Chhattisgarh Swami Vivekananda Technical University, Bhilai

Name of program: Bachelor of Technology Branch:All Branches **Semester: III**
Subject: Mathematics – III **Code: B000311(014)**
Total Theory Periods: 03 **Total Tutorial Periods: 01**
Class Tests: Two (Minimum) **Assignments: Two (Minimum)**
ESE Duration: Three Hours **Maximum Marks: 100** **Minimum Marks: 35**

Course Objectives:

1. To provide knowledge of Laplace transform of elementary functions including its properties and applications to solve ordinary differential equations.
2. To have thorough knowledge of partial differential equations which arise in mathematical descriptions of situations in engineering.
3. To study about a quantity that may take any of a given range of values that can't be predicted as it is but can be described in terms of their probability.
4. To provide a thorough understanding of interpolation and methods to solve ordinary differential equation.

UNIT-I Laplace transform: Definition, Transform of elementary functions, Properties of Laplace transform, Transform of derivatives & integrals, Multiplication by t^n, Division by t, Evaluation of integrals, Inverse Laplace Transform, Convolution theorem, Unit step function, Unit impulse function, Periodic function, Application to solution of ordinary differential equations.

UNIT- II 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.

UNIT- III Random variable: Discrete and continuous probability distributions, Mathematical expectation, Mean and Variance, Moments, Moment generating function, probability distribution, Binomial, Poisson and Normal distributions.

UNIT- IV Interpolation with equal and unequal intervals: Finite differences, Newton's Forward & Backward Difference Formulae, Central Difference Formula, Stirling's Formula, Bessel's Formula, Lagrange's Formula and Newton's Divided Difference Formula.

UNIT-V Numerical Solution of Ordinary Differential Equations: Picard's Method, Taylor's Series Method, Euler's Method, Euler's Modified Method, Runge-Kutta Methods, Predictor-corrector Methods- Milne's Method, Adams-Bashforth Method.

Text Books:

1. "Higher Engg. Mathematics", Dr. B.S. Grewal– Khanna Publishers.
2. "Advanced Engg. Mathematics" , Erwin Kreyszig – John Wiley & Sons.
3. "Numerical Methods in Engineering and Science" , Dr. B.S. Grewal, Khanna Publishers.
4. "Numerical Methods for Scientific and Engineering Computation" , M .K. Jain, S. R. K

Reference Books:

1. "Applied Mathematics", P. N. Wartikar& J. N. Wartikar. Vol-II Pune Vidyarthi Griha Prakashan, Pune.
2. "Applied Mathematics for Engineers & Physicists", Louis A. Pipes- TMH.
3. "Numerical Methods for Scientists and Engineers" K. Shankar Rao, Prentice Hall of India.
4. "Numerical Methods" P. Kandasamy, K. Thilagavathy and K. Gunavathi, S. Chand publication.

Course outcomes: After studying the contents of the syllabus in detail the students will be able to: Define (mathematically) unit step unit impulse, Laplace transform its properties, inverse and applications to solve ordinary differential equations and find Numerical solution of differential equations, which may be arising due to mathematical modelling based on engineering problems. Hands on these Mathematical topics will make them equipped to prepare for higher studies through competitive examinations.

Chhattisgarh Swami Vivekananda Technical University, Newai

Name of the Program: Bachelor of Technology
Semester: B.Tech – 3rd **Branch: Mining Engineering**
Subject: Mine Development **Course Code: B039312(039)**
Total Marks in End Semester Exam: 100 **L: 3 T: 1 P: 0 Credits: 4**
Minimum number of Class Tests: 02

UNIT-I:-Prospecting: Definition of important mining terms, Stages in the life of mine, Meaning and methods of mine development, Prospecting: Surface method – trenching, Tracing of float, panning, test pitting, Geophysical and geochemical prospecting. Underground Prospecting.

UNIT- II Exploratory Drilling:
Drilling machines used for exploratory drilling viz. Rotary & Percussive, their attachments ;Core Barrels; applicability conditions of drilling methods; Borehole Survey, Directional drilling

UNIT-III Drivage of Incline / Drift / Adit:
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 centre line; Organization and cycle of operations; Mechanized and modern methods of drivage of inclines/ adits /drifts.

UNIT- IV 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; Deepening and widening of shafts. Upward drivage; Organization and cycle of operations, Modern method of shaft sinking.

UNIT-V Introduction to Surface and Underground Mining:
Definition of important terms used in underground mining, advantages and disadvantages of underground mining, Introduction to unit operations in underground mining. Choice of underground method of coal mining, Introduction to various Underground Mining methods.
Definition of important terms of surface mining, Advantages and disadvantages of surface mining, mineral deposits amenable to surface mining, various surface mining methods, Introduction to unit operations in surface mining.

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

Chhattisgarh Swami Vivekananda Technical University, Newai

Name of the Program: Bachelor of Technology
Semester: B.Tech – 3rd **Branch: Mining Engineering**
Subject: Mine Ventilation-I **Course Code: B039313(039))**
Total Marks in End Semester Exam: 100 **L: 3 T: 1 P: 0 Credits: 4**
Minimum number of Class Tests: 02

UNIT- I Mine Gases:
Mine Atmosphere, Mine Gases: Their Origin, Occurrence, Physiological Effects and Detection, Different methods of Methane Drainage, methane layering. Monitoring System of Mine gases, Analysis of Mine air.

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

UNIT-III Mine Illumination: Photometry, Underground lightning from mains, Illumination survey, Flame and electric safety lamps, their examinations, testing and maintenance, standards of illumination in underground and opencast mines. Flame proof apparatus and intrinsically safe apparatus.

UNIT-IV Air flow in mine working: Measurement of velocity, quantity and pressure of mine air. Reynolds Number, Laminar and turbulent flow, Objects and Standard of Ventilation, Flow of air in Ducts and Mine Roadways, Resistance of Air Ways, Resistance in series and parallel, Network Analysis, Laws of Ventilation, Atkinson's Equations, Equivalent Resistance and Equivalent Orifice of Mine, Regulation Related with above topics.

UNIT-V Natural Ventilation: Natural Ventilation and its Measurements, Applicability conditions, merits and demerits of Natural Ventilation, Thermodynamics of Natural Ventilation, Calculation of NVP, Distribution and Control of air Current, Ventilation structures: Doors, Regulators, Stopping and Their Types, air Crossings, Air Locks.

Text Books:
1. Mine Env. By G.B. Mishra
2. Elements of Mining Tech. Vol.2 by D. J. Deshmukh

Reference Books:
1. H. L. Hartman, Mine Ventilation and Air Conditioning, John Wiley, Paperback edition, 1989.
2. H. L. Hartman, J. M. Mutmansky, R. V. Ramani and Y. J. Wang, Mine Ventilation And Air Conditioning,Wiley-interscience, 3rd Edition, 1997
3. S. P. Banerjee, Mine Ventilation, Lovely Prakashan, 1st Edition, 2003
4.M. A. Ramlu, Mine Disaster and Mine Rescue, Oxford & IBH, 1991

Chhattisgarh Swami Vivekananda Technical University, Newai

Name of the Program: Bachelor of Technology
Semester: B.Tech – 3rd **Branch: Mining Engineering**
Subject: Mine Geology **Course Code: B039314(039)**
Total Marks in End Semester Exam: 100 **L: 2 T: 1 P: 0 Credits: 3**
Minimum number of Class Tests: 02

UNIT- I The Earth in Space and Time:
Size, Shape, Mass and Density of Earth; A Brief idea of the origin and the age of the Earth. Interior of the Earth:- Density &Pressure within the Earth; Geological agents of weathering and erosion. Standard stratigraphy scale. Indian Stratagraphy (with special references to Precambrian, Gondwana and Tertiary formations)

UNIT-II Mineralogy:
Process of formation of minerals, 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 Petrology: Main classes of rocks and rock forming minerals, elementary idea about origin, characteristics and classification of igneous, sedimentary and metamorphic rocks, rock cycle, brief description of the important types of igneous, sedimentary and metamorphic rocks with special reference to their economic uses and Indian occurrences .

UNIT-IV Structural Geology:
Concept of Deformation; Beds and their dip & strike; fault, fold, Joints, cleavage igneous intrusion, unconformity, outliers & inliers, their influence in Mining Operations.
Outcrop patterns; Width of Outcrop and thickness of beds; Structural Contours; study of geological Maps

UNIT-V Economic Minerals: Important coalfields and petroleum fields in India. Occurrence, association, distribution and utilization of major deposits of Fe, Mn, Cr, Au Cu,Zn, Diamond and Radioactive minerals in India.

Text Books:

1. A Text Book of Geology: P.K. Mukherjee
2. Engineering And General Geology: Parbin Singh

Reference Books:

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

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch: Mining Engineering | **Semester: III**
Subject: Mechanics of Solids & Fluid Mechanics | **Code: B0039315(037)**
Total Theory Periods: 40 | **Total Tutorial Periods: 10**
Class Tests: Two (Minimum) | **Assignments: Two (Minimum)**
ESE Duration: Three Hours | **Maximum Marks: 100** | **Minimum Marks: 35**

Course Objectives:

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

Unit I	**(a) Simple Stress and Strain:** Concept of stress and strain, types of stresses and strains, Thermal stresses and strains, Hooke's law, Poisson's ratio, Modulii of elasticity, stress strain diagram for ductile and brittle material; material strengths. **(b)Principal Stresses and Strain:** Two-dimensional state of stress and strains: Plane state of stress - equations of transformation - principal planes and stresses, Mohr's circles of stress – plane state of strain. **Composite bars:** Composite bars in tension and compassion; Thermal stresses in composite bars.
Unit II	**(a) S.F. and B.M. diagrams of beams**-Types of load, types of beams, SF and BM diagram for cantilever, simply supported and overhanging beams, Point of contra-flexure, relation between load, SF and BM. **(b) Bending stresses in beams:** Pure bending, neutral axis, moment of resistance, bending stresses in symmetric sections, section modulus, bending equation, bending stress distribution, problems. Theory of Plates.
Unit III	**Deflections of Beams:** Relation between bending moment and slope, slope and deflection of determinate beams, double integration method (Macaulay method), moment area method, conjugate beam method propped cantilever and fixed beams.
Unit IV	**Introduction to Fluid Mechanics:** Fluid, ideal and real fluid, properties of fluid, Compressible and Incompressible fluids; Newtonian and Non-Newtonian fluids. **Fluid Statics:** 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 – S. Ramamrutham – Dhanpat Rai Publishing Company
2. Elements of Strength of Material – Timoshenko & Young- EWP press
3. Strength of Materials – Dr. Sadhu Singh – Khanna publication
4. Strength of Material – R.K. Rajput – Dhanpat Rai & Sons
5. Fluid Mechanics and Machines – Dr. A.K. Jain – Khanna Publications
6. Fluid Mechanics and Machines – Dr. R.K. Bansal – Laxmi Publications.

Reference Books:

1. Strength of Material – Rider – ELBS
2. Mechanics of Material – F.P. Bear & E.E. Johnston – McGraw Hill
3. Mechanics of Material – J.M. Gera & Time Shenko – CBS Publishers
4. Fluid Mechanics – Dr. P.N. Modi – Standard Book House
5. Mechanics of Fluid – Irving H. Shames – McGraw Hill
6. Introduction to Fluid Mechanics – James A. Fay – Prentice Hall India.

Course Outcomes:

- The students are expected to enhance the technical knowledge on relation between stress & strain, Mohr's circle, principal stress & principal strain.
- 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.
- The students are expected to possess ability to use the techniques, skills and modern engineering tools necessary for mechanics of solid & fluid mechanics.
- Work effectively as an individual and as a member of multidisciplinary team.

Chhattisgarh Swami Vivekanand Technical University, Newai

Name of the Program: Bachelor of Technology
Semester: B.Tech – 3rd **Branch:Mining Engineering**
Subject: Mine Development Laboratory **Course Code: B039321(039)**
Total Marks in End Semester Exam: 40 **L: 0 T: 0 P: 2 Credits: 1**

List of Experiments:

1. Study of exploratory drilling by manual and power operated percussive drilling machine.

2. Study of working of diamond drilling machine.

3. Study of different types of drilling tools and bits required for exploratory drilling.

4. Study of Single tube and double tube Core barrel.

5. Study of surface arrangements required during shaft sinking and its cycle of operation.

6. Study of various special methods of Shaft sinking.

7. Study of drivage of Incline/Adit by conventional method using drilling and blasting, cycle of operation and calculation of manpower.

8. Study of drivage of Incline using tunnel boring machine.

9. Study of erection of temporary lining during shaft sinking operation.

10. Study of erection of permanent brick/concrete lining during shaft sinking.

Chhattisgarh Swami Vivekanand Technical University, Newai

Name of the Program: Bachelor of Technology
Semester: B.Tech – 3rd **Branch:Mining Engineering**
Subject: Mine Ventilation-I **Course Code: B039322(039)**
Total Marks in End Semester Exam: 40 **L: 0 T: 0 P: 2 Credits: 1**

List of Experiments:

Number of Practical to be performed: 10

1. Measurement of Relative humidity by Hygrometer.
2. Measurement of air velocity by velometer.
3. Measurement of air velocity by anemometer.
4. Measurement of air quantity.
5. Study of Flame safety Lamp.
6. Study of Physiological effects of various toxic gases found in underground mine.
7. Study of various techniques of methane drainage.
8. Study of surface air-conditioning plant.
9. Study of different types of ventilation devices.
10. Study of thermodynamics of Natural ventilation.
11. Study of Air flow in mine working.

Chhattisgarh Swami Vivekanand Technical University, Newai

Name of the Program: Bachelor of Technology
Semester: B.Tech – 3rd **Branch:Mining Engineering**
Subject: Mine Geology Lab- **Course Code: B039323(039)**
Total Marks in End Semester Exam: 40 **L: 0 T: 0 P: 2 Credits: 1**

List of Experiments: (At least Ten experiments are to be performed by each student)

1. Megascopic Description and Distribution of Ore Forming Minerals and Industrial Minerals.
2. Megascopic Description of important Igneous, Sedimentary, and Metamorphic Rocks found in coal mines.
3. Basic Concept of Contours, Attitude of Beds, Width of Outcrop, True and Apparent Dips, Rules of V's .
4. Study of Geological Maps and Preparation of Cross Sections. (Any two map)