



S. No.	Board of Studies (BOS)	Courses (Subject)	Subject Code	Period Per Week			Scheme of Examination			Total Marks	Credits
				L	T	P	Theory/ Lab				
							ESE	CT	TA		
1	Electrical Engineering	Mine Electrical Engineering	2039C01BT039	2	1	-	100	20	20	140	3
2	Electrical Engineering	Mine Electrical Engineering (Lab)	2039C01BL039	-	-	2	40	-	20	60	1

Unit-1.0: BASIC CONCEPTS

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

Unit-2.0: A.C. CIRCUIT

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

Unit-3.0: Electrical Equipment Used in Mines

- 3.1 Flameproof and intrinsically safe apparatus – construction, testing,
- 3.2 Mining type switchgear: Gate End Box, Drill Panel, Air Circuit Breakers, Oil Circuit Breakers, Vacuum Circuit Breakers
- 3.3 Transformers for mines: 3.3 kV/550 V, 6.6 kV/1100 V

Unit-4.0: Electrical Safety and Protection in Mines

- 4.1 Hazards of electricity in mines: shock, fire, explosion in gassy mines
- 4.2 Electrical protection systems:
- 4.3 Overload, short-circuit, under-voltage protection
- 4.4 Electrical accidents – causes, prevention, first aid, shock treatment chart
- 4.5 Statutory provisions: Electricity Rules applicable to mines

Unit-5.0: Maintenance, Testing and Energy Conservation

- 5.1 Preventive and breakdown maintenance schedule of mine electrical equipment



5.2 Modern trends: variable frequency drives (VFD), energy-efficient motors, solar power in mines

5.3 Case studies of electrical accidents in Indian mines .

Reference Books-

S. No.	Titles	Author, publisher
1.	Electrical Equipment in Mines	Singh, Deshmukh & Deshpande
2.	Indian Electricity Act 2003	--
3.	A Treatise on Flameproof Equipment	S.K. Gupta
4.	DGMS Circulars (Electrical)	--
5.	भारतीय विद्युत् अधिनियम 2003	भारत सरकार

**SUBJECT- MINE ELECTRICAL ENGINEERING (LAB)**

Laboratory instruction number	Short laboratory experiment titles	Assessment of laboratory work (Marks)		
		Performance		Viva-Voce
		PRA	PDA	
1	Identification and study of flameproof and intrinsically safe apparatus			
2	Study of mining-type cables			
3	Verify Ohm's Law. Verify KCL & KVL.			
4	Study of electrical control circuit of coal drill / Gate End Box			
5	Study of Mine Power Distribution System			
6	Testing of Mine Signaling and Communication Equipment			
7	Measurement of current, voltage and power in 3-phase load			
8	Study of electrical braking and safety devices in mine winder			
9	Study of Electrical Safety Devices in Mines (e.g., Earth Leakage Circuit Breakers - ELCB)			



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				L	T	P	Theory/ Lab				
							ESE	CT	TA		
1	Mining Engg.	Elements of Mining Technology	2039C02BT039	2	1	-	100	20	20	140	3

Unit-1.0: Introduction

- 1.1. Scope and Importance of Mining: Role in national economy
- 1.2. Enlists Different Classification of mining methods
- 1.3. Basic common mining terminologies used in coal mining- Underground (UG) and Opencast (OC).
- 1.4. Geographical locations of major mineral deposits in india.
- 1.5. Prepare a map of Mineral Wealth of Chhattisgarh.

Unit-2.0: Mode of entry

- 2.1. Different types of mode of entry (Shaft, Incline and Adit)
- 2.2. Site selection for different modes of entries.
- 2.3. Condition suitable to site selection of a suitable mode of entries
- 2.4. Factors governing shape and size of different modes of entry.
- 2.5. Compare different mode of entries.
- 2.6. Drivage of incline and Adit by road header machine

Unit-3.0: Shaft Sinking

- 3.1. Sinking of shaft in different types of strata.
- 3.2. Marking of center of shaft.
- 3.3. Temporary and permanent lining, scaffolding, rider, spider.
- 3.4. Face preparation & Firing shots in sinking shaft.
- 3.5. Precaution during shaft sinking operation.
- 3.6. Special methods of shaft sinking.

Unit-4.0 Drilling/ boring

- 4.1. Drilling/boring in different types of strata.
- 4.2. Principles of drilling / boring.
- 4.3. Purposes of drilling / boring in mining
- 4.4. Types of drill and drill bits, drilling accessories, drill ability of rock.
- 4.5. Surface arrangement for Drilling/boring.
- 4.6. Safety aspects to be observed drilling/boring

Unit-5.0 Methods of mining

- 5.1. Classification of methods of mining.
 - 5.1.1 Opencast mining
 - 5.1.2 Underground mining-
 - 5.1.2.1 U/G Coal Mining: Bord and Pillar and Mining Longwall Mining



- 5.1.2.2 U/G Metal Mining: Different stoping methods
- 5.2. Various parameters for Selection of suitable methods of mining.
- 5.3. Special methods of mining i.e., Placer, dredging, hydraulic, highwall, shortwall, solution, strip, Gasification, auger and leaching mining.

Reference Books:

S. No.	Titles	Author, Publication
1	Elements of Mining Technology Vol. I	D.J. Deshmukh
2	Principles and Practices of Modern Coal Mining	R.D. Singh
3	Introductory Mining Technology	S. Ghatak
4	U.G. Mining Methods (Coal)	T.N. Singh
5	खनीकर्म के मूलतत्व भाग 1	डी जे देशमुख



Sl. No.	Board of Studies (BOS)	Courses (Subject)	Subject Code	Period Per Week			Scheme of Examination			Total Marks	Credits
				L	T	P	Theory/ Lab				
							ESE	CT	TA		
1	Mining Engg.	Applied Geology	2039C03BT039	2	1	-	100	20	20	140	3
2	Mining Engg.	Applied Geology (Lab)	2039C02BL039	-	-	2	40	-	20	60	1

UNIT-1.0: Introduction to Physical Geology

- 1.1 Scope and importance of geology in mining engineering- Definition and branches of geology, Role in site selection, exploration, safety, and stability.
- 1.2 Various methods to determination of age of the earth.
- 1.3 Geological Processes and Hazards- Physical processes: Weathering (physical, chemical), erosion, transportation, deposition - Mass wasting: Types (landslides, rockfalls), causes, and prevention in mines - Endogenic processes: Volcanism, earthquakes, seismic zones in India.
- 1.4 Internal structure of the Earth: Crust, mantle, core; plate tectonics and continental drift.
- 1.5 Elementary knowledge of weathering, work of wind and work of rivers in formation of geological structures.

UNIT-2.0: Mineralogy

2.1 Introduction to Mineralogy

Definition of mineral; crystal vs. amorphous - Crystal systems (cubic, tetragonal, orthorhombic, etc.) – basic forms - Importance in mining: ore minerals, gangue, alteration products.

Rock-Forming Minerals- Silicates: Quartz, Feldspar (orthoclase, plagioclase), Mica (muscovite, biotite), Pyroxene (augite), Amphibole (hornblende), Olivine - Non-silicates: Calcite, Dolomite, Gypsum.

2.2. Basics of Mineralogy

Diagnostic Physical properties of minerals – crystal form, Colour, Streak, Luster, hardness, Cleavage, Fracture

- 2.3. Ore Minerals (Metallic & Non-Metallic)- Ferrous: Hematite, Magnetite, Pyrite, Siderite - Non-Ferrous: Chalcopyrite, Galena, Sphalerite, Bauxite - Precious: Native Gold, Silver - Industrial: Graphite, Asbestos, Fluorite, Barite.

- 2.4. Uses of mineral identification instrument like goniometer, streak plate, knife, Geology Hammer, Geiger Counter glass plate, magnifying glass.

UNIT-3.0: Petrology

- 3.1 Introduction to Petrology- Definition; rock cycle - Texture vs. structure; megascopic vs. microscopic study - Role in mining: host rocks, overburden, roof/floor competence.

- 3.2 Igneous Petrology- Formation: Magma crystallization, Texture, silica % (acidic, basic, ultrabasic) - Common Rocks: Granite, Syenite, Diorite, Gabbro, Basalt, Dolerite, Pegmatite –



3.3 Sedimentary Petrology- Formation: Weathering → transportation → deposition → diagenesis - Classification: Clastic (conglomerate, sandstone, shale), Chemical (limestone, rock salt), Organic (coal, lignite) – Structures, Mining Relevance: Coal seams, aquifer rocks.

3.4 Metamorphic Petrology- Agents: Heat, pressure, chemically active fluids - Types: Thermal, dynamic, metasomatism - Classification: Foliated (slate, phyllite, schist, gneiss), Non-foliated (marble, quartzite) - Grade: Low (slate), medium (schist), high (gneiss).

Unit-4.0: Structural Geology

4.1 Structural Control on Mineral Deposits- Folded veins, fault-fill deposits, saddle reefs.

4.2 Dip and Strike, Apparent dip and True dip.

4.3 Folds- definition, Elements of fold, types of fold, Identification of fold in map and field.

4.4 Fault – definition, Fault Terminology, elements of fault. Classification and type of faults.

4.5 Unconformities- definition, Types. Identification of Unconformity in map and field.

4.6 Joints-Classification- Strike joints, Dip joints, Oblique joints, Bedding joints, Mural Joints, Sheet Joints and columnar joints.

Unit-5: Economic Geology

5.1. Ore genesis: Magmatic, hydrothermal, sedimentary processes; syngenetic and epigenetic deposits.

5.2. Distribution of coal and major metallic deposits in India.

5.3. Reserve estimation: Classification (proved, probable, possible); role of geology in mine valuation.

Reference Book:

S.No.	Title Name	Author
1	Principles of Engineering Geology	K.M. Bangar
2	A Textbook of Geology	G.B. Mahapatra
3	Geology for Engineers	B.L. Gupta & A.K. Gupta
4	Engineering and General Geology	Parbin Singh
5	प्रायोगिक भू-विज्ञान	डॉ दीपक राज तिवारी



SUBJECT- APPLIED GEOLOGY (LAB)

Laboratory Instruction Number	Short Laboratory Experiment Titles	Assessment of Laboratory Work (Marks)		
		Performance		Viva-Voce
		PRA	PDA	
1.	Sketch and draw features of solar system			
2.	Observe effects of physical (freeze-thaw) and chemical (acid on limestone) weathering on rock samples.			
3.	Perform hardness tests on given mineral samples using standard kit.			
4.	Determine color, streak, luster, hardness, cleavage, and specific gravity of 20 mineral samples (10 rock-forming + 10 ore minerals)			
5.	Identify 20 rock samples (8 igneous, 7 sedimentary, 5 metamorphic) using texture, color, mineral composition.			
6.	Identify the igneous, sedimentary and metamorphic rock with texture and Structure.			
7.	Draw outcrop sketches of folded beds, faulted contact, unconformity from models/photograph.			
8.	Draw and sketch different types of Unconformity			
9.	Draw and sketch different types of fold and fault.			
10.	Prepare maps and models used in economic evaluation			
11.	Identify ore minerals and host rocks in hand specimens.			



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				L	T	P	Theory/ Lab				
							ESE	CT	TA		
1	Mining Engg.	Basics of Mine Surveying	2039C04CT039	2	1	-	100	20	20	140	3
2	Mining Engg.	Basics of Mine Surveying (Lab)	2039C03CL039	-	-	2	40	-	20	60	1

Unit-1.0: Introduction

- 1.1 Definition and Objects of surveying
- 1.2 Classification of survey
- 1.3 Principles of surveying
- 1.4 Measurement-
 - 1.4.1 Linear measurement
 - 1.4.2 Angular measurements
- 1.5 Measurement of distances
 - 1.5.1 Direct method
 - 1.5.2 Computation method
- 1.6 Instruments used for horizontal measurement: pacing, passometer, pedometer, odometer, speedometer etc.

Unit-2.0: Chain Surveying

- 2.1. Purpose and principle of chain surveying.
- 2.2. Equipment used in chain surveying- chain, tape, ranging rods, arrows, pegs, cross staff & its type, optical square their construction and uses
- 2.3. Different operations in chain surveying-
 - 2.3.1. Direct and indirect ranging,
 - 2.3.2. chaining on flat and sloping ground,
 - 2.3.3. perpendicular and oblique offsetting.
- 2.4. Conducting chain survey recording field data plotting the survey work using conventional sign.
- 2.5. Obstacles and errors in chain surveying.
- 2.6. Corrections for erroneous length of chain and simple problem.
- 2.7. Testing, and adjustment of chain.

Unit-3.0: Compass Surveying

- 3.1. Compass surveying & Purpose of compass surveying.
- 3.2. Construction and working of surveyor compass.
- 3.3. Construction and working of prismatic compass.
- 3.4. Comparison between surveyors and prismatic compass.
- 3.5. Concept of
 - 3.5.1. meridian- true, magnetic and arbitrary meridians.
 - 3.5.2. bearing-true, magnetic and arbitrary, and declination.
- 3.6. System of measuring the bearings-



Whole circle bearing (W.C.B.)

Reduced bearing (Q.B.)

Problems on conversion of bearings.

3.7. Fore bearing and back bearing of a line

3.8. Concept of a traverse- open and closed traverse.

3.9. Local attraction: causes, detection, error and applying correction.

3.10. Checks for an open and closed traverse.

3.11. Calculation of included angle from bearing and vice-versa.

Error, precaution and adjustment in compass surveying.

Unit-4.0: Plain Table Surveying

4.1 General Introduction. Purpose of plane table surveying.

4.2 Equipments used in plane table surveying, plane table. Alidade - plane and telescopic.

4.3 Operation of plane table, centering, leveling, orientation. Important precautions while plane table surveying.

4.4 Introduction about methods of plane table survey : (i) Radiation (ii) Intersection (iii) Traversing (iv) Resection.

4.5 Advantages and disadvantages of plane table surveying.

Unit 5.0 Computation of Area and Volume

5.1. Trapezoidal Rule.

5.2. Simpsons Rule.

5.3. Computation of area by Trapezoidal Rule and Simpsons Rule.

5.4. Computation of volume by Trapezoidal Rule and Simpsons Rule.

5.5. Computation of Area & volume by Mid and Average ordinate Rule.

5.6. Area calculation using Planimeter instrument

Reference Books:

S. No.	Titles	Author, Publication
1	Surveying and Levelling (Vol. 1)	Dr. B.C. Punmia
2	Mine Surveying	S. Ghatak
3	Elements of Mining Surveying	L. C. Sharma
4	Surveying (Vol. I & II)	K.R. Arora
5	सर्वेक्षण एवं छेत्र कार्य भाग – 1	बी . सी. पुनमिया, अशोक कुमार जैन, अरुण कुमार जैन
6	प्रारम्भिक सर्वेक्षण भाग– 1	गुरचरण सिंह



Laboratory instruction number	Short laboratory experiment titles	Assessment of laboratory work (Marks)		
		Performance		Viva-Voice
		PRA	PDA	
1	To check and adjust the accuracy of a pedometer/passometer.			
2	Sketch and describe various types of chain and tape use in chain survey.			
3	Ranging and chaining of a line about 50 meter in length.			
4	Describe the procedure of traversing by chain and tape.			
5	Measurement of included angle with the help of a prismatic compass.			
6	Calculate the effect of local attraction and apply corrections.			
7	Calculate least count of a given Vernier dial.			
8	Measure bearings of given lines and calculate included angle between them.			
9	Measurement of deflection angle and calculation of bearings.			
10	Traversing through plain Table surveying- Radiation, Intersection, Resection			
11	Computation of area by Trapezoidal Rule and Simpsons Rule.			
12	Computation of volume by Trapezoidal Rule and Simpsons Rule.			



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				L	T	P	Theory/ Lab				
							ESE	CT	TA		
1	Mining Engg.	Mine Ventilation	2039C05CT039	2	1	-	100	20	20	140	3
2	Mining Engg.	Mine Ventilation (Lab)	2039C04CL039	-	-	2	40	-	20	60	1

Unit-1.0: Mine Air and Gases

- 1.1 Composition and Contamination of Mine Air, Classification and Properties of Mine Gases- Inflammable Gases (Fire Damps):
- 1.2 Toxic/Noxious Gases (Black Damp, White Damp, Stink Damp) Afterdamp and Blackdamp
- 1.3 The gas laws.
- 1.4 Principle, construction & working of - Flame Safety Lamps, Methanometer, multi-gas detectors.
- 1.5 Physiological effects of gases on miners and preventive measures.

Unit-2.0: Mine Climate and Environmental Control

- 2.1. Sources of heat in mines, temperature measurement, and geothermal gradient.
- 2.2. Humidity and moisture: Relative humidity, wet/dry bulb temperatures, measurement using whirling hygrometer.
- 2.3. Cooling power of mine air: Determination using Kata thermometer, methods to improve cooling power.
- 2.4. Effects of heat, humidity, and dust on workers; dust control techniques and respirable dust standards.

Unit-3.0: Natural and Mechanical Ventilation

- 3.1 Standards of ventilation: Minimum/maximum air velocity, quantity requirements for different mine locations.
- 3.2 Natural ventilation: Principles, motive column, natural ventilation pressure (NVP) calculations, factors affecting NVP, limitations.
- 3.3 Mechanical ventilation: Types of fans (centrifugal and axial flow), principles, characteristics curves, exhaust vs. forcing types.
- 3.4 Ascensional and descensional ventilation.
- 3.5 Fan arrangements: Series and parallel operations, reversal of air current, comparison of fan types.



Unit-4: Air Distribution and Ventilation Systems

- 4.1 Laws of airflow: Atkinson's equation, friction factors, resistance in airways.
- 4.2 Air distribution: Splitting methods, advantages/disadvantages, equivalent orifice calculations.
- 4.3 Auxiliary ventilation: Methods (line brattice, ducting), advantages, hazards, precautions.
- 4.4 Booster fans: Purpose, installation precautions, associated dangers; ascensional vs descensional ventilation.
- 4.5 Accessories of ventilation used in mines –Door, Airlock, regulator, stopping, air crossing, brattice partitions.

Unit-5: Ventilation Survey and Monitoring

- 5.1 Measurement instruments: Anemometer (vane type) for quantity, velometer for velocity, pitot-static tube and manometer for pressure.
- 5.2 Conducting pressure and quantity surveys: Procedures, precautions, data interpretation.
- 5.3 Quantity survey, pressure survey, pressure-quantity (P-Q) survey Tracer gas survey, smoke tube survey.

Reference Books:

S.No.	Title name	Author
1	Mine Environment & Ventilation	G.B. Mishra
2	Mine Ventilation (Vol. I & II)	S. Ghatak
3	Practical Mine Ventilation	B.C. Mukherjee
4	Mine Ventilation & Air Conditioning	H.L. Hartman
5	खनिकम के मूलतत्त्व खण्ड-२	डी.जे. देशमुख

**SUBJECT- MINE VENTILATION (LAB)**

Laboratory Instruction Number	Short Laboratory Experiment Titles	Assessment of Laboratory Work (Marks)		
		Performance		Viva-Voice
		PRA	PDA	
1.	Study of flame safety lamp: Assembly, gas cap observation, methane percentage estimation.			
2.	Determination of Relative Humidity using Whirling Hygrometer			
3.	Determination of Cooling Power using Kata Thermometer			
4.	Calculation of Natural Ventilation Pressure (NVP)			
5.	Series and Parallel Operation of Fans			
6.	Construction and Testing of Permanent Stopping			
7.	Study and Precautions for Booster Fan Installation			
8.	Operation of Ventilation Doors and Airlocks			
9.	Velocity Measurement using Smoke Tube and Velometer			
10.	Air Quantity Survey in a Ventilation Circuit			
11.	Preparation of Ventilation Plan with Survey Data			



Sl. No.	Board of Studies (BOS)	Courses (Subject)	Subject Code	Period Per Week			Scheme of Examination			Total Marks	Credits
				L	T	P	Theory/ Lab				
							ESE	CT	TA		
1	Humanities	Indian Traditional Knowledge: Science and Practices	2039C06ET046	1	-	-	-	-	20	20	1

Course Objectives:

1. Creating awareness amongst the youths about the true history and rich culture of the country;
2. Understanding the scientific value of the traditional knowledge of Bhārata;
3. To familiarize learners with major sequential development in Indian science, engineering and technology.
4. To review & strengthen the ancient discovery and research in physics, chemistry, maths, metallurgy, astronomy, architecture, textile, transport, agriculture and Ayurveda etc.
5. To understand the importance of functional, aesthetic, psychological, culture and socio religious concept of ancient India architecture.

Course Outcomes:

1. Student understands the various traditional practices of ancient India.
2. They have been introduced to some concepts of Ancient Indian Physics and Chemistry.
3. They have been introduced to some concepts of Ancient Indian Science (Metallurgy, Astronomy & Astrology).
4. They have been introduced to some fields of IKS like Ancient Architecture and Engineering.

UNIT I: Bhāratīya Civilization and Development of Knowledge System (6 Hours)

Genesis of the land, Antiquity of civilization, On the Trail of the Lost River, Discovery of the Saraswatī River, the Saraswatī-Sindhu Civilization, Traditional Knowledge System, Introduction to Vedas, A synopsis of the four Vedas, Sub-classification of Vedas, Vedic Life: A Distinctive Features, Ancient Education System, the Takṣaśilā University, the Nālandā University, Knowledge Export from Bhārata.

UNIT II: ANCIENT INDIAN SCIENCE (8 Hours)



Physics in India: Vaisheshika darshan Atomic theory & law of motion, theory of panchmahabhoota, Brihath Shathaka (divisions of the time, unit of distance), bhaskaracharya (Theory of gravity, surya siddhanta & sidhanta shriomani), Lilavati (gurutvakashan Shakti).

Chemistry in India: Vatsyayana, Nagarjuna, Khanda, Al-Biruni, Vagbhaṭa –building of the ras-shala (laboratory), working arrangements of ras-shala, material and equipment, Yaśodhara Bhaṭṭa-process of distillation, apparatus, saranasamskara, saranataila

UNIT III: ANCIENT INDIAN TECHNOLOGY

(8 Hours)

Metallurgy in India: Engineering Science and Technology in the Vedic Age and Post-Vedic Records, Mining and ore extraction, Survarṇa (gold), Rajata (silver), Tamra (copper), Loha (iron), Vanga (tin), Naga / sisa (lead), Pittala (brass), and steel in ancient India, Apparatuses used for extraction of metallic components, Iron Pillar of Delhi.

Astronomy and Astrology: The Beginnings of Indian Astronomy - The Early Historical Period-The Siddhāntic Era., Ancient Indian Observational astronomy. Foundation concepts - nakṣatra, graha, time units, phenomena like meteors, eclipses., Brief notes on Astronomical instruments like sundials, water clock, time measurement. Aryabhatta - Varahamihira- Bhaskara I – Brahmagupta- Bhaskara II

UNIT IV: ARCHITECTURE AND CIVIL ENGINEERING

(8 Hours)

Perspective of Arthaśāstra on town planning, Vāstu-śāstra – The science of architecture, Eight limbs of Vāstu, Town planning, Temple architecture in India, Iconography, Architecture in India: Nagara (northern style), Vesara (mixed style), and Dravida (southern style), Indian vernacular architecture, Temple style, cave architecture, rock cut architecture, kalinga architecture, chandela architecture, rajput architecture, jain architecture, sikh architecture, Maratha architecture.

Text Books: (Hindi and English language as per availability)

1. Textbook on “The Knowledge System of Bhārata by Bhag Chand Chauhan.
2. वास्तविक आईना सनातन विज्ञान का, परम कुमार, वैभव प्रकाशन रायपुर
3. SCIENTIFIC BASIS OF INDIAN KNOWLEDGE SYSTEM Saroj Sharma, Bal Krishna Rai, Sunita Joshi Kathuria, SHIPRA PUBLICATIONS
4. R P Kulkarni, Glimpse of Indian Engineering and Technology (Ancient & Medieval period, Munshiram Manoharlal Publishers Pvt. Ltd. 2018.
5. Sen, S. N., and Shukla, K. S. (Ed.) (2000). History of Astronomy in India, 2nd Revised Edition. New Delhi: Indian National Science Academy.



6. D N Shukla Civil Architecture in Ancient India (Part-I) Meharchand lakshmidas publication, 2016.

Reference Books: (Hindi and English language both)

1. Iyengar, R. N. (2016) Astronomy in Vedic texts, History of Indian Astronomy, A Handbook - Volume brought out on the occasion of IX International Conference on Oriental Astronomy November 14–18.
2. Pride of India- A Glimpse of India's Scientific Heritage edited by Pradeep Kohle et al. Samskrit Bharati (2006).
3. Vedic Physics by Keshav Dev Verma, Motilal Banarsidass Publishers (2012). 3. India's Glorious Scientific Tradition by Suresh Soni, Ocean Books Pvt. Ltd. (2010).
4. AK Pathak, Science and Technology in India, Anshika prakashan pratapgarh, 2016.
5. AR vasudev Murty, Science and Technology in Ancient India as Reflected in the Mahabharata, Sanskrit bharati, 2019.
6. B Dagens, Mayamata: An Indian Treatise on Housing Architecture and Iconography (An Updated Edition with revised Glossary), Motilal banrsidas, 2017.
7. Dr. V. Ganapati Sthapati, Building Architecture of Sthapatya Veda.



Sl. No.	Board of Studies (BOS)	Courses (Subject)	Subject Code	Period Per Week			Scheme of Examination			Total Marks	Credits
				L	T	P	Theory/ Lab				
							ESE	CT	TA		
1	Computer Science and Engineering	Idea and Innovation Lab	2039C05FL022	-	-	2	-	-	30	30	1

A) Rationale :

The Idea and Innovation Lab provides hands-on, experiential learning component in the Diploma Engineering program to nurture skills. The course aims to instill an innovation mindset among students by guiding them through the complete cycle of problem identification, idea generation, conceptual design, prototyping, testing, and pitching. It emphasizes design thinking, teamwork, and user-centric development, encouraging students to step beyond textbooks and apply their knowledge to practical, meaningful challenges.

B) Course Outcome:

- CO1: Develop creative thinking, innovation skills, and problem-solving mindset.
- CO2: Learn the process of taking an idea from concept to working prototype
- CO3: Apply design thinking in real-world scenarios
- CO4: Understand and evaluate prototype
- CO5: Prepare technical report and demonstrate awareness of IPR

C) Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of Studies (Hours/Week)				
			L	P	T	Total Study Hours (L+T+P)	Total Credits(C) (L+T+P/2)
Computer Science and Engineering	2039C05FL022	Idea and Innovation Lab	-	2	-	2	1

Legend: Lecture (L), Tutorial (T) and Practical(P)

D) Scheme of Assessment:

Board of Study	Course Code	Course Title	Scheme of examination					
			Total Marks					
			Theory			Practical		Total Marks
			ES E	C T	T A	ESE	TA	
Computer Science and Engineering	2039C05FL022	Idea and Innovation Lab	-	-	-	-	30	30

E) Course-Curriculum Detailing:

This course curriculum detailing depicts learning outcomes at course level and session level and their attainment by the students through Laboratory Instruction (LI) and Self Learning (SL). Students are expected to demonstrate the attainment of Session Outcomes (SOs) and finally Course Outcomes (COs) upon the completion of course.



CO-1 Develop creative thinking, innovation skills, and problem-solving mindset

(Approx. Hrs: LI +SL =5)

Session Outcomes (SOs)	Laboratory Instruction (LI)	Self-Learning (SL)
SO1.1 List of real-world problems SO1.2 Shortlisted idea proposals	Unit-1.0 Ideation & Problem Identification 1.1 Introduction to Innovation & Design Thinking 1.2 Empathizing with users and identifying real-life problems 1.3 Brainstorming, Mind Mapping, SCAMPER method 1.4 Creating clear problem statements	1.1 Different creative thinking techniques. 1.2 List of Real life problems

CO-2 Learn the process of taking an idea from concept to working prototype.

(Approx. Hrs: LI+ SL =6)

Session Outcomes (SOs)	Laboratory Instruction (LI)	Self-Learning (SL)
SO2.1 Concept document SO2.2 Wireframes, flow diagrams	Unit-2.0 Concept Development 2.1 Concept sketching, use-case creation 2.2 Wireframes, user journey mapping 2.3 Technical feasibility study 2.4 Functional requirement gathering	2.1 Basic blueprint making 2.2 Feasibility study

CO-3 Apply design thinking in real-world scenarios

(Approx. Hrs: LI+ SL =7)

Session Outcomes (SOs)	Laboratory Instruction (LI)	Self-Learning (SL)
SO3.1 Selection of tools and technologies SO3.2 Prototype plan	Unit-3.0 Tools & Technologies for Prototyping 3.1 Web/Mobile app prototyping tools (like Figma, HTML/CSS basics) 3.2 Basics of hardware/software integration 3.3 Component selection, system design	3.1 Usage of different tools. 3.2 Hardware Software integration

CO-4 Understand and evaluate prototype



(Approx. Hrs: CI+LI+SW+SL =7)

Session Outcomes (SOs)	Laboratory Instruction (LI)	Self-Learning (SL)
SO4.1 Working prototype (Minimum Viable Product)	Unit-4.0 Building the Prototype 4.1 Development of the Prototype 4.2 Interface design, module integration 4.3 Testing and Evaluation 4.4 Final refinement of prototype based on feedback	4.1 Prototype models 4.2 Interface design 4.3 Prototype evaluation methods 4.4 Debugging steps

CO-5 Prepare technical report and demonstrate awareness of IPR

(Approx. Hrs: LI+ SL =5)

Session Outcomes (SOs)	Laboratory Instruction (LI)	Self-Learning (SL)
SO5.1 Students will be able to prepare technical reports SO5.2 Students will be able to demonstrate prototypes SO5.3 Students will be able to understand IP basics.	Unit5. Reporting and IPR 5.1 Reporting of results/ demos: process of explaining the project idea, working and results. 5.2 Learning intellectual property basics: legal rights given to creations of the mind. Types of Intellectual Property 5.2.1 Patent –Protects new inventions 5.2.2 Copyright – Protects written work, software 5.2.3 Trademark –Protects logos, brand names 5.2.4 Design Rights – Protects product appearance its Importance for Students	Identify the purpose of Form 1 and Form 2 in the patent application process. List the difference between Provisional Specification and a Complete specification while filing an IPR List the specific features as per Design act that constitutes a Design

H) Suggested Learning Resources:

S. No.	Titles	Author	Publisher	Edition & Year
1	Developing Thinking Skills (The way to Success)	E Balaguruswamy	Khanna Publication, 2022	1 st Edition 2022
2	Product Design and Manufacturing	A.K. Chitale and R.C. Gupta	Prentice Hall, India	7 th edition
3	Ideas to Innovation: Creativity, Design Thinking, IPR & the Innovation Ecosystem	Dr Gaurav Kumar	Atlantic Publishers and Distributors (P) Ltd.	1 st edition, 2025
4	Startupology: Ideation to Execution for First-Time Founders	Vivek Chadha	Zebra Learn	1 st edition, 2025



5	8 Steps to Innovation	Vinay Dabholkar, Rishiksha T Krishnan	Collins	1 st edition, 2013
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I) List of Suggestive Laboratory Equipment and Tools:

1.	Simulation Software	Necessary Licensed softwares with Desk top Computer with minimum processor of 3 GHz, 64 bit, Graphic Card, 16 GB RAM and SSD drive.
2.	3 D Printer	Print Technology Fused Deposition modelling, Material Supported PLA, ABS, PETG and flexible TPU, Build volume: Suitable for prototype and projects (200mmx200mmx200mm) to (300mmx300mmx300mm), Layer resolution 50-300 micron, Software: Open-source software compatibility e.g., Cura, Prusa Slicer that can import standard CAD formats like STL or OBJ
3.	Development Boards & Sensors	Example: Arduino UNO, Arduino MEGA, Arduino 8266, ESP 32 etc, RTC Module, Temperature sensors, Light sensors, Motion sensors, Pressure sensors, Humidity Sensors, Gas sensors
4.	Display Boards	Character LCDs, Graphic LCDs, OLED and TFT LCDs
5.	Tools & Measuring Instruments	Drilling Machines, Automated welding machines , CNC lathes, Soldering stations, Digital Multimeters, Waveform analyzers,



Diploma -Semester: III	Branch: Mining Engineering
Subject: Personality Development	Subject Code: - 2039C07DT046
Periods/week: L: 1 T: - P: -	Total Credits: Non Credit Course
Total TA marks: 10	Assessment Hrs:15

Course Objectives: This course aims to develop self-awareness, self-management, communication, interpersonal, and professional skills in students to enhance their personality and prepare them for career and workplace readiness.

Course Contents:

Unit I: Personality & Self-Awareness – Concept and determinants of personality, Self-awareness and SWOT analysis, Attitude and confidence building.

Unit II: Self-Management– Stress management techniques, Time management and goal setting, Body language.

Unit III: Interpersonal Skills – Interpersonal transactions and Transactional Analysis (TA) basics; Conflict – Types and resolution, Digital communication etiquette: email writing, netiquette, and professional social media presence.

Unit IV: Teamwork – Group dynamics and team building, Leadership skills, Collaboration and coordination, Problem-solving in teams.

Unit V: Professional Skills – Public speaking and presentation skills: overcoming stage fear, structuring a talk, use of visuals; Workplace etiquette: professional appearance, meeting conduct, and workplace relationship.

Course Outcomes:

CO No.	Course Outcome	Bloom's Level
CO1	Identify personality traits and perform self-assessment analysis.	Remember (L1) / Understand (L2)
CO2	Apply self-management techniques for personal and career goals.	Apply (L3)
CO3	Demonstrate effective interpersonal skills in various contexts.	Apply (L3)
CO4	Analyze group dynamics and exhibit teamwork abilities.	Analyze (L4)
CO5	Develop professional competencies and workplace etiquettes.	Create (L6)

Text Books:

S.No.	Title	Authors	Edition	Publisher
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1	Personality Development and Soft Skills	Barun K. Mitra	-	Oxford University Press
2	Communication Skills and Personality Development	J.R. Kadam et al.	-	Scientific Publishers

Reference Books:

S.No.	Title	Authors	Edition	Publisher
1	Communication Skills and Personality Development	M. Jegadeesan et al.	-	-
3	How to Win Friends and Influence People	Dale Carnegie	-	-