

**CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,
BHILAI**

Diploma Programme in Mining and Mine Surveying

Semester -IV

| S. No | Board of Study | Subject Code | Subject | Period/week in Hours | | | Scheme of Examination | | | | | Credit | |
|--------------|----------------|--------------|------------------------------------|----------------------|---|---|-----------------------|-----|-----|-----------|-----|--------|-------------|
| | | | | L | T | P | Theory | | | Practical | | | Total Marks |
| | | | | | | | ESE | CT | TA | ESE | TA | | |
| 1. | Electric al | 239411 (24) | Basic Electrical Engineering | 4 | 1 | - | 100 | 20 | 20 | - | - | 140 | 5 |
| 2. | Mining | 239412 (39) | Applied Geology | 4 | 2 | - | 100 | 20 | 20 | - | - | 140 | 5 |
| 3. | Mining | 239413 (39) | Mine Safety and Legislation | 4 | 1 | - | 100 | 20 | 20 | - | - | 140 | 5 |
| 4. | Mining | 239414 (39) | Mine Surveying | 4 | 2 | - | 100 | 20 | 20 | - | - | 140 | 5 |
| 5. | Mining | 239415 (39) | Wining and working coal | 4 | 2 | - | 100 | 20 | 20 | - | - | 140 | 5 |
| 6. | Electric al | 239421 (24) | Basic Electrical Engineering (Lab) | - | - | 2 | - | - | - | 50 | 20 | 70 | 1 |
| 7. | Mining | 239422 (39) | Applied Geology (Lab) | - | - | 2 | - | - | - | 50 | 20 | 70 | 1 |
| 8. | Mining | 239423 (39) | Mine Surveying (Lab) | - | - | 3 | - | - | - | 50 | 20 | 70 | 2 |
| 9. | Mining | 239424 (39) | Industrial training* | - | - | 1 | - | - | - | 50 | 40 | 90 | 1 |
| Total | | | | 20 | 8 | 8 | 500 | 100 | 100 | 200 | 100 | 1000 | 30 |

L: Lecture Hours, T: Tutorial Hours, P: Practical Hours,
ESE: End Sem Exam, CT: Class Test, TA: Teacher's Assessment

* Industrial Training: Students will undergo on industrial practical training for 1 months during 4th semester

**CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,
BHILAI**

- A) **SEMESTER** : **IV**
 B) **COURSE TITLE** : **BASIC ELECTRICAL ENGINEERING**
 C) **CODE** : **239411 (24)**
 D) **BRANCH/DISCIPLINE** : **Mining & Mine Surveying**
 E) **RATIONALE** :

Electricity plays a very important role in day-to-day life of every one. It also forms the very first basis for any Electronics technician course, since the fundamentals of Electrical Engg. are used in the Electronics circuits, T.V. Engg. Instrumentation and control.

As a technician, one is expected to know the fundamentals and utilization aspects of electrical engineering, practice the safety rules and prevent the mishaps and hazards.

The course of fundamentals of Electrical Engg. , aims to impart the knowledge and practice in DC and AC circuits, machines, measuring instruments and electrical safety, which is essential in developing a solid foundation for any Electronics Engg student to become a competent technician.

The course is designed so that more emphasis on practice through laboratory work is given to reinforce fundamental concepts and develop basic skills of handling of instruments and machines.

F) TEACHING AND EXMINATION SCHEME:

| Course Code | Periods/Week (In Hours) | | | Scheme of Examination | | | | | | Credit [L+(T+P)] 2 |
|-------------|-------------------------|---|---|-----------------------|----|----|-----------|----|-------------|-----------------------|
| | L | T | P | Theory | | | Practical | | Total Marks | |
| | | | | ESE | CT | TA | ESE | TA | | |
| 239411 (24) | 4 | 1 | - | 100 | 20 | 20 | - | - | 140 | 5 |
| 239421 (24) | - | - | 2 | - | - | - | 50 | 20 | 70 | 1 |

G) DISTRIBUTION OF MARKS AND HOURS:

| Sl. No. | Chapter No. | Chapter Name | Hours | Marks |
|----------------|--------------------|-------------------------------------|--------------|--------------|
| 1 | 1 | Basic concepts | 10 | 10 |
| 2 | 2 | Electromagnetism | 06 | 10 |
| 3 | 3 | A.C. Circuit | 08 | 12 |
| 4 | 4 | Polyphase Circuits | 06 | 08 |
| 5 | 5 | Transformers | 08 | 10 |
| 6 | 6 | D.C. Machines | 08 | 10 |
| 7 | 7 | A.C. Motors | 09 | 12 |
| 8 | 8 | Single Phase Induction Motor | 10 | 10 |
| 9 | 9 | Electrical & Electronic Measurement | 10 | 12 |
| 10 | 10 | Electrical Safety | 05 | 06 |
| | | Total | 80 | 100 |

H) DETAILED COURSE CONTENTS:

Chapter – 1 : BASIC CONCEPTS

- Concept of unit of Electric Current and Voltage: Ohm's Law, Concept of Resistance, Inductance, Resistivity and Conductivity; Their units and dependence on temperature.
- Power & energy heating effect of electric current and conversion of units (Mechanical to Electrical).
- Kirchoff's Voltage and Current Laws & their application in simple D.C. Circuits.
- Series and parallel combination of resistance and wattage considerations.

Chapter – 2 : ELECTROMAGNETISM

- Concept of magnetic field production by flow of current, Concept of m.m.f., flux reluctance, permeability, Analogy between electric & magnetic circuit.
- Faraday's Laws of electromagnetic Induction, Self and mutually induced e.m.f., Simple numerical problems.

Chapter – 3 : A.C. CIRCUIT

- Concept of alternating voltage and current, difference between A.C. and D.C.
- Concept of Cycle, Frequency, Period, Amplitude, Instantaneous Value, Average Value, r.m.s. value and peak value, form factor (definitions only).
- Concept of impedance, phase angle, RL, RC & RLC Series & parallel circuits. Numerical problems

Chapter – 4 : POLY PHASE CIRCUITS

- Three phase A.C. waveform, phase displacement,

- Three phase A.C. circuit with balanced load.

Chapter – 5 : TRANSFORMERS

- Principle of Transformer
- Auto Transformer
- Applications of Transformer and Auto Transformer.

Chapter – 6 : D.C. MACHINES

- Working principle of D.C. Machines
- Constructional Features

Chapter – 7 : A.C. MOTORS

- Introduction of A.C. Motor
- Classification of A.C. Motors
- Construction and working principle of 3- ϕ Induction motors
- Introduction of Synchronous Motor

Chapter – 8 : SINGLE PHASE INDUCTION MOTOR

- Working principle of Single Phase Induction Motor.
- Types of Single Phase Induction Motor: Capacitor start, Capacitor start and Capacitor run, Shaded Pole type, Universal Motor.

Chapter – 9 : ELECTRICAL & ELECTRONIC MEASUREMENT

- General description of PMMC, moving iron, dynamometers type instruments.
- Working principle and construction of Ammeters and Voltmeters, extension of range and simple numerical problems.
- Principle and working of Wattmeter (dynamometer type) and Energy meter (Induction type).
- Digital measuring instruments, Seven-segment display and its applications.
- Basic concepts of CRO.

Chapter – 10 : ELECTRICAL SAFETY

- Safety Precaution.
- Artificial Respiration.
- Circuit Protection: Fuses, Switches, relays of circuit, MCB, MCCB.
- Earthing.

I) SUGGESTED INSTRUCTIONAL STRATEGIES:

The implementation strategy to teach this course should be a good mix of the various teaching methods like lecture, question answer, assignment and lab. work. More drill and practice to solve numerical problems, home and classroom assignments would prove more useful to develop the analytical skills. As this will be the first exposure to an electrical laboratory, the procedure of lab practices should be in more detail including the safe practices to be followed.

J) SUGGESTED LEARNING RESOURCES.**(a) Reference Books :**

| Sl. No. | Title | Author, Publisher, Edition & Year |
|---------|---|--|
| 1. | Principles of Electrical Engineering | Bhattacharya, Tata -McGraw-Hill, New Delhi, 1997 |
| 2. | Electrical Technology | Cotton, H., ELBS, London, 6 th , 1987 |
| 3. | Electrical Application Servicing | Crouse, William H., McGraw Hill, New York, 1 st . 1980 |
| 4. | Preventing Electrical Fires & Failures | Hattangadi, A.A., Tata -McGraw-Hill, New Delhi, 2001 |
| 5. | Electrical Technology | Hughes, Edward, Longman, 1 st , 1990 |
| 6. | Basic Electrical Engineering | Mittle, V.N. Tata McGraw-Hill, New Delhi 1990 |
| 7. | Electrical Technology Vol.I | Thareja B.L., Thareja A.K. S. Chand & Company Ltd., New Delhi, 23 rd Edition. |
| 8. | Electrical Technology Vol.II | Thareja B.L., Thareja A.K. S. Chand & Company Ltd., New Delhi, 23 rd Edition. |
| 9. | Electric Machinery and Transformers | Kosow, Prentice-hall, New- Delhi, 2 nd edition |
| 10. | Electrical Engineering Fundamentals | Del Toro, Prentice-hall, New- Delhi, 2 nd Edition |
| 11. | Electrical Engineering- Principles and Applications | Hambley, Prentice-hall, New- Delhi, 2 nd Edition |
| 12. | Electromagnetism: Theory and Applications | Pramanik, Prentice-hall, New- Delhi, |
| 13. | Basic Electrical Engineering | R.K. Rajput |
| 14. | Basic Electrical Engineering | Jain & Jain |

| Sl. No. | Title | Author, Publisher, Edition & Year |
|---------|------------------------------|-----------------------------------|
| 15. | Basic Electrical Engineering | Anjali Chakraborty |

(b) Others:

- Lab Manuals.
- Charts.

COURSE TITLE : BASIC ELECTRICAL ENGINEERING LAB

PRACTICAL CODE : 239421 (24)

HOURS: 32

LIST OF PRACTICALS / TUTORIALS:

- Follow Electrical engineering laboratory practices
 - Supply system & safety.
 - Introduction to various measuring instruments.
- Verify Ohm's Law.
- Verify KCL & KVL.
- Measure voltage & current in RLC series circuit, Calculate impedance, inductance, capacitance, & power factor.
- Measure voltage & current in RLC parallel circuit. Also calculate impedance, power factor.
- Use rheostat as Regulator and Potential divider.
- Identify the different parts of a dismantled motor.
- Identify the different parts of 3-point starter and use it for starting single-phase induction motor.
- Measure current & voltage in balanced star connection. Also verify the relation of phase and line value of voltage and current.
- Measure current & voltage in balanced Delta connection. Also verify the relation of phase and line value of voltage and current.
- Measure the electrical power and energy in a given circuit.
- Use analog and digital multimeter for testing voltage, current and resistance.
- Calculate fusing current of a fuse wire.

**CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,
BHILAI**

| | | |
|----------------------|---|---------------------------|
| A) SEMESTER | : | IV |
| B) SUBJECT TITLE | : | APPLIED GEOLOGY |
| C) CODE | : | 239412 (39) |
| D) BRANCH/DISCIPLINE | : | MINING AND MINE SURVEYING |
| E) RATIONAL | : | |

Mining Engineering is the application of the knowledge of science and other branches of engineering for the extraction of minerals and ores from the surface of the earth or from the underground. As such Geology becomes the first step of mining education. It is essential to know and identify mineral and ore, their modes of occurrences in the earth crust and the formation and deposition of various rocks.

As such the subject Applied Geology is introduced in the forth semester (second year) of the three years diploma course in Mining and Mine surveying. The subject deals with the following topics which are the basic for a mining diploma education, in first stage.

- a) Physical Geology
- b) Mineralogy
- c) Petrology
- d) Structural Geology
- e) Stratigraphy

Contents of the topic will cover basic aspects of Geology in mining field.

F) TEACHING AND EXAMINATION SCHEME :

| Sl. No. | Course code | Periods/Week (In Hours) | | | Scheme of Examination | | | | | | Credit [L+(T+P)/2] |
|---------|-------------|-------------------------|---|---|-----------------------|----|----|-----------|----|-------------|--------------------|
| | | L | T | P | Theory | | | Practical | | Total Marks | |
| | | | | | ESE | CT | TA | ESE | TA | | |
| 1 | 239412 (39) | 4 | 2 | - | 100 | 20 | 20 | - | - | 140 | 5 |
| 2 | 239422 (39) | - | - | 2 | - | - | - | 50 | 20 | 70 | 1 |

G) DISTRIBUTION OF MARKS AND HOURS:

| S. No. | Chapter No. | Chapter Name | Hours | Marks |
|--------|-------------|--------------------|-------|-------|
| 1. | 1 | Physical Geology | 27 | 30 |
| 2. | 2 | Mineralogy | 19 | 20 |
| 3. | 3 | Petrology | 27 | 25 |
| 4. | 4 | Structural Geology | 23 | 25 |
| Total | | | 96 | 100 |

H) DETAILED COURSE CONTENTS :

CHAPTER – 1 PHYSICAL GEOLOGY

- 1.1 Solar system, origin of the earth, various hypotheses related to origin of earth.
- 1.2 Age of the earth, various methods of age determination, radioactive methods and their advantages.
- 1.3 Interior of the earth –crust, mantle and core.
- 1.4 Weathering - physical weathering and chemical weathering. Exfoliation and spheroidal weathering.
- 1.5 Work of wind – Erosion, Transport and Deposition ventifacts, Pedestal rocks, Sand dunes and Loess.
- 1.6 Work of Rivers: Erosion Transport and Deposition, water falls, Meanders, oxbow lakes, Alluvial fans, flood plains, Delta.
- 1.7 Earth quakes : Seismograph, earthquake waves, classification of earthquakes, elastic rebound theory, Richter scale of earthquake intensity, Distribution of earthquakes
- 1.8 Volcano: Types of volcanoes, Volcanic products, Volcanic cones, distribution of volcanoes.

CHAPTER – 2 MINERALOGY

- 2.1 Definition, Physical properties of minerals – Color, Streak, Luster, hardness, Habit, Cleavage, Fracture.
- 2.2 Identification of common minerals- Orthoclase, Plagioclase, Augite, Hornblende, Biotite, Muscovite, Olivine, Quartz, Asbestos, Calcite, Dolomite, Corundum, Gypsum, Talc.

CHAPTER – 3 PETROLOGY

- 3.1 Classification of Rocks- Igneous, Sedimentary and Metamorphic.
- 3.2 Igneous rocks – Acid and basic rocks, Textures of Igneous rocks- Glassy, Vesicular, Prophyritic, Coarse grained, Medium grained, Fine grained and Cryptocrystalline. Classification – Plutonic, Hypabyssal and volcanic rocks. Tabular Classification Igneous bodies- Batholithic, Laccolith, sill and Dyke, Lava flows, Common Igneous rocks – Granite, Syenite, Gabbro, Basalt, Trachyte and Rhyolite.
- 3.3 Sedimentary rocks - definition , Classification, mechanically formed, Organically formed and chemically formed rocks, Sedimentary structures, Stratification, Lamination, graded bedding. Current bedding and ripple marks, common Sedimentary rocks- Conglomerate Sandstone, Shale, Mine stone and Breaccia.
- 3.4 Metamorphic rock – Definition, Agents of metamorphism- Heat, Uniform pressure, Directed Pressure, Chemically active fluids and gases. Structures and textures of Metamorphic rocks – Slaty, Schistose, Gneissose and Granulose . Common Metamorphic rocks – Slate, Schist, Gneiss, Quartzite and Marble.

CHAPTER – 4: STRUCTURAL GEOLOGY

- 4.1 Dip and Strike, Apparent dip and True dip.
 - 4.2 Folds- Elements of folds, Anticline and Syncline, Limbs, Axial of folds, Types of folds- Symmetrical, Asymmetrical, Overtured, Recumbent, Isoclinal, Plunging folds, Anticlinorium, Synclinorium , Open fold, Close fold ,Dome and Basin.
 - 4.3 Faults – Fault Terminology, Fault- Plan, Hade, Dip and strike, Throw, Heave, Slip, Hanging wall and foot wall. Classification of faults- Normal and reverse faults, Dip fault, strike fault and Oblique faults, High and low angle faults , Parallel faults, Steps- faults, Graben, Horst, Radial faults, Peripheral faults.
 - 4.4 Unconformities- definition, Types – Angular unconformity, Disconformity, Nonconformity.
 - 4.5 Joints- Classification- Strike joints, Dip joints, Oblique joints, Bedding joints, Master Joints, Sheet Joints and columnar joints.
- D) SUGGESTED INSTRUCTIONAL STRATEGIES :
- Lecture method
 - Industrial visits
 - Expert lecture
 - Demonstration

Reference Books:

| Sl.No. | Title | Author, Publisher, Edition & Year |
|--------|-----------------------------------|-----------------------------------|
| 1 | A Text book of Geology | K.M. Banger |
| 2 | Engineering and General Geology | Prabin Singh |
| 3 | Laboratory Manual of Geology | Ajay Kumar Sen. |
| 4 | Sedimentary rocks | Pettijohn |
| 5 | Elements of Mineralogy | Rutley's |
| 6 | Introduction to Physical Geology | A.K. Dutta |
| 7 | Structural Geology | P. Billings |
| 8 | The Principal of Petrology | Tyrrel |
| 9 | A Text book of Geology | P.K. Mukharjee |
| 10 | A Text book of Mineralogy | Dana |
| 11 | भौतिक भू विज्ञान | मुकुल घोष |
| 12 | भारत वर्ष की भू वैज्ञानिक समीक्षा | अम्बिका प्रसाद अग्रवाल |
| 13 | शैलिकी के सिद्धान्त | टरेल एवं झिंगरन |

Others -

- VCDs
- Video Cassettes
- Learning Packages

SUBJECT TITLE: APPLIED GEOLOGY LAB

Practical Code: 239422 (39)

Hours: 32

J) LIST OF PRACTICAL / TUTORIALS:

1. Identification of Minerals in hand specimen -Asbestos, Augite, Biotite, Calcite, Corundum, Dolomite, Gypsum, Hornblende, Muscovite , Kaolinite Orthoclase, Plagioclase, Quartz, Talc.
2. Identification of Rocks –
 - (i) Granite, Rhyolite, Syenite, Gabbro, Basalt, Trachyte.
 - (ii) Conglomerate, Sandstone, Shale, Limestone.
 - (iii) Slate, Schist, Gneiss, Quartzite, Marble.
3. Geological map reading and drawing simple Geological section -
 - (i) Geological maps of inclined beds.
 - (ii) Geological maps of Unconformity
 - (iii) Geological maps of Folds.

**CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,
BHILAI**

| | | | |
|----|--------------------|---|-----------------------------|
| A) | SEMESTER | : | IV |
| B) | SUBJECT TITLE | : | MINE SAFETY AND LEGISLATION |
| C) | CODE | : | 239413 (39) |
| D) | BRANCH /DISCIPLINE | : | MINING AND MINE SURVEYING |
| E) | RATIONAL | : | |

The objective of including the subject of “ Mine Safety and Legislation” is to impart basic knowledge of the act, rules, and regulations applicable in the mining industry with regards to conservation of mineral deposit, safe mining operations, and safety of the persons working in the industry. This paper of mine safety and legislation is added in the curriculum of forth semester (second year); to enable the students to acquire knowledge of latest laws applicable to mining industry. This industry being, one of the hazardous industries causing environmental pollution, exposing chances of accidents, even to the extent of fatal injuries, has effective control on incidences of accidents through a number of statutory restrictions imposed by inspecting authorities of Director General of Mines Safety under Mines Act 1952, Mines Rules 1955, Coal Mining Regulation 1957 and recently introduced legislations by the Central Pollution Control Board. Awareness of statutory framework on mining industry will be imparted to the students, through the teaching, field visits, projects, case studies and incidence analysis through use of the following in details:

1. Relevant provisions of Mines Act 1952.
2. Relevant provisions of Mines Rules 1955
3. Relevant provisions of Coal Mines Regulations 1957.
4. Vocational Training Rules.
5. Related Circulars issued by DGMS time-to-time.

It is expected that above contents will enable students to comprehend statutory duties and responsibilities of mining personnel working in mines in different capacities. This will also enable the students to comprehend various statutory provisions for operation and maintenance of safety in mines.

F: TEACHING AND EXAMINATION SCHEME:

| S.No. | Course code | Periods/ week (In Hrs.) | | | Scheme of examination | | | | | | Credit [L+(T+P)/2] |
|-------|----------------|-------------------------------|---|---|-----------------------|----|----|-----------|----|----------------|-----------------------|
| | | L | T | P | Theory | | | Practical | | Total Marks | |
| | | | | | ESE | CT | TA | ESE | TA | | |
| 1. | 239413 (39) | 4 | 1 | - | 100 | 20 | 20 | - | - | 140 | 5 |

G) DISTRIBUTION OF MARKS AND HOURS :

| S. No. | Chapter No. | Chapter Name | Hours | Marks |
|--------|-------------|---|-------|-------|
| 1. | 1 | Relevant provisions of mines act 1952 | 20 | 25 |
| 2. | 2 | Relevant provisions of mines rules 1956 | 20 | 25 |
| 3. | 3 | Relevant provisions of coal mines regulation 1957 | 20 | 25 |
| 4. | 4 | General safety in mines | 20 | 25 |
| Total | | | 80 | 100 |

CHAPTER- 1 RELEVANT PROVISIONS OF MINES ACT, 1952

- 1.1 Preliminary Definitions.
- 1.2 Mining Boards and committees.
- 1.3 Provisions as to health and safety.
- 1.4 Hours and limitations of employment.
- 1.5 Provisions regarding leaves & wages.
- 1.6 Regulations, Rules & by laws

CHAPTER-2 RELEVANT PROVISIONS OF MINES RULES, 1956

- 2.1 Preliminary Definitions
- 2.2 Committees.
- 2.3 Provisions regarding health and sanitation, Medical examination of persons employed, workman inspector and committees.
- 2.4 Provisions regarding first aid and Medical appliance.
- 2.5 Employment of persons.
- 2.6 Provisions as to leave with wages.
- 2.7 Welfare committees.
- 2.8 Provisions regarding accident, classification as per annexure I and II.
- 2.9 Equipments of first aid room and first aid station as per II and III schedule.
- 2.10 Abstract of the mines act & rule from (1) to (42) as per V schedule.

CHAPTER – 3 RELEVANT PROVISIONS OF COAL MINES REGULATIONS, 1957

- 3.1 Definitions
- 3.2 Duties and responsibilities of persons employed in mines.
- 3.3 Provisions regarding plans and sections.
- 3.4 Provisions as to mines working.
- 3.5 Provisions regarding precautions against danger from fire, dust, gas and water.
- 3.6 Ventilation.
- 3.7 Provisions as to explosives and shot firing.

3.8 Miscellaneous provisions as to symbols for mine plan and section, systematic support rules as per II and III schedule.

CHAPTER- 4 GENERAL SAFETY IN MINES

4.1 Knowledge of vocational training of persons employed in a mine.

4.2 Refresher course for mining persons.

4.3 Pit safety committee, formation, function and organizations.

Reference Books –

| Sl.No. | Title | Author, Publisher, Edition and Year |
|--------|---|-------------------------------------|
| 1. | Mines Act, 1952 up-to-date | DGMS |
| 2. | Mines Rules, 1555 up-to-date | DGMS |
| 3. | Coal Mines Regulations, 1957 up-to-date | DGMS |
| 4. | Legislation in Indian mines- A critical appraisal | Rakesh and Prasad |

**CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,
BHILAI**

| | | | |
|----|--------------------|---|---------------------------|
| A) | SEMESTER | : | IV |
| B) | SUBJECT TITLE | : | MINE SURVEYING |
| C) | CODE | : | 239414 (39) |
| D) | BRANCH /DISCIPLINE | : | MINING AND MINE SURVEYING |
| E) | RATIONAL | : | |

After understanding the Importance, procedure and carrying out land surveying project individually in the curriculum of second semester . A student has acquired a level of knowledge of which he will now be made equated with the under ground surveying for mines with the help of more sensitive and accurate surveying equipments. this skill will be developed with the theoretical and practical coaching of the following subjects -

1. Miner's Dial
2. levelling
3. contouring
4. subsidence surveying
5. Theodolite
6. Dip strike & Borehole Problems
7. Study of mines plans and sections.

it is expected that a student will be able to carryout under-ground mine surveys and prepare mine plan as required by the statutory provisions of coal mines regulation 1957.

F) TEACHING AND EXAMINATION SCHEME:

| Sl. No | Course Code | Periods/ Week (In Hours) | | | Scheme of Examination | | | | | | Credit [L+(T+P)/2] |
|--------|----------------|--------------------------------|---|---|-----------------------|----|----|-----------|----|----------------|-----------------------|
| | | L | T | P | Theory | | | Practical | | Total Marks | |
| | | | | | ESE | CT | TA | ESE | TA | | |
| 1. | 239414 (39) | 4 | 2 | - | 100 | 20 | 20 | - | - | 140 | 5 |
| 2. | 239423 (39) | - | - | 3 | - | - | - | 50 | 20 | 70 | 2 |

G) DISTRIBUTION OF MARKS AND HOURS :

| S. No. | Chapter No. | Chapter Name | Hours | Marks |
|--------|-------------|----------------------------------|-------|-------|
| 1. | 1 | Miner's Dial | 12 | 10 |
| 2. | 2 | Levelling | 17 | 20 |
| 3. | 3 | Contouring | 17 | 20 |
| 4. | 4 | Subsidence surveying | 10 | 10 |
| 5. | 5 | Theodolite | 17 | 20 |
| 6. | 6 | Dip strike & Borehole Problems | 11 | 10 |
| 7. | 7 | Study of mine plans and sections | 12 | 10 |
| Total | | | 96 | 100 |

G) DETAILED COURSE CONTENTS:

CHAPTER -1 MINERS DIAL

- 1.1 Introduction and general description.
- 1.2 Taking bearing & observations with a dial.
- 1.3 Method of dial Traversing -
 - i) Loose or free needle methods.
 - j) Fast or fixed needle methods
- 1.4 Measurement of Included angles
- 1.5 Fixing of under ground survey station.
- 1.6 Transfer of survey station from floor to roof and from roof to floor.
- 1.7 Setting of instrument under roof station.
- 1.8 Under ground traversing with a dial.
- 1.9 Marking of centre line of a gallery.
- 1.10 Marking of centre line in a given direction.

CHAPTER- 2 LEVELLING

- 2.1 Introduction, purpose of levelling.
- 2.2 Definition and terminology.
- 2.3 Different types of levels.
- 2.4 Principle and constructional details of Dumpy and Tilting level.
- 2.5 Levelling staves , types of staves.
- 2.6 Graduation and least count types of diaphragms.
- 2.7 Adjustment of levelling instruments – Temporary and permanent.
- 2.8 Concept of datum, Back sight, Fore sight, Station, Change point, height of instrument
- 2.9 Level book, Booking of levels, Reduction of level.

- 2.10 Height of instrument or collimation, Rise and fall, Arithmetical check.
- 2.11 Differential levelling and check levelling.
- 2.12 Problems on reduction of level.
- 2.13 Balancing or equalizing of back sight and fore sight distance.
- 2.14 Types of levelling.
- 2.15 Errors in levelling and precaution to minimize the errors.
- 2.16 Practical problems in levelling work as – Levelling across summits and depression, Across a wall.
- 2.17 Degree of precision in levelling, closing error and its adjustment.
- 2.18 Testing and adjusting of Dumpy and Tilting levels.
- 2.19 Permanent adjustment of levels.
- 2.20 Methods of Traversing and plotting of traverse.

CHAPTER-3 COUNTERING

- 3.1 Introduction and concept.
- 3.2 Purpose of counterering.
- 3.3 Object of counterering.
- 3.4 Horizontal equivalent.
- 3.5 Counter interval.
- 3.6 Factors affecting counter interval.
- 3.7 Characteristic of counters.
- 3.8 Method of counterering – Direct method, Indirect method.
- 3.9 Interpolation of contours methods:
 - i) Estimation method,
 - ii) Arithmetical method.
 - iii) Graphical method
- 3.10 Plotting of contour maps.
- 3.11 Use of contour Maps

CHAPTER- 4 SUBSIDENCE SURVEY

- 4.1 Definitions.
- 4.2 Fixing of survey station.
- 4.3 Transfer of colliery benchmark to the subsidence area.
- 4.4 Determination of position of a survey station (longitudinal) displacement.
- 4.5 Determination of reduced level of survey station.
- 4.6 calculation of Subsidence – Lateral displacement, Vertical displacement.
- 4.7 Precautions during subsidence survey.
- 4.8 Preparation of subsidence plans and section.

CHAPTER-5 THEODOLITE

- 5.1 Introduction
- 5.2 Classification of theodolite -
 - a. Transit and non –transit theodolites

- b. Vernier theodolites
- c. Micro-optic theodolites
- d. Electronic theodolites.
- 5.3 Essential parts of the transit vernier theodolites.
- 5.4 Definition and the terms used.
- 5.5 Fundamental axis of theodolites and their relationship.
- 5.6 Temporary adjustment of theodolites
 - i) Setting over the stations
 - ii) Levelling up the instrument
 - iii) Elimination of parallax and focusing of object.
- 5.7 Method of taking readings – Vernier reading, calculation of least count
- 5.8 Measurement of horizontal and vertical angles – General method, Repetition method, Reiteration method
- 5.9 Booking of readings
- 5.10 Method of traversing, plotting survey work

CHAPTER – 6 DIP, STRIKE AND BORE HOLE PROBLEMS :

- 6.1 Definition of borehole surveying
- 6.2 Purpose of borehole surveying
- 6.3 Definition of dip, strike, true and apparent dip
- 6.4 Relation between true dip, apparent dip and angle between them
- 6.5 Numerical problems on dip, strike and borehole surveying

CHAPTER – 7 MINE PLANS AND SECTIONS

- 7.1 General requirement of mine plans
- 7.2 Types of plans and their scale
- 7.3 Symbols used in mine plans
- 7.4 Preparation of plans and sections
- 7.5 Plotting of traverse
- 7.6 Checking accuracy of old mine plans
- 7.7 Planimeter and its uses
- 7.8 Enlargement and reduction of plans
- 7.9 Mines regulations concerning above topics

Reference Books –

| Sl.No. | Title | Author, Publisher, Edition & year |
|--------|------------------------------------|-----------------------------------|
| 1. | Surveying and leveling ,vol I & II | T.P. Karnetkar |
| 2. | Surveying , vol I & II | B.C. Punamia |
| 3. | Advance Surveying , Vol I & II | Alam Chand |
| 4. | Advance surveying | D.C. Clark |
| 5. | Surveying , vol I & II | Arora |

Others -

- VCDs
- Video Cassettes
- Learning Packages

SUBJECT TITLE: MINE SURVEYING LAB

Practical Code: 239423 (39)

Hours: 48

LIST OF PRACTICAL / TUTORIALS:

2. To take the bearing of given lines and measure the included angles by the verniers of the dial.
3. To traverse the area by loose needle method with miner's dial.
4. To traverse a given area by fast needle method with miner's dial.
5. To sketch and describe a dumpy level.
6. Use and application of a micro optic level.
7. Find out the reduced level of different points with a given datum.
8. To carry out differential levelling and check the work by the levelling.
9. To draw a longitudinal profile along with a chain line.
10. To draw a cross section across given chain line.
11. To draw a contour of given area by direct and indirect methods.
12. To conduct a complete subsidence survey in a given area.
13. To calculate the contours of required reduced level and to plot the subsidence work with a suitable scale.
14. To sketch and describe a transit vernier theodolite.
15. To measure the horizontal angle by repetition method with a theodolite.
16. To measure the horizontal angle by reiteration method with a theodolite.
17. Study of mine plans & sections.

**CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,
BHILAI**

| | |
|-----------------------|-----------------------------|
| A) SEMESTER | : IV |
| B) SUBJECT TITLE | : WINNING AND WORKING COAL |
| C) CODE | : 239415 (39) |
| D) BRANCH /DISCIPLINE | : MINING AND MINE SURVEYING |
| E) RATIONAL | : |

Though the present trend of mining is for open cast mining, the importance of underground mining can not be ignored. The deep deposits of coal can only be worked by underground mining. It is also a fact that accident ratio are more in under-ground mining than in open cast mining, yet where the Over Burden ratio is beyond working limit, under ground mining becomes the necessity. This course is designed to make students comprehend different mining methods used for underground mining of coal, safety measures and management of other related operations such as.

F) TEACHING AND EXAMINATION SCHEME:

| S. No. | Course Code | Periods/week (In Hrs.) | | | Scheme of examination | | | | | | Credit [L+(T+P)/2] |
|--------|----------------|---------------------------|---|---|-----------------------|----|----|-----------|----|----------------|-----------------------|
| | | L | T | P | Theory | | | Practical | | Total Marks | |
| | | | | | ESE | CT | TA | ESE | TA | | |
| 1. | 239415 (39) | 4 | 2 | - | 100 | 20 | 20 | - | - | 140 | 5 |

G) DISTRIBUTION OF MARKS AND HOURS :

| S.No. | Chapter No. | Chapter Name | Hours | Marks |
|-------|-------------|---|-------|-------|
| 1. | 1 | Introduction to pit top and pit bottom lay out. | 19 | 20 |
| 2. | 2 | Board and Pillar method of Working | 19 | 20 |
| 3. | 3 | Longwall method of Working | 19 | 20 |
| 4. | 4 | Horizon Mining | 19 | 20 |
| 5. | 5 | Thick seam working | 20 | 20 |
| Total | | | 96 | 100 |

CHAPTER- 1 INTRODUCTION TO PIT TOP AND PIT BOTTOM LAY OUT.
 1.1 Ideal pit top and pit bottom layout.
 1.2 Tub circuit
 1.3 Study of pit top and pit bottom lay outs of important U/G mines of India.

CHAPTER- 2 BOARDS AND PILLAR METHOD OF WORKING
 2.1 Board and Pillar method of Working under following.
 (a) Working thin seams.

- (b) Working thick seams.
 - (c) Working very thick seams in Sections.
 - (d) Working contiguous thick seams.
 - (e) Working below ponds, reverses, railways etc.
 - (f) Working seams liable to spontaneous heating and / or highly gassy.
- 2.2 Mechanised board and pillar working
- (a) With SDL / tub combination LHD/Tub combination
SDL/chain conveyor combination
 - (b) Scraper/ loader.
 - (c) Continuous miner-road headers, dirt headers layouts.
- 2.3 Advantages of panel system over board and pillar.

CHAPTER- 3 LONGWALL METHOD OF WORKING

- 3.1 Suitable working conditions
- 3.2 Comparison between Advancing and Retreating method of longwall working.
- 3.3 Layout of single unit and double unit faces, roof support in the system.
- 3.4 Single ended drum. Double ended drum. layouts, sumping method.
- 3.5 Ploughs- applicability construction layout.
- 3.6 Mechanised long wall mining
 - A- Layout
 - B - Conveyors
 - C- Drum Shearer

CHAPTER- 4 INTRODUCTION TO HORIZON MINING

- 4.1 Conditions, suitability and limitation.
- 4.2 Methods of working.
- 4.3 Study of some horizon mining cases of India.

CHAPTER-5 THICK SEAM WORKING

- 5.1 Multi section working with stowing (ascending order)
- 5.2 Multi section working in descending order.
- 5.3 Multi section working with thick coal partings and caving.
- 5.4 French method of working thick seam.
- 5.5 Problem in mining thick seam, 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.

G) SUGGESTED INSTRUCTIONAL STRATEGIES :

- Lecture method
- Industrial visit
- Expert Lecture
- Demonstration

F) SUGGESTED LEARNING RESOURCES :

a) **Reference Books -**

| Sl.No. | Title | Author, Publisher, Edition and Year |
|--------|--------------------------------------|-------------------------------------|
| 1. | Mines planning for coal | S.P. Mathur |
| 2. | Surface Mining Technology | Sameer Kumar |
| 3. | Modern Coal mining Technology | -- -- |
| 4. | Coal Mine Ground Control Vol- II | Syed. S. Peng |
| 5. | Under ground Winning of coal | T.N. Singh |
| 6. | Mine Working Part I & II | H.N. Karmkar |
| 7. | Elements of Mining Technology, Vol.I | D.J.Deshmukh |

**CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,
BHILAI**

- A) **SEMESTER** : **IV**
 B) **SUBJECT TITLE** : **INDUSTRIAL TRAINING**
 C) **CODE** : 239424 (39)
 D) **BRANCH/DISCIPLINE** : **DIPLOMA PROGRAMME IN MINING AND MINE SURVEYING**

E) RATIONALE:

Industrial Training is one of the most essential components for a diploma graduate in Mining and Mine Surveying. The sole purpose of industrial training is to expose the students to “real life” situations. Different aspect of mining such as geology, exploration, selection of method of working, selection of machines for mining, environmental controls and measures, safety in mines and various statutory provisions can only be understood when the students are exposed to different mine workings. Students will cover different coal and metal mines both underground and opencast in such a way that at the end of the completion of diploma programme, they are conversant with different mining conditions. Industrial training also opens avenues of new learning to the students and apply them during their project and industrial training presentations.

F) TEACHING AND EXMINATION SCHEME:

| Course Code | Periods/Week (In Hours) | | | Scheme of Examination | | | | | | Credit [L+(T+P)] |
|----------------|----------------------------|---|---|-----------------------|----|----|-----------|----|-------------|---------------------|
| | L | T | P | Theory | | | Practical | | Total Marks | 2 |
| 239424 (39) | | | | ESE | CT | TA | ESE | TA | | |
| | - | - | 1 | - | - | - | 50 | 40 | 90 | 1 |

Note: Student will undergo on industrial practical training for 2 months after/before end of semester examination

L : Lecture hours : T : Tutorial hours, P : Practical hours

ESE – End of Semester Exam.; CT – Class Test; TA- Teacher’s Assessment of the Training Report.

G) SUGGESTED DISTRIBUTION OF MARKS AND DURATION:

| Sl. No. | Items | Duration | Marks |
|----------------|---------------------------------------|-----------------|--------------|
| 1 | Preparation of report format | 2 Hrs | 15 |
| 2 | Industrial Training | 08 Weeks | 20 |
| 3 | Report Writing | 01 week | 15 |
| 4 | Report Presentation | - | 10 |
| 5 | Seminar | - | 10 |
| 6 | End of the semester exam viva voce | - | 20 |
| TOTAL | | 09 Weeks | 90 |

Before going for training, the students will prepare various formats for data collection based on the topic of training assigned to them. The students will be given specific assignments for the period of training. During the course of training students will complete weekly report, assignments and keep weekly attendance updated. On completion of training each student will submit a report of training and make a presentation before the group of students. Teacher assessment will be done during the training, on presentation of training and at the end of semester examination. A seminar will be organized on specific topics identified by the teacher and the students will present their experiences earned during the training on the specific tasks. End of the semester examination will be an external exam.