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Sr. No. 751104

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M.Sc.(Chem.) I SEMESTER

Mathematics for Chemists (CH-104XB)

Time: 90 Minutes

Max. Marks:25

- Instructions:**
1. It is compulsory to answer all the questions (1 marks each) of Part -A in short.
  2. Answer any three questions from Part -B in detail.
  3. Different sub-parts of a question are to be attempted adjacent to each other.

**PART -A**

- Q1 (a) Simplify  $\log_c b \times \log_a c \times \log_b a$  (1)
- (b) Find an unit vector normal to the plane of  $\vec{A} = 3\hat{i} - 2\hat{j} + 4\hat{k}$  and  $\vec{B} = \hat{i} + \hat{j} - 2\hat{k}$  (1)
- (c) Factorize  $\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 & b^2 & c^2 \end{vmatrix}$  (1)
- (d) Given  $\log 2=0.30103$  and  $\log 3=0.47712$ ; find  $\log 0.005$ . (1)
- (e) Find the slope of the line passing through A(2,3) and B(4,7) (1)
- (f) If  $y = x^{\log x}$ , find  $\frac{dy}{dx}$  (1)
- (g) Evaluate  $\int_a^b \frac{\log x}{x} dx$  (1)
- (h) Find the Laplace Transform of  $t \sin^2 t$  (1)
- (i) Define Parseval's identity for Fourier Transform (1)
- (j) Evaluate  $\int_3^4 \frac{dx}{x^3}$  (1)

**PART -B**

- Q2 With the help of Matrices, Solve the following system of linear equations using (5)
- $x+2y+z=7$ ;  $x+3z=11$ ;  $2x-3y=1$

Q3 Prove that  $\frac{1}{\log_a(abcd)} + \frac{1}{\log_b(abcd)} + \frac{1}{\log_c(abcd)} + \frac{1}{\log_d(abcd)} = 1$  (5)

Q4 Find  $\frac{\partial u}{\partial x}$  and  $\frac{\partial u}{\partial y}$  for  $u = \frac{1}{\sqrt{x^2+y^2}}$  (5)

Q5 Find the area bounded by the curves  $y^2 = 4x$  and  $x^2 = 4y$  (5)

Q6 By the method of least squares, fit a second degree parabola to the following data (5)

x	1.0	1.5	2.0	2.5	3.0	3.5	4.0
y	1.1	1.3	1.6	2.0	2.7	3.4	4.1

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