

**DIPLOMA CURRICULUM OF  
MINING ENGINEERING  
(THIRD YEAR)  
(5<sup>th</sup> Semester)**

**(To be implemented from 2026-27)**

***Prepared by;***



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**PROGRAMME TITLE: MINING ENGINEERING**

**SEMESTER – V**

SL. No	Category of Course	Code No	Course Title	Study Scheme			Evaluation Scheme				Total Marks	Credits	
				Pre-requisite	Contact Hours/ week			Theory		Practical			
								End Exam	Progressive Assessment	End Exam			Progressive Assessment
L	T	P											
1	Programme Core	MEPC301 (TH:1)	Electrical Equipment in Mines		3	0	0	70	30	-	-	100	3
2		MEPC305 (TH:2)	Mine Hazard and Safety		3	0	0	70	30	-	-	100	3
3		MEPC305 (PR:1)	Mine Hazard and Safety Lab		0	0	4	-	-	15	35	50	2
4		MEPC309 (PR:2)	Electrical Equipment in Mines Lab		0	0	4	-	-	15	35	50	2
5		MEPC311 (PR:3)	Mine Design Lab		0	0	4	-	-	15	35	50	2
6	Programme Elective	MEPE301 (Any one) (TH:3)	(a) Mineral Dressing (b) Mine Planning and Design (c) Mine Legislation and General Safety –II		3	0	0	70	30	-	-	100	3
7		MEPE307 (TH:4)	(a)Underground Metal Mining (b) Material handling and Logistics (c) Rock Mechanics & Support system (d) Mineral Exploration		3	0	0	70	30	-	-	100	3
7	Open Elective	OE301A (TH:5)	a. Universal Human Values b. Leadership and Management Skills c. Professional Skills		3	0	0	70	30	-	-	100	3
8	Summer Internship	SI301	Summer Internship II*		0	0	0	-	-	20	30	50	2
9	Major Project	PR301 (PR:4)	Major Project		0	0	4	-	-	15	35	50	2
<b>TOTAL</b>					<b>15</b>	<b>0</b>	<b>16</b>	<b>350</b>	<b>150</b>	<b>80</b>	<b>170</b>	<b>750</b>	<b>25</b>

\*6-week internship after 4<sup>th</sup> Semester ## Assessment to be done in 5<sup>th</sup> semester, credit carried over

## **SEMESTER - V COURSES**

## TH:1- ELECTRICAL EQUIPMENT IN MINES

L	T	P	<b>Total Marks: 100</b>	<b>Course Code: MEPC301</b>	
3	0	0		(Th.1)	
<b>Total Contact Hours</b>				<b>Theory Assessment</b>	
Theory : 45Hrs				End Term Exam	70
<b>Pre Requisite : Nil</b>				Progressive Assessment	30
<b>Credit 3</b>			Category of Course : PC		

### RATIONALE:

For a Mining Engineer, it is essential to have the fundamental concepts of electrical engineering and its applications in mining operation.

### COURSE OUTCOMES:

At the end of the course, the student will be able to:

- Describe various types of electrical cables used in Mines.
- Describe different types of protective system.
- Explain the principle of Transformer, Industrial drives- Mining type and Electric braking used in Mines
- Describe the working of underground signaling arrangements.
- Explain various types of sensors and their applications.

### COURSE CONTENT DETAILS:

Unit No.	Content	Time Allotted (Hrs.)
I	<b>Electrical cables for Mining use:</b> Cables for mining use, Constructional features of high tension and low-tension cables armored and trailing cables, Size of cables and their use. State procedures of cable laying at surface, underground roadway and shafts, Cable joint box mining type.	<b>9</b>
II	<b>Protective Systems:</b> Fuses, Fuse Materials, Rewireable Fuse, HRC Fuse., Uses of Fuse., Circuit Breakers, Air Circuit Breaker, Minimum Oil Circuit Breaker (MOCB), Bulk Oil Circuit Breaker (BOCB), Air Blast Circuit Breaker, SF6 Circuit Breaker, Essential qualities of a good protective system, Types of relays (plunger, induction and direction over current, over loads, no volt and latching relay, frequency relay and earth leakage relay), Protection of transformer by differential relay, Remote control circuit and various protective devices of Gate-End Box, Drill panel, Earthing system in mines, Voltage limit.	<b>12</b>
III	<b>Transformer:</b> Fundamentals of Transformer, purpose, Working principle of	<b>9</b>

	Transformer. <b>Industrial drives- Mining type:</b> Starting and running characteristics of D.C. and A.C. Motors, Selection of motors for mining use. <b>Electric braking used in Mines:</b> Regenerative braking, Magnetic braking.	
IV	<b>Underground signaling arrangement:</b> Signals and shaft signal, Communication system in U/G mines, Point to point communication, Intercom system/Telephone, Cordless system.	<b>9</b>
V	<b>Sensors and their applications:</b> Battery locomotive, Automation with Thyroster control, Elecrical LHD, Electric mine phone.	<b>6</b>
<b>Total</b>		<b>45</b>

**REFERENCES:**

1. Electrical Equipment in Mines, H.Cotton, George Newnes Publishers, 1955.
2. Principles of Power System, V K Mehta, Rohit Mehta, S Chand Publishers, 3rd edition,2005,
3. Power Electronics, P.S. Bimbhra, Khanna Publishers, 2018.

## TH:2- MINE HAZARD AND SAFETY

L	T	P	<b>Total Marks: 100</b>	<b>Course Code: MEPC305</b>
3	0	0		(Th.2)
<b>Total Contact Hours</b>				<b>Theory Assessment</b>
Theory : 45Hrs				End Term Exam 70
				Progressive Assessment 30
<b>Pre Requisite : Nil</b>				
<b>Credit 3</b>			Category of Course : PC	

**RATIONALE:** As a Mining Engineer, one must be thoroughly conversant with various sources of mining hazards as also the remedial measures needed to be undertaken to avoid any mishap and able to understand total operation of rescue and recovery.

### COURSE OUTCOMES:

After completion of the course, the students will be able:

- Identify the aspects of mine gases, gas testing, limitations and emissions.
- Explain fires, spontaneous heating, causes and elaborate necessary steps required for prevention of coal explosion.
- Identify the sources of mine inundation, precautions and water dams.
- Describe mine lighting and illumination along with noise and vibration.
- Explain the aspects of mine rescue and recovery.

Unit No.	Content	Time Allotted (Hrs.)
I	<b>Mine gases and gas testing:</b> Composition of atmospheric air. Different mine gases, their properties and physical effects, Fire damps, black damp, stink damp, white damp and after damp in mines, Flame safety lamp and its working principle, Gas testing by flame safety lamp by accumulation test and percentage test. Precaution for gas testing. Flame safety lamp, special features, Limitations of flame safety lamp. Emission of firedamp in underground working: Gradual exudation, Blower and outbursts of firedamp in underground working.	12
II	<b>Define fires and spontaneous heating:</b> Incubation period, Spontaneous heating and its causes and effects, Preventive measures against spontaneous heating. CO/O <sub>2</sub> ratio and CO <sub>2</sub> /O <sub>2</sub> ratio. <b>Mine Explosion:</b> Coal dust explosion and fire damp explosion with their causes and prevention, Inflammability of coal dust and fire damp. Coward's diagram, Prevention, suppression and treatment of dust, Sampling of dust in Mines, Stone dust barrier.	12
III	<b>Mine Inundation:</b> Sources of water in mines and its danger, Precaution against inundation, Burnside safety boring apparatus, Precaution while approaching water logged area, Water dams- its construction and design, Water danger plan, Provision for working near water body.	9
IV	<b>Mine lighting and illumination:</b> Illumination and its units, Standards of lighting at different parts of mine as per mine regulation. <b>Noise and Vibration:</b> Effect of noise and vibration on miners and mine structures and other surface structure with respect to statutory provision.	6
V	<b>Mine Rescue and Recovery:</b> Proto-IV, Proto-V, Drager BG-174, Self rescuer, Smoke helmet, Gas mask, Construction of Rescue brigade and their role in rescue and recovery operation, Mine Rescue rules 1985 Annexure I,II,III.	6
	Total	45

#### REFERENCES:

1. Mine Environment and Ventilation, G B Mishra, Oxford University press, 1986.
2. Elements of Mining Technology Vol. 2, D. J. Deshmukh, Denett & Co., 9<sup>th</sup> edition, 2016.
3. Practical Coal Mining for Miners Vol. 2, E. Mason, Virtue and Company Publishers, 1951.
4. UMS (Universal Mining School) Vol-I, Lecture notes, Cardiff, UK.
5. Coal Mines Regulations 2017, Gazette, Govt. of India, 2017.
6. Mine Disasters and Mine Rescue, M A Ramlu, Universities Press; Second edition, 2006.

## PR:1- MINING HAZARDS AND SAFETY LAB

L	T	P	<b>Total Marks: 100</b>	<b>Course Code:</b> MEPC305
0	0	4		(Pr.1)
<b>Total Contact Hours</b>				<b>Practical Assessment</b>
Practical : 60Hrs				End Term Exam 15
Pre Requisite : Nil				Progressive Assessment 35
<b>Credit</b> 2				Category of Course : PC

### RATIONALE:

As a Mining Engineer, one must be thoroughly conversant with various sources of mining hazards as also the remedial measures needed to be undertaken to avoid any mishap and able to understand total operation of rescue and recovery.

### COURSE OUTCOMES:

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

- Develop a clear idea about Methanometer and CO detector.
- Know details about procedure of analysis of gases by halden and Orsat apparatus.
- Sample the dust particles by using Gravimetric dust Sampler.

### COURSE CONTENT DETAILS:

Sl. No.	Topics for practice	Time Allotted (Hrs.)
I	Study of different types of toxic & hazardous gases.	8
II	Study of flame safety lamps.	8
III	Detection of firedamp by accumulation test.	8
IV	Detection of firedamp by percentage test.	8
V	Early detection of spontaneous heating in underground coal mines by using CO detector.	8
VI	Detection of different gases by Multi gas Detector.	4
VII	Study of personal dust sampler.	4
VIII	Explosibility study of mine flammable gases (CH <sub>4</sub> ) - Cowards Diagram.	4
IX	Study of chemical type self-rescuer	4
X	Study of SCBA (DRAGER BG-174) & SCBA (PROTO MARK V)	4
	<b>Total</b>	<b>60</b>

### REFERENCE BOOKS:

1. Mine Environment and Ventilation, G B Mishra, Oxford University press, 1986.
2. Elements of Mining Technology Vol. 2, D. J. Deshmukh, Denett and Co., 9<sup>th</sup> edition, 2016.

3. Practical Coal Mining for Miners Vol. 2, E. Mason, Virtue and Company Publishers, 1951.
4. UMS (Universal Mining School) Vol-I, Lecture notes, Cardiff, UK.
5. Coal Mines Regulations 2017, Gazette, Govt. of India, 2017.
6. Mine Disasters and Mine Rescue, M A Ramlu, Universities Press; Second edition, 2006.

## PR:2- ELECTRICAL EQUIPMENT IN MINES LAB

L	T	P	<b>Total Marks: 100</b>	<b>Course Code: MEPC309</b>	
0	0	4		(Pr.2)	
<b>Total Contact Hours</b>				<b>Practical Assessment</b>	
Practical : 60Hrs				End Term Exam	15
<b>Pre Requisite : Nil</b>				Progressive Assessment	35
<b>Credit 2</b>				Category of Course : PC	

### RATIONALE:

For a Mining Engineer, it is essential to have the fundamental concepts of electrical engineering and its applications in mining operation.

### COURSE OUTCOMES:

At the end of the course, the student will be able to:

- Prepare an electrical switch board to control two light points and one plug points.
- Explain circuit breakers along with circuit diagram of gate end box and drill panel.
- Describe different types of protective system and Relays.
- Distinguish different types of cables used for mining purpose
- Explain the uses of Megger check and continuity of windings.

### COURSE CONTENT DETAILS:

Sl. No.	Topics for practice	Time Allotted (Hrs.)
I	Preparation of electrical switch board to control two light points, one plug point, fan point and put a required fuse.	12
II	Study of circuit breakers - (Air Circuit Breaker and Oil Circuit Breaker).	12
III	Study of Gate End Box	12
IV	Study of Relays – like Buchholz Relay , Over Current Relay.	8
V	Identify the different parts of a given cable and find faults in the cable.	8
VI	Use of Megger check and the continuity of windings - By the use of Megger check the continuity of windings, body to winding, body to earth of an 3-Phase induction Motor.	8
<b>Total</b>		<b>60</b>

### REFERENCES BOOKS:

1. Electrical Equipment in Mines, H.Cotton, George Newnes Publishers, 1955.
2. Principles of Power System, V K Mehta, Rohit Mehta, S Chand Publishers, 3rd edition,2005,
3. Power Electronics, P.S. Bimbhra, Khanna Publishers, 2018.

### PR:3- MINE DESIGN LAB

L	T	P	<b>Total Marks: 100</b>	<b>Course Code: MEPC311</b>
0	0	4		(Pr.3)
<b>Total Contact Hours</b>				<b>Practical Assessment</b>
Practical : 60Hrs				End Term Exam 15
<b>Pre Requisite : Nil</b>				Progressive Assessment 35
<b>Credit 2</b>			Category of Course : PC	

#### RATIONALE:

Mining has to be planned and designed with due regards to economics, techniques, environment, safety and conservation. To make the mining production feasible with stated parameters, the skill of mining layout and design is required for mining technician.

#### COURSE OUTCOMES:

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

- To transfer the skill of mine layout and design.
- Brain storming session for appropriate mining planning.
- Dissemination of attitude for apt mine design

#### COURSE CONTENT DETAILS:

Sl. No.	Topics for practice	Time Allotted (Hrs.)
I	Layout of manual bord and pillar method	8
II	Layout of mechanised bord and pillar method (LHD/SDL/Continuous miners etc)	8
III	Layout of long wall advancing method.	8
IV	Layout of long wall retreating method.	8
V	Layout of shovel-dumper combination.	8
VI	Formation of benches in open cast mines as per coal mine regulations.	4
VII	Pit top and Pit bottom layout of u/g coal mine.	4
VIII	Pit top and bottom layout of u/g metal mine	4
IX	Manpower calculation and OMS in assumed mine.	4
X	Design of Haul roads	4
<b>Total</b>		<b>60</b>

#### REFERENCE BOOKS:

1. Elements of Mining Technology Vol. 2, D. J. Deshmukh, Denett and Co., 9<sup>th</sup> edition, 2016.

2. Practical Coal Mining for Miners Vol. 2, E. Mason, Virtue and Company Publishers, 1951.
3. UMS (Universal Mining School) Vol-I, Lecture notes, Cardiff, UK.
4. Coal Mines Regulations 2017, Gazette, Govt. of India, 2017.
5. Central techno publication, Nagpur HL Hartman
6. SME Mining Engineering Handbook, Vol. I & II A.I.M.M. New-York

### TH:3(a)- MINERAL DRESSING

L	T	P	<b>Total Marks: 100</b>	<b>Course Code:</b> MEPE301(a)
3	0	0		
<b>Total Contact Hours</b>				<b>Theory Assessment</b>
Theory : 45Hrs				End Term Exam 70
				Progressive Assessment 30
<b>Pre Requisite : Nil</b>				
<b>Credit 3</b>			Category of Course : PE	

**RATIONALE:**

In case of metalliferous mines, the ultimate goal is the extraction of metals. Prior to sending ores into the process of extraction, it requires dressing for removal of desirable gangue minerals as far as possible. So a Mining Engineer, specially attached to metalliferous mines should have some basic concepts about mineral dressing.

**COURSE OUTCOMES:**

At the end of the course, the student will be able to:

- a. Identify the importance of mineral dressing and operation of different crushers.
- b. Explain the principles of grinding and industrial screening.
- c. Describe the principles of gravity concentration and heavy media separation.
- d. Explain the principles of flotation process and cell.
- e. Explain the principle and application of magnetic and electric separators.

**COURSE CONTENT DETAILS:**

Unit No.	Topics for practice	Time Allotted (Hrs.)
I	<p><b>Introduction:</b> Application of mineral dressing in surface and underground mines.</p> <p><b>Unit operations:</b> Principle of Blake and dodge jaw crushers, gyratory and cone crushers, roll crusher.</p>	<b>9</b>
II	<p><b>Grinding:</b> Principle of ball mill operation, open circuit grinding, close circuit grinding, dry and wet grinding.</p> <p><b>Industrial screening:</b> Principle of industrial screening, type of screening, Operation of classifier and their applications.</p>	<b>12</b>
III	<p><b>Gravity concentration:</b> General principles of wilfly table and its operation, Elementary idea regarding the operation jigs.</p> <p><b>Heavy media separation:</b> Fundamental principle of heavy media separation – Chance process.</p>	<b>10</b>
IV	<b>Floatation:</b>	<b>9</b>

	Elementary principle of froth floatation, practical utility of frother, collection, modifiers and depressants. Floatation cell.	
V	<b>Magnetic and Electrostatic Separators:</b> Principle of operation of magnetic and electrostatic separators, Application of separators in mineral dressing.	5
	<b>Total</b>	<b>45</b>

**REFERENCE BOOKS:**

1. Principles of Mineral Dressing- Gaudin A.M.
2. Hand Book of Mineral Dressing Ores and Minerals – A.E.Taggart
3. Mineral Processing Technology – B.A.Wills.

**TH:3(b)- MINE PLANNING AND DESIGN**

L	T	P	<b>Total Marks: 100</b>	<b>Course Code:</b> MEPE301(b)
3	0	0		
<b>Total Contact Hours</b>				<b>Theory Assessment</b>
Theory : 45Hrs				End Term Exam 70
				Progressive Assessment 30
<b>Pre Requisite : Nil</b>				
<b>Credit 3</b>			Category of Course : PE	

**RATIONALE:**

Mine Planning and Design covers topics like mine life stages, preliminary evaluation of mining prospects, mine planning principles, mining methods, surface and underground mine layouts and relevant software applications. These are essential for mining engineers.

**COURSE OUTCOMES:**

At the end of the course, the student will be able to:

- Prepare and design a mine plan depending upon various site conditions.
- Select suitable mining methods depending upon the economical conditions.
- Explain various technical parameters related with mine planning.
- Follow the environment friendly and economic working procedure for mining.

**COURSE CONTENT DETAILS:**

Unit No.	Topics for practice	Time Allotted (Hrs.)
I	<b>Introduction:</b> Mine planning and its components, role of planning in mining ventures; technical information for mine planning.	<b>9</b>
II	<b>Mine Economics:</b> Mineral inventory and ore reserves and its estimation. The basic difference cut-off grade, its determination. Grade Tonnage curves and their computation.	<b>12</b>
III	<b>Surface Mine Planning:</b> Bench geometry and mine layouts, planning steps; determination of mine size and Taylor's mine life rule; ultimate pit configuration; mining programme; haul road design.	<b>10</b>
IV	<b>Underground Mine Planning:</b> Mining system and sub-systems; optimal geometrical size of a mine; planning and scheduling of production. <b>Feasibility study :</b> Its functions and preparation of feasibility report for metallic and Non-metallic minerals.	<b>9</b>
V	<b>Mine Closure Planning:</b> Various legal aspects of mine closure planning. Its advantages and amendments. Guide lines from ministry of environment and forest. Under the guidance of subject teacher preparation of a detailed project report of any mine visited by the student and submit it in department.	<b>5</b>
	<b>Total</b>	<b>45</b>

**REFERENCE BOOKS:**

1. R.D.Singh Principals and practices of Modern coal Mining New Age International (P) Ltd
2. R.T.Deshmukh Advance Coal Mining Denett and Co, Nagpur
3. V.S.Vorobzer Advance Coal Mining Mir Publication
4. Hartman, Howard L. Introductory to Mining Engineering John Wiley and Sons Publication, New Delhi
5. Samir Kumar Das Advance mining Lovely Prakashan, Dhanbad
6. Deshmukh, D.J. Elements of mining Denett and Co, Nagpur

### TH:3(c)- Mine Legislation and General Safety -II

L	T	P	<b>Total Marks: 100</b>	<b>Course Code:</b> MEPE301(c)	
3	0	0		<b>Theory Assessment</b>	
<b>Total Contact Hours</b>				End Term Exam	70
Theory : 45Hrs				Progressive Assessment	30
<b>Pre Requisite : Nil</b>					
<b>Credit 3</b>				Category of Course : PE	

#### RATIONALE:

Mining operations involve frequent accidents, it is very important for a mining engineer to be thoroughly conversant with various acts and rules framed for providing safety to workers. This course covers the mine legislation and general safety aspects.

#### COURSE OUTCOMES:

At the end of the course, the student will be able to:

- Describe various aspects of M.M.R. 1961.
- Describe various aspects of Mines Vocational Training Rules 1966.
- Describe various aspects of Mines Creche Rules 1966.
- Describe various aspects of Maternity Benefit Act.
- Describe various aspects of Mines Accident and Safety.
- Describe various aspects of Forest Conservation Act (FCA) 1980 and Environmental Protection Act 1986.

#### COURSE CONTENT DETAILS:

Unit No.	Topics for practice	Time Allotted (Hrs.)
I	<p><b>Metalliferous Mines Regulations 1961</b>                      Short title &amp; important definition under MMR 1961, SEC 5. Annual Returns, SEC 11. Board of Mining Examinations , SEC 12.Certificate granted by the Board, SEC 13. Examinations and Examiners, SEC 14. Submission of applications, 15. Age and general qualifications etc. of candidates, 16. Practical experience of candidates for Manager’s Examinations, 17. Practical experience of candidates for Surveyor’s Examination, 22. Exchange Certificates, 23. Service Certificate, 24. Service Certificate for Surveyors,26. Duplicate Certificates, 30. Validity of Foreman’s, Mate’s, Engine-driver’s, Blaster’s and Gas testing Certificates, 32. Qualifications of Inspectors, 34. Qualifications and appointment of managers, 35. Appointment of assistant managers or underground managers, 37. Appointment and qualifications of senior officials, 38. Appointment of surveyors, 39. Appointment of Officials and competent persons, 41. Duties of persons employed in mines, 42. Duties of competent persons, 43. Duties of officials, 44. Duties and responsibilities of managers, 45. Duties and responsibilities of assistant managers or</p>	15

	<p>underground manager, 47. Duties and responsibilities of mining mates , 48. Duties and responsibilities of blasters, 52. Duties and responsibilities of surveyors, 58. Duties of magazine incharge, 60. General requirements about mine plans and sections, 61. Types of plans and sections, 62. Copies of plans and sections to be submitted, 63. Plans and sections to be submitted after abandonment or discontinuance, 66. Preparation of Plans by Surveyors, 66. Outlets from a mine, 69. Working shafts and winzes, 70. Fencings and gates at outlets, 84. Man winding, 87. Winding in sinking shafts 88. Winding ropes, etc., 90. Precautions after recapping, etc91. Examination of winding equipment, 95. Haulage roadways , 96. Travelling roadways, 106. Opencast workings, 107 Underground workings., 109. Workings under railways and roads, etc. 111. Working near mine boundaries, 113. Setting of supports., 119. Precautions against Fire, 120. Precautions after a fire has broken out, 121. Equipment for free-fighting , 123. Precautions when a fire exists belowground, 124. Precautions against dust.,125. Precautions against irruption of gas, 127. Danger from surface water, 128. Danger from underground inundation., 129. International flooding., 131. Standard of ventilation., 132. Mechanical ventilators and their fittings. , 135. Brattices, doors, stoppings ad air crossings., 136. Auxiliary fans., 140. Precautions against gas during de-watering and re-opening., 141. Precautions against inflammable and noxious gases, 142. Safety lamps to be used in gassy mines., 146. General lighting , 148. Standards of lighting., 149. Maintenance and examination of safety lamps., 150. Use of safety lamps. , 151. Maintenance ad repairs of safety lamps. , 153. Type of Explosives to be used in mines. , 154. Storage of explosives., 156. Magazines, stores and premises to store explosives., 157. Cases and containers for carrying explosives., 158. Transport of explosives., 160. Blasters., 161 Shotfiring tools., 162. Drilling, charging, stemming and firing of shotholes., 163. Electric Shotfiring., 164. Taking shelter etc., 166. Inspections after shotfiring., 170. General precautions regarding explosives., 174. Precautions regarding moving parts of machinery,</p>	
II	<p><b>Mines V.T. Rules 1966</b>  Definition &amp; short title, General Vocational Training: 6. Scope and Standard, 7. Training of persons previously employed, Refresher Training: 8. Scope and standard, 9. Training of persons already employed, 10, Training of persons employed belowground in gassy mines, 11. Arrangement for refresher training, Training Of Special Categories Of Employees: 12. Training of timber Mistry, 13. Training of persons in handling of explosives, 14. Training of person on shot firing, 17. Periodical training in gas testing, Training Centres And Arrangements For Training: 19. Arrangements for the training centre, 20. Training Officer, 21. Duties of Training Officer, 22.Trainers, 23. Qualification of trainers, 24. Duties of trainers and persons undergoing training, 25. Training allowance, Allowance Of Trainees And Issue Of Certificates: 26. Trainees, 27. Stipend to trainees, 28. Certificate of trainees, 29. Duplicate Certificate.</p>	6
III	<p><b>Mines Creche Rules 1966</b>  Definition &amp; short title &amp; provision of mines creche rules 1966.</p>	6
IV	<p><b>Maternity Benefit Act</b>  Provisions of Maternity Benefit Act.  Short title, Application of Act &amp; Definitions. 4. Employment of, or work by, women prohibited during certain periods, 5. Right to payment of maternity benefit, 7-9A. Payment of maternity benefit in case of death of a woman, 11. Nursing breaks, 14. Appointment of Inspectors, 15. Powers and duties of Inspectors, 28. Power to make rules.</p>	6

V	<p><b>Mines Accident and Safety</b>  Classification, causes and prevention of accidents, concepts about accident report, procedure for conducting an enquiry to ascertain the causes of accidents. procedure for investigation and reporting Mine accident, Role of supervision in accident prevention, accident due to opencast workings, Basis concepts of safety, safety and productivity, safety consciousness and safety campaign, safety organization, safety audit. The role of workmen inspectors Industrial fatigue, preventive maintenance, productive equipments and duties of Safety Officer.</p>	6
VI	<p><b>Forest Conservation Act (FCA) 1980</b>  Various provisions of Forest Conservation Act (FCA) 1980.  Environmental Protection Act 1986  Various provisions of Environmental Protection Act 1986.</p>	6

**REFERENCES:**

1. Metalliferous Mines Regulations 1961
2. Mines V.T.Rules- 1966
3. Mines Creche Rules- 1966
4. Maternity Benefit Act
5. Pit Head bath Rules
6. Worker's compassion Act
7. Environmental Protection Act-1986
8. DGMS Circulars

### TH:4(a)- UNDERGROUND METAL MINING

L	T	P	<b>Total Marks: 100</b>	<b>Course Code:</b> MEPE307(a)
3	0	0		
<b>Total Contact Hours</b>				<b>Theory Assessment</b>
Theory : 45Hrs				End Term Exam 70
				Progressive Assessment 30
<b>Pre Requisite : Nil</b>				
<b>Credit 3</b>			Category of Course : PC	

#### RATIONALE:

As Mining Engineer, one should have the knowledge in fundamental principles of generation in underground metal mines.

#### COURSE OUTCOMES:

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

- Describe various methods to access an ore body.
- Explain various methods of development used in underground metal mines.
- Explain various stoping methods used in underground metal mines.
- Identify the basics of stone drifting.
- Explain the causes and prevention of rock burst along with face mechanization.

#### COURSE CONTENT DETAILS:

Unit No.	Content	Time Allotted (Hrs.)
I	<b>Access to ore body:</b> Modes of entries – Adits, inclines and shafts ,applicability of entries.	<b>4</b>
II	<b>Development in underground Metal Mine:</b> Formation of blocks of mineral deposit, Level interval, Open raising method, Two compartment method, Jora raise lift, Long hole drilling method./Vertical Crater retreat (VCR) method, Alimak raise climber, Raise borer, Development of Ore pass system. Comparative study between coal and metal Mining.	<b>12</b>
III	<b>Stoping methods:</b> Stoping methods with application and factors affecting methods of stopping, Preparatory arrangement for stoping, Methods and layouts of drilling, blasting, transportation and supports. Open stoping. Open stoping with pillar support. Shrinkage stoping. Cut and fill stoping. Square set stoping. Block caving. Sub-level caving. Top slicing.	<b>10</b>
IV	<b>Stone Drifting:</b> Describe conventional methods of drifting. Find out direction gradient of drift. Describe drilling and blasting, support,	<b>9</b>

	transportation, drainage, ventilation and lighting arrangements, organization and supervision in mechanised method of drifting..	
V	<p><b>Rock Burst:</b> Causes and prevention of rock burst.</p> <p><b>Face mechanization:</b> Use of jumbo drill with air leg, Various Loading and Transportation System like L.H.D., L.P.D.T.(Low Profile Dump Truck), rocker shovel, spiral chutes and draw points, Scraper etc.</p>	<b>10</b>
	<b>Total</b>	<b>45</b>

**REFERENCE BOOKS:**

1. SME Mining Engineering Hand Book Vol.I and II, 2nd Edition, Society for Mining, Metallurgy, and Exploration; A.B. Cummins, I.A Given, 2<sup>nd</sup> edition, 1992.
2. Metal Mining, Chacharker
3. SME Mining Engineering Hand Book Vol.I and II, 2nd Edition, Society for Mining, Metallurgy, and Exploration; A.B. Cummins, I.A Given, 2nd edition, 1992.
4. Elements of Mining Technology Vol. 2, D. J. Deshmukh, Denett and Co., 9th edition, 2016.
5. Mining Ground control, Prof. B.S. Verma
6. Rock Mechanics, Jermic
7. Rock Mechanics, Jugger and Cook
8. Metalliferous Mining, Higam
9. Underground Mining Method, Bullock.

### TH:4(b)- MATERIAL HANDLING AND LOGISTICS

L	T	P	<b>Total Marks: 100</b>	<b>Course Code:</b> MEPE307(b)
3	0	0		
<b>Total Contact Hours</b>				<b>Theory Assessment</b>
Theory : 45Hrs				End Term Exam 70
				Progressive Assessment 30
<b>Pre Requisite : Nil</b>				
<b>Credit 3</b>			Category of Course : PE	

**RATIONALE:**

A mining engineer entrusted with the responsibility of supervising material handling in a mine should have specialized knowledge in the area of handling and logistics. In addition, transportation in mines is also required, which is discussed in this course.

**COURSE OUTCOMES:**

At the end of the course, the student will be able to:

- Classify underground and surface transportation systems in mines.
- Describe various types of conveyors and their design.
- Explain various types of locomotive haulages used in underground mines.
- Describe aerial ropeway and its applicability.
- Describe hydraulic transportation and man riding haulage system.
- Explain spiral chute and flow of materials in bins and bunkers.

**COURSE CONTENT DETAILS:**

Unit No.	Topics for practice	Time Allotted (Hrs.)
I	<b>Introduction:</b> Underground and surface haulage system, Factors affecting design of a haulage system, Capacity of a haulage system in a given production.	<b>6</b>
II	<b>Conveyors:</b> Classification of Conveyors, Factors affecting design of belt conveyor, cable belt conveyor and steel cord conveyors, Carrying capacity of belt conveyor, cable belt conveyor and steel cord conveyor, Constructional features of belt conveyor and cable belt conveyor, Drive capacity of belt conveyor and cable belt conveyor.	<b>9</b>
III	<b>Locomotive haulage:</b> Different types of locomotive haulage, Basic constructional features of trolley wire, compressed air, diesel and battery locomotives, Applicability, merits and demerits of locomotives, Safety devices of diesel locomotive including flame trap around exhaust conditioner box.	<b>9</b>

IV	<b>Aerial ropeways:</b> Classification of aerial ropeways, Applicability of aerial ropeways, Constructional features of bicable and twin cable ropeways, Loading, unloading and angle stations bicable and thin cable ropeways.	<b>6</b>
V	<b>Hydraulic transportation of solids:</b> Hydraulic transportation, Theory of hydraulic transportation of solids in mines, Design of the hydraulic transportation system, Applicability, advantages and disadvantages of hydraulic transportation in Mines. <b>Man riding haulage:</b> Different types of man riding system, Constructional features of monorail, deorail and flight chairs and conveyor system,	<b>9</b>
VI	<b>Spiral Chutes:</b> Capability of spiral chutes, Working principle of spiral chutes, Constructional features of spiral chutes. <b>Flow of materials in bins, bunkers:</b> Bins and bunkers, Flow of materials in bins and bunkers, Design of bunkers and bins for a given production.	<b>6</b>
	<b>Total</b>	<b>45</b>

#### REFERENCE BOOKS:

2. Mining Machinery – T. Bryson
3. Material Handling in Mines IIT Kharagpur journal
4. Mine Transport – N.T.Kerlin
5. Elements of Mining Technology Vol. 3, D. J. Deshmukh, Denett and Co., 8<sup>th</sup> edition, 2016.
6. SME Mining Engineering Hand Book Vol.I & II, 2nd Edition, Society for Mining, 2019.

### TH:4(c)- ROCK MECHANICS AND SUPPORT SYSTEM

L	T	P	<b>Total Marks: 100</b>	<b>Course Code:</b> MEPE307(c)
3	0	0		
<b>Total Contact Hours</b>				<b>Theory Assessment</b>
Theory : 45Hrs				End Term Exam 70
				Progressive Assessment 30
<b>Pre Requisite : Nil</b>				
<b>Credit</b>		<b>3</b>		Category of Course : PE

**RATIONALE:**

The diploma holders in mining e-engineering will be responsible to supervise the operation of driving various kinds of safe and stable underground opening. They should be able to select the suitable shape and size of opening with suitable drilling pattern, explosives and shot firing with its tools. This subject provides them basic knowledge of stress concentration fields, rock strength, its associated problems and remedies which will make them able to supervise and drive safe and stable underground opening.

**COURSE OUTCOMES:**

At the end of the course, the student will be able to:

- Explain the fundamentals of rock mechanics.
- Identify the principles of rock pressure and subsidence.
- Describe the principle of rock testing.
- Explain the fundamentals of rock exploration.
- Describe different rock support systems.

**COURSE CONTENT DETAILS:**

Unit No.	Topics for practice	Time Allotted (Hrs.)
I	<b>Rock Mechanics:</b> Definition and its importance, Rock mass and material form, Effects of discontinuities on rock mass. Physical properties of rocks- - Porosity - Density - Moisture content - Degree of saturation - Coefficient of permeability - Electrical properties - Thermal properties - Swelling - Anisotropy – Durability, Mechanical properties of rocks- - Strength (Compressive, Tensile and Shear) - Deformability - Elasticity and Plasticity – Hardness, Stresses involved in mining, Engineering Classification of rock Masses (by deer and miller), Moh’s scale of Hardness.	<b>9</b>
II	<b>Rock Pressure and Subsidence:</b> Classification of Conveyors, Factors affecting design of belt conveyor, cable belt conveyor and steel cord conveyors, Carrying capacity of belt conveyor, cable belt conveyor and steel cord conveyor, Constructional features of belt	<b>9</b>

	conveyor and cable belt conveyor, Drive capacity of belt conveyor and cable belt conveyor.	
III	<b>Rock Testing:</b> Introduction, Sampling and Sample preparation, Specimen, Uni-axial compressive strength, Test; Protodykanov strength index, Tests for measuring rock strengths, Tensile strength tests, Brazilian tests, Bending tests, Flexural strength test- Three point and Four point load test, Shear strength test, Indirect Shear strength test, Punch shear test, In situ tests: Flat jack and load cells for load measurement, Extensometer and roof sag meter for deformation measurement, Flat jack for stress measurement, Strain guage for measuring strain..	9
IV	<b>Rock Exploration:</b> Introduction. Object of exploration, Methods of rock exploration, Rock exploration (a) by direct penetration - Core boring - Core recovery - Rock quality designation - Fracture frequency (b) by indirect penetration - Large diameter calyx hole, Logging of core.	9
V	<b>Rock Support Systems:</b> Ground Support Elements: Rock bolts, anchors, shotcrete, mesh, steel supports, Design and Specification: Principles for selecting and designing support systems based on rock mass conditions and excavation geometry, Quality Control and Management: Ensuring proper installation and monitoring of support systems.	9
	<b>Total</b>	<b>45</b>

#### REFERENCE BOOKS:

1. Elements of Mining Technology Vol. 3, D. J. Deshmukh, Denett and Co., 8<sup>th</sup> edition, 2016.
2. Modern Coal Mining Technology, S. K. Das, Lovely Prakashan.
3. Rock Mechanics for Engineers B.P. Verma, Khanna Publishers
4. Rock Reinforcement and Rock Support , Q. Aydan, CRC Press; 1st edition, 2018.

### TH:4(d)- MINERAL EXPLORATION

L	T	P	<b>Total Marks: 100</b>	<b>Course Code:</b> MEPE307(d)
3	0	0		
<b>Total Contact Hours</b>				<b>Theory Assessment</b>
Theory : 45Hrs				End Term Exam 70
				Progressive Assessment 30
<b>Pre Requisite : Nil</b>				
<b>Credit 3</b>			Category of Course : PE	

#### RATIONALE:

Mining engineers need to get acquainted with exploration steps and techniques. This course covers ores, mineral economics and exploration along with applications.

#### COURSE OUTCOMES:

At the end of the course, the student will be able to:

- Explain the fundamentals of mineral exploration.
- Identify the basic concepts of geological prospecting.
- Describe different techniques used in mineral exploration.
- Explain the principles of reserve estimation.
- Describe different software applications in mineral exploration.

#### COURSE CONTENT DETAILS:

Unit No.	Topics for practice	Time Allotted (Hrs.)
I	<b>Introduction:</b> Basic definitions, historical development and future opportunities and complexities. Geological mapping in mineral exploration, overview of various stages of mineral exploration: activities, data and tools.	<b>9</b>
II	<b>Basic concepts of geological prospecting:</b> Geological indicators, lithological and structural controls of mineralization, geobotanical observations. Basic concepts of geochemical prospecting: planning, Soil Sampling, biogeochemical observations analysis and interpretation.	<b>9</b>
III	<b>Different techniques in mineral exploration:</b> Drilling, sampling, core logging, geological plans and sections. Overview of geophysical methods useful in mineral prospecting: airborne survey, magnetic survey, gravity method, electromagnetic method, integration of geological and geophysical data.	<b>9</b>
IV	<b>Principles of reserve estimation:</b> Density and bulk density, factors affecting reliability of reserve estimation, reserve estimation based on geometrical	<b>9</b>

	models (square, rectangular, triangular and polygon blocks) regular and irregular grid patterns.	
V	<b>Photogeology, Remote Sensing and Geographic Information System in Mineral Exploration:</b> Remote Sensing, GIS and computer software applications in mineral exploration, Evaluation Techniques, case studies.	<b>9</b>
	<b>Total</b>	<b>45</b>

**REFERENCE BOOKS:**

1. Mineral Exploration: Principles and Applications, S. K. Haldar, Elsevier Science Publishing Co, 2<sup>nd</sup> edition, 2018.
2. Introduction to Mineral Exploration, Anthony M. Evans, Michael K. G. Whateley, Charles Moon, Wiley-Blackwell, 2<sup>nd</sup> Edition 2009.
3. Elements of Mineral Exploration, Report by Indian Bureau of Mines press, 1980.

**Bundle - IV****TH:5(a)- UNIVERSAL HUMAN VALUES**

L	T	P	<b>Total Marks: 100</b>	<b>Course Code:</b> OE301A
3	0	0		
<b>Total Contact Hours</b>				
Theory : 45Hrs				End Term Exam 70
Pre-Requisite : Nil				Progressive Assessment 30
Credit 3				Category of Course: OE

**RATIONALE:**

The Universal Human Values (UHV) course aims to help diploma students develop a strong ethical foundation, nurturing responsible individuals who contribute positively to society. In an era driven by rapid technological advancements, it is crucial for students not only to gain technical expertise but also to cultivate values that promote harmony, respect, and sustainability.

**LEARNING OUTCOMES:**

After completion of the course, the students will be able to:

- Identify fundamental human aspirations such as happiness and prosperity.
- Differentiate between the self and the body and understand their respective needs.
- Practice self-reflection to improve decision-making, emotional balance, and personal growth.
- Develop respectful and trustworthy relationships within family, friends, and society.
- Explain the role of values like trust, respect, and love in building strong social bonds.
- Promote cooperation and harmony within communities through ethical practices.

**DETAILED COURSE CONTENT:**

Unit No.	Topic/Sub-Topic	Allotted Time (Hours)
I	<b>Introduction to Value Education and Human Values</b> - Concept and Need for Value Education - Understanding the importance of value education in personal and professional life, Differentiating between values and skills. Basic Human Aspirations - Exploring fundamental human aspirations: happiness and prosperity, Methods to achieve these aspirations through right understanding and relationships.	8
II	<b>Harmony in the Human Being</b> - Understanding the Self - Differentiating between the 'Self' (I) and the Body, Understanding the needs of the Self and the Body, Harmony of the Self with the Body - Ensuring the harmony of 'T' with the Body, Practices for mental and physical well-being.	8
III	<b>Harmony in the Family and Society</b> - Family as the Basic Unit of Society - Understanding values in human relationships, Trust and respect as the foundational values in relationships, Harmony in Society - The concept of an undivided society, Universal human order and world family.	8

IV	<b>Harmony in Nature and Existence</b> - Interconnectedness in Nature -Understanding the four orders of nature: material, plant, animal, and human, Mutual fulfillment among these orders, Co-existence in Existence - Holistic perception of harmony in existence, Role of human beings in maintaining environmental balance.	8
V	<b>Professional Ethics</b> - Ethical Human Conduct - Integrating values into professional life, Concept of professional ethics and accountability, Case Studies in Professional Ethics - Analyzing real-life scenarios to understand ethical dilemmas, Developing solutions based on universal human values.	8
VI	<b>Personal Development and Social Responsibility</b> - Self-Reflection and Self-Exploration - Techniques for self-assessment and personal growth, Setting personal goals aligned with universal values, Social Responsibility - Understanding one's role in society, Participating in community service and social initiatives.	5

#### REFERENCES:

1.	R. R. Gaur, R. Asthana, G. P. Bagaria, A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019.
2.	R. R. Gaur, R. Asthana, G. P. Bagaria, Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019.
3.	A. Nagraj, JeevanVidya: EkParichaya, Amarkantak, 1999.
4.	A. N. Tripathi, Human Values, New Age Intl. Publishers, New Delhi, 2004.
5.	Moral Thinking: An Introduction To Values And Ethics, Vineet Sahu, IIT Kanpur: <a href="https://onlinecourses.nptel.ac.in/noc23_hs89/preview">https://onlinecourses.nptel.ac.in/noc23_hs89/preview</a>

## TH:5(b)- LEADERSHIP AND MANAGEMENT SKILLS

L	T	P	<b>Total Marks: 100</b>	<b>Course Code: OE301(b)</b>	
3	0	0		<b>Theory Assessment</b>	
<b>Total Contact Hours</b>				End Term Exam	70
Theory : 45Hrs				Progressive Assessment	30
<b>Pre Requisite : Nil</b>					
<b>Credit 3</b>				Category of Course : OE	

### RATIONALE:

This course/subject on Leadership and Management Skills for students undergoing Diploma programmes is an exploration in leading and managing people, majorly in education based on sound and acceptable principles and theories for effective leadership. The leadership skills will enable them to take initiative, guide team efforts, motivate peers, and ensure effective collaboration. They'll learn how to delegate tasks, resolve conflicts, and foster a positive team environment. The management skills will help them in organizing tasks, setting timelines, and ensuring efficient workflow within a team.

It is expected that the students will be able to handle projects with better project outcomes and earn a more productive learning experience. This will benefit their academic journey, future careers, and overall professional development:

### LEARNING OUTCOMES:

After completion of the course, the students will be able to

- Explain the principles of management
- Collaborate across cultures for effective team work
- Communicate with people for a positive work culture
- Demonstrate personal dispositions, skills & abilities of a leader
- Undertake the process of change management
- Design training for staff development
- Adapt suitable leadership style for improved work efficiency.

### DETAILED COURSE CONTENT:

Unit No.	Topic/Sub-Topic	Allotted Time (Hours)
<b>I</b>	<b>Leadership &amp; Management, concept, principles.</b> <ul style="list-style-type: none"> <li>• Definition of leadership, management</li> <li>• Leadership theories</li> <li>• Leadership characteristics</li> <li>• Principles of management</li> <li>• Managerial functions</li> <li>• Leader v/s Manager, Leader/Manager traits and character</li> <li>• Leadership Styles</li> </ul>	10

II	<b>Human Resource Management in Organizations</b> <ul style="list-style-type: none"> <li>• Human Resource Management: Meaning, Nature, Objectives, Scope</li> <li>• Job &amp; Job analysis.</li> <li>• Staff Development: Need and Objectives of Staff Development, Approaches</li> <li>• Training &amp; development</li> <li>• Organizational Development: Components of OD process.</li> <li>• Learning organization</li> </ul>	10
III	<b>Personal disposition, skills &amp; abilities of leaders</b> <ul style="list-style-type: none"> <li>• Self-awareness</li> <li>• Leadership characteristics, traits</li> <li>• Leadership skills &amp; abilities</li> <li>• Emotional intelligence &amp; its components, importance in leadership</li> <li>• Communication skills for effective leadership, barriers to effective communication, Active Listening, Mindful listening.</li> <li>• Leading &amp; Mentorship – Influencing &amp; mentoring</li> </ul>	09
IV	<b>Leader’s role in Motivating, Inspiring and Transformative leadership, nurturing team-work</b> <ul style="list-style-type: none"> <li>• Goal setting &amp; leadership</li> <li>• Transformative Leadership, vision &amp; envisioning</li> <li>• Motivational role of leader in people management</li> <li>• Group &amp; team</li> <li>• Team dynamics</li> <li>• Conflict management, strategies in managing conflicts</li> </ul>	08
V	<b>Change Management &amp; Leadership</b> <ul style="list-style-type: none"> <li>• Models of change</li> <li>• Forces driving change</li> <li>• Change Management – process, goal, importance</li> <li>• The process of change happening in an organization</li> <li>• Key aspects of leadership in change management – responsibilities of a change leader.</li> </ul>	08

**SUGGESTED ACTIVITIES:**

- Group/individual presentation on the basic principles of leadership and management, Discussion on readings - Individual or group presentation of assigned topics in class on leadership and management principles and theories.
- Activities on Envisioning, Goal setting
- ACTION PLAN to be prepared

## REFERENCES:

1.	Theories of Educational Leadership and Management (3rd ed.), by Bush, Tony (2003). SAGE Publications, Ltd.
2.	The inspiring leader: unlocking the secrets of how extraordinary leaders motivate. By Zenger, John, Joseph Folkman, and Scott Edinger (2009). New York: McGraw Hill Press.
3.	Knowing yourself. On becoming a leader: the leadership classic. By Bennis, Warren (2009). New York: Basic Books.
4.	Leading Change. By P. Kotter, Harvard Business, 2012.
5.	The Fifth Discipline. By Peter M. Senge, Crwon Currency, 2006.
6.	The Leadership Sutra: An Indian Approach to Power. By Devdutt Pattanaik, – Penguin Random House, 2017.
7.	Leadership and Management. By Dr. A. Chandra Mohan. Himalaya Publishing House, 2010.

### TH:5(c)- PROFESSIONAL SKILLS

<b>L</b>	<b>T</b>	<b>P</b>	<b>Total Marks: 100</b>	<b>Course Code: OE301(c)</b>		
<b>3</b>	<b>0</b>	<b>0</b>		<b>Theory Assessment</b>		
<b>Total Contact Hours</b>				End Term Exam 70		
Theory : 45Hrs				Progressive Assessment 30		
<b>Pre Requisite : Nil</b>						
<b>Credit 3</b>				Category of Course : OE		

#### RATIONALE:

The term, “Professional skills” carries significant weight in the job market and career development. This open elective course explores various types of professional skills, their significance, and how they can be cultivated and harnessed for career progression. By understanding the landscape of professional skills, student can better position himself or herself for success in the competitive job market. It is crucial to continuously update and adapt the professional skills to stay ahead in a rapidly changing work environment. By investing in professional development, one can enhance employability and open doors to new opportunities.

#### LEARNING OUTCOMES:

After completion of the course, the students will be able to

- Demonstrate Self-competency and Confidence
- Practice Emotional Competency
- Work in a team work or in collaboration
- Demonstrate problem solving and decision making skills
- Apply time management strategies and techniques effectively
- Apply professional ethics and integrity in professional and personal life

UNIT NO.	CONTENT	ALLOTTED TIME (HOURS)
I Communication Skills:	<ul style="list-style-type: none"> <li>● Active listening</li> <li>● Verbal and non-verbal communication</li> <li>● Written communication</li> <li>● Presentation skills</li> <li>● Conflict resolution</li> </ul>	08
II Teamwork and Collaboration:	<ul style="list-style-type: none"> <li>● Building trust within a team</li> <li>● Effective collaboration strategies</li> <li>● Role delegation and responsibility sharing</li> <li>● Conflict resolution within a team</li> </ul>	08
III Problem-Solving:	<ul style="list-style-type: none"> <li>● Identifying root causes of issues</li> <li>● Generating solutions and evaluating options</li> </ul>	08

	<ul style="list-style-type: none"> <li>• Decision-making under pressure</li> <li>• Critical thinking skills</li> <li>• Triple constraint issues</li> </ul>	
<b>IV</b> Time Management:	<ul style="list-style-type: none"> <li>• Prioritization and task management</li> <li>• Setting realistic deadlines</li> <li>• Effective time planning and organization</li> </ul>	06
<b>V</b> Emotional Intelligence:	<ul style="list-style-type: none"> <li>• Self-awareness and emotional regulation</li> <li>• Empathy and understanding others' emotions</li> <li>• Managing interpersonal relationships</li> <li>• Motivation</li> <li>• Social skills</li> <li>• Emotional Intelligence (EQ)</li> <li>• Stress management</li> </ul>	08
<b>VI</b> Professional Ethics and Integrity:	<ul style="list-style-type: none"> <li>• Workplace ethics and code of conduct</li> <li>• Confidentiality and data privacy</li> <li>• Professional accountability-</li> <li>• Important Considerations:</li> </ul>	05

**REFERENCES:**

1. Dr. Vitthal Gore: Professional Skills for 21st Century: A Key to Success: Blue Rose- ACADEMIC
2. The ACE of Soft Skills: Attitude, Communication and Etiquette for Success: PEARSON
3. The essence of Leadership: S. Manikutty: Bloomsbury

## SUMMER INTERNSHIP – II

<b>L</b>	<b>T</b>	<b>P</b>	<b>Total Marks: 50</b>	<b>Course Code: SI201</b>	
<b>0</b>	<b>0</b>	<b>0</b>		<b>Assessment</b>	
<b>Total Contact Hours</b>				<b>End Term Exam</b>	
<b>Practical</b>				<b>20</b>	
<b>Pre Requisite</b>				<b>Progressive Assessment</b>	
<b>: Nil</b>				<b>30</b>	
<b>Credit</b>			<b>Category of Course : SI</b>		
<b>2</b>					

**Duration: 3-4 weeks during summer vacation after 4th Semester.**

### RATIONALE

Summer Internship - II is to offer a structured and practical learning experience that prepares individuals for their future careers, helps them make informed career choices, and equips them with the skills and knowledge necessary to succeed in their chosen field. This course provides opportunities to students for hands-on industry experience.

### LEARNING OUTCOMES

After completion of the course, the students will be able to:

- Apply theoretical knowledge gained in their academic coursework to real-world situations.
- Enhance specific skills relevant to their field.
- Gain hands-on experience in a professional network by interacting with mentors and industry professionals.
- Manage time effectively.
- Clarify career goals.

### DETAILED COURSE CONTENTS

#### SUGGESTED ACTIVITIES:

##### I Orientation:

- Introduction to the organization’s mission, values, and culture.
- Familiarization with workplace policies, procedures, and safety guidelines.
- Orientation to the team and organizational structure.

##### II Project-Based Learning:

- Description of the main project or tasks the intern will be working on during the internship.
- Detailed project goals and objectives.
- Training and guidance on project-specific tools, technologies, or methodologies.

##### III Technical and Skill Development:

- Training sessions or workshops to enhance technical skills relevant to the internship role (e.g., programming languages, software tools, laboratory techniques).
- Soft skills development, including communication, teamwork, problem solving, and time management

##### IV Mentorship and Supervision:

- Regular meetings with a designated mentor or supervisor for guidance, feedback, and support.
- Mentorship objectives and expectations.

##### V Professional Development:

- Sessions on professional etiquette, networking, and building a personal brand

- Resume writing and interview preparation workshops.

#### VI Industry and Field-Specific Knowledge:

- Lectures, seminars, or presentations on industry trends, best practices, and emerging technologies.
- Guest speakers from the field to share insights and experiences.
- Field visit for practical exposures.

#### VII Reporting and Documentation:

- Training on how to document project progress, results, and findings.
- Practice in creating reports, presentations, or other deliverables.

#### VIII Ethics and Professionalism:

- Discussions on ethical considerations within the field.
- Scenarios and case studies related to ethical decision-making

#### IX Feedback and Evaluation:

- Regular performance evaluations and feedback sessions.
- Self-assessment and goal-setting exercises.

#### X Networking and Industry Exposure:

- Opportunities to attend industry conferences, webinars, or networking events.
- Encouragement to connect with professionals in the field.

### **NOTE**

As per AICTE guidelines, in Summer Internship-I, students are required to be involved in Inter/ Intra Institutional Activities viz;

- Training with higher Institutions;
- Soft skill training organized by Training and Placement Cell of the respective institutions;
- contribution at incubation/ innovation /entrepreneurship cell of the institute;
- participation in conferences/ workshops/ competitions etc.;
- Learning at Departmental Lab/ Tinkering Lab/ Institutional workshop;
- Working for consultancy/ research project within the institutes and
- Participation in all the activities of Institute's Innovation Council for eg: IPR workshop/Leadership Talks/ Idea/ Design/ Innovation/ Business Completion/ Technical Expos etc.

## PR:4- MAJOR PROJECT

L	T	P	<b>Total Marks: 100</b>	<b>Course Code:</b> PR302
0	0	4		(Pr. 4)
<b>Total Contact Hours</b>				<b>Theory Assessment</b>
Theory : 90Hrs				End Term Exam : 15
<b>Pre Requisite : Nil</b>				Progressive Assessment : 35
<b>Credit : 2</b>				Category of Course : Project

### RATIONALE:

Students' Project Work aims at developing innovative skills in the students whereby they apply the knowledge and skills gained through the course covered in many subjects and Labs, by undertaking a project. The prime emphasis of the project work is to understand and apply the basic knowledge of the principles of Mining Operation and practices in real life situations, so as to participate and manage a large organization and projects, in future.

Entire Project shall spread over 5th and 6th Semester. Part of the Project covered in 5th Semester shall be named as Project Decertation-I and the balance portion to be covered in 6th Semester shall be named as Project Decertation-II.

### LEARNING OUTCOMES:

After the completion of the course, the student shall be able to

- Implement the theoretical and practical knowledge and skills gained through various subjects/courses into an application suitable for a real practical working environment, preferably in an industrial environment.
- Develop software packages or applications and implement these for the actual needs of the community/industry.
- Identify and contrast gap between the technological knowledge acquired through curriculum and the actual industrial need and to compensate it by acquiring additional knowledge as required.
- Carry out cooperative learning through synchronous guided discussions within the class in key areas, asynchronous document sharing and discussions, as well as prepare collaborative edition of the final project report.
- Achieve real life experience in Project design.
- Develop the skill of writing Project Report

# STUDENTS' ACTIVITY

Students will do their project work as guidance from their guide (faculty member).

## Guidelines:

The individual students have different aptitudes and strengths and also areas of interest. Project work, therefore, should match the strengths and interest of the students. For this purpose, students should be asked to identify the type of project work they would like to execute. The activity of problem identification should begin well in advance (right from beginning of 5th semester). Students should be allotted a problem of interest to him/her as a project work. It is also essential that the faculty of the respective departments may have a brainstorming session to identify suitable project assignments for their students. The project assignment can be an individual assignment or a group assignment. Preferably there should not be more than 5 students if the project work is given to a group. The project work identified in collaboration with industry/organization should be preferred.

## Project Phase-I and Phase-II

The Project work duration shall cover 2 semesters (5th and 6th semester). The Grouping of students, selection of Project, assignment of Project Guide to the Group shall be done in the beginning of 5th semester under Project Phase-I. The students may be allowed to study literature, any existing system and then define the Problem/objective of the Project. Requirements specification and Preliminary work of the system have to be completed in Phase-I. Project Milestones are to be set so that progress can be tracked. In Phase-II Detailed work, Documentation has to be complete. Project Report have to be prepared and complete in Phase-II. All Project reports should be organized uniformly in proper order, irrespective of group. Teacher Guides can make suitable alterations in the components of Task and schedule.

At the end of Project Phase-I in the 5th semester there shall be one presentation by each group to mark to progress and also to judge whether the Project is moving in right direction as per the objective of the Project.

A suggestive criterion for assessing student performance by the external (preferably person from industry) and internal (teacher) examiner is given in the table below:

Sl. No.	Performance Criteria	
1.	Selection of project assignment	
2.	Planning and execution of considerations	
3.	Quality of performance	
4.	Providing solution of the problems or production of final product	
5.	Sense of responsibility	
6.	Self-expression/ communication/ Presentation skills	
7.	Interpersonal skills/human relations	
8.	Report writing skills	
9	Viva voce	

The teachers are free to evolve other criteria of assessment, depending upon the type of project work.

It is proposed that the institute should organize an annual exhibition of the project work done by the students and invite leading Industrial organizations of area of subject to such an exhibition.

## **ORGANIZATION OF PROJECT REPORT**

### 1. Cover page:

It should contain the following (in order)

- I. Title of the Project
- II. “Submitted in partial fulfillment of the requirements for the Diploma in <Branch Name>”
- III. By Name of the Student(s)
- IV. Logo of the Institution
- V. Branch Name/Depart Name and Institution Name with Address
- VI. Academic Year

### 2. 1st Inner page

Certificate:

It should contain he is following

“This is to certify that the work in this Project Report entitled <Project Title> by <Name of student(s)> has been carried out under my supervision in partial fulfillment of the requirements for the Diploma in <Branch Name>” during session <session > in <Branch /Department Name> of <Institute name> and this work is the original work of the above student(s).

Seal and signature of the Supervisor/Guide with date

### 3. 2nd Inner Page

Acknowledgement by the Student(s)

### 4. Contents.

### 5. Chapter wise arrangement of Reports

### 6. Last Chapter: Conclusion

It should contain

- I. Conclusion
- II. Limitations
- III. Scope for further Improvement

### 7.Reference