

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

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- (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 $\text{cov}(x, y) = 0.6$, $\sigma_x = 2$, $\sigma_y = 1$, 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 $P(A \text{ or } B)$ 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, $\text{mode} = 3 \text{ median} + k \text{ mean}$. Then $k = -2$.

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- (iv) The coefficient of variation = $(\text{mean/s.d.}) \times 100$
- (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.
