M.Sc. DEGREE EXAMINATION, JULY/AUGUST - 2026

FIRST SEMESTER

BRANCH : MATHEMATICS

PAPER : MSC-101 : ALGEBRA

(New Syllabus effective from the academic year 2025-26)

(For C.D.O.E. Students only)

Max. Marks : 30

$(3 \times 6 = 30)$

1. Express the permutation $\sigma = (123)(45)(16789)(15)$ as a product of disjoint cycle.

2. Show that conjugacy is an equivalence relation.

3. If $o(G) = p^2$ where p is a prime number, these show that G is abelian.

4. If u is an ideal R and $1 \in u$, then show that $u = R$.

5. State Eisenstein's criterion and show that $f(x) = x^4 + 2x + 2$ is irreducible over Q.

6. If α is constructible then show that α lies in some extension of the rationale of degree a power of 2.

7. Show that group of automorphisms G(K, F) is a subgroup of automorphisms of K.

8. Show that a group G is solvable if and only If $G^k = (e)$ for some integer k.

9. Degree a Modular Lattice. Give an example of a Modular Lattice.

10. Define a Boolean lattice and Boolean algebra and give an example.

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M.Sc. DEGREE EXAMINATION, JULY/AUGUST - 2026

FIRST SEMESTER

BRANCH : MATHEMATICS

PAPER : MSC-102 : REAL ANALYSIS

(New Syllabus effective from the academic year 2025-26)

(For C.D.O.E. Students only)

Max. Marks : 30

(5×6 = 30)

1. Prove that every infinite subset of a countable set A is countable.
2. If E is an infinite subset of a compact set K, then prove that E has a limit point in K.
3. If $p > 0$, then prove that $\lim_{n\to\infty}\left(\frac{1}{n^p}\right) = 0.$
4. If $\Sigma a_n = A$ and $\Sigma b_n = B$ then prove that $\Sigma(a_n + b_n) = A + B$ and, $\Sigma c a_n = cA$, for any fixed c.
5. Prove that continuous function of a continuous function is continuous.
6. Prove that f^{-1} is continuous if f is continuous, one-one mapping of a compact metric space X onto a metric space Y.
7. State and prove fundamental theorem of Calculus.
8. Establish integration by parts formula.
9. Provide example of a double sequence $S_{m,n}$ for which $\lim_{n\to\infty}\lim_{m\to\infty} S_{m,n} \neq \lim_{m\to\infty}\lim_{n\to\infty} S_{m,n}$
10. State and prove Weierstrass test for uniform convergence.

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M.Sc. DEGREE EXAMINATION, JULY/AUGUST - 2026

FIRST SEMESTER

BRANCH : MATHEMATICS

PAPER : MSC-103 : ORDINARY DIFFERENTIAL EQUATIONS

(New Syllabus effective from the academic year 2025-26)

(For C.D.O.E. Students only)

Max. Marks : 30

$(5 \times 6 = 30)$

Write any Five questions. Each question carries 4 marks.

1. Solve $y'' + y = 0$ satisfying $y(0) = 1, y(\pi/2) = 2$
2. Determine linear independence or dependence of $y_1(x) = \sin x, y_2(x) = e^{ix}$.
3. Reduce order of the differential equation $y'' - (2/x^2)y = x$ given that $y_1(x) = x^2$ is a solution.
4. Find two linearly independent solutions of the equation $(3x-1)^2 y'' + (9x-3)y' - 9y = 0$ for $x > 1/3$.
5. Compute the indicial polynomials, and their roots of equation $x^2 y'' + (x - 3x^2)y' + \exp(x)y = 0$
6. Distinguish between singular and regular singular points through definitions and examples.
7. Define Lipschitz condition and provide two examples with one of them satisfying the Lipschitz condition and the other not satisfying the Lipschitz condition.
8. Construct for successive approximations for $y' = x^2 + y^2,\ y(0) = 0$.
9. Determine if the equation $2xy\, dx + (x^2 + 3y^2)dy = 0$ is exact and solve it.
10. Find the real values solutions of $yy' = x$.

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M.Sc. DEGREE EXAMINATION, JULY/AUGUST-2026

FIRST SEMESTER

BRANCH: MATHEMATICS

PAPER-MSC-104: COMPLEX ANALYSIS

(New Syllabus Effective from the Academic year 2025-26)

(For C.D.O.E. Students only)

Max. Marks : 30

(5x6 = 30)

1. Find the derivative of $(2z^2+i)^5$.
2. Find if $f(z)=\cos (x^2-y^2) \cosh 2xy-i\sin (x^2-y^2) \sinh 2xy$ is continuous. Justify your answer.
3. Explain branch of logarithm.
4. State the Argument principle.
5. Define Bilinear transformations and list a few of their properties.
6. State Mittag-Leffler's theorem.
7. State Bieberbach's conjecture.
8. State the great Picard's theorem.
9. State Liouville's theorem.
10. Describe Riemann Zeta function.

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M.Sc. DEGREE EXAMINATION, JULY/AUGUST - 2026

FIRST SEMESTER

BRANCH : MATHEMATICS

PAPER : MSC-105 : DISCRETE MATHEMATICS

(New Syllabus effective from the Academic year 2025-26)

(for C.D.O.E Students only)

Max. Marks : 30

~~(5x6~~30

(5x6 = 30)

1. Construct the truth table for $(P \to Q) \wedge (Q \to P)$.
2. Prove that $(P \to Q) \Leftrightarrow (\neg P \vee Q)$.
3. Show that $((P \vee Q) \wedge \neg(\neg P \wedge (\neg Q \vee \neg R))) \vee (\neg P \wedge \neg Q) \vee (\neg P \wedge \neg R)$ is a tautology.
4. Show that $(P \vee Q) \wedge (\neg P \wedge (\neg P \wedge Q)) \Leftrightarrow (\neg P \wedge Q)$
5. Show that $A \subseteq B \Leftrightarrow A \cap B = A$
6. Show that for any two sets A and B $A - (A \cap B) = A - B$.
7. For any commutative monoid (M, *) prove that the set of all idempotent elements of M forms a submonoid.
8. Define a lattice and give an example of partially ordered set which is not a lattice.
9. Prove that there are 2^r subsets of a set A with r elements.
10. In how many ways 12 of the 14 people will be distributed into 3 teams of 4 each?

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