

School of Engineering & I.T.

MATS University

Raipur



Syllabus Scheme

(IIIrd Semester)

For

Bachelor of Technology

Mining Engineering

Subject Code for School of Engineering & I.T. Deptt.

IIIrd Semester (Mining)

S. No.	Subject Code	Subject Name
1.	BT360	Mathematics – III
2.	BT361	Computer Programming
3.	BT362	Mechanics of Solids & Fluid Mechanics
4.	BT363	Mining Geology-I
5.	BT364	Mine Surveying-I
6.	BT365	Introduction to Mining Engineering
7.	BT366	Computer Programming Laboratory
8.	BT367	Mechanics of Solids & Fluid Mechanics Lab
9.	BT368	Mining Geology-I Lab
10.	BT369	Mine Surveying-I Lab



MATS UNIVERSITY

ARANG, RAIPUR(C.G.)



Scheme of Teaching & Examination

III - Semester

S.N.	code	Subject	Periods per week			Scheme of marks		Total Credit
			L	T	P	ESE	IM	
1.	BT360	Mathematics – III	4	0	-	70	30	3
2.	BT361	Computer Programming	3	0	-	70	30	3
3.	BT362	Mechanics of Solids & Fluid Mechanics	3	0	-	70	30	4
4.	BT363	Mining Geology-I	4	0	-	70	30	4
5.	BT364	Mine Surveying-I	4	0	-	70	30	4
6.	BT365	Introduction to Mining Engineering	4	0	-	70	30	4
7.	BT366	Computer Programming Laboratory	-	-	2	30	20	1
8.	BT367	Mechanics of Solids & Fluid Mechanics Lab	-	-	2	30	20	1
9.	BT368	Mining Geology-I Lab	-	-	2	30	20	1
10.	BT369	Mine Surveying-I Lab	-	-	2	30	20	1
Total			22	0	8	540	260	26

L – Lecture, T – Tutorial, ESE – End Semester Examination,

P – Practical, IM – Internal Marks (Include Class Test & Teacher's Assessments)

MATS UNIVERSITY

GULLU, ARANG, RAIPUR

Semester: B.Tech. III Sem.

Subject:-MATHEMATICS--III

Total Lecture Periods/Week : 3

Total marks in end semester Exam:100

Minimum Number of Class test to be conducted: 02

Branch: - Mining Engineering

Code: - BT360

Total Tutorial Periods/Week: 00

Total Practical Periods/Week: 00

Course Objectives:

1. To make the students understand that Fourier series analysis is a powerful method where the formulas are integrals and to have knowledge of expanding periodic functions that explore variety of applications of Fourier series.
2. To provide knowledge of Laplace transform of elementary functions including its properties and applications to solve ordinary differential equations.
3. To have a thorough knowledge of PDE which arise in mathematical descriptions of situations in engineering.
4. To provide a sound background of complex analysis to perform a thorough investigation of major theorems of complex analysis and to apply these ideas to a wide range of problems that include the evaluation of both complex line integrals and real integrals.
5. To study about a quantity that may take any of a given range of values that can't be predicted exactly but can be described in terms of their probability.

Course Outcome:

After studying the contents of the syllabus in detail the students will be able to

1. define Fourier series including half range series, Harmonic analysis and variety of its applications.
2. define (mathematically) Unit step, Unit impulse, Laplace transforms, its properties, Inverse and applications to solve ordinary differential equations.
3. form and solve by direct integration method Linear equation of first order including Homogeneous and Non-homogeneous Linear equations and also method of separation of variables.
4. solve difficult problems using theorems of complex analysis and apply Residue theorem to evaluate real integrals.
5. understand discrete and continuous probability distribution and be able to find mean and standard deviation and use the Uniform distribution.

UNIT - I Fourier Series

Euler's Formula, Functions having points of discontinuity, Change of interval, Even & Odd Functions, half range series, Harmonic analysis.

UNIT - II Special Function

Series solution of differential equations, the method of Frobenius, Bessel's differential equations, Bessel's function of first & second kind, Recurrence relation, orthogonality Legendre's differential equation, Legendre's polynomial, Rodriguez's formula, generating function, recurrence relation, Orthogonality.

UNIT - III Partial Differential Equation

Formation, Solution by direct integration method, Linear equation of first order, Homogeneous Linear equation with constant coefficients, Non-homogeneous linear equations, Method of separation of variables. Laplace, heat & wave equations.

UNIT - IV Complex Variable

Derivative, Cauchy-Riemann equations, Analytic functions, Harmonic functions, Flow problems, Complex integration, Cauchy theorem, Cauchy integral formula, Taylor & Laurent series, Singularity, Residue, Evaluation of real definite integrals.

UNIT - V Statistics

Random variables, Discrete & continuous probability distributions, Expectation, Mean & Standard Deviation, Moments & moment generating function, Distributions- Binomial, Poisson and Normal distributions.

TEXT BOOKS: -

1. Higher Engg. Mathematics by Dr. B.S. Grewal – Khanna Publishers.
2. Advanced Engg. Mathematics by Erwin Kreyszig – John Wiley & Sons.

REFERENCE BOOKS: -

1. Advanced Engg. Mathematics by R.K. Jain and S.R.K. Iyengar – Narosa Publishing House.
2. Applied Mathematics by P.N.Wartikar& J.N. Wartikar. Vol- II– Pune Vidyarthi Griha Prakashan,Pune
3. Applied Mathematics for Engineers & Physicists by Louis A. Pipes- TMH.
4. Higher Engineering Mathematics by B.V.Ramana , Tata McGraw Hill

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Semester: B.Tech.III Sem.

Subject:- MOS & FM

Total Lecture Periods/Week : 4

Total marks in end semester Exam:100

Minimum Number of Class test to be conducted: 02

Branch: - Mining Engineering

Code: - BT362

Total Tutorial Periods/Week: 00

Total Practical Periods/Week: 02

Course Objectives:

1. Discuss the stress and strain relationship, Mohr's Circle, principal stress and principal strain, tension and compression in composite bars.
2. Derive the bending stresses in beams and plates.
3. Determine the slope and deflection of beams by deflection methods, area moment and conjugate beam methods.
4. Study the physical properties of the fluid, compressibility & incompressibility of fluid, Newtonian and Non-Newtonian fluids.
5. Study the fluid in static and kinematics

Course Outcome:

1. The students are expected to enhance the technical knowledge on relation between stress & strain, Mohr's circle, principal stress & principal strain.
2. The students are expected to possess ability to identify, formulate, and solve engineering problems in bending stresses in beams and plates, deflection of beams and knowledge in fluid statics & fluid dynamics.
3. The students are expected to possess ability to use the techniques, skills and modern engineering tools necessary for mechanics of solid & fluid mechanics.
4. Work effectively as an individual and as a member of multidisciplinary team.

UNIT-I Concept of Stress and Strain

Stress and strain at a point; Axial and shear stresses' Ultimate and working stresses; Relation between stress and strain' Poisson's Ratio; Two dimensional state of strain 'Principle stresses and Principle planes' Mohr's Circle' Two state of strain' Principle strains and principle axis of strain; Determination of Principle strain from strain measurements; Calculation of Principle stresses from; Principle strains; Composite bars in tension and Compression; Thermal stresses in composite bars.

UNIT-II Bending Stresses in Beams and plates

Pure bending' Bending Stresses' Section Modulus of rolled and built up sections Composite beams' Distribution of normal and shear stresses across the section of a simple beam with vertical section of symmetry; Theory of plates.

UNIT-III Deflection of beams

Slope and deflection of beams by deflection methods; Area moment and conjugate beam Methods' propped cantilever and fixed beams.

UNIT-IV Introduction to Fluid Mechanics & Fluid Statics

Physical properties of fluids; Compressible and Incompressible fluids; Newtonian and Non-Newtonian fluids. Pressure, density and height relationships; manometer pressure on curved and plane surfaces; Centre of Pressure; Buoyancy; Stability of Immersed and Floating bodies; Fluids in relative equilibrium.

UNIT-V Fluid Kinematics

Classification of flow: Uniform and Non-Uniform; Steady and Non- Steady; Laminar and Turbulent; One, Two, Three dimensional flows; Stream lines; Streak lines; Path lines; Stream Tubes; Elementary Explanation of stream function and velocity potential; Basic idea of flow nets.

TEXT BOOKS: -

1. Strength of Materials – R.K. Rajput (S. Chand & Co.)
2. Mechanics of Materials – B.C. Punmia (Laxmi Publication)
3. A text book of fluid mechanics by R. K. Bansal (Luxmi publication)
4. A text book of fluid mechanics and Hydraulic mechanics in SI Units by R. K. Rajput(S. Chand and company)

MATS UNIVERSITY
GULLU, ARANG, RAIPUR

Semester: B.Tech.III Sem.

Subject: Computer Programming

Total Lecture Periods/Week : 3

Total marks in end semester Exam:100

Minimum Number of Class test to be conducted: 02

Branch: Mining Engineering

Code: BT 361

Total Tutorial Periods/Week: 00

Total Practical Periods/Week: 02

Course Objectives:

1. Discuss the history and development of C compiler, data types, functions, operators, debugging.
2. Explain if-else statements, conditional operator, loop control, arrays and pointer.
3. Explain declaring and defining functions, library function, recursion.
4. Discuss the reading and writing strings & declaring and using structures.
5. Discuss the reading and writing the text files through C programs.

Course Outcome:

1. The students are expected to enhance the technical knowledge on C language
2. The students are expected to possess ability to identify, formulate, and solve engineering problems in data types, functions, operator, arrays, pointer, functions, debugging, structures.
3. The students are expected to possess ability to use the techniques, skills and modern engineering tools necessary for C Programming
4. Work effectively as an individual and as a member of multidisciplinary team.

Unit-1

Introduction to C language: History and development, C compilers, Data types, Identifiers, Constant, Operators, console I/O statements, compilation, flowcharts debugging and testing of programs.

Unit-2

Control Statements: if-else, for loop, do-while loop, while loop, nested if-else, Arrays: Syntax and definition, one, Two dimensional and multi dimensional arrays, reading and writing an array. Pointers and arrays, array of pointers.

Unit-3

Functions: Declaring and defining functions, storage classes, Function calling, call by value, call by reference, using library functions in programs.

Unit-4

Strings: reading and writing strings, passing a string into a function, using library functions to manipulate strings. Structures: Declaring and using structures. Array of structures, passing structures into function. Unions.

Unit-5

File Handling: reading and writing text files through C programs. . Working with Binary files, fread and fwrite. Command line arguments. Bitwise operators in C.

Text Books:

1. Let us C – Yashwant Kanetkar BPB Publication
2. Programming in ANSI C – E. Balaguruswamy Tata Mc-Graw Hill

MATS UNIVERSITY
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Semester: B.Tech. III Sem.

Subject:- Mine Surveying I

Total Lecture Periods/Week : 4

Total marks in end semester Exam:100

Minimum Number of Class test to be conducted: 02

Branch: - Mining Engineering

Code: - BT 364

Total Tutorial Periods/Week: 00

Total Practical Periods/Week: 02

Course Objectives:

1. Discuss the chain survey for linear measurements
2. Explain the compass survey
3. Discuss the plane table surveying and Miner's Dial
4. Brief discussion on types of leveling instruments, temporary and temporary adjustment of leveling instruments, trigonometric leveling, reciprocal leveling.

Course Outcome:

1. The students are expected to enhance the technical knowledge on linear measurements by chain surveying & tape surveying, compass surveying and plane table surveying.
2. The students are expected to possess ability to identify, formulate, and solve engineering problems in leveling.
3. The students are expected to possess ability to use the techniques, skills and modern engineering tools necessary for mine surveying.
4. Work effectively as an individual and as a member of multidisciplinary team.

UNIT I: Chain Survey

Linear Measurements; Types of chains; Tapes; Errors in chaining and corrections in linear measurements; Direct and indirect Ranging; Principles of chain surveying offsets; Limiting length of offsets; Booking field notes; Obstacles in chaining; Instruments for setting out right angles.

UNIT II: Compass Survey

Theory of Magnetism; Dip of Magnetic needle; Prismatic Compass; Surveyor's Compass; Bearings; Designation of Bearings; Calculation of Included Angles; Local Attraction; Magnetic Declination. errors in compass survey

UNIT III: Leveling

Definitions of important terms used in leveling; Development in leveling Instruments; Types and Constructional details; Temporary and Permanent Adjustments; Methods of leveling; Straight edge leveling; Fly leveling; Check leveling; Reciprocal leveling; Longitudinal Sections; Cross- Sectioning; Trigonometric leveling; Methods of booking and reduction of levels

UNIT IV: Theodolite Surveying

Types of Theodolites; Description of various parts of a vernier Theodolite; Requirements of Mining type Theodolites; Measurements of height and distances of accessible and inaccessible points; Traversing with Theodolite on surface and underground; Checks on Closed and Open traverses. Balancing of traverses; Temporary & Permanent adjustments of Theodolites; Sources of errors and their prevention.

UNIT V : PLANE TABLE SURVEYING

Principles of Plane Tabling; instrument used in plane tabling; Working operations; Methods of Plane Table Surveying; Two and Three point problems ;advantages and disadvantages;errors in plane tabling

References:

1. Metalliferous Mine Surveying : Frederick Winniberg
2. Surveying and levelling :Kanetkar and Deshpande
3. Surveying Vol. I by B.C. Punmia& Ashok Jain
4. Suverying Vol. II by B.C.Punmia& Ashok Jain
5. Surveying Vol. I by S.K.Duggal
6. Surveying Vol II by S.K.Duggal
7. Mine Surveying Vol I by Ghatak
8. Mine Surveying Vol II by Ghatak

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Semester: B.Tech. III Sem.

Subject:- Mining Geology I

Total Lecture Periods/Week : 4

Total marks in end semester Exam:100

Minimum Number of Class test to be conducted: 02

Branch: - Mining Engineering

Code : - BT 363

Total Tutorial Periods/Week: 00

Total Practical Periods/Week: 02

Course Objectives:

1. Discuss the size, shape, mass & density of earth, age of earth, internal structure of earth, earthquake and volcanism.
2. Explain physical properties of the mineral.
3. Brief discussion of igneous rock, sedimentary rock and metamorphic rock.
4. Discuss the folds, faults, joints, geological maps.

Course Outcome:

1. The students are expected to enhance the technical knowledge on shape, size, mass & density of earth, age of earth, structure of the earth.
2. The students are expected to possess ability to identify, formulate, and solve engineering problems in properties of minerals, structural geology, types of rocks and geological maps
3. The students are expected to possess ability to use the techniques, skills and modern engineering tools necessary for Engineering Geology.
4. Work effectively as an individual and as a member of multidisciplinary team.

UNIT I: The Earth in Space and Time

Solar System; Size, Shape, Mass and Density of Earth; A Brief idea of the origin and the age of the Earth; Interior of the Earth- seismic data, Density and Pressure within the Earth; The internal structure and composition of Earth;; Elementary knowledge of Diastrophism, earthquakes and volcanism, Volcanic and earthquake belts, and their relationship with plate tectonics.

UNIT II: Mineralogy

Physical Properties of Minerals; Classification of various Rock forming Minerals; Introduction and preliminary study of principle Rock forming Mineral groups - Garnet, Pyroxene, Amphibole, Mica, Feldspar and Felspethoid, Megascopic properties of Economically important non Silicate minerals.

UNIT III: Igneous and Metamorphic Petrology

Elementary knowledge of Magma and its Crystallization; Classification of Igneous Rocks; Textures and Structures of Igneous Rocks; Petrographic Description of Common Igneous Rocks; Agents and Types of Metamorphism; Depth zones, Facies and Grades of Metamorphism and Petrographic Description of Common Metamorphic Rocks

UNIT IV: Sedimentary Petrology

Textures and Structures of Sedimentary Rocks; Sedimentary Processes- Weathering, Transportation and Deposition; Classification and Petrographic Description of Common Sedimentary Rocks.

UNIT V: Structural Geology

Concept of Deformation; Primary and Secondary Planer and Linear structure of Rocks; Topography and its representations; Altitude of strata- Dip and strike; Outcrop patterns; Width of Outcrop and thickness of beds; Structural Contours; Geological Maps; Study of Unconformity; Folds, Joints, Faults and their influence in Mining Operations.

References:

1. Engineering And General Geology : Parbin Singh
2. Physical And Engineering Geology : S.K. Garg
3. Rutley's Elements of Mineralogy : H.H.Read
4. Principles Of Petrology : G.W.Tyrell
5. Structural Geology : M.P.Billings
6. Geological Maps : G.W.Chiplonkar

7. A Text Book of Geology : P.K. Mukherjee
8. Applied Geology : S. Bange

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Semester: B.Tech. III Sem.

Subject: - Introduction to Mining

Total Lecture Periods/Week : 4

Total marks in end semester Exam: 100

Minimum Number of Class test to be conducted: 02

Branch: - Mining Engineering

Code : - BT 365

Total Tutorial Periods/Week: 00

Total Practical Periods/Week: 00

Course Objectives:

1. Discuss the various drilling machines are used .for exploratory drilling.
2. Explain the drives of inclines, drifts and adits for the opening of the underground mines.
3. Explain the drilling, blasting, loading, transportation, ventilation, lightening and drainage operation used in shaft sinking in the underground mines.
4. Discuss the various methods of shaft sinking.
5. Explain the advantages and disadvantages of surface mining and underground mining.
6. Discuss the various types of machinery used in the underground mining and surface mining.

Course Outcome:

1. The students are expected to enhance the technical knowledge on exploratory drilling, drivage of inclines, adits and shaft sinking
2. The students are expected to possess ability to identify, formulate and solve engineering problems in drilling and shaft sinking.
3. The students are expected to possess ability to use the techniques, skills, and modern engineering tools necessary for mine development practice.
4. Work effectively as an individual and as a member of a multidisciplinary team.

UNIT I: Exploratory Drilling

Drilling machines used for exploratory drilling viz. Rotary & Percussive, their attachments; Core Barrels; Conditions of applicability of drilling methods; Borehole Survey, Directional drilling, Underground methods of exploratory drilling.

UNIT II: 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 III: Shaft Sinking

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.

UNIT IV: Introduction to Underground Mining

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.

UNIT V: Introduction to surface Mining

Definition of important terms, Advantages and disadvantages of surface mining, mineral deposits amenable to surface mining, Various surface mining methods, Introduction to unit operations in surface mining. Introduction to various types of machineries used in surface mining.

References:

1. Surface Mining : G.B. Misra
2. Mining Engineer's Handbook Vol. 1&2, 2nd Edition : Edited by Harold Hartman
3. U.M.S. Notes :
4. Elements of Mining Technology Vol. 1&3 : D.J.Deshmukh
5. Mining of Mineral Deposits : Shevyakov
6. Modern Coal Mining : Samir Das
7. Coal Mining : R.D.Singh
8. Mining : Boki
9. Introduction to mining: Hartman

Department of Mining Engineering

List of Experiment

Subject: Computer Programming Lab.

Code: BT-366

Maximum Marks 50

- (1) Write a program to add 2 numbers?
- (2) Write a program to print digit in reverse order?
- (3) Write a program to find if a number is even or odd?
- (4) Write a program to find greatest number using if statement?
- (5) Write a program to find greatest number using nested if else?
- (6) Write a program to find if number is perfect number or not?
- (7) Write a program to find prime number?
- (8) Write a program for Lucas series?
- (9) Write a program for Fabonary series?
- (10) Write a program to print Armstrong number?

Department of Mining Engineering List of Experiment

Subject: Mining Geology I lab.
Code: BT-368
Maximum Marks 50

Megascopic Description of Rock Forming Minerals.

Megascopic Description of important Igneous, Sedimentary, Metamorphic Rocks.

Basic Concept of Contours, Attitude of Beds, Width of Outcrop, True and Apparent Dips.

Study of Geological Maps and Preparation of Cross Sections.

Department of Mining Engineering

List of Experiment

Subject: Mining Surveying I lab.
Code: BT-369
Maximum Marks 50

List of Practical's to be performed (minimum 10)

1. Ranging and chaining of line of 50 Meter.
2. Determination of width of an obstacle which can be seen across but can't be chained.
3. Determination of area of a field by Cross staff survey.
4. Study of various types of chained.
5. Determination of included angle with the help of a Prismatic Compass.
6. Plotting a closed traverse and elimination of errors.
7. Determination of width of an inaccessible obstacle by intersection.
8. Determination of location of instrument station by two point problem.
9. Determination of location of instrument station by three point problem.
10. Study of Dumpy level.
11. Determination of difference in elevation and gradient between two stations using dumpy level.
12. Study of Vernier Theodolite.
13. Angle measurement by repetition method.
14. Angle measurement by reiteration method.

Department of Mining Engineering

List of Experiment

Subject: MOS & FM Lab.

Code: BT-367

Maximum Marks 50

1. Determination of compressive strength of cement cube.
2. Determination of tensile strength of cement cube.
3. Determination of fineness of cement by sieving method.
4. Determination of fineness of cement by Blain Apparatus.
5. To determine Uni-axial tensile test of mild steel.
6. To determine Izod Charpy Value of given mild steel.
7. To determine the Rockwell Hardness of given material.
8. To determine Compressive strength of wood: (a.) Along the fiber and (b.) Across the fiber.
9. To study the cupping test machine and determination of Erichseser value of mild steel sheet.
10. To determine the meta-centric height of a ship model.
11. To calibrate an orifice-meter.
12. To determine the head loss in various pipe fittings.
13. To determine the coefficient of discharge of a mouthpiece.
14. To study the variation of friction factor for pipe flow.
15. To verify the bernoulli's theorem.