GUJARAT TECHNOLOGICAL UNIVERSITY
B. Pharmacy Sem-I   Remedial examination March 2009

Subject code: 210006
Subject Name: Elementary (Remedial) Mathematics

Date: 18 / 03 / 2009   **Time: 02:30pm- 05:30pm**
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   **16**

(a) Solve $x (x + 5) (x + 7) (x + 12) = - 150$

(b) Solve the following simultaneous equations

$x^2 + y^2 = 185$; $x + y = 19$

(c) Solve the following simultaneous equations using Cramer's Rule.

$x + y + z = 4$; $2x – 3y + 4z = 33$; $3x -2y-2z = 2$

(d) If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ then prove that $A^2 -5A + 7I = 0$

Q.2   **16**

(a) Expand by SARRUS RULE

$\begin{vmatrix} 3 & 4 & 1 \\ 2 & 0 & 7 \\ 1 & -3 & -2 \end{vmatrix}$

(b)   Using theorems prove that

$\begin{vmatrix} x & y & z \\ x^2 & y^2 & z^2 \\ x^3 & y^3 & z^3 \end{vmatrix} = xyz (x - y) (y- z) (z – x)$

(c)   If $A = \begin{bmatrix} 3 & 5 \\ 16 & 27 \end{bmatrix}$ Verify that $AA^{-1} = A^{-1}A = I$

(d)   Solve by MATRIX INVERSION method.

$-3x_1 + 6x_2 -11x_3 = 14$
$3x_1 - 4x_2 + 6x_3 = -5$
$4x_1 - 8x_2 + 13x_3 = -17$

Q.3   **16**

(a) The number N of bacteria in a culture grew at the rate proportional to N. The value of N was initially 100 and increased to 332 in one hour. What will be the value of N after 1.5 hours ?

(b) Evaluate : (1) $\lim\limits_{x \to \infty} \dfrac{x^2 - x + 3}{2x^3 + 1}$ (2) $\lim\limits_{x \to 0} (1 + 2x)^{1/x}$

(c) Calculate the mean and standard deviation from the following data

Value	90-99	80-89	70-79	60-69	50-59	40-49	30-39
Frequency	2	12	22	20	14	4	1

Q. 4   16

[a]

(1) In triangle ABC , $\cos B = \dfrac{3}{5}$ Find $\sin A$, $\cos A$, $\tan A$, $\sin B$, $\tan B$.

(2) If $\cot \theta = \dfrac{-12}{5}$ and θ lies in second quadrant. Find the value of order five trigonometric functions.

(3) Find the value of the following trigonometric ratio :
Sin $(- 1125°)$, cot $(570°)$

(4) Prove that $2 \cos \dfrac{\pi}{13} \cdot \cos \dfrac{9\pi}{13} + \cos \dfrac{3\pi}{13} + \cos \dfrac{5\pi}{13} = 0$

(5) Find the value of $\sin 22\dfrac{1}{2}^{0}$

[b]   If $_{2n}P_3 = 14 \,_n P_3$ Find n

Q. 5   16

[a]

(1) If $y = 3 \cos (\log x) + 4 \sin (\log x)$ Prove that $x^2 y_2 + x y_1 + y = 0$

(2) If $y = 500 e^{7x} + 600 e^{-7x}$. Show that $\dfrac{d^2 y}{dx^2} = 49y$

(3) prove that $\dfrac{d}{dx} [2x \tan^{-1}x - \log (1 + x^2)] = 2 \tan^{-1} x$

[b]   Evaluate the following Differential

    (1) $y = \tan (e^{2x^2 + 3})$

    (2) $x^3 + y^3 - 3axy = 0$

Q. 6   **16**

    [a]   Solve the following differential equations

        (1) $x \, y \, \dfrac{dy}{dx} = y + 2$ if $y \, (1) = 1$

        (2) $2xy \, \dfrac{dy}{dx} = x^2 + 3y^2$

        (3) $x \, (\dfrac{dy}{dx} + y \,) = 1 - y.$

    [b]   Evaluate the following Integration.

        (1) $\int \tan^3 x \, dx$

        (2) $\int_{0}^{4} (4 - x \,)^{3/2} x \, dx$

Q. 7   **16**

(a) Evaluate $(998)^{1/3}$ up to five places of decimal.

(b) Show that the vertices of triangle $(7 , 9)$, $(3 , -7)$, $(-3 , 3)$ from a right angled isosceles triangle.

(c) Find the area of the triangle whose vertices are $(4 , 4)$, $(3 , -2)$, $(-3 , 16)$.

(d) In a group of students there are 4 girls and 6 boys. In how many ways a committee of five members can be formed such that

    I. There are at least 3 girls

    II. There are at the most 3 boys in the committee.

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