GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: Diploma

Branch: Mining Engineering

Course / Subject Code: DI03022061

Course / Subject Name: Mine Access and Support Technology

w. e. f. Academic Year:	2024-25
Semester:	3rd
Category of the Course:	PCC

Prerequisite:	Basic knowledge of mining.
Rationale:	The diploma holders in mining engineering will be responsible to supervise the shaft sinking operations, drift drivage operation & support erection operation in underground mines. Students should be able to select the suitable ground, drilling pattern, explosives & shot firing with its tools in shaft sinking operation & drift drivage for developing access to underground mines &/or connecting two individual/separate mine parts. This subject provides students basic knowledge of shaft sinking, drift drivage & support erection operations, its associated problems & remedies which will make him able to supervise respective operations.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Explain selection of shaft site with its various sinking methods.	R, U
02	Select the special method for shaft sinking with its applicability conditions.	R, U, A
03	Explain safe drift drivage operation with its applicability conditions.	R, U
04	Analyze roof types and support systems using appropriate testing methods.	R, U, A
05	Design roof bolting systems and mine support plans effectively.	R, U, A

**Revised Bloom's Taxonomy (RBT)*

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA(M)	PA(I)	ESE (V)	
3	0	0	3	70	30	00	00	100

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Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	**Mine Access:** 1.1 Types of Mine access- Vertical shaft, Inclined shaft, declines, adits, and tunnels. 1.2 Preliminary Consideration for Shaft Sinking operation: - Site selection, Shape, size. 1.3 Shaft Sinking operation: (i) Sinking up to Rock head. (ii) Sinking through strata below Rock Head 1.4 Shaft Centering operation. 1.5 Temporary and Permanent lining of shaft sides. 1.6 Ventilation, Lighting & dealing with water during Shaft sinking.	09	20%
2.	**Special methods for Shaft sinking:** 2.1 Requirements of Special methods for shaft sinking. 2.2 Types of special methods for shaft sinking: 2.2.1 Piling system 2.2.2 Caisson methods 2.2.3 Freezing method 2.2.4 Cementation process	08	19%
3.	**Drift/ Tunnel & its driving operation:** 3.1 Drift & Tunnel- Definitions & advantages of drift over staple shaft. 3.2 Drift drivage operation: drilling, blasting, mucking. 3.3 Ventilation arrangements in short & long Drift.	08	19%
4.	**Introduction of Support system and Passive Support:** 4.1 Properties of various types of roofs. 4.2 Roof testing methods and analysis. 4.3 Classification of Supports; Need of Support; Pressure Arch Theory 4.4 Timber support- Setting props, timber bars, Safari supports & side supports; Withdrawal of supports. 4.5 Iron & Steel- advantages over timber; Yielding props, Friction props and Hydraulic props	10	21%
5.	**Active Support system and Mine Support Plan:** 5.1 Introduction to Roof Bolting and Theories behind Roof Bolting 5.2 Roof Bolt: General features, common types, its advantages & disadvantages. 5.3 Draw a mine support plan for various unsupported areas like goaf, junction, galleries, face etc.	10	21%
	Total	**45**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
45%	**40%**	**15%**	--	--	--

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

Sr. No.	Title of Book	Author	Publication with place, year and ISBN
1	Elements of Mining Technology, Volume-I	D.J. Deshmukh	Denett & Co.
2	Modern coal Mining Technology	S.K. Das	Lovely Prakashan
3	Underground Metalliferous Mining Methods	Y.P. Chacharkar	Lovely Prakashan
4	Universal Mining School		Lovely Prakashan
5	Principles and Practices of Modern coal mining	R D Singh	New Age International Publishers, 1997, ISBN-10 **8122409741**

(b) Open-source software and website:

a) NPTEL Lecture series on Underground Mining of Metalliferous deposits: https://archive.nptel.ac.in/courses/123/105/123105006/
b) You tube link:- https://www.youtube.com/watch?v=Dj_JugL7TDk&t=1908s
c) www.mining-enc.com (Mining Encyclopedia)
d) www.ibm.gov.in
e) www.dgms.gov.in

Suggested Project List:

a) Identification and sketching of different mine entries.
b) Layout preparation of shaft and incline access.
c) Visit report on shaft/incline construction (if possible).
d) Hands-on demo (or video-based) of support installation.
e) Model preparation/drawing of support systems.
f) Viva on DGMS guidelines and systematic support rules.

Suggested Activities for Students:

a) Prepare a schematic diagram sheet showing temporary lining & permanent lining used during shaft sinking operation.
b) Prepare a flowsheet of drilling & blasting operation used during shaft sinking (Briefly explain all activities)
c) Prepare a chart showing the selective criteria for special methods of shaft sinking. (Briefly explain the methods)
d) Design a comparative analysis chart showing the selective criteria for different types of mine access.
e) Case studies on mine access planning.

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