

FOUNDATION COURSE EXAMINATION

June 2018

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 ratio of work done by $(x + 2)$ men in $(x - 2)$ days to that of $(x - 1)$ men in $(x + 1)$ days is 4:5, the value of x is
- (A) ± 4
(B) 6
(C) 4
(D) 8
- (ii) The mean proportional between 2 and 8 is
- (A) 4
(B) 16
(C) 3
(D) 1
- (iii) The simple interest (SI) on ₹ 100 at the rate of 5% p.a. for 5 years is
- (A) ₹ 10
(B) ₹ 5
(C) ₹ 1
(D) ₹ 25
- (iv) The 7th term of the Arithmetic Progression (AP) 7, 10, 13, 16,..... is
- (A) 28
(B) 22
(C) 25
(D) 20

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- (v) The value of logarithm of 1 to the base 10 is
(A) 2
(B) 10
(C) 0
(D) 1
- (vi) The set $P = \{2, 3, 5\}$ and the set $Q = \{1, 4\}$. Then the set $P \cap Q$ is
(A) Null set
(B) $\{0\}$
(C) $\{\phi\}$
(D) $\{P\}$
- (vii) If ${}^nP_4 = 30 \times {}^nP_2$, then the value of n is
(A) 10
(B) 8
(C) 6
(D) 5
- (viii) The sum of the roots of the quadratic equation $x^2 - 3x = 0$ is
(A) 1
(B) 0
(C) -3
(D) 3
- (ix) If $3^{x-1} - 3^{x-3} = 8$, then the value of $(x^2 - x + 4)$ is
(A) 10
(B) 8
(C) 12
(D) 15

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

1×6=6

- (i) The set of all the subsets of a given set A is called the Power Set of A .
- (ii) The value of $(32)^{1/5}$ is $\frac{1}{2}$.
- (iii) The value of 5C_2 is equal to 5C_3 .
- (iv) The geometric mean of 3 and $\frac{1}{3}$ is -1.

(v) The value of x when $2^x = 3^x$ is 0.

(vi) If $p = 2 + \sqrt{3}$, then $\frac{1}{p} = 2 - \sqrt{3}$.

3. Answer *any four* questions:

4×4=16

(a) If $x \propto y$, then prove that $x^2 + y^2 \propto x^2 - y^2$.

(b) Find the Compound Interest (CI) on ₹ 1,000 for 2 years at 10% p.a.

(c) The 4th and 7th terms of a G.P. series are respectively 24 and 192. Find the sum of first 10 terms.

(d) Find the value of $\log_5 3 \times \log_3 625$.

(e) Find the number of ways in which a person can invite his 4 friends selecting at least 1.

(f) If p and q are the roots of the quadratic equation $x^2 + x - 1 = 0$, find the value of $\frac{1}{p} + \frac{1}{q}$.

Section-B

(Fundamentals of Business Statistics)

4. Choose the correct answer:

2×12=24

(i) Out of total outlay ₹ 40,000 (crore) during an annual plan of a country, the central angle represented by education of amount ₹ x crore is 72° . The value of x (in crore) is

(A) ₹ 10,000

(B) ₹ 9,000

(C) ₹ 6,000

(D) ₹ 8,000

(ii) Given a table:

Value (greater than)	100	150	200	250
Frequency	50	32	9	0

The number of observations between 150 and 200 is

(A) 23

(B) 15

(C) 8

(D) 18

(iii) Given the table:

Class Interval	10–15	15–20	20–25	25–30	30–35
Frequency	5	7	4	6	8

The class mark for the second class is

- (A) 27.5
- (B) 17.5
- (C) 12.5
- (D) 32.5

(iv) The Arithmetic Mean for the series 2, 6, 5, 7, 9, 4, 2 is

- (A) 7
- (B) 4
- (C) 5
- (D) 6

(v) The Geometric Mean (GM) for the series 1, 3, 9 is

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

(vi) The Standard Deviation for two observations is

- (A) square of their difference.
- (B) half of their absolute difference.
- (C) their absolute difference.
- (D) twice of their absolute difference.

(vii) The absolute deviations of the values of a variable from the mean are 10, 15, 19, 2, 14. The mean deviation is

- (A) 16
- (B) 14
- (C) 12
- (D) 9

- (viii) A.M. of 40 observations of a variable is 25 and S.D. is 4. The sum of squares of all observations is
- (A) 25640
 - (B) 26540
 - (C) 24560
 - (D) 26450
- (ix) If $y + 2x = 10$, $\bar{x} = 3$ and $Var(y) = 25$, then C.V. of y is
- (A) 100%
 - (B) 150%
 - (C) 125%
 - (D) 50%
- (x) The coefficient of skewness of a distribution is 0.4. Its S.D. and mean are respectively 8 and 30. The mode of the distribution is
- (A) 26
 - (B) 26.2
 - (C) 26.4
 - (D) 26.8
- (xi) If $\sigma_y = 4$, $b_{yx} = 0.48$, $r = 0.6$, then σ_x is
- (A) 5
 - (B) 7
 - (C) 9
 - (D) 6.5
- (xii) If A and B be two mutually exclusive events and $P(A) = \frac{3}{4}$, $P(A \cup B) = \frac{5}{6}$ then $P(B)$ is
- (A) $\frac{2}{3}$
 - (B) $\frac{3}{5}$
 - (C) $\frac{5}{12}$
 - (D) $\frac{1}{12}$

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

- (i) In any group frequency distribution class intervals are of equal width always.
- (ii) Frequency densities are necessary for drawing histogram.
- (iii) The statistical data collected during the census are primary data to the census department.
- (iv) Median is the value of a variable which divides the whole statistical data into two equal parts.
- (v) The value of the standard deviation of a series of observations can never be negative.
- (vi) For a frequency distribution Median (Q_2), 5th Decile (D_5) and 50th Percentile (P_{50}) have the same value.
- (vii) The standard deviation of a series of observations is defined as a root mean square deviation from any central value A .
- (viii) Standard deviation is a kind of relative measure of dispersion.
- (ix) Empirical relation between mean, median and mode is expressed as $\text{Mean} - \text{Mode} = 3(\text{Mean} - \text{Median})$.
- (x) When one regression coefficient is negative and other regression coefficient is also negative.
- (xi) The event neither A nor B occurs is represented by $A \cap B^c$.
- (xii) For any two independent events A and B , $P(A|B) = P(A)$.

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

(a) Draw Histogram for the frequency distribution:

Class Interval	10–15	15–20	20–25	25–30	30–40
Frequency	10	20	35	20	15

(Draw the diagram on a paper using proper scale and labeling)

(b) The frequency distribution of marks of 100 students is given below. If the median is 32, obtain the missing frequencies.

Marks	0–10	10–20	20–30	30–40	40–50	50–60
No. of students	10	–	25	30	–	10

- (c) For 10 values of x , it is given that $\sum u = 4$ and $\sum u^2 = 144$, where $u = \frac{x-10}{5}$. Find the mean and S.D. of x .
- (d) Given $\sum (x - \bar{x})^2 = 60$, $\sum (y - \bar{y})^2 = 60$, $\sum (x - \bar{x})(y - \bar{y}) = 57$, $n = 9$. Find the Karl Pearson Correlation Coefficient r_{xy} by Product-Moment Method.
- (e) The lines of regression of y on x and x on y are respectively $y = x + 5$ and $16x = 9y - 94$. Find the variance of x if the variance of y is 16. Also, find the covariance of x and y .
- (f) Two unbiased dice are thrown. Construct the set of pairs of points having difference 2 between them. Hence, find the probability of getting the difference 2 between the points in each pair.
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