COURSE STRUCTURE FOR M.TECH PROGRAMME
IN
MINING MACHINERY ENGINEERING

I SEMESTER

Course No.	Subject	L – T – P	Credit Hours
AMC 51101	Advanced Numerical Methods and Applied Statistics	4 – 0 – 0	8
MSC 51105	Management Principles and Practices	4 – 0 – 0	8
EIC 51151	Instrumentation and Microprocessor control	3 – 0 – 0	6
MMC 51101	Underground mining equipment	4 – 1 – 0	9
	Elective (any one)	3 – 0 – 0	6
MME 51101	(a) Mineral Processing Equipment		
EEE 51121	(b) Mine Electrical Systems		
MME 51102	(c) Maintenance Engineering Systems		
MME 51103	(d) Fluid Flow Machines		
PRACTICAL/PLANT VISIT/EXCURSION			
MMC 51601	Industrial Visits	0 – 0 – 0	2
	TOTAL	18 – 1 – 0	39

II SEMESTER

Course No.	Subject	L-T-P	Credit Hours
MMC 52101	Fluid power systems	3 – 1 – 0	7
MEC 52191	Mining Practices	3 – 0 – 0	6
MMC 52102	Open-pit Mining Equipment	3 – 1 – 0	7
MSC 52105	Advanced Decision Modeling	4 – 1 – 0	9
	Elective (any one)	3 – 0 – 0	6
MME 52101	(a) Friction, wear and lubrication		
MME 52102	(b) Computer Aided Maintenance		
CME 52107	(c) Environmental Engineering		
MME 52104	(d) Automation and Robotics		
PRACTICAL/PLANT VISIT/EXCURSION			
MMC 52201	Fluid Power System	0 – 0 – 2/2	1
	Industrial Training (4 weeks, to be credited in III rd Sem.)	-	-
MMC 52001	Comprehensive Viva Voce	0 – 0 – 0	2
	TOTAL	16 – 3 – 2/2	38

III SEMESTER

Course No.	Subject	L-T-P	Credit Hours
MMC 53901	Industrial Training (to be credited from II nd Semester)	0 – 0 – 0	4
MMC 53401	Seminar &Viva-Voce on Industrial Training	0 – 0 – 0	2
MMC 53501	Comprehensive Viva-Voce	0 – 0 – 0	4
MMC 53901	Interim Dissertation	0 – 0 – 0	15
MMC 53402	Seminar & Viva- Voce on Dissertation	0 – 0 – 0	10
MMC 53001	Teaching Assignment Evaluation/ Laboratory Development Work etc.	0 – 0 – 0	5
Total		0 – 0 – 0	40

IV SEMESTER

Course No.	Subject	L-T-P	Credit Hours
MMC 54901	Dissertation	0 – 0 – 0	20
MMC 54401	Seminar on Dissertation	0 – 0 – 0	5
MMC 54501	Viva-voce on Dissertation	0 – 0 – 0	10
MMC 54001	Teaching Assignment Evaluation/ Laboratory Development Work etc.	0 – 0 – 0	5
Total		0 – 0 – 0	40

Syllabus

AMC 51101 ADV. NUMERICAL METHODS AND APPLIED STATISTICS 4-0-0

Section –A (Advanced Numerical Methods)

Review of solution of system of linear simultaneous equation; Solution of tri-diagonal system; Ill conditioned system and iterative method to improve accuracy of an ill conditioned system; Evaluation of double and triple integrals by numerical method and its application; Solution of non-linear simultaneous equations; Numerical solution of integral equations; Advanced method of interpolation; Spline interpolation; Numerical solution of of simultaneous first order ordinary differential equations and higher order O.D.E; Initial and boundary value problems; Numerical solution of partial differential equations; Laplace and Poisson equation; Heat conduction and wave equations; Writing computer programs of the above methods.

Section-B (Applied Statistics)

Review of binomial, negative binomial, Poisson, normal and log normal distributions; Tests for significance for mean, variance, correlation and regression coefficients; χ^2- test for goodness of fit; Attributes and contingency table; F-test; Test of proportions; Tests of significance under large sample approximations; Non- parametric tests; Wald-Wolfowitz run test; Test of randomness; Median Test; Sign test; Mann-Whiteney Wilcoxon U-test; Time series analysis; Introduction to reliability and life

testing experiments in engineering problems; One way and two way analysis of variance; Completely Randomized Design(CRD); Randomized Block Design(RBD); Latin Square Design(LSD).

MSC 51105 MANAGEMENT PRINCIPLES AND PRACTICES 4-0-0

Essentials of management functions; Human behaviour at work- motivation, leadership, training and development; Essentials of communication- types of communication, barriers to communication, presentation skill; Financial management- sources of capital (long term and short term), financial statement analysis, working capital management; Engineering economics- concept of time value of money, capital budgeting techniques, replacement analysis, cost concepts, cost volume profit analysis, characteristics and life cycle of a project, project cost estimates, job costing; Introduction to marketing management- concept and practices.

EIC 51151 INSTRUMENTATION & MICROPROCESSOR CONTROL 3-0-0

Functional description of electronic measurement system; Measurement of temperature, flow, displacement, pressure etc; D/D and A/D converters; Data acquisition system; Types of control system, mathematical models, transfer functions of some physical systems; Time response analysis; Concept of stability and stability criterion; Microprocessor- architecture, hardware, programming and application to control systems.

MMC 51101 UNDERGROUND MINING EQUIPMENT 4-1-0

Rope haulage- types, constructional features, operation, application, maintenance, haulage calculations; Mine locomotives- types, construction, operation, application, maintenance, locomotive calculations. Conveyors- types, construction, operation, selection, maintenance, conveyor calculations; Mine Winders- types, constructional details, safety appliances, duty cycles, winding calculations; Construction and application of Drills, Shearers, Ploughs, Road-headers, Dint-headers, Continuous-miners, Roof supports, SDL; LHD, Shuttle cars, LPTDs.

MME 51101 MINERAL PROCESSING EQUIPMENT 3-0-0

Types, construction, operation, application of mineral processing equipment like crushers, mills, feeders, screens, classifiers, jigs, flotation machines, magnetic separators, thickeners, filters, centrifuges and cyclones.

EEE51121 MINE ELECTRICAL SYSTEM 3-0-0

Concept of earth fault current limitation in underground mine power system; Types of electrical power supply systems for underground coal mines – solidify earthed, restricted-neutral and insulated-neutral systems of power supply and their comparisons; Mining type switchgears and protective devices- mining type circuit breaker, air circuit breaker, vacuum and SF6 breakers, gate end box, drill panel, transwitch unit; Protective relays- thermal and induction type overload relays, mining type earth fault relay; General electrical power distribution scheme for opencast and underground mines; Substation management; Mining type cables; Haulage signaling practices for underground coal mines; Types of industrial tariffs; Power factor improvement in mines; Selection of motors and starters for mining applications; Introduction to thyristor controlled variable speed mine electrical drives; Electrical braking; Electrical safety in mines- equipment earthing practices in mines; Principle of flameproof enclosure; Intrinsic safety; Indian electricity rules as applied to mines.

MME 51102 MAINTENANCE ENGINEERING SYSTEMS 3-0-0

Maintenance techniques- breakdown, preventive and condition based maintenance; RCM analysis of frequency and distribution of failure; Principles and application of fault analysis; Condition monitoring of machine components through vibration, oil and temperature monitoring; Trouble shooting of different equipment; Non-destructive testing techniques and their application in maintenance; Use of soft computing for maintenance.

MME 51103 FLUID FLOW MACHINES 3-0-0

Classifications, application, calculation of capacity, head, power, energy and efficiency of fluid flow machines like- centrifugal pumps, reciprocating and rotary positive displacement pumps, mine fans and compressors.

II nd SEMESTER

MMC 52101 FLUID POWER SYSTEMS 3-1-0

Theory, construction, operation, characteristics and selection of different hydraulic components- pumps, motors, cylinders, valves, power pack etc. Construction, operation and characteristics of torque motor, electro-hydraulic valves, servo valves and their application; Use of programmable logic controller for sequence control in hydraulic drives; Maintenance of hydraulic control systems; Circuit layouts, presentation, labeling and control problem analysis; Theory, construction, operation and characteristics of pneumatic motors, cylinders, valves and other accessories; Pneumatic counters; Mixed control circuit design; Pneumatic control for hydraulic sequential power systems.

MEC 52191 MINING PRACTICES 3-0-0

Surface Mining : Introduction; Mine Development; Unit operations; Mine systems and mine equipment; Methods of working for sub-surface and hilly deposits; Waste dump formation.

Underground Coal Mining : Introduction; Classification and selection of mining methods; Bord & Pillar development layouts and extraction methods; Longwall mining; Stowing in underground coalmines; Mine Ventilation.

Underground Metal Mining : Introduction; Classification and selection of underground metal mining methods; Development layouts and extraction for open stope; Cut and fill; Shrinkage stoping and sub-level caving.

MMC 52102 OPENPIT MINING EQUIPMENT 3-1-0

Rock drills; Constructional features and component detail of excavators, draglines, dumpers, dozers, graders, rippers, compactors, bucket wheel excavators, surface miners, scrapers, cable belt conveyor, shiftable belt conveyor, high angle conveyor, in-pit crusher and front end loader; Selection of various equipment.

MSC 52105 ADVANCED DECISION MODELING 4-1-0

Review of linear programming technique and its solution methodology; Integer programming and its application in managerial decision making, solution methodologies, zero-one programming; Dynamic programming- principle of optimality, concepts of state and stage, solution of discrete problems through backward dynamic programming, continuous and multistage dynamic programming problems, concept of stochastic dynamic programming problems; Introduction of Markov decision

process; Markov decision problems; Queuing theory- definitions and classifications, birth and death process, single and multi server queues; Application of queuing analysis and decision making; Discrete event simulation- random number and random deviate generation, simulation of queuing, inventory and maintenance systems, validation of simulation models, sampling of simulation output and statistical inferences, variance reduction techniques; Concept of multi criteria decision making; Stochastic decision making models- decision tree, introduction to stochastic programming model.

MME 51101 FRICTION, WEAR AND LUBRICATION 3-0-0

Theories of friction, wear and their measurements; Classification of wear and wear minimization techniques; Wear testing instruments and tests; Introduction to lubrication engineering; Lubricants, their properties and characteristics; Theories of lubrication; Bearing lubrication techniques; Testing of lubricants.

MME 52102 COMPUTER AIDED MAINTENANCE 3-0-0

Computers for maintenance planning and failure analysis; System design; Computer application for spare parts control and maintenance costing; Computer simulation for the planning of maintenance manpower and other facilities; Information system for effective maintenance; Computer application for data processing; Computer controlled condition monitoring of equipment; Application of artificial intelligence.

CME 52107 ENVIRONMENTAL ENGINEERING 3-0-0

Environmental issues, policies, laws; Structure and functions of ecology and ecosystem; Water pollution- water quality parameters, their characteristics and standards, water quality monitoring, heavy metal pollution, eutrophication, deoxygenation, disinfections, water quality indices, water quality management and treatment; Air pollution- primary and secondary pollutants, air quality monitoring, standards and indices, meteorology and natural purification processes, engineered system for air pollution control, control devices for gaseous contaminants, vehicular pollution and control; Euro standards; Industrial noise abatement and control; Solid waste management- solid waste disposal design and operation of landfills; Environmental management systems; ISO 14000; Environmental auditing; Environmental impact assessment and preparation of EMP.

MME 52104 AUTOMATION AND ROBOTICS 3-0-0

Basic concepts of automation; Automation in material handling; Mechanisms of automation; Defination, specification and classification of robots; Application of robots in mines; Robots for different industrial purposes; Type of sensors- tactiles; Tele operated robots; Multi robot systems and applications; Artificial Intelligence.

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