

SECOND SEMESTER UG DEGREE EXAMINATION, APRIL 2023

B.Com. HONOURS

GBCH2B09T: BUSINESS MATHEMATICS

Time: 3 Hours

Maximum Marks: 80

PART A: Answer all the questions. Each carries *one* mark

Choose the correct answer.

- The slope of the line passing through the points (1,1) and (3,9) is
(a) 1 (b) 2 (c) 3 (d) 4
- Find the number of elements in a 2×3 matrix
(a) 6 (b) 5 (c) 2 (d) 3
- $B = \{A, P, L, E\}$ which of the following is true
(a) $A \notin B$ (b) $L \notin B$ (c) $E \in B$ (d) $F \in B$
- Which of the sets is not equal to the set $A = \{1,3,4\}$
(a) $\{1,2,3,4\}$ (b) $\{1,4,3\}$ (c) $\{3,3,4,1\}$ (d) $\{1,1,3,4,3\}$
- If A and B are independent events in a random experiment, then $P(A|B)$ is
(a) $P(A \cap B)$ (b) $P(A \cup B)$ (c) $P(A)$ (d) $P(B)$

Fill in the Blanks.

- The equation of line parallel to x -axis and passing through the point (2,1) is
- If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ then $A + B = \dots\dots\dots$
- The tabular form of $A = \{x/x \text{ is an integer } -3 < x < 7\}$ is
- True or false;
"If A and B are 2 sets then $A \cap B = B \cap A$ "
- $\frac{d}{dx}(\cos x) = \dots\dots\dots$

(10 x 1 = 10 Marks)

PART B: Answer any *eight* questions. Each carries *two* marks.

- Solve $\frac{3x}{5} + \frac{x}{2} = \frac{5x}{4} - 3$
- What is the slope of the line which is parallel to a line which is passing through the points (2, -3), (4,5).
- $A = \begin{bmatrix} 3 & 2 \\ 1 & 4 \\ 5 & 3 \end{bmatrix}$, $B = \begin{bmatrix} -2 & 5 \\ -8 & 12 \\ 0 & -18 \end{bmatrix}$, find (a) $A + B$ (b) $A - B$
- Write the roster form,

$$A = \{x: x \text{ is a day in a week}\}$$

$$B = \{x: x \text{ is an integer } -3 < x < 2\}$$

(PTO)

15. Check whether the following sets are equal or not

$$'A = \{2,4,6,8,10\}'$$

$$'B = \{x: x \text{ is an even natural number and } x \leq 10\}'$$

16. Find the power set of $A = \{7,9,8\}$.

17. Let $n(A) = 21, n(B) = 11$ and $n(A \cup B) = 30$, find $n(A \cap B)$.

18. How many 3 digit numbers can be formed from the digits 1,2,3,4 and 5. Assuming that

(a) repetition of the digits is not allowed.

(b) repetition of the digits is allowed.

19. If $P(A) = \frac{1}{3}, P(B) = \frac{1}{5}$ and $P(A \cap B) = \frac{1}{15}$, then find

$$(a) P(A \cup B) \quad (b) P(A^c)$$

20. Suppose $\lim_{x \rightarrow 1} f(x) = 1$, $\lim_{x \rightarrow 1} g(x) = 2$ and $\lim_{x \rightarrow 1} h(x) = -1$, then find
 $\lim_{x \rightarrow 1} \left(\frac{f(x)+g(x)}{3h(x)+f(x)} \right)$

(8 x 2 = 16 Marks)

PART C: Answer any six questions. Each carries four marks.

21. Line L through the points $(-2,6), (4,8)$ is perpendicular to the line L_1 and parallel to the line L_2 ,
find

(a) Slope of L_1 .

(b) Slope of L_2 .

22. Find AB where, $A = \begin{bmatrix} 1 & 2 & 3 \\ -4 & -4 & -4 \\ 5 & 6 & 7 \end{bmatrix}, B = \begin{bmatrix} 2 & -5 & 1 \\ 0 & 3 & -2 \\ 1 & 2 & -4 \end{bmatrix}$.

23. Find the equation of a line perpendicular to the line $x - 2y + 3 = 0$ and passing through the point $(1, -2)$.

24. Solve the system of linear equations using matrix method,

$$5x + 2y = 4$$

$$7x + 3y = 5$$

25. An animal feed company must produce at least 200 kgs of a mixture consisting of ingredients X_1 and X_2 daily. X_1 costs ₹ 3 per kg and X_2 , ₹ 8 per kg. No more than 80 kgs of X_1 can be used and at least 60kgs of X_2 must be used. Formulate a mathematical model to the problem.

26. In a class of 35 students, 24 like to play cricket and 16 like to play football. Also each student like to play at least one of the two games. How many students like to play both cricket and football.

27. In how many ways can one select a cricket team of 11 players from 17 players in which only 5 players can bowl, if each cricket team of 11 must include exactly 4 bowlers?

28. Find the point of local maxima and local minima of $f(x) = 9x^2 + 12x + 2$.

(6 x 4 = 24 Marks)

PART D: Answer any two questions. Each carries fifteen marks.

29. Use simplex method to solve the LLP,

$$\text{Minimize: } Z = -x_1 - 4x_2$$

$$\text{Subject to: } 2x_1 + x_2 \leq 3$$

$$3x_1 + 5x_2 \leq 9$$

$$x_1 + 3x_2 \leq 5$$

$$\text{with } x_1 \geq 0, x_2 \geq 0.$$

30. a) A factory has 2 machines, machine A produces 30% of the items of output, machine B produce 70% of the items, further 5% of the items produced by machine A were defective and only 1% produced by machine B were defective. If the defective item is drawn at random, what is the probability that it was produced by machine A.
- b) A coin is tossed 3 times. What is the probability of getting?
- (i) 3 head
 - (ii) Exactly 2 head
 - (iii) At least 2 head
 - (iv) At most 2 head
31. a) Find absolute maximum and absolute minimum value of $f(x) = 2x^3 - 15x^2 + 36x + 1$ in $[1,5]$.
- b) Given, Revenue $R(x) = -x^2 + 24x$ and Cost $C(x) = 12x + 28$. Find the value of x that maximise the profit.

(2 x 15 = 30 Marks)