GUJARAT TECHNOLOGICAL UNIVERSITY

B. Pharmacy Sem - 1st Regular / Remedial Examination January. 2011

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

Date: 13 /01 /2011   **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   **[16]**

     (a)   Solve $\sqrt{4x+1} + \sqrt{x+1} = 3$

     (b)   A Two digit Number is Four times the sum and Three times the product of its digits. Find the Number.

     (c)   Solve by cramer's Rule.
                $x + 2y = 9; \; 2x - 3y = 4$

     (d)   Define the following with suitable Examples.
                (1) Diagonal Matrix   (2) Transpose of a Matrix.
                (3) Symmetric Matrix   (4) Upper Triangular Matrix

Q:2   **[16]**

     (a)   Expand $D = \begin{vmatrix} 2 & -1 & 3 \\ 4 & 1 & 2 \\ 1 & -1 & 5 \end{vmatrix}$ by Sarrus Method.

     (b)   Prove that
$$\begin{vmatrix} 1 & a & b+c \\ 1 & b & c+a \\ 1 & c & a+b \end{vmatrix} = 0$$

     (c)   Prove that
$$\begin{vmatrix} Sec^2\theta & Cos^2\theta \\ -Cot^2\theta & Sin^2\theta \end{vmatrix} = 1 - 2\,Sin^2\theta\;Cos^2\theta.$$

     (d)   If

$$A = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 2 & 0 & 1 & 2 \\ 3 & 1 & 0 & 5 \end{pmatrix} \quad \& \quad B = \begin{pmatrix} 2 & 1 & 0 \\ 3 & 2 & 1 \\ 1 & 0 & 1 \end{pmatrix}$$

Find AB or BA, Whichever Exists.

Q:3   **[16]**

     (a)   A Population grows at the rate of 5% per year. How long does it take for the population to double ?

     (b)   Evaluate : (1) $\lim\limits_{x\to 2} \dfrac{x^2 - 5x + 6}{x^2 - 4}$

                        (2) Let $f(x) = \dfrac{3x^2 + 8x - 4}{2x^2 + 4x - 5}$

                        Compute $\lim\limits_{x\to\infty} f(x)$ if it Exists.

     (c)   Define : Median.
                The following Figures show incubation Periods of 9 Polio Cases. Find the Median of the data.
                23,19,21,17,22,18,20,24,16.

Q:4 [16]

(a) **(1)** If $\cos A = \dfrac{15}{17}$ Find $\sin A$ & $\tan A$.

(2) Prove that
$$\dfrac{1 + \cot\theta}{1 + \tan\theta} = \cot\theta$$

(3) If $A = 30°$ Verify that $\tan 2A = \dfrac{2\tan A}{1 - \tan^2 A}$

(4) Evaluate : $\sin^{-1}(\cos \pi/5)$

(5) Prove that
$\tan^{-1} 4/5 + \tan^{-1} 2/3 = \tan^{-1} 22/7$

(b) Find 'n' If $_{11}P_n : {}_{12}P_n = 3 : 4$

Q:5 [16]

(a) **(1)** Find $\dfrac{dy}{dx}$ if $x = at^2, \quad y = 2at$.

(2) If $y = 5\cos x - 3\sin x$ Prove that $\dfrac{d^2y}{dx^2} + y = 0$

(3) Differentiate $x^5 + \log x + 9$ w.r.to x

(b) **(1)** Form the differential Equation from $xy = Ae^x + Be^{-x}$,
Where A and B are arbitrary Constants.

(2) Solve the differential Equation : $\dfrac{dy}{dx} + 2y = 4x$.

Q:6 [16]

(a) Solve the following differential Equations.

(1) $\dfrac{dy}{dx} = e^{x-y} + x^2 e^{-y}$

(2) $\tan y \dfrac{dy}{dx} = \sin(x + y) + \sin(x - y)$.

(3) $y \sqrt{1-x^2}\, dy + x\sqrt{1-y^2}\, dx = 0$.

(b) Evaluate the following Integration.

(1) $\displaystyle\int \dfrac{1 + \sin x}{1 + \cos x}\, dx$.
(2) $\displaystyle\int_{1}^{3} (3x^2 + e^x)\, dx$

Q:7 [16]

(a) Find the value of $(19)^4$ by using Binomial Expansion only.

(b) If the distance between A(5,a) & B (2,6) is $3\sqrt{2}$.

Find the value of 'a'.

(c) For what velue of x the area of the triangle formed by the vertices (x,4), (8,2) and (6,7) is 13 units ?

(d) Find the Number of permutations of 5 boys and 5 girls can seat around a circular table such that boys and girls are at alternate position.

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