

B.Sc.(IT) Semester - 2 (CBCS) Examination**March/April- 2018****MATHEMATICAL AND STATISTICAL FOUNDATION OF COMPUTER SCIENCE
(CORE)****Time: 2:30 Hours****Marks: 70****Instructions:**

1. All questions are compulsory.
2. Figures to the right indicate marks.

Que-1 (A) Attempt the following. (04)

- (1) Value of determinant of unit matrix is _____.
- (2) Find determinant of given matrix $A = \begin{bmatrix} -3 & -6 \\ 7 & 4 \end{bmatrix}$
- (3) Discuss the symbol $R_{ij}(C_{ij}) i \neq j$.
- (4) Define : Square matrix.

Que-1 (B) Answer the following : (any one) (02)

- (1) Find determinant of given matrix $A = \begin{bmatrix} 4 & -6 & 0 \\ 3 & 4 & 0 \\ 2 & 9 & 3 \end{bmatrix}$
- (2) Without Expanding prove the $\begin{vmatrix} 0 & a & -b \\ -a & 0 & -c \\ b & c & 0 \end{vmatrix} = 0$.

Que-1 (C) Answer the following : (any one) (03)

- (1) Show that all the rows of a determinant are converted into the corresponding columns the value of the determinant remains same.
- (2) If $\begin{vmatrix} 4 & 5 & -7 \\ -2 & k & 6 \\ 1 & k & 1 \end{vmatrix} = 43$ then find the value of k.

Que-1 (D) Answer the following : (any one) (05)

- (1) Use Cramer's rule to solve the equation.
 $2x + 3y - z = 1, 4x + y - 3z = 11, 3x - 2y + 5z = 21$.
- (2) Prove that $\begin{vmatrix} a+b+2c & a & b \\ c & b+c+2a & b \\ c & a & c+a+2b \end{vmatrix} = 2(a+b+c)^3$.

Que-2 (A) Attempt the following. (04)

- (1) Define : Unit matrix.
- (2) A square matrix A is said to be _____ matrix if $A' = A$.
- (3) Let A be a square matrix, If $|A| = 0$, then A is said to be _____ matrix.
- (4) Define : Nilpotent matrix.

Que-2 (B) Answer the following : (any one) (02)

- (1) If $A = \begin{bmatrix} 4 & 3 \\ 0 & -1 \end{bmatrix}$ & $B = \begin{bmatrix} 4 & 1 \\ 2 & 5 \end{bmatrix}$ then $2B - 3A =$ _____.
- (2) If $A = \begin{bmatrix} -3 & 2 & 5 \end{bmatrix}$ & $B = \begin{bmatrix} 4 \\ 3 \\ -2 \end{bmatrix}$ then find AB & BA.

Que-2 (C) Answer the following : (any one) (03)

(1) Find the Ad joint of given matrix $A = \begin{bmatrix} 2 & -1 & 3 \\ 4 & 2 & 0 \\ -1 & 3 & -2 \end{bmatrix}$.

(2) If $A = \begin{bmatrix} 1 & -1 & 2 \\ 2 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix}$ then find A^{-1} .

Que-2 (D) Answer the following : (any one) (05)

(1) If $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$ then prove that $A^2 - 4A - 5I = 0$, hence find A^{-1} .

(2) If $A = \begin{bmatrix} 2 & 3 & 4 \\ 5 & 7 & 9 \\ -2 & 1 & 1 \end{bmatrix}$ & If $B = \begin{bmatrix} 4 & 0 & 5 \\ 1 & 2 & 0 \\ 0 & 3 & 1 \end{bmatrix}$ then verify that $(AB)^T = B^T \cdot A^T$.

Que-3 (A) Attempt the following. (04)

- (1) Find the distance between Following two points (-2, 10), (9, -1).
- (2) Write an Equation of section formula for Internal Division.
- (3) Define : Power set.
- (4) How many cardinal number of the set of the letter in the word 'GUJARAT'

Que-3 (B) Answer the following : (any one) (02)

- (1) Find the coordinate of the point which divides the join o the pair of points A(-7, -15), B(6, -5) in the ratio of 4:7
- (2) Prove that $A \cap (B - C) = (A \cap C)$.

Que-3 (C) Answer the following : (any one) (03)

- (1) Find the area of the triangle whose vertices are A(x,y-z), B(-x,z), C(x,y+z).
- (2) Prove $(A \cap B)' = A' \cup B'$.

Que-3 (D) Answer the following : (any one) (05)

- (1) Show that the Points (-1, 1), $(-\sqrt{3}, -\sqrt{3})$, (1, -1) are the vertices of equilateral triangles.
- (2) There are 50 students in a class, studies at least one of the subjects mathematics, science, economics. 15 students study mathematics, 25 students study science, 20 students study economic, 3 students study mathematics & Economics, 2 students study science & Economics, Xstudents study mathematics & science and there is no student who studies all the three subjects. Find the number of students who study Mathematics but not English.

Que-4 (A) Answer the following questions : (04)

- (1) The range of observation 116, 121, 125, 127, 129, 130, 130 = _____
- (2) The mode of observation 12, 23, 34, 23, 33, 23, 10 = _____
- (3) Write down equation of Combined Mean.
- (4) The median of observation 9, 16, 11, 12, 14, 18, 20, 12 = _____

Que-4 (B) Answer the following : (any one) (02)

- (1) Explain Merit and Demerit of Mean.
- (2) Find out Q_1 and Q_3 of observation 102, 107, 113, 115, 119, 127

Que-4 (C) Answer the following questions : (any one) (03)

(1) Find out Quartile Deviation from the following data :

Class	55-60	60-65	65-70	70-75	75-80
Frequency	10	18	14	16	12

(2) Explain Range, Standard Deviation.

Que-4 (D) Answer the following questions : (any one) (05)

(1) Find out Standard Deviation & Coefficient of Variation of the given data :

Class	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40
Frequency	7	11	12	19	16	7	5	2

(2) Find out Mean, Median and Mode from the Following data :

Class	0-20	20-40	40-60	60-80	80-100	100-120	120-140
Frequency	5	9	11	16	12	5	3

Que-5 (A) Attempt the following. (04)

(1) Define : Series.

(2) Write the formula for S_n in G.P.

(3) 1.5, 2.5, 3.5, 4.5, _____ find the 13th term in A.P.

(4) Write an equation of Relation between A.M., G.M. and H.M.

Que-5 (B) Answer the following : (any one) (02)

(1) Find the n^{th} term of series $5/2, 20/13, 10/9, 20/23, \underline{\hspace{2cm}}$

(2) Prove that $1/3125$ is a term of the series $25, 5, 1, \underline{\hspace{2cm}}$

Que-5 (C) Answer the following : (any one) (03)

(1) The third term of A.P. is 12 and six term is 42, find 26th term.

(2) Find the general term for the arithmetic sequence -1, 3, 7, 11, _____ Then find a_{12} .

Que-5 (D) Answer the following : (any one) (05)

(1) The sum of the three numbers in a G.P. is 28 and their product is 512. Find the numbers.

(2) The sum of four numbers in an A.P. is 24 and their product is 945. Find the four numbers.
