

**Paper 4 - Fundamentals of Business  
Mathematics and Statistics**

# MTP\_Foundation\_Syllabus2016\_Dec2018\_Set 1

## Paper-4: 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.

This question paper has two sections.

Both the sections are to be answered subject to instructions given against each.

### Section – A

I. (a) Choose the correct answer (9 × 2 = 18)

- (1) If 3, x, 27 are in continued proportion then  $x =$  \_\_\_\_\_  
(a)  $\pm 6$             (b)  $\pm 9$             (c)  $\pm 7$             (d) None of these
- (2) At what rate p.a. S.I. will a sum of money double itself in 25 years?  
(a) 4%            (b) 3%            (c) 5%            (d) 6%
- (3) If  $A : B = 3 : 4$  &  $B : C = 2 : 5$ , then  $A : B : C$   
(a) 3 : 4 : 5    (b) 3 : 4 : 10    (c) 4 : 3 : 10    (d) 3 : 4 : 8
- (4) If  ${}^n P_3 = 120$  then  $n =$  \_\_\_\_  
(a) 8            (b) 4            (c) 6            (d) None of these
- (5) If  ${}^r C_{12} = {}^r C_8$  find  ${}^{22} C_r$   
(a) 213            (b) 321            (c) 231            (d) None of these
- (6) The value of  $\log_{\sqrt{2}} 32$  is  
(a) 5/2            (b) 5            (c) 10            (d) 1/10
- (7) A.M. of two integral numbers exceeds their G.M. by 2 and the ratio of the numbers is 1 : 4. Find the numbers.  
(a) 5, 20            (b) 1, 4            (c) 2, 8            (d) 4, 16
- (8) Set of even positive integers less than equal to 6 by selector method.  
(a)  $\{x/x < 6\}$             (b)  $\{x/x = 6\}$             (c)  $\{x/x \leq 6\}$             (d) None
- (9) If one roots of the equation  $x^2 - 3x + m = 0$  exceeds the other by 5 then the value of M is equal to \_\_\_\_\_  
(a) -6            (b) -4            (c) 12            (d) 18

I. (b) State whether the following statements are true or false (6 × 1 = 6)

- (1) If 30% of  $x = 40\%$  of  $y$  then  $x : y = 4 : 3$  ( )
- (2) If the terms -1 + 2x, 5, 5+x are is an A.P. then x is 4 ( )
- (3) The statement "Equivalent sets are always equal" is true or false ( )
- (4) The logarithm of one to any base is zero ( )
- (5)  ${}^n C_0 = n$  is true of false ( )
- (6) The degree of the equation  $3x^5 + xyz^2 + y^3$  is 3 ( )

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II. Answer any four questions. Each question carries 4 marks (4 × 4 = 16)

- (1) If  $\frac{x}{b+c} = \frac{y}{c+a} + \frac{z}{a+b}$  then show that  $(b-c)(x-a) = (c-a)(y-b) = (a-b)(z-c) = 0$ .
- (2) Which is better investment - 3% per year compounded monthly (or) 3.2% per simple interest (given that  $(1.0025)^{12} = 1.0304$ )
- (3) Insert 4 arithmetic means between 4 and 324.
- (4) Prove that  $\frac{\log\sqrt{27} + \log 8 + \log\sqrt{100}}{\log 14400} = \frac{3}{4}$
- (5) A question paper is divided into three groups A, B, C which contains 4, 5 and 3 questions respectively. An examinee is required to answer 6 questions taking at least 2 from A, 2 From B, 1 From C. in how many ways he can answer.
- (6) If the roots of the equation  $ax^2 + bx + c = 0$  in the ratio 2 : 3, then show that  $6b^2 = 25ca$ .

## Section - B

III. (a) Choose the correct answer (12 × 2 = 24)

- (1) The mode for the series 3, 5, 6, 2, 6, 2, 9, 5, 8, 6 is .....  
(a) 5.1 (b) 5 (c) 6 (d) 8
- (2) Which of the following measures of averages divide the observation into two parts  
(a) Mean (b) Median (c) Mode (d) Range
- (3) If the co-efficient of correlation between x and y is  $\frac{2}{3}$  and the standard deviation of x is 3 and standard deviation of y is 4, the covariance between x and y will be \_\_\_\_\_  
(a) 3 (b) 6 (c) 7 (d) 8
- (4) If Median = 12, Q1 = 6, Q3 = 22 then the co-efficient of Quartile Deviation is \_\_\_\_\_  
(a) 33.33 (b) 60 (c) 66.67 (d) 70
- (5) Class mark is  
(a) A midpoint of class interval (b) Upper point of class interval  
(c) Average rate of increase in net worth of a company (d) All the above 1 & 3
- (6) Harmonic mean is used for calculating  
(a) Average Growth Rate of variables (b) Average speed of journey  
(c) Average rate of increase in net worth of a company (d) All the above 1 to 3
- (7) Two regression lines coincide when  
(a)  $r = 0$  (b)  $r = 2$  (c)  $r = +1$  or  $-1$  (d) None
- (8) For the regression equation of Y on X,  $2x + 3y + 50 = 0$ . The value of  $b_{xy}$  is  
(a)  $\frac{2}{3}$  (b)  $-\frac{2}{3}$  (c)  $-\frac{3}{2}$  (d) None
- (9) If  $y = a + bx$ , then what is the co-efficient of correlation between x and y?  
(a) 1 (b) -1 (c) 1 or -1 according as  $b > 0$  or  $b < 0$  (d) None of these

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(10) If an unbiased coin is tossed twice, the probability of obtaining at least one tail is  
(a) 0.25 (b) 0.50 (c) 0.75 (d) 1.00

(11) Two dice are thrown together. The probability that 'the event the difference of nos. shown is 2' is  
(a) 2/9 (b) 5/9 (c) 4/9 (d) 7/9

(12)  $x = \frac{31}{6} - \frac{y}{6}$  is the regression equation of  
(a) y on x (b) x on y (c) both (d) none

III. (b) State whether the following statements are true or false (12 × 1 = 12)

(1) Harmonic mean is based on few items in a series ( )

(2) Mode is a mathematical average ( )

(3) Co-efficient of variation =  $\frac{\text{Co-efficient of variation}}{\text{Mean}} \times 100$  ( )

(4) Range is the value of difference between mode and median ( )

(5) If a coin is tossed, then probability of getting two heads is zero ( )

(6) If an unbiased coin is tossed once, then the two events head and tail are mutually exclusive ( )

(7) 10<sup>th</sup> Percentile is equal to 9<sup>th</sup> Decile. ( )

(8) Mean deviation can never be negative ( )

(9) The value of correlation co-efficient lies between -1 & +1 ( )

(10) Bivariate data are the data collected for n variables ( )

(11) When all values are equal, then standard deviation would be zero ( )

(12) As the sample size increase, range tends to increase ( )

IV. Answer any four questions. Each question carries 6 marks (4 × 6 = 24)

(1) Prove that for any two positive real quantities  $AM \geq GM \geq HM$ .

(2) Find the median and median-class of the data given below:

Class-boundaries	Frequency
15-25	4
25-35	11
35-45	19
45-55	14
55-65	0
65-75	2

(3) The marks obtained by 6 students were 24, 12, 16, 11, 40, 42. Find the Range. If the highest mark is omitted, find the percentage change in the range.

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- (4) Calculate Karl Pearson's coefficient of correlation between variables X and Y using the following data:

X	25	40	30	25	10	5	10	15	30	20
Y	10	25	40	15	20	40	28	22	15	5

- (5) Given:

Covariance between X and Y = 16

Variance of X = 25

Variance of Y = 16

(i) Calculate co-efficient of correlation between X and Y,

(ii) If arithmetic means of X and Y are 20 and 30 respectively, find regression equation of Y on X.

(iii) Estimate Y when X = 30.

- (6) What is the chance that a leap year, selected at random will contain 53 Sundays?