FOUNDATION COURSE EXAMINATION

June 2017

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. Choose the correct answer: 2×9=18

(i) Three numbers are in the ratio 5 : 7 : 12 and the sum of the first and third numbers is greater than the second by 50. The sum of the three numbers is

(A) 130
(B) 120
(C) 128
(D) 125

(ii) In a certain time ₹ 1400 becomes ₹ 1848 at 8% p.a. simple interest. When ₹ 2100 will become ₹ 2604 at the same time, the rate of interest is

(A) 8·2%
(B) 7%
(C) 10%
(D) 6%

(iii) The year by which a sum of rupees would be 1·21 times of itself at 10% per annum C.I is

(A) 2 years
(B) 3 years
(C) 3·5 years
(D) 2·5 years

(iv) If S be the set of all prime numbers and $M = \{x : 0 \leq x \leq 9\}$, then $M - (S \cap M)$ is

(A) {0,1,4,6,8,9}
(B) {0,4,6,8}
(C) {1,2,4,6,8}
(D) {1,3,5,7}

(v) If $a = b^2 = c^3$, then the value of $\log_a(abc)$ is

(A) $\frac{13}{3}$

(B) $\frac{11}{6}$

(C) $\frac{8}{3}$

(D) 4

(vi) Which term 128 is, of the progression 1,2,4,8,...?

(A) 8th term

(B) 7th term

(C) 9th term

(D) 10th term

(vii) If ${}^5C_r - {}^3C_2 = {}^7C_1$, then r is

(A) 4

(B) 3

(C) 2

(D) both 2 and 3

(viii) $y = A + B$ where A and B vary directly and inversely respectively with x; $x = 1$ when $y = 11$ and $x = 2$ when $y = 13$. The value of y when $x = 3$ is

(A) 15

(B) 17

(C) 19

(D) 20

(ix) The value of $\log_7 7$ is

(A) 0

(B) –1

(C) $\frac{1}{2}$

(D) 1

2. State whether the following statements are True or False: 1×6=6

(i) $1 + 3 + 5 + 7 + \ldots\ldots + (2n - 1) = n^2$.

(ii) If ${}^{16}p_r = 240$, then r is 2.

(iii) If a set 'A' has 6 elements and a set 'B' has 8 elements, then the minimum number of elements in the set $A \cup B$ is 14, when $A \subset B$.

(iv) If $\log_3(\log_3 x) = 0$, then x is 1.

(v) ${}^nC_r + {}^nC_{n-r} = 2({}^nC_r)$.

(vi) The sum of the roots of the quadratic equation $3x^2 + 2x - 5 = 0$ is $-\frac{2}{3}$.

3. Answer any *four* questions: 4×4=16

(a) If the population of a town increases every year by 25 per thousand, in how many years the population will be doubled? (Given: $\log 2 = 0 \cdot 3010$ and $\log 1 \cdot 025 = 0 \cdot 0107$).

(b) If –15, –25 are respectively the 11th and 16 th terms of an A.P., then find the sum of first 20 terms of the A.P.

(c) If one root of the quadratic equation $qx^2 - 2px + 3 = 0$ be twice the other, show that $8p^2 = 27q$.

(d) Find the sum of n terms of the series $2 + 22 + 222 + \ldots\ldots$

(e) If $2^p = 5^q = 10^r$, show that $r = \frac{pq}{p+q}$.

(f) Find the number of ways in which a person can invite one or more of 6 friends in a party.

Section-B

Fundamentals of Business Statistics

4. Choose the correct answer: 2×12=24

(i) If the Harmonic Mean of 2, a, 8 be $\frac{24}{7}$, the value of a is

(A) 4
(B) 6
(C) 12
(D) 9

(ii) The variance of first 5 natural numbers is

(A) 3
(B) 4
(C) 8
(D) 2

(iii) Two variables x and y are given by the relation $y = 3x - 2$. If the mode of x be 5, the mode of y will be

(A) 13
(B) 10
(C) 15
(D) 9

(iv) If for a symmetrical distribution 1st and 3rd quartiles are respectively 16 and 22, then the Median of the distribution is

(A) 20
(B) 18
(C) 24
(D) 19

(v) If Mean = 50 cm and C.V.= 60%, then the S.D. is

(A) 25 cm
(B) 30 cm
(C) 28 cm
(D) 20 cm

(vi) For a given frequency distribution C.V.= 30%, variance = 36 and Pearson's coefficient of skewness $= -0{\cdot}25$, the mode of the distribution is

(A) 24
(B) 20
(C) 21·5
(D) 24·5

(vii) The regression equation of y on x is $3x - 5y = -12$ and regression equation of x on y is $2x - y = 7$. The value of y when $x = 10$ is

(A) 8·4
(B) 6·5
(C) 7
(D) 9

(viii) If $y = 3x + 30$ and mean of x is 20, then the mean of y is

(A) 90
(B) 80
(C) 70
(D) 100

(ix) If the events A and B are mutually exclusive then

(A) $P(A + B) = P(A) + P(B)$

(B) $P(A + B) = P(A) - P(B)$

(C) $P(A + B) = P(A)\,P(B)$

(D) $P(A + B) = 0$

(x) If $\sigma_x = 10, \sigma_y = 12$ and $b_{xy} = -0 \cdot 8$, then the value of correlation coefficient (r) is

(A) – 0·84

(B) – 0·96

(C) – 0·75

(D) 0·86

(xi) When $Var(x) = 2 \cdot 25, Var(y) = 1$ and $Cov(x, y) = 0 \cdot 9$, then correlation coefficient is

(A) 0·45

(B) 0·8

(C) 0·6

(D) 0·75

(xii) If the odds against an event 3 : 5, the probability of that event is

(A) $\frac{3}{8}$

(B) $\frac{5}{8}$

(C) $\frac{2}{3}$

(D) $\frac{1}{3}$

5. State whether the following statements are True or False: 1×12=12

(i) A discrete variable assumes only integral values.

(ii) (Class Frequency)/ (Width of the Class) is defined as Frequency Density.

(iii) If C.V. of series A is more than that of series B, then B is more stable than A.

(iv) The meeting point of two regression lines $y - \bar{y} = b_{yx}(x - \bar{x})$ and $(x - \bar{x}) = b_{yx}(y - \bar{y})$ gives $(\bar{x}, \bar{y})$.

(v) The stub of a table is the space meant for the row head.

(vi) Covariance of x and y is expressed as $\frac{1}{n}\sum(x - \bar{x})(y - \bar{y})$.

(vii) For a symmetrical distribution Mean ≠ Median ≠ Mode.

(viii) For a negatively skewed distribution it is found that Mean, Median and Mode are respectively 50,51 and 49.

(ix) For two events A and B, P (A–B) = P(B–A).

(x) Variance is always non-negative.

(xi) Mode is the value of the observation having minimum frequency.

(xii) The variance of the first n natural numbers is $\frac{n^2-1}{12}$.

6. Answer any *four* questions. 6×4=24

(a) Draw a histogram for the following distribution and hence find mode:

Class Boundary	1—3	3—5	5—7	7—9	9—11	TOTAL
frequency:	2	5	6	3	4	20

(b) Compute rank correlation coefficient from the following data:

x	4·15	4·34	4·20	4·30	4·24	4·28
y	3·30	3·32	3·28	3·31	3·27	3·25

(c) Find the Regression of x on y from the following data:

$n = 10, \sum x = 30, \sum y = 90, \sum x^2 = 110, \sum y^2 = 858, \sum xy = 294$

Find the estimated value of x, when $y = 8$.

(d) A student obtained the Mean and Standard Deviation of 100 observations as 40 and 5·1 respectively. It was later found that he copied 50 wrongly instead of the correct value 40. Find the correct Mean and correct Standard Deviation.

(e) Given values:

Value (X)	1	2	3	4	5	TOTAL
Probability	0·20	0·15	0·30	0·25	0·10	1·00

Calculate the mathematical expectation E (X).

(f) There are two urns containing 4 white and 3 red balls and 3 white and 7 red balls respectively. An urn is chosen at random and a ball is drawn from it. Find the probability that the ball is white. If the ball drawn is white, what is the probability that it is from the first urn.