

RANI CHANNAMMA UNIVERSITY BELAGAVI

B Sc III Semester Mathematics (SEC)

MODEL QUESTION PAPER (CBCS)-2022

Paper: Set Theory and Theory of Equation (MATSECT 3.2)

Time: 2 Hours

Maximum Marks:40

1. Answer any Five of the following

(5x2=10)

- Define equivalent sets and give an example.
- Define equivalence relation and give an example.
- Define countable set and uncountable set.
- Define Partition of a set.
- Find the remainder when $f(x) = x^2 - 12x - 42$ is divided by $x - 3$.
- Find all the roots of $x^3 - 3x^2 - 3x + 1 = 0$ given that one root is $2 + \sqrt{3}$.
- Find i) $\sum \alpha^2$ ii) $\sum \frac{1}{\alpha}$ α, β and γ are the roots of the equation.

Answer any SIX of the following

(6x5=30)

- Prove that every equivalence relation on a non-empty set 'A' determines a partition of 'A'.
- State and Prove De Morgan's laws for arbitrary union of indexed family of sets.
- Prove that the unit interval $[0,1]$ is uncountable.
- Show that every infinite subset of a denumerable set is denumerable.
- Solve $x^4 + 4x^3 + 5x^2 + 2x - 2 = 0$ if one root being $-1 + i$.
- Prove that n^{th} degree polynomial $a_0x^n + a_1x^{n-1} + a_2x^{n-2} + \dots + a_n = 0$ has exactly n roots.
- Solve $x^4 - 9x^3 + 27x^2 - 29x + 6 = 0$ given that $2 + \sqrt{3}$ is a root.
- Solve $x^4 - 2x^3 + 2x^2 - 7x + 6 = 0$ by synthetic division method.