RGPV (DIPLOMA WING) BHOPAL	OBE CURRICULUM FOR THE COURSE	FORMAT-3	Sheet No. 1/3

Branch	Mining and Mine surveying	Semester	5

Course Code		Course Name	Mine Machinery

Course Outcome 1	To Supervise the transportation system for coal/mineral by different types of method.	Teach Hrs	Marks
		20	14

Learning Outcome 1	To understand rope haulage system in underground mines .
Contents	• Classification & types of haulages system • Description, advantages & disadvantages of each haulage system. • Direct rope haulage • Endless rope haulage • Main and Tail rope haulage • Gravity haulage, safety devices used in haulage system • Calculation of rope haulage
Method of Assessment	External : End semester theory exam-Pen paper test
Learning Outcome 2	To learn various safety devices used in haulage system.
Contents	Safety devices used on rope haulage system • Stop block/Buffers • Back stay • Monkey catch • Jazz rail • Runaway Switch
Method of Assessment	Internal: mid semester exam/assignment/quiz
Learning Outcome 3	To understand applicability, merits & demerits of various locomotives.
Contents	• Locomotive Haulage different types/ Applicability • Diesel locomotive • Electric locomotive • Air compressed locomotive • Battery locomotives.

Method of Assessment	External : End semester theory exam-Pen paper test		
Learning Outcome 4	To comprehend applicability , merits & demerits of various conveyors & Aerial ropeway .		
Contents	• Different Types of Conveyor • Chain conveyor • Plate conveyor • Belt conveyor • Condition of Suitability of each type • Advantageous and disadvantages, Introduction to Aerial Ropeways, bicable and monocable, advantages and disadvantages		
Method of Assessment	External : End semester theory exam-Pen paper test		
Learning Outcome 5	To understand different types of rope haulages and safety devices.		
Contents	1. Study of different types of rope haulage 2. Demonstration of different models of safety devices uses on rope haulage.		
Method of Assessment	Internal: Task/ Experiment performance in Laboratory		
		Teach Hrs	Marks
Course Outcome 2	To Supervise the winding of coal/minerals from underground to surface and movement of coal/mineral on the surface.	20	14
Learning Outcome 1	To know different terms and purpose of winding in shaft.		
Contents	• Purpose of Winding • Main equipments used for Winding • Head gear • Headgear pulley • Cage/Skip		

	• Winding Rope • Winding drum • Provisions on winding drum • Koepe winding- description , advantages and disadvantages • Guides • Keps • Suspension Gear • Electric motor
Method of Assessment	External : End semester theory exam-Pen paper test
Learning Outcome 2	Demonstration of different types of drum winder models
Contents	• Different types of winding • Drum winding • Drum winding different types • Cylindrical drum • Conical drum • Cylindroconical drum • Bicylindroconical drum
Method of Assessment	Internal: mid semester exam/assignment/quiz
Learning Outcome 3	To understand various appliances used in winding
Method of Assessment	External : End semester theory exam-Pen paper test

Learning Outcome 4	To learn various Cage attachment in winding systems
Contents	• Rope capel • D link and bull chain • Safety hook-king safety hook its construction and working • Triangular distribution plate • Different types of keps • safety devices used in winding.
Method of Assessment	External : End semester theory exam-Pen paper test
Learning Outcome 5	To understand the function of different types of drum winder & different parts of cage suspension gear.
Contents	1. Demonstration of different types of drum winder models. **2. Demonstration of different parts in cage suspension gear** and their function Different parts a. Reliance rope cable b. D-link c. Safety hook b. D-link c. Safety hook d. Triangular distribution plate e. Bull chain f. Cage.
Method of Assessment	Internal: Task/ Experiment performance in Laboratory

		Teach Hrs	Marks
Course Outcome 3	To understand the construction capping Testing Care and maintenance of wire ropes	12	08

Learning Outcome 1	To comprehend different types of wire ropes & its constructions		
Contents	• Construction of wire ropes , different types of wire ropes- Stranded rope, • Non stranded rope • Lays of rope- Lang's lay and ordinary lay • Different definition like static load, dynamic load, factor of safety. • Selection of wire rope • Care and maintenance of ropes • Types of deterioration in the ropes • Testing of wire ropes		
Method of Assessment	External : End semester theory exam-Pen paper test		
Learning Outcome 2	To Understand rope capping & splicing procedure.		
Contents	• Types of Rope capping • White metal capping (cone socket type capel) • Wedge type capping (Reliance rope capel) • Capping with split capel and rivets (Split capel) • Recapping • Rope splicing procedure		
Method of Assessment	External : End semester theory exam-Pen paper test		
Learning Outcome 3	To understand different types of wire ropes and their maintenance		
Contents	1 Demonstration of different types of Rope sample and their identification 2 Study of Rope splicing method		
Method of Assessment	Internal: Task/ Experiment performance in Laboratory		
		Teach Hrs	Marks
Course Outcome 4	To Supervise the installation and operation of water pumps for dealing with water in underground mines	14	14
Learning Outcome 1	To understand the construction & classifications of various types of mine pumps		
Contents	• Sources of water in Mines • Classification of Mine Pumps • Reciprocating Pump –Single acting,Double acting,Ram pumps		

	• Centrifugal Pumps • Turbine Pumps
Method of Assessment	External : End semester theory exam-Pen paper test
Learning Outcome 2	To understand installation & operation of mine pump
Contents	• Installation of pump • Operation of pump • Fitting on pump • Starting and stopping of pump • Face pumps • Characteristics Curves of • Centrifugal and turbine pumps. • Calculations for pump discharge etc.
Method of Assessment	External : End semester theory exam-Pen paper test
Learning Outcome 3	To study of roto pump & its fittings
Contents	Roto Pump – • Applicability, • constructions • merits,demerits • limitation
Method of Assessment	Internal: mid semester exam/assignment/quiz

Learning Outcome 4	To study about different types of pumps used in mines.		
Contents	1 Study of different types of reciprocating pumps 2. Study of different types of Centrifugal pump 3. Study of face pump.		
Method of Assessment	Internal: Task/ Experiment performance in Laboratory		
Course Outcome 5	To learn about different types of Electrical power transmission used in mine	Teach Hrs 10	Marks 06
Learning Outcome 1	To study of different types of Electrical power cables used in mine		
Contents	• Types of cables used in mines • Permanent cable • Different types, construction • Semi flexible cable,Different types, construction • Flexible cable • Different types, construction • Screening of cable • Cable joint box • care and maintenance during use and storage.		
Method of Assessment	External : End semester theory exam-Pen paper test		
Learning Outcome 2	Study of gate and box and its different circuits		

Contents	• Construction of gate end box • Safety provision in gate end box • Pilot Circuit • Different circuits for protection		
Method of Assessment	Internal: mid semester exam/assignment/quiz		
Course Outcome 6	To learn operations of various coalface machineries	Teach Hrs 06	Marks 14
Learning Outcome 1	To understand the constructions & operations of Electric drill machine used in mines		
Contents	• Electric coal drill machine – construction & working. • Drill rods and bits for rotary drill • Jackhammer Drills,		
Method of Assessment	Internal: mid semester exam/assignment/quiz		
Learning Outcome 2	To study of different type of face machineries		
Contents	• Continuous miners, Drum Shearer- Construction, advantages disadvantages & Applicability, of machineries LHD • SDL • Power Support.		
Method of Assessment	External : End semester theory exam-Pen paper test		

Learning Outcome 3	To understand the operations of face machinery used in underground mines.
Contents	1 Study of Electric coal drill machine. 2 Study of Load haul dumper (L.H.D.) 3 Study of Side discharge loader (S.D.L.)
Method of Assessment	Internal: Task/ Experiment performance in Laboratory

LIST OF EXPERIMENTS

Name of Experiment
1. Study of different types of rope haulage 2. Demonstration of different models of safety devices uses on rope haulage. 3. Demonstration of different types of drum winder models. **4. Demonstration of different parts in cage suspension gear** and their function Different parts a. Reliance rope cable b. D-link c. Safety hook d. Triangular distribution plate e. Bull chain f. Cage. 5. Demonstration of different types of Rope sample and their identification

6-Study of Rope splicing method.

7. Study of different types of reciprocating pumps

8. Study of different types of Centrifugal pump

9.Study of face pump.

10. Study of different types of coal cutting m/c.

11.Identification of different types of Electrical power cables used in mine

12. Study of gate and box and its different circuits

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Branch	Mining and Mine surveying	Semester	5

Course Code		Course Name	Advance Mine surveying

		Teach Hrs	Marks
Course Outcome 1	To acquire skills of using theodolite	20	14
Learning Outcome 1	To learn different terminology used in theodolite survey		

Contents	Definitions of terms used in operating theodolite.
Method of Assessment	External : End semester theory exam-Pen paper test
Learning Outcome 2	To learn about various angular measurement methods with theodolite.
Contents	• Temporary adjustments of transit theodolite. • Horizontal angle measurement methods – Ordinary, repetition and reiteration method • Vertical angle measurement by theodolite.
Method of Assessment	Internal: mid semester exam/assignment/quiz.
Learning Outcome 2	To learn about theodolite traversing methods
Contents	**THEODOLITE TRAVERSING** • Methods of traversing, by continuous azimuth method, included angles & Deflection angle. • Checks in closed & open traverse. • Traverse computation: latitude, departure, • Consecutive coordinates, independent coordinates, error of closure • Adjustment of closed traverse, balancing by Bowditch and transit rule. • Permanent adjustments of theodolite. (only relationship of different axis of theodolite
Method of Assessment	External : End semester theory exam-Pen paper test
Learning Outcome 3	To measure angle and coordinates by different methods using theodolite
Contents	1.Understanding the components of Theodolite and their functions. 2.Measurement of Horizontal angle by method of Repetition. 3.Measurement of vertical angles by theodolite. 4 Measurement of Magnetic bearing of a line using theodolite. 5.Measurement of deflection angle by taking open traverse of 4 –5 sides. 6traverse an area by included angle method

	7To traverse an area by deflection angle method. 8To traverse an area by couninous azimuth method		
Method of Assessment	Internal: Task/ Quiz/Assignment ,Experiment performance in Laboratory		
Learning Outcome 4	To study coordinate system & calculate length & bearing of closing line and area of closed traverse.		
Contents	**RECTANGULAR COORDINATE SYSTEM** • Definitions - latitudes & departures. Partial Latitude and partial departures. • Calculation of partial latitude and partial departures. • Total latitudes & total departures. • Calculation of total latitudes & departures. • Calculation of length & bearing from total coordinates. • Calculation of Area by partial coordinate method. • Calculation of Area by total coordinate method.		
Method of Assessment	External : End semester theory exam-Pen paper test		
		Teach Hrs	Marks
Course Outcome 2	To perform surveying operation by tachometry & triangulation survey.	20	16
Learning Outcome 1	To understand principle and classification of triangulation survey.		
Contents	**TRIANGULATATION SURVEY.** • Definition and principle of triangulation survey. • Classification of Triangulation survey. • Fixing of stations. • Selection of site for Base line. • Sequence of preparation before base line measurement. • Equipments required for base line measurement. • Measurement of base line.		

	• Correction required in base line measurement. • Prolongation of a base line. • Adjustments of horizontal angles. • Colliery triangulation. • Precautions in measuring angles and base line.
Method of Assessment	External : End semester theory exam-Pen paper test
Learning Outcome 2	To learn techniques of Tachometric survey to calculate height and distances.
Contents	• Principle of Tachometry. Essential requirements of Tachometer. Use of Theodolite as a Tachometer with staff held in vertical and fixed hair method . Determination of tachometric constants, • Stadia diaphragm and its principle. • Theory of anallactic lens. • Determination multiplying and additive constant. • Tachometric survey Numerical problems
Method of Assessment	External : End semester theory exam-Pen paper test
Learning Outcome 3	Measure height and distances using Tachometer.
Contents	1 To find constants of a given Tachometer. 2To find reduced levels and horizontal distances using theodolite as a Tachometer. 3 To traverse an area by measuring horizontal angles and staff intercept .
Method of Assessment	Internal: Task/ Experiment performance in Laboratory

		Teach Hrs	Marks
Course Outcome 3	Develop skills to set out simple circular curve on the field.	15	16
Learning Outcome 1	To understand basics of curves, components and types		
Contents	**SETTING OUT CURVES** • Definition • Types of curves.-normal, compound, and reverse • Nomenclature of a simple circular curve. • Degree of curve. • Vertical curve • Super-elevation		
Method of Assessment	Internal: mid semester exam/assignment/quiz.		
Learning Outcome 2	To learn various methods of setting out of simple circular curve.		
contents	• Elements of simple survey (circular) • Classification of curve ranging method. • Methods of simple circular curve ranging. • Chain & tape (I) By successive bisection of arc. (II) By taking perpendicular off sets from tangents. (III) By taking perpendicular off sets from long chord. (IV) Chord and off set method. • Instrumental methods. (i) Chord and angle method. (Tangential angle method) (ii) By taking angles from single station. (Ranking method) (iii) By taking angles two stations. U/G curve ranging methods. • Chord & off set method. • Chord & angle method.		
Method of Assessment	External : End semester theory exam-Pen paper test		
Learning Outcome 3	To develop skill to set out simple circular curve.		
contents	1. To range a curve by chord of offset method 2. To range a curve by chord & angle method		

Method of Assessment	Internal: Task/ Experiment performance in Laboratory		
		Teach Hrs	Marks
Course Outcome 4	To learn correlation survey & stope survey.	15	10
Learning Outcome 1	To understand the process of correlation survey.		
Contents	**CORRELATION SURVEY.** ○ Purpose of correlation survey. ○ Classification of methods of orientation. ○ Direct method of traversing. ○ Assumed bearing method (Two shaft method). ○ Exact alignment method. ○ Approximate alignment method. ○ Wiess quadrilateral method. ○ Precise magnetic method.		
Method of Assessment	External : End semester theory exam-Pen paper test		
Learning Outcome 2	To understand the process of stope surveying.		
Contents	**STOPE SURVEYING** ○ Definition and Introduction, purpose of stope survey. ○ Methods of stope surveying for flat, moderate, incline of steeply inlined ore deposit.		
Method of Assessment	Internal: mid semester exam/assignment/quiz.		
Course Outcome 5	To be familiar with drift fault problem and advance surveying instrument.	Teach Hrs 20	Marks 14

Learning Outcome 1	To solve drift fault problem.
Contents	**DRIFT & FAULT PROBLEM** o Definition- Fault, normal, Reverse and transcurrent fault plane ,hade of fault, throw, want, heave, Excess. o Numerical problems on drift and fault.
Method of Assessment	External : End semester theory exam-Pen paper test
Learning Outcome 2	To study of different advance surveying instrument.
Contents	**ADVANCES IN MINE SURVEYING** o Global Positioning System- Concept, Principle, application, Advantages and Disadvantages. o Geographic information system (GIS) - component, capability and application. o Total station- description application in distance measurement, angle measurement o Electronic Distance Measurement; Principle of measurement, types etc. o Gyro theodolite- principle of gyro, gyro attachments o Laser plummet o Remote sensing-basic concept, objects & its applications.
Method of Assessment	External : End semester theory exam-Pen paper test
Learning Outcome 3	Able to handle advance surveying instrument total station.
Contents	1. Demonstration of Total station. 2. To measure an area /volume of closed traverse by total station in the field.

Method of Assessment	Internal: Task/ Experiment performance in Laboratory.

LIST OF EXPERIMENTS

Name of Experiment
1. Sketch and describe Electronic Theodolite
2. To traverse an area by included angle method
3. To traverse an area by deflection angle method.
4. To traverse an area by couninous azimuth method
5. To determine a height of an electric pole / building tower by measuring vertical angle from a single station
6. To determine a constant of given a tacheometer
7. To determine a distance from the instruments stations to the given stations by given tacheometer.
8. To traverse an area by measuring horizontal angles and staff intercept
9. To range a curve by chord of offset method
10. To range a curve by chord & angle method
11. Demonstration of Total station.
12. To measure an area /volume of closed traverse by total station in the field.

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Branch	Mining and Mine surveying	Semester	5

Course Code		Course Name	Rock mechanics & Ground control

		Teach Hrs	Marks
Course Outcome 1	To understand fundamentals of rock mechanics	20	14
Learning Outcome 1	To learn different terminology used in rock mechanics		
Contents	o Definition of rock mechanics – scope of Rock mechanics Application of Rock mechanics to mining field. Rock Properties – Physical, Mechanical, Properties of rocks o Concept of stress and strain in rock, stress due to weight of strata, vertical and lateral stresses.Stress due to tectonic and organic force, Residual stresses, Induced stresses. o Field stresses, modulus of elasticity , poisson's number, Poisson's ratio, stress fields		

Method of Assessment	External : End semester theory exam-Pen paper test
Learning Outcome 2	To understand different types of rock strength
Contents	○ compressive strength – Tensile strength- Shear strength – strength indices of rocks – Point Load Strength Index- Protodyakanov Strength Index(PSI) – porosity & permeability Anisotropy ○ Introduction to elementary rock mass classification based on strength, hardness, RQD, Bieniawski RMR classification
Method of Assessment	External : End semester theory exam-Pen paper test
Learning Outcome 3	To study of determination of some physical properties of rock.
Contents	○ Rock physical properties-water absorption ○ Density ○ Specific gravity
Method of Assessment	Internal: Task/ Experiment performance in Laboratory

		Teach Hrs	Marks
Course Outcome 2	To know mechanical properties of rock & testing	20	14
Learning Outcome 1	To understand different types of strength properties of rock		
Contents	○ Strength Properties: Compressive strength, Tensile Strength, Shear Strength, Flexural Strength ○ Porosity, Density, Moisture content, permeability ○ Rebound hardness, insitu stress by flat jack		

Method of Assessment	External : End semester theory exam-Pen paper test
Learning Outcome 2	To understand the characteristics of rock
Contents	Material Characteristics: Brittle material, Ductile material, Elastic material, Plastic material Time dependent properties: creep, Creep curve, factors contributing Creep. Deformation, weatherability
Method of Assessment	Internal: mid semester exam/assignment/quiz.
Learning Outcome 3	To perform different types of testing of rock
Contents	Uniaxial compressive strength Bending test Shear strength test- punch shear test, Direct shear test on Rock cube, Triaxial method
Method of Assessment	External : End semester theory exam-Pen paper test
Learning Outcome 4	To understand different types of rock testing in lab.
Contents	1. Determination of uniaxial compressive strength of a rock sample. 2. Determination of tensile strength (Brazilian test) Of a rock sample. 3. Determination of shear strength. of a rock sample. 4. Demonstration of triaxial cell. 5. Determination of point load strength index. 6. Determination of Protodykonov strength index. 7. Determination of impact strength index. 8. Demonstration of use of flat jack for insitu stress determination

Method of Assessment	Internal: Task/ Experiment performance in Laboratory		
Course Outcome 3	To know about rock burst & subsidence due to mining.	Teach Hrs 15	Marks 14
Learning Outcome 1	To understand causes of rock burst & bumps.		
Contents	○ Rock burst, Bumps, causes controlling measures, factors affecting proneness to rock burst/Bumps. ○ Pillar Design- factors considered. Pillar design by tributary area approach, determination of factor of safety.		
Method of Assessment	External : End semester theory exam-Pen paper test		
Learning Outcome 2	To learn about subsidence & its affecting factors.		
Contents	○ Subsidence: Definition of various terms – Angle of draw positive or negative, factors influencing angle of draw – factors affecting subsidence – damages – Protective measures. ○ Types of subsidence		
Method of Assessment	External : End semester theory exam-Pen paper test		
Learning Outcome 3	To understand subsidence measurements technique.		

Contents	○ Subsidence measurements –surface Movements and Deformation during depillaring& Longwall Mining		
Method of Assessment	Internal: mid semester exam/assignment/quiz..		
Course Outcome 4	To study about roof support system in an underground mines.	Teach Hrs 20	marks 14
Learning Outcome 1	To comprehend various active supports in mines.		
Contents	○ Timber supports, props. Chocks, safari, supports of galleries, haulage road, prop free Front. ○ Withdrawal of supports		
Method of Assessment	External : End semester theory exam-Pen paper test		
Learning Outcome 2	To understand the theory of roof bolts & mechanics of strata behavior.		
Contents	○ Function of roof bolts. ○ Principle of Action Roof Bolts. ○ Varieties of Roof Bolts: Slot and Wedge, Expansion shell ○ Grouted Roof Bolts ○ Theories of mechanics of strata behavior: Dome or arch theory, Beam theory. ○ Resin Roof Bolts. ○ Anchorage Testing of Roof Bolts. ○ Bolt density. ○ Code of practice for roof bolting in underground mines. ○ Roof stitching		

	Principle of Roof stitching. Cable Bolting.
Method of Assessment	External : End semester theory exam-Pen paper test
Learning Outcome 3	To learn about types of roof bolts.
Contents	1.Demonstration of various Rock bolts. 2.Study of anchorage testing of rock bolts. 3.Demonstration of cable bolting.
Method of Assessment	Internal: Task/ Experiment performance in Laboratory
Course Outcome 5	To study about power supports & creep behavior in mines.
Learning Outcome 1	To understand about hydraulic props & provisions of support.
Contents	○ Hydraulic props – Method of setting, testing & withdrawal ○ Power support– Method of setting, testing & withdrawal ○ Fore polling, Junction Supports – Clearance of Heavy roof Collapse – Strata Monitoring Plan (SMP) & SCAMP as per CMR
Method of Assessment	External : End semester theory exam-Pen paper test

Teach Hrs	marks
15	14

Learning Outcome 2	To understand creep behavior & rheological models.
Contents	○ Loading diagrams, ○ creep, creep in rocks- measurement of creep, estimation of creep deformation, ○ Rheology and rheological models, Different rheological models- ○ The St. venant model, ○ The Kelvin model, ○ The Maxwell model, ○ The Maxwell model, ○ The bingham model, ○ The burger model
Method of Assessment	External : End semester theory exam-Pen paper test

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Branch	**Mining and Mine surveying**		**Semester**	**5**
Course Code		**Course Name**	**MINE LEGISLATION & MANAGEMENT**	
			Teach Hrs	Marks
Course Outcome 1	To know about coal mine regulation		25	20
Learning Outcome 1	To understand provisions regarding mining examinations & duties of persons employed in mines.			

Contents	COAL MINES REGULATIONS 2017 • Preliminary, Important definitions. • Examinations and certificates of competency and fitness. • Duties and responsibilities of workmen, competent person & officials.
Method of Assessment	External : End semester theory exam-Pen paper test
Learning Outcome 2	To understand provisions regarding plans and sections & transportation of men & material.
Contents	• Provisions of Reg. Plans and sections - • Means of access & egress. • Provisions regarding winding in shaft • Transport of men & material Haulage - • Mine workings-Reg. • Precautions against dangers from the fire, dust, gas & water -Reg. • Provisions regarding machinery, plant & equipments important provisions under chapter on miscellaneous
Method of Assessment	External : End semester theory exam-Pen paper test
Learning Outcome 3	To study of provisions regarding ventilation, lighting, Explosives & blasting.
Contents	• Ventilation -Reg. • Provisions regarding lighting and safety lamp • Explosives & Blasting.
Method of Assessment	Internal: mid semester exam/assignment/quiz.

		Teach Hrs	Marks

Course Outcome 2	To know about coal mine rules.	20	14
Learning Outcome 1	To understand provisions regarding health & sanitation and medical aid.		
Contents	MINES RULES • Important definitions • Provisions regarding health & sanitation, first aid and medical appliances.		
Method of Assessment	External : End semester theory exam-Pen paper test		
Learning Outcome 2	To understand provisions regarding leave with wages and welfare amenities.		
Contents	○ Mines Rules- Provisions connected with leave with wages, over time and welfare amenities. Employment of persons		
Method of Assessment	Internal: mid semester exam/assignment/quiz.		
Course Outcome 3	To know about Mines Act.	Teach Hrs 15	Marks 12
Learning Outcome 1	To understand provisions regarding health & safety.		
Contents	MINES ACT • Important definition eg. Adolescent, adult, child, Employed, Mine, Open cast working, Relay, Shift, Serious bodily injury. • Provision for health and safety.		

Method of Assessment	External : End semester theory exam-Pen paper test		
Learning Outcome 2	To understand provisions regarding leave with wages , hours & limitations of employment.		
Contents	○ Provisions regarding leave with wages, Act 49 to 56 ○ Hours & Limitations of Employment, act 28 to 48..		
Method of Assessment	External : End semester theory exam-Pen paper test		
Course Outcome 4	To know about mine management	Teach Hrs 15	marks 12
Learning Outcome 1	To understand the business organization & qualities of good supervisors.		
Contents	MANAGEMENT • Principles of scientific management. • Functions of scientific management. • Types of business organizations, organization of Coal India Ltd. • Supervision qualities of good supervisors, • PERT & CPM (simple calculation)		
Method of Assessment	External : End semester theory exam-Pen paper test		

Learning Outcome 2	To understand the industrial dispute & leadership.		
Contents	• Leadership, functions of industrial leadership, delegation of responsibility • Principles of time study, • Trade unions, their functions. Strikes and lockouts		
Method of Assessment	External : End semester theory exam-Pen paper test		
Course Outcome 5	To study of various mine accidents & bylaws.	Teach Hrs 15	marks 12
Learning Outcome 1	To understand circulars & bylaws.		
Contents	**Circulars, Bylaws & Standing orders**. • Model standing order in the event of stoppage of main mechanical ventilator. • Maximum air velocity. • Systematic support rules for coal mine with Bord and pillar method of working. • Conditions for solid blasting with P5 explosives. • Precautions for use of Auxiliary fan underground. • Procedure for dealing with misfire. • Precautions regarding Blown through shots.		
Method of Assessment	External : End semester theory exam-Pen paper test		
Learning Outcome 2	To understand various types of mine accidents, causes & preventions.		

Contents	**MINE ACCIDENTS** • Types of mine accidents, their classifications, • Causes of accidents due to fall of roof, explosives and blasting, haulage and winding and their preventions. • Cause and prevention of accidents due to fires, explosions and inundations. Safety statistics, safety drive and organization of safety in the mines/area etc
Method of Assessment	External : End semester theory exam-Pen paper test