Code : 302204

BBA 2nd Semester Exam., 2021

BBA–204

BUSINESS MATHEMATICS AND STATISTICS—I

(Mathematical Economics)

Time : 3 hours   *Full Marks* : 60

Instructions :

(i) *The marks are indicated in the right-hand margin.*

(ii) *There are* **SEVEN** *questions in this paper.*

(iii) *Attempt* **FIVE** *questions in all.*

(iv) *Question Nos.* **1** *and* **2** *are compulsory.*

(v) *Notations, if, any, are of usual meanings.*

1. Choose the correct option (any six) :   2×6=12

   (a) A bi-quadratic equation has degree

      (i) 1

      (ii) 2

      (iii) 3

      (iv) 4

   (b) The equation $2x^2 + kx + 3 = 0$ has two equal roots, then the value of k is

      (i) $\pm\sqrt{6}$

      (ii) ± 4

      (iii) $\pm 3\sqrt{2}$

      (iv) $\pm 2\sqrt{6}$

   (c) There are 30 people in a group. If all shake hands with one another, how many handshakes are possible?

      (i) 870

      (ii) 435

      (iii) 30!

      (iv) 29! +1

   (d) Evaluate the integral of $dx/(x+2)$ from -6 to -10.

      (i) 21/2

      (ii) 1/2

      (iii) ln 3

      (iv) ln 2

(e) Differentiate $y = \sec(x^2 + 2)$.

  (i) $2x \cos(x^2 + 2)$

  (ii) $- \cos(x^2 + 2) \cot(x^2 + 2)$

  (iii) $2x \sec(x^2 + 2) \tan(x^2 + 2)$

  (iv) $\cos(x^2 + 2)$

(f) Differentiate $(x^2 + 2)^{1/2}$.

  (i) $((x^2 + 2)^{1/2})/2$

  (ii) $x/(x^2 + 2)^{1/2}$

  (iii) $2x/(x^2 + 2)^{1/2}$

  (iv) $(x^2 + 2)^{3/2}$

(g) If A and B are symmetric matrices of the same order, then

  (i) AB is a symmetric matrix

  (ii) $A - B$ is a skew-symmetric matrix

  (iii) $AB + BA$ is a symmetric matrix

  (iv) $AB - BA$ is a symmetric matrix

(h) For any square matrix A, AA^T is a

  (i) unit matrix

  (ii) symmetric matrix

  (iii) skew-symmetric matrix

  (iv) diagonal matrix

(i) If a matrix A is both symmetric and skew-symmetric, then

  (i) A is a diagonal matrix

  (ii) A is a zero matrix

  (iii) A is a scalar matrix

  (iv) A is a square matrix

(j) If $A^2 - A + I = 0$, then the inverse of A is

  (i) $I - A$

  (ii) $A - I$

  (iii) A

  (iv) $A + I$

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

(a) Find the 6th term in the expansion of $(2x^2 - 1/3x^2)^{10}$.

(b) Find the number of permutation of all the letters of the word 'MATHEMATICS' which starts with consonants only.

(c) If the sum of the coefficients of all even powers of x in the product

$$(1 + x + x^2 + \cdots + x^{2n})(1 - x + x^2 - x^3 + \cdots + x^{2n})$$

is 61, then find the value of n.

(d) "If the sum of the coefficients in the expansion of $(a + b)^n$ is 4096, then the greatest coefficient in the expansion is 924." Solve.

(e) Define identity and square of a matrix.

Answer any *three* of the following questions :

$12 \times 3 = 36$

3. (a) Evaluate $\lim_{x \to 4} \dfrac{x^2 - 16}{x - 4}$.   4

(b) Evaluate $M = \lim_{x \to 2} \dfrac{x^2 - 4}{x - 2}$.   4

(c) Evaluate $\lim_{x \to 4} x^2 + 3x - 4$.   4

4. (a) If $A = \begin{pmatrix} 2 & 3 & 0 \\ 4 & 3 & 7 \end{pmatrix}$ and $B = \begin{pmatrix} 5 & 7 \\ 6 & 4 \end{pmatrix}$, find AB and BA.   4

(b) Write the following system of linear equations in matrix form :   4

$$2x + 4y - 3z = 24$$
$$6x - 10y + 4z = 52$$
$$-2x + 6y + 4z = 68$$

(c) A system of linear equations is presented below in matrix form. Write the corresponding equation system $AX = B$:   4

$$\begin{pmatrix} 1 & 4 & -3 \\ 6 & -10 & 4 \\ -2 & 6 & 0 \end{pmatrix} \begin{pmatrix} X \\ Y \\ Z \end{pmatrix} = \begin{pmatrix} 24 \\ 52 \\ 40 \end{pmatrix}$$

5. (a) Find the derivatives of the following : $4 \times 2 = 8$

(i) $f(x) = (\cos x)^x$

(ii) $f(x) = (5 + 3x)^5$

(b) Integrate $\cos x \, dx$ under the lower and upper limits 0 and π.   4

6. (a) Using matrix inversion, solve the following system of linear equations :   6

$$2x + y = 10$$
$$x + y = 7$$

(b) Find the inverse of the following matrix :   6

$$A = \begin{pmatrix} 4 & 2 \\ 1 & 1 \end{pmatrix}.$$

7. Find the inverse of the following matrix :   12

$$A = \begin{pmatrix} 4 & 2 & 2 \\ 2 & 3 & 1 \\ 2 & 1 & 0 \end{pmatrix}$$

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