

**UKA TARSADIA UNIVERSITY**

Maliba Pharmacy College

B. Pharm 1<sup>st</sup> Semester Internal Examination 2013 (*Mid-Sem 2*)

**030020105-Elementary Mathematics**

Time: 10:00 a.m. To 1:00 p.m.

Max. Marks: **70**

Date: 03/12/2013

**Instructions:**

- Question no. **1 is compulsory.**
- From Q.2 to Q.7 attempt any **four** questions.
- Make suitable assumption whenever necessary.
- Figures to the right indicate full marks.

**Q.1** (a) Answer the following: (any six) **06**

- 1 Convert the following into radian measure:  
(a)  $45^\circ$  (b)  $120^\circ$
- 2 Convert the following into degree measure:  
(a)  $\frac{\pi}{3}$  (b)  $\frac{\pi}{2}$
- 3 Differentiate  $e^{4x}$  with respect to  $x$ .
- 4 Integrate  $\int x^5 dx$
- 5 Differentiate  $x \log x$  with respect to  $x$ .
- 6 Write the order of matrices a)  $\begin{bmatrix} 2 & 5 \\ -5 & 1 \\ 8 & 0 \end{bmatrix}$ , b)  $\begin{bmatrix} a & b & c \\ m & n & o \end{bmatrix}$
- 7 Define: Unit Matrix with example.
- 8 If distance between (4,1) and (1,y) is 3, then find the value of y.

(b) Describe in brief: (any four) **08**

- 1 Differentiate  $\frac{x-1}{\sqrt{x}}$  with respect to  $x$ .
- 2 Find the derivative of  $\sec^{-1} x^2$
- 3 Using the properties of determinant, find the value of  $\begin{vmatrix} 3 & 2 & 4 \\ 2 & 3 & 6 \\ 6 & 4 & 8 \end{vmatrix}$
- 4 Evaluate  $\lim_{x \rightarrow 4} \frac{x^2 - 16}{x - 4}$
- 5 Find the slope of line joining the points: **(a)** (5,5) and (9,9) **(b)** (4,4) and (3,5)
- 6 Find the point which divides the joining of A(-1,-5) and B(1,-2) externally in the ratio 4:3

**Q.2** (a) Find  $\frac{dy}{dx}$  where  $y = e^{ax} \cos (bx + c)$  **04**

(b) 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  $A+2B+C$ . **05**

(c) Evaluate the integrals (a)  $\int \frac{dx}{x\sqrt{x^2-1}\sec^{-1}x}$  (b)  $\int \frac{dx}{x \log|x|}$  **05**

**Q.3** (a) Find the following system of equation by matrix inverse method : **04**

$$3x - y = 2, 4x - y = 1$$

(b) If  $y = \frac{x - \cos x}{\sin x + x}$  find  $\frac{dy}{dx}$ . **05**

(c) Integrate  $\int \frac{\sin 2x}{\sin^4 x + \cos^4 x} dx$  **05**

- Q.4** (a) Find the inverse of matrix  $A = \begin{bmatrix} -1 & 2 & -3 \\ 2 & 1 & 0 \\ 4 & -2 & 5 \end{bmatrix}$  **04**
- (b) Find the derivative of  $\cos^{-1} \frac{a+b\cos x}{b+a\cos x}$  with respect to  $x$ . **05**
- (c) Prove that  $\frac{\sin\theta + \sin 3\theta + \sin 5\theta + \sin 7\theta}{\cos\theta + \cos 3\theta + \cos 5\theta + \cos 7\theta} = \tan 4\theta$  **05**
- Q.5** (a) If  $A = \begin{bmatrix} -4 & -3 & -3 \\ 1 & 0 & 1 \\ 4 & 4 & 3 \end{bmatrix}$  then prove that  $(\text{adj}A) = A$  **04**
- (b) Solve the following system of equation using cramer's rule: **05**  
 $5x - 7y + z = 11, \quad 6x - 8y - z = 15, \quad 3x + 2y - 6z = 7$
- (c) If  $A = \begin{bmatrix} 5 & 3 \\ 12 & 7 \end{bmatrix}$ , verify  $A^2 - 4A + 3I_2 = 0$  **05**
- Q.6** (a) If  $y = A\sin mx + B\cos mx$ , prove that  $y_2 + m^2y = 0$  **04**
- (b) Differentiate  $x^{x^x}$  with respect to  $x$ . **05**
- (c) Prove that  $\cos 20^\circ \cos 40^\circ \cos 80^\circ = \frac{1}{8}$  **05**
- Q.7** (a) Find the second derivative of  $\frac{\log x}{x}$ . **04**
- (b) Differentiate  $(\sin x)^x$  with respect to  $x$ . **05**
- (c) Find the equation of locus of point such that the sum of its distance from  $(0,3)$  and  $(0,-3)$  is 8. **05**