

GUJARAT TECHNOLOGICAL UNIVERSITY
B. Pharm. – SEMESTER – I • EXAMINATION – WINTER • 2014

Subject Code: 210006**Date: 07-01-2015****Subject Name: Elementary (Remedial) Mathematics****Time: 10:30 am - 01:30 pm****Total Marks: 80****Instructions:**

1. Attempt any five questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1**
- (a) Solve $(2x+7)(x^2-9)(2x-5) = 91$ **06**
- (b) Expand by Sarrus rule: **05**
- $$\begin{vmatrix} 1 & 4 & -3 \\ -5 & 2 & 6 \\ -1 & -4 & 2 \end{vmatrix}$$
- (c) Solve the following simultaneous equations. **05**
- $$\begin{aligned} X^2 + Y^2 &= 185 \\ X + Y &= 19 \end{aligned}$$
- Q.2**
- (a)
$$\begin{matrix} a+b & b+c & c+a \\ b+c & c+a & a+b \\ c+a & a+b & b+c \end{matrix} = 2(3abc - a^3 - b^3 - c^3)$$
 06
- (b) **05**
- $$\text{If } A = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 2 & 0 & 1 & 2 \\ 3 & 1 & 0 & 5 \end{pmatrix} \text{ and } B = \begin{pmatrix} 2 & 1 & 0 \\ 3 & 2 & 1 \\ 1 & 0 & 1 \end{pmatrix}$$
- (c) Find AB or BA, Whichever exists. **05**
- The relationship between the displacement s, velocity v and acceleration a of a piston is given by the equations.
- $$\begin{aligned} s+2v+2a &= 4 \\ 3s-v+4a &= 25 \\ 3s+2v-a &= -4 \end{aligned}$$
- Use Cramer's rule to determine the values of s,v,and a.
- Q.3**
- (a)
- i. Solve the equation: $\log(x-1) + \log(x+1) = 2 \log(x+2)$ **06**
 - ii. Find the values of λ that satisfy the following equation.
- $$\begin{vmatrix} (5-\lambda) & 7 & -5 \\ 0 & (4-\lambda) & -1 \\ 2 & 8 & (-3-\lambda) \end{vmatrix} = 0$$
- (b) Given the matrix **05**
- $$A = \begin{vmatrix} 1 & 2 & 3 \\ 1 & 3 & 5 \\ 1 & 5 & 12 \end{vmatrix}$$
- verify that $A(\text{adj } A) = (\text{adj } A)A = |A| I$

	(c)	Solve by matrix inversion method $-3X_1 + 6X_2 - 11X_3 = 14$ $3X_1 - 4X_2 + 6X_3 = -5$ $4X_1 - 8X_2 + 13X_3 = -17$	05
Q .4	(a)	Prove the following i. $(\operatorname{cosec} \theta - \sin \theta)(\sec \theta - \cos \theta)(\tan \theta + \cot \theta) = 1$ ii. $(1 + \cot \theta)^2 + (1 - \cot \theta)^2 = 2 \operatorname{cosec}^2 \theta$	06
	(b)	i. Find the value of $\sin 23^\circ 26'$ ii. Find the angle θ if $\sin \theta = 0.7071$, $0 < \theta < 90^\circ$	05
	(c)	How many three digit numbers can be formed from the digit 0,1,2,3,4,5,6 if each digit can be used only once? How many of these are odd numbers? How many are greater than 330?	05
Q .5	(a)	i. Find the middle term in the expansion of $\left(x + \frac{1}{x}\right)^{10}$ ii. Find the value of $(19)^4$ by using binomial expansion only.	06
	(b)	Find the area of the quadrilateral whose vertices are (2,1), (6,0), (5,-2) and (-3,-1).	05
	(c)	If $f: \mathbb{R} \rightarrow \mathbb{R}$ $f(x) = 2x + 1$ and $g: \mathbb{R} \rightarrow \mathbb{R}$ $g(x) = 3x - 2$ Find fog, gof, fof and gog exist.	05
Q .6	(a)	Find $\frac{dy}{dx}$ for the following functions $y = a \sin^{-1}(5x^2)$ and $y = x^x$	06
	(b)	If $y = A \sin x + B \cos x$ prove that $\frac{d^2y}{dx^2} + y = 0$	05
	(c)	Solve $x \frac{dy}{dx} + \cot y = 0$ given $y = \frac{\pi}{4}$ when $x = \sqrt{2}$	05
Q .7	(a)	Integrate w.r.t. x i. $\log x$ ii. $\frac{2x+1}{\sqrt{x^2-2x+5}}$	06
	(b)	Evaluate : $\int \frac{x e^x}{(1+x^2)} dx$	05
	(c)	Evaluate: $\int \frac{3x-5}{x^2-x-2}$	05
