

FOUNDATION COURSE EXAMINATION

June 2017

P-4(FBMS)  
Syllabus 2012

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. Answer any two questions:

5×2=10

- (a) A government constructed a housing flat costing ₹ 9,50,000. Half of the amount is to be paid at the time of possession and the balance reckoning compound interest @ 9% p.a. is to be paid in 12 equal annual installments. Find the amount of each such installment.

[Given  $(1.09)^{-12} = 0.3558$ ]

- (b) If  $a^x = bc$ ,  $b^y = ca$  and  $c^z = ab$  then, show that  $\frac{x}{x+1} + \frac{y}{y+1} + \frac{z}{z+1} = 2$ .

- (c) The true discount on a bill due 6 months hence at 8% p.a. is ₹ 80. Find the amount of the bill.

2. Answer any two questions:

3×2=6

- (a) Find the product AB of two matrices A and B where  $A = \begin{bmatrix} 1 & 2 \\ 3 & -1 \end{bmatrix}$  and  $B = \begin{bmatrix} 1 & 3 \\ 2 & -1 \end{bmatrix}$ .

- (b) Evaluate  ${}^5C_3 : {}^5P_2$ .

- (c) Evaluate  $\log_2 \log_2 (\log_2 4)$ .

Please Turn Over

3. Choose the correct answer:

(a) The determinant  $\begin{vmatrix} 2 & 5 \\ 1 & 3 \end{vmatrix}$  is equal to

- (i) 1    (ii) -1    (iii)  $\frac{1}{2}$     (iv)  $-\frac{1}{2}$

(b) If  $x + y \propto x - y$  then which one is True?

- (i)  $x \propto -y$     (ii)  $y \propto -x$     (iii)  $x \propto y$     (iv)  $xy = 1$

(c) The value of 5! is equal to

- (i) 10    (ii) 120    (iii) 25    (iv) 5

(d) The discriminant of the quadratic equation  $x^2 + 2x + 1 = 0$  is

- (i) -1    (ii) 1    (iii)  $\frac{1}{2}$     (iv) 0

(e)  $\int_{-1}^1 x^2 dx$  is equal to

- (i)  $\frac{2}{3}$     (ii)  $\frac{3}{2}$     (iii)  $-\frac{2}{3}$     (iv)  $-\frac{3}{2}$

4. Fill in the blanks:

(a) The value of  $\frac{d}{dx}(x)$  is \_\_\_\_\_.

(b) The value of 0! is \_\_\_\_\_.

(c) The value of  $\log 1$  is \_\_\_\_\_.

(d) If  $I$  be the identity matrix of order 2 then  $I =$  \_\_\_\_\_.

(e) If  $y = x^2 + x$ , then  $\frac{d^2y}{dx^2} =$  \_\_\_\_\_.

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

1×5=5

- (a) The set  $A = \{x: x + 5 = 5\}$  is a null set.
- (b) The value of  $\log_{3\sqrt{3}} 729 = 4$ .
- (c)  ${}^n P_n = n!$ .
- (d) Bill value (B.V.) is equal to the sum of Present Value (P.V.) and True Discount (T.D.).
- (e) The matrix  $A$  is called singular matrix if its determinant is zero.

## 6. Match the following:

1×5=5

(a) If one root of the quadratic equation $5x^2 - 3x + p = 0$ be reciprocal of the other, then the value of $p$ is	(i) 1
(b) The number of ways a boy can invite one or more of 4 friends are	(ii) 6
(c) If $y = 6x + 2e^{-2x}$ , then the value of $\frac{dy}{dx}$ at $x = 0$ is	(iii) 5
(d) If $\int_0^1 x^k dx = \frac{1}{7}$ , ( $k > 0$ ) the value of $k$ is	(iv) 15
(e) If $A = \begin{bmatrix} x & 7 \\ -2 & 5 \end{bmatrix}$ and the value of the determinant of transpose of $A$ is 19, the value of $x$ is	(v) 2

## 7. Answer the following in one or two steps:

1×4=4

- (a) Construct the truth table for  $\sim p \wedge q$ .
- (b) If  $x^2 - x - 2 \leq 0$ , then find the maximum value of  $x$ .
- (c) Evaluate:  $\lim_{x \rightarrow 0} \frac{4^{3x} - 4^{2x}}{x}$ .
- (d) If  $u = \log\left(\frac{1}{xy}\right)$ , then find  $\frac{\partial^2 u}{\partial x^2}$ .



**Section – B**

(Business Statistics)

**8. Choose the correct answer (any nine):**

2×9=18

(a) Mode depends on change of

- (i) origin only    (ii) scale only    (iii) Both origin and scale    (iv) Neither origin nor scale

(b) If the A.M. of first  $n$  natural numbers be 25, the value of  $n$  is

- (i) 48    (ii) 49    (iii) 45    (iv) 50

(c) The Harmonic Mean (H.M.) of three numbers 1, 2, 3 is

- (i) 7    (ii) 11    (iii) 18/11    (iv) 1

(d) In a batch of 15 students, 5 failed in a test. The marks of 10 students who passed were 90, 60, 70, 80, 90, 60, 50, 40, 80, 70. The median of the marks of all the 15 students is

- (i) 70    (ii) 60    (iii) 50    (iv) 80

(e) If  $x = 5 + 2y$  be the relation between variables  $x$  and  $y$  and third quartile of  $y$  is 15, then third quartile of  $x$  is

- (i) 35    (ii) 30    (iii) 15    (iv) 60

(f) Mean deviation about median of the numbers 31, 35, 29, 68, 60, 72, 37 is

- (i) 12    (ii) 15    (iii) 12.5    (iv) 14.5

(g) If  $r$  be the coefficient of correlation between two variables  $x$  and  $y$  then

- (i)  $-1 \leq r \leq 1$     (ii)  $0 < r < 1$     (iii)  $-1 < r < 1$     (iv)  $0 \leq r \leq 1$

(h) If the two regression lines are mutually perpendicular, then the correlation coefficient is

- (i) 0      (ii) 1      (iii) -1      (iv)  $\pm 1$

(i) A fair dice is thrown. The probability that either an odd number or a number greater than 4 will turn up is

- (i)  $\frac{1}{6}$       (ii)  $\frac{1}{3}$       (iii)  $\frac{2}{3}$       (iv)  $\frac{3}{4}$

(j) The mean of a Poisson distribution is 9. Its standard deviation is

- (i)  $\frac{1}{3}$       (ii) 9      (iii) 3      (iv)  $\frac{1}{9}$

(k) For a symmetric distribution

- (i) mean < median < mode      (ii) mean  $\neq$  median  $\neq$  mode  
(iii) mean > median > mode      (iv) mean = median = mode

(l) There are 50 cards numbered as 1, 2, 3, 4, 5, ....., 50. A card is drawn at random and the probability that it bears a number multiple of 10 is

- (i)  $\frac{1}{5}$       (ii)  $\frac{1}{10}$       (iii)  $\frac{2}{5}$       (iv)  $\frac{3}{5}$

**9. Answer any nine questions:**

2×9=18

(a) Find the geometric mean of 4, 6, 9 with weights 1, 2, 1 respectively.

(b) If the absolute deviations of 5 observations from mean be 26, 15, 39, 24, 41 find the mean deviation about mean.

(c) If for a frequency distribution median = 27, mode = 21 and S.D. = 3, find the value of coefficient of variation (C.V.).

(d) The first three quartiles of a distribution are ₹ 12, ₹ 22, ₹ 45; find the quartile deviation.

- (e) For a symmetrical distribution, the second and third quartiles are 8 and 12 respectively. Find the first quartile.
- (f) If the first and third quartiles of a distribution are 26 and 76 respectively, find median when coefficient of skewness is 0.2.
- (g) Karl Pearson's coefficient of correlation between two variables  $x$  and  $y$  is 0.52 and their covariance is 7.8. If the variance of  $x$  is 16, find the standard deviation of  $y$ .
- (h) For 10 values of  $x$  it is given that  $\sum d = 4$ , where  $d = (x - 10)/5$ . Hence find  $\sum x$ .
- (i) An unbiased die is thrown twice. Write down the sample space.
- (j) Let  $x$  be a Poisson variable. If  $P(x = 1) = P(x = 2)$ , find mean of the Poisson distribution.
- (k) Two series with equal number of observations have means 2 and 3. Find their combined mean.
- (l) Draw a simple bar chart of the given productions of a two-wheeler factory:

Year :	2013	2014	2015	2016
Production :	840	720	1000	1200

(no. of two-wheelers)

**10. Answer any four questions:**

6×4=24

- (a) In an examination 70% passed in accountancy, 75% passed in mathematics and 50% passed in both the subjects, while 40 students failed in both the subjects. Draw a pie diagram to represent the number of students (i) who passed in both, (ii) who passed in accountancy only, (iii) who passed in mathematics only and (iv) who failed in both.

(b) Class Boundaries :	0-10	10-20	20-30	30-40	40-50	Total
Frequency :	10	25	20	25	20	100

Find the median of the distribution.

(c) Given:

$x$ :	2	3	4	5
$f$ :	3	2	1	4

Compute the mean and variance.

(d) Given the bivariate data

$x$ :	2	3	4	5
$y$ :	3	2	1	4

Compute the correlation coefficient between  $x$  and  $y$ .

(e)

Commodity	Year 2015		Year 2016	
	Price	Quantity	Price	Quantity
A	5	10	4	12
B	8	6	7	7
C	6	3	5	4

Calculate Laspeyres' and Paasche's Price Index Numbers of 2016 taking 2015 as base year.

(f) Find the trend for the following series using a three-year weighted moving average with weights 1, 2, 1.

Year	1	2	3	4	5	6	7
Values	2	4	5	7	8	10	13

