Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

B.PHARM- SEM-I–EXAMINATION – JUNE 2012

Subject code: 210006 Date: 29/06/2012

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 the following system of equations using inverse of a matrix : **06**

$$x + y + z = 3$$
$$2x + y + z = 4$$
$$x + 2y + 3z = 6$$

(b) If α and β are the roots of quadratic equation $x^2 - px + q = 0$, then construct a quadratic equation whose roots are $\frac{q}{p-\alpha}$ and $\frac{q}{p-\beta}$. **05**

(c) Solve by Cramer's rule $\begin{matrix} x + 2y = 9 \\ 2x - 3y = 4 \end{matrix}$ **05**

Q.2 (a) Find mean and standard deviation of the following data : **06**

Protein intake/day	15-25	25-35	35-45	45-55	55-65	65-75	75-85
Number of families	30	40	100	110	80	30	10

(b) In a pharmaceutical factory, three machines A, B and C manufacture 30%, 45% and 25% of the total product respectively. Of these outputs machine A, B and C produce 4%, 3% and 2% respectively, are defective tablets. A tablet is picked at random and is found to be defective. What is the probability that the tablet was produced by the machine B? **05**

(c) If the probability of a bad reaction from a certain injection is 0.001, determine the probability that out of 2000 individuals **05**

(i) Exactly 3.
(ii) more than 2 individuals

will suffer a bad reaction.

Q.3 (a) In a group of students there are 4 girls and 6 boys. In how many ways a committee of 5 members can be formed such that **06**

(i) There are at least 3 girls.
(ii) There are at the most 3 boys in the committee.

(b) The third term of an arithmetic progression (A.P.) is 10 and its 10^{th} term is 31. Find the sum of first 25 terms of this A.P. **05**

(c) Find the middle term in the expansion of $\left(1+\sqrt{x}\right)^{20}$. **05**

Q.4 (a) (i) Prove that $\sin 2A = \dfrac{2\tan A}{1+\tan^2 A}$. **03**

(ii) Show that **03**

$$4\sin\frac{\pi}{6}\sin^2\frac{\pi}{3}+3\cos\frac{\pi}{3}\tan\frac{\pi}{4}+\cos ec^2\frac{\pi}{2}=2\sec^2\frac{\pi}{4}$$

(b) If $\sin A=\dfrac{3}{5}, \cos B=-\dfrac{12}{13}$, where A and B both lie in second quadrant, find the value of $\sin(A+B)$. **05**

(c) Prove that $\dfrac{\log 25-\log 125+\frac{1}{2}\log 625}{3\log 5}=\dfrac{1}{3}$ **05**

Q.5 (a) (i) Find the area of the triangle whose vertices are (4, 4), (3, -2) and (-3, 16). **03**

(ii) Show that the vertices of a (7, 9), (3, -7) and (-3, 3) form a right angled isosceles triangle. **03**

(b) A point P(x, y) moves such that its distance from the fixed point (3, 2) remains 4 unit. Find the equation of its locus. **05**

(c) Find the equation of the line passing through the points (2, 3) and (5, -2). **05**

Q. 6 (a) (i) Find the limit if it exists $\lim\limits_{x\to 3}\dfrac{\sqrt{x^2+7}+\sqrt{3x-5}}{x+2}$ **03**

(ii) Find $\dfrac{dy}{dx}$ for the function $y=5^{x^5}$ **03**

(b) (i) Differentiate the following w.r.t. x **03**

$$x^3+y^3+3x^2y=a^3$$

(ii) Find $\dfrac{dy}{dx}$, if $x=at^2$, $y=2at$ **02**

(c) Find $\dfrac{d^2y}{d\theta^2}$ when θ = 0 given that y = 4 sec 2 θ **05**

Q.7 (a) Evaluate $\int\dfrac{3x-5}{x^2-x-2}dx$ **06**

(b) (i) Evaluate $\int x\log x\,dx$ **03**

(ii) Evaluate $\int_0^{\frac{\pi}{2}}\sin^2 x\,dx$ **02**

(c) Solve $\dfrac{dy}{dx}+\dfrac{4x}{x^2+1}y=\dfrac{1}{(x^2+1)^3}$ **05**

****