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 ${}^{2n}P_3 = 84.{}^{n}P_2$, 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

(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. × mean = S.D. × 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, Mean ≠ Median ≠ 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	$r = 0{\cdot}8$	

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