

Code : 302204

BBA 2nd Semester Exam., 2014

BUSINESS MATHEMATICS AND
STATISTICS—1

(Mathematical Economics)

Time : 3 hours

Full Marks : 60

Instructions:

- (i) The marks are indicated in the right-hand margin.
 (ii) Attempt **FIVE** questions in all.
 (iii) Answer Question Nos. 1 and 2 which are compulsory and other **THREE** from Q. Nos. 3 to 7.

1. Choose the correct answer (any six) : $2 \times 6 = 12$ (a) Sum up to n terms of the series
 $1 + 3 + 5 + 7 + \dots$ is

(i) $\frac{n}{2}(n+2)$

(ii) $\frac{n}{2}(n-1)$

(iii) $\frac{n}{2}(n+1)$

(iv) n^2

(2)

(b) The solution to the simultaneous equations $x + y = 8$ and $5x - 2y = -2$ is

(i) $x = 2, y = 6$

(ii) $x = 6, y = 2$

(iii) $x = 5, y = 3$

(iv) None of the above

(c) The value of

$$\lim_{x \rightarrow \infty} \left[\frac{3x^2 + 5x + 1}{5x^2 + 3x + 2} \right]$$

is

(i) $\frac{6}{7}$

(ii) $\frac{5}{3}$

(iii) $\frac{3}{5}$

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

(d) If n th term of 96, 48, 24, 12, ... is $\frac{3}{16}$, then n is

(i) 10

(ii) 8

(iii) 12

(iv) 18

(3)

(e) The differential coefficient of $3x^3 - 5x^2 + 8x + 9$ is

(i) $9x^2 + 5x + 8x^3 + 9$

(ii) $3x^2 - 5x + 8$

(iii) $x^3 + x^2 + 8$

(iv) $9x^2 - 10x + 8$

(f) For three sets A, B and C, the set $A - (B \cap C)$ is equal to

(i) $(A - B) \cap (A - C)$

(ii) $(A \cap B) - (A \cap C)$

(iii) $(A - B) \cup (A - C)$

(iv) None of the above

(g) The roots of $6x^2 + 7x - 5 = 0$ are

(i) real and unequal

(ii) real and equal

(iii) imaginary

(iv) None of the above

(h) ${}^n C_r + {}^n C_{r-1}$ is equal to

(i) ${}^{n+1} C_{r+1}$

(ii) ${}^{n-1} C_{r-1}$

(iii) ${}^n C_{r+1}$

(iv) ${}^{n+1} C_r$

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(Turn Over)

(4)

(i) The matrix

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 7 \\ 3 & 7 & 5 \end{bmatrix}$$

is

(i) symmetric

(ii) skew-symmetric

(iii) horizontal

(iv) vertical

(j) $\int \frac{\log x}{x} dx$ will be equal to

(i) $(\log x)^2 + c$

(ii) $\frac{1}{2} (\log x)^2 + c$

(iii) $\frac{1}{x} + c$

(iv) $\log x + c$

2. Answer any three questions : $4 \times 3 = 12$

(a) Use an example to show that

$$A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$$

(b) Find the sum of first n natural numbers.

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(Continued)

(c) If

$$A = \begin{bmatrix} 1 & 5 & 3 \\ 2 & -1 & 7 \\ 3 & 3 & 1 \end{bmatrix} \text{ and } B = \begin{bmatrix} -1 & 6 & 2 \\ 5 & 0 & 3 \\ 1 & 7 & -3 \end{bmatrix}$$

$$\text{then find } A + B' + 2I, \text{ where } I = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}.$$

(d) Evaluate $\frac{dy}{dx}$ if $y = \sqrt{x + \sqrt{x + \sqrt{x + \dots}}}$ to ∞ .

(e) Evaluate

$$\int \frac{x^3 dx}{(4 - x^4)^2}$$

3. State and prove binomial theorem for any positive integral index. 12

4. The square of one more than a number x is 13 more than itself. Find the value of x , where x is positive. 12

5. Evaluate : 12

$$(i) \lim_{x \rightarrow 0} \left[\frac{1 - \sqrt{1-x}}{x} \right]$$

$$(ii) \lim_{x \rightarrow k} \left[\frac{\sqrt{x} - \sqrt{k}}{x - k} \right]$$

6. State and prove De Morgan's laws for two sets A and B . 12

7. If

$$A = \begin{bmatrix} 1 & 5 & 3 \\ 7 & 1 & 2 \\ 1 & 5 & 1 \end{bmatrix}$$

then find the matrix $A^3 + A^2 + 3A - 7I$, where

$$I = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$
