



RPS Degree College, Balana (Mahendergarh)

Syllabus Plan

2020-21(Odd Semester)

Class and Section: M.Sc Math 3rd Semester

Subject: Functional Analysis

| Lecture | Topics |
|---------|---|
| 1 | Introduction to Syllabus, Scheme of Exam & Learning Objectives/Outcomes |
| 2 | Test to Check the Learning Level of the Students |
| 3 | Definition of normed linear space |
| 4 | Basic properties of normed linear space |
| 5 | Basic properties of Normed linear space and example |
| 6 | Bounded linear transformation |
| 7 | examples of bounded linear transformation |
| 8 | Completion of normed linear space |
| 9 | Banach space |
| 10 | examples of Banach space |
| 11 | holders inequality |
| 12 | minkowski inequality |
| 13 | completeness of quotient space of normed linear space |
| 14 | continuous linear functional |
| 15 | completeness of some subspaces |
| 16 | completeness of some more subspaces |
| 17 | Hahn Banach theorem |
| 18 | finite dimensional normed linear space |
| 19 | example of finite dimensional normed linear space |
| 20 | bounded linear transformation |
| 21 | examples of bounded linear transformation |
| 22 | equivalent formation of continuity |
| 23 | theorem on formation of continuity |
| 24 | conjugate spaces |
| 25 | examples of conjugate spaces |
| 26 | theorem on conjugate spaces |
| 27 | Hahn Banach theorem |

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| 28 | proof of Hahn Banach theorem |
| 29 | some applications of Hahn Banach theorem |
| 30 | Riesz representation theorem |
| 31 | proof of riesz representation theorem |
| 32 | riesz representation theorem of some spaces |
| 33 | second conjugate spaces |
| 34 | Examples of second conjugate spaces |
| 35 | Reflexive spaces |
| 36 | examples of reflexive spaces |
| 37 | Proof on reflexive spaces |
| 38 | to prove some space a reflexive space |
| 39 | to prove some space a reflexive space |
| 40 | uniform bounded principle |
| 41 | Axiom on uniform bounded principle |
| 42 | Consequences of uniform bounded principle |
| 43 | Proof of uniform bounded principle |
| 44 | Open Mapping theorem |
| 45 | Proof of open mapping theorem |
| 46 | Application of open Mapping theorem |
| 47 | closed graph theorem |
| 48 | proof of closed graph theorem |
| 49 | Equivalent norms |
| 50 | examples of equivalent norms |
| 51 | proof of equivalent norms |
| 52 | some different example of equivalent norms |
| 53 | weak convergence |
| 54 | Strong convergence |
| 55 | Difference between weak convergence and strong convergence |
| 56 | equivalence in finite dimensional spaces |
| 57 | Compact operator |
| 58 | Compact operator and its relation with continuous operator |
| 59 | theorem on compact operator |
| 60 | Compactness of linear operator on finite dimensional space |
| 61 | Compactness of linear operator on finite dimensional space |
| 62 | Area bounded by closed curves |
| 63 | Properties of compact operators |
| 64 | Properties of Compact operators |
| 65 | Properties of Compact operators |
| 66 | Compactness of limit of the sequences |
| 67 | compactness of limit of sequences |

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| 68 | proof of above theorem |
| 69 | Application of above theorem |
| 70 | Application of above theorem |

RPS Degree College, Balana (Mahendergarh)

Class and Section: M.Sc 3rd Sem.

Subject: Advanced Topology

| Lecture | Topics |
|---------|---|
| 1 | Introduction to Syllabus, Scheme of Exam & Learning Objectives/Outcomes |
| 2 | Test to Check the Learning Level of the Students |
| 3 | Topics |
| 4 | Defination of regular space & its characterisation |
| 5 | Defination of T3 space and theorems of T3 space |
| 6 | Hereditary and Topological property of T3 space |
| 7 | Defination of normal space and its characterisation |
| 8 | Hereditary and Topological property of T4 space |
| 9 | Hausdorff space is a T3 Space and T4 Space |
| 10 | Regularity of a compact hausdorff space |
| 11 | Normality of a compact hausdorff space |
| 12 | T3 half space |
| 13 | T5 space |
| 14 | Every compact hausdroff space is Regular and Normal |
| 15 | Characterisation of T3 half space |
| 16 | Characterisation of T5 space |
| 17 | Tietze extension theorem |
| 18 | Urysohn's Lemma |
| 19 | Topological and Hereditary property of T5 Space and T3 half |
| 20 | Short type questions of First Unit |
| 21 | Definition of Filter and examples |
| 22 | Types of filter |
| 23 | Union and Intersection of filters and examples |
| 24 | Filter generated by a collection of sets |
| 25 | Base and sub-base of a filter |
| 26 | Theorem related to filter |
| 27 | Filter generated by base |
| 28 | Definition of Convergent filter and examples |
| 29 | <u>Therom based on filter</u> |
| 30 | Definition of cluster point of a filter and examples |
| 31 | Theorem related to cluster point and convergent filter |
| 32 | <u>Examples</u> |
| 33 | Definition of sub filter and ultra filter and their examples |
| 34 | Hausdorff space and convergent filter |
| 35 | Every filter is contained in an ultra filter |
| 36 | Characterisation of ultra filter |
| 37 | Canonical way of converting nets to filters and vice-versa |
| 38 | Convergent net and filters and vice-versa |
| 39 | Cluster point of net and cluster of filter and vice-versa |
| 40 | Image filter |
| 41 | Continuity in terms of convergence of filters |
| 42 | Stone Cech compactification theorem |
| 43 | Doubts of filters topic |
| 44 | Definition of net and examples |
| 45 | Definition of convergent net and cluster point of net |
| 46 | Definition of subnet and examples |
| 47 | Hausdorffness and nets |
| 48 | Compactness and nets |

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| 49 | Definition of ultranet and examples |
| 50 | Theorem of ultranet |
| 51 | Eventually net in discrete space |
| 52 | Convergence of net in an indiscrete space |
| 53 | Closed set and convergence of net |
| 54 | Closer set and convergence of net |
| 55 | Limit point of a set and convergence of net |
| 56 | Continuity and convergence of net |
| 57 | Continuity and convergence of net in product space |
| 58 | Doubts of net topic |
| 59 | Short type questions of net |
| 60 | Definition of Locally finite set in a space |
| 61 | Characterisation of locally finite set |
| 62 | Definition of σ locally finite |
| 63 | Definition of para-compact space |
| 64 | Michael's Theorem on characterisation of paracompactness |
| 65 | Michael's Theorem on characterisation of paracompactness |
| 66 | Paracompactness as a regular space |
| 67 | Paracompactness as a normal space |
| 68 | A.H. Stone theorem |
| 69 | Nagata-Smirnov Metrization theorem |
| 70 | Tychonoff embedding theorem |
| 71 | Definition of product topological space |
| 72 | Projection mapping |
| 73 | Tychonoff product topology in terms of standard subbases |
| 74 | Tychonoff product topology in terms of standard subbases and |



RPS Degree College, Balana (Mahendergarh)

Syllabus Plan

2020-21(Odd Semester)

Class & Section- MSc Math 3rd

Subject: Fluid dynamics

| Lecture | Topics |
|---------|---|
| 1 | Introduction to Syllabus, Scheme of Exam & Learning Objectives/Outcomes |
| 2 | Test to Check the Learning Level of the Students |
| 3 | velocity at a point of fluid |
| 4 | Eulerian method |
| 5 | Lagrangian method |
| 6 | Examples |
| 7 | stream line |
| 8 | Path line |
| 9 | Streak line , velocity potential |
| 10 | irrotational or rotational motion |
| 11 | vorticity and circulation |
| 12 | Equation of continuity |
| 13 | Boundary surface |
| 14 | Acceleration at a point of fluid |
| 15 | Test - Unit 1 |
| 16 | Eulerian equation of motion |
| 17 | Equation of motion in cylindrical and spherical co ordinate |
| 18 | Bernoulli equation |
| 19 | Impulsive motion |
| 20 | Kelvin circulation theorem |
| 21 | vorticity equation |
| 22 | Energy equation |
| 23 | Kinetic energy of irrotational motion |
| 24 | Kelvin minimum energy theorem |
| 25 | Kinetic energy of infinite fluid |
| 26 | Uniqueness theorem |
| 27 | Problem |
| 28 | Test-Unit 2 |
| 29 | Axially symmetric flow |
| 30 | Liquid streaming past a fixed sphere |
| 31 | Motion of a sphere |
| 32 | Equation of motion of sphere |
| 33 | Kinetic energy generated by impulsive motion |
| 34 | Motion of two concentric sphere |
| 35 | Examples |

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| 36 | Source and sink |
| 37 | Doublets |
| 38 | Image of source |
| 39 | Image of sink and doublet |
| 40 | EXAMPLES |
| 41 | Examples |
| 42 | Problem |
| 43 | Test -Unit 3 |
| 44 | Two dimensional motion |
| 45 | Use of cylindrical co ordinate |
| 46 | Stream function |
| 47 | Axisymmetric flow |
| 48 | Stoke stream function |
| 49 | Stoke stream function of basic flow |
| 50 | Irrotational motion in two dimensions |
| 51 | Complex velocity potential |
| 52 | Milne Thomson circule theorem |
| 53 | Source,Sinks |
| 54 | Doublets |
| 55 | Images of source and sinks |
| 56 | Blasius theorem |
| 57 | Examples |
| 58 | Examples |
| 59 | Test-Unit 4 |
| 60 | Revision |



RPS Degree College, Balana (Mahendergarh)

Lesson Plan

2020-21 (Odd Semester)

Class and Section: M.Sc Math 3rd Sem

Subject: Discrete Mathematics

| Lecture | Topics |
|---------|---|
| 1 | Introduction to Syllabus, Scheme of Exam & Learning Objectives/Outcomes |
| 2 | Test to Check the Learning Level of the Students |
| 3 | Statements: Symbolic Representation and Tautologies |
| 4 | Quantifiers, Predicates and validity |
| 5 | Propositional Logic. |
| 6 | Semigroups and Monoids- |
| 7 | Definitions and examples of semigroups |
| 8 | Definitions and examples of monoids |
| 9 | Homomorphism of semigroups and monoids. |
| 10 | Congruence relation and Quotient semigroups |
| 11 | Subsemigroups and submonoids |
| 12 | Direct products. |
| 13 | Basic homomorphism theorem. |
| 14 | Pigeonhole principle, |
| 15 | principle of inclusion and exclusion |
| 16 | derangements. |
| 17 | Lattices |
| 18 | Lattices as partially ordered sets |
| 19 | properties of lattices |
| 20 | Lattices as Algebraic systems |
| 21 | Sub lattices |
| 22 | Direct products and Homomorphism |
| 23 | Some special |
| 24 | Complete lattices |
| 25 | Complemented lattices |
| 26 | Distributive Lattices |
| 27 | Join-irreducible elements |
| 28 | Join-irreducible elements |
| 29 | Boolean Algebras |
| 30 | Boolean Algebras as Lattices |
| 31 | Various Boolean Identities |
| 32 | The Switching Algebra example |
| 33 | Subalgebras |
| 34 | Direct Products and Homomorphism |
| 35 | Boolean forms and their equivalence |

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| 36 | Minterm |
| 37 | Boolean forms |
| 38 | Sum of Products |
| 39 | Canonical forms |
| 40 | Canonical forms |
| 41 | Minimization of Boolean functions |
| 42 | Applications of Boolean Algebra to Switching Theory |
| 43 | using AND, OR and NOT gates |
| 44 | The Karnaugh method. |
| 45 | Finite state Machines |
| 46 | their transition tables |
| 47 | their transition diagrams |
| 48 | Equivalence of Finite State Machines |
| 49 | Reduced Machines |
| 50 | Homomorphism |
| 51 | Finite automata and Acceptors |
| 52 | Non-deterministic Finite Automata |
| 53 | equivalence of its power to that of deterministic Finite automata |
| 54 | Moore Machines. |
| 55 | Mealy Machines. |
| 56 | Grammars and Language |
| 57 | Phrase-Structure Grammars, Rewriting rules |
| 58 | Derivations, Sentential forms, Language generated by a Grammar |
| 59 | Regular, Context-free and Context sensitive grammars and Languages |
| 60 | Regular sets, Regular expressions and the Pumping Lemma, Kleene's theorem. |



RPS Degree College, Balana (Mahendergarh)

Syllabus Plan

2020-21(Odd Semester)

Class and Section: M.Sc.(Math) 3rd Sem

Subject: Analytical Number Theory 310

| Lecture | Topics |
|---------|---|
| 1 | Introduction to Syllabus, Scheme of Exam & Learning Objectives/Outcomes |
| 2 | Test to Check the Learning Level of the Students |
| 3 | Distribution of primes |
| 4 | Distribution of primes |
| 5 | Fermat and Mersenne numbers |
| 6 | Fermat and Mersenne numbers |
| 7 | Fermat and Mersenne numbers |
| 8 | Farey series and some results concerning Farey series |
| 9 | Farey series and some results concerning Farey series |
| 10 | Approximation of irrational numbers by rationals |
| 11 | Approximation of irrational numbers by rationals |
| 12 | Hurwitz's theorem |
| 13 | Hurwitz's theorem |
| 14 | Irrationality of e and π |
| 15 | Irrationality of e and π |
| 16 | Irrationality of e and π |
| 17 | The arithmetic in \mathbb{Z}_n |
| 18 | The arithmetic in \mathbb{Z}_n |
| 19 | The arithmetic in \mathbb{Z}_n |
| 20 | The group U_n |
| 21 | The group U_n |
| 22 | Primitive roots and their existence |
| 23 | Primitive roots and their existence |
| 24 | Primitive roots and their existence |
| 25 | Primitive roots and their existence |
| 26 | Group U_{p^n} (p -odd) and U_{2^n} |
| 27 | Group U_{p^n} (p -odd) and U_{2^n} |
| 28 | Group U_{p^n} (p -odd) and U_{2^n} |
| 29 | Group U_{p^n} (p -odd) and U_{2^n} |
| 30 | The group of quadratic residues Q_n |
| 31 | The group of quadratic residues Q_n |
| 32 | The group of quadratic residues Q_n |
| 33 | The group of quadratic residues Q_n |
| 34 | Quadratic residues for prime power & arbitrary moduli |
| 35 | Quadratic residues for prime power & arbitrary moduli |
| 36 | The algebraic structure of U_n and Q_n |
| 37 | The algebraic structure of U_n and Q_n |
| 38 | The algebraic structure of U_n and Q_n |
| 39 | The algebraic structure of U_n and Q_n |
| 40 | Riemann Zeta Function $\zeta(s)$ and its convergence |
| 41 | Riemann Zeta Function $\zeta(s)$ and its convergence |
| 42 | Riemann Zeta Function $\zeta(s)$ and its convergence |
| 43 | Application to prime numbers, $\zeta(s)$ as Euler product |
| 44 | Application to prime numbers, $\zeta(s)$ as Euler product |
| 45 | Application to prime numbers, $\zeta(s)$ as Euler product |
| 46 | Evaluation of $\zeta(2)$ and $\zeta(2k)$. |

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| 47 | Evaluation of $\zeta(2)$ and $\zeta(2k)$. |
| 48 | Evaluation of $\zeta(2)$ and $\zeta(2k)$. |
| 49 | Evaluation of $\zeta(2)$ and $\zeta(2k)$. |
| 50 | Diophantine equations |
| 51 | Diophantine equations |
| 52 | Diophantine equations |
| 53 | Diophantine equations |
| 54 | Diophantine equations |
| 55 | The representation of number by two or four squares |
| 56 | The representation of number by two or four squares |
| 57 | The representation of number by two or four squares |
| 58 | Waring problem |
| 59 | Waring problem |
| 60 | Four square theorem |
| 61 | Four square theorem |
| 62 | Four square theorem |
| 63 | The numbers $g(k)$ and $G(k)$, |
| 64 | The numbers $g(k)$ and $G(k)$, |
| 65 | Lower bounds for $g(k)$ and $G(k)$. |
| 66 | Lower bounds for $g(k)$ and $G(k)$. |
| 67 | Lower bounds for $g(k)$ and $G(k)$. |
| 68 | Lower bounds for $g(k)$ and $G(k)$. |
| 69 | Arithmetic functions $\varphi(n), \tau(n), \sigma(n), \sigma_k(n), U(n), N(n), I(n)$ |
| 70 | Examples and simple properties |
| 71 | Examples and simple properties |
| 72 | Perfect numbers |
| 73 | Perfect numbers |
| 74 | Perfect numbers |
| 75 | Mobius inversion formula |
| 76 | Mobius inversion formula |
| 77 | The Mobius function $\mu(n)$ |
| 78 | The Mobius function $\mu(n)$ |
| 79 | The order & average order of function $\varphi(n), \tau(n)$ and $\sigma(n)$ |
| 80 | The order & average order of function $\varphi(n), \tau(n)$ and $\sigma(n)$ |

RPS Degree College, Balana (Mahendergarh)

Lesson Plan

Class and Section: M.S.c Math 3rd Sem(B)

Subject: Introduction to Computer (Open Elective)

Name of the Faculty : Monika

| Lecture | Topics |
|---------|---|
| 1 | Introduction to Syllabus, Scheme of Exam & |
| 2 | Test to Check the Learning Level of the Students |
| 3 | What is computer, Characteristics of computer |
| 4 | Advantages of Computer, Limitation of Computer |
| 5 | Types of Computer |
| 6 | Application of Computer, Data Representation |
| 7 | Hardware, Firmware, Liveware |
| 8 | Software, Relationship between Hardware and Software |
| 9 | System software, Operating System |
| 10 | Translator, Interpreter, Compiler |
| 11 | Assemblers, Linkers |
| 12 | Overview of Operating system |
| 13 | Functions of operating system |
| 14 | Information system: Meaning, Need of an efficient information system |
| 15 | Types of information system |
| 16 | Information requirement for Planning, Coordination |
| 17 | Information requirement for control for various levels in business, Industry |
| 18 | Basic of data arrangement and access |
| 19 | Introduction to database, Definition, Uses of databases |
| 20 | Characteristics of database, DBMS |
| 21 | Data independencies |
| 22 | Difference between traditional file processing system and database approaches |
| 23 | LAN, WAN |
| 24 | Wireless Network |
| 25 | Introduction to networking |
| 26 | Importance of networking |
| 27 | Communication devices such as modem |
| 28 | Features of networking |
| 29 | Introduction to Internet: Meaning of Internet |
| 30 | Growth of Internet |
| 31 | Owner of Internet |
| 32 | Anatomy of internet |
| 33 | Basic Internet Terminology |
| 34 | World Wide Web |
| 35 | Internet Protocols |
| 36 | Usage of internet to society |
| 37 | Search engines |
| 38 | Introduction to MS Word |
| 39 | Features of MS-Word |
| 40 | Component of word document |

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| 41 | Creating a document |
| 42 | Printing a document |
| 43 | Formatting text and document |
| 44 | Mail Merge |
| 45 | Macro |
| 46 | Export and Import file |
| 47 | Working with auto shapes |
| 48 | Adding pictures to a work document |
| 49 | Introduction to MS Excel |
| 50 | Features of Excel |
| 51 | Creating a table |
| 52 | Formatting worksheet |
| 53 | Types of graph |
| 54 | Excel functions |
| 55 | Printing a worksheet |
| 56 | Managing and organizing data |
| 57 | Powerpoint presentation |