GUJARAT TECHNOLOGICAL UNIVERSITY

Master of Engineering
Subject Code: 3730006
Semester III
Industrial Safety

Type of Course:

Prerequisite: Nil

Rationale: Safety is major issue in any industry; awareness about safety helps students from any major accidents, Different rules regulation of safety helps students apply it in industry for performance and productivity improvements. Knowledge of Maintenance, its type and application gives better work environments and helps industry from major shutdown. Different maintenance tools and techniques for different situation and industry equipment's helps students to apply it in real life industry problems.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE (E)	PA (M)	ESE Viva (V)	PA (I)	
3	0	0	3	70	30	0	0	100

Sr. No.	Topics	Teaching Hours
1	Industrial safety: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods.	08
2	Fundamentals of maintenance engineering: Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment	08
3	Wear and Corrosion and their prevention: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods	10
4	Fault tracing: Fault tracing-concept and importance, decision tree concept, need and applications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment's like, I. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes	09
5	Periodic and preventive maintenance: Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets, Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance	10

Distribution of marks weightage for cognitive level

Bloom's Taxonomy for Cognitive Domain	Marks % weightage
Recall	10
Comprehension	20
Application	25
Analysis	25
Evaluate	10
Create	10

References:

1. Maintenance Engineering Handbook, Higgins & Morrow, Da Information Services
2. Maintenance Engineering, H. P. Garg, S. Chand and Company
3. Pump-hydraulic Compressors, Audels, Mcgrew Hill Publication
4. Foundation Engineering Handbook, Winterkorn, Hans, Chapman & Hall London

Course Outcomes:
After learning the course the students should be able to :

Sr. No.	CO statement	Marks % weightage
CO-1	Understand Importance of Safety and Important related Acts.	20
CO-2	Apply Maintenance techniques as per requirements and able to compare for with different technique for better performance.	30
CO-3	Understand wear and corrosion, its causes and remedial actions for preventions.	30
CO-4	Demonstrate fault tracing, its methods and application.	20

GUJARAT TECHNOLOGICAL UNIVERSITY

Master of Engineering
Subject Code:3730007
Semester III
Operation Research

Type of Course: Open Elective

Prerequisite: Nil

Rationale: Operation research techniques are useful for solving real life Industrial problem, Problems can be of Manufacturing, Service and supply related. Different techniques help for optimization of linear as well as non - linear type problem.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE (E)	PA (M)	ESE Viva (V)	PA (I)	
3	0	0	3	70	30	0	0	100

Sr. No.	Topics	Teaching Hours
1	**Linear Programming Problems:** Formulation of a LPP, - graphical solution, simplex method, duality in LPP, sensitivity analysis, Integer linear programming, revised simplex method, parametric linear programming, Dynamic programming under certainty, Dynamic programming approach for solving LPP.	12
2	**Project Management , Inventory Control and Decision Making:** CPM, PERT, Project time cost trade off, Resource allocation, Deterministic inventory control models, Probabilistic inventory control models, Decision making process, Decision making under uncertainty, Decision making under risk, Decision tree analysis, Theory of games, Pure strategies, Mix strategies, Solutions method games without saddle points.	10
3	**Classical Optimization Methods:** Single variable optimization, Constrained and unconstrained multi-variable optimization, Direct substitution method, Lagrange's method of multipliers, Kuhn-Tucker conditions	06
4	**Non-linear Programming:** **Constrained Optimization Techniques** Unimodal function, Unrestricted search, Exhaustive search, Dichotomous search, Interval halving method, Fibonacci method, Golden section method **Unconstrained Optimization Techniques** Direct Search Methods: Random search methods, Grid search method, Univariate method, **Constrained Optimization Techniques** Direct Methods: Random search method, Sequential linear programming.	10
5	**Evolutionary Algorithms** An overview of evolutionary algorithms, Simulated annealing algorithm, Genetic algorithm, Particle swarm optimization	04

Distribution of marks weightage for cognitive level

Bloom's Taxonomy for Cognitive Domain	Marks % weightage

Recall	10
Comprehension	10
Application	25
Analysis	25
Evaluate	20
Create	10

References:

1. J. K. Sharma, Operation Research, Theory and Application, Macmillan Publishers India Ltd,2013
2. H.A. Taha, Operations Research, An Introduction, PHI, 2008
3. S.S.Rao, Engineering Optimization Theory and Practice, New Age International (P) Ltd, Publishers.
4. H.M. Wagner, Principles of Operations Research, PHI, Delhi, 1982
5. Pannerselvam, Operations Research: Prentice Hall of India 2010
6. Harvey M Wagner, Principles of Operations Research: Prentice Hall of India 2010

Course Outcomes:
After learning the course:

Sr. No.	CO statement	Marks % weightage
CO-1	Students should able to apply the Liner programming techniques to solve problems of real life applications and carry out post optimality analysis.	30
CO-2	Students should able to apply the concepts of non-linear programming and apply them for real life problems.	30
CO-3	Students should able to obtain quantitative solutions in business decision making under conditions of certainty, risk and uncertainty.	20
CO-4	Students should able to implement various scientific tools and models that are available in the subject to take decisions in a complex environment.	20

GUJARAT TECHNOLOGICAL UNIVERSITY

Master of Engineering
Subject Code: 3730008
Semester III
Cost Management of Engineering Projects

Type of Course:

Prerequisite:

Rationale:

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE (E)	PA (M)	ESE Viva (V)	PA (I)	
3	0	0	3	70	30	0	0	100

Sr. No.	Topics	Teaching Hours
1	Introduction and Overview of the Strategic Cost Management Process	
2	Cost concepts in decision-making; Relevant cost, Differential cost, Incremental cost and Opportunity cost. Objectives of a Costing System; Inventory valuation; Creation of a Database for operational control; Provision of data for Decision-Making	
3	Project: meaning, Different types, why to manage, cost overruns centres, various stages of project execution: conception to commissioning. Project execution as conglomeration of technical and nontechnical activities. Detailed Engineering activities. Pre project execution main clearances and documents Project team: Role of each member. Importance Project site: Data required with significance. Project contracts. Types and contents. Project execution Project cost control. Bar charts and Network diagram. Project commissioning: mechanical and process	
4	Cost Behavior and Profit Planning Marginal Costing; Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis. Various decision-making problems. Standard Costing and Variance Analysis. Pricing strategies: Pareto Analysis. Target costing, Life Cycle Costing. Costing of service sector. Just-in-time approach, Material Requirement Planning, Enterprise Resource Planning, Total Quality Management and Theory of constraints. Activity-Based Cost Management, Bench Marking; Balanced Score Card and Value-Chain Analysis. Budgetary Control; Flexible Budgets; Performance budgets; Zero-based budgets. Measurement of Divisional profitability pricing decisions including transfer pricing	
5	Quantitative techniques for cost management, Linear Programming, PERT/CPM, Transportation problems, Assignment problems, Simulation, Learning Curve Theory.	

References:

1. Cost Accounting A Managerial Emphasis, Prentice Hall of India, New Delhi
2. Charles T. Horngren and George Foster, Advanced Management Accounting
3. Robert S Kaplan Anthony A. Alkinson, Management & Cost Accounting
4. Ashish K. Bhattacharya, Principles & Practices of Cost Accounting A. H. Wheeler publisher
5. N.D. Vohra, Quantitative Techniques in Management, Tata McGraw Hill Book Co. Ltd

Course Outcomes:
After learning the course the students should be able to :

Sr. No.	CO statement	Marks % weightage
CO-1		
CO-2		
CO-3		
CO-4		

GUJARAT TECHNOLOGICAL UNIVERSITY

CIVIL (Construction Engineering & Management)
Master of Engineering
Subject Code: 3731407
Semester – III
Subject Name: Project Formulation and Appraisal

Type of Course: Elective

Prerequisite: NIL

Rationale:
To explain project appraisal techniques, financial structuring and financing alternatives. This course intends to involve students to apply appraisal techniques for evaluating live projects.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	0	3	70	30	0	0	100

Course Contents

Sr.No.	Topics	Hrs.
1	**Introduction:** Project appraisal and evaluation, Project cycle, Project cycle management, Private and Public sector Projects; Identification of investment opportunities – industry analysis review of project profiles, feasibility study, Project identification and formulation, Basic Principles of Project Analysis, Entrepreneurship – concept, theory and perspective	05
2	**Market Analysis**: Market analysis of a project, Need for market analysis,Demand and supply analysis, primary /secondary data, Forecasting techniquesTechnical appraisal of a project, Business and Technology Acquisition and managementof technology.	09
3	**Investment Appraisal:** Introduction, Investment criteria and techniques-Discounted Cost Flow (DCF) and non-DCF, Capital Rationing, Project Appraisal parameters of Financial Institutions. **Social Cost benefit analysis**: value added concept, social surplus, indirect impact of projects	17
4	Project Assessment under risk and uncertainty: Risk and Sensitivity Analysis, probabilistic cash flow approaches, Application of Network Analysis and Monte Carlo Simulation techniques.	08
	Total	**39**

GUJARAT TECHNOLOGICAL UNIVERSITY

CIVIL (Construction Engineering & Management)
Master of Engineering
Subject Code: 3731407

Reference Book(s)

- Prasanna Chandra, Project Preparation Appraisal Budgeting and Implementation, Tata McGraw.
- James Parkin, D. Sharma, Infrastructure Planning, Thomas Telford
- Bennet P. Lientz, Kathryn P. Rea, Breakthrough Technology Project Management (Second Edition), Academic Press
- W. Ronald Hudson, Waheed Uddin, Ralph C. Haas, Infrastructure Management: Integrating Design, Construction, Maintenance, Rehabilitation and Renovation, McGraw-Hill Professional,
- S. Goodman and M. Hastak, Infrastructure planning handbook: Planning, engineering, and economics, McGraw-Hill, New York
- J. D. Finnerty, Project financing - Asset-based financial engineering, John Wiley & Sons, New York
- Rajarshi Majumder, Infrastructure and Development in India, Interlinkages and Policy Issues, Rawat Publications
- Machiraju, H.R.: Introduction to Project Finance, Vikas Publishing House

Course Outcome

Sr. No.	CO statement	Marks % weightage
CO-1	Student will be capable of identifying of a project and performing feasibility analysis including market, technical and financial appraisal of a project.	40%
CO-2	Student will be capable to understand the relevance of Alternative project appraisal techniques, financial structuring and financing alternatives.	30%
CO-3	Students will be able to apply appraisal techniques for evaluating live projects	30%

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	**25**	**20**	**20**	**15**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above

List of Open Source Software/learning website: www.nptel.ac.in/courses/

GUJARAT TECHNOLOGICAL UNIVERSITY

CIVIL (Construction Engineering & Management)
Master of Engineering
Subject Code: 3731408
Semester – III
Subject Name: Project Economics and Financial Management

Type of Course: Elective

Prerequisite: NIL

Rationale:
This course bring about an exposure to construction economics, financing and accounting methods and their usefulness in controlling construction projects.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	0	3	70	30	0	0	100

Course Contents

Sr.No.	Topics	Hrs.
1	**Engineering Economics :** Basic principles – Time value of money, Quantifying alternatives for decision making, Cash flow diagrams, Equivalence- Single payment in the future (P/F, F/P), Present payment compared to uniform series payments (P/A, A/P), Future payment compared to uniform series payments (F/A, A/F), Arithmetic gradient, Geometric gradient.	07
2	**Comparison of Alternatives:** Present, future and annual worth method of comparing alternatives, Rate of return, Incremental rate of return, Break-even comparisons, Capitalized cost analysis, Benefit-cost analysis.	14
3	Depreciation, Inflation and Taxes: Depreciation, Inflation, Taxes.	05
4	**Equipment Economics:** Equipment costs, Ownership and operating costs, Buy/Rent/Lease options, Replacement analysis.	05
5	**Cost Estimating:** Types of Estimates, Approximate estimates – Unit estimate, Factor estimate, Cost indexes, Parametric estimate, Life cycle cost.	04
6	**Financial Management:** Construction accounting, Chart of Accounts, Financial statements – Profit and loss, Balance sheets, Financial ratios, Working capital management.	05
	Total	**42**

GUJARAT TECHNOLOGICAL UNIVERSITY

CIVIL (Construction Engineering & Management)
Master of Engineering
Subject Code: 3731408

Reference Book(s)

- Blank, L. T. and Tarquin, A. J., "Engineering Economy", Fourth Edition, WCB/McGraw-Hill, 1998.
- Bose, D. C., "Fundamentals of Financial management", 2nd ed., PHI, New Delhi, 2010.
- Boyer, C. B. and Merzbach, U. C., "A History of Mathematics", 2nd ed., John Wiley & Sons, New York, 1989.
- Gould, F. E., "Managing the Construction Process", 2nd ed., Prentice Hall, Upper Saddle River, New Jersey, 2002.
- Gransberg, D. G., Popescu, C. M. and Ryan, R. C., "Construction Equipment Management for Engineers, Estimators, and Owners, CRC/Taylor & Francis, Boca Raton, 2006.
- Harris, F. , McCaffer, R. and Edum-Fotwe, F., "Modern Construction Management", 6th ed., Blackwell Publishing, 2006.
- Jha, K. N., "Construction Project Management, Theory and Practice", Pearson, New Delhi, 2011.
- Newnan, D. G., Eschenbach, T. G. and Lavelle, J. P., "Engineering Economic Analysis", Indian Edition, Oxford University Press, 2010.

Course Outcome

Sr. No.	CO statement	Marks % weightage
CO-1	Prepare income, profit and loss statements and implement construction accounting	20%
CO-2	Evaluate construction project economics, cost-benefit analysis and breakeven analysis.	30%
CO-3	Analyze and evaluate construction risks and uncertainties.	20%
CO-4	Understand the impact of inflation, taxation, depreciation, Financial planning, working capital management, budgeting and control, economic basis for replacement.	30%

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	**25**	**20**	**20**	**15**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above

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GUJARAT TECHNOLOGICAL UNIVERSITY

CIVIL (Construction Engineering & Management)
Master of Engineering
Subject Code: 3731409
Semester – III
Subject Name: Construction Equipment and Management

Type of Course: Elective

Prerequisite: NIL

Rationale:
This course introduce various construction equipment and study the efficient utilization of the same using scientific principles.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	0	3	70	30	0	0	100

Course Contents

Sr.No.	Topics	Hrs.
1	**Equipment Management:** Identification –Planning - Equipment Management in Projects - operation and guideline for selection and deployment of equipment - Maintenance Management – Replacement - Cost Control of Equipment – Depreciation Analysis, Methods of calculation of depreciation- Safety Management.	08
2	**Earthwork Equipment:** Fundamentals of Earth Work Operations - Earth Moving operations-Types of Earthwork Equipment - Tractors, Motor Graders, Scrapers, Front end Loaders, Earth Movers – capacity calculations.	08
3	**Pumps Used In Construction :** Equipment for Dredging, Trenching, Tunneling, Drilling and Blasting. Equipment for compaction - Types of pumps used in Construction - Equipment for Grouting – Pile Driving Equipment- Equipment of Erection and demolition.	08
4	**Forklifts Equipment:** Forklifts and related equipment - Portable Material Bins - Conveyors – equipment used in demolition – Chain Pulley Blocks.	08
5	**Screening Equipment:** Crushers – Feeders - Screening Equipment - Batching and Mixing Equipment – Hauling equipment - Pouring and Pumping Equipment – Ready mixed concrete carriers.	07
	Total	**39**

Reference Book(s)

- Peurifoy, R.L., Ledbetter, W.B. and Schexnayder. C, "Construction Planning Equipment and Methods", McGraw Hill. Singapore.
- Sharma S.C. "Construction Equipment and Management", Khanna Publishers, Delhi.
- Deodhar, S.V. "Construction Equipment and Job Planning", Khanna Publishers Delhi.
- Mahesh Varma .Dr. "Construction Equipment and its planning and application", Metropolitan Book Company, New Delhi.

Course Outcome

Sr. No.	CO statement	Marks % weightage
CO-1	To introduce various construction equipment for earthwork, material handling and other miscellaneous purposes.	50%
CO-2	To study the working of the equipment mentioned above and apply scientific principles for effectively utilizing them.	50%

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	**25**	**20**	**20**	**15**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above

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