

**PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)**

**BCom DEGREE EXAMINATION MAY 2019
(First Semester)**

Branch - COMMERCE (BUSINESS ANALYTICS)

MATHEMATICAL TECHNIQUES FOR BUSINESS ANALYTICS

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks (10 x 1 = 10)

- 1 Let $A = [a_{ij}]$ be a square matrix If $a_{ij} = -a_{ji}$ then it is said to be _____ matrix.
 (i) Diagonal (ii) Symmetric
 (iii) Skew symmetric (iv) Asymmetric
- 2 If $A = \begin{pmatrix} 2 & 4 \\ 3 & 5 \end{pmatrix}$, then \mathbf{jAj} =
 (i) 22 (ii) 2 (iii) -22 (iv) -2
- 3 Number of subsets of the set $A = \{1, 2, 3, 4, 5\}$ is _____.
 (i) 32 (ii) 16 (iii) 30 (iv) 25
- 4 If $f(x) = \frac{1}{x^2 - 2}$ then $f\{f(10)\} =$ _____.
 (i) 2 (ii) -4/7 (iii) 4/7 (iv) -7/4
- 5 If A (-3, 3) and B(5, 9) then distance between AB is _____.
 (i) 13 (ii) 10 (iii) 8 (iv) None
- 6 If a line passing through the point (2, -3) having the slope -5/7. then the equation of the line is _____.
 (i) $5x + 7y = -1$ (ii) $5x + 7y = 1$ (iii) $5x - 7y = -11$ (iv) $5x + 7y = 11$
- 7 On an investment of Rs. 25,000, A made a profit of Rs. 2325, then the profit percent is _____.
 (i) 10% (ii) 9.5% (iii) 9% (iv) 9.3%
- 8 Simple interest for Rs. 8,000 at 5% per annum for 2 years is _____.
 (i) 800 (ii) 820 (iii) 780 (iv) None
- 9 If $v = f(x)$ decreases as x increase at the point (x, y) then $\frac{dy}{dx}$ is
 (i) Zero (ii) Greater than zero
 (iii) Less than zero (iv) Not equal to zero
- 10 The maximum and minimum values of a function are called the _____ of a function.
 (i) Absolute maximum (ii) Absolute minimum
 (iii) Stationary values (iv) External values

SECTION - B (25 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5x5 = 25)

- 11 a If $A = \begin{pmatrix} 9 & U \\ U & 3 \end{pmatrix}$ and $B = \begin{pmatrix} I \\ I \end{pmatrix}$ find the matrix X such that, $3A + 5B + 2X = 0$.

10.1.

11 b Find the inverse of the matrix $A = \begin{bmatrix} 3 & 4 & 5 \\ 0 & -6 & -7 \end{bmatrix}$

12 a If $A = \{1, 2, 3, 4\}$, $B = \{2, 4, 5, 6\}$ and $C = \{1, 3, 5\}$ then show that, $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$.

OR

b If $f(x) = x^2 - 3x + 16$ find i) $f(0)$, ii) $f(1)$, iii) $f(2)$, iv) $f(-1)$, v) $f(-2)$.

13 a Find the equation of the line passing through $(2, -3)$ and $(-4, 5)$.

OR

b Find the point of intersection of the lines $5x + 2y = 11$ and $x - 3y = 9$.

14 a A man deposits Rs. 12,000 in a finance company and gets Rs. 27,566.93 at end of $3\frac{1}{2}$ years. Find the rate of compound interest which the company pays per month.

OR

b The sum of 3 numbers in G.P is 35 and their product is 1,000. Find the numbers.

15 a Determine the curve $y = 2x^3 - 6x^2 + 2$ rise or fall at $x = 2$ and $x = 1$.

OR

b Examine the function, $y = 40 - 4x + x^2$ for maximum or minimum.

SECTION -C (40 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks (5 x 8 = 40)

16 a Show that the matrix $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ satisfies the equation

$$A^3 - 6A^2 + 9A - 4I = 0. \text{ Hence deduce the value of } A^{-1}.$$

OR

b Solve the following system of simultaneous equations $2x + 3y + 3z = 22$; $x - y + z = 4$; $4x + 2y - z = 9$.

17 a Prove that $(A \cap B)' = A' \cap B'$ using Venn diagram.

OR

b The management of a company finds that fixed costs for producing an item is Rs. 5,000 and variable costs per unit of output Rs. 2.00. (a) Find the total cost function (b) If the unit demand function, where price is the independent variable and quantity is the dependent variable is, $q = -1000p + 10,000$ (c) Find the sales revenue and profit functions (d) Find the maximum profit and optimum price.

18 a Find the point of intersection of the following lines

(i) $x + 3y - 5 = 0$, $x - 2y + 5 = 0$

(ii) $4x - 3y - 5 = 0$, $3x + 4y - 40 = 0$.

OR

b A company estimates that when its sales is Rs. 60,000, its variable expenses will be Rs. 30,000 for a fixed expenses of Rs. 10,000 find the break-even point. What is the profit when the sales is Rs. 50,000?

19 a A certain amount of money was invested at 8% simple interest and after 9 months an equal amount was invested at 10% simple interest. Find the period in which the amount in each case becomes Rs. 2,600. How much money was invested in each case?

OR

b The annual increase of population of a city is found to be 4% approximately. The population of the city was 25 lakhs at the end of 1975. What will be the population at the end of 1985?

20 a Examine the function $y = 2x^2 - x^3 + 5$ for maximum and minimum.

OR

b The production manager of a company plans to include 180 square centimeters of actual printed matter in each page of a book under production. Each page should have a 2.5 cm. Margin along the top and bottom and 2 cm wide margin along the sides. What are the most economical dimensions of each printed page?

Z-Z-Z

END