Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

B. Pharm. – SEMESTER – I • EXAMINATION – WINTER 2013

Subject Code: 210006 **Date: 27-12-2013**

Subject Name: Elementary (Remedial) Mathematics

Time: 02.30 pm - 05.30 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 the following equations: **06**

(i) $5x^2 - 2x - 4 = 0$

(ii) $(x + 3)^2 = 4x - 1$

(b) Solve the following system of linear equation using Cramer's rule **05**

$x + 2y = -4$; $5x + 3y = 1$

(c) Find the sum of the first 20 terms of an A.P. 2,7,12,17,22,……. **05**

Q.2 (a) Solve the following system of equations using inverse of matrix **06**

$4x - y - z = -7$; $x - 5y + z = -10$; $x + 2y + 6z = 9$

(b) Solve the following simultaneous equation using Cramer's rule **05**

$x + 2y + 3z = 5$; $2x - 3y - z = 3$; $-3x + 4y + 5z = 3$

(c) If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$, then prove that $A^2 - 5A + 7I = 0$, where I is unit matrix. **05**

Q.3 (a) An automatic filling machine is used to fill syrup in 100gms bottles. A random sample of 100 bottles showed the following: **06**

Syrup content (in gms.)	85 – 90	90 – 95	95 – 100
Frequency	10	15	24
Syrup content (in gms.)	100 – 105	105 – 110	110 – 115
Frequency	30	18	3

Find the Mean, Standard deviation and Coefficient of variation from the above data.

(b) An urn contains 5 red and 10 black balls. Eight of them are drawn and placed in another urn. What is the chance that later contains 2 red and 6 black balls? **05**

(c) The catalytic decomposition of hydrogen peroxide may be followed by measuring the volume of oxygen liberated in a gas burette. From such an experiment, it was found that the concentration of hydrogen peroxide remaining after 65 minutes, expressed as the volume in milliliters of gas evolved was 9.60 from an initial concentration of 57.90. **05**

(i) Calculate k using equation $k = \frac{2.303}{t} \log \frac{c_0}{c}$, where k is the first order constant, c is the concentration of hydrogen peroxide remaining undecomposed at time t, and c_0 is concentration at time t = 0.

(ii) How much hydrogen peroxide remained undecomposed after 25 minutes?

Q.4 (a) (i) if the distance between A(5, a) and B(2, 6) is $3\sqrt{2}$, find the value of a. **06**

(ii) Find the area of the triangle whose vertices are (4, 4), (3, –2) and (–3, 16).

(b) Prove that $\frac{\frac{1}{2}\log 16 - \frac{1}{3}\log 8}{\log 4} = \frac{1}{2}$ **05**

(c) 12% of the tablets produced by a tablet machine are defective. What is the probability that out of a random sample of 20 tablets produced by the machine, 5 are defective? **05**

Q.5 (a) Prove that **06**

(i) $\tan 3A = \frac{3\tan A - \tan^3 A}{1 - 3\tan^2 A}$

(ii) $\cos(y - \pi) + \sin\left(y + \frac{\pi}{2}\right) = 0$

(b) If $\sin\theta = \frac{5}{13}$ and θ lies in the second quadrant, find the values of other five trigonometric function. **05**

(c) Find the equation of locus of a point which moves such that it remains equidistance from the points A (3, –1) and B (4, 2). **05**

Q. 6 (a) (i) Evaluate **06**

$$\lim_{x \to 3} 2x^3\sqrt{x^2 - 7}$$

(ii) Find the limit if it exist

$$\lim_{x \to -1} \frac{x^2 - x - 2}{2x^2 - x - 3}$$

(b) (i) Differentiate $x^5 + \log x + 9$ w.r.t. x **05**

(ii) Find $\frac{dy}{dx}$ if $y = x^3 + \cos x$

(c) Find the middle term in the expansion of $\left(x^2 - \frac{2}{x}\right)^6$ **05**

Q.7 (a) Evaluate **06**

(i) $\int \left(4 + \frac{3}{7}x - 6x^2\right) dx$

(ii) $\int \left(x + \frac{1}{\sqrt{x}}\right)^2 dx$

(b) Evaluate **05**

$$\int_0^{\frac{\pi}{2}} \frac{\sqrt{\sin x}}{\sqrt{\sin x} + \sqrt{\cos x}}\, dx$$

(c) Find $\frac{dy}{dx}$ for $x = 3\cos\theta - 2\cos^3\theta$; $y = 3\sin\theta - 2\sin^3\theta$ **05**

****