



**KAKATIYA UNIVERSITY, WARANGAL-506 009**  
**DEPARTMENT OF MINING ENGINEERING**

**B. Tech (Mining) VII SEMESTER**

S. No	Course Code	Course Title	Scheme of Instruction			Lecture hr/week	Scheme of Examination		Credits
			L	T	P		CIE	SEE	
1	PC 4101MN	Mine Planning	3	1	-	4	30	70	4
2	PC 4102MN	Numerical Modeling in Mining	3	1	-	4	30	70	4
3	PC 4103MN	Mineral Processing	3	1	-	4	30	70	3
4	PC 4104MN	Mineral Processing Laboratory	-	-	3	3	25	50	1.5
5	PC 4105MN	Numerical Modeling in Mining Lab	-	-	3	3	25	50	1.5
6	PC 4106MN	Survey & Geological camp	-	-	-	-	100	-	1
7	PC 4107MN	Internship II (Metal Mining)	-	-	-	-	100	-	0.5
8	PC 4108MN	Project Stage 1	-	-	3	3	50	-	1.5
9	OE-I*	Open Elective -I*	2	-	-	2	30	70	2
<b>TOTAL</b>			<b>11</b>	<b>3</b>	<b>9</b>	<b>23</b>	<b>420</b>	<b>380</b>	<b>19</b>

**OPEN ELECTIVE -I (OE\*\*\*)**

OE4101HS	Human Resource Management
OE4102HS	Cyber Law and ethics
OE4203HS	Intellectual Property Rights

- The Internship – II taken during summer vacation after VI Semester.
- The duration of Survey & Geological camp is between 7-10 days (under special conditions duration can be changed by HEAD, Mining)

The Internship – III is to be conducted after completion of VII Semester for a duration of 15 days to be evaluated in VIII Semester

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**B Tech (Mining) VII- Semester**

**PC4101MN**

**MINE PLANNING**

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	1	0	4	External Marks : 70

**UNIT I**

**Introduction:**

Technical factors in mine planning, methodology of mine planning, short range & long range, mine modeling, mine simulation systems approach to mine planning based on mine subsystems and their elements, mine plan generation.

**UNIT II**

**Open Pit Mining:**

Selection of initial mine cuts, location of surface structures, division of mining area into blocks, mine design, bench drainage, geometry, haul roads, slope stability; open pit limits and optimization, calendar plan, production planning, production scheduling, economic productivity indices.

**UNIT III**

**Underground Mining:**

Location of mine entries, mine and auxiliary, optimization of mine parameters, design of shaft pillars and protective pillars, planning of production capacity, layout of development drives/raises/winzes etc, length of faces, size of panels, etc planning of support systems, ventilation, layout of drainage system, planning production scheduling and monitoring, selection of depillaring/stopping method, manpower management, economic/productivity indices, techno economic analysis, mine reclamation design

**UNIT IV**

**Equipment Planning:**

Latest technological developments in increase in both types and capacities of equipments used in mining operations. Planning and selection of equipment for different mining conditions. Equipment design for optimum drilling and blasting operations. Equipment information, performance, monitoring and expert systems; Innovative mining systems

**UNIT V**

**Project Implementation and Monitoring:**

Pre-project activities feasibility report, environmental clearance, detailed project report, sources of funds, import of technology, selection of contracts and contract administration, time management, cost control material management system, project quality assurance, social responsibility, government orders and guidelines. Environmental impact assessment and preparation of environmental management plan. Mine closure plan.



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**Text / Reference books:**

1. Jayanth Bhattacharya, Principles of Mine Planning-Allied Publishers, Delhi 2003.
  2. Hustrulid, W. and Kuchta, M., (eds)., Fundamentals of Open pit Mine Planning and Design, Elsevier, 1995
  3. Ehrenburger, V and Fajkos, A., Mining Modeling, Elsevier, 1995.  
Bawden, W.F., and Archibald. J.F., Innovative Mine Design for the 21st Century Elsevier, 1993.
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**DEPARTMENT OF MINING ENGINEERING**

**B Tech (Mining) VII- Semester**

**PC4102MN**

**NUMERICAL MODELLING IN MINING**

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	1	0	4	External Marks : 70

**UNIT I**

**Introduction to elastic and plastic models:**

Fundamentals, elastic, plastic, homogeneous and isotropic, non-linear elastic and elastoplastic models  
 Need for numerical modelling in design of excavations in mines; Domain and boundary conditions;  
 Discretisation of domain and boundary; Methods of numerical simulation for excavations in mining

**UNIT II**

**Finite difference methods:**

Concept, formation of mesh element, finite difference patterns, solutions, application to mining  
 Commercial Software's for application in mining. Explicit finite difference method; Finite difference  
 equation; Mechanical damping, mechanical time-step determination, solution stability, advantages and  
 their limitations; Non-linear solution methods Introduction to Numerical Modelling Packages: FLAC.

**UNIT III**

**Finite element methods:**

Concept, discretisation, element configuration, element stiffness, Assembling elements to form a  
 structural stiffness matrix; Imposing boundary conditions and solving structural equations Elements on  
 assumed displacements, constant strain triangle, isoparametric formulation, advantages and their  
 limitations., two and three dimensional solutions, linear and non-linear analysis, applications in  
 geomechanics; simulation of joints in strata. Commercial Software's for application in mining: ANSYS.

**UNIT IV**

**Boundary element method:**

Concept, discretisation, formulation, merits, demerits and limitations, different methods of solution for  
 isotropic and infinite media. Commercial Software's for application in mining, Boundary Element  
 Method: Introduction, formulation, advantages and their limitations.

**UNIT V**

**Applications in mines:**

Design of underground structures such as accesses of the deposit, pillar during development and  
 depillaring operations, barrier pillar and panel. Performance of longwall powered support. Design of pit  
 and dump in opencast mines. Prediction of subsidence



**Text / Reference books:**

1. Desai CS and Abel JF. Introduction to the finite element method. Van Nostrand Rieholkl Co., New York. 1983.
  2. D Deb. Finite element method: concepts and application in geo-mechanics. PHI publishers. 2012.
  3. Zienkiewicz OC. Finite element method in engineering science. Tata McGraw Hill. 1972.
  4. Segerlind LJ. Applied finite element analysis. John Wiley and Sons, New York. 1987.
  5. Mukhopadyay M. Matrix finite element – computer and structural analysis. Oxford and IBH Publishing co. 1984.
  6. Brown ET. Analytical and computational methods in engineering and rock mechanics. Allen and Unwin, London. 1987.
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**B Tech (Mining) VII- Semester****PC4103MN****MINERAL PROCESSING**

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	1	0	3	External Marks : 70

**UNIT I****Introduction:**

Definition, scope and limitation, concepts of mineral beneficiation, properties of minerals, useful in concentration; Importance of mineral beneficiation and coal cleaning; Liberation and sorting

**UNIT II****Comminution:**

Introduction to Comminution, purposes of Comminution, primary, secondary and tertiary crushing techniques. Types of crushers and mills; Flow sheet for wet/dry grinding; Mechanism of crushing

**UNIT III****Size Analysis and Classifiers:**

Sieve analysis, choice of sieve sizes, Gates-Gaudin - Schuhmann and Rosin- Rammler method. Screens, importance of screens, factors effecting performance of screens, various types of screens and sizes analysis

Classifiers, mechanism of classifiers, hindered settling and free settling types. Types of classifiers, hydro cyclone and factors affecting its performance

**UNIT IV****Concentration and Dewatering techniques:**

Introduction to concentration techniques, DMS, Jigging, Tabling, Magnetic separators, High tension separators and forth flotation

Dewatering: Thickness, Filters and Thermal Drying

**UNIT V****Flow Sheets:**

Coal Preparation & General importance of coal cleaning, sink & float tests, wash ability curves.

Flow Sheets: Simplified flow sheets for coal, magnetite, iron, copper, lead, zinc.

**Text / Reference books:**

1. MalleswarRao, "Introduction to mineral processing Vol. I and II"
2. Wills B.A and Napier-Munn T.J, " Mineral processing technology"
3. Jain SK., "Ore Processing "
4. Gardin, "Principle of mineral dressing

**B Tech (Mining) VII- Semester****OE4101HS****HUMAN RESOURCE MANAGEMENT**

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
2	0	2	2	External Marks : 70

**UNIT – I****Introduction of HRM:**

Introduction to HRM – Line Managers – HR Role and responsibilities – New Approaches to Organizing HR – Globalization & Competition Trends – Technological Trends – Trends in Nature of Work – Workforce and Demographic Trends – Economic Challenges – High Performance Work System’s – Labor Legislation in India

**UNIT – II****Recruitment and Selection:**

Basics of Job Analysis and talent Management process – Methods for Collecting Job Analysis Information – Job Descriptions and specifications – Job Satisfaction – Job Enlargement, Job Enrichment, Job Rotation, HR Planning – Recruitment & Selection Process – Planning & Forecasting of human resources – Sources of Recruitment – Recruitment on Diverse Work Force

**UNIT – III****Training and Developing and Performance Management:**

Importance of Training and Development – Training process - Analyzing Training needs & Designing the program – Implementation of training programs – training methods – Management development process – Evaluation of training and development programs.

**UNIT – IV****Compensation and Employee welfare:**

Basic factors in determining pay rates – Job evaluation methods - Establishing pay rates – Pricing Managerial and Professional Jobs – Performance based pay -Benefits – Insurance – Retirement Benefits – Employee Welfare facilities.

**UNIT – V**

**Employee Relations** – Labor Movement – Collective Bargaining Process – Grievances – Grievances handling procedure – Employee Separation – Employee Safety and Health – Occupational Safety Law – Work Place Health Hazards Problems & Remedies – Salient features of Industrial Disputes Acts 1947 – Factories Act



**Text / Reference books:**

1. Gary Dessler, Biju Varkkey, Human Resource Management, 4e, Pearson 2017.
  2. Robert L.Mathis, John H.Jackson, Manas Ranjan Tripathy,Human Resource Management, Cengage Learning 2016.
  3. Uday Kumar Haldar, Juthika Sarkar, Human Resource Management, Oxford University Press 2013.
  4. K. Aswathappa, Human Resource Management, Text and Cases, TMH, 2011.
  5. Sharon Pande and Swapnalekha Basak, Human Resource Management, Text and Cases. Vikas Publishing, 2e, 2015.
  6. Nick Wilton, "An Introduction to Human Resource Management" Sage, 2012
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**B Tech (Mining) VII- Semester****OE4102HS****CYBER LAW AND ETHICS**

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
2	0	2	2	External Marks : 70

**UNIT – I****Introduction to Cyber law:**

Evolution of computer Technology, emergence of cyber space; Cyber Jurisprudence, Jurisprudence and law, Doctrinal approach, Consensual approach, Real Approach, Cyber Ethics, Cyber Jurisdiction, Hierarchy of courts, Civil and criminal jurisdictions

**UNIT – II****Information Technology Act:**

Overview of IT Act, 2000, Amendments and Limitations of IT Act, Digital Signatures Cryptographic Algorithm, Public Cryptography, Private Cryptography, Electronic Governance, Legal Recognition of Electronic Records

**UNIT – III****Cyber law and Related Legislation:**

Patent Law, Trademark Law, Copyright, Software – Copyright or Patented, Domain Names and Copyright disputes, Electronic Data Base and its Protection, IT Act and Civil Procedure Code, IT Act and Criminal Procedural Code

**UNIT – IV****Electronic Business and legal issues:**

Evolution and development in E-commerce, paper vs paper less contracts E-Commerce models- B2B, B2C, E security. Business, taxation, electronic payments, supply chain, EDI, E-markets, Emerging Trends

**UNIT – V****Cyber Ethics:**

The Importance of Cyber Law, Significance of cyber Ethics, Need for Cyber regulations and Ethics; Ethics in Information society, Introduction to Artificial Intelligence Ethics: Ethical Issues in AI and core Principles, Introduction to Block chain Ethics

**Text / Reference books:**

1. Cyber Laws: Intellectual property & E Commerce, Security- Kumar K, dominant Publisher
  2. Cyber Ethics 4.0, Christoph Stuckelberger, Pavan Duggal, by Globethic
  3. Information Security policy & Implementation Issues, NIIT, PHI
  4. Computers, Internet and New Technology Laws, Karnika Seth, Lexis Nexis Butterworths WadhwaNagpur.
  5. Legal Dimensions of Cyber Space, Verma S, K, Mittal Raman, Indian Law Institute, New Delhi,
  6. Cyber Law, Jonthan Rosenoer, Springer, New York, (1997).
  7. The Information Technology Act, 2005: A Handbook, OUP Sudhir Naib,, New York, (2011)
  8. Information Technology Act, 2000, S. R. Bhansali,, University Book House Pvt. Ltd., Jaipur (2003).
  9. Cyber Crimes and Law Enforcement, Vasu Deva, Commonwealth Publishers, New Delhi, (2003)
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**B Tech (Mining) VII- Semester****OE4103HS****INTELLECTUAL PROPERTY RIGHTS**

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
2	0	2	2	External Marks : 70

**UNIT – I****Introduction to Intellectual Property Law:**

Evolutionary past – Intellectual Property Law Basics – Types of Intellectual Property – Innovations and Inventions of Trade related Intellectual Property Rights - Compliance and Liability Issues

**UNIT – II****Introduction to Copyrights:**

Principles of Copyright – Subject Matters of Copyright – Rights Afforded by Copyright Law – Copyright Ownership – Transfer and Duration - Copyright Formalities and Registration – Limitations – Infringement of Copyright

**UNIT – III****Introduction to Patent Law:**

Rights and Limitations – Rights under Patent Law – Patent Requirements – Ownership and Transfer – Patent Application Process and Granting of Patent – Patent Infringement and Litigation – International Patent Law – Double Patenting – Patent Searching – Patent Cooperation Treaty

**UNIT – IV****Introduction to Trade Mark:**

Trade Mark Registration Process – Post registration procedures – Trade Mark maintenance – Transfer of rights – Inter parties Proceedings - Infringement – Dilution of Ownership of Trade Mark – Likelihood of confusion – Trade Mark claims – Trade Marks Litigation – International Trade Mark Law

**UNIT – V****Introduction to Trade Secrets:**

Maintaining Trade Secret – Physical Security – Employee Access Limitation – Employee Confidentiality Agreement – Trade Secret Law – Unfair Competition – Trade Secret Litigation – Breach of Contract – Applying State Law



**Text / Reference books:**

1. Deborah E. Bouchoux: "Intellectual Property". Cengage learning, New Delhi
  2. Kompal Bansal & Parishit Bansal "Fundamentals of IPR for Engineers", BS Publications (Press)
  3. Cyber Law. Texts & Cases, South-Western's Special Topics Collections
  4. Prabhuddha Ganguli: "Intellectual Property Rights" Tata Mc-Graw – Hill, New Delhi
  5. Richard Stim: "Intellectual Property", Cengage Learning, New Delhi.
  6. R. Radha Krishnan, S. Balasubramanian: "Intellectual Property Rights", Excel Books. New Delhi.
  7. M. Ashok Kumar and Mohd Iqbal Ali: "Intellectual Property Right" Serials Pub
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**B Tech (Mining) VII- Semester****PC4104MN****MINERAL PROCESSING LABORATORY**

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 25
0	0	3	1.5	External Marks : 50

1. Coning and quartering
2. Ruffle sampler
3. Working of Jaw Crusher and roller crusher
4. Working of Gyratory crusher
5. Working of Cone crusher
6. Working of Ball Mill and rod mill
7. Sieve Analysis
8. Magnetic Separators
9. Jigging
10. Tabling
11. Froth flotation

**B Tech (Mining) VII- Semester****PC4105MN****NUMERICAL MODELLING IN MINING LABORATORY**

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 25
0	0	3	1.5	External Marks : 50

1. Assessment of pre and post behavior of the entries after excavation.
2. Design of entries of the deposit.
3. Design of the mine pillar.
4. Design of the barrier pillar.
5. Design of the mine panel.
6. Design of the long wall mine workings.
7. Prediction of subsidence.
8. Design of the high wall of the opencast mine.
9. Design of the overburden dumps.
10. Performance of the powered support.