

Time: 3Hours**M. Marks: 60**
Note: Section A is compulsory. Attempt any 4 questions from section B.
Section – A**(2 marks each)**

1. (i) If $U = \{1,2,3,4,5,6,7,8,9\}$, $A = \{1,2,3,4\}$ and $B = \{2,4,6,8\}$, then find $(A - B)'$.
- (ii) Give the truth table for the statement $\sim p \vee q$.
- (iii) Find the roots of $x^2 + 2x - 35 = 0$.
- (iv) Evaluate $C(13,4) + C(13,8)$.
- (v) Using Binomial theorem, expand $(2x - y)^4$.
- (vi) Which term of G.P. $2, 1, \frac{1}{2}, \frac{1}{4}, \dots$ is $\frac{1}{128}$?
- (vii) Determine k , so that the function is continuous $f(x) = \begin{cases} kx^2, & \text{if } x \leq 2 \\ 3, & \text{if } x > 2 \end{cases}$.
- (viii) Find derivative of $\log x + 9x^{2/3} + 3a^{-7x}$.
- (ix) Evaluate $\log_3 27$.
- (x) The compound interest on the certain sum at 10% per annum for 2 years is Rs. 630, find the sum.

Section – B**(10 marks each)**

2. (a) Check if relation R in the set $A = \{1,2,3,4,5,6\}$, defined as $R = \{(x, y) : y \text{ is divisible by } x\}$, is reflexive, symmetric and transitive.
- (b) Solve the system of equations: $3x - 2y = 4$; $2x + y = 5$.
3. Find the number of arrangements of the letters of the word INDEPENDENCE. In how many of these arrangements.
 - a. Do the words start with P?
 - b. Do all the vowels never occur together?
 - c. Do all the vowels always occur together?
 - d. Do the words begin with I and end in P?
4. (a) Find the coefficient of x^7 in $\left(3x + \frac{1}{2x}\right)^{11}$.
- (b) Find the sum of all odd integers between 2 and 100 divisible by 3.
5. (a) Find $\lim_{x \rightarrow 2} f(x)$, if $f(x) = \begin{cases} x - [x], & x < 2 \\ 4, & x = 2 \\ 3x - 5, & x > 2 \end{cases}$.
- (b) If possible, find the maxima and minima of $f(x) = e^x$.
6. (a) Solve the equations $2x - y = -2$ and $2x + 4y = 3$, using Cramer's rule.
- (b) Solve $4x + y + z = 4$, $x + 4y - 2z = 4$, $3x + 2y - 4z = 6$, by Gauss Elimination method.
7. (a) Find the value of $\log \frac{75}{16} - 2 \log \frac{5}{4} + 3 \log \frac{2}{3}$.
- (b) If simple interest for a certain sum of money at 10% per annum for 2 years is Rs. 200, then what will be the compound interest for the same sum of money in same period?