

**FOUNDATION COURSE EXAMINATION**

December 2019

**P-4(FBMS)  
Syllabus 2016**

**Fundamentals of Business Mathematics and Statistics**

Time Allowed: 3 Hours

Full Marks: 100

*The figures in the margin on the right side indicate full marks.*

*Notations and symbols used are as usual.*

**Section-A**

**(Fundamentals of Business Mathematics)**

1. (a) Choose the correct answer:

2×9=18

- (i) Two numbers are in the ratio 5:7. If the sum of the numbers is 192, then the greater number is
- (A) 112
  - (B) 102
  - (C) 116
  - (D) 108
- (ii)  $x$  varies inversely as  $y$  and if  $x = 3$  then  $y = 4$ . If  $y = 6$  then the value of  $x$  is
- (A) 3
  - (B) 1
  - (C) 2
  - (D) 2.5
- (iii) A sum will be double itself at a simple interest p.a. in 8 years. The simple interest is
- (A) 10%
  - (B) 10.5%
  - (C) 12%
  - (D) 12.5%

(iv) If  $(x - 1)$ ,  $(x + 1)$  and  $(2x + 3)$  are in A.P., then the value of  $x$  is

- (A) -2
- (B) 0
- (C) 2
- (D) 4

(v) The 8th term of the series 256, 128, 64, .... is

- (A) 2
- (B) 4
- (C) 8
- (D) 16

(vi) If  $2^{x-1} + 2^{x+1} = 80$ , then the value of  $x$  is

- (A) 8
- (B) 4
- (C) 5
- (D) 10

(vii) If  $a$  and  $b$  be the roots of the equation  $2x^2 + 2x - 3 = 0$  then the value of  $2ab$  is

- (A) -6
- (B) 3
- (C) 1
- (D) -3

(viii) The value of  ${}^3P_3 - {}^3C_3$  is

- (A) 0
- (B) 5
- (C) 6
- (D) 1

(ix) P and Q are two non-empty sets. Given :

$n(P) = 12$ ,  $n(Q) = 6$  and  $n(P \cup Q) = 10$ . The  $n(P \cap Q)$  is

- (A) 8  
(B) 9  
(C) 7  
(D) 0

2. State whether the following statements are *True* or *False*:

1×6=6

- (i) The mean proportional between 2 and 8 is 4.  
(ii) If  $1 + 2 + 3 + \dots + n = 231$  then the value of  $n$  is 21.  
(iii)  $\log_a mn = (\log_a m)(\log_a n)$   
(iv)  $\frac{1}{2}({}^n P_3) = 3({}^n C_3)$   
(v) If  $3^x = \frac{1}{243}$  then the value of  $x$  is 5.  
(vi) The roots of the quadratic equation  $2x^2 - 12x + 18 = 0$  are not equal.

3. Answer *any four* questions:

4×4=16

- (a) There are 25 members of a student council in a college and the ratio of the number of boys to the number of girls is 3 : 2. How many more boys should be added to the council so that the ratio of the number of boys to the number of girls is 9 : 5?  
(b) What sum of money will amount to ₹ 3704.40 in 3 years at 5% compound interest?  
(c) There are 5 questions in group A, 4 in group B and 3 in group C. In how many ways can you select 6 questions taking 3 from group A, 2 from group B and 1 from Group C?  
(d) If  $P = \{2, 3, 4\}$ ,  $Q = \{3, 4, 5\}$ ,  $R = \{1, 2, 5, 6\}$  then find the set  $P \cup (Q \cap R)$ .  
(e) Find the value of  $\frac{1}{\log_2 24} + \frac{1}{\log_3 24} + \frac{1}{\log_4 24}$ .  
(f) Find the value of  $\left(\frac{1}{81}\right)^{-\frac{3}{4}} \times (243)^{-\frac{1}{5}}$ .

Section-B

(Fundamentals of Business Statistics)

4. Choose the correct answer:

2×12=24

(i) The necessary diagram to compare among the various components or between a part and the whole is

- (A) Bar diagram
- (B) Step diagram
- (C) Pie diagram
- (D) Histogram

(ii) A random variable  $X$  can take the values  $-1, 0$  and  $1$  with respective probabilities  $0.2, 0.5$  and  $0.3$ . The expected value of  $X$  is

- (A)  $0.3$
- (B)  $0.5$
- (C)  $0.2$
- (D)  $0.1$

(iii) Consider the following data:

Marks in Mathematics:	0 – 9	10 – 19	20 – 29	30 – 39	40 – 49	Total
No. of students (f):	10	8	12	15	5	50

Frequency density of the second class is

- (A)  $0.8$
- (B)  $8$
- (C)  $1.2$
- (D)  $1$

(iv) The measure of central tendency of a statistical data which takes into account all the data

- (A) Median
- (B) Mean
- (C) Mode
- (D) Range

- (v) The A.M. of the numbers 1, 3, 5, .....,  $(2n - 1)$  is
- (A)  $n^2$
  - (B)  $n + 1$
  - (C)  $n$
  - (D)  $2n$
- (vi) The Harmonic Mean (H.M.) of the series 1, 2, 4 is
- (A) 5
  - (B) 7
  - (C)  $\frac{7}{5}$
  - (D)  $\frac{12}{7}$
- (vii) For a symmetrical distribution first quartile and median are respectively 20 and 24. The third quartile of the distribution is
- (A) 28
  - (B) 26
  - (C) 22
  - (D) 32
- (viii) Standard Deviation (S.D.) for two observations 1 and 4 is
- (A) 1
  - (B) 1.5
  - (C) 2
  - (D) 3
- (ix) If the two regression coefficients are  $b_{yx} = -0.4$  and  $b_{xy} = -0.9$  then the value of correlation coefficient ( $r$ ) is
- (A) 0.6
  - (B) 0.65
  - (C) -0.6
  - (D) -0.65

(x) For a frequency distribution coefficient of skewness = 0.6, mean = 172 and mode = 163. The value of the variance is

- (A) 169
- (B) 215
- (C) 196
- (D) 225

(xi) For two mutually exclusive events  $A$  and  $B$  if  $P(A) = \frac{3}{4}$  and  $P(B) = \frac{1}{6}$ , then  $P(A \text{ or } B)$  is

- (A)  $\frac{11}{12}$
- (B)  $\frac{5}{12}$
- (C)  $\frac{7}{8}$
- (D)  $\frac{1}{8}$

(xii) Two unbiased coins are tossed simultaneously. The probability of getting a head and a tail is

- (A)  $\frac{1}{4}$
- (B)  $\frac{1}{2}$
- (C) 1
- (D)  $\frac{3}{4}$

5. State whether the following statements are *True* and *False*:

1×12=12

- (i) Runs in a cricket match is a continuous variable.
- (ii) Mode for a frequency distribution is calculated from Histogram.
- (iii) The sum of the deviations of  $x_1, x_2, \dots, x_n$  from their A.M.  $\bar{x}$  is zero.
- (iv) Variance is always positive.
- (v) A variable  $x$  takes the values 10 and 20 with equal frequencies then the mean of  $x$  is 30.
- (vi) Median divides the whole statistical data into two equal parts.

- (vii) The standard deviation (S.D.) is independent of change of origin but dependent on scale.
- (viii) 50th percentile is known as 2nd quartile.
- (ix) For a negatively skewed distribution it is found that mean, median and mode are respectively 58, 54 and 48.
- (x) The correlation coefficient between two variables is independent of change of origin as well as change of scale.
- (xi) If two events A and B are mutually exclusive then  $P(A \cap B) = P(A)P(B)$ .
- (xii) The coefficient of range is calculated as

$$\frac{\text{Maximum observation} - \text{Minimum observation}}{\text{Maximum observation} + \text{Minimum observation}} \times 100$$

6. Answer any four questions:

6×4=24

- (a) The following data relating to marks in a test on Mathematics of 50 students in a school were noted below:

48	54	65	58	55	57	65	55	43	60
54	65	56	77	53	63	34	45	58	47
43	42	40	56	64	63	48	75	34	53
58	53	35	33	48	46	54	44	52	62
57	56	59	55	37	42	72	47	48	46

Arrange the data in the form of a frequency distribution table in 5 classes (31 – 40, 41 – 50, 51 – 60, 61 – 70, 71 – 80). Prepare a table for cumulative frequencies (both less than and more than types) and relative frequencies.

- (b) Compute the mean and standard deviation from the following data:

Marks in Mathematics:	0 – 20	20 – 40	40 – 60	60 – 80	80 – 100
No. of students:	5	7	28	9	1

- (c) Show that the standard deviation is greater than mean deviation from mean for the observations 3, 4, 5, 8.

(d) The ranks of 6 students in Mathematics ( $R_1$ ) and Economics ( $R_2$ ) are given as

$R_1$	6	2	5	1	4	3
$R_2$	4	3	2	5	1	6

Calculate the rank correlation coefficient.

(e) You are given the following data:

	$x$	$y$
A.M.	20	25
S.D.	5	4

Correlation coefficient between  $x$  and  $y$  is 0.6. Find the two regression equations.

(f) The probability that A speaks truth is 0.4 and B speaks truth is 0.6. What is the probability that they will contradict each other in stating the same fact?