FOUNDATION COURSE EXAMINATION

December 2018

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) If $\frac{a}{3} = \frac{b}{4} = \frac{c}{7}$, then the value of $\frac{a+b+c}{c}$ is

   (A) 4

   (B) 2

   (C) 7

   (D) 14

   (ii) If p varies directly as q and if $q = 2$ then $p = 4$. If $p = 2$, the value of q is

   (A) 1·5

   (B) 2

   (C) 1

   (D) 3

   (iii) A man deposited a sum of money to a bank at 9% simple interest p.a. The total interest that he will get at the end of 5 years is ₹ 1,620. The deposited amount is

   (A) ₹ 6,000

   (B) ₹ 4,000

   (C) ₹ 3,600

   (D) ₹ 4,400

   (iv) The mean proportional between 4 and 16 is

   (A) 8

   (B) 10

   (C) 9

   (D) ± 8

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(v) The 6th term of an A.P. 2, 5, 8,……. is

    (A) 18

    (B) 16

    (C) 17

    (D) 19

(vi) The 7th term of the series 16, 8, 4, 2,………. is

    (A) $\frac{1}{8}$

    (B) $\frac{1}{4}$

    (C) $\frac{1}{2}$

    (D) $\frac{1}{16}$

(vii) If $A \subset B$ and $n(A) = 18, n(B) = 40$, then $n(A \cap B)$ is

    (A) 18

    (B) 22

    (C) 58

    (D) 40

(viii) The value of $\left(\frac{1}{3}\log_{10} 125 - 2 \log_{10} 4 + \log_{10} 32\right)$ is

    (A) 2

    (B) 1

    (C) 0

    (D) –2

(ix) Sum of the roots of the quadratic equation $5x^2 + 5x + 2 = 0$ is

    (A) –2

    (B) 2

    (C) –1

    (D) 1

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

    (i) Some money is distributed between Amal and Ashoke in the ratio 3 : 5. If Amal receives ₹ 72, then Ashoke receives ₹ 108.

    (ii) Factorial 5 is equal to 120.

(iii) Speed (s) is inversely proportional to time (t). Then st = constant.

(iv) The set {0} is a null set.

(v) $(A \cup B)' = A' \cup B'$

(vi) $(-2)^5 = 32$

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

   (a) The monthly salaries of two persons are in the ratio 7 : 5. If each receives an increase of ₹ 300 in salary, the ratio becomes 25 : 18. Find the respective salaries.

   (b) Compute compound interest on ₹ 100 for 2 years at 10% p.a.

   (c) The first term of an A.P. is 1 and the sum of its first 10 terms is 100. Find the sum of its first 20 terms.

   (d) Find x, if $\dfrac{1}{\log_2 x} + \dfrac{1}{\log_3 x} + \dfrac{1}{\log_6 x} = 2$.

   (e) In an examination a candidate has to secure minimum marks in each of the 7 subjects to pass the examination. In how many ways can a student fail?

   (f) Find the value of x when $x^2 - 5x + 6 = 0$.

Section-B

(Fundamentals of Business Statistics)

4. Choose the correct answer: 2×12=24

   (i) Mode of a frequency distribution can be determined with the help of

      (A) Pie diagram

      (B) Histogram

      (C) Bar graph

      (D) Ogive

   (ii) If the A.M. of 14, 16, x, 25, 21 be 19, then the value of x is

      (A) 16

      (B) 19

      (C) 12

      (D) 21

(iii) The G.M. of 3 and 24 with weight 2 and 1 respectively is

   (A) 8

   (B) 4

   (C) 6

   (D) 9

(iv) The mean deviation about median of 28, 7, 16, 14, 24, 15, 34, 30 is

   (A) 8

   (B) 6

   (C) 10·5

   (D) 12

 (v) The A.M. of first n natural numbers is 6. The value of n is

   (A) 12

   (B) 9

   (C) 11

   (D) 16

(vi) If the sum of 20 observations is 100, the sum of squares of these observations is at least

   (A) 25

   (B) 100

   (C) 500

   (D) 2500

(vii) The 1st and 3rd quartiles of a frequency distribution are respectively 25 and 45. If the coefficient of skewness be − 0·1, then the median is

   (A) 36

   (B) 32

   (C) 24

   (D) 28

(viii) If A.M. and the coefficient of variation of x are 6 and 50% respectively, then the variance of x is

   (A) 3

   (B) 6

   (C) 9

   (D) 11

(ix) Given: $Q_3 - Q_1 = 8, Q_3 + Q_1 = 22$, Median $(Q_2) = 10 \cdot 5$. The coefficient of skewness is

(A) $\frac{1}{8}$

(B) $\frac{1}{7}$

(C) $\frac{1}{5}$

(D) 1

(x) The correlation coefficient between two variables x and y is

(A) sum of two regression coefficients.

(B) Arithmetic Mean of two regression coefficients.

(C) Harmonic Mean of two regression coefficients.

(D) Geometric Mean of two regression coefficients.

(xi) For sure event A

(A) $P(A) = 1$

(B) $P(A) > 1$

(C) $P(A) = 0$

(D) $P(A) = -1$

(xii) For two mutually exclusive events A and B, $P(A \cup B)$ is equal to

(A) $P(A) - P(B)$

(B) $P(A) + P(B)$

(C) $\frac{1}{2}(P(A) + P(B))$

(D) $P(A) \times P(B)$

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

(i) Proportion of girls in a class of 100 students is a discrete variable.

(ii) The median for the set of observations 5, 7, 2, 1, 4, 3, 6 is 1.

(iii) The sum of cumulative frequencies of less than type and more than type of a class interval is equal to total frequency.

(iv) Standard deviation is defined as Root Mean Square Deviation about mean.

(v) S.D. is independent of change of scale, but is dependent on change of origin.

(vi) For a positively skewed distribution, Mean > Median > Mode.

(vii) The correlation between sale of woollen garments and day temperature is positive.

(viii) For two mutually exclusive events A and B, $P(AB) = 0$.

(ix) The correlation coefficient is a measure of linear association.

(x) The probability of an event may exceed unity.

(xi) The conditional probability $P(A/B) = \frac{P(AB)}{P(B)}$.

(xii) Three perfect coins are tossed together. The probability of getting at least one head is $\frac{5}{8}$.

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

(a) Draw the cumulative frequency diagrams (both more than and less than ogive) of the following frequency distribution and hence compute the median:

Marks-group	0-10	10-20	20-30	30-40	40-50	50-60	60-70	Total
No. of students	4	8	11	15	12	6	3	59

Draw the diagrams on a paper using proper scale and labelling.

(b) Compute the coefficient of variation from the following data:

Marks in Statistics	0-20	20-40	40-60	60-80	80-100
No. of students	5	7	28	9	1

(c) In a certain distribution the following results were obtained:

A.M. = 45, Median = 48 and coefficient of skewness = -0.4. Estimate the standard deviation.

(d) Calculate the coefficient of correlation between x and y from the following data:

x	7	4	6	3	5
y	13	11	10	6	10

(e) Age (x) and blood pressure (y) of a group of 10 women are recorded as follows:

	x	y
Mean:	53	142
Variance:	130	165

$\sum(x - \bar{x})(y - \bar{y}) = 1220$

Find the regression equation of y on x and use it to estimate the blood pressure of a woman of age 45.

(f) Four cards are drawn from a full pack of cards. Find the probability that there are (i) three spades and one heart and (ii) at least one diamond.

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(c) In a certain distribution the following result were obtained:

A.M. = 45, Median = 48 and coefficient of skewness = −0.4. Estimate the standard deviation.

(ii) Calculate the coefficient of correlation between x and y from the following data:

					3
	12	11	10	9	10

(a) Age (x) and blood pressure (y) of a group of ... women are recorded as follows:

Mean	85	145
Variance	150	

$$\sum (x-\bar{x}) \ldots = 1320$$

Find the regression equation of y on x and use it to estimate the blood pressure of a woman ...

(b) Four cards are drawn from a full pack of cards. Find the probability that there are (i) three spades and one heart and (ii) at least one diamond.