Number of workers	500	600
Average daily wages	180	175
Variance distribution of wages	81	100

- (a) Which firm, A or B , has a larger wage bill ?  
 (b) In which firm, A or B, is there greater variability in individual wages?

- OR iii. Compute the median for the following data: 7

Marks more than	0	5	10	15	20	25	30	35
Frequency	75	73	68	61	48	27	11	3

- Q.6 i. State the properties of regression coefficients.  
 ii. Define the term correlation and write types of correlation.  
 Calculate correlation between X and Y from the following data:

X :	22	30	25	20	15	8
Y :	10	12	15	20	23	28

- OR iii. From the following data obtain the two regression equations, also find regression coefficient. 7

X :	6	2	10	4	8
Y :	9	11	5	8	7

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Faculty of Management Studies

END SEM(ODD) EXAMINATION DEC-2017

COURSE CODE : MS3C002

COURSE NAME: BUSINESS MATHEMATICS and  
STATISTICS

Programme: BBA

MAX. MARK : 60

ANSWER - 1

(i)	(c) 120	+1
(ii)	(c) -63	+1
iii)	(a) finite set	+1
iv)	(c) $ A  \neq 0$	+1
v)	(a) upper limit	+1
vi)	(b) census survey	+1
vii)	(b) standard deviation	+1
viii)	(c) grouping	+1
ix)	(d) -1 to 1	+1
x)	(a) average of x and y.	+1

ANSWER - 2

(i) Given  ${}^{11}P_8 = 7920$

$$\frac{11!}{(11-8)!} = 7920$$

$$\frac{11!}{7920} = (11-8)!$$

$$\frac{11 \times 10 \times 9 \times 8 \times 7!}{7920} = (11-8)!$$

$$7! = (11-8)!$$

$$7 = 11-8$$

$$11-7 = 4$$

(2)

+2

(ii) Difference between Ratio and proportion (At least 2)

Let figures be  $6x$ ,  $7x$  respectively, then

According to condition

$$\frac{6x-5}{7x-5} = \frac{5}{6}$$

+2

$$(6x-5) \times 6 = (7x-5) \times 5$$

$$36x - 30 = 35x - 25$$

$$36x - 35x = -25 + 30$$

$$\therefore x = 5$$

+1

$$\text{I figure } 6x = 6 \times 5 = 30 \quad \text{Ans}$$

+1

$$\text{II figure } 7x = 7 \times 5 = 35 \quad \text{Ans}$$

+1

8

2

jii)

$$\text{Total no. of members} = 6+4=10$$

+1

a) Required no. of ways by selecting 5 members out of 10 is

$$= {}^{10}C_5$$

$$= 252$$

+2

b) A Committee of 5 members including at least one lady can be formed by choosing

$$1 \text{ lady } \& 4 \text{ gentlemen} = {}^4C_4 \times {}^6C_4 = 60$$

+1

$$2 \text{ lady } \& 3 \text{ gentlemen} = {}^4C_2 \times {}^6C_3 = 120$$

+1

$$3 \text{ lady } \& 2 \text{ gentlemen} = {}^4C_3 \times {}^6C_2 = 60$$

$$4 \text{ lady } \& 1 \text{ gentleman} = {}^4C_4 \times {}^6C_1 = 6$$

$$\therefore \text{Req. no. of ways} = 60 + 120 + 60 + 6 = 246.$$

+2

(3)

- Q.3 (i) Union :- Definition + Example  $(\frac{1}{2} + \frac{1}{2} = \underline{\underline{1 \text{ mark}}})$   
 Intersection:- Definition + Example  $(\frac{1}{2} + \frac{1}{2} = \underline{\underline{1 \text{ mark}}})$   
 Complement :- Definition + Example  $(\frac{1}{2} + \frac{1}{2} = \underline{\underline{1 \text{ mark}}})$

Q.3 (ii) Cramer's Rule Solution

$$\begin{aligned}x + 6y - z &= 10 \\2x + 3y + 3z &= 17 \\3x - 3y - 2z &= -9\end{aligned}$$

Here  $D = \begin{vmatrix} 1 & 6 & -1 \\ 2 & 3 & 3 \\ 3 & -3 & -2 \end{vmatrix}$

+1

$$D = 1(-6+9) - 6(-4-9) - 1(-6-9) = 3 + 78 + 15 = 96$$

+1

$$D_x = \begin{vmatrix} 10 & 6 & -1 \\ 17 & 3 & 3 \\ -9 & -3 & -2 \end{vmatrix}$$

$$D_x = 10(-6+9) - 6(-34+27) - 1(-51+27) = 30 + 42 + 24 = 96$$

+1

$$D_y = \begin{vmatrix} 1 & 10 & -1 \\ 2 & 17 & 3 \\ 3 & -9 & -2 \end{vmatrix}$$

$$D_y = 1(-34+27) - 10(-4-9) - 1(-18-51) = -7 + 130 + 69 = 192$$

+1

$$D_z = \begin{vmatrix} 1 & 6 & 10 \\ 2 & 3 & 17 \\ 3 & -3 & -9 \end{vmatrix}$$

$$D_z = 1(-27+51) - 6(-18-51) + 10(-6-9) = 24 + 414 - 150 = 288$$

+1

$$x = \frac{D_x}{D} = \frac{96}{96} = 1, \quad y = \frac{D_y}{D} = \frac{192}{96} = 2 \quad \text{and} \quad z = \frac{D_z}{D} = \frac{288}{96} = 3$$

Ans

(4)

- 8 (iii) Let  $A, B, C$  denote the set of persons who read magazine  $A, B$  and  $C$  respectively. Then

$$\text{Total Persons} = 100, n(A) = 28, n(B) = 30, n(C) = 42$$

$$n(A \cap B) = 8, n(B \cap C) = 5, n(A \cap C) = 10 \text{ and}$$

$$n(A \cap B \cap C) = 3$$

+1

(i) W.K.T.

$$n(A \cup B \cup C) = n(A) + n(B) + n(C) - n(A \cap B) - n(B \cap C) - n(C \cap A) + n(A \cap B \cap C)$$

+2

$$n(A \cup B \cup C) = 28 + 30 + 42 - 8 - 5 - 10 + 3 = 80$$

$\therefore$  No. of persons who read none of three magazines

$$= \text{Total no. of persons} - n(A \cup B \cup C) = 100 - 80 = 20$$

Ans

+1

- (ii) Number of persons who read magazine  $C$  only  
 $= n((C \cap B') \cap A')$

$$n((C \cap B') \cap A') = n(C) - n(B \cap C) - n(A \cap C) + n(A \cap B \cap C)$$

+1

$$= 42 - 5 - 10 + 3 = 30$$

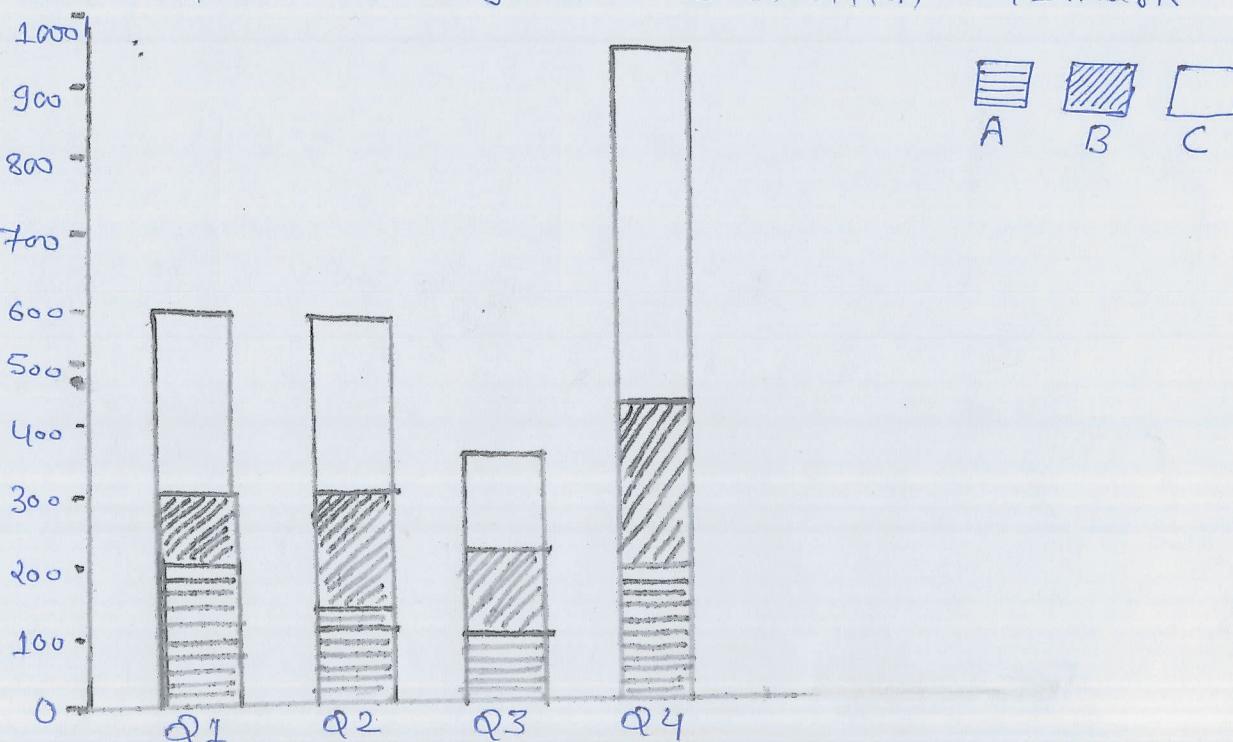
Ans

+2

4 (i) For proper comment and example give +3 marks

+3

(ii) Sub-divided bar diagram — Definition +1 mark



+4

(iii)

Class : 10-20 20-30 30-40 40-60 60-80 80-110

Frequency : 7

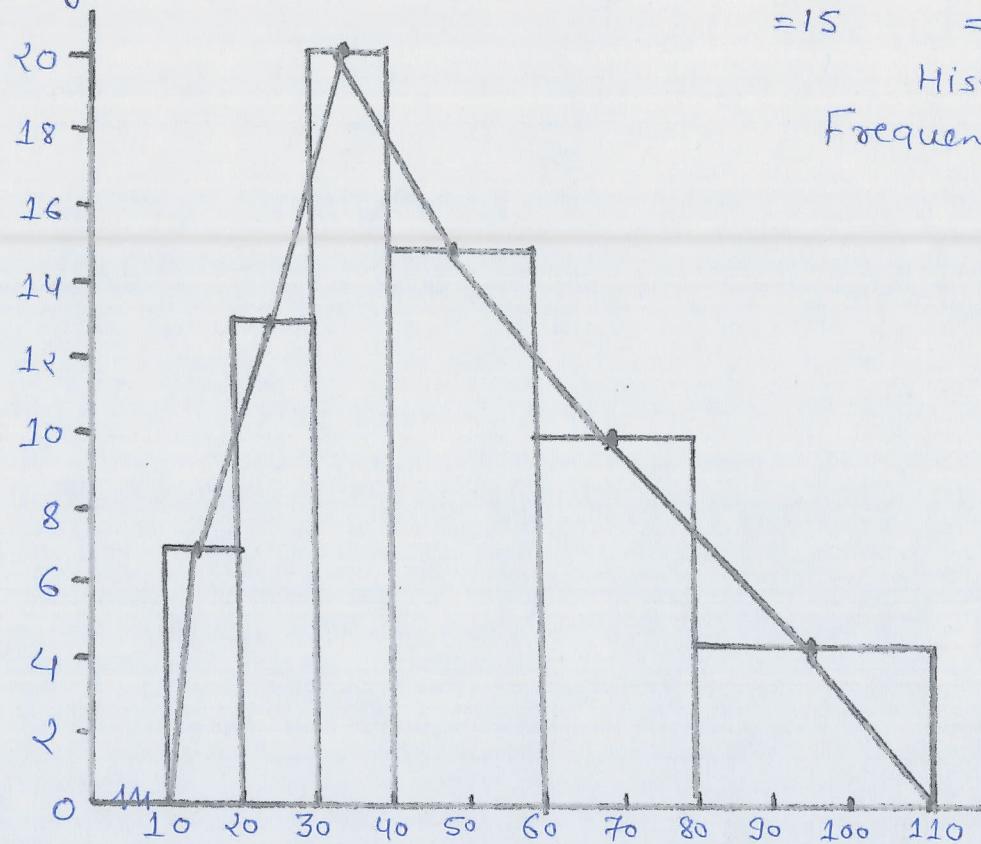
13

20

$$\frac{30}{2} = 15$$

$$\frac{20}{2} = 10$$

$$\frac{13}{3} = 4.3$$



Histogram  
Frequency Polygon

+3.5  
+3.5

NOTE:- Student can draw Histogram and Frequency Polygon in one graph or in different graph.

5

i)

Difference between Absolute and Relative measure of dispersion (one mark for each difference  
At least 3 differences)

+3

ii)

(a) For firm A

$$\bar{x}_A = \frac{\text{Total wage Paid}}{\text{No. of workers}}$$

+1

$$180 = \frac{\text{Total wage Paid}}{500}$$

$$\text{Total wage Paid for firm A} = 180 \times 500 = 90,000/-$$

+1

For firm B

$$\bar{x}_B = \frac{\text{Total wage Paid}}{\text{No. of workers}}$$

$$175 = \frac{\text{Total wage Paid}}{600}$$

$$\text{Total wage Paid for firm B} = 175 \times 600 = 1,05,000/-$$

+1

firm B has larger wage bill.

+1

(6)

- (b) For greater variability in individual wages we have to find Coefficient of Variation (C.V.)

For firm A

$$C.V._A = \frac{\sigma_A}{\bar{X}_A} \times 100 = \frac{9}{180} \times 100 \quad [\sigma_A^2 = 81 \\ \therefore \sigma_A = 9]$$

$$\boxed{C.V._A = 5}$$

+1

For firm B

$$C.V._B = \frac{\sigma_B}{\bar{X}_B} \times 100 = \frac{10}{175} \times 100 \quad [\sigma_B^2 = 100 \\ \therefore \sigma_B = 10]$$

$$\boxed{C.V._B = 5.71}$$

+1

$\therefore C.V._B$  is greater than  $C.V._A$ .

$\therefore$  firm B has greater variability in Individual wages.

+1

Q.5

- (iii) first we find class interval and frequency  
we are given cumulative frequency.

class	Frequency	cumulative frequency
0-5	2	2
5-10	5	7
10-15	7	14
15-20	13	27
20-25	21	48
25-30	16	64
30-35	8	72
35-40	3	75

+2

$$N = \sum f = 75$$

Median = measure of  $(\frac{N}{2})^{th}$  term = measure of  $(\frac{75}{2})^{th}$  term

Median = measure of 37.5<sup>th</sup> term

C.f. just greater than 37.5 is 48

+1

corresponding class is 20-25 so median class is 20-25.

W.K.T.

$$\text{Median} = L + \left( \frac{\frac{N}{2} - C.F.}{f_i} \times i \right)$$

(7)

+1

$$\text{Median} = 20 + \left( \frac{37.5 - 27}{21} \times 5 \right)$$

+2

$$= 20 + 2.5$$

$$\text{Median} = 22.5 \quad \underline{\text{Ans}}$$

+1

Q.6 (i) 1 marks for 1 property of Regression  
 (At least 3 property)

(ii) Correlation - Definition - 1 marks

Types of correlation - +1 marks for each types Total (+2)

X	Y	$u = x - Ax$ $u = x - 20$	$v = y - Ay$ $v = y - 20$	UV	$u^2$	$v^2$
22	10	+2	-10	-20	4	100
30	12	10	-8	-80	100	64
25	15	5	-5	-25	25	25
20	20	0	0	0	0	0
15	23	-5	3	-15	25	9
8	28	-12	8	-96	144	64
		$\sum u = 0$	$\sum v = -12$	$\sum uv = -236$	$\sum u^2 = 298$	$\sum v^2 = 262$

+2

Shortcut method

$$\gamma = \frac{n \sum uv - \sum u \sum v}{\sqrt{n \sum u^2} (\sum u)^2 \sqrt{n \sum v^2} (\sum v)^2}$$

+1

$$\gamma = \frac{6 \times (-236) - 0}{\sqrt{6(298)} \times \sqrt{6(262)} \times (-12)^2}$$

$$\gamma = \frac{-1416}{\sqrt{1788} \times \sqrt{1572} \times 144}$$

$$\gamma = \frac{-1416}{\sqrt{1788} \sqrt{1428}}$$

$$\gamma = \frac{-1416}{42.28 \times 37.78} = \frac{-1416}{1597.384} = -0.88$$

+1

Regression line  $Y$  on  $X$  is  $(Y - \bar{Y}) = b_{yx} (X - \bar{X})$  -①

Regression line  $X$  on  $Y$  is  $(X - \bar{X}) = b_{xy} (Y - \bar{Y})$  -②

WKT.

$$b_{xy} = \frac{n \sum uv - \sum u \sum v}{n \sum v^2 - (\sum v)^2}, \quad b_{yx} = \frac{n \sum uv - \sum u \sum v}{n \sum u^2 - (\sum u)^2}$$

$X$	$Y$	$u = X - 6$	$v = Y - 8$	$u^2$	$v^2$	$uv$
6	9	0	1	0	1	0
2	11	-4	3	16	9	-12
10	5	4	-3	16	9	-12
4	8	-2	0	4	0	0
8	7	2	-1	4	1	-2
		$\sum u = 0$	$\sum v = 0$	$\sum u^2 = 40$	$\sum v^2 = 20$	$\sum uv = -26$

$$b_{xy} = -0.65$$

$$b_{yx} = -1.3$$

$\cancel{du}$

(On putting value in above eqn and solving)

from ① and ②

$$(Y - \bar{Y}) = b_{yx} (X - \bar{X})$$

$$Y - 8 = -1.3(X - 6)$$

$$Y = -1.3X + 7.8 + 8$$

$$\boxed{Y = -1.3X + 15.8}$$

$Y$  on  $X$

$\cancel{du}$

+ 2

+ 1.5

$$(X - \bar{X}) = b_{xy} (Y - \bar{Y})$$

$$(X - 6) = -0.65(Y - 8)$$

$$X = -0.65Y + 5.2 + 6$$

$$\boxed{X = -0.65Y + 11.2}$$

$X$  on  $Y$

$\cancel{du}$

+ 1.5