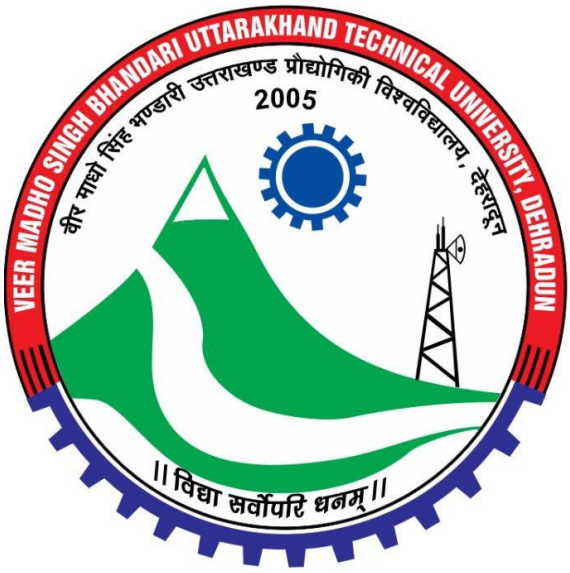
VEER MADHO SINGH BHANDARI UTTARAKHAND TECHNICAL UNIVERSITY

(Formerly Uttarakhand Technical University, Dehradun Established by Uttarakhand State Govt. wide Act no. 415 of 2005)

Suddhowala, PO-Chandanwadi, Premnagar, Dehradun, Uttarakhand (Website- www.uktech.ac.in)



SYLLABUS

Approved in 13th Meeting of Executive Council held on 27th March 2023 subsequent to the 14th Meeting of Academic Council held on 20th March 2023

(For admission in 2022-23 and onwards)

VEER MADHO SINGH BHANDARI UTTARAKHAND TECHNICAL UNIVERSITY, DEHRADUN

MASTER OF TECHNOLOGY

in

STRUCTURAL ENGINEERING

SYLLABS

of

THIRD SEMESTER (Open Elective)

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ProposedSchemeofExaminationofM.Tech.2YearProgrammeforSpecilalization:

StructuralEngineering

			SemesterI							
Sr.No.	**Course Type**	**Course Type/Code**	**CourseName**	**Teaching Scheme**			**Credits**	**Internal Marks**	**External Marks**	**Total Marks**
				L	**T**	**P**				
1			AdvancedMathematics	3	1	0	4	50	100	150
2	Core-I	CET-301	AdvancedStructuralAnalysis	3	1	0	4	50	100	150
3	Core-II	CET-302	AdvancedSoildMechanics	3	1	0	4	50	100	150
4	Professional Elective-1	CET-303	Analytical and Numerical Methodsfor Structural Engineering	3	0	0	3	50	100	150
		CET-304	StructuralHealthMonitoring							
		CET-305	AnalysisoflaminatedcompositePlates							
5	Professional Elective-2	CET-306	TheoryofThinplatesandShells	3	0	0	3	50	100	150
		CET-307	TheoryandapplicationofCement Composites							
		CET-308	TheoryofStructuralStability							
6	Core	CEP-301	StructuralDesignLab	0	0	3	1	25	25	50
7	Core	CEP-302	AdvanceconcreteLab	0	0	3	1	25	25	50
8	Mandatory course	MLC	ResearchMethodologyandIPR	2	0	2	2	50	50	100
9	Audit-1	Audit-1	Audit	2	0	0	0	50	0	50
			Total	**19**	**3**	**8**	**22**	**400**	**600**	**1000**
10	*OpenElective-1 (Optional)	*OpenElective-1 (Optional)		3	0	0	3	50	100	150
			SemesterII							
Sr.No.	**Course Type**	**Course Type/Code**	**CourseName**	**Teaching Scheme**			**Credits**	**Internal Marks**	**External Marks**	**Total Marks**
				L	**T**	**P**				
1	Core-III	CET-309	FEMinStructuralEngineering	3	0	0	3	50	100	150
2	Core-IV	CET-310	StructuralDynamics	3	0	0	3	50	100	150
3	Professional Elective-3	CET-311	AdvancedSteelDesign	3	0	0	3	50	100	150
		CET-312	DesignofHighRiseStructures							
		CET-313	DesignofMasonryStructures							
4	Professional Elective-4	CET-314	DesignofAdvancedConcreteStructures	3	0	0	3	50	100	150
		CET-315	AdvancedDesignofFoundations							
		CET-316	DesignofIndustrialStructure							
5	Open Elective-1	CET-317	RiskmanagementinConstruction	3	0	0	3	50	100	150

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		CET-318	EnvironmentalImpactAssesment							
		CET-319	IndustrialSafety							
6	Core	CEP-303	ModelTestingLab	0	0	3	1	25	25	50
7	Core	CEP-304	NumericalAnalysisLab	0	0	3	1	25	25	50
8	Audit-2	Audit-2		2	0	0	0	100	0	
			Total	**17**	**0**	**6**	**17**	**400**	**550**	950
9	*OpenElective-2 (Optional)	*OpenElective-2 (Optional)		3	0	0	3	50	100	150

SemesterIII

Sr.No.	**Course Type**	**CourseType/Code**	**CourseName**	**Teaching Scheme**			**Credits**	**Internal Marks**	**External Marks**	**Total Marks**
				L	T	P				
1	Open Elective-2	CET-320	BusinessAnalytics	3	0	0	3	50	100	150
		CET-321	OperationsResearch							
		CET-322	CostManagementofEngineeringProjects							
2	Seminar	Seminar		0	0	4	2	100		100
3	Project	Project		0	0	10	5	100	150	250
4	Dissertation	Dissertation	Dissertation	0	0	12	6	300		300
			Total	**3**	**0**	**22**	**16**	**550**	**250**	**800**

SemesterIV

Sr.No.		**CourseType/Code**	**CourseName**	**Teaching Scheme**			**Credits**	**Internal Marks**	**External Marks**	**Total Marks**
				L	T	P				
1	Dissertation	Dissertation	Dissertation	0	0	28	14	250	450	700
			Total	**0**	**0**	**28**	**14**	**250**	**450**	**700**

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Syllabus

Business Analytics (CET-320)

L:T:P:: 3:0:0 **Credits-3**

Course Objectives:

1. Understandtheroleofbusinessanalyticswithinanorganization.
2. Analyze data using statistical and data mining techniques and understand relationships between theunderlyingbusiness processes of an organization.
3. Togainanunderstandingofhowmanagers usebusiness analyticstoformulateand solvebusinessproblemsand tosupportmanagerialdecisionmaking.
4. Tobecomefamiliarwithprocessesneededtodevelop,report,andanalyzebusinessdata.
5. Usedecision-makingtools/Operations researchtechniques.Mangebusinessprocessusinganalyticalandmanagementtools

Course Outcomes: At the end of the course, students will be able to

1. Demonstrate knowledge of data analytics.
2. Demonstrate the ability of think critically in making decisions based on data and deep analytics.
3. Demonstrate the ability to use technical skills in predicative and prescriptive modelling tosupport business decision-making.
4. Demonstrate the ability to translate data into clear, actionable insights.
5. Capable of solving business analytic problems

Syllabus:

UNIT – I **(08 Hours)**

Business analytics: Overview of Business analytics, Scope of Business analytics, Business Analytics Process, Relationship of Business Analytics Process and organisation, competitive advantages of Business Analytics. Statistical Tools: Statistical Notation, Descriptive Statistical methods, Review of probability distribution and data modelling, sampling and estimation methods overview

UNIT – II **(08 Hours)**

Trendiness and Regression Analysis: Modelling Relationships and Trends in Data, simple Linear Regression, Important Resources, Business Analytics Personnel, Data and models for

Business analytics, problem solving, Visualizing and Exploring Data, Business Analytics Technology.

UNIT – III **(10 Hours)**

Organization Structures of Business analytics, Team management, Management Issues,Designing Information Policy, Outsourcing, Ensuring Data Quality, measuring contribution of Business analytics, Managing Changes. Descriptive Analytics, predictive analytics, predicative Modelling, Predictive analytics analysis, Data Mining, Data Mining Methodologies, Prescriptive analytics and its step in the business analytics Process, Prescriptive Modelling, nonlinear Optimization

UNIT – IV **(08 Hours)**

Forecasting Techniques: Qualitative and Judgmental Forecasting, Statistical ForecastingModels, Forecasting Models for Stationary Time Series, Forecasting Models for Time Series with a Linear Trend, Forecasting Time Series with Seasonality, Regression Forecasting with Casual Variables, Selecting Appropriate Forecasting Models. Monte Carlo Simulation and Risk Analysis: Monte Carle Simulation Using Analytic Solver Platform, New-Product Development Model, Newsvendor Model, Overbooking Model, Cash Budget Model

UNIT – V **(06 Hours)**

Decision Analysis: Formulating Decision Problems, Decision Strategies with the without Outcome Probabilities, Decision Trees, the Value of Information, Utility and Decision Making. Recent Trends in: Embedded and collaborative business intelligence, Visual data recovery, Data Storytelling and Data journalism

Text Books:

1. BusinessanalyticsPrinciples,Concepts,and ApplicationsbyMarcJ. Schniederjans,DaraG.Schniederjans,ChristopherM. Starkey, Pearson FTPress.

ReferenceBooks:

1. BusinessAnalytics byJamesEvans, persons Education.

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Syllabus

Operation Research (CET-321)

L:T:P:: 3:0:0 **Credits-3**

Course Objective: The course provides an overview of operation research.

Course Outcomes: At the end of the course, students will be

1: Able to understand the basics of OR and LPP.

2:Able to understand and solve the nonlinear programming problems and decision theory.

3:Able to understand and analyse game theory problems.

4: Able to understand and analyse dynamic and goal programming.

5: Able to understand and analyse PERT and CPM techniques

Syllabus:

UNIT – I **(10 Hours)**

Introduction: Linear programming, Definition, scope of Operations Research (OR) approach and limitations of OR Models, Characteristics and phases of OR Mathematical formulation of L.P. Problems. Graphical solution methods. Linear Programming Problems: The simplex method - slack, surplus and artificial variables. Concept of duality, Big-M method, Two-phase method, degeneracy, and procedure for resolving degenerate cases.

UNIT – II **(08 Hours)**

Nonlinear programming: Kuhn- Tucker conditions- quadratic programming- Wolfe's algorithm.Decision Theory: Introduction, Decision under certainty, Decision under risk, Decision under uncertainty, Laplace criterion, Maxi Min criterion, Mini Max criterion, savage Mini Max regret criterion, hurwicz criterion, Decision tree

UNIT – III **(08 Hours)**

Game Theory: Formulation of games, two person-Zero sum game, games with and without saddle point, Graphical solution (2x n, m x 2 game), dominance property, mixed strategy (3x3 or higher games). Introduction to optimization techniques, sequencing and scheduling, sensitivity analysis.

UNIT – IV **(06Hours)**

Dynamic Programming: Deterministic and stochastic example. Goal Programming: Formulations Goal Programming Solutions Complexity of Simplex Algorithm

UNIT – V **(08Hours)**

PERT-CPM Techniques: Network construction, determining critical path, floats, scheduling by network, project duration, variance under probabilistic models, prediction of date of completion.

Text Books:

1. Hiller & Lieberman, Introduction to Operations Research
2. Hira D. S. &Gupt P. K., Operations Research, S. Chand & Co. 1995.
3. Taha H. A.,Operation Research, 7th Ed., Prentice Hall of India, New Delhi, 2002**.**

ReferenceBooks:

1. Wagner H. M., Principles of Operation Research with Applications to Managerial Decisions, 2nd Ed., PHI, 2010.
2. Vohra N.D, Quantitative Techniques in Management, Tata McGraw Hill, 1995.
3. Sharma J. K., Operation Research Theory and Applications, 2nd Ed., Macmillan, 2003.

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Syllabus

Cost Management of Engineering Projects (CET-322)

L:T:P:: 3:0:0 **Credits-3**

Course Objective: Students will be able to understand the tools of costing and managerial aspect to implement anengineering project

Course Outcomes: At the end of the course, students will be able to

1: understand the aspect of costing aspects in decision making and inventory.
2: Perceived knowledge of project execution.
3: understand the cost behavior and profit planning marginal costing.
4: understand the aspect of MRP, ERP and TQM.
5: Analyze the quantitative techniques for cost management**.**

Syllabus:

UNIT – I **(08 Hours)**

IntroductionandOverviewoftheStrategicCostManagementProcess: Cost concepts in decision-making; Relevant cost, Differential cost, Incremental cost and Opportunitycost. Objectives of a Costing System; Inventory valuation; Creation of a Database for operationalcontrol;Provision of data for Decision-Making.

UNIT – II **(06 Hours)**

Project: meaning, Different types, why to manage, cost overruns centers, various stages of projectexecution:conceptiontocommissioning.Projectexecutionasconglomerationoftechnicalandn on-technicalactivities

UNIT – III **(10 Hours)**

DetailedEngineeringactivities.Preprojectexecutionmainclearancesanddocuments Projectteam:Roleofeachmember.ImportanceProjectsite:Datarequiredwithsignificance.Projectcontracts. Typesandcontents.ProjectexecutionProjectcostcontrol.BarchartsandNetworkdiagram. Projectcommissioning: mechanicaland process

UNIT – IV **(08 Hours)**

Cost Behavior and Profit Planning Marginal Costing; Distinction between Marginal Costing and,Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis. Various decision-makingproblems.StandardCostingandVarianceAnalysis.Pricingstrategies:ParetoAnalysis.Targetcosting, Life Cycle Costing. Costing of service sector. Just-in-time approach, Material RequirementPlanning,EnterpriseResourcePlanning

UNIT – V **(08 Hours)**

TotalQualityManagementandTheoryofconstraints.Activity-Based Cost Management, Bench Marking; Balanced Score Card and Value-Chain Analysis.Budgetary Control; Flexible Budgets; Performance budgets; Zero-based budgets. Measurement ofDivisionalprofitabilitypricingdecisions includingtransfer pricing. Quantitativetechniquesfor costmanagement,LinearProgramming,PERT/CPM,Transportation problems,Assignment problems, Simulation, LearningCurveTheory.

Text Books:

1. CostAccountingAManagerialEmphasis,PrenticeHallof India, NewDelhi
2. CharlesT.HorngrenandGeorgeFoster, AdvancedManagementAccounting
3. RobertSKaplanAnthonyA. Alkinson, Management&Cost Accounting

ReferenceBooks:

1. AshishK.Bhattacharya,Principles&Practicesof CostAccountingA.H.Wheelerpublisher
2. N.D.Vohra, Quantitative TechniquesinManagement,TataMcGrawHillBookCo. Ltd.