

Model Paper– 1
Hi-Tech Institute of Engineering & Technology
B.C.A. Examination
(Semester-I) Odd Semester
Mathematics-1
(BCA-101)

Time: 3 Hours

Maximum Marks: 75

Faculty Name: Mr. Vivek Gupta

Note: Attempt questions from all sections as per instructions.

Section – A

Note: Attempt all questions.

5 x 3 = 15

1. Define the rank of a Matrix with examples.
2. Write the formula $\vec{a} \cdot \vec{b}$ and $\vec{a} \times \vec{b}$.
3. Give the statement of Rolle's theorem.
4. Show that $A = \begin{bmatrix} 3 & 1 + 2i \\ 1 - 2i & 2 \end{bmatrix}$ is Hermitian.
5. Evaluate: $\int x^2 \sin x dx$.

Section – B

Note: Attempt any two questions.

2 x 7.5 = 15

6. Differentiate $(\sin x)^x$.
7. Use Cramer's rule to solve the following system of equations
 $3x + y - z = 1$, $5x + 2y + 3z = 2$, $8x + 3y + z = 3$.
8. Calculate the area of parallelogram spanned by the vectors $a = (1, -1, 3)$ and $b = (2, -7, 1)$.

Section – C

Note: Attempt any three questions.

3 x 15 = 45

9. Find the unit vector perpendicular to both the vectors $4\hat{i} - \hat{j} + 3\hat{k}$ and $-2\hat{i} + \hat{j} - 2\hat{k}$.
10. If $f(x) = \frac{|x|}{x}$, for $x \neq 0$ and $f(x) = 0, x = 0$ then show that $f(x)$ is not continuous at $x = 0$.
11. Show that $\lim_{x \rightarrow 2} \frac{|x-2|}{x-2}$ does not exist.
12. If $y = (\sin^{-1} x)^2$, prove that $(1-x^2)y_2 - xy_1 - 2 = 0$ and $(1-x^2)y_{n+2} - x(2n+1)y_{n+1} - n^2y_n = 0$.
13. Using Maclaurin's series, expand e^x in ascending Power of x .