FOUNDATION COURSE EXAMINATION

December 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) The mean proportional between 9 and 25 is

(A) 17
(B) 15
(C) 225
(D) 16

(ii) p varies inversely as q. If $p = 2$ then $q = 3$. Find p if $q = 2$.

(A) 3
(B) 4
(C) 1
(D) 0

(iii) A person deposits ₹ 2,000 at 6% p.a. simple interest for 3 years. The amount he will get back after 3 years is

(A) ₹ 2,300
(B) ₹ 2,400
(C) ₹ 2,360
(D) ₹ 2,350

(iv) Find the 10th term of the A. P. 3, 6, 9, 12, 15, ...

(A) 20
(B) 25
(C) 23
(D) 30

(v) The product of 3 terms in a G.P. is 125. The middle term is
(A) 3
(B) 4
(C) 5
(D) 6

(vi) The value of ${}^5C_2$ is
(A) 10
(B) 9
(C) 11
(D) 5

(vii) For a quadratic equation $x^2 - 2x + 1 = 0$, the product of the roots is
(A) –1
(B) 1
(C) 0
(D) 2

(viii) The value of logarithm of $\frac{1}{10}$ to the base 10 is
(A) 1
(B) –1
(C) 0
(D) 10

(ix) The set A = {1, 2, 3} and the set B = {1, 2}, then A – B is
(A) {0}
(B) {2}
(C) {3}
(D) Φ

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

(i) Null set is a subset of every set.

(ii) If ${}^nP_1 = {}^nC_1$, then ${}^nP_3 = {}^nC_3$

(iii) The series 1, 11, 111, 1111, ... is an AP series.

(iv) The 7th term of the progression 3, –9, 27, ... is 2187.

(v) One root of the quadratic equation $3x^2 + 10x + 3 = 0$ is reciprocal to the other.

(vi) The true discount on a bill of ₹ 1,040 due for 6 months at 8% p.a. is ₹ 40.

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

(a) Monthly income ratio of two persons is 5 : 6 and their monthly expenditure ratio is 3 : 4. If each saves ₹ 4,000 per month, find their monthly incomes.

(b) A person invests ₹ 1,00,000 on compound interest for 2 years at 10% p.a. Calculate the amount that he will get back.

(c) The sum of n terms of an A.P. is $3n^2 + 5n$. Find the number of the term which is equal to 152.

(d) If $\log_3 x + \log_9 x + \log_{81} x = \frac{7}{2}$, find x.

(e) Prove that KOLKATA is seven times of LONDON in respect of arrangements of their letters.

(f) Solve for t :

$$\sqrt{\frac{t}{1-t}} + \sqrt{\frac{1-t}{t}} = \frac{13}{6}.$$

Section-B

(Fundamentals of Business Statistics)

4. Choose the correct answer: 2×12=24

(i) The mode for the series 2, 5, 7, 6, 3, 7, 4, 7, 9, 2 is

(A) 6
(B) 2
(C) 7
(D) 9

(ii) The median of the numbers 94, 33, 86, 68, 32, 80, 48 and 70 is

(A) 68
(B) 69
(C) 64
(D) 70

(iii) The Geometric Mean (G.M.) for the series 1, 2, 4 is

(A) 2

(B) $\frac{7}{3}$

(C) $\frac{3}{7}$

(D) 2·5

(iv) The Standard Deviation (S.D.) for 2 and 8 is

(A) 5

(B) 4

(C) 3

(D) 6

(v) The mean deviation of the observations 3, 5, 9, 1 and 2 about their median is

(A) 2·4

(B) 2·2

(C) 3

(D) 2·8

(vi) If the sum of squares of the deviations of 10 observations taken from mean 50 is 250, then C.V. is

(A) 10%

(B) 12%

(C) 20%

(D) 15%

(vii) If the relation between two variables x and y be $5x + 7y = 28$ and median of y be 3, then the median of x is

(A) 1·4

(B) – 4·2

(C) 3

(D) $\frac{13}{7}$

(viii) For a symmetric distribution, skewness is

(A) 0

(B) 1

(C) –1

(D) 0·5

(ix) If cov $(x,y) = 0{\cdot}6$, $\sigma_x = 2$, $\sigma_y = 1$, then r_{xy} is

(A) 0·1

(B) 0·3

(C) 0·2

(D) 0

(x) The value of the correlation coefficient lies between

(A) 0 and 1

(B) – 1 and 1

(C) – 1 and 0

(D) – 0·5 and 0·5

(xi) For two independent events A and B, P(AB) is

(A) P(A|B)

(B) P(A)P(B)

(C) P(A–B)

(D) P(B|A)

(xii) For two mutually exclusive events A and B, if P(A) = 0·4 and P(B) = 0·3, then P(A or B) is

(A) 0·6

(B) 0·58

(C) 0·7

(D) 0·75

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

(i) Monthly income of workers of a factory is a continuous variable.

(ii) Cumulative frequencies are necessary for drawing ogive.

(iii) In a moderately skewed distribution, mode = 3 median + k mean. Then $k = -2$.

(iv) The coefficient of variation = (mean/s.d.) × 100

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

(vi) For a positively skewed distribution, it is found that mean, median and mode are respectively 62, 61 and 59.

(vii) The sum of the deviations of the observations from their Arithmetic Mean (A.M.) is always zero.

(viii) The relation between A.M., G.M. and H.M. is expressed as A.M. < G.M. < H.M.

(ix) Skewness of a frequency distribution is defined as the measure of its extent of asymmetry.

(x) Correlation coefficient r_{xy} of two variables x and y is the geometric mean of two regression coefficients b_{xy} and b_{yx}.

(xi) If $b_{xy} = -0.8$ and $b_{yx} = -0.2$, then $r_{xy} = -0.6$.

(xii) The sum of the probability of an event and its complement is always zero.

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

(a) The weights (in gram) of 50 mangoes picked out at random from a basket are as follows:

90, 81, 75, 104, 80, 82, 118, 110, 84, 131, 107, 78, 98, 90, 136, 111, 113, 84, 94, 204, 141, 123, 115, 110, 92, 86, 70, 126, 68, 130, 129, 139, 119, 115, 128, 100, 186, 111, 125, 123, 95, 187, 93, 115, 107, 109, 82, 76, 107, 106

Form a grouped frequency table by dividing the variate range into intervals of equal width, each corresponding to 20 gram in such a way that the mid-value of the first class corresponds to 70 gram.

(b) Find the mean age of the students.

Age (year)	10-12	12-14	14-16	16-18	18-20	Total
No. of students	3	1	2	1	3	10

(c) Compute the standard deviation of first 11 natural numbers.

(d) Calculate r_{xy} using product-moment method due to Karl Pearson.

x	2	3	1	4
y	1	2	3	5

(e) For the variables x and y, the equation of regression lines are $4x - 5y + 33 = 0$ and $20x - 9y - 107 = 0$. Identify the regression lines. Also find $\bar{x}, \bar{y}$ and r.

(f) Find the probability of getting sum of points at least 10 in a single throw of two dice.