MATS UNIVERSITY

SCHOOL OF ENGINEERING AND INFORMATION TECHNOLOGY

DEPARTMENT OF MINING ENGINEERING

Syllabus

For

(Four-Year Full-Time Degree Programme)

Bachelor of Technology (B.Tech.)

Mining Engineering

(2025-2029)

(Semester Based Course)

MATS University, Raipur C.G.				
School of Engineering and Information Technology, Raipur C.G.				
Model Curriculum of B.Tech. Program Mining Engineering				
(BASED ON AICTE MODEL ALIGNED WITH NEP-2020)				
S. No.	**Subject Code**	**Semester - 1**	**LTP**	**Credits**
1	BTDSCBSC100	Matrices and Calculus	3:0:0	3
2	BTDSCBSC101	Engineering Physics	3:0:0	3
3	BTDSCESC102	Programming for Logic Building	3:1:0	4
4	BTDSCHSC103	Technical English	2:0:0	2
5	BTDSCMC104	Environmental Sciences	1:0:0	0
6	BTDSCBSC105	Engineering Physics Laboratory	0:0:2	1
7	BTDSCESC106	Manufacturing Practices – I Laboratory	0:0:2	1
8	BTDSCESC107	Engineering Graphics & Design Laboratory	0:0:4	2
9	BTSEC108	Programming and Soft Skill Laboratory (SEC)	0:0:2	1
10	BTAEC109	Communication Skills Laboratory (AEC)	0:0:4	2
11	BTVAC110	Universal Human Values	1:0:0	1
12	GEA	Multidisciplinary Elective Course - I (from bucket)	3:0:0	3
Total Credits				**23**
S. No.	**Subject Code**	**Semester - 2**	**LTP**	**Credits**
1	BTDSCBSC200	Analytical Mathematics	3:0:0	3
2	BTDSCBSC201	Engineering Chemistry	3:0:0	3
3	BTDSCESC202	Basic Electrical & Electronics Engineering	3:0:0	3
4	BTMC203	Constitution of India, Professional Ethics and Human Rights.	1:0:0	0
5	BTDSCESC204	Fundamental of Mechanical Engineering. (For Aero./Mech./Mining/Civil Engg.)	3:0:0	3
6	BTDSCESC205	Engineering Chemistry Laboratory	0:0:2	1
7	BTDSCESC206	Basic Electrical & Electronics Engineering Laboratory	0:0:2	1
8	BTDSCESC207	Fundamental of Mechanical Engineering Laboratory (For Aero./Mech./Mining/Civil Engg.)	0:0:2	1
9	BTDSCESC208	Manufacturing Practices - II Laboratory	0:0:2	1
10	BTSEC209	Problem Solving with Python Programming (SEC)	3:0:0	3
11	BTAEC210	Advanced Programming Laboratory (AEC)	0:0:2	1
12	GEA	Multidisciplinary Elective Course - II (from Basket)	3:0:0	3
Total Credits				**23**

S. No.	Subject Code	Semester - 3	LTP	Credits
1	BTDSCBSC300	Numerical Methods and Statistics	3:0:0	3
2	BTDSCMIN361	Mechanics of Solids & Fluid Mechanics	3:1:0	4
3	BTDSCMIN362	Mining Geology I	3:1:0	4
4	BTDSCMIN363	Basics of Mining Engineering	3:1:0	4
5	BTDSCMIN364	Mining Geology I Laboratory	0:0:2	1
6	BTAEC365	Basics of Mining Engineering Laboratory (AEC)	0:0:2	1
7	BTSEC366	Mechanics of Solids & Fluid Mechanics Laboratory (SEC)	0:0:2	1
8	BTSEM367	Project / Seminar	0:0:2	1
9	GEAXX	Multidisciplinary Elective Course - III (from Basket)	3:0:0	3
Total Credits				**23**
S. No.	**Subject Code**	**Semester - 4**	**LTP**	**Credits**
1	BTDSCMIN460	Mine Environment-I	3:0:0	3
2	BTDSCMIN461	Mining Geology – II	3:0:0	3
3	BTDSCMIN462	Mine Surveying-I	3:1:0	4
4	BTDSCMIN463	Mining Geology II Laboratory	0:0:2	1
5	BTSEC464	Mine Surveying-I Laboratory (SEC)	0:0:2	1
6	BTAEC465	Mine Environment-I Laboratory (AEC)	0:0:2	1
7	BTSEM466	Project/ Seminar	0:0:1	1
8	BTINT467	Internship- I	0:0:1	3
9	BTDSCPE6XX	Professional Elective Course-I	3:0:0	3
10	GEAXX	Multidisciplinary/ Generic Elective Course IV	3:0:0	3
Total Credits				**23**
S. No.	**Subject Code**	**Semester – 5**	**LTP**	**Credits**
1	BTDSCMIN560	Rock Mechanics	3:0:0	3
2	BTDSCMIN561	Mine Ventilation	3:0:0	3
3	BTDSCMIN562	Mine Machinery-I	3:0:0	3
4	BTDSCMIN563	Blasting Technology	3:0:0	3
5	BTDSCMIN564	Rock Mechanics Laboratory	0:0:2	1
6	BTSEC565	Mine Ventilation Laboratory (SEC)	0:0:2	1
7	BTAEC566	Mine Machinery-I Laboratory (AEC)	0:0:2	1
8	BTPR567	Interdisciplinary Project	0:0:2	1
9	BTINT568	Internship - II	0:0:1	3
10	BTDSCPE6XX	Professional Elective Course - II	3:0:0	3
Total Credits				**22**

S. No.	Subject Code	Semester – 6	LTP	Credits
1	BTDSCMIN660	Mine Machinery - II	3:0:0	3
2	BTDSCMIN661	Mine Surveying-II	3:0:0	3
3	BTDSCMIN662	Mine Environment-II	3:0:0	3
4	BTDSCMIN663	Mine Legislation-I	3:0:0	3
5	BTDSCMIN664	Mine Machinery -II Laboratory	0:0:2	1
6	BTSEC665	Mine Surveying-II Laboratory (SEC)	0:0:2	1
7	BTAEC666	Mine Environment-II Laboratory (AEC)	0:0:2	1
8	BTPR667	Multidisciplinary Project / Case Study	0:0:2	1
9	BTINT668	Internship - III	0:0:1	3
10	BTPDSE6XX	Professional Elective Course - III	3:0:0	3
		Total Credits		**22**
S. No.	**Subject Code**	**Semester – 7**	**LTP**	**Credits**
1	BTDSCMIN760	Mine Legislation-II	3:0:0	3
2	BTDSCMIN761	Mine Economics & System Engineering	3:0:0	3
3	BTDSCMIN761	Strata Control	3:0:0	3
4	BTDSCMIN762	Mineral Dressing	3:0:0	3
5	BTDSCMIN763	Strata Control Lab	0:0:2	1
6	BTSEC764	Mineral Dressing Lab	0:0:2	1
7	BTPR765	Project Work Phase-I	0:0:2	2
8	BTINT766	Internship- IV	0:0:1	3
9	BTDSCPE6XX	Professional Elective Course-IV	3:0:0	3
Total Credits				**22**
S. No.	**Subject Code**	**Semester – 8**	**LTP**	**Credits**
1	BTPR860	Project Work Phase - II (Domain Specific/live Project)	0:0:2	6
2	BTPDSE5XX	Professional Elective Course - V	3:0:0	3
3	BTPDSE5XX	Professional Elective Course - VI	3:0:0	3
4	BTPDSE5XX	Professional Elective Course - VII	3:0:0	3
		Total Credits		**15**
Grand Total Credits				**173**

Minors Courses listing:

S. No.	Subject Code	Semester – 5	LTP	Credits
1	xxxx	**Minors (01 Th + 01 Lab)**	3:0:4	3+2
		Total Credits		**5**
S. No.	**Subject Code**	**Semester – 6**	**LTP**	**Credits**
1	xxxx	**Minors (01 Th + 01 Lab)**	3:0:4	3+2
		Total Credits		**5**
S. No.	**Subject Code**	**Semester – 7**	**LTP**	**Credits**
1	xxxx	**Minors (01 Theory + 01 Research Project / Case Study)**	3:0:4	3+2
		Total Credits		**5**
S. No.	**Subject Code**	**Semester – 8**	**LTP**	**Credits**
1	xxxx	**Minors (01 Theory)**	3:0:0	3
Grand Total Credits				**191**

Scheme of Teaching and Evaluation
(As per NEP -2020)
Choice Based Credit System (CBCS) and Outcome Based Education (OBE)

Semester - I

S. No.	Course Sub Category	Course Name	Course Code	Teaching Scheme				Evaluation Scheme		Total Marks
				Hours			Credits			
				Theory	Tutorial	Practical		CIA	ESE	
1	DSCC - BSC	Matrices and Calculus	BTDSCBSC100	3	0	-	3	30	70	100
2	DSCC - BSC	Engineering Physics	BTDSCBSC101	3	0	-	3	30	70	100
3	DSCC - ESC	Programming for Logic Building	BTDSCESC102	3	1	-	4	30	70	100
4	DSCC - HSC	Technical English	BTDSCHSC103	2	0	-	2	30	70	100
5	DSCC - MC	Environmental Sciences	BTDSCMC104	1	0	-	0	30	70	100
6	DSCC - BSC	Engineering Physics Laboratory	BTDSCBSC105	-	-	2	1	20	30	50
7	DSCC - ESC	Manufacturing Practices – I Laboratory	BTDSCESC106	-	-	2	1	20	30	50
8	DSCC - ESC	Engineering Graphics & Design Laboratory	BTDSCESC107	-	-	4	2	20	30	50
9	SEC	Programming and Soft Skill Laboratory	BTSEC108	-	-	2	1	20	30	50
10	AEC	Communication Skills Laboratory	BTAEC109	-	-	2	2	20	30	50
11	VAC	Universal Human Values	BTVAC110	1	-	-	1	30	70	100
12	GEC	Multidisciplinary Elective Course - I	GEA	3	0	0	3	30	70	100
			Total	16	1	12	23	310	640	950

L – Lecture, T – Tutorial, ESE – End Semester Examination, P – Practical, IM – Internal Marks (Include Class Test & Teacher's Assessments)

Note : Theory Internal Marks (CIA) = 30 (CT-I = 05, CT-II=05, Assignment=05, Mid Term=15)
Practical Internal Marks (CIA) = 20 (Attendance = 05, Lab Viva-Voce = 05, Lab Record Work = 10)

Discipline Specific Core Courses (DSCC) Major				AEC (Ability Enhancement Course) (E)	SEC/Internship (Skill Enhancement Course) (F)	Value Added Course (VAC) (G)	GEC (Generic Elective Course) (H)
Basic Sciences Course (A)	Engineering Sciences Course (B)	Humanities Science (C)	Mandatory Course (D) (Zero Credit Course)				
Engineering Mathematics – I	Programming for Logic Building	Technical English	Environmental Sciences	Communication Skills Laboratory	Programming and Soft Skill Laboratory	Universal Human Values	Multidisciplinary Elective Course - I
Engineering Physics	Engineering Graphics & Design						
Engineering Physics Laboratory	Manufacturing Practices – I Laboratory						
	Engineering Graphics & DesignLaboratory						

Credit Definition:

- 1-hour lecture (L) per week per semester = 1Credit
- 1-hour tutorial (T) per week per semester = 1Credit
- 2-hour Practical/Drawing(P) per week per semester = 1 Credit

- Four credit courses are to be designed for 60 hours of Teaching-Learning process.
- Three credit courses are to be designed for 48 hours of Teaching-Learning process.
- Two credit courses are to be designed for 28 hours of Teaching-Learning process.
- One credit courses are to be designed for 15 hours of Teaching Learning process

Semester: I B. Tech **Branch: All Streams of Engineering**
Subject: Matrices and Calculus **Code: BTDSCBSC100**
Total Theory Periods: 48 **Total Tutorial Periods: 00**
Total Credits: 03

OBJECTIVES:

- To develop the use of matrix algebra techniques this is needed by engineers for practical applications.
- To make the student knowledgeable in the area of infinite series and their convergence so that he/ she will be familiar with limitations of using infinite series approximations for solutions arising in mathematical modeling.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To introduce the concepts of improper integrals, Gamma, Beta and Error functions which are needed in engineering applications.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.

UNIT-I

MATRICES

Real vector space, Subspace, Linear span, Linear dependence and linear independence of vectors, Basis, Dimension, Linear transformation, Matrix associated with a linear transformation, Rank and inverse by elementary transformation (Gauss Jordan method), System of linear equations, Eigenvalues and eigenvectors, Cayley-Hamilton theorem, Diagonalization of matrices.

UNIT- II

DIFFERENTIAL CALCULUS

Successive differentiation, Lebnitz theorem, Rolle's Theorem, Taylor's theorem with Lagrange's form of remainder, Expansions of functions in Taylor's and McLaurin's series

UNIT-III

PARTIAL DIFFERENTIATION

Functions of two variables: Limit, continuity and partial derivatives, derivatives of higher order, Euler's theorem on homogeneous functions, Total derivative, Change of variables, Jacobians, Maxima, minima and saddle points of functions of two variables

UNIT-IV

ORDINARY DIFFERENTIAL EQUATION

First order ordinary differential equations: Exact, linear and Bernoulli's equations, Euler's equations, Equations of first order and higher degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

Ordinary differential equations of higher order linear differential equations with constant coefficients & variable coefficients, method of variation of parameters, Cauchy-Euler equation,Legendre polynomials and their properties

UNIT-V

MULTIPLE INTEGRAL

Beta and Gamma functions – elementary properties, Double and triple integrals, change of order of integration, Application to area and volume.

OUTCOMES:

- This course equips students to have basic knowledge and understanding in one fields of materials, integral and differential calculus.

NAME OF TEXT BOOKS:

1. Higher Engineering Mathematics by B.S.Grewal (42th edition)-Khanna Publisher.
2. Advanced Engineering Mathematics by Erwin Kreyszig (8th edition)-John Wiley & Sons.

NAME OF REFERENCE BOOKS:

1. Differential Calculus by Gorakh Prasad-Pothisala Private Limited.
2. Advanced Engineering Mathematics by R.K.Jain and S.R.K. Iyengar-Narosa Publishing House.
3. Applied Mathematics by P.N.Wartikar&J.N.Wartikar Vol-ll –Pune VidyarthiGrihaPrakasan, Pune.
4. Integral Calculus by Gorakh Prasad-Pothisala Private Limited.

Semester: I B.Tech **Branch: All Streams of Engineering**
Subject: Engineering Physics **Code: BTDSCBSC101**
Total Theory Periods: 48 **Total Tutorial Periods: 00**
Total Credits : 03

OBJECTIVES:

- To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology.

Unit -I

THEORY OF RELATIVITY SPACE

Time and motion, frame of reference, Galilean Transformation Outline of relativity, Michelson-Morley experiment, Special theory of Relativity, transformation of space and time, Time dilation, Doppler effect ,length contraction, addition of velocities, Relativistic mass: variation of mass with velocity, kinetic energy, equivalence of mass and energy, Relation between energy and momentum.

Unit- II

(a) LASERS

Temporal and spatial coherence of light wave Principle of laser, Laser characteristics, components of laser, Principle of Ruby, He-Ne &Nd -YAG lasers, application, basic concepts of Holography (only introductory part, No detail derivation)

(b) FIBRES OPTICS:

Optical fibers: Introduction & advantages, structure & classification, Option of propagation in fiber, attenuation & distortion, acceptance angle and cone, numerical aperture (only introductory part, No detail derivation).

Unit -III

NUCLEAR PHYSICS

Controlled and uncontrolled chain reaction, criteria of critical mass, nuclear reactor and its site selection & numerical ,nuclear forces, Nuclear fusion in stars . Introduction of elementary particles. Electron ballistic: Motion of charged particles in electric and magnetic field. Aston and Bainbridge mass spectrograph.

Unit -IV

WAVE OPTICS

Wedge shaped films, Interferences by division of amplitude: Newton's rings and its applications Interference by division of wave front: Fresnel's bi prism, fringe width, diffraction grating, resolving power of grating,

Unit- V

SOLID STATE DEVICES:

Transistor: Input and Output characteristics in CE mode, Transistor as an amplifier, Hartley Oscillator. FET: Input and output characteristics of J-FETs & MOSFETs, Operational amplifiers (Op-Amp).

OUTCOMES:

The students will have knowledge on the basics of physics related to properties of matter, optics, acoustics etc., and they will apply these fundamental principles to solve practical problems related to materials used for engineering applications.

TEXT BOOKS:

1. Gaur and Gupta “Engineering Physics”
2. Avadhanulu and Kshirsagar “Engineering Physics”.
3. Verma H.C.: Concepts of Physics, Part-1 & Part-2, BharatiBhawan (P&D)
4. A.K. Tayal: Engineering Mechanics (Statics and Dynamics)

REFERENCE BOOKS:

• Jenkins and White: “Optics”, MeGrew-Hill Book Company.

• Singh R.B.: “Physics of Oscillations and Waves”

• Ghatak A.K.: “Optics”

• Mani and Mehta: “Modern Physics”, Affiliated East-West Press Pvt. Ltd, 1998.

• Sanjeev Puri: Modern Physics, narosa Pub. Co.2004.

• Azroff: Solid State Physics, Tata McGraw-Hill, 2004.

• Theraja: B.L., Basic Electronics, S.Chand, 2002.

• Puri: Digital Electronics, Tata McGraw-Hill, 2002.

• Millman, J and Halkias: integrated Electronics, Tata MeGraw-Hill, 2004.

• Tyagrajan and Ghatak: Lasers, Macmillan, 2001. •

Semester: I B.Tech **Branch: All Streams of Engineering**

Subject: Programming For Logic Building **Subject Code: BTDSCESC102**

Total Theory Periods: 48 **Total Tutorial Periods: 12**

Total Credits: 04

COURSE OBJECTIVE:

- To distinguish and recognize low-level and high-level programming languages
- To know fundamental concepts of structured programming
- To understand logic development
- To design pseudo logic for various programming problems.
- To understand the basic structure of a program including sequence, decisions and looping.
- To design solutions to real world problems using C language.
- To use C language for problem solving and numerical computations.
- To apply computer-programming concepts to new problems or situations.

UNIT – I

ELEMENTS OF C LANGUAGE

Tools for Problem Solving: Problem Analysis, Flowchart, Algorithm Development. Top-Down Program Design, Structured Design Approach, Origin of C, Features & Characteristic of C, C Compiler, Character Set, Keywords, Identifiers, Constants, Variables, Input/ Output Statements, Basic Data Types, Operators and Expressions, Basic structure of C programs, A simple C Program.

UNIT – II

CONTROL FLOW CONSTRUCTION

Decision making and branching: Simple if statement, if else statement, Nesting of if-else statement, else - if Ladder, Switch statement, Operator, goto statement, Decision making and looping, While statement, Do-While statement, For statement, Jumps in loops, Break and Continue statement.

UNIT – III

DEFINING AND MANIPULATING ARRAYS

One Dimensional Arrays: Declaration of Arrays, Initialization of Arrays, Reading and Writing of integer, real and Character arrays, sorting and Searching in Arrays, Multi-Dimensional Arrays, Handling of Character Strings.

UNIT – IV

USER DEFINED FUNCTIONS

Syntax of Function, Calling functions, Actual & Formal Arguments, Categories of Functions, Function prototype, Scope Rules: Local & Global variables, Recursion, Recursion vs. iteration, Passing Arguments: call by values & call by reference, passing array to function.

Structures: Declaration and initialization of Structure, Array of structures, Array within structure, structure within structure, Structures and functions, Introduction to unions.

UNIT – V

POINTER DATA TYPE AND ITS APPLICATION

Pointer Operator, Pointer Expression, Initialization of pointers, Pointer Arithmetic, Pointer and Function Arguments, Pointer to function, Pointer and Arrays, Pointers and String, Arrays of Pointers, Pointers to Pointers, Dynamic memory allocation.

Files in C: Defining and Opening a file, closing a file, Input/ Output operations on files, Error handling during I/O operations, Random access to files.

COURSE OUTCOME:

After completion of the course study, students are going to be in a position to

1. Analyze issues and style algorithms in pseudo code.
2. Able to implement the algorithms and draw flowcharts for solving Mathematical and Engineering problems
3. Read, perceive and trace the execution of programs written in C language.
4. Develop confidence for self-education and ability for life-long learning needed for Computer language.
5. Write down C program for a given algorithm by means of modular approach.

TEXT BOOKS:

1. The C programming Language, Dennis M Ritchie and Kernighan, PHI.
2. Let us C, YashwantKanetkar, BPB Publication.
3. Programming in C, E. Balaguruswamy, TMH.

REFERENCE BOOKS:

1. Programming in C, Byron Gottfried, Schaum's series outline TMH.
2. Programming in C, Ghosh, PHI.
3. Computer Programming in C, V. Raja Raman, PHI.

Semester: I B. Tech **Branch: All Streams of Engineering**

Subject: Environmental Sciences **Code: BTDSCMC104**

Total Theory Periods: 15 **Total Tutorial Periods: 00**

Total Credits: 00

UNIT-I:

CONCEPTS OF ENVIRONMENTAL SCIENCES AND NATURAL RESOURCES

Environment, Levels of organizations in environment, Structure and functions in an ecosystem; Biosphere, its Origin and distribution on land, in water and in air, Broad nature of chemical composition of plants and animals. Renewable and Non-renewable Resources, Forests, water, minerals, Food and land (with example of one case study); Energy, Growing energy needs, energy sources (conventional and alternative).

UNIT-II:

BIODIVERSITY AND ITS CONSERVATION

Biodiversity at global, national and local levels: India as a mega-diversity nation; Threats to biodiversity (biotic, abiotic stresses), and strategies for conservation.

UNIT-III:

ENVIRONMENTAL POLLUTION

Types of pollution- Air, water (including urban, rural, marine), soil, noise, thermal, nuclear; Pollution prevention; Management of pollution- Rural/Urban/Industrial waste management [with case study of any one type, e.g., power (thermal/nuclear), fertilizer, tannin, leather, chemical, sugar], Solid/Liquid waste management, disaster management.

UNIT-IV:

ENVIRONMENTAL BIOTECHNOLOGY AND ENVIRONMENTAL MONITORING

Biotechnology for environmental protection- Biological indicators, bio-sensors; Remedial measures- Bio-remediation, phyto-remediation, bio-pesticides, bio-fertilizers; Bio-reactors- Design and application. Monitoring- Identification of environmental problem, tools for monitoring (remote sensing, GIS); Sampling strategies- Air, water, soil sampling techniques.

UNIT-V:

SOCIAL ISSUES AND ENVIRONMENT

Problems relating to urban environment- Population pressure, water scarcity, industrialization; remedial measures; Climate change- Reasons, effects (global warming,

ozone layer depletion, acid rain) with one case study; Legal issues- Environmental legislation (Acts and issues involved), Environmental ethics

TEXTBOOKS:

1. Gilbert M. Masters, "Introduction to Environmental Engineering and Science", 2nd Edition, Pearson Education, 2004.

2. Benny Joseph, "Environmental Science and Engineering", Tata McGraw-Hill, New Delhi, 2006.

REFERENCE BOOKS:

1. A. K. Chatterji, "Introduction to Environmental Biotechnology", Prentice Hall of India, New Delhi, 2006.

2. R.K. Trivedi,"Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol. I and II, Enviro Media.

3. Nebel B. J., "Environmental Science", Prentice Hall of India, New Delhi, 1987.

Semester: I B.Tech **Branch: All Streams of Engineering**

Subject: Technical English **Code: BTDSCHSC103**

Total Theory Periods: 28 **Total Tutorial Periods: 00**

Total Credits : 02

OBJECTIVES:

- To enable learners of Engineering and Technology develop their basic communication skills in English.
- To emphasize specially the development of speaking skills amongst learners of Engineering and Technology.
- To ensure that learners use the electronic media such as internet and supplement the learning materials used in the classroom.
- To inculcate the habit of reading and writing leading to effective and efficient communication.

UNIT-I

Technical vocabulary-meaning in context, sequencing words, articles, prepositions, intensive reading and predicting content-reading and interpretation- process description.

UNIT-II

Phrases/structures indicating use/purpose- nonverbal communication- listening- corelating verbal and nonverbal communication-speaking in group discussion- formal letter writing-writing analytical paragraphs.

UNIT III

Cause and effect expressions- different grammatical forms of the same word- speaking stress and intonation- writing using connectives- report writing- types, structures, data collection, content form recommendation.

UNIT –IV

Numerical adjectives- oral instructions- descriptive writings, letter of application-content, format (c.v./biodata)-imperative forms –checklists, yes/no question forms- e mail communication.

UNIT-V

Speaking – discussion of problems and solutions- creative and critical thinking, writing a proposal.

OUTCOMES:

Learners should be able to

- Speak clearly, confidently, comprehensibly, and communicate with one or many listeners using appropriate communicative strategies.
- Write cohesively and coherently and flawlessly avoiding grammatical errors, using a wide vocabulary range, organizing their ideas logically on a topic.
- Read different genres of texts adopting various reading strategies.

Listen/view and comprehend different spoken discourses/excerpts in different accents.

BOOKS AND REFERENCES:

1. P.k. dutta, g. Rajeevan and c.l.n.prakash, ‘a course in communication skills,. Cambridge university press, india2007

2. Krishna mohan and meerabanerjee, ‘developing communication skills’ Macmillan india limited

3. Edger thrope, showickthrope, ‘objective english’ second edition,pearson education,2007

Semester: I B.Tech. **Branch: All Streams of Engineering**

Lab: Engineering Physics Lab **Code: BTDSCBSC105**

Total Practical Periods: 30 **Total Credit: 01**

OBJECTIVES:

- To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics and properties of matter.

OUTCOMES:

- The hands on exercises undergone by the students will help them to apply physics principles of optics and thermal physics to evaluate engineering properties of materials.

LIST OF EXPERIMENTS (Any ten experiments can be performed)

1. To determine the surface tension by Capillary/Jager's method.
2. To determine the wave length of light by Newton's rings method.
3. To determine the wave length of light by Fresnel's Biprism.
4. To determine the focal length of combination of two thin lenses by nodal slide assembly and its verification.
5. To determine specific resistance of a wire by Carry Foster's Bridge.
6. To determine the Hall coefficient of semiconductor.
7. To determine e/m by Thomson's method.
8. Study of Photo – Cell and determination of Planck's constant.
9. Determination of wavelength of a spectral line using diffraction grating.
10. Determination of divergence of LASER beam.
11. Determination of grating element of a diffraction grating using LASER beam.
12. To determine the coefficients of viscosity of a liquid by capillary flow/Stoke's method.
13. To determine the frequency of A.C. mains using sonometer.
14. To determine the moment of inertia of flywheel.
15 To determine the forbidden energy gap of semiconductor diode.
16. To determine the mechanical equivalent of heat (J) by Calender&Barne's method.
17. To determine the numerical aperture (NA) of the given fiber cables.
18. To study the characteristics of LDR.

Semester: I B.Tech. **Branch: All Streams of Engineering**
Lab: Programming & soft skills laboratory **Code: BTSEC108**
Total Practical Periods: 30 **Total Credits: 01**

List of Programs:

1 Write a program to take the radius of a sphere as input and print the volume and surface area of that sphere.
2 Write a program to take a 5-digit number as input and calculate the sum of its digits.
3 Write a program to take three sides of a triangle as input and verify whether the triangle is an isosceles, scalene Oran equilateral triangle.
4 Write a program that will take 3 positive integers as input and verify whether or not they form a Pythagorean triplet or not.
5 Write a program to print all the Prime numbers between a given ranges.
6 Write a program to define a function that will take an integer as argument and return the sum of digits of that integer**.**
7 Write a program to define a macro that can calculate the greater of two of its arguments. Use this macro to calculate the greatest of 4 integers.
8 Write a program to define a recursive function that will print the reverse of its integer argument.
9 Write a program to print the sum of first N even numbers using recursive function.
10 Write a program to sort an array using Bubble sort technique.
11 Write a program that will take the elements of two integer arrays of 5 element each, and insert the common elements of both the array into a third array (Set intersection)
12 Write a program to take 5 names as input and print the longest name.
13 Write a program to check whether two given strings are palindrome or not using user defined function.
14 Write a program to find sum of all array elements by passing array as an argument using user define functions.
15 Write a program to convert decimal number to binary number using the function.
16 Write a program to get the largest and smallest element of an array using the function.
17 Write a program to define a structure Student that will contain the roll number, name and total marks of a student. The program will ask the user to input the details of 5 students and print the details of all the students whose total marks is greater than a given value.

18 Write a program to define a union Contact that will contain the members Mobile no and E-mail id. Now define structure Employee that will contain name, roll number, mode of contact (mob/e-mail) and a variable of type Contact as members. The program will ask the user to give the details of two Employees including mode of contact and the contact num/ E-mail. Print the details of both the Employees.

19 Write a program to count vowels and consonants in a string using pointer.

20 Write a program to swap two numbers using pointers.

21 Write a program to find sum of array elements using Dynamic Memory Allocation.

22 Write a program that will ask the user to input a file name and copy the contents of that file into another file.

23 Write a program that will take any number of integers from the command line as argument and print the sum of all those integers.

24 Write a program to process sequential file for payroll data.

25 Write a program to process random file of library data.

Smart Working with MS-Office

MS-Word

a) Creating, editing, saving and printing text documents
b) Font and paragraph formatting
c) Simple character formatting
d) Inserting tables, smart art, page breaks
e) Using lists and styles
f) Working with images
g) Using Spelling and Grammar check
h) Understanding document properties
i) Mail Merge

MS-Excel

a) Spreadsheet basics
b) Creating, editing, saving and printing spreadsheets
c) Working with functions & formulas
d) Modifying worksheets with color &auto formats
e) Graphically representing data : Charts & Graphs
f) Speeding data entry : Using Data Forms
g) Analyzing data : Data Menu, Subtotal, Filtering Data
h) Formatting worksheets
i) Securing & Protecting spreadsheets

MS-PowerPoint

a) Opening, viewing, creating, and printing slides
b) Applying auto layouts
c) Adding custom animation
d) Using slide transitions
e) Graphically representing data : Charts & Graphs
f) Creating Professional Slide for Presentation.

LIST OF EQUIPMENT'S / MACHINE REQUIRED:

PCs, C-Compiler, C Online Compiler, Microsoft Office (version 2007 or above)

REFERENCES:

1. Programming in ANSI C – E. Balaguruswamy Tata Mc-Gcraw Hill.
2. Let us C, YashwantKanetkar, BPB Publication
3. C: The Complete Reference, Herbert Schildt, McGraw Hill.
4. Office 2007 for Dummies, Wallace Wang, Wiley Publishing
5. MS-Office 2010 Training Guide, Satish Jain/M.Geeta/Kratika, BPB Publications

Semester: I B.Tech **Branch: All Streams of Engineering**

Lab: Engineering Graphics and Design Lab **Code: BTDSCESC107**

Total Practical Periods: 48 **Total Credits: 02**

LIST OF EXPERIMENTS

Component-1

Sheet-1: Projection of Solids (4 problems) + Section and Development of solid surfaces (4 problems) Sheet -2: Orthographic projection without section (4 problems).

Sheet -3: Orthographic projection with section (4 problems). Sheet- 4: Isometric Projections (6 problems).

Component -2

One A-3 size sketch book consisting of:-

1) 6 problems each from Projection of Curves, Lines, Planes and Solids.

2) 6 problems from Section and Development of Solids.

3) 4 problems each from the Orthographic Projections (with Section), Reading of orthographic projections and Isometric projections.

Component - 3

1. An introduction of cad software and its utilities in the engineering software.
2. Study of the basic initial setting and viewing of drafting software interface.
3. Study of various tool bar options and exercises to familiarize all the drawing tools.
4. Use of various modify commands of drafting software.
5. Dimensioning in 2d and 3d entities.
6. Draw different types of 3d modeling entities using viewing commands, to view them (isometric projection).
7. Sectioning of solid primitives and rendering in 3d.
8. Intersection of solid primitives.

Semester: I B.Tech **Branch: All Streams of Engineering**
Lab: Communication Skill Lab **Code: BTAEC109**
Total Practical Periods: 30 **Total Credits: 02**

LIST OF TASKS:

1. Listening comprehension – Achieving ability to comprehend material delivered at relatively fast speed; comprehending spoken material in Standard Indian English, British English, and American English; intelligent listening in situations such as interview in which one is a candidate.

2. Vocabulary building, Creativity, using Advertisements, Case Studies etc.

3. Personality Development: Decision-Making, Problem Solving, Goal Setting, Time Management & Positive Thinking

4. Cross-Cultural Communication: Role-Play/ Non-Verbal Communication.

5. Meetings- making meeting effective, chairing a meeting, decision making, seeking opinions , interrupting and handling interruptions, clarifications, closure- Agenda, Minute writing.

6. Group Discussion – dynamics of group discussion, Lateral thinking, Brainstorming and Negotiation skills

7. Resume writing – CV – structural differences, structure and presentation, planning, defining the career objective

8. Interview Skills – formal & informal interviews, concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele and video-conferencing 9. Writing Skills - Business Communication, Essays for competitive examinations.

10. Technical Report Writing/ Project Proposals – Types of formats and styles, subject matter – organization, clarity, coherence and style, planning, data-collection, tools, analysis.- Feasibility, Progress and Project Reports.

Semester: I B.Tech **Branch: All Streams of Engineering**
Lab:Manufacturing Practices -I Laboratory **Code: BTDSCESC106**
Total Practical Periods: 45 (15 Instructional Periods) **Total Credits: 02**

INSTRUCTIONAL SYLLABUS

Carpentry:
Timber, definition, engineering applications, seasoning and preservation, plywood and ply boards.
Foundry:
Moulding sands, constituents and characteristics. Pattern, definition, materials, types, core prints. Role of gate, runner, riser, core and chaplets. Causes and remedies of some common casting defects like blow holes, cavities, inclusions.
Welding:
Definitions of welding, brazing and soldering processes, and their applications, Oxyacetylene gas welding process, equipment and techniques, type of flames and their applications. Manual met an arc Welding technique and equipment, AC and DC welding, electrodes, constituents and functions of electrode coating, Welding positions. Type of weld joint. Common welding defects such ascracks, undercutting slag inclusion, porosity.

LIST OF EXPERIMENTS

1. T-Lap joint and Bridle joint (Carpentry shop)

2. Mould of any pattern (foundry shop)

3. Casting of any simple pattern (foundry shop)

4. (a) Gas welding practice by students on mild steel flat

(b) Lap joint by Gas welding

5. (a) MMA Welding practice by students

(b) Square butt joint by MMA Welding

6. (a) Lap joint by MMA Welding

(b) Demonstration of brazing

Scheme of Teaching and Evaluation (As per NEP -2020) Choice Based Credit System (CBCS) and Outcome Based Education (OBE)

Semester - II

S. No.	Course Sub Category	Course Name	Code	Teaching Scheme				Evaluation Scheme		Total Marks
				Hours			Credits			
				Theory	Tutorial	Practical		CIA	ESE	
1	DSCC	Analytical Mathematics	BTDSCBSC200	3	0	-	3	30	70	100
2	DSCC	Engineering Chemistry	BTDSCBSC201	3	-	-	3	30	70	100
3	DSCC	Basic Electrical & Electronics Engineering	BTDSCESC202	3	0	-	3	30	70	100
4	DSCC	Constitution of India, Professional Ethics and Human Rights.	BTMC203	1	-	-	0	30	70	100
5	DSCC	Fundamental of Mechanical Engineering.	BTDSCESC204	3	0	-	3	30	70	100
6	DSCC	Engineering Chemistry Laboratory	BTDSCESC205	-	-	2	1	20	30	50
7	DSCC	Basic Electrical & Electronics Engineering Laboratory	BTDSCESC206	-	-	2	1	20	30	50
8	DSCC	Fundamental of Mechanical Engineering Laboratory	BTDSCESC207	-	-	2	1	20	30	50
9	DSCC	Manufacturing Practices - II Laboratory	BTDSCESC208	-	-	2	1	20	30	50
10	SEC	Problem Solving with Python Programming	BTSEC209	3	-	0	3	30	70	100
11	AEC	Advanced Programming Laboratory	BTAEC210	-	-	2	1	20	30	50
12	GEC	Multidisciplinary Elective Course - II	GEA	3	0	-	3	30	70	100
			Total	15	0	13	23	310	640	950

Discipline Specific Core Courses (DSCC) Major			AEC (Ability Enhancement Course) (D)	SEC/Internship (Skill Enhancement Course) (E)	Generic Elective Course (GEC) (F)
Basic Sciences (A)	Engineering Sciences (B)	Humanities Science (C)			
Analytical Mathematics	Basic Electrical & Electronics Engineering	Constitution of India, Professional Ethics and Human Rights.	Advanced Programming Laboratory	Problem Solving with Python Programming	Multidisciplinary Elective Course - II
Engineering Chemistry	Fundamental of Mechanical Engineering.				
	Engineering Chemistry Laboratory				
	Basic Electrical & Electronics Engineering Laboratory				
	Fundamental of Mechanical Engineering Laboratory				
	Manufacturing Practices - II Laboratory				

Note: 'French Language' is introduced in the even semester as an Add-on Certification Course (Non-credited).

Credit Definition:

1-hour lecture (L) per week per semester = 1Credit
1-hour tutorial (T) per week per semester = 1Credit
2-hour Practical/Drawing(P) per week per semester = 1 Credit

➢Four credit courses are to be designed for 60 hours of Teaching-Learning process.
➢Three credit courses are to be designed for 48 hours of Teaching-Learning process.
➢Two credit courses are to be designed for 28 hours of Teaching-Learning process.
➢ One credit courses are to be designed for 15 hours of Teaching-Learning process

Semester: 2nd B.Tech **Branch: All Streams of Engineering**
Subject: Analytical Mathematics **Subject Code: BTDSCBSC200**
Total Theory Periods: 48 **Total Credits: 03**

OBJECTIVES:

- To make the scholars perceive the series analysis could be a powerful methodology wherever the formulas square measure integrals and to possess information of increasing periodic functions that explore sort of applications of Fourier series.
- To possess intensive information of PDE those arise in mathematical descriptions of things in engineering. To review a few amount which will take any of a given vary of values that will not be foreseen because it is however can be delineated in terms of their likelihood.
- To acquaint the student with the concepts of vector calculus needed for problems in all engineering disciplines.
- To produce a sound background of advanced analysis to perform an intensive investigation of major theorems of complex analysis and to use these ideas to a large vary of issues that features the analysis of each complex line integrals and real integrals.
- To make the student appreciate the purpose of using transforms to create a new domain in which it is easier to handle the problem that is being investigated.

UNIT I

FOURIER SERIES

Fourier series, Even odd function, Half range sine and cosine series, Parseval's theorem, practical harmonic analysis & Fourier Transform

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 & application of PDE

UNIT III

COMPLEX ANALYSIS

Derivative, Cauchy-Riemann equations, Analytic functions, Harmonic functions, Flow problems, Complex integration, Cauchy theorem, Cauchy integral formula, Taylor & Laurent series, Singularity, Residue

UNIT IV

LAPLACE TRANSFORMATION

Definition, Transform of elementary functions, Properties of Laplace transform, of derivatives & integrals, Multiplication by tn, Division by t, Evaluation of integrals, Inverse Laplace function,

Convolution theorem, Unit step functions, Unit impulse function, periodic function. Application to solution of ordinary differential equations

UNIT V

VECTOR CALCULUS

Directional derivative, Gradient, Divergence and curl, Line, Surface and Volume integrals, Green's, Gauss's &Stoke's theorem (without proof) and applications

OUTCOMES:

The subject helps the students to develop the fundamentals and basic concepts in vector calculus, PDE, Laplace transform and complex functions. Students will be able to solve problems related to engineering applications by using these techniques.

TEXT BOOKS:

1. Higher Engineering Mathematics by B.S.Grewal (40th edition)-Khanna Publisher.
2. Advanced Engineering Mathematics by Erwin Kreyszig (8th edition)-John Wiley & Sons.

REFERENCE BOOKS:

1. Differential Calculus by Gorakh Prasad-Pothisala Private Limited.
2. Advanced Engineering Mathematics by R.K.Jain and S.R.K. Iyengar-Narosa Publishing House.
3. Applied Mathematics by P.N.Wartikar&J.N.Wartikar Vol-ll –Pune VidyarthiGrihaPrakasan, Pune

Semester : II B. Tech **Branch: All Streams of Engineering**
Subject: Engineering Chemistry **Code: BTDSCBSC201**
Total Theory Periods: 48 **Total Tutorial Periods: 00**
Total Credits: 03

OBJECTIVES:

- To make the students conversant with boiler feed water requirements, related problems and water treatment techniques.
- Principles of electrochemical reactions, redox reactions in corrosion of materials and methods for corrosion prevention and protection of materials.
- Principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells.
- Preparation, properties and applications of engineering materials.
- Types of fuels, calorific value calculations, manufacture of solid, liquid and gaseous fuels

OUTCOMES:

- The knowledge gained on engineering materials, fuels, energy sources and water treatment techniques will facilitate better understanding of engineering processes and applications for further learning.

UNIT-I:

(a) ELECTROCHEMISTRY AND BATTERY TECHNOLOGY ELECTROCHEMISTRY: Introduction, Derivation of Nernst equation for electrode potential. Reference electrodes: Introduction, construction, working and applications of calomel and Ag / AgCl electrodes. Measurement of electrode potential using calomel electrode. Ion selective electrode: Introduction; Construction and working of glass electrode, determination of pH using glass electrode. Concentration cells: Electrolyte concentration cells, numerical problems.

(b) BATTERY TECHNOLOGY:

Introduction, classification - primary, secondary and reserve batteries. Characteristics - cell potential, current, capacity, electricity storage density, energy efficiency; cycle 10 hours life and shelf life. Construction, working and applications of Zinc Air, Nickel- metal hydride batteries. Lithium batteries: Introduction, construction, working and applications of Li-MnO_2 and Li-ion batteries.

(c) FUEL CELLS:

Introduction, difference between conventional cell and fuel cell, limitations & advantages. Construction, working & applications of methanol-oxygen fuel cell with H_2SO_4 electrolyte.

UNIT-II:

(a) CORROSION AND METAL FINISHING CORROSION:

Introduction, electrochemical theory of corrosion, galvanic series. Factors affecting the rate of corrosion: ratio of anodic to cathodic areas, nature of metal, nature of corrosion product, nature of

medium – pH, conductivity, and temperature. Types of corrosion- Differential metal, differential aeration (Pitting and water line) and stress. Corrosion control: Inorganic coatings Anodizing of Al and phosphating; Metal coatings-Galvanization and Tinning. Cathodic protection (sacrificial anodic and impressed current methods).

(b) METAL FINISHING:

Introduction, Technological importance. Electroplating: Introduction, principles governing- Polarization, decomposition potential and overvoltage. Factors influencing the nature of electro deposit-current density, concentration of metal ion & electrolyte; pH, temperature & throwing power of plating bath; additives- brighteners, levelers, structure modifiers & wetting agents. Electroplating of Nickel (Watt's Bath) and Chromium (decorative and hard). Electro less plating: Introduction, distinction between electroplating and electro less plating, electro less plating of copper & manufacture of double sided Printed Circuit Board with copper.

UNIT-III:

(a) FUELS AND SOLAR ENERGY FUELS:

Introduction, classification, calorific value- gross and net calorific values, determination of calorific value of fuel using bomb calorimeter, numerical problems. Cracking: Introduction fluidized catalytic cracking, synthesis of petrol by Fishcher-Tropsch process, reformation of petrol, octane and cetane numbers. Gasoline and diesel knocking and their mechanism, anti-knocking agents, power alcohol & biodiesel.

(b) SOLAR ENERGY:

Introduction, utilization and conversion, photovoltaic cells- construction and working. Design of PV cells: modules, panels & arrays. Advantages & disadvantages of PV cells. Production of solar grade silicon: Union carbide process, purification of silicon (zone refining), doping of silicon-diffusion technique (N&P types).

UNIT-IV:

POLYMERS:

Introduction, types of polymerization: addition and condensation, mechanism of polymerization- free radical mechanism taking vinyl chloride as an example. Molecular weight of polymers: number average and weight average, numerical problems. Glass transition temperature (Tg): Factors influencing Tg-Flexibility, inter molecular forces, molecular mass, branching & cross linking and stereo regularity. Significance of Tg. Structure property relationship: crystallinity, tensile strength, elasticity & chemical resistivity. Synthesis, properties and applications of PMMA (plexi glass), Polyurethane and polycarbonate. Elastomers: Introduction, synthesis, properties and applications of Silicone rubber. Adhesives: Introduction, synthesis, properties and applications of epoxy resin. Polymer Composites: Introduction, synthesis, properties and applications of Kevlar. Conducting polymers: Introduction, mechanism of conduction in Poly aniline and applications of conducting poly aniline.

UNIT-V:

WATER TECHNOLOGY AND NANOMATERIALS

(a)WATER TECHNOLOGY:

Introduction, boiler troubles with disadvantages & prevention methods-scale and sludge formation, priming and foaming, boiler corrosion (due to dissolved O2, CO2 and MgCl2). Determination of DO, BOD and COD, numerical problems on COD. Sewage treatment: Primary, secondary (activated sludge method) and tertiary methods. Softening of water by ion exchange process. Desalination of seawater by reverse osmosis & electro dialysis (ion selective).

(b)NANO MATERIALS:

Introduction, properties (size dependent). Synthesis-bottom up approach (sol-gel, precipitation, gas condensation & chemical vapour condensation processes). Nano scale materials- carbon nano tubes, nano wires, fullerenes, dendrimers, nano rods, &nano composites.

TEXTBOOKS:

1. B.S.Jai Prakash, R.Venugopal, Sivakumaraiah&PushpaIyengar., "Chemistry for Engineering Students", Subhash Publications, Bangalore.

2. R.V.Gadag&A.Nityananda Shetty., "Engineering Chemistry", I K International Publishing House Private Ltd. New Delhi.

3. P.C.Jain& Monica Jain., "Engineering Chemistry", Dhanpat Rai Publications, New Delhi.

REFERENCE BOOKS:

1. O.G.Palanna,"Engineering Chemistry", Tata McGraw Hill Education Pvt. Ltd. New Delhi, Fourth Reprint.

2. G.A.Ozin& A.C. Arsenault, "Nano chemistry A Chemical Approach to Nanomaterials", RSC publishing, 2005.

3. "Wiley Engineering Chemistry", Wiley India Pvt. Ltd. New Delhi. Second Edition.

4. V.R.Gowariker, N.V.Viswanathan&J.Sreedhar., "Polymer Science", Wiley-Eastern Ltd.

5. M.G.Fontana., "Corrosion Engineering", Tata McGraw Hill Publishing Pvt. Ltd. New Delhi.

Semester: II B.Tech **Branch: All Streams of Engineering**
Subject: Basic Electrical & Electronics Engineering **Code: BTDSCESC202**
Total Theory Periods: 48 **Total Tutorial Periods: 00**
Total Credits: 03

Unit – I

D.C. Networks:

Elementary idea about power generation, transmission and distribution. Node voltage and mesh current method. Superposition, Thevenin's and Norton's theorems. Star- delta and Delta- star conversions.

Unit – II

Single Phase A.C. Circuits:

Single phase EMF generation, Effective & Average values of sinusoids and determination of form-factor, Analysis of simple series R-L, R-C and RLC circuits, power and power factor

Unit – III

(a) Three Phase AC circuits:

Introduction, Generation of Three-phase EMF, Phase sequence, Connection of Three-phase Windings - Delta and Star connection: Line and Phase quantities, phasor diagrams, Power equations in balanced conditions.

(b)Magnetic Circuits:

Introduction, Magneto motive force (MMF), Magnetic field strength, Reluctance, B-H curve, Comparison of the Electric and Magnetic Circuits, Series-Parallel Magnetic Circuit, Leakage flux and fringing, Magnetic Hysteresis, Eddy currents.

Unit – IV

(a) Single phase Transformers:

Introduction, Principles of operation, Constructional details, Ideal Transformer and Practical Transformer, EMF equation, Rating, Phasor diagram on no load, Losses, Efficiency calculations.

(b) Direct current machines:

Basic concepts and elementary idea of AC and DC machines, construction and working principal of DC Generator, emf and torque equation dc machine and types of dc motor.

Unit – V

(a) Semiconductor Devices and Applications

Introduction - Characteristics of PN Junction Diode – Zener Effect - Zener Diode and its Characteristics - Half wave and Full wave Rectifiers - Voltage Regulation. Bipolar Junction Transistor - CB, CE, CC Configurations and Characteristics - Elementary Treatment of Small Signal Amplifier

(b) Digital Electronics

Binary Number System – Boolean algebra theorems, Digital circuits - Introduction to sequential Circuits,

Flip-Flops - Registers and Counters – A/D and D/A Conversion.

TEXT BOOKS:

1. V.N. Mittle and Arvind Mittal, “Basic Electrical Engineering”, Second Edition, Tata McGraw Hill.
2. 2 Del Torro, Vincent “Electrical Engineering Fundamentals”, Second Edition Prentice Hall of India Pvt. Ltd.

REFERENCE BOOKS:

1. Fitzrald and Higgonbothom, “Basic Electrical Engineering”, Fifth Edition, McGraw Hill.
2. D.P. Kothari and I.J. Nagrath, “Theory and Problems of Basic Electrical Engineering”, PHI.
3. I.J. Nagrath and D.P. Kothari, ”Electrical Machines”, Tata McGraw Hill.
4. Ashfaq Hussain, “Fundamentals of Electrical Engineering”, Third Edition, Dhanpat Rai and Co.
5. H. Cotton, ”Advance Electrical Technology,” ISSAC Pitman, London. 6. Parker Smith S. (Ed.Parker Smith N.N.), “Problems in Electrical Engineering”, Tenth edition, Asia publication.

Semester: II B.Tech. **Branch: All Streams of Engineering**
Subject : Problem Solving with Python Programming **Code: BTSEC209**
Total Theory Periods: 45 **Total Tutorial Periods: 00**
Total Credits: 03

COURSE OBJECTIVE:

1. To learn the object-oriented programming concepts using C++.
2. To design and implement C++ programs with the concept of OOP.
3. To understand implementation issues related to object-oriented techniques.
4. To learn how to build good quality software using object-oriented programming technique.

UNIT-I

INTRODUCTION TO OOP AND C++

Concept of Object Oriented Programming, Procedural programming Vs. Object oriented programming (OOP), Features and Benefits of OOPs, Object Oriented Languages, Introduction to C++, C++ Compiler, C++ Standard library, Basics of a typical C++ environment and C++ program, Pre-processors directives, and illustrative simple C++ programs. Header files and namespaces, library files, Data Types, Keywords, Operators and Expressions, Control Structure, Loops, Arrays, Structures, Functions.

UNIT-II

CLASSES & OBJECT, CONSTRUCTORS&DESTRUCTORS

Introduction to class, class object creation, Access of class members, Scope of class and its member, Nested class, Data hiding & encapsulation, Friend function, Array within a class, Array of object as function argument, Function returning object, Static member. Constructor function, Parameterized multiple constructor, Default constructor, Dynamic memory allocation with new and delete, Copy constructor, Constant and class, Data conversion between objects of different classes, Destructor function.

UNIT- III

INHERITANCE, POINTER, VIRTUAL FUNCTIONS & POLYMORPHISM

Fundamentals of operator overloading, restrictions on operators overloading, operator functions as class members vs. as Friend functions, Overloading, <<, >> Overloading unary operators, overloading binary operators. Introduction to inheritance, Base classes and derived classes, protected members, Casting base class pointers to derived class pointers, Using member functions, Overriding base class members in a derived class, public, protected and private inheritance, Using constructors and destructors in derived classes, Implicit derived class object to base class object conversion, Composition Vs. Inheritance. Introduction to virtual functions, Abstract base classes and concrete classes, new classes and dynamic binding, virtual destructors, polymorphism, dynamic binding.

UNIT-IV

FILE I/O, TEMPLATES& EXCEPTION HANDLING

Files and streams, Creating a sequential access file, Reading data from a sequential access file, Updating sequential access files, Random access files, creating a random access file, Writing data randomly to a random access file, reading data sequentially from a random access file. Stream Input/output classes and objects, Stream output, Stream input, Unformatted I/O (with read and write),

Stream manipulators. Function templates, Overloading template functions, Class template, Class templates and non-type parameters, Templates and inheritance, Templates and friends, Templates and static members. Basics of C++ Exception handling: Try Throw, Catch, Throwing an exception, catching an exception, rethrowing an exception, Exception specifications, processing unexpected exceptions.

UNIT-V

OOPS CONCEPTS WITH PYTHON

Python Basics, Python Objects, Standard Types, Other Built-in Types, Internal Types, Standard Type Operators, Standard Type Built-in Functions, Categorizing the Standard Types, Unsupported Types Numbers - Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Operators, Built-in Functions, Related Modules Sequences - Strings, Lists, and Tuples, Mapping and Set Types. Creating classes and objects, inheritance in python.

COURSE OUTCOME:

After completion of the course study, students will be able to

1. Explain the basics of Object Oriented Programming concepts.
2. Design and develop a C++ program with concept of Object Oriented Programming.
3. Apply the object initialization and destroy concept using constructors and destructors.
4. Apply the concept of polymorphism to implement compile time polymorphism in programs by using overloading methods and operators.
5. Use the concept of inheritance to reduce the length of code and evaluate the usefulness.
6. Apply the concept of run time polymorphism by using virtual functions, overriding functions and abstract class in programs.
7. Use I/O operations and file streams in programs.
8. Make an application/project using C++.

TEXT BOOKS:

1. Object Oriented Programming in C++, Robert Lafore, CourseSams Publishing.
2. Object Oriented Programming with C++, E. Balagurusamy, McGraw Hill Education.
3. Python 3 Object-Oriented Programming - Third Edition

REFERENCE BOOKS:

1. The Complete Reference C++, Herbert Schildt, McGraw Hill Education.
2. Let Us C++, YashavantKanetkar, BPB Publication.
3. Programming with C++, John R. Hubbard, Schaum's Outlines, McGraw Hill Education.
4. Programming with C++, D. Ravichandran, McGraw Hill Education.
5. Core Python Programming, Wesley J. Chun, Second Edition, Pearson.

Semester:II B.Tech **Branch: All Streams of Engineering**
Subject: Constitution of India, Professional Ethics and Human Rights **Code: BTMC203**
Total Theory Periods: 15 **Total Tutorial Periods: 00**
Total Credits: 00

UNIT-I: CONSTITUTION OF INDIA

Introduction to the Constitution of India, The Making of the Constitution and Salient features of the Constitution, Preamble to the Indian Constitution Fundamental Rights & its limitations.

UNIT-II: FUNDAMENTAL DUTIES AND UNION EXECUTIVES

Directive Principles of State Policy & Relevance of Directive Principles State Policy Fundamental Duties. Union Executives – President, Prime Minister Parliament Supreme Court of India

UNIT-III: STATE LEGISLATURE AND ELECTORAL PROCESS

State Executives – Governor Chief Minister, State Legislature High Court of State, Electoral Process in India, Amendment Procedures, 42nd, 44th, 74th, 76th, 86th &91st Amendments.

UNIT-IV: HUMAN RIGHTS

Special Provision for SC & ST Special Provision for Women, Children & Backward Classes Emergency Provisions. Human Rights –Meaning and Definitions, Legislation Specific Themes in Human Rights- Working of National Human Rights Commission in India ,Powers and functions of Municipalities, Panchyats and Co - Operative Societies..

UNIT-V: PROFESIONAL ETHICS

Scope & Aims of Engineering Ethics, Responsibility of Engineers Impediments to Responsibility. Risks, Safety and liability of Engineers, Honesty, Integrity & Reliability in Engineering.

TEXTBOOKS:

1. Durga Das Basu: “Introduction to the Constitution on India”, (Students Edn.) Prentice –Hall EEE, 19th / 20th Edn., 2001

2. Charles E. Haries, Michael S Pritchard and Michael J. Robins “Engineering Ethics” Thompson Asia, 2003-08-05.

REFERENCE BOOKS:

1. M.V.Pylee, “An Introduction to Constitution of India”, Vikas Publishing, 2002.

2. M.Govindarajan, S.Natarajan, V.S.Senthilkumar, “Engineering Ethics”, Prentice –Hall of India Pvt. Ltd. New Delhi, 2004

3. Brij Kishore Sharma,“Introduction to the Constitution of India”, PHI Learning Pvt. Ltd., New Delhi, 2011.

Semester : II B.Tech
Subject: Fundamental of Mechanical Engineering **Code: BTDSCESC204**
Total Theory Periods: 48 **Total Tutorial Periods: 00**
Total Credits: 03

OBJECTIVES:

- To develop capacity to predict the effect of force and motion in the course of carrying out the design functions of engineering.

UNIT – I :

RESULTANT AND EQUILIBRIUM ANALYSIS:

Basic concepts and laws of mechanics, system of forces, free body diagram, Resultant and equilibrium of concurrent, parallel and non-concurrent co-planar force system.
General numerical applications.

UNIT – II :

(a) ANALYSIS OF PLANE TRUSSES Perfect truss, basic assumptions for perfect truss, analysis of axial forces in the members by method of joint and method of sections. General numerical applications.

(b) FRICTION Static, dynamic and limiting friction, Law of limiting friction, Angle of friction, Angle of Repose, Cone of Friction, Wedge friction. General numerical applications

UNIT –III :

PROPERTIES OF SURFACES Centre of Gravity, Second moment of area, determination of second moment of area by integration, polar moment of inertia, radius of gyration of area, Parallel axis theorem, Moment of inertia of composite areas, and determination of Product of inertia by integration.

UNIT –IV :

KINETICS OF PARTICLES

(a) D'Alembert's principle applied to bodies having rectilinear motion.

(b) Principle of work and Energy: General numerical applications

(c) Principle of Impulse and momentum: General numerical applications

UNIT – V :

LAWS OF THERMODYNAMICS

(a) Thermodynamic System, properties, process, cycle, thermodynamic equilibrium, Quasi-static Process, Zeroth Law of thermodynamics, Work and Heat transfer, flow work, general numerical application.

(b)First Law of thermodynamics, internal energy, proof of internal energy as a point function, general numerical application of first law to non-flow process and steady flow process.

OUTCOMES:

(a) Ability to explain the differential principles applies to solve engineering problems dealing with force, displacement, velocity and acceleration.
(b) Ability to analyses the forces in any structures.
(c) Ability to solve rigid body subjected to dynamic forces.

TEXT BOOKS:

1. Engineering Mechanics (Statics and Dynamics) ; A. K. Tayal ,Umesh Pub., Delhi .

2. Engineering Mechanics : S. Timoshenko and D.H. Young,TMH

3. Engineering Thermodynamics: P.K.Nag, TMH

4. Engineering Thermodynamics: C.P.Arora, TMH

REFERENCE BOOKS:

1. Engineering Mechanics (Statics and Dynamics): R.C.Hibbeler, Pearson

2. Engineering Mechanics:Meriam and Kreige ,John Wiley and sons

3. Thermodynamics: Cengel and Boles, TMH

4. Essentials of Engg Mechanics: S.Rajasekharan&G.ShankaraSubramaniyam, Vikas Publications

5. Engineering Mechanics: BasudebBhatytacharya , Oxford

Semester: II B.Tech **Branch : All Streams of Engineering**

Subject : Engineering Chemistry Lab **Code: BTDSCESC205**

Total Theory Periods: 30 **Total Tutorial Periods: 00**

Total Credits: 01

COURSE OBJECTIVE:

1. To make the student acquire practical skills in the wet chemical and instrumental methods for quantitative estimation of hardness, alkalinity, metal ion content, corrosion in metals and cement analysis.

LIST OF EXPERIMENTS

1. Acid-base titration (estimation of commercial caustic soda)

2. Redox titration (estimation of iron using permanganometry)

3. Complexometric titration (estimation of hardness of water using EDTA titration).

4. Preparation and analysis of metal complex (for example thiourea/copper sulfate or nickel chloride/ammonia complexes).

5. Chemical kinetics (determination of relative rates of reaction of iodide with H_2O_2 at room temperature (Clock reaction).

6. Viscosity of solutions (determination of percentage composition of sugar solution from viscosity).

7. Detection of functional groups in organic compounds.

8. Utilization of paper/thin layer/column chromatographic techniques in the separation of organic compounds

9. Conduct metric titration (determination of the strength of a given HCl solution by titration against a standard NaOH solution).

10. Determine the amount of oxalic Acid and sulphuric Acid/Hydrochloric Acid in one liter of solution given standard Sodium Hydroxide and Potassium Permangate.

11. To determine the Carbonate, Bicarbonate and Chloride contents in irrigation water.

12. Determination of dissolved Oxygen in given sample of water.

13. Determination of calorific value of fuel by Bomb Calorimeter.

14. Determination of Flash Point and Fine Point of Lubricant by Abels and Pensky Martin apparatus.

COURSE OUTCOME:

1. The students will be conversant with hands-on knowledge in the quantitative chemical analysis of water quality related parameters, corrosion measurement and cement analysis.

Semester: II B.Tech **Branch: All Streams of Engineering**
Subject: Basic Electrical & Electronics Engineering Lab **Code: BTDSCESC206**
Total Theory Periods: 30 **Total Tutorial Periods: 00**
Total Credits: 01

List of Experiments (To perform minimum 10 experiments)

1. To verify Thevenin's theorem and Norton's theorem.
2. To verify Superposition theorem.
3. To verify Kirchhoff's Current Law and Kirchhoff's Voltage Law.
4. To verify Maximum Power Transfer theorem
5. To determine V– I characteristics of Incandescent lamp.
6. To study B-H curve.
7. To measure current, power, voltage and power factor of series RLC circuit.
8. To measure current, power, voltage of parallel RLC circuit.
9. To measure current, power, voltage of series parallel RLC circuit.
10. To measure R and L of choke coil.
11. To study construction of transformer.
12. To perform ratio test and polarity test of single phase transformer.
13. To calculate efficiency of single phase transformer by direct loading.
14. To study construction of D.C. machine.
15. To study charging and discharging of a capacitor.
16. To study the Wattmeter and Energy meter.

Semester : II B.Tech **Branch: All Streams of Engineering**
Subject : Advance Programming Laboratory **Code: BT 208**
Total Theory Periods: 30 **Total Tutorial Periods: 00**
Total Credits: 01

1 Write a program to check whether a given number is Prime or not.

2 Write a program to read number and to display the largest value between two, three or four numbers by using switch-Case statements.

3 Write a program to find sum of first natural numbers : sum= 1+2+3+4+……. 100 by using
a. for loop b. while loop c. do-while loop

4 Write a program to find sum of the following series using function:
Sum= $x-(x)^3/3!+(x)^5/5!$ ..... $(x)^n/n!$

5 Write a program to read the elements of two matrices & to perform the matrix multiplication.

6 Write a program to swap the contents of two variable by using
a. call by value b. Call by reference

7 Write a program to perform the following arithmetic operations on complex numbers using structure
a. Addition of the two complex numbers b. Subtraction of two complex numbers
c. Multiplication of two complex numbers d. Division of two complex numbers

8 Write a C++ program to declare a class. Declare pointer to class. Initialize and display the contents of the class member.

9 Write an object-oriented program (OOP) using C++ to exchange the private data members of two different functions using friend functions.

10 Write an OOP using C++ to count how many times a particular member function of a class is called by:
a. A particular object b. Any objects

11 Write an OOP using C++ to define a constructor for a “Date” class that initializes the Date objects with initial values. In case initial values are not provided, it should initialize the objects with default values.

12 Write an OOP using C++ to overload:
a. + Operator b. = operator c. >> operator d. ++ operator

13 Write a C++ program to demonstrate how ambiguity is avoided using scope resolution operator in the following:
a. Single Inheritance b. Multiple Inheritance

14 Write a C++ Program to demonstrate function overloading for swapping of two variables of the variousdata types (integer, floating-point number and character type).

15 Write a C++ program to declare a class. Declare pointer to class. Initialize and display the contents of the class member.

16 Write a C++ program to access the private data of a class by non-member function through friendfunction where the friend function is declared:

a. in the location of public category
b. in the location of private category
c. within the scope of a class definition itself
d. defined with inline code subtraction

17 Write a C++ program to demonstrate how a pure virtual function is defined, declared and invoked fromthe object of derived class through the pointer of the base class.

18 Write a C++ program to open a file and count the number of characters, number of vowels and numberof newline characters present in the file.

19 Write a program to copy the contents of one text file to another and display both the files using a text Menu.

20 Create a database of 10 students. The database should contain the name, marks of 5 subjects, aggregatemarks, aggregate percentage and division according to the following conditions:

a. Percentage greater or equal to 60 – First division
b. Percentage between 50 and less than 60 – Second division
c. Percentage between 40 and less than 50 – Third division
d. Percentage below 40 – Improvement required

Display the above database of every student in a tabulated form. Implement the above program using Structures, Text-Menu and File I/O operations.

21 Write an OOP using a class template to read any five parameterized data type such as float and integer, and print the average.

22 Write a program for sorting of numbers with Bubble Sort using template function.

23 Write a C++ program to declare a class. Declare pointer to class. Initialize and display the contents of the class member.

24 Write a C++ program to read two numbers and find the division of these two numbers using exception handling.

25 Write a C++ program to create a function which take a parameter, if the value of parameter is > 0 then throw integer type, if parameter is = 0, then throw character type, if parameter is < 0 then throws float type exception but for all design use only one catch block.

26 Write a python program for finding biggest number among 3 numbers.

27 Implement Python Script to generate prime numbers series up to n

28 Implement python script to read person's age from keyboard and display whether he is eligible for voting or not.

29 Write a python program to work with classes and objects.

30 Write a python program that makes use of function to display all such numbers, which are divisible by7 but are not a multiple of 5, between 1000 and 2000.

LIST OF EQUIPMENT/ MACHINE REQUIRED

PCs, Turbo C++ compiler, Online C++ Compiler, Python 3/Python IDE, Online python compiler

REFERENCES:

1. Programming with C++, D. Ravichandran, McGraw Hill Education.
2. Object Oriented Programming with C++, E. Balagurusamy, McGraw Hill Education.
3. Mastering C++, K. R. Venugopal, Mcgraw Hill Education.
4. The Complete Reference C++, Herbert Schildt, McGraw Hill Education.
5. Object Oriented Programming in C++, Robert Lafore, CourseSams Publishing.
6. Let Us C++, YashavantKanetkar, BPB Publication.
7. Head-First Python: A Brain-Friendly Guide (2nd Edition), Paul Barry, Oreilly.

Python Programming: An Introduction to Computer Science (3rd Edition), John Zelle

Scheme of Teaching and Evaluation (As per NEP -2020)
Choice Based Credit System (CBCS) and Outcome Based Education (OBE)
B. TECH. III Semester

S. No.	Course Sub Category	Course Name	Code	Teaching Scheme				Evaluation Scheme		Total Marks
				Hours			Credits			
				Theory	Tutorial	Practical		CIA	ESE	
1	DSCC - BSC	Numerical Methods and Statistics	BTDSCBSC300	3	0	-	3	30	70	100
2	DSCC - PCC	Mechanics of Solids & Fluid Mechanics	BTDSCMIN361	3	1	-	4	30	70	100
3	DSCC - PCC	Mining Geology I	BTDSCMIN362	3	1	-	4	30	70	100
4	DSCC - PCC	Basics of Mining Engineering	BTDSCMIN363	3	1	-	4	30	70	100
5	DSCC - PCC	Mining Geology I Laboratory	BTDSCMIN364	-	-	2	1	20	30	50
6	AEC	Basics of Mining Engineering Laboratory	BTAEC365	-	-	2	1	20	30	50
7	SEC	Mechanics of Solids & Fluid Mechanics Laboratory	BTSEC366	-	-	2	1	20	30	50
8	RP	Project / Seminar	BTSEM367	-	-	2	1	20	30	50
9	GEC	Multidisciplinary/Generic Elective Course III	GEAXX	3	-	0	3	30	70	100
Total				**15**	**03**	**8**	**22**	**230**	**470**	**700**

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

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

Note: Theory Internal Marks (CIA) = 30 (CT-I = 05, CT-II=05, Assignment = 05, Mid Term=15, Attendance=05)

Practical Internal Marks (CIA) = 20 (Attendance = 05, Lab Viva-Voce = 05, Lab Record Work = 10)

Discipline Specific Core Courses (DSCC) Major		Generic Elective(C)	AEC (Ability Enhancement Course) (D)	SEC /Internship (Skill Enhancement Course) (E)	RP/SEMINAR
Engineering Sciences (A)	Professional Elective(B)				
Mining Geology-I		GEA	Basics of Mining Engineering Laboratory	Mechanics of Solid and Fluid Mechanics Laboratory	Project/ Seminar
Basics of Mining Engineering					
Mining Geology I Laboratory					
Mechanics of Solid and Fluid Mechanics					

Credit Definition:

- 1-hour lecture(L) per week per semester=1Credit
- 1-hour tutorial(T)per week per semester=1Credit
- 2-hourPractical/Drawing(P) per week per semester=1Credit
- Four credit courses are to be designed for 60 hours of Teaching-Learning process.
- Three credit courses are to be designed for 48 hours of Teaching-Learning process.
- Two credit courses are to be designed for 28 hours of Teaching-Learning process.
- One credit courses are to be designed for 15 hours of Teaching Learning process

Semester	: III B.Tech
Branch	: Mining Engineering
Subject	: Numerical Methods & Statistics
Total Theory Periods	: 48
Total Tutorial Periods	: 00
Total Credits	: 03
Subject Code	: BTDSCBSC300

COURSE OBJECTIVE:

The course aims to develop a rigorous scientific understanding of statistical behaviour, probability distributions, and data characteristics essential for analysing engineering uncertainties. It further intends to strengthen students' numerical problem-solving capabilities through foundational and advanced computational methods required in engineering modelling and simulation

UNIT-I STATISTICS

Random variables, Discrete and continuous probability distributions, Expectation, Mean and Standard Deviation, Moments and moment generating function, Distributions: binomial, Poisson, and normal distributions.

UNIT-II NUMERICAL SOLUTION OF ALGEBRAIC, TRANSCENDENTAL & SIMULTANEOUS LINEAR EQUATIONS

Bisection method, Regula–Falsi Method, Secant Method, Newton Raphson Method, Direct Methods: Gauss Elimination, Gauss-Jordan & Crout's Triangularisation method, Iterative methods: Jacobi, Gauss-Seidel & relaxation methods.

UNIT-III INTERPOLATION

Interpolation with equal intervals, Finite differences, Forward, Backward & Central difference interpolation, Interpolation with unequal intervals, Lagrange's method and Newton's divided difference method.

UNIT-IV NUMERICAL DIFFERENTIATION & INTEGRATION

Derivatives using forward, Backward and central difference methods, Derivatives using unequally spaced values, Numerical integration using Newton-Cotes' quadrature method, Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule, Weddle's rule.

UNIT-V NUMERICAL SOLUTION OF ODE

Numerical solution of ODE's by Taylor's series method, Picard's method, Euler's method, Euler's modified method, Runge–Kutta methods, Predictor-corrector methods, Milne's method, Adams-Bashforth method.

COURSE OUTCOME:

CO1: Students will learn to apply statistical concepts such as probability distributions and variability analysis, enabling them to interpret and manage uncertain engineering data encountered in industrial decision-making.

CO2: Students will acquire skills in numerical methods for solving equations and linear systems, preparing them to handle computational tasks in industrial modelling and process simulations.

CO3: Students will develop competence in interpolation techniques, which will help them estimate missing data and support data-driven decision-making in engineering organisations.

CO4: Students will learn numerical differentiation and integration methods essential for analysing machine behaviour, operational trends, and engineering calculations in industry.

CO5: Students will gain proficiency in solving differential equations numerically, preparing them to

work with simulation tools used in mining, mechanical, civil, and allied industrial sectors.

TEXT BOOK:

1. B.S. Grewal, “Higher Engineering Mathematics”, Khanna Publications (2007)

REFERENCE BOOKS:

1. Glyn James, “Advanced Modern Engineering Mathematics, Pearson Education (2007)
2. B. V. Ramana, “Higher Engineering Mathematics”, Tata McGraw-Hill Hill 2007.
3. N. P. Bali, and Manish Goyal, “A Text Book of Engineering 7th Edition (2007), Lakshmi Publications (P) Limited, New Delhi.

Semester	: III B.Tech
Branch	: Mining Engineering.
Subject	: Mechanics of Solids & Fluid Mechanics
Total Theory Periods	: 48
Total Tutorial Periods	: 12
Total Credits	: 04
Subject Code	: BTDSCMIN361

COURSE OBJECTIVES:

This course seeks to provide a comprehensive understanding of the mechanical behaviour of materials under various loading conditions through the principles of stress–strain analysis, bending, and structural deformation. It also intends to build scientific competence in analysing fluid properties, statics, and kinematics to support engineering design, hydraulic systems, and fluid-flow applications.

UNIT-I CONCEPT OF STRESS AND STRAIN

Stress and strain at a point; Axial and dimensional state of strain; Principal stresses and Principal planes, Mohr's Circle; Two state of strain principal strains and principal axis of strain; Determination of principal strain from strain measurements; Calculation of principal stresses from principal strains; Composite bars in tension and compression; Relation between stress and strain; Poisson's Ratio.

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; Stream lines; Elementary Explanation of stream function and velocity potent.

COURSE OUTCOME:

CO1: Students will understand stress–strain behaviour and material response, enabling them to analyse structural components and ensure safety in industrial engineering applications.

CO2: Students will learn to calculate bending and shear stresses in beams and plates, building skills essential for designing mechanical structures and supporting mining equipment.

CO3: Students will gain the ability to estimate beam deflections, preparing them to evaluate structural stability and compliance in industrial design and maintenance tasks.

CO4: Students will acquire knowledge of fluid properties and fluid statics, helping them analyse pumps, pipelines, hydraulic systems, and mine water management operations.

CO5: Students will understand fluid flow characteristics, enabling them to contribute effectively to fluid transport, ventilation design, and process engineering in industrial organisations.

TEXT BOOKS:

1. A textbook of fluid mechanics by R. K. Bansal
2. A textbook of fluid mechanics and Hydraulic mechanics in SI Units by R. K. Rajput (S. Chand and Company)

REFERENCE BOOKS:

1. Strength of Materials – R.K. Rajput (S. Chand & Co.)
2. Mechanics of Materials – B.C. Punmia (Laxmi Publication)

Semester	: III B.Tech
Branch	: Mining Engineering.
Subject	: Mining Geology I
Total Theory Periods	: 48
Total Tutorial Periods	: 12
Total Credits	: 04
Subject Code	: BTDSCMIN362

COURSE OBJECTIVES:

The course aims to impart a scientific understanding of the Earth's structure, geological processes, mineral properties, and rock formation essential for resource evaluation and geotechnical assessments. It also intends to develop students' ability to interpret geological structures and maps for effective mine planning, exploration, and hazard prediction

UNIT-I The Earth, its theories and process

Definition & branches of geology; scope (with emphasis on mining) • Origin & age of Earth • Internal structure of Earth • Geodynamic theories: Plate tectonics, paleomagnetism, sea-floor spreading, continental drift, isostasy • Mountain building, volcanism, earthquakes, seismic zones in India • Physical geology processes: weathering, rivers, oceans, groundwater, wind, glaciers, lakes

UNIT-II Mineralogy

Definition and physical properties of minerals • Classification of minerals • Rock-forming (silicate) minerals: garnet, pyroxene, amphibole, mica, feldspar, feldspathoid (properties, recognition) • Economically important non-silicate minerals (physical properties, identification)

UNIT-III Igneous & Metamorphic Petrology

Igneous rocks: magma, crystallization, textures, structures, classification, petrographic descriptions of common types • Metamorphic rocks: agents & types of metamorphism, zones, facies, textures, structures, classification, petrographic descriptions

UNIT-IV Sedimentary Petrology

Sedimentary rocks: definition, significance • Processes: weathering, transport, deposition, lithification • Classification, origin, textures & structures of sedimentary rocks • Petrographic descriptions of common sedimentary rocks

UNIT-V Structural Geology

Concept of rock deformation • Attitude of beds (dip & strike) • Unconformities • Folds, joints, faults and their influence on mining operations • Geological maps: concepts, relevant terms, contours • Making geological cross-sections from maps and their interpretation

COURSE OUTCOME:

CO1: Students will learn about Earth's structure and geological processes, equipping them with the ability to assess geological conditions influencing mine planning and hazard mitigation.

CO2: Students will develop the ability to identify and classify minerals, supporting mineral evaluation, quality assessment, and resource estimation in mining industries.

CO3: Students will gain knowledge of igneous and metamorphic rocks, enabling them to interpret rock behaviour and its impact on excavation, support design, and mine safety.

CO4: Students will understand sedimentary processes and rock types, preparing them to analyse depositional environments and predict strata behaviour in mining operations.

CO5: Students will learn to interpret structural features and geological maps, a key skill required for mine layout design, exploration planning, and risk assessment in industry.

TEXT BOOKS:

1. A Text Book of Geology: P.K. Mukherjee
2. Principles of Engineering Geology: K.M. Bangar
3. A Text Book of Geology: G.B.Mahapatra

REFERENCE BOOKS:

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

Semester	: III B.Tech.
Branch	: Mining Engineering.
Subject	: Basics of Mining Engineering
Total Theory Periods	: 48
Total Tutorial Periods	: 12
Total Credits	: 04
Subject Code	: BTDSCMIN363

COURSE OBJECTIVES:

This course is designed to provide a foundational scientific understanding of mining operations including exploration drilling, shaft sinking, underground and surface mining methods, and mine development activities. It further aims to equip students with technical knowledge of mining machinery, unit operations, and engineering practices essential for safe, efficient, and sustainable mineral extraction.

UNIT-1 EXPLORATION METHOD AND TECHNIQUES

Drilling: Introduction, Method, uses & limitations; Various types of drilling machines: Rotary & percussive drilling technique and their equipment; Core barrel: single tube and double tube; Conditions of applicability of drilling methods; Borehole deviation, Borehole Survey, & deflection, directional drilling, Underground methods of exploratory drilling.

UNIT-II SHAFT SINKING METHOD

Shape & size of shaft; Shaft sinking: surface plant & equipment required, Shaft lining and its design; Special methods of shaft sinking: The piling system, caisson methods, freezing method, Shaft boring; Upward drivage, Organization, and cycle of operations. Drilling, blasting, loading, and transportation of muck, Ventilation, lighting, and drainage, Extension of the center line.

UNIT-III UNDERGROUND MINING METHOD

Definition of important terminology, mine development and its planning, Activities involved in the development of a mine, Introduction to unit operations in underground mining. Productivity calculation, Choice of method of mining, Introduction to various Mining method and various types of machinery used in Underground mining.

UNIT-IV SURFACE MINING METHOD

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 methods and types of machinery used in surface mining, Productivity of machinery.

UNIT-V DRIVAGE OF INCLINE/DRIFT/ADIT

Drivage: types of openings, location of openings, shape of opening; Operation: Drilling, blasting, loading and transportation of muck, Ventilation, lighting and drainage, Extension of center line; Mechanized methods of drivages of incline/adit/drift.

COURSE OUTCOME:

CO1: Students will learn industrial drilling techniques and exploratory methods, preparing them for roles in mineral exploration, core handling, and resource evaluation.

CO2: Students will understand shaft sinking practices, lining systems, and mining infrastructure development, enabling them to contribute to deep mine construction projects.

CO3: Students will gain knowledge of underground mining methods and machinery, building competency to participate in mine operations, production planning, and safety management.

CO4: Students will learn surface mining methods and equipment productivity assessment, preparing them

for roles in open-cast operations, fleet management, and production optimisation.
CO5: Students will learn the procedures for drivage of inclines, drifts, and adits, enabling them to support mine development, blasting operations, ventilation planning, and mine infrastructure expansion.

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

TEXT BOOKS:

1. Modern Coal Mining: Samir Das
2. Coal Mining: R.D. Singh

REFERENCE BOOKS:

1. Surface Mining: G.B. Mishra
2. Mining Engineer's Handbook Vol. 1&2, 2nd Edition: Edited by Harold Hartman
3. Elements of Mining Technology Vol. 1&3: D.J. Deshmukh

Semester	: III B.Tech.
Branch	: Mining Engineering.
Subject	: Mining Geology I Laboratory
Total Theory Periods	: 28
Total Tutorial Periods	: 00
Total Credits	: 01
Subject Code	: BTDSCMIN364

LIST OF EXPERIMENTS

1. Identification of minerals in a hand specimen.
2. Megascopic identification and description of rock-forming minerals.
3. Megascopic identification and description of Igneous Rocks.
4. Megascopic identification and description of Sedimentary Rocks.
5. Megascopic identification and description of Metamorphic Rocks.
6. Practices on Basic Concept of Contours, Attitude of Beds, Width of Outcrop, True and Apparent Dips.
7. Study of Geological Maps, preparation and description of Geological Cross Sections.

Semester	: III B.Tech.
Branch	: Mining Engineering.
Subject	: Basics of Mining Engineering Laboratory
Total Theory Periods	: 28
Total Tutorial Periods	: 00
Total Credits	: 01
Subject Code	: BTAEC365

LIST OF EXPERIMENTS

1. Study of exploratory drilling by manual and power-operated percussive drilling machines.
2. Study of the working of the diamond drilling machine.
3. Study of different types of drilling tools and bits required for exploratory drilling.
4. Study of surface arrangements required during shaft sinking and its cycle of operation.
5. Study of the erection of temporary lining and permanent lining during the shaft sinking operation.
6. Study of the erection of permanent brick and concrete lining during 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 development and excavation in the surface coal mines.
9. Study of the development of a coal mine by the Bord & Pillar method.
10. Study of the development of a coal mine by the Longwall advancing & retreating method

Semester	: III B.Tech.
Branch	: Mining Engineering.
Subject	: Mechanics of Solids & Fluid Mechanics Laboratory
Total Theory Periods	: 28
Total Tutorial Periods	: 00
Total Credits	: 01
Subject Code	: BTSEC366

LIST OF EXPERIMENTS

1. To determine the Uniaxial tensile test of mild steel.
2. To determine the Rockwell Hardness of the given material.
3. To determine the Compressive strength of wood:
   a. Along the fiber, &
   b. Across the fiber.
4. To study the cupping test machine and the determination of Ericheser value of mild steel sheet.
5. To calibrate an orifice meter.
6. To determine the head loss in various pipe fittings.
7. To determine the coefficient of discharge of a mouthpiece.
8. To study the variation of the friction factor for pipe flow.
9. To verify Bernoulli's theorem.

Scheme of Teaching and Evaluation (As per NEP -2020)
Choice Based Credit System (CBCS) and Outcome Based Education (OBE)
B. TECH. IV Semester

S. No.	Course Sub Category	Course Name	Code	Teaching Scheme				Evaluation Scheme		Total Marks
				Hours			Credits			
				Theory	Tutorial	Practical		CIA	ESE	
1	DSCC - PCC	Mine Environment-I	BTDSCMIN460	3	0	-	3	30	70	100
2	DSCC - PCC	Mining Geology – II	BTDSCMIN461	3	0	-	3	30	70	100
3	DSCC - PCC	Mine Surveying-I	BTDSCMIN462	3	1		4	30	70	100
4	DSCC - PCC	Mining Geology II Laboratory	BTDSCMIN463	-	-	2	1	20	30	50
5	SEC	Mine Surveying-I Laboratory	BTSEC464	-	-	2	1	20	30	50
6	AEC	Mine Environment-I Laboratory	BTAEC465	-	-	2	1	20	30	50
7	RP	Project/ Seminar	BTSEM466	-	-	1	1	30	70	100
8	INT	Internship- I	BTINT467	-	-	1	3	20	30	50
9	DSCC-PEC	Professional Elective Course-I	BTDSCPE6XX	3	-	-	3	30	70	100
10	GEC	Multidisciplinary/ Generic Elective Course IV	GEAXX	3	-	0	3	30	70	100
Total				**15**	**01**	**8**	**23**	**230**	**540**	**800**

L – Lecture, T – Tutorial, ESE – End Semester Examination,
P – Practical, IM – Internal Marks (Include Class Test & Teacher's Assessments)
Note: Theory Internal Marks (CIA) = 30 (CT-I = 05, CT-II=05, Assignment = 05, Mid Term=15)
Practical Internal Marks (CIA) = 20 (Attendance = 05, Lab Viva-Voce = 05, Lab Record Work = 10

Discipline Specific Core Courses(DSCC) Major		Generic Elective(C)	AEC(Ability Enhancement Course)(D)	SEC/Internship (Skill Enhancement Course) (E)	RP/SEMINAR	INTERNSHIP
Engineering Sciences (A)	Professional Elective(B)					
Mine Environment-I	Professional Elective Course-I	GEA	Mine Environment-I Laboratory	Mine Surveying-I Laboratory	Project/ Seminar	Internship- I
Mining Geology – II						
Mine Surveying-I						
Mining Geology II Laboratory						

Credit Definition:

- 1-hour lecture(L) per week per semester=1Credit
- 1-hour tutorial(T)per week per semester=1Credit
- 2-hour Practical/Drawing(P) per week per semester=1Credit

- Four credit courses are to be designed for 60 hours of Teaching-Learning process.
- Three credit courses are to be designed for 48hours of Teaching-Learning process.
- Two credit courses are to be designed for 28hours of Teaching-Learning process.
- One credit courses are to be designed for 15hoursofTeachingLearningprocess

Semester	:	IV B.Tech.
Branch	:	Mining Engineering.
Subject	:	Mine Environment-I
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	BTDSCMIN460

COURSE OBJECTIVES:

This course aims to introduce the principles of mine atmosphere, gases, ventilation, dust hazards, and illumination systems used in mining. It also intends to build awareness of environmental impacts and monitoring techniques essential for safe and sustainable mining.

UNIT- I MINE ATMOSPHERE

Composition of Mine atmosphere, Mine Gases, Their Origin, Occurrence, Effects and Detection and their presence, Methane Drainage, Monitoring System for Mine environment, Analysis of Mine air- Proximate and Ultimate Analysis.

UNIT-II MINE HEAT & HUMIDITY

Heat & humidity in mine atmosphere, causes and its effects, Cooling power of mine air, Assessment of comfort conditions, Air conditioning of Mines.

UNIT-III MINE DUST

Classification, physiological effect, measurement of dust concentration, dynamics of small particles, sampling of air borne dust, prevention and suppression of dust, D.G.M.S. regulations for precaution of dust.

UNIT-IV MINE ILLUMINATION AND FLAME SAFETY LAMPS

Types of portable lamps, maintenance and examination, Lamp room design and organization, Lighting from mains, Photometry and illumination surveys, Standard of illumination for Underground and open cast workings, as per mining laws.

UNIT-V SURFACE MINING ENVIRONMENT

Air, Water, Noise pollution in Mines - Causes, Consequences and Preventive Measures, Preventive measures for Land degradation and reclamation, Environmental Impact of Surface Mining, Environmental Management Plan.

COURSE OUTCOMES (CO):

CO1: Students will learn the properties, behaviour, sources, and physiological effects of mine gases, enabling them to understand and identify hazardous atmospheric conditions in mines.

CO2: Students will learn the principles of heat, humidity, air flow, and ventilation requirements, gaining the ability to maintain safe atmospheric conditions inside mines.

CO3: Students will learn about mine dust types, measurement, hazards, and control techniques, helping them ensure dust safety and regulatory compliance.

CO4: Students will learn the principles of illumination, standards of lighting, and use of flame safety lamps for enhancing visibility and safety in underground mines.

CO5: Students will learn how mining activities impact the environment and develop skills to apply monitoring and mitigation methods for sustainable mining.

TEXT BOOKS:

1. M.J. McPherson, Subsurface Ventilation and Environmental Engineering, Chapman & Hall

Publication, London.
2. G.B.Mishra, Mine Ventilation and Environment, Oxford University Press.
3. V.S.Vutukuri and R.D.Lama, Environmental Engineering in Mines, Trans Tech Publishers.

REFERENCE BOOKS:

1. H.L.Hartman, Mine Ventilation and Air Conditioning, Wiley Publication, 1999.
2. D.J.Deshmukh, Elements of Mining Technology Vol II, Vidyasewa Prakashan, Nagpur.
3. A.Skochinsky and Komorov V., Mine Ventilation, MIR Pub., Moscow
4. B.B.Dhar and A.K.Ghose, Mining Challenges for 21st Century, Ashish Publications New Delhi.
5. D. Pennman, J.S. Penman, The principles and practice of Mine Ventilation, Charles Griffin.
6. H. Rabia, Mine Environmental Engineering, Entrac Software Pub.

Semester	:	IV B.Tech.
Branch	:	Mining Engineering.
Subject	:	Mining Geology-II
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	BTDSCMIN461

COURSE OBJECTIVES:

This course aims to provide an understanding of stratigraphy, geological formations, ore-forming processes, and mineral resources. It further intends to introduce basic exploration and prospecting techniques used in mineral investigation.

UNIT-I STRATIGRAPHY

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 Their Uses; Broad Palaeontological Groups of Animals and Plants; Brief Palaeontological Study of Gondwana Fields

UNIT-II INDIAN GEOLOGY

Major Geomorphic Divisions of India; General Review of Indian Stratigraphy; Descriptions of important Indian Geological formations – Archeans, Cuddapahs , Vindhyans , Gondwanas and teriaries.

UNIT-III ECONOMIC GEOLOGY-I

Introduction and Scope of the subject; Fundamental Terms and Their Definitions; Distribution and Morphology of Minerals Deposits; Brief Review of the Processes of Mineral Formation and the Genetic classification of mineral deposits

UNIT-IV 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, minerals, petroleum deposits of India.

UNIT-V PROSPECTING AND EXPLORATION

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

COURSE OUTCOMES:

CO1: Students will learn the principles of stratigraphy and geological time divisions for interpreting Earth's geological history relevant to mining.

CO2: Students will learn the major stratigraphic formations of India and their economic importance in mineral exploration.

CO3: Students will learn how minerals form through magmatic, sedimentary, and metamorphic processes, helping them identify potential mineral deposits.

CO4: Students will learn to identify, classify, and evaluate economically important minerals used in the mining and industrial sectors.

CO5: Students will learn geophysical, geochemical, and geological prospecting methods used to locate mineral resources safely and effectively.

TEXT BOOKS:

1. India's Mineral Resources :S. Krishnaswamy
2. Geophysical Prospecting : M.Dorbin & B. Miller.

REFERENCES:

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.L. Jensen & A.Batman

Semester	: IV B.Tech.
Branch	: Mining Engineering.
Subject	: Mine Surveying-I
Total Theory Periods	: 48
Total Tutorial Periods	: 00
Total Credits	: 03
Subject Code	: BTDSCMIN462

COURSE OBJECTIVES

This course aims to develop foundational knowledge of surveying principles, including chain and compass surveying, levelling, and theodolite operations for precise measurement of distances, angles, and alignments in mining environments. It further intends to build competency in statutory mine plan preparation, plotting conventions, and systematic error detection and adjustment in survey data.

UNIT-I MINE SURVEYING

Definition, objective, concept of surveying, primary division of survey, classification and principles of surveying; Measurements: Linear and Angular Measurement; Shrunk Scale; Sources of errors; Instruments for measuring distances and angles such as EDM, Total Station, Miner's Dial. Prismatic compass: principle, construction and measurement techniques. EDM equipment: Geodimeter, Tellurometer, Total Station.

UNIT-II CHAIN SURVEY & COMPASS SURVEY

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.

Compass surveying: 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 the compass survey.

UNIT-III LEVELLING & CONTOURING

Levelling: Terminology; Object of levelling in mining; method of levelling; levelling instruments; sensitivity of level tubes; types of level; adjustment of level; Classification of levelling: simple, differential, profile, cross-sectional and reciprocal levelling; underground levelling; booking and reduction method; effect of curvature and refraction & their correction; errors in levelling, shaft depth measurement.

Contouring: Characteristics, methods of contouring, contour gradient, and uses of contours; problem solving.

UNIT-IV THEODOLITE SURVEYING

Terminologies, Types of Theodolites; Description of various parts of a Vernier Theodolite; 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 adjustment of Theodolites; Sources of errors and their prevention.

UNIT-V PLANS & SECTIONS

General requirements of mine plans; types of plans; Symbols used in mine plans; Planimeter and its uses; Pentagraph, Enlargement & reduction of plans.

COURSE OUTCOME (CO):

CO1: Students will learn the objectives, principles, and classifications of mine surveying required for establishing accurate mine layouts.

CO2: Students will learn chaining, ranging, bearing measurements, and compass traversing, essential for basic mine mapping.
CO3: Students will learn levelling operations, contour generation, and gradient calculations used in planning excavation and drainage systems.
CO4: Students will learn theodolite components, angle measurement, and traversing techniques for producing precise mine plans.
CO5: Students will learn statutory mine plan preparation, plotting, error detection, and adjustment methods as per DGMS requirements.

TEXT BOOKS:

1. Mine Surveying & Levelling: S. Ghatak (Vol-I)
2. Surveying: Dr. B.C. Punmia (Vol-I)
3. Surveying & Leveling: T.P. Kanetkar & S. V. Kulkarni (Vol-I)

REFERENCE BOOKS:

1. Metalliferous Mine Surveying: Frederick Winiberg
2. Surveying: S. K. Husain & M.S. Nagaraj

Semester	:	IV B.Tech.		
Branch	:	Mining Engineering.		
Subject	:	Mining Geology -II Laboratory		
Total Theory Periods	:	48		
Total Tutorial Periods	:	00 Total Credits	:	03
Code	:	BTAEC464		

LIST OF EXPERIMENTS

1. Megascopic Description and Distribution of Ore Forming Minerals and Industrial
2. Minerals Study of Plant Fossils.
3. Study of Advance Geological Maps and Preparation of Cross Sections.

Semester	: IV B.Tech.
Branch	: Mining Engineering.
Subject	: Mining Surveying -I Laboratory
Total Theory Periods	: 28
Total Tutorial Periods	: 00
Total Credits	: 01
Subject Code	: BTSEC465

LIST OF EXPERIMENTS

1. Ranging and chaining of a 50-meter line.
2. Surveying of an area by chain & compass (both open & closed traverse) & plotting.
3. Determination of the width of an obstacle that can be seen across but can't be chained.
4. Determination of the distance between two inaccessible points with a compass.
5. Determination of the area of a field by cross-staff survey.
6. Determination of the included angle with the help of a Prismatic Compass.
7. Determination of height & distance of inaccessible points using theodolite.
8. Determination of the difference in elevation and gradient between two stations using a dumpy level.
9. Plotting a closed traverse and elimination of errors.
10. Study of various types of levels.
11. Study of various types of chains.
12. Study of enlargement & reduction of the plan using Planimeter.

Semester	:	IV B.Tech.		
Branch	:	Mining Engineering.		
Subject	:	Mine Environment-I Laboratory		
Total Theory Periods	:	48		
Total Tutorial Periods	:	00 Total Credits	:	03
Code	:	BTSEC466		

LIST OF EXPERIMENTS

1. Detection of presence and accumulation of firedamp in mine atmosphere.
2. Detection of presence and accumulation of CO in mine atmosphere
3. Study of various techniques of methane drainage.
4. Study of surface air conditioning plant.
5. Study of Underground air conditioning plant.
6. Study of different types of ventilation devices.
7. Study of cap lamp used in underground mine.
8. Design of a cap lamp room for a large underground coal mine.
9. Study of gravimetric dust sampler.
10. Study of thermal precipitator dust sampler.
11. Study of Flame safety lamps and method of gas testing used in underground mine.

Semester	:	IV B.Tech.
Branch	:	Mining Engineering.
Subject	:	Underground Coal Mining
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	BTDSCPE617

COURSE OBJECTIVES

The basic objective of the course is to provide knowledge of different theories of coal formation, coal classification, methods of coal mining.This course aims to develop understanding of coal formation, bord and pillar mining, mechanization, and longwall mining systems. It also intends to introduce thick seam and special underground mining methods used under diverse geological conditions.

UNIT-I INTRODUCTION

Theories of Coal Formation, Classification of Coal, Coal Seam and its Classification, Coal Seam Structures and abnormalities, Coal Measuring Rocks and their Characteristics, Distribution of Coal in India, Indian Coal Mining Industry

UNIT-II BORD AND PILLAR METHOD

Development by Bord & Pillar system, Panel & without Panel system, Size and Shape of the Pillar, Galleries, Cycle of Operations, Depillaring, Problems in Depillaring, Preparatory arrangements, Pillar Extraction techniques, Depillaring with Stowing and Caving Methods, Dangers associated with Depillaring, Numerical problems based on bord & pillar system.

UNIT-III 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, Numerical problems based on longwall mining

UNIT-IV OVERVIEW OF 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-V OVERVIEW OF SPECIAL METHODS OF MINING

Short wall Mining, Room & Pillar mining, Hydraulic Mining, Underground gasification of Coal, Introduction to CBM recovery.

COURSE OUTCOMES:

CO1: Students will learn coal types, properties, and seam characteristics important for selecting mining methods.

CO2: Students will learn development, depillaring, and mechanization practices of bord & pillar mining.

CO3: Students will learn the layout, machinery, and operational principles of longwall mining systems.

CO4: Students will learn extraction techniques suitable for thick coal seams under varying geological conditions.

CO5: Students will learn advanced and special-purpose mining methods used in challenging underground conditions.

TEXT BOOKS:

3. Principles and practices of modern Coal Mining by R.D. Singh
4. Coal Mining in India by S.P. Mathur
5. Winning & working coal by R.T. Deshmukh
6. Elements of Mining Technology Volume 1- D.J. Deshmukh

REFERENCE BOOKS

1. Underground winning of Coal by T.N. Singh
2. Longwall Mining by S. Peng

Semester	: IV B.Tech.
Branch	: Mining Engineering.
Subject	: Engineering Materials
Total Theory Periods	: 48
Total Tutorial Periods	: 00
Total Credits	: 03
Code	: GEAXX

COURSE OBJECTIVES:

This course aims to introduce the classification, properties, and behaviour of engineering materials used in mining and construction. It also intends to provide knowledge of heat treatment, wire ropes, cement, concrete, and shotcreting applications.

UNIT-I GENERAL

Introduction, Classification of engineering materials, Structure of Metals and Alloys, Iron-carbon phase diagram.

UNIT-II HEAT TREATMENT OF IRON & STEEL

Different Types of Steels, Their Properties and Uses, Different Types of Heat Treatment Techniques viz. Hardening, Annealing, Normalizing & Tempering and Their Uses in Mining Industry.

UNIT-III WIRE ROPE

Types and Construction, Wire Rope Lays, Non- Stranded Ropes, Selection of Wire Ropes, Ropes used for different purposes, Mass & Strength of Wire Ropes, Wire ropes used in Mines, Application of wire ropes in Mines, Testing of wire ropes, Factor of safety, Examination of Wire ropes, Care of wire ropes. Rope splicing.

UNIT-IV CONSTRUCTION MATERIALS

Cements–Classification & Properties, Quick Setting Cement, R.C.C., Shotcreting, Brick & Stone Masonries, and Application of Fly Ash in Mining.

UNIT-V ENGINEERING BEHAVIOUR OF SOME MATERIALS

Stress- Strain curves of Typical Engineering Materials, Elastic and Plastic Deformation, Fracture, Fatigue and Creep.

COURSE OUTCOMES:

CO1: Students will learn the properties, classification, and applications of metals, polymers, ceramics, and composites.
CO2: Students will learn stress–strain behaviour, hardness, toughness, fatigue, and other engineering properties.
CO3: Students will learn annealing, quenching, tempering, and case-hardening used to modify material properties.
CO4: Students will learn selection, construction, testing, and application of wire ropes used in mine hoisting and haulage.
CO5: Students will learn to apply cement, concrete, RCC, and shotcreting principles in underground support and mining structures

TEXT BOOKS:

1. Introduction to Engineering Materials by B.K. Agrawal
2. Elements of Mining Technology by D.J. Deshmukh, Vol.I

REFERENCE BOOKS:

1. Engineering Materials by Surendra Singh
2. Concrete Technology by M.L.Gambhir.