

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**  
**B.Tech. in MINING ENGINEERING**  
**COURSE STRUCTURE & SYLLABUS (R18)**

**Applicable From 2018-19 Admitted Batch**

**II YEAR I SEMESTER**

S. No.	Course Code	Course Title	L	T	P	Credits
1	MA301BS	Probability and Statistics & Complex Variables	3	1	0	4
2	MN302ES	Fluid Mechanics and Hydraulic Machines	3	1	0	4
3	ME302ES	Mechanics of solids	3	0	0	3
4	MN304PC	Mine Surveying	3	1	0	4
5	MN305PC	Development of Mineral Deposits	3	0	0	3
6	MN306PC	Mine Surveying – I Lab	0	0	2	1
7	AE306ES	Mechanics of Solids Lab	0	0	2	1
8	MN307ES	Fluid Mechanics and Hydraulic Machines Lab	0	0	2	1
9	*MC309	Constitution of India	3	0	0	0
		<b>Total Credits</b>	<b>18</b>	<b>3</b>	<b>6</b>	<b>21</b>

**II YEAR II SEMESTER**

S. No.	Course Code	Course Title	L	T	P	Credits
1	MN401ES	Mining Geology	3	0	0	3
2	EE401ES	Basic Electrical and Electronics Engineering	3	0	0	3
3	MN403PC	Mine Mechanization - I	3	1	0	4
4	MN404PC	Drilling and Blasting	3	1	0	4
5	MN405PC	Mine Environmental Engineering - I	3	0	0	3
6	EE409ES	Basic Electrical and Electronics Engineering Lab	0	0	2	1
7	MN407ES	Mining Geology lab	0	0	3	1.5
8	MN408PC	Mine Surveying – II Lab	0	0	3	1.5
9	*MC409	Gender Sensitization Lab	0	0	2	0
		<b>Total Credits</b>	<b>15</b>	<b>2</b>	<b>10</b>	<b>21</b>

**\*MC – Satisfactory/Unsatisfactory**

**MA301BS: PROBABILITY AND STATISTICS & COMPLEX VARIABLES****B.Tech. II Year I Sem.****L T/P/D C**  
**3 1/0/0 4****Pre-requisites:** Mathematical Knowledge at pre-university level**Course Objectives:** To learn

- The ideas of probability and random variables and various discrete and continuous probability distributions and their properties.
- The basic ideas of statistics including measures of central tendency, correlation and regression.
- The statistical methods of studying data samples.
- Differentiation and integration of complex valued functions.
- Evaluation of integrals using Cauchy's integral formula and Cauchy's residue theorem.
- Expansion of complex functions using Taylor's and Laurent's series.

**Course outcomes:** After learning the contents of this paper the student must be able to

- Formulate and solve problems involving random variables and apply statistical methods for analysing experimental data.
- Analyse the complex function with reference to their analyticity, integration using Cauchy's integral and residue theorems.
- Taylor's and Laurent's series expansions of complex function.

**UNIT - I: Basic Probability****8 L**

Probability spaces, conditional probability, independent events, and Bayes' theorem.

Random variables: Discrete and continuous random variables, Expectation of Random Variables, Moments, Variance of random variables

**UNIT - II: Probability distributions****10 L**

Binomial, Poisson, evaluation of statistical parameters for these distributions, Poisson approximation to the binomial distribution

Continuous random variables and their properties, distribution functions and density functions, Normal and exponential, evaluation of statistical parameters for these distributions

**UNIT - III: Testing of Hypothesis****10 L**

Test of significance: Basic of testing of Hypothesis. Null and alternate Hypothesis, types of errors, level of significance, critical region.

Large sample test for single proportion, difference of proportions, single mean, difference of means; small sample tests: Test for single mean, difference of means and test for ratio of variances

**UNIT - IV: Complex Variables (Differentiation)****10 L**

Limit, Continuity and Differentiation of Complex functions, Analyticity, Cauchy-Riemann equations (without proof), finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm) and their properties.

**UNIT - V: Complex Variables (Integration)****10 L**

Line integral, Cauchy's theorem, Cauchy's Integral formula, Zeros of analytic functions, Singularities, Taylor's series, Laurent's series; Residues, Cauchy Residue theorem, Conformal mappings, Mobius transformations and their properties.

**TEXT BOOKS:**

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2010.

2. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, keying Ye, Probability and statistics for engineers and scientists, 9<sup>th</sup> Edition, Pearson Publications.
3. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., Mc-Graw Hill, 2004.

**REFERENCES:**

1. Fundamentals of Mathematical Statistics, Khanna Publications, S. C. Gupta and V. K. Kapoor.
2. Miller and Freund's, Probability and Statistics for Engineers, 8<sup>th</sup> Edition, Pearson Educations
3. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
4. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

**MN302ES: FLUID MECHANICS & HYDRAULIC MACHINES****II B.Tech. Mining. Engg. II-Sem.**

L	T	P	C
3	1	0	4

**Course Objectives:** The objectives of the course are to enable the student;

- To understand the basic principles of fluid mechanics
- To identify various types of flows
- To understand boundary layer concepts and flow through pipes
- To evaluate the performance of hydraulic turbines
- To understand the functioning and characteristic curves of pumps

**Course Outcomes:**

- Able to explain the effect of fluid properties on a flow system.
- Able to identify type of fluid flow patterns and describe continuity equation.
- To analyze a variety of practical fluid flow and measuring devices and utilize Fluid Mechanics principles in design.
- To select and analyze an appropriate turbine with reference to given situation in power plants.
- To estimate performance parameters of a given Centrifugal and Reciprocating pump.
- Able to demonstrate boundary layer concepts.

**UNIT - I**

**Fluid statics:** Dimensions and units: physical properties of fluids- specific gravity, viscosity, and surface tension - vapour pressure and their influence on fluid motion- atmospheric, gauge and vacuum pressures – measurement of pressure- Piezometer, U-tube and differential manometers.

**UNIT - II**

**Fluid kinematics:** Stream line, path line and streak lines and stream tube, classification of flows- steady & unsteady, uniform & non-uniform, laminar & turbulent, rotational & irrotational flows-equation of continuity for one dimensional flow and three-dimensional flows.

**Fluid dynamics:** Surface and body forces –Euler's and Bernoulli's equations for flow along a stream line, momentum equation and its application on force on pipe bend.

**UNIT - III**

**Boundary Layer Concepts:** Definition, thicknesses, characteristics along thin plate, laminar and turbulent boundary layers (No derivation) boundary layer in transition, separation of boundary layer, submerged objects – drag and lift.

**Closed conduit flow:** Reynold's experiment- Darcy Weisbach equation- Minor losses in pipes- pipes in series and pipes in parallel- total energy line-hydraulic gradient line. Measurement of flow: Pitot tube, venturi meter, and orifice meter, Flow nozzle

**UNIT - IV**

**Basics of turbo machinery:** Hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work done and efficiency, flow over radial vanes.

**Hydraulic Turbines:** Classification of turbines, Heads and efficiencies, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies, hydraulic design –draft tube theory- functions and efficiency.

**Performance of hydraulic turbines:** Geometric similarity, Unit and specific quantities, characteristic curves, governing of turbines, selection of type of turbine, cavitation, surge tank, water hammer.

**UNIT - V**

**Centrifugal pumps:** Classification, working, work done – barometric head- losses and efficiencies specific speed- performance characteristic curves, NPSH.

**Reciprocating pumps:** Working, Discharge, slip, indicator diagrams.

**TEXT BOOKS:**

1. Hydraulics, Fluid mechanics and Hydraulic Machinery - MODI and SETH.
2. Fluid Mechanics and Hydraulic Machines by Rajput.

**REFERENCES:**

1. Fluid Mechanics and Fluid Power Engineering by D.S. Kumar, Kotaria & Sons.
2. Fluid Mechanics and Machinery by D. Rama Durgaiyah, New Age International.
3. Hydraulic Machines by Banga & Sharma, Khanna Publishers.

**ME302ES: MECHANICS OF SOLIDS**

II B.Tech. Mining. Engg. I-Sem.

L	T	P	C
3	0	0	3

**Course Objectives:** The objective is to learn the fundamental concepts of stress, strain, and deformation of solids with applications to bars, beams, and columns. Detailed study of engineering properties of materials is also of interest. Fundamentals of applying equilibrium, compatibility, and force-deformation relationships to structural elements are emphasized. The students are introduced to advanced concepts of flexibility and stiffness method of structural analysis. The course builds on the fundamental concepts of engineering mechanics course.

This course will advance the students' development of the following broad capabilities:

- Students will be able to understand basic concepts of stress, strain and their relations based on linear elasticity. Material behaviors due to different types of loading will be discussed.
- Students will be able to understand and know how to calculate stresses and deformation of a bar due to an axial loading under uniform and non-uniform conditions.
- Students will understand how to develop shear-moment diagrams of a beam and find the maximum moment/shear and their locations
- Students will understand how to calculate normal and shear stresses

**Course Outcomes:**

- Analyze the behavior of the solid bodies subjected to various types of loading;
- Apply knowledge of materials and structural elements to the analysis of simple structures;
- Undertake problem identification, formulation and solution using a range of analytical methods;
- Analyze and interpret laboratory data relating to behavior of structures and the materials they are made of, and undertake associated laboratory work individually and in teams.
- Expectation and capacity to undertake lifelong learning

**UNIT – I**

**Simple Stresses & Strains:** Elasticity and plasticity – Types of stresses & strains–Hooke's law–stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio & volumetric strain – Elastic moduli & the relationship between them – Bars of varying section – composite bars – Temperature stresses. Strain energy – Resilience – Gradual, sudden, impact and shock loadings.

**UNIT – II**

**Shear Force and Bending Moment:** Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, u.d.l., uniformly varying loads and combination of these loads – Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam.

**UNIT – III**

**Flexural Stresses :** Theory of simple bending – Assumptions – Derivation of bending equation:  $M/I = f/y = E/R$  Neutral axis – Determination bending stresses – section modulus of rectangular and circular sections (Solid and Hollow), I,T, Angle and Channel sections – Design of simple beam sections.

**Shear Stresses:** Derivation of formula – Shear stress distribution across various beams sections like rectangular, circular, triangular, I, T angle sections.

**UNIT - IV**

**Principal Stresses and Strains:** Introduction – Stresses on an inclined section of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial

stresses – Two perpendicular normal stresses accompanied by a state of simple shear – Mohr's circle of stresses – Principal stresses and strains – Analytical and graphical solutions.

**Theories of Failure:** Introduction – Various theories of failure - Maximum Principal Stress Theory, Maximum Principal Strain Theory, Strain Energy and Shear Strain Energy Theory (Von Mises Theory).

#### UNIT - V

**Torsion of Circular Shafts :** Theory of pure torsion – Derivation of Torsion equations :  $T/J = q/r = N\theta/L$  – Assumptions made in the theory of pure torsion – Torsional moment of resistance – Polar section modulus – Power transmitted by shafts – Combined bending and torsion and end thrust – Design of shafts according to theories of failure.

**Thin Cylinders:** Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and Volumetric strains – changes in dia, and volume of thin cylinders– Thin spherical shells.

#### TEXT BOOKS:

1. Strength of materials – R.S. Kurmi and Gupta.
2. Solid Mechanics, by Popov
3. Strength of Materials – Ryder. G.H.; Macmillan Long Man Pub.
4. Strength of Materials – W.A. Nash, TMH

#### REFERENCE BOOKS:

1. Strength of Materials -By Jindal, Umesh Publications.
2. Analysis of structures by Vazirani and Ratwani.
3. Mechanics of Structures Vol –I by H. J. Shah and S. B. Junnarkar, Charotar Publishing House Pvt. Ltd.
4. Strength of Materials by D.S Prakash Rao, Universities Press Pvt. Ltd.
5. Strength of Materials by S. S. Rattan, Tata McGraw Hill Education Pvt. Ltd.
6. Fundamentals of Solid Mechanics by M. L. Gambhir, PHI Learning Pvt. Ltd
7. Strength of Materials by R.K Rajput, S. Chand & Company Ltd.

**MN304PC: MINE SURVEYING****II B.Tech. Mining. Engg. I-Sem.**

L	T	P	C
3	1	0	4

**Pre Requisites:** NIL

**Course Objectives:** To introduce various technologies of surveying on the surface and underground mining situations including distance measurements, leveling, contouring, traversing etc along with descriptions of associated instruments.

**Course Outcomes:**

Students will get the benefit of fundamentals of surveying knowledge being used for preparation of mine plans. This course gives an opportunity to understand all the techniques of surveying. Students can also get sufficient knowledge on conducting mine surveys using latest instruments and this also provides elementary excursions using total station, GPS, GIS, data generation, preparation of mine plans in the mining industry.

**UNIT – I**

Introduction: overview of Plane Surveying (Chain, compass, and plane table-in brief): Objectives, Principles and classifications; electronic distance measurements; Types of compasses, different types of meridians and bearings, local attraction and closed traversing with compass; computation of angles from bearings; declination.

Global Positioning System: Introduction to Global Information System (GIS), Remote Sensing – basic Principles, Integration of RS, GIS and Laser scanning.

Total Station: Description, uses, types of surveys by total station, mapping of sites by total station surveys – elementary exercises only.

**UNIT - II**

Levelling: Different types leveling instruments and description of parts; Temporary and Permanent adjustments; methods of levelling – fly levelling, differential levelling, and reciprocal levelling. Problems on leveling. Permissible error and distribution of error.

Contouring: Characteristics and uses of contour; contour interval; methods of establishing contours.

**UNIT - III**

Theodolite – description of parts; Temporary and Permanent Adjustments, Measurement of horizontal and vertical angles, Principles of Electronic Theodolite, Trigonometric levelling. Tacheometry Traversing with Theodolite: Principles of traversing, open traverse and closed traverse using theodolite; Latitude and Departure : consecutive co-ordinates/ dependent co-ordinates and independent co-ordinates/ total coordinates; closing error and correction in closed traversing by different methods- Bowditch method, transit method. Triangulation: Principles and methods of triangulation: classification of triangulation system, signals and towers; base line measurement; calculations of length of base- tape corrections. Astronomical surveying. Center line and gradient control of inclines. Center line of sinking and raising Shafts. Surveying and preparation of slope planes etc. Duties and responsibilities of surveyors. Errors in mine plans and their corrections. Calculation of volumes. Introduction to surveying softwares.

**UNIT - IV**

Computation of Areas and Volumes: Areas from field notes, computation of Areas along irregular boundaries and regular boundaries. Embankments and cuttings, determination of capacity of reservoir/volume. Tacheometric Surveying: – Principles, Stadia and tangential methods, measurements of heights and distances by tacheometry, distance and elevation formulae for staff



vertical and normal; anallactic lens. Curves: Definitions and types of curves; simple curves by linear and angular method (Rankine's method); setting of underground curve.

#### **UNIT - V**

Mine Surveys: Verticality of shaft, measurement of depth of shaft. Correlation Survey: classification and purposes of correlation survey; different methods- single shaft (co-plantation method, weissbach triangle method) and two shaft (Weiss quadrilateral method)

Miscellaneous: EDM and modern instruments, open pit surveys, mine plans and sections, Statutory requirements.

#### **TEXT BOOKS:**

1. Surveying (Vol-1, 2 & 3) by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain- Laxmi Publications (P) Ltd., New Delhi.
2. Surveying (Vol 1 & 2) – Kanitkar

#### **REFERENCE BOOKS:**

1. Arthur R. Benton and Philip J Taetly, Elements of Plane Surveying, McGraw Hill-2000
2. Arora K R Surveying Vol 1 & 2 & 3, Standard Book House, Delhi, 2004.
3. Chandra A M, Plane Surveying, New age International Pvt. Ltd., Publishers, New Delhi, 2002.
4. Chandra A M, Higher Surveying, New age International Pvt. Ltd, Publishers, New Delhi, 2002.

**MN305PC: DEVELOPMENT OF MINERAL DEPOSITS****II B.Tech. Mining. Engg. I-Sem.**

L	T	P	C
3	0	0	3

**Course Objective:**

Course introduces underground and surface mining methods along with the associated activities such as drilling, blasting, supporting etc for mines. Modes of entry into the underground mines with special emphasis on various shaft sinking methods for development of mineral deposits are also described.

**Course Outcomes:**

Students can understand the fundamentals of drilling and blasting techniques for underground and opencast mines which can be put in practice later in the concerned mining industries. As deep underground mining is inevitable in near future, students must play on active role in participating in various activities like arrangement for sinking, ventilation, lighting etc.

**UNIT - I**

Historical overview of mining, evaluation of mining and mining machinery/Distribution of mineral deposits in India and other countries, mining contributions to civilization, mining terminology, stages in the life of the mine, introduction to underground and surface mining methods. Positive and negative aspects of mining. Role of mining engineers in mining industry. Various statutes applicable in mining. Stages in a life of a mine. Role of statutory bodies like DGMS, IBM, PESO, MOEF etc., Introduction to seabed mining. Brief procedure of obtaining mining leases.

**UNIT - II**

Introduction to drilling and drilling equipment. Fundamentals of explosive and blasting techniques.

**UNIT - III**

Objectives and limitations of mine supports, hydraulic props, Roof bolts, chock supports, Roadway support, face supports, side supports, junction supports, supports in special conditions, setting and withdrawal of supports, systematic supporting rules.

**UNIT - IV**

Modes of entry into deposits for underground mining- shafts, inclines, adits etc – their fields of applications. Drivage of drifts, organization and cycle of operations, modern methods of drifting and tunneling, road headers, tunnel boring.

**UNIT - V**

Location of shaft, shape and size, incline and vertical shafts. Surface arrangements for sinking shafts, tools and equipments, ordinary methods of sinking, drilling, blasting, removal of debris and water, ventilation and lighting, temporary and permanent lining. Widening and deepening of shafts, special methods of shaft sinking: piling, caisson, freezing and cementation method of shaft sinking. Modern techniques of shaft sinking like shaft boring, shaft raising.

**TEXT BOOKS:**

1. Introductory mining engineering- Wiley India (P) Ltd, Howard L. Hartman, Jan M. Mutmansky.
2. Elements of mining technology Vol-I - D.J. Deshmukh

**REFERENCE BOOKS:**

1. Roy Pijush Pal, Blasting in ground excavations and mines, Oxford and IBH, 1<sup>st</sup> ed 1993
2. C.P. Chugh, Drilling technology handbook, Oxford and IBH, 1<sup>st</sup> ed, 1977

**MN306PC: MINE SURVEYING – I LAB****II B.Tech. Mining. Engg. I-Sem.**

L	T	P	C
0	0	2	1

**Course Objectives:**

To familiarize with the various surveying instruments and methods.

**LIST OF EXPERIMENTS:**

1. Ranging a line, measuring the distance between two points, pacing.
2. Chain triangulation, booking, calculation of areas and plotting.
3. Traversing with compass.
4. Introduction to levels.
5. Fly leveling & Reduction of level.
6. Profile leveling and plotting the section.
7. Contouring
8. Measurement of Horizontal angle.
9. Measurement of vertical angle.
10. Theodolite traversing
11. Finding distance between two inaccessible points.

**Course Outcomes:** At the end of the course, students will be able to

1. Do the range between the two points and measure the distance between two points
2. Conduct the chain triangulation survey
3. Determine the area by using different methods.
4. Determine the elevation of a given point.
5. Use the instruments used in the surveying.

**AE306ES: MECHANICS OF SOLIDS LAB**

II B.Tech. Mining. Engg. I-Sem.

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

**Pre Requisites:** NIL**Course Objectives:**

- Understand basic knowledge on the mechanical behavior of materials like aluminum, mild steel, and cast iron.
- Adopt with the experimental methods to determine the mechanical properties of materials.

**Course Outcomes:**

- Identify microstructures and wear properties of engineering materials.
- Examine the defects in the materials by non-destructive testing
- Test the important mechanical properties of ferrous and non-ferrous materials.

**List of Experiments:**

1. **Brinell Hardness Test:** Determination of Brinell number of a given test specimen.
2. **Rockwell Hardness Test:** Determination of hardness number of different specimens such as steel, brass, copper and aluminum.
3. **Tension Test:** Study the behavior of mild steel and various materials under different loads.  
To determine
  - a) Tensile
  - b) Yield strength
  - c) Elongation
  - d) Young 's modulus
4. **Torsion Test:** Determine of Modulus of rigidity of various specimens.
5. **Izod Impact Test:** Determination the toughness of the materials like steel, copper, brass and other alloys using Izod test
6. **Charpy Impact Test:** Determine the toughness of the materials like steel, copper, brass and other alloys using Charpy test.
7. **Compression Test on Short Column:** Determine the compressive stress on material.
8. **Compression Test on Long Column:** Determine Young 's modulus of the given long column.
9. **Testing of Springs:** Determine the stiffness of the spring and the Modulus of rigidity of wire material.
10. **Deflection Test For SSB And Cantilever Beam:** Determine the Young's modulus of the given material with the help of deflection of SSB and cantilever beam

**Reference Books:**

1. Gere, Timoshenko, —Mechanics of MaterialsII, McGraw Hill, 3rd Edition, 1993.
2. R. S Kurmi, Gupta, —Strength of MaterialsII, S. Chand, 24th Edition, 2005.
3. William Nash, —Strength of MaterialsII, Tata McGraw Hill, 4th Edition, 2004.

**MN307ES: FLUID MECHANICS & HYDRAULIC MACHINES LAB****II B.Tech. Mining. Engg. I -Sem.**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

**Pre-Requisites:** NIL**Course Objectives:**

- To understand the basic principles of fluid mechanics.
- To identify various types of flows.
- To understand boundary layer concepts and flow through pipes.
- To evaluate the performance of hydraulic turbines.
- To understand the functioning and characteristic curves of pumps.

**Course Outcomes:**

- Able to explain the effect of fluid properties on a flow system.
- Able to identify type of fluid flow patterns and describe continuity equation.
- To analyze a variety of practical fluid flow and measuring devices and utilize fluid mechanics principles in design.
- To select and analyze an appropriate turbine with reference to given situation in power plants.
- To estimate performance parameters of a given Centrifugal and Reciprocating pump.
- Able to demonstrate boundary layer concepts

**List of Experiments:**

1. Impact of jets on Vanes.
2. Performance Test on Pelton Wheel.
3. Performance Test on Francis Turbine.
4. Performance Test on Kaplan Turbine.
5. Performance Test on Single Stage Centrifugal Pump.
6. Performance Test on Multi Stage Centrifugal Pump.
7. Performance Test on Reciprocating Pump.
8. Calibration of Venturimeter.
9. Calibration of Orifice meter.
10. Determination of friction factor for a given pipe line.
11. Determination of loss of head due to sudden contraction in a pipeline.
12. Verification of Bernoulli's Theorems.

**\*MC309: CONSTITUTION OF INDIA****II B.Tech. Mining. Engg. I - Sem.**

L	T/P/D	C
3	0/0/0	0

The Constitution of India is the supreme law of India. Parliament of India cannot make any law which violates the Fundamental Rights enumerated under the Part III of the Constitution. The Parliament of India has been empowered to amend the Constitution under Article 368, however, it cannot use this power to change the “basic structure” of the constitution, which has been ruled and explained by the Supreme Court of India in its historical judgments. The Constitution of India reflects the idea of “Constitutionalism” – a modern and progressive concept historically developed by the thinkers of “liberalism” – an ideology which has been recognized as one of the most popular political ideology and result of historical struggles against arbitrary use of sovereign power by state. The historic revolutions in France, England, America and particularly European Renaissance and Reformation movement have resulted into progressive legal reforms in the form of “constitutionalism” in many countries. The Constitution of India was made by borrowing models and principles from many countries including United Kingdom and America.

The Constitution of India is not only a legal document but it also reflects social, political and economic perspectives of the Indian Society. It reflects India’s legacy of “diversity”. It has been said that Indian constitution reflects ideals of its freedom movement; however, few critics have argued that it does not truly incorporate our own ancient legal heritage and cultural values. No law can be “static” and therefore the Constitution of India has also been amended more than one hundred times. These amendments reflect political, social and economic developments since the year 1950. The Indian judiciary and particularly the Supreme Court of India has played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of India and its historic contributions has been recognized throughout the world and it gradually made it “as one of the strongest court in the world”.

**Course content**

1. Meaning of the constitution law and constitutionalism
2. Historical perspective of the Constitution of India
3. Salient features and characteristics of the Constitution of India
4. Scheme of the fundamental rights
5. The scheme of the Fundamental Duties and its legal status
6. The Directive Principles of State Policy – Its importance and implementation
7. Federal structure and distribution of legislative and financial powers between the Union and the States
8. Parliamentary Form of Government in India – The constitution powers and status of the President of India
9. Amendment of the Constitutional Powers and Procedure
10. The historical perspectives of the constitutional amendments in India
11. Emergency Provisions: National Emergency, President Rule, Financial Emergency
12. Local Self Government – Constitutional Scheme in India
13. Scheme of the Fundamental Right to Equality
14. Scheme of the Fundamental Right to certain Freedom under Article 19
15. Scope of the Right to Life and Personal Liberty under Article 21

**MN401ES: MINING GEOLOGY****II B.Tech. Mining. Engg. II - Sem.**

L	T	P	C
3	0	0	3

**Pre-Requisites:** NIL**Course Objectives:**

This course is aimed at providing the necessary geological inputs required for a mining engineer. The components would help the mining engineering student to understand the identification of important minerals and rocks, strengths and weaknesses of rocks, physical and mechanical properties of rocks and the response of rocks to loading and excavation. The knowledge pertaining to the genesis of mineral deposits, mineral exploration, ore reserves estimation and mineral resources of India are of immense use in the mining engineering practice. A mining engineer should learn geology thoroughly since his profession would require him to know the methods of mining and different types of underground openings.

**Course Outcomes:**

Students will gain the skills to identify the geological problems, hazards, and phenomena occurring in the mining practice.

Students can understand the origin of mineral deposits, techniques of mineral exploration and estimation of mineral resources as outcome of this course.

**UNIT - I**

**Introduction:** Branches of Geology useful to mining engineering and scope of geological studies in various mining engineering projects.

**Mineralogy:** Physical properties, chemical composition, mode of occurrence and uses of important rock-forming, ore-forming and industrial minerals- Quartz, Feldspars, Olivine, Augite, Hornblende, Micas, Calcite, Dolomite, Kaolinite, Illite, Montmorillonite, Talc, Chlorite, Garnet, Kyanite, Hematite, Magnetite, Gypsum, Bauxite, Graphite, Corundum, Chromite, Magnesite, Barytes, Apatite, Chalcopyrite, Pyrite, Sphalerite, and Galena.

**Petrology:** Origin/mode of formation, mineral composition, textures and structures and mode of occurrence of important igneous, sedimentary and metamorphic rocks - Granite, Rhyolite, Gabbro, Dolerite, Basalt, Pegmatite, Syenite, Trachyte, Laterite, Conglomerate, Breccia, Sandstone, Shale, Limestone, Slate, Phyllite, Schist, Gneiss, Quartzite, Marble, Khondalite and Charnockite.

**Engineering properties of rocks:** Physical and mechanical properties of rocks, stress-strain behaviour of rocks under uniaxial compression, factors controlling the strength of rocks, numerical values and constructional uses of rocks.

**UNIT - II**

**Rock weathering:** Definition, rate of weathering, processes of weathering, end products of weathering, susceptibility of rocks to weathering, assessment of the degree and depth of weathering, classification of weathering.

**Geology of soils:** Genesis/origin, profile of the soils, Geological classification and description of soils, soil conservation with reference to mining and major soil groups of India.

**Land forms:** Mode of formation/origin, characteristic features and engineering considerations of erosional and depositional land forms of alluvial, aeolian, glacial and marine.

**UNIT - III**

**Structural Geology:** Strike and Dip, outcrop, Fundamental types, characteristic features, field criteria, mechanics and engineering considerations of folds, faults, joints (discontinuities) and unconformities. Foliation and lineation.

**Ground Water:** Hydrologic cycle, water table, vertical distribution of ground water, types of aquifers, Geologic formations as aquifers, springs, ground water movement, ground water exploration and ground water control.

#### **UNIT - IV**

**Economic Geology:** Definitions of ore, gangue, tenor/grade of ore. Processes and formation of ore deposits. Geological time scale, metallogenic epochs and provinces.

**Mineral Exploration:** Geological, Geophysical, Geochemical and remote sensing methods of mineral exploration.

**Mineral Economics:** Estimation and determination of mineral resources and reserves by classical and modern methods.

**Mineral Resources of India:** Major and Minor mineral resources of India, Brief description of origin, environment and distribution of mineral deposits of India.

#### **UNIT - V**

**Geology of Tunnels:** Purpose, Stand-up time of different rock mass classes, Engineering geological investigations (litho logical, structural, groundwater, geophysical and borehole drilling) to drive tunnels in soft and hard ground, geology of some well-known tunnels of India, problems in tunnelling and their solutions.

**Mining Methods:** Geological factors to be considered in the selection of alluvial mining/ surface mining, quarrying, open-cast mining and underground mining; **Role** of Geology in the opening of Shafts and Inclines.

#### **TEXT BOOKS:**

1. Peters, W. C. Exploration and Mining Geology (2nd Ed.); 1987. John Wiley & Sons, New York.
2. P.K. Mukerjee, A Text Book of Geology (13<sup>th</sup> Ed.); 1997. Reprinted 2018, The World Press Pvt. Ltd. Kolkata.
3. RNP Arogyaswamy, Courses in Mining Geology (Fourth Edition) 1995, Reprint, 2017, OXFORD & IBH; CBS Publishers & Distributors Pvt. Ltd

#### **REFERENCE BOOKS:**

1. Geology and Mineral Resources of India, Misc. Publication No. 30, Part- XXII,
2. Geological Survey of India, 2010.
3. Mining Geology by Hugh Exton Mc Kinstry, 1948, Asia Publishing House (1960)
4. Geological Methods in Mineral Exploration and Mining by Roger Marjoribanks, Springer 2<sup>nd</sup> Ed. 2010.
5. Introduction to Mineral Exploration, Second Edition, Edited by Charles J. Moon, Michael K. G. Whateley & Anthony M. Evans



**EE401ES: BASIC ELECTRICAL AND ELECTRONICS ENGINEERING****II B.Tech. Mining. Engg. II-Sem.**

L	T	P	C
3	0	0	3

**Course Objectives:**

- To introduce the concepts of electrical circuits and its components
- To understand magnetic circuits, DC circuits and AC single phase & three phase circuits
- To study and understand the different types of DC/AC machines and Transformers.
- To impart the knowledge of various electrical installations.
- To introduce the concept of power, power factor and its improvement.
- To introduce the concepts of diodes & transistors, and
- To impart the knowledge of various configurations, characteristics and applications.

**Course Outcomes:**

- To analyze and solve electrical circuits using network laws and theorems.
- To understand and analyze basic Electric and Magnetic circuits
- To study the working principles of Electrical Machines
- To introduce components of Low Voltage Electrical Installations
- To identify and characterize diodes and various types of transistors.

**UNIT - I:****D.C. CIRCUITS**

Electrical circuit elements (R, L and C), voltage and current sources, KVL & KCL, analysis of simple circuits with dc excitation.

**A.C. CIRCUITS**

Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits, Three-phase balanced circuits, voltage and current relations in star and delta connections.

**UNIT - II:****ELECTRICAL INSTALLATIONS**

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

**UNIT - III:****ELECTRICAL MACHINES**

Working principle of Single-phase transformer, equivalent circuit, losses in transformers, efficiency, Three-phase transformer connections. Construction and working principle of DC generators, EMF equation, working principle of DC motors, Torque equations and Speed control of DC motors, Construction and working principle of Three-phase Induction motor, Torques equations and Speed control of Three-phase induction motor. Construction and working principle of synchronous generators.

**UNIT - IV:**

**P-N JUNCTION AND ZENER DIODE:** Principle of Operation Diode equation, Volt-Ampere characteristics, Temperature dependence, Ideal versus practical, Static and dynamic resistances, Equivalent circuit, Zener diode characteristics and applications.

**RECTIFIERS AND FILTERS:** P-N junction as a rectifier - Half Wave Rectifier, Ripple Factor - Full Wave Rectifier, Bridge Rectifier, Harmonic components in Rectifier Circuits, Filters – Inductor Filters, Capacitor Filters, L- section Filters,  $\pi$ - section Filters.

**UNIT - V:**

**BIPOLAR JUNCTION TRANSISTOR (BJT):** Construction, Principle of Operation, Amplifying Action, Common Emitter, Common Base and Common Collector configurations, Comparison of CE, CB and CC configurations.

**FIELD EFFECT TRANSISTOR (FET):** Construction, Principle of Operation, Comparison of BJT and FET, Biasing FET.

**TEXT BOOKS:**

1. Basic Electrical and electronics Engineering –M S Sukija TK Nagasarkar Oxford University
2. Basic Electrical and electronics Engineering-D P Kothari. I J Nagarath, McGraw Hill Education

**REFERENCES:**

1. Electronic Devices and Circuits – R. L. Boylestad and Louis Nashelsky, PEI/PHI, 9<sup>th</sup> Ed, 2006.
2. Millman's Electronic Devices and Circuits – J. Millman and C. C. Halkias, Satyabrata Jit, TMH, 2/e, 1998.
3. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, McGraw Hill Company, 6<sup>th</sup> edition.
4. Linear circuit analysis (time domain phasor and Laplace transform approaches) - 2<sup>nd</sup> edition by Raymond A. De Carlo and Pen-Min-Lin, Oxford University Press-2004.
5. Network Theory by N. C. Jagan& C. Lakshminarayana, B.S. Publications.
6. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.
7. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
8. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
9. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

**MN403PC: MINE MECHANIZATION – I****II B.Tech. Mining. Engg. II-Sem.**

L	T	P	C
3	1	0	4

**Pre Requisites:** NIL**Course Objectives:**

To extract and transport the minerals to the required processing unit/ utilization point variety of machines are used in the mining industry. In this course the student gets acquainted with a few machinery including brief details of the machine parts, their working principles, operation and maintenance in addition to the machine installation, commissioning and safety aspects.

**Course Outcomes:**

After going through this course, the student will have basic knowledge of installation, commissioning, operation, maintenance and safety aspects of the mining machinery viz., different types of rope haulages, mine locomotives, conveyors, laying of rail tracks for rope haulages and locomotives. In addition, he gains knowledge of the prime movers for the machinery and power transmission mechanisms.

**UNIT - I**

Prime Movers for Mining Machinery: I.C. engines, hydraulic power, pneumatic power, elements of mechanical power transmission, Types of couplings, clutches, brakes, gear drives, belt drives, chain drives-advantages and limitations of each drive

**UNIT - II**

Rope haulage: Construction of the wire ropes, rope haulages – gravity, direct, balanced direct, main & tail, endless. Suitability of these haulages and their limitations. Dimension of ropes and their calculations, drums and pulleys, care and maintenance of ropes, changing of haulage ropes, rope splicing, safety appliances on haulage road, signaling, Statutory requirements of haulages. Haulage calculations for different types of haulage including gravity type. Electrical layout of haulages. Pit top and pit bottom layouts for rope haulages.

**UNIT - III**

Track Laying: Rail, joints, crossings, plates, turn tables and curves, track extension,  
Aerial Ropeways: Types, construction, operation, Applications, advantages and limitations.

**UNIT - IV**

Mine Locomotives: Types, constructional features of compressed air, diesel, battery and electric trolley- wire locomotives- operation, application, advantages and limitations. Comparison of various haulages and locomotives. Numerical problems in locomotion. Conveyors: Belt Conveyors and Chain Conveyors- Types, their installation, operation, shifting, maintenance, applicability and limitations. Vibration and shaking conveyors with their fields of applications. High angle Conveyors in open cast mines (in brief), Stage loader in long wall mining (in brief). Numerical problems in conveying.

**UNIT - V**

Compressed air generation and applications. Types of air compressors, reciprocating and rotary compressors like roots blower, vane type, centrifugal, axial flow, screw type- operation, maintenance, application, advantages and limitations. Distribution of compressed air, application of compressed air in Mining machinery, maintenance of compressed air, distribution systems

**TEXT BOOKS**

1. Elements of Mining Technology Vol. III, D.J. Deshmukh
2. Mine Transport – Karelin

**REFERENCE BOOKS:**

1. Mining and Transport – Walker.
2. Introduction to Mining Engineers – Hartman. H.L.

**MN404PC: DRILLING AND BLASTING****II B.Tech. Mining. Engg. II-Sem.**

L	T	P	C
3	1	0	4

**Pre Requisites:** NIL**Course Objectives:**

To familiarize the students with exploratory and production drilling including the factors affecting drilling; Various types of the explosives and blasting techniques used in underground and opencast mining are also explained besides blasting in civil constructions projects.

**Course Outcomes:**

Drilling and blasting is primary operation in any mining organization, student understands various methods of drilling, design and selection of drilling methods. Knowledge about explosives and blasting techniques, makes student confident in design of blasting operations in the field.

**UNIT - I**

Exploratory Drilling: Drilling for exploration and other purposes; diamond drilling-equipment and principal of operation, it's merits, demerits and limitations; core recovery — single, double and triple tube core barrels; wire line drilling; directional drilling; fishing tools; borehole surveying; borehole logging; novel and special drilling techniques, Horizontal and directional drilling.

**UNIT - II**

Production Drilling: Various methods and mechanics of drilling -percussive, rotary and rotary percussive. Jack hammer drilling, Top hammer and Down the Hole (DTH) hammer and rotary drills.  
Drillability: Drillability studies, Factors affecting drilling- operational parameters (like air pressure, thrust, r.p.m., flushing, bit type and bit geometry etc.) and physico-mechanical properties (like strength properties, hardness, abrasivity etc.) design and selection of drills and drill bits; bit wear and reconditioning of drill bits; drilling economics.

**UNIT - III**

Explosives: Classification and properties of explosives, Types of explosives – Permitted type and their importance, slurry explosives, SMS and PMS, ANFO, LOX, boosters, blasting agents. Mechanics of blasting, alternatives to explosives.  
Accessories and Tools: Accessories- different types of detonators, safety fuses, detonating cords, relays, NONEL, exploders, sequential blasting machines and other shot firing tools, testing of explosives, storage, transportation and handling and destruction of explosives and accessories.

**UNIT - IV**

Underground Blasting: Drill patterns for underground excavations (for both coal and metal) and in shafts and tunnels; solid blasting; VCR blasting, smooth blasting, induced blasting, charge ratios, rock fragmentation, dangers associated with underground blasting, blasting economics, gallery blasting, statutory requirements, computer design of underground blast, precautionary measures, misfires, blown out shot and blasting economics.

**UNIT - V**

Open Pit Blasting: Blasting in opencast mines, blast design, primary and secondary blasting; accidents due to blast in opencast mines and preventive measures; environmental impacts due to blasting- ground vibrations, fly rocks, dust, fumes, water pollution etc. Dimension stone blasting, controlled blasting, computer design of opencast blast; statutory requirements. Introduction to different blasting and fragmentation analysis softwares, blasting economics.

Blasting for Civil Constructions and Trenches: Blasting for road constructions, trench cutting in soft and hard rocks, demolition of buildings, underwater blastings etc. Introduction to blasting instruments like VOD probe, vibration etc. And high speed under cover etc.,

**TEXT BOOKS:**

1. Roy Piush Pal, Blasting in ground excavations and mines, Oxford and IBH, 1st ed 1993.
2. C.P. Chugh, Drilling technology handbook, Oxford and IBH, 1sted, 1977.

**REFERENCE BOOKS:**

1. Roy Piush Pal, Rock blasting effect and operation, A.A. Balkema, 1st ed, 2005.
2. D.J. Deshmukh, Elements of mining technology, Vol-1, Central techno, 7th ed, 2001.
3. B. Hemphill Gary, Blasting operations, Mc-Graw Hill, 1st ed 1981.
4. R.D. Singh, Principles and practices of modern coal mining, New age International, 1st ed, 1977.

**MN405PC: MINE ENVIRONMENTAL ENGINEERING – I****II B.Tech. Mining. Engg. II-Sem.****L T P C**  
**3 0 0 3****Pre-Requisites:** NIL**Course Objectives:**

In view of very difficult /uncomfortable environment envisaged in deeper mines in future, this course aims at sampling and analysis of mine air, understanding of heat, humidity, distribution of air, natural ventilation etc for underground mines. Mechanical ventilation devices including auxiliary fans, booster fans etc are also covered in this course.

**Course Outcomes:**

Student can understand the ventilation requirements for ground mines including selection of mine fans, ventilation planning, ventilation surveying etc. For any underground mine, ventilation officer is a statutory post as per Indian Mining Law. This course facilitates the required knowledge to perform the duties of ventilation planning effectively.

**UNIT - I**

Atmospheric air-its composition, mine air – its composition and variation, origin, occurrence, physical, chemical and physiological properties and monitoring of mine gases, various types of damp. Sampling and analysis of mine air. Methane drainage and methane layering of gases. Ventilation Air Method (VAM), Cowords diagram, Flame safety lamp monitoring system.

**UNIT - II**

Heat and humidity: Sources of heat in mines, effect of heat and humidity, psychometric, kata thermometer, methods of improving of cooling power of mine air. Air conditioning basic vapour cycle, representative layout. Air flow through mine openings: Laws of air flow, resistance of airways, equivalent orifice, distribution of air, flow control devices.

**UNIT - III**

Natural Ventilation: Calculation of NVP from air density, artificial aids to natural ventilation. Mechanical ventilation: Principal types of mine fans and their suitability, merits, limitation, efficiency and characteristics. Selection of mine fan, fan testing, output control in fans, series and parallel operation of mine fans. Controlled recirculation, ventilation network analysis.

**UNIT - IV**

Auxiliary fan, duct, matching of fan to the duct system. Reversal of air current. Fan drift, evasee, diffuser, booster fans, Face Ventilation. Ventilation surveys and surveying instruments. Ventilation planning: Standard of ventilation including permissible air velocities. Ascensional, descensional, homotropical, anti-tropical ventilation. Central and boundary ventilation – ventilation surveys and surveying instruments, layouts and comparison. Economics of ventilation.

**UNIT - V**

Quantity and pressure requirement. Ventilation layout for coal mining and metal mining. Calculation of air quantity and total mine head required for ventilating a mine. Introduction to Network analysis: Hardy-Cross method, Ventilation survey.

**TEXT BOOKS:**

1. Mine Environment and Ventilation – G.B. Misra
2. Mine Ventilation and Air Condition – HL Hearlman

**REFERENCE BOOKS:**

1. Vatukuri V.S. & Lama R.D. – Environmental Engineering in Mines.
2. Dhar B.B. – Mining and Environment.



**EE409ES: BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB****II B.Tech. Mining. Engg. II-Sem.**

L	T	P	C
0	0	2	1

**Pre-requisites:** Basic Electrical and Electronics Engineering**Course Objectives:**

- To introduce the concepts of electrical circuits and its components
- To understand magnetic circuits, DC circuits and AC single phase & three phase circuits
- To study and understand the different types of DC/AC machines and Transformers.
- To impart the knowledge of various electrical installations.
- To introduce the concept of power, power factor and its improvement.
- To introduce the concepts of diodes & transistors, and
- To impart the knowledge of various configurations, characteristics and applications.

**Course Outcomes:**

- To analyze and solve electrical circuits using network laws and theorems.
- To understand and analyze basic Electric and Magnetic circuits
- To study the working principles of Electrical Machines
- To introduce components of Low Voltage Electrical Installations
- To identify and characterize diodes and various types of transistors.

**List of experiments/demonstrations:****PART A: ELECTRICAL**

1. Verification of KVL and KCL
2. (i) Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer  
(ii) Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star) in a Three Phase Transformer
3. Measurement of Active and Reactive Power in a balanced Three-phase circuit
4. Performance Characteristics of a Separately Excited DC Shunt Motor
5. Performance Characteristics of a Three-phase Induction Motor
6. No-Load Characteristics of a Three-phase Alternator

**PART B: ELECTRONICS**

1. Study and operation of  
(i) Multi-meters (ii) Function Generator (iii) Regulated Power Supplies (iv) CRO.
2. PN Junction diode characteristics
3. Zener diode characteristics and Zener as voltage Regulator
4. Input & Output characteristics of Transistor in CB / CE configuration
5. Full Wave Rectifier with & without filters
6. Input and Output characteristics of FET in CS configuration

**TEXT BOOKS:**

1. Basic Electrical and electronics Engineering –M S Sukija TK Nagasarkar Oxford University
2. Basic Electrical and electronics Engineering-D P Kothari. I J Nagarath, McGraw Hill Education

**REFERENCES:**

1. Electronic Devices and Circuits – R. L. Boylestead and Louis Nashelsky, PEI/PHI, 9<sup>th</sup> Ed, 2006.
2. Millman's Electronic Devices and Circuits – J. Millman and C. C. Halkias, Satyabrata Jit, TMH, 2/e, 1998.
3. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, McGraw Hill Company, 6<sup>th</sup> edition.

4. Linear circuit analysis (time domain phasor and Laplace transform approaches) - 2<sup>nd</sup> edition by Raymond A. De Carlo and Pen-Min-Lin, Oxford University Press-2004.
5. Network Theory by N. C. Jagan & C. Lakshminarayana, B.S. Publications.
6. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.
7. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
8. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
9. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

**MN407ES: MINING GEOLOGY LAB****II B.Tech. Mining. Engg. II-Sem.**

L	T	P	C
0	0	3	1.5

**Pre-Requisites:** Mining Geology (Theory)**Course Objectives:**

The geological concepts, processes, materials and phenomena are well understandable in the field rather than in the class room. An attempt in this direction is to show some important minerals and rocks, models of geological structures, and maps of different kinds in the laboratory.

**Course Outcomes:** At the end of the course, students will be able to:

1. Identify the properties of rock forming and ore forming minerals.
2. Determine the strike and dip of planar features by Clinometer Compass.
3. Identify the folds, faults and unconformities.
4. Understand the importance and uses of topographic and geological maps in the mining profession
5. Understand the unconfined compressive strength of important rocks.

**List of Experiments:**

1. Identification and systematic description of physical properties of important rock-forming and ore-forming minerals (as mentioned in the theory syllabus) (2 Weeks)
2. Identification and systematic description of important igneous, sedimentary and metamorphic rocks (as mentioned in the theory syllabus) (3Weeks)
3. Determination of strike and dip of planar features using /Brunton Compass and the study of models pertaining to folds, faults, unconformities and tunnels.
4. Study and interpretation of Topographic Maps.
5. Study of Geology and Mineral Resources of Telangana, Andhra Pradesh & India (GSI Publications)
6. Study of Metallogenic Map of India (GSI Publication)
7. Vertical Electrical Sounding Survey to determine depth to water table & bed rock.
8. Determination of unconfined compressive strength of rocks (Demonstration)
9. Field work/ visit to the nearby Quarries/Open Cast Mines and Underground Mines to learn Geologic Mapping

**Lab Examination Pattern:**

1. Identification and description of SIX Minerals.
2. Identification and description of SIX Rocks.
3. Measurement of Strike and Dip of an inclined planar feature (drawing board model) by a clinometer compass.
4. Identification and description of FOUR models pertaining to folds, faults, unconformities and tunnels.
5. Interpretation of a topographic map/ geological map of India/metallogenic map of India.

**MN408PC: MINE SURVEYING – II LAB****II B.Tech. Mining. Engg. II-Sem.**

L	T	P	C
0	0	3	1.5

**Pre-Requisites:** NIL**Course Objectives:**

- To familiarize with the various surveying instruments and methods

**Course Outcomes:** At the end of the course, students will be able to

- Conduct the correlation by two shaft co-planar method.
- Conduct the correlation by shaft weisbatch methods and shaft weiss quadrilateral methods.
- Set a curve by ranging offsets from long chord and ranging ranking method.
- Set a curve by Tacheometric and ranging tacheometric methods.

**LIST OF EXPERIMENTS (Any 10 to 12 Experiments to be done minimum)**

- Determination of constants k and C by tachemometric surveying.
- Tachemometric surveying by stadia method- distance and elevation formulae for staff vertical.
- Tachemometric surveying by stadia method- distance and elevation formulae for staff normal.
- Tachemometric surveying by tangential method- when both angles are angles of elevation.
- Tachemometric surveying by tangential method when both angles are angle of depression.
- Tachemometric surveying by tangential method when one angle is elevation and other depression.
- Curve ranging by offsets/ordinates from the long chord.
- Curve ranging by Rankine's method of tangential (or deflection) angle.
- Correlation in single shaft by co-plantation method.
- Correlation in single shaft by Weisbach triangle method.
- Correlation in two shafts by weiss quadrilateral method
- Finding the height of an in accessible object.
- Reading mine plans and sections.
- Using total station for measurement of volumes

**Text Books/Reference Books:**

- Surveying- Vol. II by Punimia
- Surveying and Levelling by kanetkar.
- Mine Surveying and Levelling by Ghatak.

**\*MC409/\*MC309: GENDER SENSITIZATION LAB**  
(An Activity-based Course)

**B.Tech. II Year II Sem.**

**L T/P/D C**  
**0 0/2/0 0**

**COURSE DESCRIPTION**

This course offers an introduction to Gender Studies, an interdisciplinary field that asks critical questions about the meanings of sex and gender in society. The primary goal of this course is to familiarize students with key issues, questions and debates in Gender Studies, both historical and contemporary. It draws on multiple disciplines – such as literature, history, economics, psychology, sociology, philosophy, political science, anthropology and media studies – to examine cultural assumptions about sex, gender, and sexuality.

This course integrates analysis of current events through student presentations, aiming to increase awareness of contemporary and historical experiences of women, and of the multiple ways that sex and gender interact with race, class, caste, nationality and other social identities. This course also seeks to build an understanding and initiate and strengthen programmes combating gender-based violence and discrimination. The course also features several exercises and reflective activities designed to examine the concepts of gender, gender-based violence, sexuality, and rights. It will further explore the impact of gender-based violence on education, health and development.

**Objectives of the Course:**

- To develop students' sensibility with regard to issues of gender in contemporary India.
- To provide a critical perspective on the socialization of men and women.
- To introduce students to information about some key biological aspects of genders.
- To expose the students to debates on the politics and economics of work.
- To help students reflect critically on gender violence.
- To expose students to more egalitarian interactions between men and women.

**Learning Outcomes:**

- Students will have developed a better understanding of important issues related to gender in contemporary India.
- Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
- Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
- Students will acquire insight into the gendered division of labour and its relation to politics and economics.
- Men and women students and professionals will be better equipped to work and live together as equals.
- Students will develop a sense of appreciation of women in all walks of life.
- Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

**UNIT - I: UNDERSTANDING GENDER**

Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudes towards Gender-Construction of Gender-Socialization: Making Women, Making Men

- Preparing for Womanhood. Growing up Male. First lessons in Caste.

## **UNIT – II: GENDER ROLES AND RELATIONS**

Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender Roles-Gender Roles and Relationships Matrix-Missing Women-Sex Selection and Its Consequences-Declining Sex Ratio. Demographic Consequences-Gender Spectrum: Beyond the Binary

## **UNIT – III: GENDER AND LABOUR**

Division and Valuation of Labour-Housework: The Invisible Labor- “My Mother doesn’t Work.” “Share the Load.”-Work: Its Politics and Economics -Fact and Fiction. Unrecognized and Unaccounted work. -Gender Development Issues-Gender, Governance and Sustainable Development-Gender and Human Rights-Gender and Mainstreaming

## **UNIT – IV: GENDER - BASED VIOLENCE**

The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment: Say No! -Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: “*Chupulu*”.  
Domestic Violence: Speaking Out/Is Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Thinking about Sexual Violence Blaming the Victim-“I Fought for my Life...”

## **UNIT – V: GENDER AND CULTURE**

Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature- Gender Development Issues-Gender Issues-Gender Sensitive Language-Gender and Popular Literature - Just Relationships: Being Together as Equals  
Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Rosa Parks-The Brave Heart.

**Note:** Since it is Interdisciplinary Course, Resource Persons can be drawn from the fields of English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field from engineering departments.

- ***Classes will consist of a combination of activities: dialogue-based lectures, discussions, collaborative learning activities, group work and in-class assignments. Apart from the above prescribed book, Teachers can make use of any authentic materials related to the topics given in the syllabus on “Gender”.***
- ☞ **ESSENTIAL READING:** The Textbook, “*Towards a World of Equals: A Bilingual Textbook on Gender*” written by A.Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu published by Telugu Akademi, Telangana Government in 2015.

## **ASSESSMENT AND GRADING:**

- Discussion & Classroom Participation: 20%
- Project/Assignment: 30%
- End Term Exam: 50%