

# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*

## SCHEME OF TEACHING AND EXAMINATION

### ***B.E. IV SEMESTER MINING ENGINEERING***

S. No.	Board of Study	Subject Code	Subject	Periods per week			Scheme of Exam			Total Marks	Credit L+(T+P)/2
				L	T	P	Theory/Practical				
							ESE	CT	TA		
1	Mining Engg.	339411 ( 39)	Mine Environment-I	3	1	-	80	20	20	120	4
2	Mining Engg.	339412 ( 39)	Engineering Materials	3	-	-	80	20	20	120	3
3	Electrical Engg.	339413 ( 24)	Basic Electrical Engineering	4	1	-	80	20	20	120	5
4	Mining Engg.	339414 ( 39)	Mining Geology – II	3	1	-	80	20	20	120	4
5	Mining Engg.	339415 ( 39)	Underground Coal Mining	3	1	-	80	20	20	120	4
6	Electronics & Telecom	339416 ( 28)	Basic Electronics and Instrumentation	4	1	-	80	20	20	120	5
7	Mining Engg.	339421 ( 39)	Mining Geology – II Lab	-	-	2	40	-	20	60	1
8	Mining Engg.	339422 (39)	Mine Environment – I Lab	-	-	2	40	-	20	60	1
9	Electrical Engg.	339423 ( 24)	Basic Electrical Engineering Lab	-	-	4	40	-	20	60	2
10	Mining Engg.	339424 (39)	Underground Coal Mining Lab	-	-	4	40	-	20	60	2
11	Humanities etc.	300425 (46)	Health, Hygiene & Yoga	-	-	2	-	-	40	40	1
12			Library	-	-	1	-	-	-	-	-
				<b>20</b>	<b>5</b>	<b>15</b>	<b>640</b>	<b>120</b>	<b>240</b>	<b>1000</b>	<b>32</b>

**L – Lecture, T – Tutorial, P – Practical, ESE- End Semester Exam , CT- Class Test TA – Teacher’s Assessment**

Note (1) : Duration of all theory papers will be of **Three Hours**.

Note (2) : Industrial Training of six weeks is mandatory for B.E. student. It is to be completed in two equal parts. The first part will be in summer after IV sem. after which students have to submit a training report which will be evaluated by the college teachers during B.E. V sem.

**CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY  
BHILAI (C.G.)**

Semester : **B.E. IV Sem**

Subject: **Mine Environment-I**

Total Theory Periods: **40**

Total Marks in End Semester Examination: **80**

Minimum number of Class tests to be conducted: **Two**

Branch: **Mining Engineering**

Code: **339411 (39)**

Total Tutorial Periods: 10

**UNIT 1: MINE ATMOSPHERE**

Pollution of Mine Atmosphere, Mine Gases, Their Origin, Occurrence, Effects And Detection, Methane Drainage. Monitoring System for Monitoring of Mine Environment. Analysis of Mine Air.

**UNIT 2: HEAT AND HUMIDITY**

Heat and Humidity in Mine Atmosphere and Their Effects, Cooling Power of Mine Air, Assessment of Comfort Conditions, Air Conditioning of Mines, Surface, Underground And Divided Installations, Spot Coolers.

**UNIT 3: THEORY OF VENTILATION**

Objects and Standards of Ventilation, Flow of Air in Ducts and Mine Roadways, Resistance of Air Ways, Laws of Ventilation, Chezy's and Atkinson's Equations, Equivalent Resistance and Equivalent Orifice of Mine, Regulations Related With Above Topics.

**UNIT 4: NATURAL VENTILATION**

Natural Ventilation and Its Measurements, Thermodynamics of Natural Ventilation, Distribution and Control of Air Current, Doors, Regulators, Stoppings and Their Types, Air Crossings, Air Locks.

**UNIT 5: MINE ILLUMINATION**

Types of Portable Lamps, Their Maintenance and Examination, Lamp Room Design and Organization, Percentage and Accumulation Tests, Lighting from Mains, Photometry And Illumination Surveys, Standards of Illumination for Underground and Open Cast Workings.

**CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY  
BHILAI (C.G.)**

Semester : **B.E. IV Sem**

Subject: **Engineering Materials**

Total Theory Periods: **40**

Total Marks in End Semester Examination: **80**

Minimum number of Class tests to be conducted: **Two**

Branch: **Mining Engineering**

Code: **339412 (39)**

Total Tutorial Periods: 10

**UNIT 1: General**

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

**UNIT 2: Heat Treatment Of Iron & Steel**

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

**UNIT 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., Shotcreting, Brick & Stone Masonries, 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.

**CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY  
BHILAI (C.G.)**

Semester : **B.E. IV Sem**

Subject: **Basic Electrical Engineering**

Total Theory Periods: **40**

Total Marks in End Semester Examination: **80**

Minimum number of Class tests to be conducted: **Two**

Branch: **Mining Engineering**

Code: **339413 (24)**

Total Tutorial Periods: 10

- UNIT –1**      **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, Under ground distribution schemes, Electrical Signaling in mines.
- UNIT-2**      **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-3**      **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-4**      **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-5**      **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.
- UNIT-6**      **SWITCHGEAR 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.

**CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY  
BHILAI (C.G.)**

Semester : **B.E. IV Sem**

Branch: **Mining Engineering**

Subject: **Mining Geology-II**

Code: **339414 (39)**

Total Theory Periods: **40**

Total Tutorial Periods: 10

Total Marks in End Semester Examination: **80**

Minimum number of Class tests to be conducted: **Two**

**UNIT 1: Stratigraphy**

Introduction, Definitions and Basic Principles Of Stratigraphy; Units of Stratigraphy; Criteria for Stratigraphic Classification and Correlation; Standard Geological Time Scale; Fossils-Elementary Idea about Their Conditions, Modes of Their Preservation and Their Uses; Broad Palaeontological Groups of Animals and Plants; Brief Palaeontological Study of Gondwana Fields.

**UNIT 2: Indian Geology**

Major Geomorphic Divisions of India; General Review of Indian Stratigraphy; Descriptions of important Indian Geological formations- Archeans, Cuddapahs, Vindhyan, Gondwanas and Tertiaries.

**UNIT 3: 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: 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: 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.

**References :**

- |   |                             |
|---|-----------------------------|
| 1. Fundamentals of Historical Geology and Stratigraphy of India | :Ravindra Kumar             |
| 2. Geology Of India and Burma                                   | :M.S. Krishnan              |
| 3. Economic Mineral Deposits                                    | :M.L.Jensen<br>& A. Bateman |
| 4. India's Mineral Resources                                    | :S. Krishnaswamy            |
| 5. Geophysical Prospecting                                      | :M.Dorbin & B. Miller       |
| 6. Courses in Mining Geology                                    | :Arogyaswamy                |
| 7. Applied Geology  | : S. Banger                 |

**CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY  
BHILAI (C.G.)**

Semester : **B.E. IV Sem**

Branch: **Mining Engineering**

Subject: **Underground Coal Mining**

Code: **339415 (39)**

Total Theory Periods: **40**

Total Tutorial Periods: **10**

Total Marks in End Semester Examination: **80**

Minimum number of Class tests to be conducted: **Two**

**UNIT 1: 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: 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: 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: 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: 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.

**CHHATTISGARH SWAMI VEVEKANAND TECHNICAL UNIVERSITY  
BHILAI (C.G.)**

Semester : **B.E. IV Sem.**

Sub : **Basic Electronics & Instrumentation**

Total Theory Periods : 40

Total Marks in End Semester Exam : 80

Minimum number of class test to be conducted : 02

Branch: **Mining Engg.**

Code : **339416 (28)**

Total Tutorial Periods : 10

**Unit – I : Semiconductor Diodes**

Construction & Characteristics of PN Junction diodes, Rectifier : Half wave, Full Wave & Bridge (Circuit and operation), Zener diode: construction, characteristics, specifications, Voltage regulator circuit using Zener diode.

**Unit – II : Transistors**

(8L + 2T)

Junction Transistor : Construction, Various current components inside a transistor, circuit symbol of PNP and NPN transistors, transistor amplifier, input and output characteristics, relation between  $\alpha$  and  $\beta$  of a transistor, CB, CE & CC configuration. Field Effect Transistor: construction, principle of operation and characteristics of JFET. Construction, principle of operation and characteristics of MOSFET 0 enhancement and depletion type MOSFET.

**Unit – III : Basics of Transducers**

(8L + 2T)

Active & Passive Transducers, Analog & Digital Transducers, Classification of transducers according to Applications. Selection of a transducer. Construction, Principles of operation and applications of : Wire wound Potentiometer, Strain gauge, LVDT, Thermistor, Solar cell Transducer, Piezo-electric crystals.

**Unit – IV : Signal Conditioning Circuits**

(8L + 2T)

*Operational Amplifiers*: Terminal characteristics, Ideal characteristics, OPAMP as Inverting amplifier, Non-inverting amplifier, Adder, Difference amplifier, differentiator, Integrator, Comparator, Instrumentation amplifier. *Passive Filters*: High Pass, Low Pass and Band Pass filter using RC- expression for their Gain – BW Product. *Wheatstone bridge*. *Diode Clipper and clamper* (only qualitative analysis, no mathematical derivation is required).

**Unit – V : Basic Instrumentation System & Components**

(8L + 2T)

Block diagram of basic measurement systems: Distortion due to Mechanical loading, Distortion due to Impedance loading, Distortion due to change in signal frequency, Distortion due to electrical noise. *Data Acquisition System*: Objective of DAS, Single & Multi channel DAS, Computer based DAS. Data Loggers, (Only introductory idea is expected no detail analysis is required).

**Text Books :**

1. *Electronic Instrumentation* (2<sup>nd</sup> Ed.) by H S Kalsi, TMH
2. *Elements of Electronic Instrumentation* by J. Jha, M.Puri, R. Sukesh Kumar & M. Kowar, Narosa Publishing House.
3. *Electronics & Instrumentation* by B.R. Gupta, S. Chand & Co.

**Reference Books :**

1. *Electrical & Electronics Measurement & Instrumentation* by A.K. Sawheny, Dhanpat Rai Publishing Company.
2. *Electronic Instrumentation & Measurement Techniques* by Copper & Helfrick, PHI.

**CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY  
BHILAI (C.G.)**

Semester : **B.E. IV Sem**

Branch: **Mining Engineering**

Subject: **Mining Geology-II Lab**

Code: **339421 (39)**

Total Practical Periods: **36**

Total Marks in End Semester Examination: **40**

**Practical Exercises of BE- V Semester (Mining Geology)**

Megascopic Description and Distribution of Ore Forming Minerals and Industrial Minerals.

Study of Plant Fossils.

Study of Advance Geological Maps and Preparation of Cross Sections.

**CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY  
BHILAI (C.G.)**

Semester : **B.E. IV Sem**

Subject: **Mine Environment – I Lab**

Total Practical Periods: **24**

Total Marks in End Semester Examination: **40**

Branch: **Mining Engineering**

Code: **339422 (39)**

**List of Practicals to be performed.**

1. Detection of presence and accumulation of Firedamp in mine atmosphere.
2. Detection of presence and accumulation of CO in mine atmosphere.
3. Study of various techniques of methane drainage
4. Study of surface airconditioning plant.
5. Study of underground airconditioning plant .
6. Study of different types of ventilation devices.
7. Study of cap lamps used in underground mine.
8. Study of Flame safety lamps used in underground mine.
9. Design of a cap lamp room for a large underground coal mine.

**CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY  
BHILAI (C.G.)**

Semester : **B.E. IV Sem**

Subject: **Basic Electrical Engg. – I Lab**

Total Practical Periods: **48**

Total Marks in End Semester Examination: **40**

Branch: **Mining Engineering**

Code: **339423 (39)**

**List of Experiments**

1. Magnetisation Characteristics of a separately excited DC Machine
2. Speed Control of a DC Shunt Motor.
3. Load Test on a DC Shunt/Compound Motor.
4. Load test on a DC Shunt / Compound Generator.
5. Connection, Starting Reversing and load Test on a 3 phase Induction motor.
6. Study of Electromagnetic Induction Disc Relay.
7. Study of Star- Delta Starter.
8. Measurement of 3 phase power by 2wattmeter method. .
9. Open Circuit and short circuit Test single phase Transformer and prediction of performance.
10. Load Test on single phase Transformer and calculation of performance.

**CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY  
BHILAI (C.G.)**

Semester : **B.E. IV Sem**  
Subject: **Underground Coal Mining Lab**  
Total Practical Periods: **48**  
Total Marks in End Semester Examination: **40**

Branch: **Mining Engineering**  
Code: **339424 (39)**

**List of Practicals to be performed.**

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 Logwall Advancing system.
4. Study of layout of Logwall 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.

# CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester : B.E. IV Sem.

Branch: Common for all branches

Subject : **HEALTH, HYGIENE & YOGA**

Code : 300425 (46)

No. of Periods : 2 pds/week

Tutorial Periods : NIL

Total Marks in End Semester Exam. : NIL

Teacher's Assessment: 40 Marks

Minimum number of class tests to be conducted: Two

## UNIT- I

**HEALTH & HYGIENE:** Concept of health, Physical health and mental health and wellbeing and how to achieve these, longevity and how to achieve it, concept and common rules of hygiene, cleanliness and its relation with hygiene; Overeating and undereating, amount of food intake required, intermittent fasting; adequate physical labour, sleep; consumption of junk fast food vs nutritious food; fruits, vegetables cereals and qualities of each of these.

## UNIT- II

**INTRODUCTORY KNOWLEDGE OF COMMON STREAMS OF MEDICINAL CURE:** History, development, basic concepts, modes of operation of Alopathy, Ayurved, Homoeopathy, Biochemic, Unani, Siddha, Accupressure, Accupuncture, Naturopathy, Yogic and Herbal system of medicines, Introduction of Anatomy and Physiology concerned.

## UNIT- III

**YOGASANS:** Meaning and concept of Yoga, Yogasans and its mode of operation, How to perform Yogasans, Common Yogasans with their benefits, such as, Padahastasan, Sarvangasan, Dhanurasan, Chakrasan, Bhujangasan, Paschimottasan, Gomukhasan, Mayurasan, Matsyasan, Matsyendrasan, Pawanmuktasan, Vajrasan, Shalabhasan, Sinhasan, Shashankasan, Surya Namaskar, Halasan, Janushirasan, Utshep Mudra,

## UNIT- IV

**YOGASANS FOR COMMON DISEASES:** From Yogic Materia Medica with symptoms, causes, asans and herbal treatment.

- **Modern silent killers:** High blood pressure, diabetes and cancer, causes and cure; Common health problems due to stomach disorders, such as, indigestion, acidity, dysentery, piles and fissures, arthritis, its causes, prevention and cure.
- **Asans for relaxation:** Shavasana, Makarasana, Matsyakridasana, Shashankasana.
- **Asans to increase memory and blood supply to brain :** Shirsh padasana, Shashankasana.
- **Asans for eye sight:** Tratak, Neti Kriya .
- **Pranayam :** Definition and types : Nadi Shodhan, Bhastrik, Shitakari, Bhramari useful for students.

## UNIT V

**CONCENTRATION:** Concentration of mind and how to achieve it. Tratak (त्राटक), Concentration on breath, Japa (जप), Ajapajap (अजपाजप), internal silence (अन्तर्मौन), visualization in mental sky (चिदाकाश धारणा), Concentration on point of light (ज्योति ध्यान), Concentration on feeling (भाव ध्यान), Concentration on figure (मूर्त ध्यान).

## REFERENCES

- (1) Yogic Materia Medica
- (2) Asana, Pranayama and Bandha