Scheme & Syllabus of

UNDERGRADUATE DEGREE COURSE

# B.Tech. VII & VIII Semester

# Mining Engineering

Bikaner Technical University, Bikaner

Effective from session: 2021 – 2022

# Teaching & Examination Scheme
# B.Tech.: Mining Engineering
# 4th Year - VII Semester

| SN | Category | Course | | Contact hrs/week | | | Marks | | | | Cr |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Code | Title | L | T | P | Exm Hrs | IA | ETE | Total | |
| **THEORY** | | | | | | | | | | | |
| 1 | PCC | 7MI4-01 | Mine Legislation and Disaster & Environmental Management in Mines | 3 | 0 | 0 | 3 | 30 | 120 | **150** | **3** |
| 2 | OE | | Open Elective - 1 | 3 | 0 | 0 | 3 | 30 | 120 | **150** | **3** |
| | | | **Sub Total** | **6** | **0** | **0** | | **60** | **240** | **300** | **6** |
| **PRACTICAL & SESSIONAL** | | | | | | | | | | | |
| 4 | PCC | 7MI4-21 | Advanced Methods of Mining | 0 | 0 | 3 | 2 | 45 | 30 | **75** | **1.5** |
| 5 | | 7MI4-22 | Mineral Processing | 0 | 0 | 2 | 2 | 30 | 20 | **50** | **1** |
| 6 | | 7MI4-23 | Environmental Management in Mines | 0 | 0 | 3 | 2 | 45 | 30 | **75** | **1.5** |
| 7 | PSIT | 7MI7-30 | Industrial Training | 1 | 0 | 0 | | 75 | 50 | **125** | **2.5** |
| 8 | | 7MI7-40 | Seminar | 2 | 0 | 0 | | 60 | 40 | **100** | **2** |
| 9 | SODECA | 7MI8-00 | Social Outreach, discipline, Extra Curricular Activities | 0 | 0 | 0 | | 0 | 25 | **25** | **0.5** |
| | | | **Sub Total** | **3** | **0** | **8** | | **255** | **195** | **450** | **9** |
| | | | **TOTAL OF VII SEMESTER** | **9** | **0** | **8** | | **315** | **435** | **750** | **15** |

***L:*** *Lecture,* ***T:*** *Tutorial,* ***P:*** *Practical,* ***Cr:*** *Credits*
***ETE:*** *End Term Exam,* ***IA:*** *Internal Assessment*

# Teaching & Examination Scheme
# B.Tech.: Mining Engineering
# 4th Year - VIII Semester

| THEORY | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SN** | **Category** | **Course** | | **Contact hrs/week** | | | **Marks** | | | | **Cr** |
| | | **Code** | **Title** | **L** | **T** | **P** | **Exm Hrs** | **IA** | **ETE** | **Total** | |
| 1 | PCC | 8MI4-01 | Mine Planning and Mine Economics & Mine Closure | 3 | 0 | 0 | 3 | 30 | 120 | **150** | **3** |
| 2 | OE | | Open Elective - 2 | 3 | 0 | 0 | 3 | 30 | 120 | **150** | **3** |
| | | | **Sub Total** | **6** | **0** | **0** | | **60** | **240** | **300** | **6** |
| | | | | | | | | | | | |
| **PRACTICAL & SESSIONAL** | | | | | | | | | | | |
| 4 | PCC | 8MI4-21 | Mine Planning & Design | 0 | 0 | 2 | 2 | 30 | 20 | **50** | **1** |
| 5 | | 8MI4-22 | Mine Economics and Mine Closure | 0 | 0 | 2 | 2 | 30 | 20 | **50** | **1** |
| 6 | PSIT | 8MI7-50 | Project | 3 | 0 | 0 | | 210 | 140 | **350** | **7** |
| 7 | SODECA | 8MI8-00 | Social Outreach, discipline, Extra Curricular Activities | 0 | 0 | 0 | | 0 | 25 | **25** | **0.5** |
| | | | **Sub Total** | **3** | **0** | **4** | | **270** | **205** | **475** | **9.5** |
| | | | **TOTAL OF VII SEMESTER** | **9** | **0** | **4** | | **330** | **445** | **775** | **15.5** |

***L:*** *Lecture,* ***T:*** *Tutorial,* ***P:*** *Practical,* ***Cr:*** *Credits*

***ETE:*** *End Term Exam,* ***IA:*** *Internal Assessment*

## List of Open Electives for Mining Engineering

| Subject Code | Title | | Subject Code | Title |
|---|---|---|---|---|
| **Open Elective - I** | | | **Open Elective - II** | |
| 7AG6-60.1 | Human Engineering and Safety | | 8AG6-60.1 | Energy Management |
| 7AG6-60.2 | Environmental Engineering and Disaster Management | | 8AG6-60.2 | Waste and By-product Utilization |
| 7AN6-60.1 | Aircraft Avionic System | | 8AN6-60.1 | Finite Element Methods |
| 7AN6-60.2 | Non-Destructive Testing | | 8AN6-60.2 | Factor of Human Interactions |
| 7CH6-60.1 | Optimization Techniques | | 8CH6-60.1 | Refinery Engineering Design |
| 7CH6-60.2 | Sustainable Engineering | | 8CH6-60.2 | Fertilizer Technology |
| 7CR6-60.1 | Introduction to Ceramic Science & Technology | | 8CR6-60.1 | Electrical and Electronic Ceramics |
| 7CR6-60.2 | Plant, Equipment and Furnace Design | | 8CR6-60.2 | Biomaterials |
| 7CE6-60.1 | Environmental Impact Analysis | | 8CE6-60.1 | Composite Materials |
| 7CE6-60.2 | Disaster Management | | 8CE6-60.2 | Fire and Safety Engineering |
| 7CS6-60.1 | Quality Management/ISO 9000 | | 8CS6-60.1 | Big Data Analytics |
| 7CS6-60.2 | Cyber Security | | 8CS6-60.2 | IPR, Copyright and Cyber Law of India |
| 7EE6-60.1 | Electrical Machines and Drives | | 8EE6-60.1 | Energy Audit and Demand side Management |
| 7EE6-60.2 | Power Generation Sources. | | 8EE6-60.2 | Soft Computing |
| 7EC6-60.1 | Principle of Electronic communication | | 8EC6-60.1 | Industrial and Biomedical applications of RF Energy |
| 7EC6-60.2 | Micro and Smart System Technology | | 8EC6-60.2 | Robotics and control |
| 7ME6-60.1 | Finite Element Analysis | | 8ME6-60.1 | Operations Research |
| 7ME6-60.2 | Quality Management | | 8ME6-60.2 | Simulation Modeling and Analysis |
| 7PE6-60.1 | Pipeline Engineering | | 8PE6-60.1 | Unconventional Hydrocarbon Resources |
| 7PE6-60.2 | Water Pollution control Engineering | | 8PE6-60.2 | Energy Management & Policy |
| 7TT6-60.1 | Technical Textiles | | 8TT6-60.1 | Material and Human Resource Management |
| 7TT6-60.2 | Garment Manufacturing Technology | | 8TT6-60.2 | Disaster Management |

## 7MI4-01: Mine Legislation and Disaster & Environmental Management in Mines

**Credit : 3** **Max. Marks: 150(IA:30, ETE:120)**
**3L+0T+0P** **End Term Exam : 3 Hours**

| SN | Contents | Hours |
|---|---|---|
| 1 | Introduction: Objective, scope and outcome of the course. | 1 |
| 2 | General Principles of Mining Laws, Development of mining legislation in India, Post independence trend of changes, National Mineral Policy. | 4 |
| 3 | Principal provisions of Mines and Minerals (Development and Regulation ) Act & Mineral Concession and Development Rules. | 3 |
| 4 | Mines Act 1952 with upto date amendments | 2 |
| 5 | Mines Rules 1955 with upto date amendments | 2 |
| 6 | Coal Mines Regulation 1957 with upto date amendments | 2 |
| 7 | Metalliferous Mines Regulations 1961 with upto date amendments | 2 |
| 8 | Principal provisions of pit head and bath rules, creche rules , mine vocational training rules, | 2 |
| 9 | Explosive rules(related to mines); Electricity rules applicable to mines and oil fields | 2 |
| 10 | Principal provisions of industrial dispute act, workmen's compensation act, trade union act, | 3 |
| 11 | Payment of wages act and minimum wages act, Rescue rules; Legal requirements, Important technical circulars issued by DGMS | 3 |
| 12 | Introduction: Objective, scope and outcome of the course. | 1 |
| 13 | Man and Mine Environment: Changes of social environment caused by mining; Socio-economic factors; | 2 |
| 14 | Occupational health hazards due to mine dust, poor lighting and ventilation, noise and vibration, trace elements, radioactive emission, Impact of surface subsidence. | 2 |
| 15 | Air and Water pollution: Sources, ill effects, measurement and monitoring, standards; Preventive and mitigating measures | 1 |
| 16 | Dust in mines: Dangers, formation, prevention and suppression; Dust sampling apparatus, their construction and applications | 1 |

| | | |
|---|---|---|
| **17** | Noise and Vibration: Sources, ill effect, measurement and monitoring, standards; Preventive and mitigating measures | **1** |
| **18** | Acid Mine Drainage: Sources, mechanism of formation and ill effects; Preventive and mitigating measures | **1** |
| **19** | Land Reclamation: Re-vegetation and restoration methodologies; Plant species selection; Case studies of coal and metalliferous mine dumps/spoils | **1** |
| **20** | Environmental Management: Factors to be considered, EIA, EMP preparation , Mine Closure Planning | **1** |
| **21** | Environmental laws and acts; Main provisions of Environmental Protection Act 1986, EIA notification 2006 and Circulars issued by MoEF, | **1** |
| **22** | Forest Conservation Act 1980 and Forest Conservation Rules 1981 related with the Mining | **1** |
| | **Total** | **39** |

## 7MI4-21: Advanced Methods of Mining

**Credit : 1.5** **Max. Marks: 75(IA:45, ETE:30)**
**0L+0T+3P**

| Contents |
|---|
| 1. Powered supports, their Classification, principles of operation and design features and application,<br>2. Support of wide excavation, longwall faces and depillaring,<br>3. Hydraulic fluids, Shotcreting, Roof stitching<br>4. Mining over old underground workings;<br>5. Placer mining: hydraulicking,<br>6. Dredging,<br>7. Dump leaching, Solution mining, ore mining by leaching, Bacterial leaching, under water/Sea-bed mining<br>8. deep sea mining.<br>9. Steep angle conveyor, high angle conveyor,<br>10. Mining by surface miner, In pit crushing and cross pit conveying techniques.<br>11. Mining of coal under difficult Situations: Contiguous seams, seams prone to outburst and bumps; Mining of seams prone to fire and spontaneous combustion,<br>12. Remote controlled operations and use of robots in coal mining<br>13. Hydraulic Mining: The concept; Layout of workings on district and level systems;<br>14. In-situ Gasification: The concept and chemistry; Methods- using underground excavations, and using vertical or directionally drilled boreholes from surface |

## 7MI4-22: Mineral Processing

**Credit : 1** **Max. Marks: 50(IA:30, ETE:20)**
**0L+0T+2P**

| Contents |
|---|
| 1. Jaw crushers and their comparison |
| 2. Roll crushers and their comparison |
| 3. Gyratory crushers and their comparison |
| 4. The ball mill and its application |
| 5. Various types of classifiers |
| 6. Determination of various sized product with sieve shaker |
| 7. Concept and apparatus of froth flotation |
| 8. Process of thickening & filtration |
| 9. Wilfrey table |
| 10. Filter press |
| 11. Laboratory jig |
| 12. Flowsheet of lead-zinc ore (Zawar) |
| 13. Flowsheet of copper ore (Khetri) |
| 14. Flowsheet of Gold, Iron ore, Mangnese ore |
| 15. Flowsheet of coal washing |

## 7MI4-23: Environmental Management in Mines

**Credit : 1.5** **Max. Marks: 75(IA:45, ETE:30)**
**0L+0T+3P**

| Contents |
|---|
| 1. Occupational health hazards and their remedial measures.<br>2. Standards for water, air, noise, dust etc. and their impact when found in excess<br>3. Measurement of dust contents with the help of dust sampler<br>4. Measurement of dust by instruments used in mines<br>5. Sound level meter and measurement of noise level produced by various mining machineries<br>6. Measurement of vibration with the help of Blastmate series III seismograph<br>7. Reclamation of dumps for mechanized opencast mines<br>8. Preparation of EMP of mines, collection of various fields data and their evaluation<br>9. Measurement of vibrations produced in mines by seismograph<br>10. Measurement of pH value of water samples collected from mine discharge and analyzing its adverse effects<br>11. Gravimetric dust sampler<br>12. Preparation of EIA<br>13. Sound level measurement<br>14. Problem for Acid mine drainage<br>15. Case study of reclamation and valley filling. |

## 8MI4-01: Mine Planning and Mine Economics & Mine Closure

**Credit : 3** **Max. Marks: 150(IA:30, ETE:120)**
**3L+0T+0P** **End Term Exam : 3 Hours**

| SN | Contents | Hours |
|---|---|---|
| 1 | Introduction: Objective, scope and outcome of the course. | 1 |
| 2 | Feasibility study: Its function and preparation of feasibility report for metallic and non-metallic minerals | 2 |
| 3 | Minerals inventory and ore reserves | 2 |
| 4 | Different types of underground mining methods as per the organizational and technical parameters | 3 |
| 5 | Determination of size of mine, life of mine and production rates | 3 |
| 6 | Design for mining the mineral deposits by open-pit mining, under ground mining and the combination of both | 2 |
| 7 | The ultimate open pit profile based on physical and economical parameters; Optimum pit design | 3 |
| 8 | Division of underground mine into parts, levels and panels; Determination of level interval; Size of long wall faces. Stope design-the basic concepts | 2 |
| 9 | Different planning stages- micro and macro planning, Project scheduling | 3 |
| 10 | Computer applications; Information systems; Information technology, Design for mining mineral deposits by underground mining | 2 |
| 11 | Production planning: Selection of machines; Haul road design; Optimum load haul system; Optimum blast design | 2 |
| 12 | Introduction: Objective, scope and outcome of the course. | 1 |
| 13 | Introduction: Economic importance of the mining industry; mining economy; risky nature of the mining industry; the state and the mining industry; Marketing and export of minerals; National mineral policy | 2 |
| 14 | Loss of mineral in Mining: Classification and incorporation of losses, coefficient of recovery of mineral extraction; Dilution and recovery | 2 |
| 15 | Mine examination and Valuation: Examination and report on mines/mineral properties; valuation of mines/mineral properties; present value and its computation; ore value and profitability of mining; recoverable value | 2 |

| | | |
|---|---|---|
| **16** | Cost of Mining: Capital and operating cost, factor affecting operating cost, method of estimating future costs; computation of cost of development and stoping operation<br>Financial Analysis: Revenue and mining costs; Taxes and royalties; Net Present Value (NPV); Internal Rate of Return (IRR); Effect of inflation on NPV of a project; Sensitivity analysis | **2** |
| **17** | Financial Statements: Nature and limitations of financial statements. Interpretation of financial statements. Uni-variate and multivariate ratio analysis. Limitation of ratio analysis | **2** |
| **18** | Cost analysis: Various cost concept; Cost-Volume-Profit analysis; Break-even analysis; Cost indifference point. Decision making with the cost data. Cost and budgetary control | **2** |
| **19** | Mine Closure plan, its need, preparation and approval. | **1** |
| | **Total** | **39** |

## 8MI4-21: Mine Planning & Design

**Credit : 1** **Max. Marks: 50(IA:30, ETE:20)**
**0L+0T+2P**

| Contents |
|---|
| 1. Estimation of ore reserve based on bore hole data of lime stone deposit |
| 2. Estimation of ore reserve based on bore hole data of Iron ore deposit |
| 3. Estimation of ore reserve based on bore hole data of Bauxite deposit |
| 4. Estimation of ore reserve based on bore hole data of Lead zinc deposit |
| 5. Design of drive in a lead zinc mine |
| 6. Design of Raise/ winge in a lead zinc mine |
| 7. Design of shaft in a lead zinc mine |
| 8. Design of box cut in an o/c mine |
| 9. Design of haul road |
| 10. Problem related to ultimate slope in o/c mine |
| 11. Problem for shovel dumper combination |
| 12. Design of length of long wall face |
| 13. Problem related to scheduling |
| 14. Optimum blast design for o/c mine |
| 15. Optimum blast design for u/g mine |

## 8MI4-22: Mine Economics and Mine Closure

**Credit : 1** **Max. Marks: 50(IA:30, ETE:20)**
**0L+0T+2P**

| Contents |
|---|
| 1. Practicals as per the theory syllabus, to be declared at the start of session by respective teacher. |