V.P. AND R.P.T.P. SCIENCE COLLEGE
B.Sc.SEMESTER -III
INTERNAL EXAMINATION
SUBJECT :MATHEMATICS (CALCULUS AND ALGEBRA - I)
SUBJECT CODE : US03EMTH05

Date : 6/10/2016 Maximum Marks : 25
Day : Thursday Time :3 p.m. to 4 p.m.

Que.1 Attempt the following. 3

(1) $\lim_{x\to 0} \frac{x}{\tan x} =$ .....

(a) 0 (b) 1 (c) x (d) 2

(2) For hermitian matrix $A =$ .....

(a) A^{θ} (b) $-A$ (c) A' (d) $\overline{A}$

(3) If $B = \begin{bmatrix} 3+i & i \\ -i & 1 \end{bmatrix}$ then $\overline{B} =$.....

(a) $\begin{bmatrix} 3-i & -i \\ i & 1 \end{bmatrix}$ (b) $\begin{bmatrix} 3-i & i \\ i & 1 \end{bmatrix}$ (c) $\begin{bmatrix} 3+i & -i \\ -i & 1 \end{bmatrix}$ (d) $\begin{bmatrix} 3-i & -i \\ i & -1 \end{bmatrix}$

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

(1) Evaluate $\lim_{x\to 0} \frac{e^x + \log(1-x) - 1}{\tan x - x}$

(2) State Reversal,Associative and Distributive law for matrix.

(3) Define Diagonal and Scalar matrix.

Que.3 [A] Evaluate $\lim_{x\to 0} \frac{\log(\log(1-3x^2))}{\log(\log(\cos 2x))}$ 6

OR

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

Que.4 [A] For the following matrix show that $AA' = \mathrm{I}$; $A = \begin{pmatrix} 0 & 2m & n \\ l & m & -n \\ l & -m & n \end{pmatrix}$

where $l = \frac{1}{\sqrt{2}}, m = \frac{1}{\sqrt{6}}, n = \frac{1}{\sqrt{3}}$ 6

OR

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]If $A = \begin{pmatrix} 3 & -4 \\ 1 & -1 \end{pmatrix}$ then show that $A^k = \begin{pmatrix} 1+2k & -4k \\ k & 1-2k \end{pmatrix}$ where k is any positive number. 6

OR

Que.5 [B] Verify the results

(1)$(AB)C = A(BC)$ (2) $(A+B)C = AC + BC$ (3) $A(B+C) = AB + AC$
where $A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$, $B = \begin{pmatrix} 2 & -7 \\ 5 & 8 \end{pmatrix}$, $c = \begin{pmatrix} 1 & 5 \\ 0 & 2 \end{pmatrix}$ 6