

Seat No: \_\_\_\_\_

Enrolment No: \_\_\_\_\_

**GUJARAT TECHNOLOGICAL UNIVERSITY**

**B. Pharmacy Sem-I Examination January-2010**

**Subject Code: 210006**

**Subject Name: Elementary (Remedial) Mathematics**

**Date: 07 / 01 / 2010**

**Time: 12.00 – 3.00 pm**

**Total Marks: 80**

**Instructions:**

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

**Q-1 (a)** Give the general form of quadratic equation. Also show that if the sum of the roots of the equation  $\frac{1}{x+a} + \frac{1}{x+b} = \frac{1}{c}$  is zero then the product of the roots is  $-\frac{1}{2}(a^2 + b^2)$ . **06**

**(b)** If  $\alpha$  and  $\beta$  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 the simultaneous equations  $x + y = 8$  and  $x^2 + 5x + y = 4$ . **05**

**Q-2 (a)** Define symmetric and skew-symmetric matrix. Express the matrix  $A = \begin{bmatrix} 2 & 4 & 6 \\ 8 & 10 & 12 \\ 14 & 16 & 18 \end{bmatrix}$  as a sum of symmetric and skew-symmetric matrix. **06**

**(b)** Solve the following system of equations using inverse of a matrix: **05**  
 $x + y + z = 3$   
 $2x + y + z = 4$   
 $x + 2y + 3z = 6$

**(c)** Evaluate the following determinant **05**  
 $\begin{vmatrix} 1+x & 1 & 1 \\ 1 & 1+y & 1 \\ 1 & 1 & 1+z \end{vmatrix}$ .

**Q-3 (a)** Define Mean and Standard deviation for grouped data. Calculate the mean and standard deviation for the following table giving the age distribution of 542 members. **06**

Age in years	20-30	30-40	40-50	50-60	60-70	70-80	80-90
No. of members	3	61	132	153	140	51	2

- (b) The following distribution shows the days of confinement after delivery for 25 patients. **05**

Days of confinement	6	7	8	9	10
Number of patients	7	6	5	4	3

Find the mean, standard deviation.

- (c) The probability that an infection is cured by a particular antibiotic drug within 5 days is 0.75. Suppose four patients are treated by this antibiotic drug, then what is the probability that
- No patient is cured
  - Exactly two patient are cured
  - At least two patient are cured

- Q-4 (a)** In a pharmaceutical factory, machine A and B manufacture 40% and 60% of the total output. Of this production of tablets, machine A and B produce 5% and 10% 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 A? **06**

- (b) The 3<sup>rd</sup> term of an arithmetic progression (A.P) is 10 & its 10<sup>th</sup> term is 31. Find the sum of first 25 terms of this A.P **05**

- (c) Find the constant term in the expansion of  $\left(x^2 + \frac{1}{x^3}\right)^5$  **05**

- Q-5 (a)** If  $\sin \alpha = \frac{1}{\sqrt{5}}$  and  $\cos \beta = \frac{3}{\sqrt{10}}$  and if  $0 < \alpha, \beta < \frac{\pi}{2}$ , then prove that  $\alpha + \beta = \frac{\pi}{4}$ . **06**

- (b) Find the equation of a straight line passing through the point of intersection of the lines  $y = 2x + 1$  and  $y = x + 2$  & which is parallel to  $y = 4x + 7$ . **05**

- (c) If  $\log\left(\frac{a+b}{2}\right) = \frac{1}{2}(\log a + \log b)$  then prove that  $a=b$ . **05**

- Q-6 (a)** If  $x = (a + bx)e^{y/x}$  then prove that  $x^3 \frac{d^2 y}{dx^2} = \left(x \frac{dy}{dx} - y\right)^2$  **06**

- (b) Find  $y_n$  for  $y = \frac{x^4}{(x-1)(x-2)}$  **05**

- (c)  $(xy^2 + x)dx + (yx^2 + y)dy = 0$  **05**

- Q-7 (a)** The rate at which bacteria multiply is proportional to the instantaneous number present. If the original number doubles in 2 hours, in how many hours will it triple? **06**

- (b) Evaluate  $\int \frac{dx}{x\sqrt{x^2+1}}$  **05**

- (c) Evaluate  $I = \int_0^{\pi/2} (1 + \cot x)^{-1} dx$ . **05**

\*\*\*\*\*