Dr. B.R. Ambedkar Open University,
Faculty of Science, Dept. of Mathematics,
I year M.Sc (Mathematics), 2019-2020

Course - 1 ALGEBRA

Assignment - 1

Max. Marks: 15

Min. Marks: 6

SECTION - A

I. Answer any one of the following (10 Marks)

1. State and Prove first Sylow theorem.

2. Prove that every PID is a UFD.

SECTION - B

II. Answer any one of the following (5 Marks)

1. State and Prove Cayley's theorem.

2. find the Number of non-Isomorphic abelian groups of order 1800.

Dr. B. R. Ambedkar Open University
Faculty of Science, Dept. of. Mathematics
M. Sc I year (Mathematics) 2019 - 2020

Course - 1 Algebra

Assignment - 2

Max. Marks : 15 Min. Marks: 6

SECTION - A

I. Answer any one of the following (10 Marks)

1. Show that any two finite fields with p^n number of elements are Isomorphic.

2. State and Prove the fundamental theorem of Galois theory.

SECTION - B (5 Marks)

I. Answer any one of the following.

1. Prove that Every Euclidean domain is a Principal Ideal domain.

2. Let H be a finite Subgroup of Art E. Then Prove that $[E : E_H] = |H|$.

Dr. B.R. Ambedkar Open University,
Faculty of Science, Dept. of. Mathematics.
I year M.Sc.,(Mathematics), 2019-2020
Course-2 Real Analysis
Assignment-1

Max. Marks: 15 Min. Marks: 6

SECTION-A

I. Answer any one of the following questions (10 Mark

1. State and Prove Cantor's Intersection Theorem.

2. (a) State and Prove a necessary and sufficient Condition that $f \in R(\alpha; a, b)$

(b) If α is a Constant, show that $\int_a^b f d\alpha = 0$ for Each bounded function f.

II. Answer any one of the questions. (5 Marks)

1. Prove that the Cantor set is a Perfect set

2. Define a function and give an Example to show that a monotonic function need not be Continuous.

Dr. B.R. Ambedkar Open University,
Faculty of Science, Dept. of. Mathematics
M.Sc I year (Mathematics) 2019-2020

Course-2 Real Analysis

Assignment - 2

Max. Marks: 15

Min. Marks - 6

SECTION-A

I. Answer any one of the following (10 Marks)

1. State and Prove Egoroff's Theorem.

2. State and Prove Fatou's Theorem. Deduce the monotone Convergence theorem.

SECTON-B

II. Answer any one of the following (5 Marks)

1. Define the Beta function, Derive

$$B(m,n) = \frac{(m-1)!\,(n-1)!}{(m+n-1)!}$$

2. for Each $a \in R$, Prove the Inteval (a, ∞) is Lebesgue measurable.

Dr. B.R. Ambedkar Open University,
Faculty of Science, Dept. of. Mathematics.
I Year M.Sc (Mathematics), 2019-2020
Course-3, Discrete Mathematical Structures

Assignment - 1

Max. Marks: 15

Min. Marks: 6

I. Answer any one of the following questions (10 Marks)

1. Define a Partially orderd set with example. Show that every finite Poset has maximal as well as minimal elements?

2. obtain the Principal disjunctive normal form of $(\neg P \to R) \wedge (Q \leftrightarrow P)$

II. Answer any one of the following questions (5 Marks)

1. In a Boolean ring B show that
   i) $a+a=0$ ii) $a.b = b.a$ $\forall a,b \in B$

2. obtain the Principal Conjuctive normal form of $(P \to (Q \wedge R)) \wedge (\neg P \to (\neg Q \wedge \neg R))$

Dr. B.R. Ambedkar Open University,
Faculty of Science, Dept. of. Mathematics,
I year M.Sc., (Mathematics), 2019-2020
Course-3 Discrete Matenatical Structures

Assignment - 2

Max. Marks: 15

Min. Marks: 6

I. Answer any one of the following questions (10 Marks)

1. Show that a nonempty connected Graph is Eulerian if and only if it has no vertices of odd degree.

2. Let L be the language accepted by a non deterministic finite automaton. Then Prove that finite automaton that accepts L.

II. Answer any one of the following questions (5 Mark

1. State and Prove Euler's theorem on degrees and hence deduce that a finite graph can not have an odd number of vertices of odd degree.

2 Discuss the travelling sales man Problem.

Dr. B.R. Ambedkar Open University,
Faculty of Science, Dept. of Mathematics,
I Year M.Sc (Mathematics), 2019-2020
Course-4, Differential Equations

Max. Marks: 15 | Assignment-1 | Min. Marks: 6

I. Answer any one of the following questions (10 Marks)

1. Using the annihiltor Method, obtain a Particular Solution of $y''' - y = xe^{x}\cos x$. Also find the General Solution.

2. Prove that $x=1$ is a regular Singular Point of the Legendre Equation and find all solutions of it near the singular point $x=1$.

II. Answer any one of the following questions (5 Marks)

1. State and Prove Rodrigue's formula for the n^{th} legendre Polynomial.

2. Show that $Y(t) = \begin{bmatrix} e^{-3t} & te^{-3t} & e^{-3t}\cdot\frac{t^2}{2!} \\ 0 & e^{-3t} & te^{-3t} \\ 0 & 0 & e^{-3t} \end{bmatrix}$ is a fundamental matrix for the system $x' = Ax$ where $A = \begin{bmatrix} -3 & 1 & 0 \\ 0 & -3 & 1 \\ 0 & 0 & -3 \end{bmatrix}$

Dr. B.R. Ambedkar Open University,
Faculty of Science, Dept. of. Mathematics.,
I year M.Sc. (Mathematics), 2019-2020

Course - 4 Differential Equations

Max. Marks: 15 | Assignments - 2 | Min. Marks: 6

I. Answer any one of the following questions (10M)

1\. (a) find the Complete Integral of $p+q=pq$

(b) obtain the Complete Integral $z=p^2-q^2$.

2\. Reduce the Equation

$$y^2\frac{\partial^2 z}{\partial x^2}-2xy\frac{\partial^2 z}{\partial x\partial y}+x^2\frac{\partial^2 z}{\partial y^2}=\frac{y^2}{x^2}\cdot\frac{\partial z}{\partial x}+\frac{x^2}{y}\cdot\frac{\partial z}{\partial y}$$

to canonical form and hence Solve it.

Answer any one of the following Questions (5M)

1\. Examine the stability of the system

$x_1'=x_1+x_2,\quad x_2'=-x_1+3x_2$

2\. find the general Solution of $z(xp-yq)=y^2-x^2$

Dr. B.R. Ambedkar Open University,
Faculty of Science, Dept. of. Mathematics,
I year M.Sc (Mathematics), 2019-2020
Course - 5 TOPOLOGY

Max. Marks: 15 Assignment-1 Min. Marks: 6

I. Answer any one of the following (10 Marks)

1. a) Let A be a subset of a topological space X. Then prove that A is dense in X if and only if it intersects every non empty open set in X

b) State and prove Lindelof's theorem.

2. a) Prove that a topological space X is compact if and only if every basic open cover for X has a finite subcover.

b) Prove that any continuous image of a compact space is compact.

II. Answer any one of the following (5 Marks)

1. Define a) Basis for a topological space
b) Subbasis for a topological space

2. Prove that the projection mappings are open from a product space into it's component spaces.

Dr. B.R. Ambedkar Open University

Faculty of Science, Dept. of. Mathematics

I Year M.Sc(Mathematics), 2019-2020

Course -5 TOPOLOGY

Max. Marks : 15 Assignment-2 Min. Marks: 6

I. Answer any one of the following (10 Marks)

1. Define regular and Completely regular spaces. Prove that every Completly regular space is regular.

2. State and Prove Urysohn's lemma.

II. Answer any one of the following (5 Marks)

1. Prove that closed subspace of normal space is normal

2. State Stone-Wierstrass theorem and out line proof.