

SWAMI VIVEKANAND UNIVERSITY, SIRONJA, SAGAR (M.P.)



SYLLABUS

For
Bachelor of Technology (Mining engineering)
Course Code: BTMNE

Department of Mining Engineering
Faculty of Engineering

Duration of Course : 4 Year

Examination Mode : Semester

Examination System : Grading

Swami Vivekanand University, Sironja Sagar (M.P.)
2016-2017



Mathematics - I (BTMNE-101)

Paper Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total	Practical		TW	Total		
		L	T	P	C	Max	Min			Max	Min		(h) = (e+ f)		
		(a)	(b)	(c)	(d) = (a+ c)	(e)	(f)			(g)	(h) = (e+ f)		(I) = (d+ h)		
BTMNE -	Mathematics - I	3	1	-	4	80	25	20	100	-	-	-	-	100	03 Hrs

UNIT – I

Marks :16

MATRICES Characteristic equation – Eigen values and Eigen vectors of a real matrix – Properties of Eigen values – Caley – Hamilton theorem – Orthogonal reduction of a symmetric matrix to diagonal form – Orthogonal matrices – Reduction of quadratic form to canonical form by orthogonal transformations.

UNIT – II

Marks: 16

DIFFERENTIAL CALCULUS Curvature – Cartesian and polar coordinates – Circle of curvature – Involute and Evolute – Envelopes – Properties of envelopes.

UNIT – III

Marks: 16

FUNCTIONS OF SEVERAL VARIABLES Function of two variables – Partial derivatives – Total differential – Taylor's expansion – Maxima and Minima – Constrained Maxima and Minima by Lagrangean Multiplier method – Jacobians

UNIT – IV

Marks: 16

ORDINARY DIFFERENTIAL EQUATIONS Simultaneous first order linear equations with Constant coefficients – Linear equations of second order with constant and variable coefficients – Homogeneous equation of Euler type – Equations reducible to homogeneous form

UNIT – V

Marks: 16

THREE DIMENSIONAL ANALYTICAL GEOMETRY Direction cosines and ratios – Angle between two lines – Equation of a plane – Equation of a straight line – Coplanar lines – Shortest distance between skew lines – Sphere – Tangent plane – Plane section of a sphere – Orthogonal Spheres.

Text Books

1. Grewal B.S, Higher Engg Maths, Khanna Publications, 38th Edition.
2. Dr.V.Ramamurthy & Dr. Sundarammal Kesavan," Engineering Mathematics" – Vol I & II Anuradha Publications, Revised Edition 2006.
3. Veerajan, T., Engineering Mathematics, Tata McGraw Hill Publishing Co., New Delhi, 2000.

Reference Books

1. Kreyszig.E, "Advanced Engineering Mathematics", 8th edition, John Wiley & Sons. Singapore, 2001.
2. Kandasamy P etal. "Engineering Mathematics", Vol.I (4th revised edition), S.Chand &Co., New Delhi, 2000.
3. Narayanan S., Manicavachagom Pillay T.K., Ramanaiah G., "Advanced Mathematics for Engineering students", Volume I (2nd edition), S.Viswanathan Printers and Publishers, 1992.



Fundamentals of Physics (BTMNE-0102)

Paper Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total	Practical		TW	Total		
		L	T	P	C	Max	Min			Max	Min		(h) =		
		(a)	(b)	(c)	(d) = (a+c)	(e)	(f)			(g)	(e+f)		(d+h)		
BTMN E-	Fundamentals of Physics	3	1	2	6	80	25	20	100	50	15	50	100	200	03 Hrs

UNIT – I

Marks: 16

WAVE OPTICS-I Interference- definition, types, explanation of interference, Interference by Division of wave front: Fresnel's baptism, fringe width, Interference in thin films
Wedge shaped films, Interference by division of amplitude: Newton's rings, Michelson's Interferometer and its applications.

UNIT – II

Marks: 16

WAVE OPTICS-II Diffraction:-Introduction - Differences between Fresnel and Fraunhofer Diffractions Single slit diffraction (Qualitative and quantitative treatment) – Differences between interference and diffraction, resolving power of optical instruments (prism and grating). Polarization:- Introduction – double refraction –Negative crystals & Positive crystals - Nicol's prism – Quarter wave plate and half wave plate – Production and detection of circularly and elliptically polarized light.

UNIT – III

Marks: 16

QUANTUM PHYSICS De Broglie's hypothesis, De Broglie's wave length, Davisson and Germer's experiment, Compton Effect, concept of wave packet & their properties, wave function & probability interpretation, Heisenberg's Uncertainty Principle, its elementary proof and applications, energy and momentum operators, time dependent and time independent Schrödinger Wave equation. Application of time independent Schrödinger wave equation to particle trapped in a one dimensional square potential well.

UNIT – IV

Marks: 16

NUCLEAR PHYSICS

General properties of nucleus, Nuclear model (liquid drop model and shell model), accelerator, linear particle accelerator, cyclotron, general Bettertton, Counters and particle detectors Geiger-Muller Counter, nuclear fission, nuclear fusion, nuclear reaction, nuclear reactors.

UNIT – V

Marks: 16

LASER AND FIBER OPTICS

Laser: Stimulated and spontaneous processes, main part of laser, laser action population inversion, pumping, Optical resonators, characteristics of laser beam, Principles and working of Ruby, Nd: YAG, He-Ne & with energy level diagram and Applications of lasers Fiber Optics - Fundamental idea about optical fiber, types of fibers, acceptance angle & cone, numerical aperture, V-number, propagation of light through step index fiber (Ray theory) pulse dispersion, attenuation, losses, various uses, and application of optical fibers.

Text Books

1. Gaur and Gupta "Engineering Physics"
2. Tiwari and Navneet Gupta "Engineering Physics"
3. Vikram Yadav "Engineering Physics"



Reference Books

1. Beiser, "Modern Physics", McGraw-Hill Inc., New Delhi.
2. Avadhanulu and Kshirsagar "Engineering Physics".
3. Jenkins and White: "Optics", McGraw-Hill Book Company.
4. Sanjeev Puri: Modern Physics, Narosa Pub.Co. 2004.
5. Kaplan: Nuclear Physics, Narosa Publishing, 1987.
6. Tyagrajan and Ghatak: Lasers, Macmillan, 2001.

List of Experiments

1. Keiser: G Optical fiber Communication, McGraw-Hill, 2000.
2. Fresnel Biprism,
3. Newton's Rings,
4. Michelson's Interferometer.
5. Resolving Powers –Telescope,
6. Spectrometers-R.I., Wavelength, using prism and grating
7. Optical polarization based experiments: Brewster's angle, polar meter etc.
8. Measurements of wavelength of LASER
9. To study the CRO.
10. Charging and discharging of capacitor
11. Other conceptual experiments related to theory syllabus



Chemistry (BTMNE-0103)

Paper Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total	Practical		TW	Total		
		L	T	P	C	Max	Min			Max	Min		(h) =		
		(a)	(b)	(c)	(d) = (a+ c)	(e)	(f)			(g)	(e+ f)		(d+ h)		
BTMNE -	Chemistry	3	1	2	6	80	25	20	100	50	15	50	100	200	03 Hrs

UNIT – I

Marks: 16

TECHNOLOGY OF WATER

Source of water, Impurities in water, Analysis of water- Hardness of water, Estimation of Hardness, Alkalinity of water, Determination of alkalinity, Disadvantages of using hard water in boiler- sludge and scale formation, Boiler corrosion, Water softening techniques (Internal and External treatment), treatment of water for domestic purposes.

UNIT – II

Marks: 16

CORROSION AND ITS CONTROL

Corrosion: Basic concept- Principles, Mechanism of Dry or Chemical Corrosion and Wet or Electrochemical Corrosion, Pilling Bed worth rule, Types of corrosion- Galvanic corrosion, Concentration cell corrosion, Pitting corrosion, Stress corrosion, Microbiological corrosion, Factors influencing corrosion, Corrosion control.

UNIT – III

Marks: 16

A. FUELS

Definition & Classification of fuels, Calorific values, Analysis of coal, Carbonization of coal, Manufacturing of coke & recovery of by-products. Cracking, Knocking, Anti-knocking, Octane & Cetane number, Gaseous fuels.

B. LUBRICANTS

Introduction, functions & classification of lubricants, Mechanism of lubrication, Properties and Testing of lubricants.

UNIT – IV

Marks: 16

POLYMERS

Introduction and classification of polymers, Types of polymerization: addition or chain polymerization, condensation polymerization, Mechanism of addition polymerization -Free radical and Ionic polymerization, Ziegler Natta polymerization, Vulcanization of rubbers, Preparation, Properties and Applications of important polymers- Polyethylene, PVC, PMMA, Nylons, Terylene, Glyptal, Bakelite, Urea-formaldehyde, Silicone resin, Neoprene, Buna S, Buna N.

UNIT – V

Marks :16

INSTRUMENTATIONAL METHODS OF CHEMICAL ANALYSIS

Introduction to Spectroscopy, Electromagnetic spectrum, Introduction, Principle, Instrumentation and Application of IR, UV- Visible, NMR, Basic Principle and Instrumentation of Potentiometry, Flame photometry and Chromatography.

Text Books

1. Jain.P.C and Monika Jain, Engineering Chemistry, Dan pat Raj publishing company (P) Ltd, New Delhi – 2002.
2. Dara.S.S, Text book of Engineering Chemistry, S. Chand & Company Ltd, New Delhi
3. Sharma B.K., “Instrumental methods of chemical analysis” 24th Edition Krishna Prakashan Media Pvt. Ltd, Meerut, 2005.

Reference Books

1. Kuriacose J.C. And Rajaram J. Chemistry in Engineering and Technology, Volume II, Tata McGraw Hill p.b. Co., 1988.
2. Jeyalakshmi.R & Ramar. P, Engineering Chemistry, 1st Edition, Devi Publications, Chennai 2006.
3. Rattan S., Text book of Engineering Chemistry, S.K. Kataria and Sons, Publication, 1st Edition, New Delhi, 2012

List of Experiments

1. Preparation of standard solutions.
2. Conductometric titration-determination of strength of an acid.
3. Determination of alkalinity, hydroxyl, carbonate and bicarbonate in water.
4. Determination of total hardness in water using EDTA titrations.
5. Estimation of iron by potentiometer.
6. Estimation of Copper in Ore
7. Determination of viscosity of lubricating oil with change of temperature by
 - a. Red Wood Viscometer Number 1
 - b. Red Wood Viscometer Number 2
8. Determination of Flash and Fire point of liquid fuel and lubricants by
 - a. Cleaveland's Open Cup Method
 - b. Abel's Flash Point Apparatus
 - c. Pensky Martin's Flash Point Apparatus.
9. Determination of Cloud and Pour point of lubricants by Cloud and Pour point Apparatus.
10. Determination of carbon residue of lubricants by Conradson's Apparatus.

REFERENCE BOOKS FOR PRACTICAL

1. Chemistry department manual, Edition, 2008.
2. Chawla S., Theory and Practicals of Engineering Chemistry, Dhanpat Rai & Co. (Pvt.) Ltd. 6th Edition, New Delhi –2011.



Basic Engg.- I (BTMNE-0104)

Paper Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total (d) = (a+c)	Practical		TW (g)	Total (h) = (e+f)		
		L	T	P	C	Max	Min			Max	Min				
		(a)	(b)	(c)	(e)	(f)									
BTMNE - 0104	Basic Engg.- I	3	1	2	6	80	25	20	100	50	15	50	100	200	03 Hrs

UNIT – I

Marks: 16

AC & DC CIRCUITS

Circuit parameters, Ohms law, and Kirchhoff's law. Average and RMS values, concept of phase or representation, RLC series circuits and series resonance, RLC parallel circuits (includes simple problems in DC & AC circuits) Introduction to three phase systems – types of connections, relationship between line and phase values.

UNIT – II

Marks: 16

MAGNETIC CIRCUITS

Definition of muf, flux and reluctance, leakage flux, fringing, magnetic materials and B-H relationship. Problems involving simple magnetic circuits. Faraday's laws, induced elms and inductances, brief idea on Hysteresis and eddy currents.

UNIT – III

Marks: 16

ELECTRICAL MACHINES

Working principle, construction and applications of DC machines and AC machines (single phase transformers, single phase induction motors – split phase, capacitor start and capacitor start & run motors).

UNIT – IV

Marks: 16

DIGITAL ELECTRONICS

– Number system, Boolean Theorems, De Morgan's Theorem, Logic gates, Implementation of Boolean expression using logic gates, half adder, Full adder. Electronic Components – Resistors, Inductors and Capacitors and their types. CRO.

UNIT – V

Marks: 16

SEMICONDUCTOR – Energy band diagram, Intrinsic and Extrinsic semi conductors, PN Junction diode, Zener diode and their V-I characteristics, Zener diode used as a Voltage regulator, Light emitting diode and Photo diode. Rectifier – Half wave and full wave Rectifier and their efficiency and ripple factor, Filters.

Text Books

1. Vincent Del Toro, Electrical Engineering Fundamentals, PHI Learning, II Edition
2. S.Ghosh, Fundamentals of Electrical and Electronics Engineering, PHI, II Edition.
3. Millman, Halkias & Parikh, Integrated Electronics, Mc Graw Hill, II Edition
4. Nagrath & Kothari, Basic Electrical Engineering, III Edition TMH.
5. Mehta V.K., Principals of Electronics, S. Chand & Co.
6. Moris Mano, Digital Electronics, PHI Pub.
7. Kalsi H.s., Electronics Instrumentation, ISTE Pub.

Reference Books

1. Kothari D. P and Nagrath IJ, Basic Electrical Engineering, Tata McGraw- Hill, 1991.
2. Thomas L.Floyd Electronic devices, Addison Wesley Longman (Singapore) Pvt . Ltd., 5th Edition
3. Nagrath & Kothari, Basic Electrical Engineering, III Edition TMH.
4. Mehta V.K., Principles of Electronics, S. Chand & Co.

List of Experiments

1. Study of KVL and KCL.
2. Study of Transformer, name plate rating, determination of ratio and polarity.
3. Determination of equivalent circuit parameters of a single phase transformer by O.C. and S.C. tests and estimation of voltage regulation and efficiency at various loading conditions and verification by load test.
4. Identification and testing of different Electronics components.
5. Observing input and output waveforms of rectifiers.
6. Verification of truth table for various gates.
7. To study the V-I characteristics of PN diode and Zener Diode.
8. To implement basic logic gate by using universal gate (NAND & NOR).
9. Measurement of frequency and time period of a signal using CRO.



Computer Lab(BTMNE-0105)

Paper Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total	Practical		TW	Total		
		L	T	P	C	Max	Min			Max	Min				
						(a)	(b)			(c)	(d) = (a+c)			(e)	
BTMNE - 0105	Computer Lab	-	-	2	2	-	-	-	-	-	-	50	50	50	

PURPOSE

This Lab Course will enable the students to understand the basics of computer and to know the basics of MSOffice.

INSTRUCTIONAL OBJECTIVES

1. To learn the basics of computer, Computer Peripherals and its application in real world.
2. Demonstration on Ms-Word, Ms-Excel, Ms-Power Point and Ms-Access

Text Books

1. Introduction to Information Technology ITL Education Solutions Ltd., Pearson 2nd Edition, 2006.

List of Experiments

1. Study experiment on evolution of computer programming languages.
2. Suggest some of the Network Topologies that can be incorporated in your campus. Justify your choice.
3. Experiments to demonstrate directory creation and file creation.
4. Create a document with all formatting effects.
5. Create a document with tables.
6. Create labels in MS word.
7. Create a document to send mails using mail merge option.
8. Create an Excel File to analyze the student's performance. Create a chart for the above data to depict it diagrammatically.
9. Create Excel sheet to use built-in-function like sum, count, count if, if, etc.
10. Create Excel sheet to maintain employee information and use this data to send mails using mail merge.
11. Create a Power Point presentation for your personal profile with varying animation effects with Timer.
12. Consider student information system which stores student personal data, mark information and non-academic details.
 - * Use MS Access to create Tables and execute SQL queries to do this following
 - * Display all student records.
 - * Display student details with respect to his identity.
 - * Delete some records from the table.
 - * Find total marks obtained by student in each list.



Workshop Practice (BTMNE-0106)

Paper Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total	Practical		TW	Total		
		L	T	P	C	Max	Min			Max	Min		(h) =		
						(a)	(b)			(c)	(d) = (a+c)		(e)	(f)	
BTMNE - 0106	Workshop Practice	-	-	2	2	-	-	-	-	50	15	50	100	100	

PURPOSE

To provide the students with hands on experience on different trades of engineering like fitting, carpentry, smithy, welding and sheet metal.

INSTRUCTIONAL OBJECTIVES

to familiarize with

1. The basics of tools and equipments used in fitting, carpentry, sheet metal, welding and smithy.
2. The production of simple models in the above trades.

Text Books

1. Gopal, T.V., Kumar, T., and Murali, G., A first course on workshop practice – Theory, practice And work book, Suma Publications, 2005.

Reference Books

1. Kannaiah, P. & Narayanan, K.C. Manual on Workshop Practice, Scitech Publications, Chennai, 1999.
2. Venkatachalapathy, V.S. , First year Engineering Workshop Practice, Ramalinga Publications, Madurai, 1999.

List of Experiments

1. EMPHASIS TO BE LAID ON REAL LIFE APPLICATIONS WHEN FRAMING THE EXERCISES.
2. FITTING
Tools & Equipments – Practice in Filing and Drilling.
Making Vee Joints, Square, dovetail joints, Key Making.
3. CARPENTRY
Tools and Equipments- Planning practice. Making Half Lap, dovetail, Mortise & Tenon joints, a mini model of a single door window frame.
4. SHEET METAL
Tools and equipments - Fabrication of a small cabinet, Rectangular Hopper, etc.
5. WELDING
Tools and equipments - Arc welding of butt joint, Lap Joint, Tee Fillet.
Demonstration of Gas welding, TIG & MIG.
6. SMITHY
Tools and Equipments – Making simple parts like hexagonal headed bolt, chisel.



English (BTMNE-0107)

Paper Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total	Practical		TW	Total		
		L	T	P	C	Max	Min			(d) = (a+c)	Max				
		(a)	(b)	(c)	(e)	(f)	(g)								
BTMNE - 0107	English	-	-	2	2	-	-	-	-	-	50	50	50	03 Hrs	

UNIT – I

Marks: 16

LANGUAGES AND SKILLS OF COMMUNICATION

Linguistic Techniques, Reading Comprehension, Phonetic symbols/signs, Oral Presentation, Process of communication, Verbal and non-verbal Communication, Barriers of communication

UNIT – II

Marks: 16

APPLICATION OF LINGUISTIC ABILITY

Definitions of Engineering terms, objects, processes & principles, Paragraph Writing on topics of General Interest, Importance of Listening Skills, Unseen Passage, Conversational Dialogues

UNIT – III

Marks: 16

LETTER WRITING

Applications, Enquiry & Complaint letters, Calling & Sending quotations, Placing orders, Tenders.

UNIT – IV

Marks: 16

PRECISE WRITING

Slogan – Writing, Technical Description of Simple engineering objects & processes, Note – Making.

UNIT – V

Marks: 16

REPORT WRITING

Observation Report, Survey Report, Report of Trouble, Laboratory Report, Project Report, Telephonic Etiquettes, Debate, Speech.

Text Books

1. Abraham Benjamin Samuel Practical Communication Communicative English LSRW2000 – SRMEC –June 2006 Revised Edition.
2. Staff of the Department of Humanities and Social Science, Anna University, “English for Engineers /Technologist Vol.-I”. Orient Longman, 1990.

Reference Books

1. Herbert. A. J. The structure of Technical English Orient Longman 1995.
2. Pickett and Lester, ‘Technical English, Writing, Reading and Speaking’, New York Harper and Row Publications, 1997.
3. Interactive course in phonetics and spoken English published by Acoustics Engineers (ACEN) 2002.



Project - I (BTMNE-0108)

Paper Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total	Practical		TW	Total		
		L	T	P	C	Max	Min			Max	Min		(g)		
		(a)	(b)	(c)	(a+c)	(e)	(f)			(g)	(h) = (e+f)		(i) = (d+h)		
BTMNE -	Project - I	-	-	4	4	-	-	-	-	-	-	50	50	50	

The objectives of the course 'Project work' are

1. To provide students with a comprehensive experience for applying the knowledge gained so far by studying various courses.
2. To develop an inquiring aptitude and build confidence among students by working on solutions of small industrial problems.
3. To give students an opportunity to do something creative and to assimilate real life work situation in institution.
4. To adapt students for latest developments and to handle independently new situations.
5. To develop good expressions power and presentation abilities in students.

The faculty and student should work according to following schedule:

- i) Each student undertakes substantial and individual project in an approved area of the subject and supervised by a member of staff.
- ii) The student must submit outline and action plan for the project execution (time schedule) and the same be approved by the concerned faculty
- iii) At all the steps of the project, students must submit a written report of the same.



Mathematics-II(BTMNE-0201)

Paper Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total (d) = (a+c)	Practical		TW (g)	Total (h) = (e+f)		
		L	T	P	C	Max	Min			Max	Min				
						(a)	(b)			(e)	(f)			(i) = (d+h)	
BTMNE - 0201	Mathematics - II	3	1	-	4	80	25	20	100	-	-	-	-	100	03 Hrs

UNIT – I

Marks: 16

Laplace Transform: Introduction of Laplace Transform, Laplace Transform of elementary functions, properties of Laplace Transform, Change of scale property, second shifting property, Laplace transform of the derivative, Inverse Laplace transform & its properties, Convolution theorem, Applications of L.T. to solve the ordinary differential equations

UNIT – II

Marks: 16

Fourier Series: Introduction of Fourier series, Fourier series for Discontinuous functions, Fourier series for even and odd function, Half range series Fourier Transform: Definition and properties of Fourier transform.

UNIT – III

Marks: 16

Second Order linear differential equation with variable coefficients : Methods one integral is known, removal of first derivative, changing of independent variable and variation of parameter, Solution by Series Method.

UNIT – IV

Marks: 16

Linear and Non Linear partial differential equation of first order: Formulation of partial differential equations, solution of equation by direct integration, Lagrange's Linear equation, charpit's method. Linear partial differential equation of second and higher order: Linear homogeneous and non homogeneous partial diff. equation. Separation of variable method for the solution of wave and heat equations.

UNIT – V

Marks: 16

Vector Calculus: Differentiation of vectors, scalar and vector point function, geometrical meaning of Gradient, unit normal vector and directional derivative, physical interpretation of divergence and Curl. Line integral, surface integral and volume integral, Green's, Stoke's and Gauss divergence theorem.

Text Books

1. Grewal B.S, Higher Engg Maths, Khanna Publications, 38th Edition. Veerajan, T., Engineering

Reference Books

1. Advanced Engineering Mathematics by Erwin Kreyszig, Wiley India
2. Higher Engineering Mathematics by BS Grewal, Khanna Publication
3. Advance Engineering Mathematics by D.G.Guffy



Material Physics (BTMNE-0202)

Paper Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total	Practical		TW	Total		
		L	T	P	C	Max	Min			Max	Min		(h) = (e+f)		
		(a)	(b)	(c)	(d) = (a+c)	(e)	(f)			(g)	(h) = (e+f)		(i) = (d+h)		
BTMNE -	Material Physics	3	1	2	6	80	25	20	100	50	15	50	100	200	03 Hrs

UNIT – I

Marks: 16

STRUCTURE OF MATERIALS

Type of solids, Lattice – Unit cell – Bravais lattice – Lattice planes – Miller indices – d spacing in cubic lattice – Calculation of number of atoms per unit cell – Atomic radius – Coordination number – Packing factor for SC, BCC, FCC and HCP structures – NaCl, ZnS, diamond and graphite structures – Bragg's law X-ray diffraction for crystal structure.

UNIT – II

Marks: 16

SEMICONDUCTING MATERIALS

Introduction, intrinsic and extrinsic semiconductors, carrier concentration in intrinsic semiconductors, carrier concentration in n type semiconductors, carrier concentration in p-type semiconductors, Hall effect and its applications - variation of carrier concentration with temperature, conductivity of extrinsic semiconductor, P-N junction – forward bias – reverse bias – V-I characteristics of a p-n junction. Basic introduction of transistors.

UNIT – III

Marks: 16

DIELECTRIC MATERIALS

Introduction, Fundamental definitions, Local field, Clausius- Mossotti relation, different types of electric polarization (dipolar, ionic and electronic polarizations), frequency and temperature Effects on polarization, dielectric loss, dielectric breakdown, determination of dielectric constant, properties and different types of insulating materials, ferroelectric materials, spontaneous polarization in BaTiO₃, electrets.

UNIT – IV

Marks: 16

MAGNETIC & SUPERCONDUCTING MATERIALS

MAGNETIC MATERIALS Concept of magnetism- Dia, Para, Ferro magnetic materials · Hysteresis loop· Soft and hard magnetic material· magnetic Storages application of magnetic Materials

SUPERCONDUCTING MATERIALS Introduction – basic theories for superconductivity Meissner effect - Properties of superconductors - Type-I and Type-II superconductors – High T_c superconductors – application.

UNIT – V

Marks: 16

NANO MATERIALS

Introduction to nano science, nano materials synthesis of nano materials (using different routes) Properties of nano materials, carbon nano tubes, application of nano materials.

Text Books

1. Gaur and Gupta "Engineering Physics"
2. Tiwari and Navneet Gupta "Engineering Physics"
3. Vikram Yadav "Engineering Physics"
4. Materials Science'.By Dr. M. Arumugam.



Reference Books

1. Beiser, "Modern Physics", McGraw-Hill Inc., New Delhi.
2. Avadhanulu and Kshirsagar "Engineering Physics".
3. Azroff: Solid State Physics, Tata McGraw-Hill, 2004.
4. Materials Science'. By Dr. M. Arumugam.
5. Science of Engg. Materials and Carbon Nano tubes- C. M. Shrivastava and C. Srinivasan

List of Experiments

1. Uses of Potentiometers and Bridges (Electrical)
2. Experiments connected with diodes
3. Experiments connected with transistor.
4. Measurement of energy band gap of semiconductor.
5. to study Hall effect.
6. To study Solar cell.
7. To study the LED
8. Other conceptual experiments related to theory syllabus.



Energy & Environment Science (BTMNE-0203)

Paper Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total	Practical		TW	Total		
		L	T	P	C	Max	Min			Max	Min		(h) = (e+f)		
		(a)	(b)	(c)	(d) = (a+c)	(e)	(f)			(g)	(h) = (e+f)		(i) = (d+h)		
BTMNE - 0203	Energy & Environment Science	3	1	-	4	80	25	20	100	-	-	-	-	100	03 Hrs

UNIT – I

Marks: 16

ENERGY

Energy, Energy scenario in world and India, Sources of energy, Renewable and nonrenewable sources of energy, Advantages and disadvantages of different sources of energy- Fossil fuel, Coal, Oil, Gas, Nuclear, Solar, Wind, Geothermal, Hydel, Hydrogen and Ocean energy.

UNIT – II

Marks: 16

ENVIRONMENT AND ECOSYSTEM

Ecology and ecosystem, Structure and types of an ecosystem, Food chain and food web, segment of Environment-Atmosphere, Hydrosphere, Lithosphere, Biosphere, Cycles in ecosystem- Gaseous, Sedimentary and Water.

UNIT – III

Marks: 16

ENVIRONMENTAL POLLUTION-I

Introduction, Air Pollution, Lapse Rate and Inversion Temperature, Air Pollutants, Classification of Air Pollutants, Causes of air pollution, Adverse effect of air pollution, Acid rain, Global warming, Chemical & photochemical smog and Ozone layer depletion, Control of Air Pollution.

UNIT – IV

Marks: 16

ENVIRONMENTAL POLLUTION-II

Water Pollution, Classification of water pollutants, Characteristics of waste water, Waste water treatment- Primary, Secondary and Tertiary, Eutrophication, Soil or and Pollution, Radioactive Pollution, Noise Pollution

UNIT – V

Marks: 16

ENVIRONMENTAL PROTECTION AND WASTE MANAGEMENT

Solid waste management, Treatment and disposal methods, important environmental protection act in India- water, air (prevention and control of pollution) act, Wild life Conservation and forest act, Functions of central and state pollution control boards, Environmental impact assessment.

Text Books

1. Sharma.B.K. And Kaur, Environmental Chemistry, Goel Publishing House, Meerut, 1994.
2. De A.K., Environmental Chemistry, New Age International Pvt. Ltd., New Delhi, 1996.
3. Kurian Joseph & R. Nagendran, Essential of Environmental Studies, Pearson Education, 2004.

Reference Books

1. Dara S.S., A Text Book of Environmental Chemistry and pollution contro, S.Chand & Company Ltd., New Delhi, 2004.
2. Jeyalakshmi.R, Principles of Environmental Science, 1st Edition, Devi Publications, Chennai 2006.
3. Kamaraj.P & Arthanareeswari.M, Environmental Science – Challenges and Changes, 1st Edition, Sudhandhira Publications, 2007.



Basic Engg. - II (BTMNE-0204)

Paper Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total	Practical		TW	Total		
		L	T	P	C	Max	Min			Max	Min		(h) = (e+f)		
		(a)	(b)	(c)	(a+c)	(e)	(f)			(g)					
BTMNE - 0204	Basic Engg.- II	3	1	2	6	80	25	20	100	50	15	50	100	200	03 Hrs

UNIT – I

Marks: 16

Building Materials & Construction Stones, bricks, cement, lime, timber-types, properties, test & Uses, laboratory tests concrete and mortar Materials: Workability, Strength properties of Concrete, Nominal proportion of Concrete preparation of concrete, compaction, curing. Elements of Building Construction, Foundations conventional spread footings, RCC footings, brick masonry walls, plastering and pointing, floors, roofs, Doors, windows, lintels, staircases – types and their suitability

UNIT – II

Marks: 16

Surveying & Positioning:

Introduction to surveying Instruments – levels, theodolites, plane tables and related devices. Electronic surveying instruments etc. Measurement of distances – conventional and EDM methods, measurement of directions by different methods, measurement of elevations by different methods. Reciprocal leveling.

UNIT – III

Marks: 16

Engineering Mechanics

Forces and Equilibrium: Graphical and Analytical Treatment of Concurrent and non concurrent Co- planner forces, free Diagram, Force Diagram and Bow's notations, Application of Equilibrium Concepts: Analysis of plane Trusses: Method of joints, Method of Sections. Frictional force in equilibrium problems. Centre of Gravity and moment of Inertia: Centered and Centre of Gravity, Moment Inertia of Area and Mass, Radius of Gyration, Introduction to product of Inertia.

UNIT – IV

Marks: 16

Measurement

Temperature, pressure, velocity, flow, strain, force and torque measurement, concept of measurement error & uncertainty analysis, measurement by Vernier caliper, micrometer, dial gauges, slip gauges, sine-bar and combination set; introduction to lathe, drilling, milling and shaping machines.

UNIT – V

Marks: 16

Reciprocating Machines

Thermodynamics: First and second law of thermodynamics; steam properties, steam processes at constant pressure, volume, enthalpy & entropy, Steam engines, hypothetical and actual indicator diagram; Carnot cycle and ideal efficiency; Otto and diesel cycles; working of two stroke & four stroke petrol & diesel IC engines.

Text Books

1. Raju K.V.B., Ravichandran P.T., Basics of Civil Engineering, Ayyappa Publications, Chennai, 2000.
2. Ramesh Babu, Civil Engineering, VRB Publishers, Chennai, 2000.



3. Kumar, T., Leenus Jesu Martin., and Murali, G., Basic Mechanical Engineering, Suma Publications, Chennai, 2007.
4. Prabhu, T. J., Jai Ganesh, V., Jebaraj, S., Basic Mechanical Engineering, Scitech Publications, Chennai, 2000.

Reference Books

1. Rangwala, S.C., Engineering Materials, Charotar Publishing House, Anand,
2. National Building Code of India, Part V, Building Materials, 2005
3. Surendra Singh, Building Materials, Vikas Publishing Company, New Delhi
4. Prabhu, T. J., Jai Ganesh, V., Jebaraj, S., Basic Mechanical Engineering, Scitech Publications, Chennai, 2000.
5. Palanichamy, M.S., Basic Civil & Mechanical Engineering, Tata McGraw-Hill, New Delhi 1991.
6. Nagpal G. R., Power Plant Engineering, Khanna Publisher, Delhi, 2004



Computer Science (BTMNE-0205)

Paper Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total	Practical		TW	Total		
		L	T	P	C	Max	Min			Max	Min		(h) =		
		(a)	(b)	(c)	(a+c)	(e)	(f)			(g)	(e+f)		(d+h)		
BTMNE - 0205	Computer Science	3	1	2	6	80	25	20	100	50	15	50	100	200	03 Hrs

UNIT – I

Marks: 16

PROGRAMMING FUNDAMENTALS

Computer Basics; Program Development Life Cycle: Flow Chart, Algorithm, Compilation and Execution; Introduction to C Language: program structure, variables, keywords, data types; Input / Output functions: scanf, printf; simple programs.

UNIT – II

Marks: 16

DECISION AND LOOP CONTROL STRUCTURE

Logical operators; Decision statements: if/else, switch/case statements; Loop control statements – For, while, do/while.

UNIT – III

Marks: 16

ARRAYS AND FUNCTIONS

Arrays: Introduction to arrays; One dimensional array: declaration, reading and printing array elements, sorting and searching. Functions: Definition; declaration of functions; return statement; recursion.

UNIT – IV

Marks: 16

INTRODUCTION TO OOP CONCEPTS

OOP concepts: classes and objects, encapsulation, inheritance, overloading, polymorphism, constructor and destructor, data hiding, simple program in C++.

UNIT – V

Marks: 16

INHERITANCE AND OVERLOADING

Inheritance – single, multiple, multilevel; overloading – Function overloading, Operator overloading.

Text Books

1. Kanetkar P.Yashwant, “Let us C”, BPB publications, 2002.
2. Ashok N.Kamthane, “Programming with ANSI and Turbo C”, Pearson Education, 2006.
3. Herbert Schildt, “The Complete Reference C++”, TataMcGrawHill, 2001, 3rd Edition.
4. Robert Lafore, “Object Oriented Programming in Microsoft C++”, the Waite Group, Galgotia Publications Pvt. Ltd., 2002.

Reference Books

1. Robert Lafore, “Object Oriented Programming in Microsoft C++”, the Waite Group, Galgotia Publications Pvt. Ltd., 2002.



List of Experiments

Note to the Instructors: Design exercise problems to demonstrate the use of C and C++ in the area of Specialization.

1. Programs to demonstrate the use of scanf() and printf() functions
2. Programs to evaluate arithmetic expressions
3. Programs using conditional statements
4. Programs using for, while , do...while
5. Programs on arrays
6. Programs to perform matrix addition and multiplication
7. Programs to implement functions
8. Programs to illustrate recursion
9. Program to create classes and objects using C++
10. Program to implement Constructor and Destructor in C++
11. Program to implement single inheritance in C++
12. Program to implement Function overloading in C++
13. Program to implement Operator overloading in C++



Engg. Graphics Lab (BTMNE-0206)

Paper Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total	Practical		TW	Total		
		L	T	P	C	Max	Min			Max	Min		(h) = (e+f)		
		(a)	(b)	(c)	(d) = (a+c)	(e)	(f)			(g)	(i) = (d+h)				
BTMNE - 0206	Engg. Graphics Lab	-	-	2	2	-	-	-	-	50	15	50	100	100	

UNIT – I

FUNDAMENTALS OF ENGINEERING GRAPHICS

Lettering, two dimensional geometrical constructions, conics, representation of three-dimensional objects – principles of projections – standard codes – projection of points.

UNIT – II

PROJECTION OF LINES AND SOLIDS

Projection of straight lines, projection of solids – auxiliary projections

UNIT – III

SECTIONS AND DEVELOPMENTS

Sections of solids and development of surfaces.

UNIT – IV

PICTORIAL PROJECTIONS

Conversion of projections: Orthographic projection, isometric projection of regular solids & combination of solids.

UNIT – V

BUILDING DRAWING

Building Drawing – plan, elevation and section of single storied residential (or) office building with flat RCC roof and brick masonry walls having not more than 3 rooms (planning / designing is not expected in this course).

Text Books

1. Jeyapoovan, T., Engineering drawing and Graphics using AutoCAD 2000, Vikas Publishing House Pvt Ltd, NewDelhi, 2005.
2. Narayanan, K.L & Kanniah, P., Engineering Graphics, Scitech Publications, Chennai, 1999.

Reference Books

1. Bhatt, N.D., Elementary Engineering Drawing (First Angle Projection), Charotar Publishing Co., Anand, 1999.
2. Venugopal, K. Engineering Drawing & Graphics, New Age international Pvt. Ltd., 2001.
3. Natarajan, K.V. Engineering Drawing & Graphics, Private Publication, Chennai, 1990.



Seminar/GD/Lang. Lab (BTMNE-0207)

Paper Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total	Practical		TW	Total		
		L	T	P	C	Max	Min			Max	Min		(h) = (e+f)		
		(a)	(b)	(c)	(d) = (a+c)	(e)	(f)	(g)	(e+f)	(d+h)					
BTMN E-0207	Seminar/GD/Lang. Lab	-	-	2	2	-	-	-	-	-	-	50	50	50	

UNIT – I

Marks:16:

Topics to be covered in the Language Lab Sessions:

Introduction session: Introduce oneself, Family background, Educational qualification, Hobbies and interest, Expertise, Experience (If any), Strength and weaknesses.

UNIT – II

Marks:16:

Body language: Importance of body language, Dressing sense, Walking sense, Talking and communication, Dining and eating sense.

UNIT – III

Marks:16

Telephonic etiquettes: How to receive calls, How to respond, How to make a call, Common expressions for calling.

PPTs presentations:

Improving speaking skills: Speech practices, Role plays (on stage), GD and Debate, Extempore speech, Word games, JAM (Just a minute) session, Describing objects and situations.

UNIT – IV

Marks:16

Reading skills: Improving reading skills, Paragraph reading, Storytelling and reading, Audio and video sessions.

UNIT – V

Marks:16

Writing skills: Paragraph writing, Word power/ vocabulary building, Article writing, Translations from Hindi to English and vice-versa.

Presentation skills: Oral presentations, on all the learning sessions. Seminar on given topics.



Project work-II (BTMNE-0208)

Paper Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total (d) = (a+c)	Practical		TW (g)	Total (h) = (e+f)		
		L	T	P	C	Max	Min			Max	Min				
						(a)	(b)			(c)	(e)			(f)	
BTMNE - 0208	Project work-II	-	-	4	4	-	-	-	-	-	-	50	50	50	

The

Objectives of the course 'Project work' are

1. To provide students with a comprehensive experience for applying the knowledge gained so far by studying various courses.
2. To develop an inquiring aptitude and build confidence among students by working on solutions of small industrial problems.
3. To give students an opportunity to do something creative and to assimilate real life work situation in institution.
4. To adapt students for latest developments and to handle independently new situations.
5. To develop good expressions power and presentation abilities in students.

The faculty and student should work according to following schedule:

- i) Each student undertakes substantial and individual project in an approved area of the subject and supervised by a member of staff.
- ii) The student must submit outline and action plan for the project execution (time schedule) and the same be approved by the concerned faculty.
- iii) At all the steps of the project, students must submit a written report of the same.



BTMNE-0301 - MATHEMATICS-III

Course Code	Title of Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
						Max (a)	Min (b)			Ma x (e)	Min (f)				
BTM NE-0301	Mathematics-III	3	1	-	4	80	25	20	100	-	-	-	-	100	3 hrs

UNIT I FOURIER SERIES: Euler's Formula, Functions having points of discontinuity, Change of interval, Even & Odd functions, Half range series, Harmonic analysis.

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

UNIT- III PARTIAL DIFFERENTIAL EQUATION: Formation, Solution by direct integration method, Linear equation of first order, Homogeneous linear equation with constant coefficients, Non-homogeneous linear equations, Method of separation of variables.

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

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

Text Books:

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

Reference Books:

1. Advanced Engg. Mathematics by R.K. Jain and S.R.K. Iyengar – Narosa Publishing House.
2. Applied Mathematics by P.N. Wartikar & J.N. Wartikar. Vol- II– Pune Vidyarthi Grih Prakashan, Pune
3. Applied Mathematics for Engineers & Physicists by Louis A. Pipes- TMH.



BTMNE-0302 INTRODUCTION TO MINING

Course Code	Title of Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTMN E-0302	Introduction to mining	3	1	-	4	80	25	20	100	-	-	-	-	100	3 hrs

UNIT 1:

Marks: 16

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

UNIT 2:

Marks: 16

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

UNIT 3:

Marks: 16

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

UNIT 4:

Marks: 16

Introduction to Underground Mining Definition of important terms, Mine development, Activities involved in development of a mine, Stages in the life of a mine, Introduction to unit operations in underground mining. Choice of method of mining, Introduction to various Underground Mining methods Introduction to various types of machineries used in Underground mining.

UNIT 5:

Marks: 16

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



Swami Vivekanand University, Sagar(M.P.)



RECOMMENDED 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
4. Mining of Mineral Deposits: Shevyakov
5. Modern Coal Mining: Samir Das
6. Coal Mining: R.D.Singh
7. Mining: Boki



BTMNE-0303 Basic Electrical Engineering

Course Code	Title of Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTMN E-0303	Basic Electrical Engg.	3	1	2	6	80	25	20	100	50	17	50	100	200	3 hrs

UNIT- I POLYPHASE CIRCUITS: Power measurement by single and two wattmeter methods, power factor correction by simple methods, star and delta networks, D.C. two wire & three wire system, A.C. three wire & four wire system. Types of cables, Underground distribution schemes, Electrical Signaling in mines.

UNIT-II TRANSFORMERS: Construction, principle of operation, equivalent circuits, phasor diagram, regulation and losses and efficiency, Open circuit and short circuit tests. Auto transformers and introduction to three phase transformers.

UNIT- III D.C. MACHINES: Construction, principle of operation and characteristics of D.C. Generators, losses and efficiency, Types of D.C. Motors and their characteristics, starters, speed control and industrial applications. Choice of motors for specific and based on characteristics of loads and motors.

UNIT-IV A.C. MACHINES: General principles and construction of alternators, induction motors and synchronous motors, induction motors types, equivalent circuits, torque slip characteristics, starting and speed control, synchronous condenser, use of synchronous and induction motors for rope haulage, locomotive, conveyors, winders, pumps, fan compressors etc, Electric Braking – types, sequence control, various motors enclosures.

UNIT-V TRANSMISSION AND DISTRIBUTORS OF POWERS IN MINES: D.C. two wire and three wire system, A.C. three wire and four wire system, Types of cable, Underground distribution schemes, Electrical signaling in Mines. Switch Gear and Protection: Elementary idea of air break, switches, air break and oil break, circuit breakers, over current, earth fault protection, intrinsically safe apparatus, simplified connection diagram A.C. switch board. Switch gear for coal face machinery



Swami Vivekanand University, Sagar(M.P.)



Text Books:

1. Electrical equipment in Mines by H.Cotton .
2. Electrical Machines by Smarajit Ghosh, Pearson Education
3. Performance & Design of A.C. Machines by M.G. Say, C.B.S. Publishers

Reference Books: 1. Performance & Design of D.C. Machines by A.E. Clayton & Hancock, C.B.S. Pbs.

2. Electric Machines by Nagrath & Kothari, TMH Pbs.
3. Electrical Technology – S.L.Uppal, Khanna Publication
4. Electrical Measurement – J.B. Gupta, Dhanpat Rai & So



Swami Vivekanand University, Sagar(M.P.)



List of experiments:

1. Verification of Kirchhoff's Law
2. To Measure Voltage Current and power in single phase AC circuit.
3. To calculate Impedance, power and power factor by measuring voltage across each element and current to the circuit for a given RLC series circuit.
4. Study of different parts of DC machine.
5. Study of three point starter for DC motor.
6. To determine transformation ratio of a given single phase transformer.
7. Study and operation of DOL and Star Delta Starter.
8. to measure slip for a given three phase induction motor.
9. To measure insulation resistance by Megger.
- 10 To measure earth resistance by earth tester



BTMNE- 304 MINING GEOLOGY – I

Course Code	Title of Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTMN E- 304	Mining Geology – I	3	1	2	6	80	25	20	100	50	17	50	100	200	3 hrs

UNIT 1:

Marks-16

The Earth in Space and Time

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

UNIT 2:

Marks-16

Mineralogy

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

UNIT 3:

Marks-16

Igneous and Metamorphic Petrology

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

UNIT 4:

Marks-16

Sedimentary Petrology

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

UNIT 5:

Marks-16

Structural Geology

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



Swami Vivekanand University, Sagar(M.P.)



RECOMMENDED BOOKS:

- a. Engineering And General Geology : Parbin Singh
- b. Physical And Engineering Geology : S.K. Garg
- c. Rutley's Elements of Mineralogy : H.H.Read
- d. Principles Of Petrology : G.W.Tyrell
- e. Structural Geology : M.P.Billings
- f. Geological Maps : G.W.Chiplonkar
- g. A Text Book of Geology : P.K. Mukherjee
- h. Applied Geology : S. Banger

List of Experiment (Expandable):-

- 1. Megascopic Description of Rock Forming Minerals.
- 2. Megascopic Description of important Igneous, Sedimentary, Metamorphic Rocks.
- 3. Basic Concept of Contours, Attitude of Beds, Width of Outcrop, True and Apparent Dips.
- 4. Study of Geological Maps and Preparation of Cross Sections.



BTMNE- 305 MINING SURVEYING – I

Course Code	Title of Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTMN E- 305	Surveying – I	3	1	2	6	80	25	20	100	50	17	50	100	200	3hrs

UNIT 1: Chain Survey

Marks-16

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

UNIT 2: Compass Survey

Marks-16

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

UNIT 3: Plane Table Surveying

Marks-16

Principles of Plane Tabling; Working operations; Methods of Plane Table Surveying; Two and Three point problems.

UNIT 4: Dial Surveying

Marks-16

Construction; Use; Tests and Adjustments; Loose and fast Needle surveying; Common Sources of errors in Dial surveying; Methods of elimination and compensation.

UNIT 5: Leveling

Marks-16

Definitions of important terms used in leveling; Development in leveling Instruments; Types and Constructional details; Temporary and Permanent Adjustments; Methods of leveling; Straight edge leveling; Fly leveling; Check leveling; Reciprocal leveling; Longitudinal Sections; Cross- Sectioning; Trigonometric leveling; Methods of booking and reduction of levels; Leveling through drifts and shafts (Including steeply inclined shafts) ; Plumbing measurements of depth of shaft and subsidence.



Text Book:

1. Metalliferous Mine Surveying: Frederick Winniberg
2. Surveying and levelling: Kanetkar and Deshpande

References:

- a. Surveying Vol. I by B.C. Punmia & Ashok Jain
- b. Surveying Vol. II by B.C. Punmia & Ashok Jain
- c. Surveying Vol. I by S.K. Duggal
- d. Surveying Vol II by S.K. Duggal

List of Experiment:-

Experiment 1.

- (a) Ranging a line.
- (c) Chaining a line and recording in the field book.
- (d) Testing and adjustment of chain.

Experiment 2.

- (a) Chaining of a line involving reciprocal ranging
- (b) Taking offsets and setting out right angles with cross staff and Indian optical square.

Experiment 3. Chain survey of a small area.

Experiment 4. Chaining a line involving obstacles in ranging.

Experiment 5.

- (a) Setting the compass and taking observations.
- (b) Measuring angle between the lines meeting at a point by prismatic compass.

Experiment 6

Traversing with the prismatic compass and chain of a closed traverse. (Recording and plotting by included angles).

Experiment 7 Traversing with the prismatic compass and chain of a closed and open traverse. (Recording and Plotting by deflection angles).

Experiment 8

Determination of local attraction at a station by taking fore and back bearing.

Experiment 9

To find true bearing of a line at a place.

Experiment 10

To find difference of level between two distant points by taking staff reading on different Stations from the single setting.

Experiment 11 to find difference of level between two points by taking at least four change points.

Experiment 12. Longitudinal sectioning of a road.



Swami Vivekanand University, Sagar(M.P.)



BTMNE-306 SEMINAR / GROUP DISCUSSION (INTERNAL ASSESSMENT)

Course Code	Title of Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTMN E-307	Seminar / Group Discussion	-	-	2	2	-	-	-	-	50	17	-	50	50	3 hrs

Objective of GD and seminar is to improve the MASS COMMUNICATION and CONVINCING/Understanding skills of students and it is to give student an opportunity to exercise their rights to express themselves.

Evaluation will be done by assigned faculty based on group discussion and power point Presentation.



BTMNE-0401 Mechanics of Solids & Fluid

Course Code	Title of Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTMN E-301	Mechanics of Solids & Fluid	3	1	-	4	80	25	20	100	-	-	-	-	100	3 hrs

UNIT- I

Marks: 16

Concept of Stress and Strain

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

UNIT II

Marks: 16

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

Marks: 16

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

UNIT IV

Marks: 16

Introduction to Fluid Mechanics- Physical properties of fluids; Compressible and Incompressible fluids; Newtonian and Non-Newtonian fluids.

Fluid Statics - Pressure, density and height relationships; manometer pressure on curved and plane surfaces; Centre of Pressure; Buoyancy; Stability of Immersed and Floating bodies; Fluids in relative equilibrium

UNIT V

Marks: 16

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



Swami Vivekanand University, Sagar(M.P.)



RECOMMENDED BOOKS:

Strength of Material – Dr. Sadhu Singh – Khanna Publishers
Elements of Strength of Material – Timo Shenko & Young – EWP Press
Strength of Material – R.K. Rajput – Dhanpat Rai & Sons
Fluid Mechanics and Machines – Dr. A.K. Jain (Khanna Publications)
Fluid Mechanics and Machines – Dr. R.K. Bansal (Laxmi Publications)



BTMNE -402 Underground Coal Mining

Course Code	Title of Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTMN E-505	Underground Coal Mining	3	1	2	6	80	25	20	100	50	17	50	100	200	3 hrs

UNIT: 1

MARKS: 16

INTRODUCTION: Origin Of Coal, Theories Of Coal Formation, Classification Of Coal, Coaking Coal, Coal Seam and its Classification, Coal Seam Structures and Abnormalities like Faults, Joints, Cleats, Folds etc., Coal Measuring Rocks and Their Characteristics, Distribution Of Coal in India, Indian Coal Mining Industry; Choice Of Coal Mining Methods.

UNIT: 2

MARKS: 16

BOARD AND PILLAR METHOD: Important Terminology, Development Size and Shape Of The Pillar, Galleries, Panel System and Without Panel System Of Development, Size Of Panel, Cycle Of Operation, Depillaring, Problems in Depillaring, Preparatory Arrangements, Depillaring by Stowing, Depillaring by Caving Methods, Pillar Extraction Techniques, Dangers Associated With Depillaring

UNIT: 3

MARKS: 16

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 and Material Supply.

UNIT: 4

MARKS: 16

THICK SEAM MINING: Problem in Mining Of Thick Seams, Choice Of Thick Seam Mining Methods, Inclined Slicing, Horizontal Slicing, Diagonal Slicing, Transverse Slicing, Sublevel Caving, Blasting Gallery Method, Cable-Bolting Method Of Thick Seam Extraction

UNIT: 5

MARKS: 16

ROOM AND PILLAR MINING: Vermelles Method, Slant Method, Sublevel Method, Coal Saw Method, Mining Of Contiguous Seams, Mining Of Steeply Inclined Seam, Mining Under Water, Mining of Seams Prone to Spontaneous Heating, Bumps, Air Blast etc.



Swami Vivekanand University, Sagar(M.P.)



RECOMMENDED BOOKS:

Text Books:

1. Elements of Mining Technology (Vol. 1 & 3): D. J. Deshmukh
2. Coal Mining: R.D.Singh
3. Modern Coal Mining: Samir Das

Reference Books:

1. Mining Engineer's Handbook (Vol. 1&2), 2nd Edition: Edited by Harold Hartman
2. Introduction to mining: Hartman

Laboratory

List of Experiments:

1. Study of layouts of Board and Pillar development working by without panel system.
2. Study of layouts of Board and Pillar development working by panel system.
3. Study of layout of Longwall Advancing system.
4. Study of layout of Longwall Retreating system.
5. Study of various line of extraction used for pillar extraction.
6. Study of stook extraction method under difficult roof conditions.
7. Study of surface arrangement required for stowing.
8. Study of sublevel caving method of thick seam mining.
9. Study of layout of blasting gallery method.
10. Study of layout of Double Unit Longwall Faces.



BTMNE- 403 Engineering Materials

Course Code	Title of Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTMN E- 403	Engineering Materials	3	1	-	4	80	25	20	100	-	-	-	-	100	3 hrs

UNIT 1 General: Introduction, Classification of Engg. Materials, Structure of Metals and Alloys, Iron-carbon phase diagram.

UNIT 2: 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 3: Wire Rope: Types and Construction, Wire Rope Lays, Non- Stranded Ropes, Selection Of Wire Ropes, Ropes Used For Different Purpose, Mass & Strength Of Wire Ropes.

UNIT 4: Construction Materials: Cements – Classification & Properties, Quick Setting Cement, R.C.C., Shot creating, Brick & Stone Masonries, and Application of Fly Ash in Mining.

UNIT 5: Engineering Behavior of Some Materials: stress-strain Curves Of typical Engg. Materials, Elastic and Plastic Deformation, Fracture, Fatigue and Creep.

RECOMMENDED BOOKS:

1. Engineering Physical Metallurgy – Lakhtin – CBS Publishers & Distributors
2. D. J. Deshmukh, Elements of mining technology, Vol. 3, Vidyasewa, 3rd ed, 1989.
3. A Text Book of Material Science & Metallurgy – O.P. Khanna – Dhanpat Rai & Sons



BTMNE- 404 MINING GEOLOGY –II

Course Code	Title of Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTMN E- 404	Mining Geology –II	3	1	2	6	80	25	20	100	50	17	50	100	200	3 hrs

UNIT 1:

Marks 16

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 Paleontological Groups of Animals and Plants; Brief Paleontological Study of Gondwana Fields.

UNIT 2:

Marks 16

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

UNIT 3:

Marks 16

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 4:

Marks 16

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 5:

Marks 16

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.



Swami Vivekanand University, Sagar(M.P.)



RECOMMENDED BOOKS:

1. Fundamentals of Historical Geology and Stratigraphy of India: Ravindra Kumar
2. Geology of India and Burma: M.S. Krishnan
3. Economic Mineral Deposit :M.L.Jensen & A. Batman
3. Fundamentals of Historical Geology and Stratigraphy of India: Ravindra Kumar
4. Geology Of India and Burma :M.S. Krishnan
3. Economic Mineral Deposit :M.L.Jensen&A.Batman
5. India's Mineral Resources :S. Krishnaswamy
6. Geophysical Prospecting :M.Dorbin& B. Mille

7. Mining Geology -II Lab.

- A. Megascopic Description and Distribution of Ore Forming Minerals and Industrial Minerals.
- B. Study of Plant Fossils.
- C. Study of Advance Geological Maps and Preparation of Cross Sections



BTMNE- 405 MINING MACHINERY –I

Course Code	Title of Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTMN E- 405	Mining Machinery –II	3	1	2	6	80	25	20	100	50	17	50	100	200	3 hrs

UNIT 1:

Marks 16

Arial ropeways Different types, their constructions & installation, operation & maintenance, design calculation, their layout including rope-tensioning arrangements.

UNIT 2:

Marks 16

Conveyors Different types of belt conveyors, their construction, installation, maintenance & design calculations.

UNIT 3:

Marks 16

Shaker conveyor, scraper chain conveyor and armored chain conveyor, their installation & construction maintenance. Safety Devices; Pit top and pit bottom arrangements.

UNIT 4:

Marks 16

Skip & Koepe Winding Skip types & Construction, pit top & pit bottom arrangements, advantages and disadvantages Types of rope Winder, Koepe wheel, floating platforms, two winders working in the same shaft, winding with side by side and up and down sheaves, advantages and disadvantages. Multi rope winding. Calculation of H.P

UNIT 5:

Marks 16

Hydraulic transmissions Fundamental of hydrostatic compression, hydraulic fluids, hydraulic pumps, motors, cylinders and accumulators, different types of valves, hydraulic coupling and torque converters, Application in mines, Advantages of hydraulic transmission.



Swami Vivekanand University, Sagar(M.P.)



RECOMMENDED BOOKS:

1. Elements of Mining Tech. Vol I & Vol III by D. J. Deshmukh
2. Mining Machinery By S. C. Walker 3. Coal Mining Practice By Statham

List of Experiments to be performed:

1. Study of Monocable aerial Ropeway.
2. Study of Bicable aerial Ropeway.
3. Study of Loop take-up and tensioning arrangement of a belt conveyor.
4. Study of pit top and pit bottom arrangements for a belt conveyor.
5. Study of Belt Conveyor
6. Study of an Armoured face Conveyor.
7. Study of Various Koepe Arrangements
8. Study of various types of skips.
9. Study of pit top and pit bottom arrangements for a Skip.
10. Study of hydraulic Couplings and Torque Converters.



BTMNE- 406 TOUR REPORT & VIVA-VOCE

Course Code	Title of Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTMN E- 406	Tour Report & Viva-Voce	-	-	2	2	-	-	-	-	50	17	50	100	100	3 hrs

Course Objective:

Whatever may be the research and developments in Rock Mechanics, the behaviour of rock is less predictable accurately. Mining Engineering is hence said to be an art more than engineering and the knowledge gained through experience is more valuable.

Instructional Objective:

The training enables the students to experience with the practical applications of the theoretical learning. The outcome at the place of work is always much more than what can be learned in the class room.

Teaching Scheme:

The industrial training phase I will be organized during summer vacation after IV semester examinations for a minimum duration of four weeks. The class shall be divided into batches of 4 or 5 students and sent to pre-determined mines from where the permissions are obtained. Students may camp at the mines or elsewhere and undergo training as per the direction of mine management. Notional teaching scheme: 4 hrs /week Practical for guidance of students.

Essential Contents of Tour Report:

- Name of the mine along with names of owner, agent, manager and other senior officials.
- Location and a brief history of the mine.
- Brief geological description along with characteristics of the ore and its marketing scenario.
- The surface features including mine entries, loading & transport arrangement of ore, disposal of waste, ore beneficiation.
- Method of working including strata control in underground mines and dump management in opencast mines.
- Sampling, survey, training and rescue sections.
- Acknowledgements.



BTMNE-0407 SELF STUDY (INTERNAL ASSESSMENT)

Course Code	Title of Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTMN E- 407	Self-Study (Internal Assessment)	-	-	2	2	-	-	-	-	-	-	50	50	50	

Objective of Self Study: is to induce the student to explore and read technical aspects of his Area of interest / hobby or new topics suggested by faculty.



BTMNE-0408 SEMINAR / GROUP DISCUSSION (INTERNAL ASSESSMENT)

Course Code	Title of Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTMN E- 408	Seminar / Group Discussion (Internal Assessment)	-	-	2	2	-	-	-	-	-	-	50	50	50	

Objective of GD and seminar is to improve the MASS COMMUNICATION and CONVINCING/ Understanding skills of students and it is to give student an opportunity to exercise their rights to express themselves.

Evaluation will be done by assigned faculty based on group discussion and power point Presentation.



BTMNE- 501 MINING MACHINERY -II

Course Code	Title of Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTMN E-501	Mining Machinery -II	3	1	2	6	80	25	20	100	50	17	50	100	200	3 hrs

UNIT I

Marks 16

Winding: Shaft fittings and head gear design.

Winding System: Different types, Mechanical and electrical braking, Ward Leonard control, Automatic winding. Winding drums: Types, their construction and duty cycles, Detaching hooks, Cages, Skips and suspension gear, Rigid and rope guides, Methods of counter balancing loads, Multi rope winding, Winding from different horizons, Design calculation for different types of winding system, Safety devices, Signaling Safety regulations different signaling system in mines.

UNIT II

Marks 16

Mineral Handling : Layouts of pit-top and pit-bottom, Details of banking, Mineral handling and screening equipments, Creepers, Tipplers, Layouts of railways siding of mines.

UNIT III

Marks 16

Mechanics of Coal Cutting: Workability of Coal, Efficiency of coal cutting equipments, Design of equipments, Selection and application of machinery.

UNIT IV

Marks 16

Face Loaders for Coal Mines: Construction features, Principal types, Choice of loaders, Operation and maintenance, Layout of faces for working with power loaders under varied condition.

UNIT V

Marks 16

Cutter Loaders: Coal Ploughs and continuous Miners: Principles of operation, construction features, their suitability, their choice, operation and maintenance.

RECOMMENDED BOOKS:

1. Elements of Mining Technology (Vol- II), D.J.Deshmukh.
2. Advance coal mining Tech., Samir Kumar Das.



BTMNE -502 SURFACE MINE PRODUCTION

Course Code	Title of Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTMN E-502	Surface Mine Production	3	1	-	4	80	25	20	100	-	-	-	-	100	3 hrs

UNIT I

Marks 16

Surface Mining: General information, Basic definition, Surface mining, Quarrying strip mining, open pit mining, open cast mining, Terms: Advantages and disadvantages. Determination of main parameters, Major dimensions, Heights and widths and benches, Slop angles, Opening up of mines by surface methods, driving of ingoing trenches, Laying of communication routes, System of disposal of overburden, Removal of cover rocks, Factors influencing selection and characteristics of opencast work.

UNIT II

Marks 16

General surface mining method, Basis layouts, Choice of mining method. Major operations in surface mining. Ground Preparation: Bull dozing, Scrapping, Grading, and Ripping.

UNIT III

Marks 16

Drilling: Criteria for selection and performance of different types of drilling equipments, drilling patterns: Inclined drilling, Blasting: Explosives, Multi row blasting, Twin bench blasting: Coyote blasting, Secondary blasting, Overcastting by explosives.

UNIT IV

Marks 16

Excavation and Loading: Factors influencing choice of excavating and loading machines, their performance in different condition of ground, Power shovel, Dragline, BWE, BCE, Front end loaders, Backhoes, Surface miner, Transport: Comparative study of different transport system in Opencast mines, Factors influencing choice of a system, Optimization of load haul system, Dumpers, Coal haulers, Belt conveyer, Pipe line transportation.

UNIT V

Marks 16

Storage: Stock piling and re handling, Spreaders, Re claimers, Reclamation: Planning methods of reclamation for different types of opencast mines, Drainage: Sources of water assessment of drainage requirements drainage patterns, Slope Stability: Factors influencing stability of slopes, Mechanics of slope failures, Stability analysis, Methods of improving stability of slopes, Protection and monitoring, Influence of pit slope on mine economics.



Swami Vivekanand University, Sagar(M.P.)



RECOMMENDED BOOKS:

- a. Elements of Mining Tech. (Vol- I), D. J. Deshmukh.
- b. Surface Mining Technology, Samir Kumar Das.
- c. Elements of Mining Tech. (Vol- I), D. J. Deshmukh.
- d. -Surface Mining Technology, Samir Kumar Das.
- e. Heavy Earth Moving Machines, Amitosh de. U M S



BTMNE – 503 Mine Legislation – I

Course Code	Title of Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTMN E-503	Mine Legislation – I	3	1	-	4	80	25	20	100	-	-	-	-	100	3 hrs

UNIT I

Marks 16

General Principles of Mining Law, Development of mining legislation in India

UNIT II

Marks 16

Mines Act – 1952 & Mines Rules – 1956

UNIT III

Marks 16

Coal Mines Regulations –1957 & Metalliferous Mines Regulation-1961

UNIT IV

Marks 16

Mine crèche Rules

UNIT V

Marks 16

Mine Vocational- training Rules

Text books:

1 Legislation in Indian Mines (A critical Appraisal) Vol. II & I by S. D. Prasad & Prof. Rakesh

2 CMR-1957 & MMR-1961 by L. C. Kaku.

3 Mines Act-1952 & Mines Rules-1955 by L. C. Kaku.

4 Vocational Training Rules by L. C. Kaku.

5 Mine Accidents by S. J. Kejeriwal



BTMNE- 504 Mining Surveying-II

Course Code	Title of Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		T W (g)	Total (h= e+g)		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTM NE-402	Surveying-II	3	1	2	6	80	25	20	100	50	17	50	100	200	3 hrs

UNIT 1:

Marks 16

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

UNIT 2:

Marks 16

Tacheometry Principles of Stadia Methods; Determination of constants; Theory of anallactic lens; Distance and elevation formulae Subtense and Tangential Methods; Reduction of stadia Notes; Beam and stadia bar; Auto-reduction Tacheometer.

UNIT 3:

Marks 16

Setting Out Setting out simple curves on surface and in underground; Elementary knowledge of compound and transition curves; joint boundary survey; Equalization of boundaries; Maintenance of direction and gradient of roadways i.e. marking and checking of center line and grade line, transfer of point from roof to floor and floor to roof.

UNIT 4:

Marks 16

Errors & Problems Computation of areas and volumes; Earthwork calculation; Problems based on Co-ordinates, faults, Dip-Strike and boreholes; Sources, classification and relative importance of errors, their prevention and elimination, theory of errors, adjustment of errors.

UNIT 5:

Marks 16

Plans & Sections General requirements of mine plans; types of plans; Symbols used in mine plans; preparation of plans & sections; Plotting of traverse; Checking accuracy of old mine plans; Planimeter and its uses; Enlargement & reduction of plans. Mines Regulations concerning above topics.



Swami Vivekanand University, Sagar(M.P.)



RECOMMENDED BOOKS:

1. Mine surveying by S. Ghatak
2. Surveying & Levelling by B. C. Punamia
3. Surveying & Levelling by Kanetkar & Kulkarni
4. Surveying & leveling by C.L. Kocher
5. Surveying & Levelling by B. C. Punamia

LIST OF EXPERIMENTS:-

1. Study of Venire Theodolites
2. Angle measurement by repetition methods.
3. Angle measurement by reiteration methods.
4. Measurement of height of accessible and inaccessible point by trigonometric surveying.
5. Determination of stadia constant.
6. Distance and elevation determination by tachometric surveying.
7. Setting out of circular curve by chord and offset method.
8. Setting out of circular curve by Rankine's method.
9. Study of planimeter.
10. Study of Pantograph /Eidograph.



BTMNE-0505 Under Ground Metal Mining

Course Code	Title of Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTMN E-0702	Under Ground Metal Mining	3	1	2	6	80	25	20	100	50	17	50	100	200	3 hrs

UNIT-I General:

Marks 16

Status and scope of Underground metal mining methods; various types of ore deposit; Definitions of Important terms used in underground metal mining methods. Comparison between coal mining & metal Mining

UNIT-II Development:

Marks 16

Mode of access; Variables affecting the choice of mode of access; Crosscuts, Levels, Raises; Their Method of drivages with the description of various unit operations; Introduction to Raise boring and Introduction to tunnel boring.

UNIT-III Stopping Methods – I:

Marks 16

Classification of mining methods; Factors affecting the choice of mining methods; Overhand, Underhand and Breast stopping methods; Open stopping; Vertical Crater Retreat method; Sub level stopping ;Room and Pillar method.

UNIT-IV

Marks 16

Stopping Methods – II:

Shrinkage stopping method; Cut and fill stopping method, Introduction to Square set stopping method, Sub Level caving, Block caving, & Top slicing method.

UNIT V Support Systems:

Marks 16

Pillars; Back fill, Cable bolting, Steel Rock bolts, Grouting, Shotcreting etc., code of timbering rules.

RECOMMENDED BOOKS:

1. Elements of Mining Tech. Vol II by D. J. Deshmukh
2. S M E Handbook



BTMNE-0601 Blasting Engineering

Cour se Code	Title of Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTM NE- 0604	Mine Health & Safety	3	1	2	6	80	25	20	100	-	-	-	100	200	3 hrs

UNIT I COMMERCIAL EXPLOSIVES

Type of explosives, Various Commercial Explosives and their properties, Bulk Explosive Systems, Selection of explosive. Testing, Transportation and Handling of explosives. Related regulations.

UNIT II INITIATION SYSTEM & BLASTING ACCESSORIES

Various types of Exploder and Detonators. Detonating cord, Safety fuse, Detonating relays Non electric initiation and blasting accessories

UNIT III SURFACE BLAST DESIGN

Factors affecting blast design, Selection of various blast parameters Burden, Spacing, Stemming distance, Sub-grade drilling, Depth of hole, Bench height, Diameter of hole, Safe charge calculation, Deck Charging, Drilling patterns, Inclined hole drilling, Secondary blasting.

UNIT IV UNDERGROUND BLAST DESIGN

Various cut patterns, U/G blast design, Series & Parallel connection of detonators, Precautions during blasting,

UNIT V ROCK BREAKAGE MECHANISM

Breakage mechanism, rock fragmentation, Factors affecting rock fragmentation. Adverse effects of Blasting: Back break, over break, Fly rock, Ground Vibration and Noise, Controlled Blasting Techniques and other remedies to the blasting nuisances.

References:

1. Explosives and Blasting Technology: G. K. Pradhan
2. Surface Blast Design: C. J. Konya
3. Rock Blasting: Sushil Bhandari
4. Indian Explosive Act 1884
5. Legislation in Indian Mines –A Critical Appraisal: Rakesh and Prasad



BTMNE 0602 Mine Health & Safety

Cour se Code	Title of Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTM NE- 0604	Mine Health & Safety	3	1	-	4	80	25	20	100	-	-	-	-	100	3 hrs

UNIT I

MARKS: 16

MINE DUST

Classification, physiological effects, measurement of dust concentration, dynamics of small particles, Sampling of air borne dust, duration and interval of sampling, different method of sampling, prevention and suppression of dust, Air cleaning methods, design of enclosures for conveyor, transfer points etc.

UNIT II

MARKS: 16

MINE ILLUMINATION

Types of portable lamps, their maintenance and examination, lamp room design and Organization, Percentage and Accumulation test, light from mains, photometry and Illumination survey, standards of Illumination for underground and opencast Workings.

UNIT III

MARKS: 16

HEALTH AND MINE OCCUPATIONAL DISEASES

Health of Mine employee, first aid and ambulance, comfort condition. Various mine occupational diseases, Their causes, nature and preventive measures. Rules related with this topic.

UNIT IV

MARKS: 16

MINE ACCIDENTS

Accident and its classification, various causes of mine accidents in opencast mine and Underground mine, Preventive measure to control these accidents, relation between accident and efficiency, cost of accident: Direct and indirect cost. Various major accidents occurred in Indian coal mines.

UNIT V

MARKS: 16

ACCIDENT ENQUIRY

Notice of accident, criteria for preparation of enquiry report, preparation of accident enquiry reports.ie. Roof fall, coal dust, explosion, fire damp explosion, fire, inundation and open cast mine accidents



BTMNE -0603 MINE HAZARDS

Course Code	Title of Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTMN E-0603	Mine Hazards	3	1	2	6	80	25	20	100	50	17	50	100	200	3 hrs

UNIT I

MARKS:16

Mine fires and spontaneous combustion: Surface fires, its effects; causes and prevention; underground fires: Spontaneous combustion; its causes, detection and preventive measures.

UNIT II

MARKS:16

Accidental fires causes and prevention. Physical and chemical characteristics of coal liable to spontaneous heating, Detection by practical and scientific method, preventive measures and dealing with underground fires.

UNIT III

MARKS:16

Study of atmosphere behind sealed off area, factors of conditions for reopening: Different method of reopening, difficulties, dangers and safety measures various mean for fires fighting. Fire fighting organization.

UNIT IV

MARKS:16

Dust in mines: Dangers, formation, prevention and suppression. Dust sampling apparatus, their construction and applications.

UNIT V

Mine Inundation: Causes and precautionary measures, bulk head doors, barriers, dams, precautions to be taken while approaching old workings, recovery of flooded mines and de watering of old workings.

Text Books:

1. Mine Env. By G.B. Mishra
2. Elements of Mining Tech. Vol.2 by D. J. Deshmukh
3. U/G Mine Env. by Mcpherson
4. Mine fires by Dr. Ramlu



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List of Practical to be performed

1. Study of erection of sand bag fire stopping
2. Study of working of soda acid fire extinguishers.
3. Study of working of foam extinguishers.
4. Study of erection of German type stone dust barriers
5. Study of erection of Polish type stone dust barriers
6. Study of erection of Double brick fire stopping
7. Study of principle and working of self contained breathing apparatus Dragger 174-A
8. Study of principle and working of Aero lox Liquid oxygen apparatus.
9. Study of principle and working of self rescuers.
10. Study of various types of water dam constructed in U/G mines



BTMNE -0604 SUB-SURFACE ENVIRONMENT

Course Code	Title of Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTMN E-0602	Sub-Surface Environment	3	1	2	6	80	25	20	100	50	17	50	100	200	3 hrs

UNIT I

MARKS:16

Mine Gases: Mine atmosphere its composition, Pollution of mine, air-mine gases, toxicity of gases. Origin, occurrence, physical, chemical and physiological properties of various gases and their detection. Heat and Humidity in Mines : Rock temperature geothermic gradient auto-compression, Humidity, its determination and effects. Metabolism and respiration. Climate conditions, Kata thermometer assessment of comfort conditions. Control of temperature and humidity in deep mines. Air conditioning in mines.

UNIT II

MARKS:16

Ventilation: Necessity and standard for ventilation, Flow of air in ducts and mine roadways, resistance of airways. Law of ventilation: Chezy's and Atkinson's equation. Equivalent resistance of mines, equivalent orifice, mine characteristics.

UNIT III

MARKS:16

Natural ventilation and its measurement, Thermodynamics of ventilation and determination of pressure volume diagram, Mine fans, principal types, their construction and working, characteristics and suitability; booster and auxiliary fans, venturi and air jets. Installation of fans, air locking arrangement, design of evasee, parallel and series operations of mines fans.

UNIT IV

MARKS:16

Coursing, distribution and regulation of air current and splitting in underground working; Ventilation of deal ends. System of Ventilation; Forcing and exhausting, ascensional and descensional, homotropical and ntiropal ventilation.

UNIT V

MARKS:16

Measurement of air flow and pressure ventilation survey, ventilation Calculation concerning to fans and ventilation of mines, Network problems.

RECOMMENDED BOOKS:

1. Elements of Mining Technology – Vol. II
2. Mine Ventilation – G.B.Mishra
3. U.M.S.



Swami Vivekanand University, Sagar(M.P.)



List of Experiments to be performed:

1. Study of gravimetric dust sampler
2. Study of thermal precipitator dust sampler
3. Study of konimeter / simslin dust sampler
4. Study of portable lamps.
5. Study of lamp room design.
6. Measurement of methane percentage
7. Study of various occupational diseases
8. Study of enquiry report related with inundation of any mine
9. Study of enquiry report related with fire damp explosion of any mine
10. Study of enquiry report related with roof fall / other accident of any mine



Swami Vivekanand University, Sagar(M.P.)





Swami Vivekanand University, Sagar(M.P.)



BTMNE -0605 Mine Legislation – II

Course Code	Title of Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTMN E-0604	Mine Legislation – II	3	1	2	4	80	25	20	100	-	-	-	-	100	3 hrs

UNIT I

MARKS:16

Principal Provisions of Mines & Minerals (Regulation & Development) Act, Coal Mines Conservation & Development Act.

UNIT II

MARKS:16

Mineral Concession Rules, Indian Electricity Rules related to mining activity.

UNIT III

MARKS:16

Byelaws & D.G.M.S. Circulars.

UNIT IV

MARKS:16

Mines Rescue Rules, Mines Vocational Training Rules

UNIT V

MARKS:16

Safety Campaign, Safety Week in Mines

RECOMMENDED BOOKS:

1. Surface Mining Technology – S.K.Das
2. Computer Graphics – K.H.Vandara
3. Auto CAD 2008 – Tymotheny, Sean Sykes
4. Data Base Management System – Ravi Jasuja



BTMNE-0701MINE PLANNING

Course Code	Title of Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTMN E-0701	Mine planning	3	1	-	4	80	25	20	100	-	-	-	-	100	3 hrs

UNIT-I

Marks 16

Introduction: Mine planning and its components, role of planning in mining ventures; technical information for mine planning, reserve estimation

UNIT-II

Marks 16

Mineral inventory and ore reserves, the basis difference cutoff grade, its determination. Grade Tonnage curves and their computation

UNIT-III

Marks 16

Surface Mine Planning: Bench geometry and mine layouts, planning steps; determination of mine size and Taylor's mine life rule; ultimate pit configuration; mining program; haul road design

UNIT-IV

Marks 16

Underground Mine Planning: Mining system and sub-systems; optimal geometrical size of a mine; planning and scheduling of production. Determination of optimum Size of mine, life of mine, rate of production and mining losses, Optimization of mine design on economic considerations.

UNIT-V

Marks 16

Feasibility study: Its functions and preparation of feasibility report for metallic and nonmetallic minerals Details Project Repot

RECOMMENDED BOOKS:

1. An Introduction to Mineral Economics- Kaulir Kisor Chatterjee
2. Mine Economics- Arvind Kumar
3. Mineral Economics – R.K.Sinha & N.L.Sharma
4. A handbook of Surface Mine Technology- Samir Kumar Das



BTMNE-0702 ENVIRONMENT MANAGEMENT IN MINE

Course Code	Title of Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTMN E-0703	Environment Management In Mine	3	1	2	6	80	25	20	100	50	17	50	100	200	3 hrs

UNIT-I

Marks 16

Environmental impact of Mining Projects on its various stages Waste Rock Mill tailing disposal: Characterization, Site selection, Rock and Mill Tailing disposal: Potential environment impact, Decommissioning reclamation

UNIT-II

Marks 16

Treatment of Acid Mine Drainage: Active and passive treatment technologies including constructed wetlands Ecological Restoration of Mining Sites: Ecological restoration, Natural restoration, Restoration planning, goal and objectives, Restoration techniques, Resilience and restoration success

UNIT-III

Marks 16

Post Mining Land Use: Management principles, Inventory of pre-mining land use, Post mining land uses, Selection of post mining land use

UNIT-IV

Marks 16

Mine Closure: Causes, mine closure objective, Planning, Closure design, Risk and Socio economic response of mine closure, Closure of mine entries

UNIT-V

Marks 16

Preparation of Environment management plan: Public hearing, collecting baseline data, Environment impact assessment and prediction, Environment management plan, environment monitoring and Management Environment Protection Act 1986 and other relevant provisions for the environment applicable to mining projects

RECOMMENDED BOOKS:

1. Best Practice Environmental Management in mining
2. Environmental Management in mining areas – N.C.Saxena, Gurdeep Singh, Rekha Ghosh
3. Mine Closure – N.C.Saxena
4. Introduction to Environmental Impact Assessment – John Glasson, Riki Therivel & Andrew Chadwi



BTMNE-0703 Rock Mechanics

Course Code	Title of Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTMN E-0704	Rock Mechanics	3	1	2	4	80	25	20	100	50	17	50	100	200	3 hrs

UNIT-I

Marks 16

INTRODUCTION

Application of rock mechanics in mining, Definition of important terms used in Rock mechanics, Classification of rock mass, Parameters of rock mass classification, Importance of rock mass classification, RQD, Q –system and Bieniskiwi's Geomechanics, classification of rock mass.

UNIT-II

Marks 16

Rock properties, Physico-mechanical properties of rock, Preparation and testing of specimen in the laboratory, ISRM standards, Determination of Physico-mechanical properties of rock as per ISRM standard testing procedures, Strength indices and their importance. Point load, Protodyaknov, Impact and Cone Indenter strength Index

UNIT-III

Marks 16

Rock as an elastic medium, Principle of elastic analysis, Rheological properties of rock, Importance of rheological models, Different types of rheological models, Dynamic properties of rocks, Anisotropy and Creep

UNIT-IV

Marks 16

Principal stress and Principal plane, Analytical method of determining the magnitudes and directions of normal and shear stress on failure plane, Mohr's circle, Theories of failure of rock, Coulomb-Navier theory, Mohr's theory, Griffith's theory, Empirical theories of failure of rock, Different modes of failure of rock

UNIT-V

Marks 16

Earth stresses, Importance of measurements of in situ stress, measurements of in situ stress by Flat jack, Over coring and Hydraulic fracturing technique. Design of circular and elliptical openings. Determination of safe span of roof.

RECOMMENDED BOOKS:

1. Rock Mechanics By Obert and Duvall
2. Rock Mechanics By Goodman
3. Rock Mechanics By Jager & Cook
4. Rock Mechanics by B.S. Verma



List of Practical to be performed

1. Determination of moisture content of rock sample by ISRM standard method
2. Determination of porosity of rock sample by ISRM standard method
3. Determination of Density of rock sample by ISRM standard method
4. Determination of slake durability strength index of rock sample by ISRM standard method
5. Determination of point load strength index of rock sample
6. Determination of Proto-dyakov strength index of rock sample
7. Determination of Uni-axial Compressive strength of rock sample by ISRM standard method
8. Determination of Tensile strength of rock sample by Brazilian method
9. Determination of Single Shear and Double Shear strength of rock sample
10. Determination of Tri-axial Compressive strength of rock sample by ISRM standard method
11. Determination of Young' Modulus of rock sample by ISRM standard method



BTMNE-0704 DEPARTMENTAL ELECTIVE-I

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTMN E-0705	DEPARTME NTAL ELECTIVE-I (a or b)	3	1	2	6	80	25	20	100	50	17	50	100	200	3 hrs

UNIT-I

Marks 16

Design and Stability of Structures in Rock:

Initial rock pressure due to narrow and wide excavations. Theories of ground movement, criteria for design and support of underground excavations; design of single and multiple openings in massive, stratified and jointed rock mass; mine pillars and their classification, pillar stresses, pillar design, stability analysis of pillars.

UNIT-II

Marks 16

Subsidence:

Causes and impacts of subsidence; mechanics of surface subsidence, Vertical and lateral movements and their estimation; angle of fracture, angle of draw; factors affecting subsidence, discontinuous and continuous subsidence; monitoring, prediction.

UNIT-III

Marks 16

Caving of Rock mass:

Caving characteristics of rocks; capability index, subsidence control protection of surface structures, design of protection pillars including shafts pillars.

UNIT-IV

Marks 16

Rock burst: Phenomenology of rock bursts; prediction and control of rockbursts; bumps and gas outbursts,

Introduction to Methods of Stress Analysis: Predictive methods for mine design; principles of classical stress analysis closed form solutions for simple excavation shapes; introduction to computational methods of stress analysis finite element, boundary element, distinct element methods and hybrid computational schemes.

UNIT-V

Marks 16

Monitoring Rock mass Performance: Purpose and nature, monitoring systems including seismic and micro-seismic methods, Mechanics of Fragmentation: Mechanism of rock cutting by picks, disc and roller-cutters; water-jet cutting; mechanics of blasting; methods of assessing cut-ability.

RECOMMENDED BOOKS:

1. A handbook of Surface Mine Technology- Samir Kumar
2. Rock Engineering- John A Franklin & Maurice B. Dusseault
3. Rock Engineering- Evert Hoek



BTMNE-0704 DEPARTMENTAL ELECTIVE-I (B)

UNIT-I

Marks 16

Present status of drilling and blasting practices in India and abroad: Methods of drilling for production of minerals from surface and underground mines, rotary, percussive and rotary –percussive drilling, different types of bits, bit wear, different types of machines, hydraulic drills, long hole drilling.

UNIT-II

Marks 16

Variables in drilling, optimization of drilling parameters, mechanics of drilling, drill-ability of rock, boring in rocks.

UNIT-III

Marks 16

Recent developments in explosives and blasting techniques. Explosives and Blasting Systems, Monitoring Blasting Results: Borehole pressure, transducer, V.O.D. Probe, vibration monitor, high speed video camera, blast design, mechanics of blasting. Computational models of blasting. Influence techniques, Overcasting with explosives. Nuclear blasting, Safety.

UNIT-IV

Marks 16

Explosives:

Classification and comparative properties of explosives, blasting devices, general application and uses; safety considerations. Blasting damages, ground vibrations and air blast. Impact of ground vibration and air blast on the neighboring structures and communities and mitigate measures, reinforcement and design alternatives.

UNIT-V

Marks 16

Blasting Systems:

Electric and non-electric methods, delay blasting techniques, priming, charge distribution, Mechanism of rock blasting. Alternative methods of rock fragmentation. Novel methods of drilling, choice of drills.

RECOMMENDED BOOKS:

1. A Study of Metalliferous Mining – Y.P.Chacharkar
2. Rock Fragmentation – B.Mohanty
3. Rock Fragmentation – Wayne S. Brown



BTMNE – 705 Advanced Mine Surveying

Course Code	Title of Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTMN E-504	Advanced Mine Surveying	3	1	2	6	80	25	20	100	50	17	50	100	200	3 hrs

UNIT I

Marks 16

Correlation: Methods of correlation of surface and underground surveys through inclines, One or two vertical shafts, steeply inclined shafts, Correlation by magnetic needle, Precautions and accuracy, Use of Gyroscope.

UNIT II

Marks 16

Stope and Face Surveying: Use of Miner's dial, Hanging compass with clinometers and theodolite in stop surveying, Tape triangulation, Traversing, Radiation and other methods, Plan meter and its use, Mine Plans and Sections: Legal requirements as to mine plans in India, preparation and preservation of plans and section, Representation of geological and other features in mine plans and sections, Tridimensional drawing, Enlargement of plans, Use of ideograph and pantograph preparation of mine modes.

UNIT III

Marks 16

Photogrammetry: Introduction to Photogrammetry, Scale of a vertical photograph, Photograph versus maps, Application of Photogrammetry in mining, Dip & Fault problems, Application of GIS, GPS and other information Technology tools in surveying and computations.

UNIT IV

Marks 16

Astronomical Survey Definitions of important terms, spherical trigonometry, various coordinate systems in field astronomy, Determination of azimuth by astronomical observations, Calculation related with field astronomy.

UNIT V

Marks 16

Modern Surveying Techniques Principle of EDM, Electronic distance measuring equipment; Merits and demerits of EDM, Geodimeter, Tellurometer, Distomat, Total Station, Introductory knowledge of Remote Sensing and Global Positioning System .Surveying software



Swami Vivekanand University, Sagar(M.P.)



RECOMMENDED BOOKS:

1. Elements of Mining Tech. (Vol- I), D. J. Deshmukh.
2. Surface Mining Technology, Samir Kumar Das.
3. Elements of Mining Tech. (Vol- I), D. J. Deshmukh.
4. Surface Mining Technology, Samir Kumar Das.
5. Heavy Earth Moving Machines, Amitosh de. U M S

LIST OF EXPERIMENTS:

- a. Setting out of S-curves
- b. Setting out a circular curve
- c. Theodolite surveying
- d. Application of GIS, GPS



BTMNE- 0801 Mine Economics

ourse Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTMN E-0801	Mine Economics	3	1	-	4	80	25	20	100	-	-	-	-	-	3 hrs

UNIT I

Marks 16

Sampling- Methods of sampling, errors in sampling, analysis of samples, estimation grade and reserves, salting and precautions against salting. Different types of reserves

UNIT II

Marks 16

Mine Valuation - Different methods, depreciation, amortization and redemption of capital, Life of a mine and present value of a mine.

UNIT III

Marks 16

Financial Management - Methods of framing and financing industrial enterprises, memorandum and articles of association, shares, debentures, dividends and interest. Break even chart and inventory control.

UNIT IV

Marks 16

Investment Decisions - discounted cash flow methods, non-discounted cash flow methods, advantages and disadvantages of them, internal rate of return, Net Present Value.

UNIT V

Marks 16

Book Keeping, Preparation of Balance sheet, Profit and Loss Account.



Swami Vivekanand University, Sagar(M.P.)



Reference Books:-

1. Mineral Economics by R.T. Deshmukh
2. SME Handbook Vol. I
3. Mineral Economics by Sinha and Sharma

RECOMMENDED BOOKS:

1. Engineering Geology by S.k. Garg
2. Economic Geology by P.K. Mukharjee
3. Economic Geology – Sen & Ghua
4. Indian Mineral Resources – D.K.Banerjee
5. Textbook of Geology – G.B.Mahapatra
6. General & Engg. Geology- Prabin Singh



BTMNE-0802 Pollution Control in Mining

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTMN E-0802	Pollution Control in Mining	3	1	2	6	80	25	20	100	50	17	50	100	200	3 hrs

UNIT I

Marks 16

ENVIRONMENTAL POLLUTION

Introduction and classification of environmental pollution, ecological conservation. Salient features of the environmental laws in India, Occupational disease

UNIT II

Marks 16

AIR POLLUTION

Air pollution due to various gases and suspended particulate materials, causes, consequences, Green House effect, Ozone Depletion, Acid Rain, Preventive Measures against air pollution, dust sampling equipment.

UNIT III

Marks 16

WATER POLLUTION

Water pollution, its causes and preventive measures, acid-mine drainage, water pollution in mines and mineral beneficiation plants, water treatment & purification schemes in brief.

UNIT IV

Marks 16

LAND POLLUTION

Land pollution: its causes and preventive measures, Land scape pollution and land reclamation, methods of land Reclamation, Mine closure plan.

UNIT V

Marks 16

NOISE POLLUTION

Pollution due to noise and its consequences, Sources of noise, permitted level of noise, noise produced by different machinery, control and safety measures, measurement of noise level.

RECOMMENDED BOOKS:

1. Air & Water Acts
2. Forest Conservation acts
3. Legislation in Indian Mines – A Critical appraisal by Rakesh and Prasad
4. Env. Impact of Mining By Down and Stokes



Swami Vivekanand University, Sagar(M.P.)



List of Practical to be performed:

1. Study of Konimeter
2. Study of Dust precipitator
3. Study of gas chromatograph
4. Study of noise measuring instruments
5. Measurement of noise
6. Study of noise controlling techniques
7. Study of vibration measuring instruments
8. Measurement of vibration
9. Study of land reclamation methods
10. Preparation of EIA and EMP for a mining project



BTMNE-0803 Mining Machinery - III

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTMN E-0803	Mining Machinery - III	3	1	2	6	80	25	20	100	50	17	50	100	200	3 hrs

UNIT I FACE MACHINERY

Drills for coal and stone: their constructional details, Drill jumbos: their applications, operation and maintenance, Introduction to coal cutting machine.

UNIT II LOADER AND TRANSPORTING MACHINE

Rocker shovel, gathering arms loaders, LHD and SDL machines: their construction, operation and maintenance, Cavo loader, shuttle car and underground trucks: their construction, operation and application.

UNIT III

CUTTER LOADERS

Different types of cutter loaders suitable for long wall and short wall faces: their constructions, operation and maintenance, different types of road headers: their construction, operation and conditions of applicability, mechanics of rock cutting, rock cutting tools and their performance.

UNIT IV

COMPRESSED AIR

Basic concept, compression process, working and constructional features of single stage and multistage compressor, unloading arrangement of compressor, layout of pipelines, Transmission of compressed air, testing of Compressor, In bye compressors.

UNIT V

USE OF ELECTRICITY IN MINES

Flame proof apparatus, intrinsically safe circuits, underground cables, drill panel, gate end box, circuit breakers, remote control (pilot circuit), underground substation, earth leakage protection, cable joining, Electrical signaling

Reference books:

1. Elements of Mining Vol. III by D. J. Deshmukh
2. UMS Booklet
3. Winning and Working of Coal : R. T. Deshmukh & D. J. Deshmukh
4. Modern Coal Mining Practices : R. D. Singh
5. Longwall Mining : Syd. S. Chaing & Peng



Swami Vivekanand University, Sagar(M.P.)



ECOMMENDED BOOKS:

1. Engineering Geology by S.k. Garg
 2. Economic Geology by P.K. Mukharjee
 3. Economic Geology – Sen & Ghua
 4. Indian Mineral Resources – D.K.Banerjee
 5. Textbook of Geology – G.B.Mahapatra
- General & Engg. Geology- Prabin Singh

List of Practical to be performed:

1. Study of working and construction of Rotary Coal Drill Machine used in U/G Coal Mine.
2. Study of working and construction of Jack hammers drill used in Metal Mine.
3. Study of working and construction of Long Wall Coal Cutting Machine
4. Study of working and construction of Side dump loader.
5. Study of working and construction of a LHD
6. Study of Double ended ranging drum shearer.
7. Study of drill panel and gate end box.
8. Study of working and construction of Gathering Arm Loader.
9. Study of working and construction of Coal Plough.
10. Study of working and construction of Torque Convertor.
11. Study of working and construction of Reciprocating Compressors.



BTMNE-0804 Strata Control

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTMN E-0804	Strata Control	3	1	2	6	80	25	20	100	50	17	50	100	200	3 hrs

UNIT I SUPPORTS

Marks 16

Timber & steel supports, Examination of roof, Roof bolting, roof stitching, method of supporting roadways. Supporting under different conditions viz. Pit bottom, crossing, junctions, faulted area, longwall faces, depillaring areas and stoping areas, support loads .SSR, CTR, Support plan, Support withdrawal.

UNIT II POWERED SUPPORTS

Marks 16

Powered supports: their principles of operation, Frame support, Chock support, shield support & chock shield support: Classification, designation, constructional features, merits demerits and applications, Hydraulic fluids, power pack.

UNIT III STOWING

Marks 16

Principal methods of stowing, their relative merits, demerits and applicability, Hydraulic stowing, Pneumatic stowing, Mechanical stowing, Hand packing, face arrangements, pipe wear, pipe jams. Hydraulic gradient.

UNIT IV STRATA CONTROL

Marks 16

Theories of ground movement, Rock pressure due to Narrow and Wide excavation, Front abutment and back abutment, Failure of roof and floor, measurement of strata movement, Causes and preventive measures against Rock burst, Bumps& Gas outbursts.

UNIT V SUBSIDENCE

Marks 16

Theories of subsidence, Types of subsidence, damage and loss due to subsidence, vertical and lateral movements and their estimation, angle of fracture and angle of draw, factors affecting subsidence, subsidence control, protection of surface structures, design of protective pillars including shaft pillars. Pot holes.



Swami Vivekanand University, Sagar(M.P.)



RECOMMENDED BOOKS:

1. Strata control in mines : Chaing & Peng
2. Winning and Working of Coal : R. T. Deshmukh & D. J. Deshmukh
3. Modern Coal Mining Practices : R. D. Singh
4. D.G.M.S. Circulars (Tech.) 1995 onwards
5. Longwall Mining : Syd. S. Chaing & Peng

List of Practical to be performed:

1. Study of Conventional support systems.
2. Study of constructional features and working of Friction props
3. Study of constructional features and working of Hydraulic props
4. Study of methods to support roof by roof bolts, roof stitching and cable bolts
5. Study of withdrawal of supports by Sylvester prop withdrawer
6. Study of methods to support junctions and faulted area
7. Study of constructional features and working of Powered Supports
8. Study of Hydraulic stowing System and the arrangement required for it
9. Study of pneumatic stowing System and the arrangement required for it
10. Study of Subsidence measurement techniques.



BTMNE-0805 Departmental Elective II (A) Surface Mining-II

Course Code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTMN E-0806	Departmental Elective II	3	1	-	4	80	25	20	100	-	-	-	-	100	3 hrs

UNIT I

Marks 16

Layouts of open pit mines, Methods of side casting, Side casting by Stripping Shovel and Dragline, Range Diagram, calculation of operating radius. Explosive casting, Layouts of waste dumps. Design of Haul roads.

UNIT II

Marks 16

Introduction to continuous surface mining equipment, Bucket wheel excavators: construction, basic operation and productivity calculation, Continuous surface miner: construction, basic operation and productivity calculation. Face Layouts.

UNIT III

Marks 16

Ultimate pit design, Factors affecting ultimate pit limits; Significance of ultimate pit limits; Manual methods of developing ultimate pit limits. Floating cone technique, Production planning, Basics of mine life and plant size concepts, Mine and Mill plant sizing,

UNIT IV

Marks 16

Introduction to rock slope engineering, Slopes in surface mines and their formation, Pit slopes and their influence on mine economics, Slope stability, Factors influencing slope stability, Various types of slope failure and their conditions.

UNIT V

Marks 16

Determination of factor of safety of a slope under plane and circular failure, Planning of slope stability investigations, Stabilization and protection methods for stability of slopes.

RECOMMENDED BOOKS:

1. Surface Mining : G.B. Misra
2. Surface mining equipment : Martin
3. Surface Mining : Pfeider
4. Rock slope engg. : Hoek & Bray
5. SME handbook : Hartman
6. Surface Mine Planning & Design : Hustralid & Kuchha



BTMNE-0805 DEPARTMENTAL ELECTIVE II (B) GEOLOGICAL EXPLORATION OF MINERAL DEPOSITS

UNIT I

Marks 16

Exploration: Basic aim of exploration. Classification of methods of exploration. Surface Exploration and sub-surface exploration. Aerial photography and remote sensing. Geometrical characteristics. Vertical and oblique photographs. Elements and principles of stereoscopic pairs. Satellite imageries and their interpretation. Gray, coloured and infra-red photographs. Interpretative characteristics of Aerial photographs and their application in identification of Geomorphology, Structures and Lithology.

UNIT II

Marks 16

Principles of Geological exploratory mapping. Significance of various scales of mapping. Underground mapping. Geophysical exploration: Principles of geophysical exploration, Gravity methods, Application of gravity methods to mineral exploration, surface and airborne surveys, Specific application of gravity methods: to mineral and oil exploration, Magnetic methods: Magnetic methods of geophysical exploration, organization of magnetic surveys, Regional and local surveys. Precautions in magnetic surveys, Electrical methods, Potential methods, Interpretation of potential survey data. Resistivity surveying, instruments and organization, Two layer cases and interpretation of resistivity data, Seismic methods: Instruments and organization of reflection and refraction surveys, Interpretation of seismic data; application to oil exploration.

UNIT III

Marks 16

Geochemical exploration: Principles and methods of geochemical prospecting, methods of geochemical exploration, applicability and precautions in geochemical explorations. Petro-, Litho-, Litho-, Geo and hydro-geochemical explorations.

UNIT IV

Marks 16

Boring : Principles of boring; Selection of sites for boreholes; surface layout; method of percussive (solid hollow and ropes), rotary, (diamond, chilled shot, clays and other system), details of equipments, properties of drilling muds, core recovery wire line, core barrel: Interpretation of borehole data, borehole logging, maintenance of records, difficult boring, controlled directional drilling, deflection of boreholes, Difficulties in boring, Fishing tools and their uses.

UNIT V

Marks 16

Ore-guides and controls ; Ore shoe's target rings and intersecting loci, Regional and local guides to ore, Physiographic guides, Lithological and stratigraphic guides, Structural guides and fracture pattern. Mineralogical, guides, bottoming and zoning of mineral deposits.

RECOMMENDED BOOKS:

1. Engineering Geology by S.k. Garg
2. Economic Geology by P.K. Mukharjee
3. Economic Geology – Sen & Ghua
4. Indian Mineral Resources – D.K.Banerjee
5. Textbook of Geology – G.B.Mahapatra
6. General & Engg. Geology- Prabin Singh



BTMNE-0806 Report Writing & Seminar

Unit -I

Introduction to Technical Writing: how differs from other types of written communication Purpose of technical writing, Correspondence: prewriting, writing and rewriting Objectives of Technical Writing. Audience Recognition: High-tech audience, Low tech audience, Lay audience, Multiple Audience.

Unit - II

Correspondence: Memos, Letters, E-mails, Its differentiation, types of letters, Document Design, its importance, Electronic Communication: Internet, Intranet, extranet, Writing effective e-mail.

Unit - III

Summary: Report Strategies, Effective style of technical report writing: Structures: content, introduction, conclusions, references, etc., Presentation, Writing first draft, revising first draft, diagrams, graphs, tables, etc. report lay-out.

Unit -IV

Report Writing: Criteria for report writing, Types of Report: Trip report, Progress report, lab report, Feasibility report, project report, incident report, etc. Case Studies.

Unit -V

Proposals & Presentation: Title page, Cover letter, Table of Content, list of illustrations, summary, discussion, conclusion, references, glossary, appendix, Case Studies. Oral Presentation/ Seminar:

Text Books:

1. Sharon J. Gerson & Steven M. Gerson "Technical Writing - Process& Product", Pearson Education. Reference Books: 1. Sunita Mishra, "Communication Skills for Engineers" Pearson Education
2. Davies J.W. "Communication for engineering students", Longman 3. Eisenberg, "Effective Technical Communication", Mc. Graw Hill.