

School of Engineering & I.T.

MATS University

Raipur



Syllabus Scheme
(IVth Semester)
For
Bachelor of Technology
Mining Engineering

Subject Code for School of Engineering & I.T. Deptt.

IVth Semester (Mining)

S.No.	Subject Code	Subject Name
1.	BT460	Mine Environment-I
2.	BT461	Underground Coal Mining
3.	BT462	Engineering Materials
4.	BT463	Mining Geology – II
5.	BT464	Mine Surveying-II
6.	BT465x	Open Elective – I
7.	BT466	Mining Geology – II Lab
8.	BT467	Mine Surveying-II Lab
9.	BT468	Underground Coal Mining Lab
10.	BT469	Mine Environment-I Lab



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Scheme of Teaching & Examination

IV - Semester

S.N.	code	Subject	Periods per week			Scheme of marks		Total Credit
			L	T	P	ESE	IM	
1.	BT460	Mine Environment-I	3	0	-	70	30	3
2.	BT461	Underground Coal Mining	4	0	-	70	30	4
3.	BT462	Engineering Materials	4	0	-	70	30	4
4.	BT463	Mining Geology – II	4	0	-	70	30	4
5.	BT464	Mine Surveying-II	4	0	-	70	30	4
6.	BT465x	Open Elective – I	3	0	-	70	30	3
7.	BT466	Mining Geology – II Lab	-	-	2	30	20	1
8.	BT467	Mine Surveying-II Lab	-	-	2	30	20	1
9.	BT468	Underground Coal Mining Lab	-	-	2	30	20	1
10.	BT469	Mine Environment-I Lab	-	-	2	30	20	1
Total			22	0	8	540	260	26

L – Lecture, T – Tutorial, ESE – End Semester Examination,
P – Practical, IM – Internal Marks (Include Class Test & Teacher's Assessments)

OPEN ELECTIVE-I

Subject Code	Subject Name
BT4651	Engineering Risk–Benefit Analysis
BT4652	Disaster Management
BT4653	Global Strategy and Technology
BT4654	Project Management
BT4655	Software Engineering

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Semester: B.Tech.IVth Sem.

Subject: - Mine Environment- I

Total Lecture Periods/Week : 3

Total marks in end semester Exam:100

Minimum Number of Class test to be conducted: 02

Branch: - Mining Engineering

Code : - BT 460

Total Tutorial Periods/Week: 00

Total Practical Periods/Week: 02

Course Objectives:

1. Explain the origin, occurrence, effects, and detection of various mine gases.
2. Discuss the air conditioning of surface mines and underground mines.

Course Outcomes:

1. The students are expected to enhance the technical knowledge on origin, occurrence, effects, and detection of various mine gases, air conditioning of surface and underground mining.
2. Work effectively as an individual and as a member of a multidisciplinary team.

UNIT I: MINE ATMOSPHERE

Pollution of Mine Atmosphere, Mine Gases, Their Origin, Occurrence, Effects and Detection, Methane Drainage. Monitoring System for Mine environment, Analysis of Mine air.

UNIT II: Mine Heat & Humidity

Heat & humidity in mine , atmosphere and its effects , Cooling power of mine air , Assessment of comfort conditions , Air conditioning of Mines , Surface , Underground and divided installations , Spot coolers.

UNIT III: Mine Dust

Classification, physiological effect, measurement of dust concentration, dynamics of small particles, sampling of air borne dust, prevention and suppression of dust.

UNIT IV: Mine Illumination

Types of portable lamps, maintenance and examination, Lamp room design and organization, Percentage and accumulation tests , Lighting from mains , Photometry and illumination surveys , standard of illumination for Underground and open cast workings.

UNIT V: Safety & Health

Occupational Safety and Health Acts, Safety procedures, Type of Accidents, Chemical and Heat Burns, Prevention of Accidents involving Hazardous substances, Human error and Hazard Analysis. Hazard Control Measures in integrated steel industry, Petroleum Refinery,

TEXT BOOKS

1. V.S.Vutukuri and R.D.Lama, Environmental Engineering in Mines, Trans Tech Publishers.
2. M.J.McPherson, Subsurface Ventilation and Environmental Engineering, Chapman & Hall Publication, London.
3. G.B.Mishra, Mine Ventilation and Environment, Oxford University Press.

REFERENCE BOOKS

1. H.L.Hartman, Mine Ventilation and Air Conditioning, Wiley Publication, 1999.
2. D.J.Deshmukh, Elements of Mining Technology Vol II, VidyasewaPrakashan, Nagpur.

3. A.Skochinsky and Komorov V., Mine Ventilation, MIR Pub., Moscow
4. B.B.Dhar and A.K.Ghose, Mining Challenges for 21st Century, Ashish Publications New Delhi.
5. D. Penman, J.S. Penman, The principles and practice of Mine Ventilation, Charles Griffin
6. H. Rabia, Mine Environmental Engineering, Entrac Software Pub.

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Semester: B.Tech. IVth Sem.

Subject: - Mine Surveying II

Total Lecture Periods/Week : 4

Total marks in end semester Exam: 100

Minimum Number of Class test to be conducted: 02

Branch: - Mining Engineering

Code : - BT 464

Total Tutorial Periods/Week: 00

Total Practical Periods/Week: 02

Course Objective

- To choose proper method of surveying for any surveying assignment.
- To set out simple curve on surface and in underground.
- To determine the distance and elevation of any point on the surface & in underground.
- To find out magnitude of error in various surveying.

Course outcomes:

- Apply knowledge of surveying for understanding, formulating and solving surveying problems.
- Identify, analyze and solve surveying problems.

UNIT I: Tacheometry

Principles of Stadia Methods; Determination of constants; Theory of anallactic lens; Distance and elevation formulae Subtense and Tangential Methods; Reduction of stadia Notes; Beaman stadia bar; Auto-reduction Tacheometer.

UNIT II: Setting Out

Setting out simple curves on surface and in underground; Elementary knowledge of compound and transition curves; joint boundary survey; Equalization of boundaries; Maintenance of direction and gradient of roadways i.e. marking and checking of center line and grade line, transfer of point from roof to floor and floor to roof.

UNIT III: Plans & Sections

General requirements of mine plans; types of plans; Symbols used in mine plans; preparation of plans & sections; Plotting of traverse; Checking accuracy of old mine plans; Planimeter and its uses; Enlargement & reduction of plans. Mines Regulations concerning above topics.

UNIT IV: Triangulation & Correlation Survey

Principles forming network of triangles; Selection of sites of triangulation stations; Base and Check base lines; Measurement and adjustment of angles by simple methods; Calculation of Co-ordinates. Methods of correlation of surface and underground surveys through adits, inclines, and shafts; Use of magnetic needle and Gyro theodolites; Different methods of Stope surveying and open pit surveying;

UNIT V: Astronomical Survey, Photographic Surveying & Modern Surveying Techniques

Definitions of important terms; Determination of azimuth by astronomical observations.

General Principles; Phototheodolite; Stereo photographic Surveying; Aerial Surveying -Field of application; Vertical and oblique photographs; Aerial photography; Preparation of photographic maps by simple methods; EDM equipment; Geodimeter, Tellurometer, Total Station, Distomat, Softwares.

Text Books

1. Mine surveying by S. Ghatak
2. Surveying & Levelling by B. C. Punamia
3. Surveying & Levelling by Kanetkar & Kulkarni

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Semester: B.Tech. IVth Sem.

Subject: - Engineering Materials

Total Lecture Periods/Week : 4

Total marks in end semester Exam:100

Minimum Number of Class test to be conducted: 02

Branch: - Mining Engineering

Code : - BT 462

Total Tutorial Periods/Week: 00

Total Practical Periods/Week: 00

Course Objectives:

1. Discuss the classification of engineering materials, structure of metals and alloys, and Fe-C phase diagram
2. Explain the treatment of iron & steel, hardening, annealing, normalizing, and tempering.
3. Explain the various types of ropes and its construction and application.
4. Explain the classification of cement, RCC, application of fly ash mining.
5. Discuss the engineering behavior of materials.

Course Outcomes:

1. The students are expected to enhance the technical knowledge on classification of engineering materials ,structure of metals and alloys and iron-carbon phase diagram.
2. The students are expected to possess ability to identify, formulate and solve treatment of iron & steel problem.
3. The students are expected to possess ability to use the techniques, skills, and modern engineering tools necessary for engineering materials.
4. Work effectively as an individual and as a member of a multidisciplinary team.

UNIT I: General

Introduction, Classification of engineering materials, Structure of Metals and Alloys, Iron-carbon phase diagram.

UNIT II: Heat Treatment Of Iron & Steel

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

UNIT III: Wire Rope

Types and Construction, Wire Rope Lays, Non- Stranded Ropes, Selection of Wire Ropes, Ropes Used For Different Purpose, Mass & Strength Of Wire Ropes, Wire ropes used in Mines, Application of wire ropes in Mines, Testing of wire ropes, Factor of safety, Examination of Wire ropes, Care of wire ropes. Ropes splicing.

UNIT IV: Construction Materials

Cements – Classification & Properties, Quick Setting Cement, R.C.C., Shotcreting, Brick & Stone Masonries, Application Of Fly Ash In Mining.

UNIT V: Engineering Behavior of Some Materials

Stress-Strain Curves of Typical Engg. Materials, Elastic And Plastic Deformation, Fracture, Fatigue And Creep.

Text Books:

1. Introduction to Engineering Materials by B.K. Agrawal
2. Elements of Mining Technology by D.J. Deshmukh, Vol.I

Reference Books:

1. Engineering Materials by Surendra Singh
2. Concrete Technology by M.L.Gambhir.

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Semester: B.Tech. IVth Sem.

Subject:- Mining Geology II

Total Lecture Periods/Week : 4

Total marks in end semester Exam:100

Minimum Number of Class test to be conducted: 02

Branch: - Mining Engineering

Code : - BT 463

Total Tutorial Periods/Week: 00

Total Practical Periods/Week: 02

Course Objectives:

1. Discuss the principles of stratigraphy, units of stratigraphy, classification and correlation of stratigraphy.
2. Discuss the important geological formations: Archeans, Cuddaphs, Vindhyan, Gondwanas and Tertiaries.
3. Discuss the mode of occurrence, origin, distribution and industrial use of important metallic and non-metallic minerals
4. Explain the geophysical and geochemical prospecting

Course Outcomes:

1. The students are expected to enhance the technical knowledge on stratigraphy of India and important geological formation of India.
2. The students are expected to possess ability to identify, formulate and solve the problems of economic minerals
3. The students are expected to possess ability to use the techniques, skills, and modern engineering tools necessary for geophysical and geochemical prospecting.
4. Work effectively as an individual and as a member of a multidisciplinary team.

UNIT I: Stratigraphy

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

UNIT II: Indian Geology

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

UNIT III: Economic Geology-I

Introduction and Scope of the subject; Fundamental Terms and Their Definitions; Distribution and Morphology of Minerals Deposits; Brief Review of the Processes of Mineral Formation and the Genetic classification of mineral deposits.

UNIT IV: Economic Geology-II

Mode Of Occurrence, Origin, Distribution, Association and Industrial Uses of Important Metallic(Au, Al, Cu, Fe, Mn, Sn, Pb And Zn) and Non Metallic (Diamond, Mica, Radioactive Minerals, Gypsum, Dolomites. Fire-Clay, Magnesite, Talc, Asbestos, Graphite, Kyanite, Sillimanite, Corundum, Fluorite, Phosphorite, precious and semi-precious stones, minerals, petroleum deposits of India.

UNIT V: Prospecting and Exploration

Prospecting and Exploration -Their Definitions and Classification Of Methods; Elementary Methods Of Geological, Geophysical, Geochemical Prospecting; Guides To Ores- Ringed Targets, Intersection Loci, Physiographical, Mineralogical, Stratigraphical and Structural Guides To Ores.

References:

1. Fundamentals of Historical Geology and Stratigraphy of India:Ravindra Kumar
2. Geology Of India and Burma :M.S. Krishnan
3. Economic Mineral Deposits :M.L.Jensen&A.Batman

4. India's Mineral Resources :S. Krishnaswamy
5. Geophysical Prospecting :M.Dorbin& B. Miller
6. Courses in Mining Geology :Arogyaswamy
7. Applied Geology : S. Banger

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Semester: B.Tech. IVth Sem.

Subject: - Underground Coal Mining

Total Lecture Periods/Week : 4

Total marks in end semester Exam:100

Minimum Number of Class test to be conducted: 02

Branch: - Mining Engineering

Code : - BT 461

Total Tutorial Periods/Week: 00

Total Practical Periods/Week: 02

Course Objectives:

1. Discuss the theories of coal, classification of coal, choice of coal mining method and distribution of coal in India.
2. Explain the board and pillar mining, depillaring by stowing method, and caving method.
3. Discuss the longwall mining of extraction of coal underground mines.
4. Explain thick seam mining and room & pillar mining.

Course Outcomes:

1. The students are expected to enhance the technical knowledge on extraction of coal by board & pillar mining and longwall mining.
2. The students are expected to possess ability to identify, formulate and solve the problems of extraction of coal from the underground mines.
3. The students are expected to possess ability to use the techniques, skills, and modern engineering tools necessary for thick seam mining and room & pillar mining.
4. Work effectively as an individual and as a member of a multidisciplinary team.

UNIT I: INTRODUCTION

Origin of Coal, Theories of Coal Formation, Classification of Coal, Coaking Coal, Coal Seam and its Classification, Coal Seam Structures and Abnormalities like Faults, Joints, Cleats, Folds etc., Coal Measuring Rocks and Their Characteristics, Distribution of Coal in India, Indian Coal Mining Industry; Choice of Coal Mining Methods.

UNIT II: BOARD AND PILLAR METHOD

Important Terminology, Development Size and Shape of The Pillar, Galleries, Panel System and Without Panel System of Development, Size of Panel, Cycle Of Operation, Depillaring, Problems in Depillaring, Preparatory Arrangements, Depillaring by Stowing, Depillaring by Caving Methods, Pillar Extraction Techniques, Dangers Associated With Depillaring.

UNIT III: LONGWALL MINING

Important Terminology, Types of Longwall Faces and Their Choice, Merits and Demerits of Longwall Mining, Development of Longwall Panels and Faces, Longwall Advancing Method, Longwall Retreating Method, Length of Longwall Faces, Rate of Face Advance, Double Unit Longwall Faces, Face organization and material supply.

UNIT IV: THICK SEAM MINING

Problem in Mining of Thick Seams, Choice of Thick Seam Mining Methods, Inclined Slicing, Horizontal Slicing, Diagonal Slicing, Transverse Slicing, Sublevel Caving, Blasting Gallery Method, Cable-Bolting Method of Thick Seam Extraction.

UNIT V: ROOM AND PILLAR MINING

Vermelles Method, Slant Method, Sublevel Method, Coal Saw Method, Mining of Contiguous Seams, Mining of Steeply Inclined Seam, Mining Under Water, Mining of Seams Prone to Spontaneous Heating, Bumps, Air blast etc.

Textbook

1. Principle and practices of modem Coal Mining – R.D. Singh
2. Coal Mining in India – S.P. Mathur

ReferenceBook

1. Wining & working coal – R.T. Deshmukh
2. U/G winning of Coal – T.N. Singh

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Semester: B.Tech. IVth Sem.

Subject: - Engineering Risk – Benefit Analysis

Total Lecture Periods/Week : 3

Total marks in end semester Exam:100

Minimum Number of Class test to be conducted: 02

Course Objective:

To improve the knowledge of risk assessment , empirical reliability, time value of money, warranty analysis.

Course Outcomes:

Learners get all knowledge about risk benefit analysis.

UNIT I: Introduction

Knowledge and Ignorance, Information Uncertainty in Engineering Systems, Introduction and overview of class; definition of Engineering risk; overview of Engineering risk analysis. Risk Methods: Risk Terminology, Risk Assessment, Risk Management and Control, Risk Acceptance, Risk Communication, Identifying and structuring the Engineering risk problem; developing a deterministic or parametric model 65

UNIT II: System Definition and Structure

System Definition Models, Hierarchical Definitions of Systems, System Complexity. Reliability Assessment: Analytical Reliability Assessment, Empirical Reliability Analysis Using Life Data, Reliability Analysis of Systems

UNIT III: Consequence Assessment

Types, Cause-Consequence Diagrams, Microeconomic Modelling, Value of Human Life, Flood Damages, Consequence Propagation. Engineering Economics: Time Value of Money, Interest Models, Equivalence

UNIT IV: Decision Analysis

Risk Aversion, Risk Homeostasis, Influence Diagrams and Decision Trees, Discounting Procedures, Decision Criteria, Tradeoff Analysis, Repair and Maintenance Issues, Maintainability Analysis, Repair Analysis, Warranty Analysis, Insurance Models

UNIT V: Data Needs for Risk Studies

Elicitation Methods of Expert Opinions, Guidance

Text Books:

1. Risk Analysis in Engineering and Economics, B. M. Ayyub, Chapman-Hall/CRC Press, 2003.

Reference Books:

1. Probability, Statistics, and Reliability for Engineers and Scientists, Ayyub & McCuen, 2003.
2. Probabilistic Risk Assessment and Management for Engineers and Scientists, by H. Kumamoto and E. J. Henley, Second Edition, IEEE Press, NY, 1996.
3. Bedford, T. and Cooke, R. Probabilistic Risk Analysis: Foundations and Methods. New York: Cambridge University Press, 2001.
4. Normal Accidents, Living with High-Risk Technologies, C. Perrow, Princeton University Press, 1999.
5. Accident Precursor Analysis and Management - Reducing Technological Risk Through Diligence, National Academy of Engineering, the National Academies Press, Washington, DC, 2004.

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Semester: B.Tech. IVth Sem.

Subject: - Disaster Management

Total Lecture Periods/Week : **3**

Total marks in end semester Exam: **100**

Minimum Number of Class test to be conducted: **02**

Course Objectives:

To improve knowledge about nature of disaster, environmental impact assessment, construction of technology for mitigation of damage of structures.

Course Outcomes:

Learners get knowledge about disasters.

UNIT I:

Nature of disasters – natural and other disasters, Earthquakes, floods, draught, cyclones, fire and other environmental disasters.

UNIT II:

Behaviour of structures in disaster prone areas, Disaster zoning, Hazard assessment, Environmental Impact Assessment.

UNIT III:

Methods of mitigating damage during disasters, disaster preparedness.

UNIT IV:

Management systems during disasters, Construction Technology for mitigation of damage of structures.

UNIT V:

Short-term and long-term relief measures.

Name of Text Books:

Design of Earthquake Resistant Buildings – Minoru Wakabayashi (McGraw Hill Publication)
Dynamics of Structures: Theory and Application to Earthquake Engineering (2nd edition) – Anil K Chopra (Pearson Education Publication)

Name of Reference Books:

Fundamentals of Vibrations – Anderson, R.A. (McMillan)
IS – 1893 (Part I): 2002, IS – 13920: 1993, IS – 4326: 1993, IS-13828: 1993
Earth quake engineering damage assessment and structural design – S.F. Borg
Disasters and development – Cuny F (Oxford University Press Publication)

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Semester: B.Tech. IVth Sem.

Subject: - Global Strategy and Technology

Total Lecture Periods/Week : 3

Total marks in end semester Exam: 100

Minimum Number of Class test to be conducted: 02

Course Objectives:

Branch: - Mining Engineering

Code : - BT 4653

Total Tutorial Periods/Week: 00

Total Practical Periods/Week: 00

To improve knowledge about leadership, CEMEX, technology and productivity.

Course Outcomes:

Learners get about global strategy and technology.

UNIT I: Introduction to Global Strategy

What the motivations to expand abroad are and how firms can manage conflicting demands in terms of global integration, local responsiveness and worldwide learning. How Global are We? How global most MNCs are? The End of Corporate Capitalism Beyond Off shoring Distance Still Matters Going International.

UNIT II: Location and Global Strategy

Home-Country Effects: Shifting global leadership in the watch industry Success of Swatch as a company in this industry Potential threat on the 68 horizon that could once again cause the decline of the Swiss watch industry. Distance and Global Strategy: Host Country Choices: The Globalization of CEMEX The benefits that CEMEX has derived from expanding across borders Challenges that CEMEX is likely to confront in the future How far can Cemex's competitive advantage travel. Industry Characteristics and Global Strategy: Host - country choices: Characteristics of the global large appliances industry Design of an effective competitive strategy Haier's current global strategy Good rationale for Haier to make global expansion its top strategic priority.

UNIT III: International Corporate Governance

International Corporate Governance with Chinese Characteristics Corporate governance matters in China's capital market Corporate governance model in China differ from international standards Special problems associated with Petro China's corporate governance model Conditions required for further reforms in Petro China's corporate governance system. Cross-cultural Negotiation: Learn from the MOUSE negotiation Issues/factors affect positively or negatively & the negotiation outcome Issues crucial in aligning different parties interests. Negotiators attitudes and culture in reaching the agreement The role of information acquisition in reaching an agreement in this negotiation. Foreign Market Entry Strategies: Issues around geographic market diversification and different strategies of internationalization Different entry modes into a foreign market Stages of internationalization International operations Tensions of a familyowned enterprise going international.

UNIT IV: Technology: Productivity and Diffusion

Productivity Impact and Managing Diffusion Science, Technology and Productivity. Technology, Markets and Competition Incumbents and Entrants Commercialization Intellectual Property and Complementary Assets.

UNIT V: Investing in R&D Capabilities

Incentives to Innovate Investing in basic/applied research; Real options and other approaches. Applying the Concepts and Frameworks: R&D Investment Decisions: Applying the NPV, Real Options and Scenario-Planning Frameworks.

Text/Reference Books:

1. Sumantra Ghoshal, "Global Strategy: an organizing framework." Strategic Management Journal (1987), pp. 425-440.
2. Ghemawat & Hout (2008) Tomorrow's Global Giants? Not the Usual Suspects, HBR Michael E. Porter, "The Competitive Advantage of Nations" HBR, 1990.

3. Pankaj Ghemawat, "Distance Still Matters: The Hard Reality of Global Expansion" Harvard Business Review Sept. (2001), pp. 137-147.

4. George S. Yip, "Global Strategy in a World of Nations?" Sloan Management Review (Fall 1989), pp. 29-41.

5. Larker and Tayan, "Models of Corporate Governance: Who's the Fairest of them all?" Stanford Business School Case, 2008, CG11.

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Semester: B.Tech. IVth Sem.

Subject: - Project Management

Total Lecture Periods/Week : 3

Total marks in end semester Exam: 100

Minimum Number of Class test to be conducted: 02

Course Objectives:

To improve knowledge about stages of Project Management, Project Planning Process, CPM/PERT Networks, Post-Project Analysis.

Course Outcomes:

Learners get knowledge about all project planning and management techniques.

UNIT I: Introduction to Project management

Characteristics of projects, Definition and objectives of Project Management, Stages of Project Management, Project Planning Process, Establishing Project organization.

UNIT II: Work definition

Defining work content, Time Estimation Method, Project Cost Estimation and budgeting, Project Risk Management, Project scheduling and Planning Tools: Work Breakdown structure, LRC, Gantt charts, CPM/PERT Networks.

UNIT III:

Developing Project Plan (Baseline), Project cash flow analysis, Project scheduling with resource constraints: Resource Levelling and Resource Allocation. Time Cost Trade off: Crashing Heuristic.

UNIT IV: Project Implementation

Project Monitoring and Control with PERT/Cost, Computers applications in Project Management, Contract Management, Project Procurement Management.

UNIT V: Post-Project Analysis.

Text/Reference Books:

1. Shtub, Bard and Globerson, Project Management: Engineering, Technology, and Implementation, Prentice Hall, India
2. Lock, Gower, Project Management Handbook.
3. Cleland and King, VNR Project Management Handbook.
4. Wiest and Levy, Management guide to PERT/CPM, Prentice Hall. India
5. Horald Kerzner, Project Management: A Systemic Approach to Planning, Scheduling and Controlling, CBS Publishers, 2002.
6. S. Choudhury, Project Scheduling and Monitoring in Practice.
7. P. K. Joy, Total Project Management: The Indian Context, Macmillan India Ltd.

Additional Readings:

1. John M Nicholas, Project Management for Business and Technology: Principles and Practice, Prentice Hall, India, 2002.
2. N. J. Smith (Ed), Project Management, Blackwell Publishing, 2002.
3. Robert K. Wysocki, Robert Back Jr. and David B. Crane, Effective Project Management, John Wiley, 2002.
4. Jack R Meredith and Samuel J Mantel, Project Management: A Managerial Approach, John Wiley, 2000.

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Semester: B.Tech. IVth Sem.

Subject: - Software Engineering

Total Lecture Periods/Week : 3

Total marks in end semester Exam:100

Minimum Number of Class test to be conducted: 02

Course Objectives:

Branch: - Mining Engineering

Code : - BT 4655

Total Tutorial Periods/Week: 00

Total Practical Periods/Week: 00

To improve knowledge about development process models, Cyclomatic Complexity.

Course Outcomes:

Learners get knowledge about some software.

UNIT I: Introduction

Notion of Software as a Product – characteristics of a good Software Product. Engineering aspects of Software production – necessity of automation. Job responsibilities of Programmers and Software Engineers as Software developers.

UNIT II: Process Models and Program Design Techniques

Software Development Process Models – Code & Fix model, Waterfall model, Incremental model, Rapid Prototyping model, 62 Spiral (Evolutionary) model. Good Program Design Techniques – Structured Programming, Coupling and Cohesion, Abstraction and Information Hiding, Automated Programming, Defensive Programming, Redundant Programming, Aesthetics. Software Modelling Tools – Data flow Diagrams, UML and XML. Jackson System Development.

UNIT III: Verification and Validation

Testing of Software Products – Black-Box Testing and White-Box Testing, Static Analysis, Symbolic Execution and Control Flow Graphs – Cyclomatic Complexity. Introduction to testing of Real-time Software Systems.

UNIT IV: Software Project Management

Management Functions and Processes, Project Planning and Control, Organization and Intra-team Communication, Risk Management. Software Cost Estimation – underlying factors of critical concern. Metrics for estimating costs of software products – Function Points. Techniques for software cost estimation – Expert judgement, Delphi cost estimation, Work break-down structure and Process breakdown structure, COCOMO and COCOMO-II.

UNIT V: Advanced Topics

Formal Methods in Software Engineering – Z notation, Hoare’s notation. Formalization of Functional Specifications – SPEC. Support environment for Development of Software Products. Representative Tools for Editors, Linkers, Interpreters, Code Generators, Debuggers. Tools for Decision Support and Synthesis, Configuration control and Engineering Databases, Project Management. Petrinets. Introduction to Design Patterns, Aspect-oriented Programming.

Text Books:

1. Fundamentals of Software Engineering – Carlo Ghezzi et. al.
2. Software Engineering – Design, Reliability Management – Pressman.

Reference Books:

1. Software Engineering – Ian Sommerville.
2. Software Engineering - Shoeman.
3. Software Engineering with Abstraction – Berzins and Luqi

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**Department of Mining Engineering
List of Experiment**

Subject: Mining Geology II Lab.
Code: BT-466
Maximum Marks: 50

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

Study of Plant Fossils.

Study of Advance Geological Maps and Preparation of Cross Sections.

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**Department of Mining Engineering
List of Experiment**

Subject: Mine Surveying II Lab.
Code: BT-467
Maximum Marks: 50

List of Practical's to be performed (minimum 10)

1. Measurement of height of accessible and inaccessible point by trigonometric surveying.
2. Determination of stadia constant.
3. Distance and elevation determination by tachometric surveying.
4. Setting out of circular curve by chord and offset method.
5. Setting out of circular curve by Rankine's method.
6. Study of planimeter.
7. Study of Pantagraph /Eidograph.
8. Baseline measurement
9. Baseline extension
10. To connect the baseline to main triangulation network
11. Reduction to centre
12. Angle adjustments in triangulation network
13. Plotting the survey by co-ordinate methods
14. Correlation survey by Weisbach triangle method
15. Study of EDM
16. Study of Total station

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**Department of Mining Engineering
List of Experiment**

Subject: Underground Coal Mining Lab.

Code: BT-468

Maximum Marks: 50

1. Study of layouts of Board and Pillar development working by without panel system.
2. Study of layouts of Board and Pillar development working by panel system.
3. Study of layout of Logwall Advancing system.
4. Study of layout of Logwall Retreating system.
5. Study of various line of extraction used for pillar extraction.
6. Study of stook extraction method under difficult roof conditions.
7. Study of surface arrangement required for stowing.
8. Study of sublevel caving method of thick seam mining.
9. Study of layout of Blasting gallery method.
10. Study of layout of Double Unit Longwall Faces.

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**Department of Mining Engineering
List of Experiment**

Subject: Mine Environment I Lab
Code: BT-469
Maximum Marks: 50

List of Practical to be performed: 10

1. Detection of presence and accumulation of firedamp in mine atmosphere.
2. Detection of presence and accumulation of CO in mine atmosphere
3. Study of various techniques of methane drainage.
4. Study of surface air conditioning plant.
5. Study of Underground air conditioning plant.
6. Study of different types of ventilation devices.
7. Study of cap lamp used in underground mine.
8. Design of a cap lamp room for a large underground coal mine.
9. Study of gravimetric dust sampler.
10. Study of thermal precipitator dust sampler.
11. Study of Flame safety lamps used in underground mine.