

**C. ABDUL HAKEEM COLLEGE (AUTONOMOUS),
MELVISHARAM - 632 509.
SEMESTER EXAMINATIONS, NOVEMBER - 2018**

**B.Sc., COMPUTER SCIENCE & B.C.A., SEMESTER I
U18AMA102 – MATHEMATICAL FOUNDATIONS - I (ALLIED)**

Time: Three Hours

Maximum: 75 Marks

SECTION - A (10 X 2 = 20 Marks)

Answer ALL Questions.

1. Define biconditional operator.
2. Write the associative and commutative laws of propositions.
3. State the distribution laws of sets.
4. Let R be a relation from $A = \{1, 2, 3, 4\}$ to $B = \{1, 3, 5\}$. Write R as a set of ordered pairs and find R^{-1} .
5. Show that the operation defined by $a * b = \min(a, b)$ is commutative.
6. If $nC_{10} = nC_6$, then find the value of n .
7. When the two curves are said to be orthogonal?
8. Write down the formula for finding $p-r$ equation of a curve.
9. Find the equation of the line passing through the point $(2, 3)$ and parallel to $3x - 4y + 5 = 0$.
10. Find the equation of the circle whose centre is $(3, -2)$ and radius 3 units.

SECTION - B (5 X 5 = 25 Marks)

Answer ALL Questions.

11. a) Prove the De Morgan's law using truth table.
(Or)
- b) Verify that $(p \rightarrow q) \wedge p \rightarrow q$ is a tautology.
12. a) Verify by Venn diagram: $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$.
(Or)
- b) Define One-one function and many-one function.
13. a) On Z , defining $a * b = -a - b$, then show that $*$ is not associative.
(Or)
- b) Prove that $nC_r + nC_{r-1} = (n+1)C_r$.
14. a) Show that the two curves $y^2 = 4(x+1)$ and $y^2 = 36(9-x)$ cut orthogonally.
(Or)
- b) Find the maximum and minimum values of $x^3 - 18x^2 + 96x + 4$.
15. a) Show that the points $A(1, 1)$, $B(5, -9)$ and $C(-1, 6)$ are collinear.
(Or)
- b) Find the equation of the circle passing through the points $(1, 1)$, $(2, -1)$ and $(3, 2)$.

SECTION - C (3 X10 = 30 Marks)

Answer **ANY THREE** Questions.

16. Test the validity of the argument $(p \rightarrow q), q \rightarrow r \mid \rightarrow p \rightarrow r$, .
17. Out of 880 boys in a school, 224 played cricket, 240 played hockey and 336 played basketball. Of the total 64 played both basketball and hockey; 80 played cricket and basketball and 40 played cricket and hockey; 24 played all the three games. How many did not play any of the games and how many played only one game?
18. In how many ways can the letters of the word NAGERCOIL be arranged? How many of them begin with NA? In how many of them the 4 vowels come together? How many of them begin with the 4 vowels?
19. Prove that the radius of curvature at the point $x = 3a \cos \theta - a \cos 3\theta$, $y = 3a \sin \theta - a \sin 3\theta$ is $3a \sin \theta$.
20. Find the value of ' α ' so that the lines $x - 6y + a = 0, 2x + 3y + 4 = 0$ and $x + 4y + 1 = 0$ are concurrent.
