UKA TARSADIA UNIVERSITY

B.Pharm 1st Semester Examination

030020105- Elementary Mathematics

Time: 3 Hours Max. Marks: 70

Instructions:

1. Attempt all questions.
2. Write each section in a separate answer book.
3. Make suitable assumptions wherever necessary.
4. Figures to the right indicate full marks.
5. Draw diagrams/figures whenever necessary.

Section-I

Q-1 (A) Do as directed: [07]

I) Solve the equation : $\sqrt{3}x^2$ + 10x + 7$\sqrt{3}$ = 0

II) Expand by SARRUS RULE : $\begin{vmatrix} 3 & 4 & 1 \\ 2 & 0 & 7 \\ 1 & -3 & -2 \end{vmatrix}$

III) Explain this term and give one example: Symmetric matrix.

IV) Evaluate : (1) ${}_7P_4$ (2) ${}_9P_2$ + ${}_5P_5$

V) Find the n^{th} term of a sequence for which the sum of first n terms is given as $S_n = 2n^2 + 3n$.

VI) For a geometric sequence $T_5 = 81$, $T_2 = 3$ then, Find T_3 and S_3.

VII) Find A^{-1} of the given matrix. A = $\begin{bmatrix} 3 & 7 \\ 2 & 5 \end{bmatrix}$

Q-1 (B) Answer the following in brief: (Any 4) [08]

I) The sum of the roots of the equation $\frac{1}{x+a} + \frac{1}{x+b} = \frac{1}{c}$ is zero. Prove that the product of the roots is $-\frac{1}{2}$ ($a^2 + b^2$).

II) Solve the following simultaneous equations using Cramer's rule.

X + Y + Z = 4

2X – 3Y + 4Z = 33

3X – 2Y - 2Z = 2.

III) For the independent events A and B , if P(A) = 0.3 and P(AUB) = 0.6 then find P(B).

IV) Find the sum of the first n terms of the given series, 9 + 99 + 999 +……

V) If A = $\begin{bmatrix} 0 & 4 & 3 \\ 1 & -3 & -3 \\ -1 & 4 & 4 \end{bmatrix}$; prove that A^2 = I.

VI) Using binomial expansion; find the value of $(11)^5$.

Q-2 Answer the following: [10]

(A) Show that A = $\begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$; satisfies the equation $A^2 - 4A - 5I = 0$ where I is the identity matrix. Hence find A^{-1}.

OR

(A) The following table gives the distribution of 60 bulbs in terms of their Life (in hours). Find mean deviation and quartile deviation.

Life of bulbs (in Hr.)	40-55	55-70	70-85	85-100	100-115
Number of bulbs	10	12	15	13	10

(B) Prove that the sum of the coefficients of x^{32} and x^{-17} in the expansion of $(x^4 - \frac{1}{x^3})^{15}$ is zero.

OR

(B) The sum of n terms of the series with 25, 22, 19, 16, … is 116. Find number of terms and last term.

Q-3 Answer the following in detail. (Any 2) [10]

(A) Solve $\sqrt{\frac{x}{1-x}} + \sqrt{\frac{1-x}{x}} = \frac{13}{6}$; x ≠ 0,1

(B) If A = $\begin{bmatrix} 5 & 3 \\ 2 & 2 \end{bmatrix}$ and B = $\begin{bmatrix} 7 & 5 \\ 4 & 3 \end{bmatrix}$ then prove that $(AB)^{-1} = B^{-1}A^{-1}$

(C) The 12th term of an A.P. is 47 and the 24th term is 107. Find its 20th term and the sum of its first 20 terms.

Section-II

Q-4 (A) Do as directed: [07]

I) Transform the following angles to radian measure

(i) 240^0 (ii) 420^0

II) An arc of length 44 cm of a circle subtends an angle of 120^0 at the center of the circle. If $\pi = \frac{22}{7}$; find the radius of the circle.

III) Evaluate $\log_2 \frac{1}{8}$.

IV) Find x if d{(x,-4),(-8,2)} = 10

V) Find the slope of the line joining the points P(-3,2) and Q(-4,5).

VI) Find the derivative of $e^{3x} \sin x$.

VII) Find $\int xe^x$.

Q-4 (B) Answer the following in brief: (Any 4) [08]

I) Prove that $\tan\alpha + \tan\beta = \sec\alpha \sec\beta \sin(\alpha + \beta)$

II) If y = $\frac{x-\cos x}{x+\cos x}$; find $\frac{dy}{dx}$.

III) Evaluate $\int_1^2 (\frac{1}{x} - \frac{1}{x^2})$ dx.

IV) Find all t-ratios of 120^0.

V) Find the equation of the line passing through the points (2,3) and (5,-2).

VI) Prove that $\frac{\log_x a}{\log_y a} - \frac{\log_x b}{\log_y b} = 0$.

Q-5 Answer the following: [10]

(A) A(1,6) , B(5,2) , C(12,9) and D(8,13) are the vertices of quadrilateral ABCD, then find the area and perimeter of quadrilateral.

OR

(A) If y = $\log(x + \sqrt{1+x^2})$; prove that $(1+x^2)\frac{d^2y}{dx^2} + x\frac{dy}{dx} = 0$.

(B) For what values of k, the line 3x – (3k + 2)y + 2 = 0 and 2x – (k – 3)y – 1 = 0 are

a) Parallel b) Perpendicular

OR

(B) Evaluate $\int \frac{dx}{(x-1)^2(x+3)}$.

Q-6 Answer the following in detail. (Any 2) [10]

(A) Prove that $(\sec\theta - \tan\theta)\sqrt{\frac{1+\sin\theta}{1-\sin\theta}} = 1$

(B) If $\log\left(\frac{a-b}{2}\right) = \frac{1}{2}(\log a + \log b)$; then prove that $\frac{a}{b} + \frac{b}{a} = 6$.

(C) Find $\frac{d^2y}{dx^2}$ for the curve x = a ($\theta + \sin\theta$), y = a (1 + $\cos\theta$).