UKA TARSADIA UNIVERSITY

B.Pharm 1st Semester Examination

030020105- Elementary (Remedial) 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 : $(x+2)^2 = 8x - 5$

II) Expand by SARRUS RULE : $\begin{vmatrix} 1 & 4 & -3 \\ -5 & 2 & 6 \\ -1 & -4 & 2 \end{vmatrix}$

III) If A = $\begin{bmatrix} 2 & -1 \\ 4 & 2 \end{bmatrix}$ and B = $\begin{bmatrix} 4 & 3 \\ -2 & 1 \end{bmatrix}$ then, Find A + B.

IV) Find n form the following equation :

(1) ${}_nP_4 = 840$ (2) ${}_nP_4 = 12 * {}_nP_2$

V) If $T_5 = 10$ and $T_{10} = 40$ then, Find T_{20}.

VI) Find the sum up to 10 terms of the series 1, 2, 4, 8, 16….

VII) Discuss the nature of the roots of the equation $x^2 + x + 5 = 0$.

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

I) If α and β are the roots of quadratic equation $x^2 - px + q = 0$ the construct a quadratic equation whose root are $\frac{q}{p-\alpha}$ and $\frac{q}{p-\beta}$.

II) Find the value of K if, $\begin{vmatrix} 1 & 2 & 5 \\ 2 & K & 0 \\ 7 & 14 & 9 \end{vmatrix} = \begin{vmatrix} 16 & 8 & 26 \\ 6 & 3 & 7 \\ 2 & 1 & 4 \end{vmatrix}$.

III) In a pharmaceutical factory, machines A and B manufacture 40% and 60% of the total output of this production of tablets, machines 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?

IV) If a ,b ,c are in G.P. , then prove that $\log a^n$, $\log b^n$, $\log c^n$ are in A.P.

V) If A = $\begin{bmatrix} 4 & 1 \\ 2 & 3 \end{bmatrix}$, find matrix B such that A + 2B = A^2.

VI) Using binomial expansion; prove that $(\sqrt{2}+1)^5 - (\sqrt{2}-1)^5 = 82$.

Q-2 Answer the following: [10]

(A) Solve the following system of equations using inverse of a matrix.

X + Y + Z = 3

2X + Y + Z = 4

X + 2Y + 3Z = 6.

OR

(A) Find the coefficient of x^{-2} in the expansion of $(2x - \frac{1}{\sqrt{3}}x^{-2})^{10}$.

(B) 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

OR

(B) Prove that ; $\begin{vmatrix} a & b & c \\ a-b & b-c & c-a \\ b+c & c+a & a+b \end{vmatrix} = a^3 + b^3 + c^3 - 3abc.$

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

(A) The sum of the three consecutive terms of an A.P. is 36, while their product is 1620. Find the three numbers.

(B) Find the constant term in the expansion of $(x + \frac{1}{x^2})^9$.

(C) If A = $\begin{bmatrix} 3 & 2 \\ 5 & 3 \end{bmatrix}$ and B = $\begin{bmatrix} 3 & 2 \\ 2 & 1 \end{bmatrix}$; Find AB + $B^{-1}A^{-1}$.

Section-II

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

I) Transform the following angles to degree measure

(i) $\frac{13\pi}{6}$ (ii) $\frac{-49\pi}{3}$

II) The perimeter of the sector of a circle having radius 5 cm is 16 cm. Find the angle of the sector in degrees.

III) Evaluate $\log\left(\frac{450}{32}\right) + \log\left(\frac{25}{128}\right) + \log\left(\frac{64}{225}\right) + \log(\frac{32}{25})$.

IV) Find the distance between the points (-2,3) and (-9,-2).

V) Find the slope of the line joining the points A(3,4) and B(5,8).

VI) Evaluate $\int \frac{dx}{1+\cos x}$.

VII) Find $\frac{dy}{dx}$ if y = $x^3 + \cos x$.

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

I) Find the derivative of the function y = $\sin x$,using definition of derivative.

II) Evaluate $\int_0^{\frac{\pi}{2}} sin^2 x$ dx.

III) Find the area of triangle whose vertices are (2,3) , (2,1) , (1,1).

IV) Prove that ; $\frac{1}{\log_6 24} + \frac{1}{\log_{12} 24} + \frac{1}{\log_8 24} = 2$

V) Prove that the points (2,3) , (6,5) and (12,8) are collinear.

VI) Show that (-1,3) , (4,-7) and (14,-2) are the vertices of an isosceles right angled triangle.

Q-5 Answer the following: [10]

(A) Evaluate $\int_0^1 x \sin^{-1} x$ dx.

OR

(A) If A(-3,2) , B(1,-2) and C(5,6)are vertices of ΔABC, then find the area and perimeter of ΔABC.

(B) ΔABC is an isosceles triangle, where $\angle B$ is right angle. If A(1,-1) and B(-1,1) are two vertices of ΔABC; find the coordinates of third vertex C.

OR

(B) If y = $\sqrt{\cos^{-1}(\frac{1-x^2}{1+x^2})}$; x ∈ R, find $\frac{dy}{dx}$.

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

(A) Find $\frac{d^2y}{dx^2}$ for x = a$cos^3 t$, y = b$sin^3 t$.

(B) Show that the points A(2,-1) , B(3,4) , C(-2,3) and D(-3,-2) are vertices of a rhombus.

(C) If $\log(\frac{a+b}{2}) = \frac{1}{2}(\log a + \log b)$; then prove that a = b.