UKA TARSADIA UNIVERSITY

B.Pharm. (1st Semester)

Subject :030020105-Elementary (Remedial) Mathematics (NEW)

Time : 10:00 am to 1:00 pm Date : 30/12/2013

Duration : 3 Hours **Max. Marks : 70.**

Instructions:

1. Attempt all questions.
2. Write each section in a separate answer book.
3. Make suitable assumptions wherever necessary.
4. Figures to the right indicate full marks allocated to that question.
5. Draw diagrams/figures whenever necessary.

SECTION - 1

Q-1 (A) Do as directed. **[07]**

I) Expand the following determinant $\begin{vmatrix} x & -y \\ y & x \end{vmatrix}$.

II) Expand the following determinant $\begin{vmatrix} cosecx & cotx \\ cotx & cosecx \end{vmatrix}$

III) Find the distance between the points $(3,-1)$ *and* $(-2,4)$.

IV) Define symmetric matrix.

V) Evaluate $\lim_{x\to 1} x^2 + x + 1$

VI) Given f *and* g such that $f(x) = x^2 + 5$ and $g(x) = cosx$ for $x \in R$, determine gof *and* fog.

VII) If $A = \begin{bmatrix} 1 & -2 & -2 \\ 2 & 0 & 3 \end{bmatrix}$, $B = \begin{bmatrix} -2 & 3 & 3 \\ 0 & 3 & 2 \end{bmatrix}$ then find $3A - 2B$.

Q-1 (B) Answer the following in brief. (Any 4) **[08]**

I) If $A = B$ and $A = \begin{bmatrix} 2 & -1 \\ 3 & 5 \end{bmatrix}$ *and* $B = \begin{bmatrix} x+3 & 5-y \\ 6-z & 9+2w \end{bmatrix}$ then find the value of x, y, z, w.

II) If $A = \begin{bmatrix} 2 & 6 & 4 \\ 4 & 4 & 8 \\ 3 & -3 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 2 & 4 & 0 \\ 4 & 3 & 5 \\ 0 & 1 & 6 \end{bmatrix}$ find $A + B$.

III) Find the point which divides the joining of $A(-3,4)$ and $B(9,6)$ internally in the ratio 3:2.

IV) Prove that the four points whose co-ordinates are $(0,5), (-2,-2), (5,0)$ *and* $(7,7)$ form a rhombus.

V) Evaluate the limit $\lim_{x\to 1} \frac{x^4-3x+2}{x^3-5x^2+3x+1}$

VI) Evaluate the limit $\lim_{x\to 0} \frac{1-cosx}{x^2}$

Q-2 Answer the following. **[10]**

A) Let $A = \begin{bmatrix} 1 & 2 & -1 \\ 3 & 5 & 6 \\ 0 & 1 & 2 \end{bmatrix}$ *and* $B = \begin{bmatrix} 2 & -1 & 5 \\ 0 & 8 & 7 \\ 3 & 1 & 2 \end{bmatrix}$

1. $(AB)^T = B^T A^T$
2. $(A+B)^T = A^T + B^T$.

OR

A) Find the equation of locus of point such that the sum of its distance from $(0,3)$ and $(0,-3)$ is 8.

B) Given that $f(x) = 4x - 3$ and $g(x) = x^4$ for all $x \in R$, find the following:
$gof(x), fog(x), fof(x), gog(x)$

OR

B) Solve the following system of equation using Cramer's rule:
$5x - 7y + z = 11, \quad 6x - 8y - z = 15, \quad 3x + 2y - 6y = 7$

Q-3 Answer the following in detail. (Any 2) **[10]**

A) If A=$\begin{bmatrix}2&2&3&2\\3&1&2&0\\3&4&1&3\end{bmatrix}$,B=$\begin{bmatrix}1&2&3&4\\0&1&0&3\\0&0&1&6\end{bmatrix}$, and C=$\begin{bmatrix}2&-1&4&5\\-1&2&1&7\\-1&-3&0&9\end{bmatrix}$, Evaluate A+2B+C.

B) Evaluate the limits; 1) $\lim_{x\to a}\frac{sinx-sina}{\sqrt{x}-\sqrt{a}}$

2) $\lim_{x\to a}\frac{cosecx-cotx}{x}$

C) If $A=\begin{bmatrix}1&5&2\\2&-2&1\\1&1&2\end{bmatrix}$ then prove that $(adjA)=A$.

SECTION – 2

Q-4 (A) Do as directed. **[07]**

I) Find ; (1) $\frac{d}{dx}sinx$, (2) $\frac{d}{dx}logx$

II) Prove that $cos4x=1-8sin^2xcos^2x$

III) Convert $\frac{\pi}{3}$ to degree Measure

IV) Differentiate $tan3x^2$.

V) Find ; (1) $\int e^x dx$, (2) $\int a^x dx$,

VI) Find $\frac{dy}{dx}$ when $y=\log(mx+c)$

VII) Find the value of $cos^2 45°-sin^2 15°$

Q-4 (B) Answer the following in brief. (Any 4) **[08]**

I) Find the value of $sin75°, \cos 15°$

II) Find the derivative of $e^x logx$.

III) Integrate: $\int\frac{cosec^2x}{1+cotx}dx$

IV) Integrate: $\int\frac{x^2}{a^6-x^6}dx$

V) Find the value of $sin105°$ and $cos105°$.

VI) Find the derivative of $\frac{sin3x}{x}$ with respect to x.

Q-5 Answer the following. **[10]**

A) Prove that , $\int\sqrt{a^2-x^2}dx=\frac{x}{2}\sqrt{a^2-x^2}+\frac{a^2}{2}sin^{-1}\frac{x}{a}+c, |x|\le a$

OR

A) Prove that $\frac{cosA}{1-sinA}=tan\left(45°+\frac{A}{2}\right)$.

B) Prove that $\cos 6°\ \cos 42°\ \cos 66°\ \cos 78°=\frac{1}{16}$

OR

B) If $x=a(t+sint)\ and\ y=a(1-cost)$ find $\frac{d^2y}{dx^2}$ at $t=\frac{\pi}{2}$.

Q-6 Answer the following in detail. (Any 2) **[10]**

A) If $y=\frac{x-cosx}{sinx+x}$ and $y=xsinx$. find $\frac{dy}{dx}$.

B) Integrate $\int\frac{sinxcosx\,dx}{a^2sin^2x+b^2cos^2x}$

C) If $A+B+C=\pi$, prove that $sin2A-sin2B+sin2C=4\,cosA\,sinB\,cosC$