

FOUNDATION COURSE EXAMINATION

June 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. Choose the correct answer:

2×9=18

- (i) Six years before the ratio of the ages of two sisters Mitali and Sonali is 2 : 3. If the present age of Mitali is 30 years, then the present age of Sonali is
- (A) 28 years
(B) 42 years
(C) 36 years
(D) 48 years
- (ii) If I is the simple interest, R is the rate % p.a., T is the time period, P being the principal, then I is expressed as
- (A) $I = 100(PRT)$
(B) $I = \frac{100}{PRT}$
(C) $I = \frac{PRT}{100}$
(D) $I = PRT$
- (iii) Find the compound interest on ₹ 4,000 for 2 years at 5% p.a.
- (A) ₹ 400
(B) ₹ 405
(C) ₹ 415
(D) ₹ 410
- (iv) The value of logarithm of 8 to the base 2 is
- (A) 3
(B) 0
(C) 1
(D) 2

- (v) If p varies inversely as q , it is written as
- (A) $p \propto \frac{1}{q}$
 - (B) $q \propto \frac{1}{p}$
 - (C) $p^2 \propto q^2$
 - (D) $\frac{1}{p^2} \propto \frac{1}{q^2}$
- (vi) If ${}^{2n}P_3 = 84 \cdot {}^n P_2$, then the value of n is
- (A) 16
 - (B) 11
 - (C) 9
 - (D) 6
- (vii) Product of the two roots of the quadratic equation $3x^2 - 5x + 2 = 0$ is
- (A) $\frac{2}{5}$
 - (B) $\frac{3}{2}$
 - (C) $\frac{2}{3}$
 - (D) $\frac{5}{3}$
- (viii) The value of $\left(2\frac{5}{4}\right)^4$ is
- (A) 30
 - (B) 23
 - (C) 31
 - (D) 32
- (ix) If P and Q are two disjoint sets, then $n(P \cap Q)$ is
- (A) 1
 - (B) 0
 - (C) 2
 - (D) 3

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

1×6=6

- (i) The cardinal number of a null set is zero.
- (ii) $\log 2 + \log 5 = \log 7$
- (iii) ${}^5C_3 = {}^5C_2$
- (iv) The sum of first 6 terms of the arithmetic progression (A.P.) 6, 4, 2, 0, is 12.
- (v) The sum of the roots of the quadratic equation $x^2 - x + 1 = 0$ is 1.
- (vi) The geometric mean of two quantities p and q is pq .

3. Answer *any four* questions:

4×4=16

- (a) A variable quantity y is equal to sum of two quantities, one of which varies directly as x and the other varies inversely as x . If $y = 11$ when $x = 1$ and $y = 13$ when $x = 2$, find y when $x = 3$.
- (b) In some years ₹ 1,500 becomes ₹ 1,980 at 8% simple interest. Find the number of years.
- (c) If the sum of the 3rd and 4th terms of a G.P. be 60 and that of the 6th and 7th terms be 480, find the 10th term of the G.P.
- (d) If $\frac{\log_{10} x - 5}{2} + \frac{13 - \log_{10} x}{3} = 2$, find the value of x .
- (e) In how many ways can 8 examination papers be arranged, so that the best and worst papers are never together?
- (f) If one root of the equation $2x^2 + 6x + m = 0$ be reciprocal to the other, then find the value of m and the roots.

Section-B

(Fundamentals of Business Statistics)

4. Choose the correct answer:

2×12=24

- (i) The vertical axis of an ogive shows
 - (A) Cumulative frequencies
 - (B) Absolute frequencies
 - (C) Frequency densities
 - (D) Class boundaries

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- (ii) The basis of classification according to differences in time is called
- (A) Ordinal classification
 - (B) Temporal classification
 - (C) Spatial classification
 - (D) Qualitative classification
- (iii) The frequencies of three class intervals 54–58, 59–63, 64–68 of a distribution are respectively 4, 8 and 12. The frequency density of the 2nd class is
- (A) 1
 - (B) 1.2
 - (C) 1.6
 - (D) 2
- (iv) The mean of five observations 5, 10, 15, 20, 25 is
- (A) 19
 - (B) 16
 - (C) 17
 - (D) 15
- (v) The variance of two observations 10 and 17 is
- (A) 12.25
 - (B) 12
 - (C) 1.225
 - (D) 13
- (vi) If a variable x takes the values 12 and 24 with equal frequencies, then mean of x is
- (A) 36
 - (B) 18
 - (C) 22
 - (D) 28
- (vii) The quartile deviation of the following data 12, 10, 17, 14, 19, 21, 27, 30, 32, 38, 34 is
- (A) 11
 - (B) 18
 - (C) 9
 - (D) 16

- (viii) For a frequency distribution mean = 68.2, median = 69 and coefficient of skewness of the distribution is - 0.6. The variance of the distribution is
- (A) 9
 - (B) 25
 - (C) 36
 - (D) 16
- (ix) If r be the correlation coefficient between two variables x and y , b_{xy} and b_{yx} being the two regression coefficients, then
- (A) $r = \sqrt{b_{xy} \times b_{yx}}$
 - (B) $r = b_{xy} \times b_{yx}$
 - (C) $r = \frac{b_{xy}}{b_{yx}}$
 - (D) $r = \frac{b_{yx}}{b_{xy}}$
- (x) If two regression equations are $x + 5y = 13$ and $3x - 2y = 5$, then the mean values of x and y are respectively
- (A) (2, 3)
 - (B) (3, 2)
 - (C) (4, 5)
 - (D) (5, 4)
- (xi) Given that $P(A) = \frac{2}{3}$, $P(B) = \frac{3}{5}$ and $P(A \cup B) = \frac{13}{15}$. The events A and B are
- (A) Equally likely
 - (B) Independent
 - (C) Mutually exclusive
 - (D) Exhaustive
- (xii) Two dice are thrown simultaneously, the probability of obtaining a total sum 8 is
- (A) $\frac{1}{6}$
 - (B) $\frac{5}{6}$
 - (C) $\frac{5}{36}$
 - (D) $\frac{7}{36}$

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

1×12=12

- (i) The colour of a flower is an attribute.
- (ii) The data collected from census reports are primary data.
- (iii) Harmonic mean of a set of observations is the reciprocal of the arithmetic mean of the reciprocal values of the observations.
- (iv) Variance is the positive square root of standard deviation.
- (v) $C.V. \times \text{mean} = S.D. \times 100$
- (vi) If two regression coefficients b_{yx} and b_{xy} are negative, then the correlation coefficient (r) is positive.
- (vii) For a symmetric distribution skewness is zero.
- (viii) The coefficient of correlation is independent of origin but dependent on the unit of measurement.
- (ix) The probability of an absurd event is zero.
- (x) Probability of an event is a real number lying between -1 and 1 .
- (xi) For a skew distribution, $\text{Mean} \neq \text{Median} \neq \text{Mode}$.
- (xii) The total number of cases is 12 when two dice are thrown together.

6. Answer *any four* questions:

6×4=24

- (a) Draw a pie chart to represent the following data relating to the production cost of sugar in a certain week under different heads in a sugar factory.

Raw material: ₹ 38,400

Cost of labour: ₹ 30,720

Direct production: ₹ 11,520

Others: ₹ 15,360

- (b) Find the mode of the following frequency distribution:

Class	10–12	12–14	14–16	16–18	18–20
Frequency	5	7	4	2	3

- (c) Find mean and variance of the set of observations 3, 5, 7, 9, 11.

- (d) Compute the correlation coefficient between x and y :

x	1	2	3	4	5
y	4	6	2	1	7

- (e) Find the estimated value of x when $y = 8$ from the following data:

	x	y
Mean	20	10
Standard Deviation	4	2
Correlation Coefficient	$r = 0.8$	

- (f) For two independent events X and Y , $P(X \cup Y) = \frac{1}{3}$ and $P(X) = \frac{1}{5}$. Find $P(Y)$.
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