



KAKATIYA UNIVERISTY
DEPARTMENT OF MINING ENGINEERING
M.TECH (MINE PLANNING) PTPG SYLLABUS
SEMESTER – IV

BLASTING TECHNOLOGY IN ROCK EXCAVATION

UNIT – I

Explosives: Chemistry and physics of explosives; Properties of explosives; Explosives and blasting agents; Initiation and priming systems; Bulk explosives; Explosives selection.

Rock breakage by explosives: Theories, laws of comminution, methods for prediction and assessment of fragmentation; Design of blasting rounds for surface and underground excavations.

UNIT – II

Special blasting techniques: Advanced theory and application of explosives in excavation. Secondary breakage, pre-splitting, profiling, trenching, Throw /cast blasting. Handling and storage of explosives. Blasting in mixed rock types, hard/soft rock,

UNIT - III

Selection of Initiating system: Electric, Non electric initiating system, digital detonators, selection of initiating system. Safety in usages and handling of explosives and initiating systems

UNIT - IV

Priming and Charging: Selection of primer and its effect on the blast performance. Influence of shape, size and quantity of primer on explosive performance.

UNIT - V

Environmental considerations: Control and monitoring of noise, vibration, air blast and fly rock.

Blast Instrumentation: Blast instrumentation for blast performance assessment and modification

Text / Reference books:

1. Jimeno CL. Drilling and blasting. AA Balkema publications. 1995.
2. Konya CJ. Rock blasting and overbreak control. National Highway Institute USA. 1991.
3. Chugh CP. Diamond drilling. Oxford-IBH. 1984.
4. Pradhan GK and Ghose AK. Drilling and blasting. Mintech publications. 1996.



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DEPARTMENT OF MINING ENGINEERING
M.TECH (MINE PLANNING) PTPG SYLLABUS
ADVANCED SURVEYING TECHNIQUES

UNIT I

Fundamentals of total station and electromagnetic waves :Types and working principles of Machines, Methods of Measuring Distance, Basic Principles of Total Station, Historical Development, Classifications, applications and comparison with conventional surveying. Classification - applications of Electromagnetic waves, Propagation properties, wave propagation at lower and higher frequencies- Refractive index (RI) - factors affecting RI. Care and Maintenance of total stations. Electro-optical system: working principle, Sources of Error, Infrared and Laser Total Station instruments. COGO functions, offsets and stake out-land survey applications.

UNIT II

Satellite, GPS System and data processing: Basic concepts of GPS, GNSS, IRNSS and GAGAN - Different segments - space, control and user segments - satellite configuration – GPS signal structure, Anti Spoofing and Selective Availability - GPS receivers. Concepts of rapid, static methods with GPS - semi Kinematic and pure Kinematic methods -satellite geometry & accuracy measures - applications.

UNIT III

Mine and Cadastral surveying: Reconnaissance – Route surveys for highways, railways and tunnels – Mine surveying Equipment – Weisbach triangle – Tunnel alignment and setting out – Transfer of azimuth – Gyro Theodolite – Shafts and audits - Cadastral survey- Legal – Real – Tax cadastre – Land record system – Settlement procedure – deformation studies. Mine plan preparation - mapping process - use of mapping softwares, VAVIks mapping. Route surveys of water ways, Hydrographic survey Tides – MSL – Sounding methods – Three point problem – River surveys – Measurement of current and discharge.

UNIT IV

Airborne Laser Scanners: Airborne Topographic Laser Scanner – Ranging Principle – Pulse Laser and Continuous Wave Laser – First Return and Last Return – Ellipsoidal and Geoidal Height - Typical parameters of a Airborne Laser Scanner (ALS) – Specifications of Commercial ALS – Components of ALS - GPS, IMU, LASER Scanner, Imaging Device, Hardware and Software. Merits of ALS in comparison to Levelling, echo sounding, GPS levelling, Photogrammetry and Interferometry

UNIT V

Data acquisition, pre and post processing: Various Scanning Mechanism – Synchronization of GPS, IMU and ALS Data - Reflectivity of terrain objects – Laser Classification – Class I to Class IV Laser – Eye Safety. Ground Point filtering – Digital Surface Model and Digital Elevation Model. Overview of LIDAR Applications in various domains - 3D models – Corridor Mapping Applications – Forestry Applications. Terrestrial Laser Scanners (TLS) – Working Principle – Commercial TLS Specifications – Applications of TLS, Drone based Mapping - derivatives from drone surveying.

TEXTBOOKS:

1. Satheesh G, Rasathish K, Madhu N. Advanced surveying, total station GPS and remote sensing. Pearson education. 2007.
2. Alfred L. GPS satellite surveying. John Wiley and Sons Inc., 3rd Edition. 2004.
3. Jie S and Charles K T. Topographic laser ranging and scanning: principles and processing. Taylor & Francis Group. 2009.



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MANAGERIAL DECISION MAKING

UNIT – I

Introduction: The origin, nature and impact of managerial decision making tools. Decision making process. Taxonomy of decision making models. Classical deterministic models.

Linear programming: The generalized linear programming (LP) model and its assumptions. Geometric and algebraic solution to LP models, Simplex method, Sensitivity analysis and interpretation of Simplex table.

UNIT - II

Transportation and assignment problems : Mathematical models, variation in classical transportation and assignment models. Sensitivity analysis.

Goal programming : Mathematical models and solution methods.

UNIT - III

PERT and CPM : Project planning and scheduling with basic PERT model, lowest cost schedule using CPM model, Resource leveling and Resource Allocation, Cost control through PERT.

Network models : Shortest route algorithmic, Minimal spanning tree problem.

UNIT - IV

Inventory Model: Nature and economic parameters in inventory problems, Classic EOQ model, Extension of classic EOQ model, Deterministic inventory models with constraints, stochastic inventory models.

UNIT - V

Simulation : Nature and process of Simulation, Fundamental of Monte Carlo Simulation, Simulation of queing and inventory systems.

Text / Reference books:

1. Richard I, Levin and others. Quantitative approach to management. 1986.
2. Frank S, Budnick and others. Principles of operations research for management. Irwin publishers, US. 1990.
3. Hillier and Lieberman. Introduction to operations Research. 1974.



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MATERIAL HANDLING

UNIT I

Bulk handling systems: Basic principles in material handling exclusive to mining industry and its benefits. Classification of material handling equipments. Current state of art of bulk handling materials in mining in the world and Indian scenario; Selection of suitable types of systems for application. Stacking, blending, reclaiming and wagon loading, machinery and systems used at the stack yards; stock piles, silos, bunkers – their design, reclamation from them, various types of weigh bridges. Segregation - size wise and grade wise, Railway sidings.

UNIT II

Short conveyors and haulage systems: Roller conveyor, overhead conveyor, screw conveyor, auger conveyor, apron feeder, bucket elevators, scraper haulage, conveyors in steep gradient, Armoured face conveyor, Off-highway Trucks, haul roads, In-pit crushers and modular conveyors, electric trolley assisted haulage, shuttle cars, skip hoist, winders, LHD's, pneumatic conveying, hydraulic transport.

UNIT III

Belt conveyor system: Design, capacity, calculations with respect to the size, speed, troughing, power requirement, tension requirement, belt selection, factor of safety; developments in the design, of various components of belt conveyor systems such as; structures, rollers, gear boxes and motors, drums and pulleys, belting, ancillary components and safety gadgets.

UNIT IV

New types of belt conveyor systems: Curved conveyors, cable belts, pipe conveyors, rock belts – mine-run-rock conveyor, steel belt conveyors, steel slot conveyor, chain belt conveyors, etc., and other new developments, stackers and reclaimers, Different types of High Angle Conveyors (HAC); New inventions in HAC , Mobile or fixed installations; Woven wire belts, En Masse conveyor, Vibrating conveyor, gravity bucket conveyor. Pneumatic and hydraulic transport systems. Safety and control devices.

UNIT V

Material handling in mines, plants and workshops: Mobile cranes, derrick cranes, pillar cranes, tower cranes, radial cranes, bridge cranes, fork lifters, over head gantry material handling in workshops. Mineral handling in dimensional stone quarries, Mineral handling plants(coal, etc.,) Locomotives, rail tracks, rail cars, railways wagons; Aerial ropeways, gravity ropeways; Containers and shipping; Rope haulage - different types.

Text/Reference books:

1. Allegri TH. Material handling : principles and practices. CBS Publishers and Distributors, Delhi. 1987.
2. Hustrulid W and Kuchta M. Open pit mine planning and design. Vol. 1. Balkema, Rotterdam. 1998.
3. Peng SS and Chiang HS. Longwall mining. John Wiley and Sons, New York. 1984.
4. Hartman HL.SME Mining Engg. handbook Vol.I and II. Society for mining, metallurgy, and exploration Inc., Colorado. 1992.



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M.TECH (MINE PLANNING) PTPG SYLLABUS
PLANNING OF UNDERGROUND MECHANIZATION

UNIT - I

Overview of Mechanization: Need for mechanization of mines. Social and organizational aspects and desired level of mechanization in India.

UNIT - II

High Speed Underground Development: Shaft sinking, drifting and boring machines, raise boring machines, road headers and tunnel boring machines. Bord and pillar mining, continuous miners, loaders and shuttle cars, LHDs and SDLs. Roof bolting machines.

UNIT - III

Powered Support Longwall Faces: Types of equipment, installation, operation and salvaging. High speed development of gates. Mechanization in different stoping methods.

UNIT - IV

Transport Planning: Application of different transport systems. Maintenance planning: preventive and predictive maintenance planning. Monitoring of equipment of condition.

UNIT - V

Other Aspects of Mechanization: Techno-economic indices of mechanized systems. Equipment availability, utilization and reliability.

Text/Reference books:

1. Singh TN and Dhar BB. Thick seam mining: problems and issues. Oxford and IBH Publishers. 1992.
2. Mathur SP. Mining planning for coal. M G Consultants, Bilaspur. 1993.
3. Peng SS and Chiang HS. Longwall mining. John Willey and Sons, New York. 1992.
4. Karmakar H., Mine working. Vol. I and II. Lovely Prakashan, Dhanbad. 1995.



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MINE PLANNING LAB

1. Estimation of reserves of coal and metaliferous deposits.
2. Design of the haul roadway of openpit mines.
3. Design of the surface mine.
4. Design of underground coal mine.
5. Design of mine ventilation for bord and pillar method.
6. Design of mine ventilation for longwall panel.
7. Design of blast for openpit workings.
8. Design of blast for cast blasting technique.