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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 $-\frac{1}{2}\left(a^2+b^2\right)$. **06**

(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 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

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(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 within5 days is 0.75. Suppose four patients are treated by this antibiotic drug, then what is the probability that **05**

i. No patient is cured
ii. Exactly two patient are cured
iii. 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 3rd term of an arithmetic progression (A.P) is 10 & its 10th 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 $x^3\frac{d^2y}{dx^2}=\left(x\frac{dy}{dx}-y\right)^2$ **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**

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