

## **IV SEMESTER**

### **B.E. 401 - ENGINEERING MATHEMATICS III**

#### **Unit I**

Functions of complex variables : Analytic functions, Harmonic Conjugate, Cauchy-Riemann Equations, Line Integral, Cauchy's Theorem, Cauchy's Integral Formula, Singular Points, Poles & Residues, Residue Theorem , Application of Residues theorem for evaluation of real integrals

#### **Unit II**

Errors & Approximations, Solution of Algebraic & Transcendental Equations (Regula Falsi , Newton-Raphson, Iterative, Secant Method), Solution of simultaneous linear equations by Gauss Elimination, Gauss Jordan, Crout's methods , Jacobi's and Gauss-Seidel Iterative methods

#### **Unit III**

Difference Operators, Interpolation ( Newton Forward & Backward Formulae, Central Interpolation Formulae, Lagrange's and divided difference formulae ), Numerical Differentiation and Numerical Integration.

#### **Unit IV**

Solution of Ordinary Differential Equations (Taylor's Series, Picard's Method, Modified Euler's Method, Runge-Kutta Method, Milne's Predictor & Corrector method ), Correlation and Regression, Curve Fitting (Method of Least Square).

#### **Unit V**

Concept of Probability : Probability Mass function, Probability density function. Discrete Distribution: Binomial, Poisson's, Continuous Distribution: Normal Distribution, Exponential Distribution ,Gamma Distribution ,Beta Distribution ,Testing of Hypothesis : Students t-test, Fisher's z-test, Chi-Square Method

#### **Reference:**

- (i) Numerical Methods using Matlab by J.H.Mathews and K.D.Fink, P.H.I.
  - (ii) Numerical Methods for Scientific and Engg. Computation by MKJain, Iyengar and RK Jain, New Age International Publication
  - (iii) Mathematical Methods by KV Suryanarayan Rao, SCITECH Publication
  - (iv) Numerical Methods using Matlab by Yang, Wiley India
  - (v) Probability and Statistics by Ravichandran ,Wiley India
- Mathematical Statistics by George R., Springer

## **IV SEMESTER**

### **MI402 – Mining Environment-I**

#### **Unit 1: Mine Atmosphere**

Pollution in Mine Atmosphere, Mine Gases, Their Origin, Occurrence, Physiological effects and Detection, Calibration of Detectors, Methane Drainage. System for Monitoring of Mine Environment by Tube bundle apparatus and Telemonitoring systems. Analysis of Mine air by Haldane Apparatus, Gas Chromatograph.

Heat and Humidity in Mine Atmosphere, their Sources and Effects, Cooling Power of Mine Air, Assessment of Comfort Conditions, Air Conditioning of Mines, Surface, Underground and Divided Installations, Spot Coolers.

#### **UNIT 2: Drivage of Inclines/Drifts/Adits**

Types of Openings; Choice of Openings; Location of Openings; Drilling, blasting, loading and transportation of muck during drivage of inclines/adits/drifts, Ventilation, lighting and drainage, Extension of center line; Organization and cycle of operations; Mechanized methods of drivages of inclines/adits/drifts.

#### **UNIT 3: Shaft Sinking and Theory of Ventilation**

Drilling, blasting, loading and transportation of muck, Ventilation, lighting and drainage, Extension of center line; Shaft lining and its design; Special methods of shaft sinking; Shaft boring; Deepening and widening of shafts. Upward drivage; Organization and cycle of operations.

Objects and Standards of Ventilation, Flow of Air in Ducts and Mine Roadways, Resistance of Air Ways, Laws of Ventilation, Chezy's and Atkinson's Equations, Equivalent Resistance and Equivalent Orifice of Mine.

#### **Unit 4: Mine Ventilation And Ventilation Devices**

Natural Ventilation Pressure and its Measurements, Thermodynamics of Natural Ventilation, Distribution and Control of Air Current, Doors, Regulators, Stoppings and their Types, Air Crossings, Air Locks.

#### **Unit 5: Flame Safety Lamps And Mine Illumination**

Constructional details of Flame Safety Lamp, Gas Testing by Flame Safety Lamp, Types of Portable Lamps, their Maintenance and Examination, Lamp Room Design and Organization, Lighting from Mains, Photometry and Illumination Surveys, Standards of Illumination for Underground and Open Cast Working

#### **Text Books:**

1. Elements of Mining Technology by D.J. Deshmukh, Vol. II
2. Mine Environment & Ventilation by G.B. Misra

#### **Reference Books:**

1. Mine Ventilation, UMS
2. Subsurface Mine Ventilation, M. J. McPherson

**IV SEMESTER**  
**MI403 – Geology-II**

**UNIT 1: Stratigraphy & Palaeontology**

Introduction, Definitions and Basic Principles Of Stratigraphy; Units of Stratigraphy; Criteria for Stratigraphic Classification and Correlation; Standard Geological Time Scale; Fossils- Elementary Idea about Their Conditions, Modes of Their Preservation and Uses; Brief Palaeontological Study of Gondwana Fields.

**UNIT 2: Indian Geology**

Major Geomorphic Divisions of India; General Review of Indian Stratigraphy; Descriptions of important Indian Geological formations- Archeans, Cuddapahs, Vindhyan, Gondwanas and Tertiaries.

**UNIT 3: Economic Geology-I**

Introduction and Scope of the subject; Fundamental Terms and Their Definitions; Brief Review of the Processes of Mineral Formation and the Genetic Classification of Mineral Deposits. Occurrence, Origin & Distribution of Coal and Petroleum Deposits.

**UNIT 4: Economic Geology-II**

Mode of Occurrence, Origin, Distribution, Association and Industrial Uses of Important Metallic (Au, Al, Cu, Fe, Mn, Sn, Pb And Zn) and Non-Metallic (Diamond, Mica, Radioactive Minerals, Gypsum, Dolomites, Fire-Clay, Magnesite, Talc, Asbestos, Graphite, Kyanite, Sillimanite, Corundum, Fluorite, Phosphorite, Precious and Semi Precious Stones)

**UNIT 5: Prospecting and Exploration**

Prospecting and Exploration -Their Definitions and Classification of Methods; Elementary Methods of Geological, Geophysical, Geochemical Prospecting; Ringed Targets, Intersection Loci, Ore Guides- Physiographical, Mineralogical, Stratigraphical and Structural.

**Text Books:**

1. Fundamentals of Historical Geology and Stratigraphy of India: Ravindra Kumar
2. Geology Of India and Burma :M.S. Krishnan
3. Economic Mineral Deposits :M.S. Krishnan & A. Batem:M.L.Jensenan

**Reference Books:**

1. Courses in Mining Geology Arogyaswamy
2. Applied Geology: D.V. Reddy
3. Engineering Geology: D.V. Reddy
4. Geology of India (Vol I&II) R. Vaidyanadhan & M. Ramakrishnan

**IV SEMESTER**  
**MI404 – Electrical & Electronic Instrumentation**

**Unit-1 D.C. Machines & A.C. Machines**

Introduction types & Characteristics of DC machine, speed control of DC motor, general principle and construction of alternators, induction motor and type, Synchronous motor, Equivalent circuits, torque slip characteristics , starting and speed control, synchronous condenser.

**Unit-2 Cables and Switchgear Protection**

Relay and its operating principle, Types Circuit breaker and its types, over current, earth fault protection, simplified connection diagram of AC switch board, DC 2 and 3 wire system, AC 3 & 4 wire system types of cables, underground distribution scheme.

**Unit-3 Semiconductor Diodes**

Rectifiers: Half wave, full wave and bridge-circuit and operation, Zener diode: construction, Characteristics, specification, voltage regulator circuit using Zener diode, SCR: switching characteristics, application and thyristor for speed control.

**Unit-4 Amplifier & FETs**

Introduction of transistor, FET: construction, principle of operation, characteristics of JFET, construction, principle of operation, characteristics of MOSFET, enhancement and depletion of MOSFET, applications of JFET & MOSFET.

Op amp: Terminal characteristics, ideal characteristics OP amp as inverting amplifier, non-inverting amplifier, adder, difference amplifier, differentiator, comparator, instrumentation amplifier.

**Unit-5 Basic of transducer and signal conditioning circuits**

Active and passive transducers, analog and digital transducer, classification of transducer according to application, selection of a transducer, construction principle of operation and application of wire wound potentiometer, strain gauge, LVDT, thermistor, solar cell transducer, piezoelectric crystals.

Introduction to DAS

**Text books:**

1. Electronic instrumentation (2nd edition) – H.S. Kalsi, TMH
2. Power system protection-Badri Ram
3. Electrical Machinery-Dr. P.S. Bimbhra, Khanna Pbs.
4. Electrical devices and circuits-A.P. Godse & U.A. Bakshi
5. Power Electronics-Dr. P.S. Bimbhra

**Reference Books:**

1. Electrical and Electronic measurements & Instrumentation-A.K. Sawhney, DhanpatRai Pbs.
2. Electrical Instrumentation & measurement techniques-copper & Helfrick, PHI
3. Electrical Power system-C.L. Wadhwa, New age international Pbs.
4. Principle of Electronics-V.K. Mehta, S. Chand Pbs.

**IV SEMESTER**  
**MI405–Underground Coal Mining**

**UNIT 1: INTRODUCTION**

Definition of important terms, Mine development, Activities involved in development of a mine, Stages in the life of a mine, Introduction to unit operations in underground mining. Choice of method of mining, Introduction to various Underground Mining methods. Introduction to various types of machineries used in Underground mining. Origin of Coal, Theories of Coal Formation, Classification of Coal, Coking Coal, Coal Seam and its Classification, Coal Seam Structures and abnormalities like Faults, Joints, Cleats, Folds etc., Coal Measuring Rocks and their Characteristics, Distribution of Coal in India, Indian Coal Mining Industry; Choice of Coal Mining Methods.

**UNIT 2: BORD AND PILLAR METHOD**

Important Terminology, Development Size and Shape of the Pillar, Galleries, Panel System and without Panel System of Development, Size of Panel, Cycle of Operation, Depillaring, Problems in Depillaring, Preparatory arrangements, Depillaring by Stowing, Depillaring by Caving Methods, Pillar Extraction techniques, Dangers associated with Depillaring.

**UNIT 3: LONGWALL MINING**

Important Terminology, Types of Longwall Faces and their choice, Merits and Demerits of Longwall mining, Development of Longwall Panels and Faces, Longwall Advancing Method, Longwall Retreating Method, Length of Longwall Faces, Rate of Face Advance, Double Unit Longwall Faces, Face Organization, Variants of longwall Mining.

**UNIT 4: THICK SEAM MINING**

Problem in Mining of Thick Seams, Choice of Thick Seam Mining Methods, Inclined Slicing, Horizontal Slicing, Diagonal Slicing, Transverse Slicing, Sublevel Caving, Blasting Gallery Method, Cable-Bolting Method of Thick Seam extraction.

**UNIT 5: SPECIAL METHODS OF MINING**

Room and Pillar Mining, Short wall Mining, Mass production technology in Coal mines, Hydraulic Mining, Underground gasification of Coal, Introduction to CBM recovery.

**Text Books:**

1. Principle and practices of modern Coal Mining — R.D. Singh
2. Coal Mining in India — S.P. Mathur

**Reference Books:**

1. Mining & working coal — R.T. Deshmukh
2. U/G winning of Coal — T.N. Singh

## IV SEMESTER

### MI-406 Computer Programming with Java

#### UNIT-I

Basic Java Features - C++ Vs JAVA, JAVA virtual machine, Constant & Variables, Data Types, Class, Methods, Objects, Strings and Arrays, Type Casting, Operators, Precedence relations, Control Statements, Exception Handling, File and Streams, Visibility, Constructors, Operator and Methods Overloading, Static Members, Inheritance: Polymorphism, Abstract methods and Classes

#### UNIT-II

Java Collective Frame Work - Data Structures: Introduction, Type-Wrapper Classes for Primitive Types, Dynamic Memory Allocation, Linked List, Stack, Queues, Trees, Generics: Introduction, Overloading Generic Methods, Generic Classes, Collections: Interface Collection and Class Collections, Lists, Array List and Iterator, Linked List, Vector.

Collections Algorithms: Algorithm sorts, Algorithm shuffle, Algorithms reverse, fill, copy, max and min Algorithm binary Search, Algorithms add All, Stack Class of Package java. Util, Class Priority Queue and Interface Queue, Maps, Properties Class, Un-modifiable Collections.

#### UNIT-III

Advance Java Features - Multithreading: Thread States, Priorities and Thread Scheduling, Life Cycle of a Thread, Thread Synchronization, Creating and Executing Threads, Multithreading with GUI, Monitors and Monitor Locks. Networking: Manipulating URLs, Reading a file on a Web Server, Socket programming, Security and the Network, RMI, Networking, Accessing Databases with JDBC: Relational Database, SQL, MySQL, Oracle

#### UNIT-IV

Advance Java Technologies - Servlets: Overview and Architecture, Setting Up the Apache Tomcat Server, Handling HTTP get Requests, Deploying a web Application, Multitier Applications, Using JDBC from a Servlet, Java Server Pages (JSP): Overview, First JSP Example, Implicit Objects, Scripting, Standard Actions, Directives, Multimedia: Applets and Application: Loading, Displaying and Scaling Images, Animating a Series of Images, Loading and playing Audio clips

#### UNIT-V

Advance Web/Internet Programming (Overview): J2ME, J2EE, EJB, XML.

#### References:

1. Deitel & Deitel, "JAVA, How to Program"; PHI, Pearson.
2. E. Balaguruswamy, "Programming In Java"; TMH Publications
3. The Complete Reference: Herbert Schildt, TMH
4. Peter Norton, "Peter Norton Guide To Java Programming", Techmedia.
5. Merlin Hughes, et al; [Java Network Programming](#), Manning Publications/Prentice Hall

#### List of Program to be perform (Expandable)

1. Installation of J2SDK
2. Write a program to show Concept of CLASS in JAVA
3. Write a program to show Type Casting in JAVA
4. Write a program to show How Exception Handling is in JAVA
5. Write a Program to show Inheritance
6. Write a program to show Polymorphism
7. Write a program to show Interfacing between two classes
8. Write a program to Add a Class to a Package
9. Write a program to demonstrate AWT.
10. Write a program to Hide a Class
11. Write a Program to show Data Base Connectivity Using JAVA
12. Write a Program to show "HELLO JAVA " in Explorer using Applet
13. Write a Program to show Connectivity using JDBC
14. Write a program to demonstrate multithreading using Java.
15. Write a program to demonstrate applet life cycle.

**IV SEMESTER**  
**MI402–Mining Environment-I Lab**

**List of Experiments:**

**Experiment 1.**

Detection of presence and accumulation of Firedamp in mine atmosphere.

**Experiment 2.**

Detection of presence and accumulation of CO in mine atmosphere.

**Experiment 3.**

Study of various techniques of methane drainage

**Experiment 4.**

Study of surface air conditioning plant.

**Experiment 5.**

Study of underground air conditioning plant .

**Experiment 6.**

Study of different types of ventilation devices.

**Experiment 7.**

Study of cap lamps used in underground mine.

**Experiment 8.**

Study of Flame safety lamps used in underground mine.

**Experiment 9.**

Design of a cap lamp room for a large underground coal mine.

**Text Books:**

Elements of Mining Technology by D.J. Deshmukh, Vol. II

Mine Environment & Ventilation by G.B. Misra

**Reference Books:**

Mine Ventilation, UMS

Subsurface Mine Ventilation, M. J. McPherson

**IV SEMESTER**  
**MI403–Geology-II Lab**

**List of Experiments:**

**Experiment 1.** Megascopic Description and Distribution of Ore Forming Minerals and industrial Minerals.

**Experiment 2.** Study of plan Fossils.

**Experiment 3.** Study of Advance Geological Maps and preparation of Cross Sections.

**Experiment 4.** Plotting of important mine-locations on map of India

**Text Books:**

1. Fundamentals of Historical Geology and Stratigraphy of India: Ravindra Kumar
2. Geology Of India and Burma :M.S. Krishnan
3. Economic Mineral Deposits :M.S. Krishnan & A. Batem:M.L.Jensenan

**Reference Books:**

1. Courses in Mining Geology Arogyaswamy
2. Geology of India (Vol I&II) R. Vaidyanadhan & M. Ramakrishnan



**IV SEMESTER**  
**MI404–Electrical & Electronic Instrumentation Lab**

**List of Experiments:**

- Experiment 1.** Magnetisation Characteristics of a separately excited DC Machine
- Experiment 2.** Speed Control of a DC Shunt Motor.
- Experiment 3.** Load Test on a DC Shunt/Compound Motor.
- Experiment 4.** Load test on a DC Shunt / Compound Generator.
- Experiment 5.** Connection, Starting Reversing and load Test on a 3 phase Induction motor.
- Experiment 6.** Study of Electromagnetic Induction Disc Relay.
- Experiment 7.** Study of Star- Delta Starter.
- Experiment 8.** Measurement of 3 phase power by 2wattmeter method. .
- Experiment 9.** Open Circuit and short circuit Test single phase Transformer and prediction of performance.
- Experiment 10.** Load Test on single phase Transformer and calculation of performance.

**Text books:**

1. Electronic instrumentation (2nd edition) – H.S. Kalsi, TMH
2. Power system protection-Badri Ram
3. Electrical Machinery-Dr. P.S. Bimbhra, Khanna Pbs.

**Reference Books:**

1. Electrical and Electronic measurements & Instrumentation-A.K. Sawhney, Dhanpat Rai Pbs.