Que.1 Attempt the following.   3

   (1) $\log 0 = \ldots$
      (a) 0 (b) $-\infty$ (c) 1 (d) -1

   (2) If $A = \begin{bmatrix} 1 & 3 \\ 4 & 6 \\ 0 & 4 \end{bmatrix}$ then order of A is $\ldots$
      (a) 2x3 (b) 3x3 (c) 2x2 (d) 3x2

   (3) If A & B are not commutative to each other then $(A + B)^2 = \ldots$
      (a) $A^2 - 2AB + B^2$ (b) $A^2 + B^2$
      (c) $A^2 + 2AB + B^2$ (d) $A^2 + AB + BA + B^2$

Que.2 Attempt the following.(any two)   4

   (1) Evaluate $\lim\limits_{x \to 0} \dfrac{\log(\sin 2x)}{\log(\sin x)}$

   (2) Define triangular matrix and identity matrix with example.

   (3) Define Determinant and Minor of matrix with example.

Que.3 [A] Find a,b and c for which $\lim\limits_{x \to 0} \dfrac{ae^x - 2b\cos x + 3ce^{-x}}{x \sin x} = 2$ 6

<div align="center">OR</div>

Que.3 [B] Evaluate $\lim\limits_{x \to 1} (4 - 4x^2)^{\frac{1}{\log(2 - 2x)}}$ 6

Que.4 [A] Prove that Every square matrix can be expressed in one and only one way as the sum of a
symmetric and skew symmetric matrix.   6
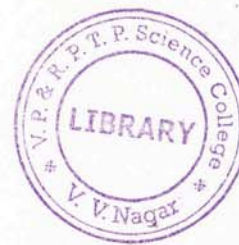
<div align="center">OR</div>

Que.4 [B] Prove that Every square matrix can be expressed in one and only one way as $P + iQ$ where
P and Q are Hermitian matrices.   6

Que.5 [A]State and prove Cayley-Hamilton theorem.   6

<div align="center">OR-</div>

Que.5 [B] If $A = \begin{pmatrix} 5 & 7 & 3 \\ 1 & 5 & 2 \\ 3 & 2 & 1 \end{pmatrix}$ then find $A^3 - 11A^2 + 15A$ 6