

Dr. B. R. Ambedkar Open University
Faculty of Science, Department of Mathematics
M.Sc. (Mathematics) I Year, I Semester 2025-26
Course -1, Abstract Algebra
Assignment-1

Max Marks: 15

Min. Marks: 6

I. Answer all the following questions.

(5 X 3 =15 Marks)

1. If centre $Z(G)$ of any group G is a subgroup of G . Then Prove that, $Z(G)$ is an Abelian group.
2. State and Prove Fundamental Theorem on Groups.
3. State and Prove Burnside Theorem.

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M.Sc. (Mathematics) I Year, I Semester 2025-26
Course -1, Abstract Algebra
Assignment-2

Max Marks: 15

Min. Marks: 6

I. Answer all the following questions.

(5 X 3 =15 Marks)

1. List all non-isomorphic abelian groups of order 72.
2. State and prove the modular law among ideals of a ring.
3. Prove that any finite integral domain is a field.

Dr. B. R. Ambedkar Open University
Faculty of Science, Department of Mathematics
M.Sc. (Mathematics) I Year, I Semester 2025-26
Course -2, Real Analysis
Assignment-1

Max Marks: 15

Min. Marks: 6

I. Answer all the following questions.

(5 X 3 =15 Marks)

1. Prove that the Cartesian product of two open intervals is open.
2. State and Prove Baire's Theorem.
3. Define Cantor set. Prove that Cantor set is a perfect set.

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M.Sc. (Mathematics) I Year, I Semester 2025-26
Course -2, Real Analysis
Assignment-2

Max Marks: 15

Min. Marks: 6

I. Answer all the following questions.

(5 X 3 =15 Marks)

1. State and prove Merten's theorem.
2. If P^* is a refinement of P , then show that $L(P^*, F, \alpha) \geq L(P, F, \alpha)$.
3. If f be a function of bounded variation on $[a, b]$ then Show that f is bounded on $[a, b]$.

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Faculty of Science, Department of Mathematics
M.Sc. (Mathematics) I Year, I Semester 2025-26
Course -3, Ordinary Differential Equations
Assignment-1

Max Marks: 15

Min. Marks: 6

I. Answer all the following questions.

(5 X 3 =15 Marks)

1. Let $\Phi_1, \Phi_2, \dots, \Phi_n$ be solutions of $L(y) = 0$ on I , an interval of R and $x_0 \in I$, then show that $W(\Phi_1, \Phi_2, \dots, \Phi_n)(x) = W(\Phi_1, \Phi_2, \dots, \Phi_n)(x_0) e^{-a_1(x-x_0)} \quad \forall x \in I$.

2. Prove that for any non-negative integer n

$$p_n(x) = \frac{1}{2^n n!} \frac{d^n}{dx^n} (x^2 - 1)^n \quad \text{for all } x \in (-\infty, \infty).$$

3. Obtain all the solutions of the equation

$$x^2 y'' - 2xy' + 2y = 0 \text{ on } (0, \infty).$$

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M.Sc. (Mathematics) I Year, I Semester 2025-26
Course -3, Ordinary Differential Equations
Assignment-2

Max Marks: 15

Min. Marks: 6

I. Answer all the following questions.

(5 X 3 =15 Marks)

1. State and prove Liouville's Theorem.
2. Construct a Liapunov function for Two-Dimensional system $x' = Ax$

Where $A = \begin{pmatrix} 1 & 2 \\ 0 & 2 \end{pmatrix}$.

3. Test for stability based on first approximation the zero solution of the

system $x'_1 = 2x_1 + x_2 - 5x_2^2$, $x'_2 = 3x_1 + x_2 + \frac{1}{2}x_2^3$.

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Course -4, Topology
Assignment-1

Max Marks: 15

Min. Marks: 6

I. Answer all the following questions.

(5 X 3 =15 Marks)

1. State and prove Lindelof's theorem.
2. Prove that any closed sub space of a compact space is compact.
3. In any metric space, Cauchy sequence convergent if and only if it has a convergent subsequence.

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Course -4, Topology
Assignment-2

Max Marks: 15

Min. Marks: 6

I. Answer all the following questions.

(5 X 3 =15 Marks)

1. Prove that every compact subspace of a Hausdorff Space is closed.
2. Prove that any product of connected space is connected.
3. State and prove Stone - Weierstras theorem.