

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

Date : 08/10/15
 Day : Thursday

Maximum Marks : 25
 Time : 3 p.m. to 4 p.m.

Que.1 Attempt the following.

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(1) $\lim_{x \rightarrow 0} \frac{\sin 2x}{x} = \dots\dots\dots$

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

(2) For symmetric matrix $A = \dots\dots\dots$

- (a) A^θ (b) $-A$ (c) A' (d) \bar{A}

(3) Distributive law for the matrix is $\dots\dots\dots$

- (a) $AB = BA$ (b) $AB(C) = (AB)C$ (c) $(AB)' = B'A'$ (d) $A(B + C) = AB + AC$



Que.2 Attempt the following.(any two)

4

(1) Evaluate $\lim_{x \rightarrow 0} \frac{\log(\sin x)}{\cot x}$

(2) Define scalar and upper triangular matrix with example.

(3) If $A = \begin{bmatrix} 1 & 2 & 5 \\ -2 & 6 & -8 \\ 5 & 8 & 7 \end{bmatrix}$ then find (1) $|A|$ (2) $|A'|$

Que.3 [A] Find a , b , c so that $\lim_{x \rightarrow 0} \frac{ae^x - 2b \cos x + 3ce^{-x}}{x \sin x}$

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OR

Que.3 [B] Evaluate $\lim_{x \rightarrow 0} \left(\frac{1}{2x^2} - \frac{\cot^2 x}{2} \right)$

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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.

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OR

Que.4 [B] Define skew Hermitian matrix and if $A = \begin{bmatrix} 2+i & 3-i & 4+5i \\ 1+3i & 2i & 5-6i \\ 3+i & 6-5i & 1+i \end{bmatrix}$

then find $(\bar{A})'$ and $A + A^\theta$.

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Que.5 [A] State and prove Cayley-Hamilton theorem with an example.

6

OR

Que.5 [B] Define characteristic matrix and characteristic equation of matrix also find the same for

$$\begin{bmatrix} 2 & -1 & 4 \\ 1 & 0 & 2 \\ 6 & 2 & 4 \end{bmatrix}$$

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