

Table-V
Multidisciplinary Open Elective –II Courses

Students of all PG programmes are required to study one open elective course in 3rd Semesters for 2-Years Programmes. They may choose any one of the following courses (excluding the courses offered by the departments of their own subjects, if not stated otherwise).

Sr. No.	Course Code	Course Title	Offered by Department
1	OEC-131A	Fundamental of Income Tax	Management Department
2	OEC-133A	Stress Management	Management Department
3	OEC-135A	Fundamental of Marketing	Management Department
4	OEC-137A	Business Analytics	Management Department
5	OEC-139A	Statistical Tools using SPSS	Applied Sc. & Humanities (Mathematics)
6	OEC-141A	Mathematical Techniques and Applications	Applied Sc. & Humanities (Mathematics)
7	OEC-143A	MATLAB	Electrical Engineering
8	OEC-145A	Sources of Energy -II	Electrical Engineering
9	OEC-147A	Natural and Manmade Disaster	Civil Engineering
10	OEC-149A	Optimization Techniques	Computer Sc. & Engineering
11	OEC-151A	Composite Materials	Mechanical Engineering
12	OEC-153A	Cost Management of Engineering Projects	Mechanical Engineering
13	OEC-155A	Voice and Data Network	Electronics and Communication Engineering
14	OEC-157A	IT for Professionals	Computer Sc. & Applications

Course code	OEC-131A				
Category	Multidisciplinary Open Elective Courses				
Course title	Fundamental of Income Tax				
Scheme and Credits	L	T	P	Credits	Semester-III
	3	0	0	3	
Course Objectives	The objectives of this course are • To familiarize students with the fundamental concepts, terminology, and importance of income tax in personal and national finance. • To enable students to understand residential status and exempt incomes for accurate tax computation. • To introduce students to the basic heads of income and principles of tax computation including clubbing, set-off, and carry-forward of losses. • To equip students with the knowledge to compute individual tax liability and file Income Tax Returns using appropriate forms.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100				
Duration of Exam	3 Hrs				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Define key tax-related concepts, terms, and classifications including income types, taxable entities, and tax planning methods.
CO2	Interpret the applicability of income tax laws including exemptions, residential status, and income heads, to explain their influence on tax obligations.
CO3	Apply provisions related to income computation, clubbing, set-off, and tax calculation to determine total taxable income and tax liability.
CO4	Analyze individual tax cases to evaluate compliance requirements, identify potential tax planning opportunities, and correctly prepare and file income tax returns.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	Meaning of tax, scope, objectives, importance, Important terms-assesse, person, previous year, assessment year, income, gross total income, total/taxable income, casual income, agriculture income, company, tax evasion, tax avoidance, tax planning, tax management.
Unit-II	Determination of residential status and incidence of tax with reference to residential status of an individual, exempted incomes of an individual.
Unit-III	Income from various heads (basic introduction only), clubbing of incomes, set of and carry forward of losses, Computation of gross total income and taxable income.
Unit-IV	Computation of tax liability of an individual; filling and filing of Income Tax Returns (ITR-I & II only).

Suggested Readings:

- Direct Taxes law and Practice by Dr. H.C. Mehrotra & Dr. S.P. Goyal, Sahitya Bhawan Publications, Agra.
- Direct Taxes and Practice by Dr. V.K. Singhania Taxmann Publication.
- Direct Taxes law and Practice by Dr. Bhagwati Prasad – Wishwa Prakashan, N.Delhi.
- Simplified Approach to income Tax by Dr. Girish & Dr. Ravi Gupta, Sahitya Bhawan Publishes & Distributors, Agra.

Useful Video Links:

Unit No	Topics	Links
Unit-I	Effective tax rate and casual income	https://archive.nptel.ac.in/courses/112/107/112107209/
Unit-II	Incidences of tax	https://archive.nptel.ac.in/courses/112/107/112107209/
Unit-III	Computation of taxable income	https://archive.nptel.ac.in/courses/110/105/110105144/
Unit-IV	Income tax return	https://onlinecourses.nptel.ac.in/noc24_mg138/

Course Code	OEC-133A				
Category	Multidisciplinary Open Elective Courses				
Course Title	Stress Management				
Scheme and Credits	L	T	P	Credits	Semester-III
	3	0	0	3	
Course Objectives	The objectives of this course are • To introduce students to the concept, nature, and effects of stress on human health and performance. • To provide an understanding of major stress theories and personality factors influencing stress response. • To equip students with techniques and behavioral strategies for managing stress effectively. • To enable students to apply stress management practices in academic, professional, and personal settings through real-life examples.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100				
Duration of Exam	3 Hrs				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Define the types, causes, symptoms, and consequences of stress along with core concepts of stress and health.
CO2	Explain key theories, models of stress, and the influence of personality traits like resilience and hardiness.
CO3	Apply various stress management techniques including CBT, mindfulness, time management, and social support in practical situations.
CO4	Analyze the effectiveness of stress management approaches in academic, workplace, and personal contexts using case studies and personalized plans.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	Introduction: Definition and nature of stress, types of stress, causes of stress, Symptoms of stress, Impact of stress on health and performance
Unit-II	Theories and Models of Stress: Stress Theories- General Adaptation Syndrome (GAS); Transactional Model of Stress and Coping, Stress Models- The Demand-Control Model; The Effort-Reward Imbalance Model Personality and Stress: Type A and Type B Personalities, Role of Resilience and Hardiness.
Unit-III	Stress Management Techniques: Cognitive Behavioral Therapy (CBT); Positive Thinking and Affirmations; Mindfulness and Meditation, Behavioral Techniques-Time Management and Organization; Relaxation Techniques: Progressive Muscle Relaxation, Deep Breathing; Physical Activity and Exercise, Social Support- Role of Family and Friends, Professional Help: Counseling and Therapy.

Unit-IV	Application of Stress Management: Stress Management in Academic Settings, Stress Management in the Workplace, Developing a Personal Stress Management Plan, Case Studies and Real-Life Applications.
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Suggested Readings:

- Stress Management by C.S Yadav, Rbsa Publisher
- Health Psychology by L. Baron & J. Feist, USA Brooks/Cole.
- 10 Steps to Mastering Stress by A Lifestyle Approach, Barlow, Rapee, and Perin , USA.
- Brilliant stress management How to manage stress in any situations by M. Clayton, Great Britain Pearson Education
- Conquer Your Stress, London by C. Cooper & S. Palmer, Institute of personal development Universities Press

Useful Video Links:

Unit No	Topics	Links
Unit-I	Definition and nature of stress Types of stress Impact of stress on health	https://archive.nptel.ac.in/courses/121/105/121105009/
Unit-II	General Adaptation Syndrome (GAS)	https://www.youtube.com/watch?v=LrotOZknWmE
Unit-III	CBT Relaxation Techniques Role of thoughts and beliefs	https://archive.nptel.ac.in/courses/121/105/121105009/
Unit-IV	Stress Management in Academic Settings Developing a Personal Stress Management Plan	https://archive.nptel.ac.in/courses/121/105/121105009/

Course code	OEC-135A				
Category	Multidisciplinary Open Elective Courses				
Course title	Fundamental of Marketing				
Scheme and Credits	L	T	P	Credits	Semester-III
	3	0	0	3	
Course Objectives	The objectives of this course are • To provide students with a foundational understanding of marketing concepts, customer value, and the role of marketing in organizations. • To develop the ability to analyze consumer behavior, segmentation strategies, and positioning in competitive markets. • To equip students with knowledge of product, pricing, distribution, and branding strategies in diverse marketing contexts. • To introduce students to integrated marketing communication tools and emerging trends such as digital and green marketing.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100				
Duration of Exam	3 Hrs				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Describe key concepts of marketing including customer value, buyer behaviour, product strategies, promotional tools, and emerging marketing trends.
CO2	Explain the principles of marketing strategy, consumer behavior, product development, distribution, and promotion in various market environments.
CO3	Apply marketing concepts, tools, and strategies to implement effective product, pricing, distribution, and promotional plans for target markets.
CO4	Analyze marketing efforts using market data, product strategy, distribution channels, and promotional efforts to support strategic marketing decisions.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	Nature and scope of marketing; corporate orientation towards marketplace; building and delivering customer value and satisfaction; retaining customers; marketing environment
Unit-II	Analyzing consumer markets and buyer behaviour; market segmentation, positioning and targeting; tools of product differentiation; marketing strategies in the different stage of the product life cycle.
Unit-III	New product development process; product mix and product line decisions; branding decisions; pricing strategies; managing marketing channels; wholesaling and retailing
Unit-IV	Advertising and sales promotion; public relations; personal selling; evaluation and control of marketing effort; web marketing; green marketing

Suggested Readings:

- Marketing Management by Kotler Philip and Keller, PHI, New Delhi
- Marketing Management in South Asian Perspective by Kotler, Philip, Kevin Keller, A. Koshy and M. Jha, Pearson Education, New Delhi
- Marketing by Kerin, Hartley, Berkowtz and Rudelius, TMH, New Delhi
- Marketing by Concepts and Cases by Etzel, Michael J, TMH, New Delhi
- Marketing Management–by Text and Cases by Dhunna, Mukesh, Wisdom Publications, New Delhi.

Useful Video Links:

Unit No	Topics	Links
Unit-I	Realities of Marketing Customer value and satisfaction	https://archive.nptel.ac.in/courses/110/107/110107147/ https://www.youtube.com/watch?v=FSCtVsJyvi0
Unit-II	Market segmentation, positioning and targeting	https://www.youtube.com/watch?v=ynozL3_s8ug&list=PLLy_2iUCG87Clg4xFPNrohNthViZnUk2D&index=22
Unit-III	Pricing Managing Marketing Channels	https://www.youtube.com/watch?v=uY-XuESPLRM&list=PLLy_2iUCG87Clg4xFPNrohNthViZnUk2D&index=39 https://www.youtube.com/watch?v=6uXABx0A9CA&list=PLLy_2iUCG87Clg4xFPNrohNthViZnUk2D&index=42
Unit-IV	Advertising and Sales Promotion; Public Relations Green Marketing	https://www.youtube.com/watch?v=28EGJjYM9eM&list=PLLy_2iUCG87Clg4xFPNrohNthViZnUk2D&index=50 https://www.youtube.com/watch?v=zBxpMMuZ6mE

Course code	OEC-137A				
Category	Multidisciplinary Open Elective Courses				
Course title	Business Analytics				
Scheme and Credits	L	T	P	Credits	Semester-III
	3	0	0	3	
Course Objectives	The objectives of this course are • To introduce the fundamental concepts, types, and processes of business analytics and their role in informed decision-making. • To develop an understanding of key analytical methods, including descriptive, predictive, and prescriptive analytics, and their strategic applications. • To explore the application of business analytics across various functional and industry domains such as finance, marketing, healthcare, and the public sector. • To familiarize students with the roles, skills, tools, and career opportunities associated with the field of business analytics and big data.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100				
Duration of Exam	3 Hrs				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Describe the fundamental concepts, types, tools, and processes of business analytics and their role in decision-making.
CO2	Explain the principles of descriptive, predictive, and prescriptive analytics and how they support strategic business decisions.
CO3	Apply business analytics methods, tools and processes to solve problems across functional domains, using relevant software and professional skills.
CO4	Analyze the integration of analytics types, processes, domain applications, roles, skills, and tools in enhancing data-driven and strategic decision-making in organizations.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	Business Analytics: Introduction, types of analytics, characteristics of analytics, business analytics, and business intelligence; business analytics process and its relationship with decision making process; Advantage of Business Analytics: Informed decisions, developing distinct capability, creating competitive advantage, key attributes of analytical competitors.
Unit-II	Analytical Methods and Models: Descriptive analytics-overview of its tools and techniques, role in business analytics process and its importance in business decision making, Predictive analytics-Nature and type of modelling, basics of data mining and machine learning environment, role in business analytics process and its importance in strategic decision making; Prescriptive Analytics: Basics of its tools and modelling, role in business analytics process.
Unit-III	Business Analytics in Action: Applicability and importance of business analytics in different areas- financial analytics, human resource analytics, marketing analytics, health care analytics, supply chain analytics, sport analytics and analytics for Government and non-profit organization.

Unit-IV	Developing Analytics: statistician, data scientist and data engineer and their key features, skills required for analytics, big data and its analyst, important analytics software, major companies providing analytical solutions, job opportunities in business analytics.
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Suggested Readings:

- Business Analytics by R. Evans, James, Pearson Education.
- Competing on Analytics by H. Davenport, J.G Harris. The New Science of Winning, Harvard Business Review Press.
- Analytics at Work by Smarter Decisions, H. Better Results Davenport, J.G. Harris and R. Morison, Harvard Business Review Press.
- Business Analytics Principles, Concepts, and Applications with SAS by M.J. Schniederjans, D.G Schniederjans. and C.M. Starkey, FT Press Analytics.
- Predictive Analytics by The Power to Predict Who Will Click, Buy, Lie, or Die, E. Siegel
- Predictive Analytics for Human Resources by J. Fitz-enz and J. Mattox, Wiley and SAS Business Series.
- Predictive Business Analytics Forward Looking Capabilities to Improve Business Performance by L. Maisel, and G. Gokins, Wiley.

Useful Video Links:

Unit No	Topics	Links
Unit-I	Business Analytics for Management Decision	https://www.digimat.in/nptel/courses/video/110105089/L01.html
Unit-II	Descriptive, Predictive and Prescriptive analytics	https://www.digimat.in/nptel/courses/video/110104086/L13.html
Unit-III	HR analytics Supply Chain Analytics Marketing Analytics	https://www.youtube.com/watch?v=JrdlsI9HbDU https://www.digimat.in/nptel/courses/video/110107074/L01.html http://acl.digimat.in/nptel/courses/video/110105142/L07.html
Unit-IV	Data Analytics	https://digimat.in/nptel/courses/video/110106072/L01.html

Course Code	OEC-139-A				
Category	Multidisciplinary Open Elective Courses				
Course Title	Statistical Tools using SPSS				
Scheme and Credits	L	T	P	Credits	Semester-III
	3	0	0	3	
Course Objectives	The objectives of this course are • To understand types of data, scales of measurement, and graphical methods to represent data. • To gain theoretical knowledge of core statistical techniques including correlation, regression, and hypothesis testing. • To learn to use SPSS software for data entry, editing, visualization, and descriptive statistical analysis. • To develop the ability to apply statistical methods in SPSS for testing hypotheses and performing advanced data analysis like regression and factor analysis.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Define fundamental concepts of data types, statistical measures, and basic statistical tests used in quantitative analysis.
CO2	Explain descriptive and inferential statistical results using both manual methods and SPSS outputs
CO3	Demonstrate proficiency in using SPSS for data management, visualization, descriptive statistics, and conducting statistical tests.
CO4	Analyze real-world datasets to uncover patterns and relationships using advanced SPSS techniques including regression and factor analysis.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	Data: Qualitative and Quantitative Data, Cross-Sectional and Time series data, Univariate and Multivariate data. Scales of measurement of Data. Frequencies, Bar charts, Pie Charts, Line Graphs, histograms, Measures of central tendency, dispersion, Skewness, Kurtosis, Box plots.
Unit-II	Concepts of Linear Correlation and Regression, Multiple Regression, Normality tests, t-tests, Chi Square tests, F-test, One way and Two way ANOVA.
Unit-III	SPSS Data File: Opening a data file in SPSS, SPSS Data Editor, creating a data file, Editing and Manipulating data, Missing Values, Editing SPSS Output, Copying SPSS output, Printing from SPSS, Importing Data. Charts and Graphs with SPSS: Frequencies, Bar charts, Pie Charts, Line Graphs, histograms.
Unit-IV	Descriptive Statistics with SPSS: Measures of central tendency, dispersion, Skewness, Kurtosis, Box plots. Statistical tests using SPSS, Correlation and Regression using SPSS, Factor analysis using SPSS.

Suggested Readings:

- Research Methodology by C.R. Kothari, New Age International Publishers
- SPSS for Researchers by S.L. Gupta and Hitesh Gupta, International Book House Pvt. Ltd.
- Discovering Statistics using SPSS by Andy Field, SAGE Publications
- SPSS for Beginners by V. Gupta, VJ Books Inc.
- SPSS for You by A. Rajathi and P. Chandran, MJP Publishers

Useful Video links:

Unit No.	Topics	Links
Unit-I	Qualitative and Quantitative Data, Cross-Sectional and Time series data, Univariate and Multivariate data. Scales of measurement of Data	https://youtu.be/Ig2qF5BC8Fg?si=x-hTlbJMBpg_z29Y
	Frequencies, Bar charts, Pie Charts, Line Graphs, histograms	https://youtu.be/kdkjVqYP92w?si=TKwj5p0d9syBING1
	Measures of central tendency, dispersion, Skewness, Kurtosis,	https://youtu.be/1MiT06JFNo4?si=Q-A8nVOx7zkrCCm2
	Box plots.	https://youtu.be/sytBDWefYb0?si=OoxDWsoBlbpbZWBG
Unit-II	Linear Correlation and Regression	https://youtu.be/TWd42yUBZkk?si=V6exIcI1CtbRwBEg
	T-tests, Chi Square tests, F-test	https://youtu.be/gp5xQHdbwwI?si=33BRMRgMaysDup2c
	One way ANOVA.	https://youtu.be/-rQjyUQcFo0?si=HenmRn0VricAqYFv
	Two way ANOVA	https://youtu.be/OXIpbKpOHxk?si=iciXcZqwyQ75vTDC
Unit-III	SPSS Data File: Opening a data file in SPSS, SPSS Data Editor,	https://youtu.be/OQqM0ZE0Fk0?si=JFinSWpKgLqpMGP4
	Creating a data file, Editing and Manipulating data,	
	Missing Values, Editing SPSS Output, Copying SPSS output, Printing from SPSS, Importing Data.	
	Charts and Graphs with SPSS	
Unit-IV	Measures of Central Tendency	https://youtu.be/XaHFNhHfXwQ?si=oir6QOmcf8ZQLpKa
	Correlation	https://youtu.be/TWd42yUBZkk?si=V6exIcI1CtbRwBEg
	Regression	https://youtu.be/_pbAib0He0Y?si=cG_TU71Js3Pq7jvq
	Statistical tests using SPSS	https://youtu.be/qPeGTFVXVf4?si=6JPI9AExfK9leTdy

Course Code	OEC-141-A				
Category	Multidisciplinary Open Elective Courses				
Course Title	Mathematical Techniques and Applications				
Scheme and Credits	L	T	P	Credits	Semester-III
	3	0	0	3	
Course Objectives	The objectives of this course are • To provide foundational knowledge of algebra, trigonometry, calculus, and basic statistics. • To develop students' ability to comprehend and interpret mathematical concepts for real-world applications. • To enable students to solve engineering and analytical problems using differential and integral calculus. • To introduce data analysis techniques using statistical tools to support logical decision-making.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Recall fundamental mathematical concepts including algebra, trigonometry, calculus, differential equations, and statistics.
CO2	Explain the underlying principles and relationships among algebraic operations, calculus techniques, and statistical methods.
CO3	Apply appropriate mathematical and statistical techniques to solve problems involving functions, limits, differentiation, integration, and data analysis.
CO4	Analyze mathematical models and datasets using calculus and statistical tools to draw logical and data-driven conclusions.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	Idea of Real Number System, Sets, Relations and functions. Solutions of linear and quadratic equations; Logarithms and Exponents. Trigonometric functions.
Unit-II	Concepts of limit, Continuity and Differentiation. Slope of a straight line. Increasing and Decreasing functions, Maxima and minima.

Unit-III	Integration - Simple techniques including integration by substitution and by parts for algebraic, exponential and logarithmic functions, Definite integrals. Differential Equation- Solution of first order linear differential equation.
Unit-IV	Measures of Central Tendency and Dispersion. Linear Correlation and Regression.

Suggested Readings:

- Thomas' Calculus by Maurice Weir, J. Hass, and R. Thomas Giordano, Pearson
- Calculus by G. Strang, Wellesley-Cambridge Press
- Introduction to Calculus, Vol-1 by J.H. Heinbockel, <http://www.math.odu.edu/~jhh/Volume-1.PDF>
- Basic Statistics by A.M. Goon, M.K. Gupta, and B. Dasgupta, World Press
- Statistical Methods by S.P. Gupta, Sultan Chand & Sons, New Delhi

Useful Video links:

Unit No.	Topics	Links
Unit-I	Idea of Real Number System	https://youtu.be/QUGmwPwtbpg?si=FxVMnpshHVOAuFOx
	Sets, Relations and functions	https://www.youtube.com/live/AV0QiF0AQn8?si=FSog806psZgQxcSW
	Solutions of linear and quadratic equations	https://youtu.be/NGPRtXxrInI?si=tjwDTu8MFyY794qH
	Logarithms and Exponents. Trigonometric functions	https://youtu.be/nCtwZ-JT9I0?si=bMOzky-crnDKRhOE
Unit-II	Concepts of limit, Continuity and Differentiation	https://youtu.be/s2QNhckjSq0?si=k42T74REjdkMsKCb
	Slope of a straight line.	https://youtu.be/ffJmYKgFpac?si=t3DsganGcxR2uJCc
	Increasing and Decreasing functions, Maxima and minima	https://youtu.be/nYA9qPRqEyM?si=tRPFJdjnrRuJNOz9
Unit-III	Integration-Simple techniques	https://youtu.be/2N6A4ed8s58?si=rzC7n_ulesW5xLgG
	Integration by substitution and by parts for algebraic, exponential and logarithmic functions	
	Definite integrals	https://youtu.be/RdxhtC0aTrk?si=Vy-alk9J8bZO85WS
	Differential Equation- Solution of first order linear differential equation	https://youtu.be/gd1FYn86P0c?si=9vcbki_C4BNdkibA
Unit-IV	Measures of Central Tendency	https://youtu.be/XaHFNhHfXwQ?si=oir6QOmc8ZQLpKa
	Correlation	https://youtu.be/TWd42yUBZkk?si=V6exIc1CtbRwBEg
	Regression	https://youtu.be/_pbAib0He0Y?si=cG_TU71Js3Pq7jvq

Course Code	OEC-143A				
Category	Multidisciplinary Open Elective Courses				
Course Title	MATLAB				
Scheme and Credits	L	T	P	Credits	Semester-III
	3	0	0	3	
Course Objectives	The objectives of this course are to: • Learn fundamental MATLAB operations, variable management, and using built-in functions for computation. • Master creating and manipulating arrays and matrices, including element-wise operations. • Develop skills in plotting and formatting various types of data visualizations, such as 2D, 3D, and polar plots. • Gain proficiency in writing functions, using control structures, and understanding the difference between script and function files.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Understand MATLAB scripts to perform arithmetic operations and mathematical functions.
CO2	Apply MATLAB plotting functions such as plots, histograms, and error bars to visualize data in one and two dimensions.
CO3	Evaluate matrices, one-dimensional and two-dimensional arrays, and perform element-wise operations using MATLAB.
CO4	Develop MATLAB programs using arithmetic operators, conditional statements, loops, and user-defined functions with local and global variables.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	Introduction: Starting MATLAB, Working in command window, Arithmetic operations, Display formats, Elementary Math Built-in functions, Defining scalar variables, useful commands for managing variables, Script files, Examples of MATLAB applications
Unit-II	Creating arrays and Mathematical operations with arrays: Creating 1- dimensional and 2- dimensional arrays, The Transpose operator, Array addressing, using a colon: in addressing arrays, Adding elements to existing variables, Deleting elements, Built in functions for handling arrays, Strings and strings as variables, Addition and Subtraction, Array Multiplication and Division, Element-by-Element operations, using arrays in MATLAB built-in math functions, Built in functions for analyzing arrays, Generation of Random Numbers, Examples of MATLAB applications.
Unit-III	Two Dimensional and Three Dimensional Plots: plot, fplot commands, formatting a plot, plots with logarithmic axes, error bars, special graphics, Histograms, Polar plots, putting multiple plots on the same page, Multiple figure windows, Examples, Line plots, Mesh and surface plots, plots with special graphics, The view command, Examples of MATLAB applications

Unit-IV	Programming in MATLAB: Relational and Logical operators, conditional statements, The switch-case statement, Loops, Nested Loops and Nested conditional statements, The break and continue commands, creating a function file, structure of a function file, Local and Global variables, saving a function file, using a User-defined function, Examples of simple User-defined functions, comparison between script files and function files.
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Suggested Readings

- MATLAB: An Introduction with applications by Amos Gilat, Wiley India Pvt. Ltd, 4th Ed., 2012.
- Getting started with MATLAB by Rudra Pratap, Oxford University Press, 2010
- MATLAB and SIMULINK for Engineers by Agam Kumar Tyagi, Oxford University Press, 2012.

Useful Video Links:

Unit No	Topics	Links
Unit I	MATLAB	https://nptel.ac.in/courses/103106118
Unit II	Creating arrays and Mathematical operations with arrays	https://archive.nptel.ac.in/content/storage2/courses/108102044/matlab/module1/module1-1_middle.htm https://archive.nptel.ac.in/courses/103/106/103106118/
Unit III	Two Dimensional and Three Dimensional Plots	https://www.mathworks.com/help/matlab/learn_matlab/plots.html
Unit IV	Programming for numerical computations	https://nptel.ac.in/courses/103106118

Course code	OEC-145A				
Category	Multidisciplinary Open Elective Courses				
Course title	Sources of Energy-II				
Scheme and Credits	L	T	P	Credits	Semester-III
	3	0	0	3	
Course Objectives	The objectives of this course are • To understand the production and applications of biogas from biomass, including the types and operation of biogas plants. • To explore the principles, performance, and limitations of wave and tidal energy systems. • To study the properties, production, and environmental impacts of petroleum and coal, including clean coal technologies. • To learn the basics of nuclear fission, fusion, and the functioning of nuclear reactors for energy production.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Understand the working principles, performance, and limitations of ocean thermal energy conversion and tidal wave energy systems
CO2	Apply biomass energy by explaining the design, operation, and application of floating drum and fixed dome type biogas plants.
CO3	Analyze coal and nuclear energy sources by evaluating coal composition, fixed carbon content, molecular structure, and nuclear fission/fusion processes for electricity generation.
CO4	Compare petroleum products based on their origin, extraction, physical properties, production processes, composition, and octane rating.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	Bio-mass: Introduction of biogas, Availability of bio-mass and its conversion theory, classification of biogas plants, principle & working of floating drum plant & fixed dome type plant- advantages & disadvantages. Biogas from plant waste, community biogas plants, utilization of biogas.
Unit-II	Ocean Thermal Energy: Availability, theory and working principle, performance and limitations. Wave and Tidal Wave: Principle, working, performance and limitations.
Unit-III	Petroleum and Coal energy: Petroleum, origin, composition, production, extraction, octane number, kerosene, LPG, lubricants natural gas, physical properties and uses of coal, generis of coal, molecular structure, determination of fixed carbon content, coal for generation of electricity, zero emission power plants, coal reserves and mining.
Unit-IV	Nuclear Energy: Nucleus and its constituents, charge mass, isotopes, isobars, mass defect, binding energy and nuclear stability, radiation and nuclear reactions. Nuclear fission, chain reaction, U235, U238, controlled nuclear fission and nuclear reactors, fast breeder reactor, nuclear fusion, condition for nuclear fusion reaction, Hydrogen bomb, Nuclear bomb

Suggested Readings:

- Renewal Energy Resources by John Twideu and Tony Weir, BSP Publications, 2006
- Energy Resources: Conventional & Non-Conventional by M.V.R. Koteswara Rao, BSP Publications, 2006.
- Non-Conventional Energy Resources by D.S. Chauhan, New Age International.
- Renewal Energy Technologies: A Practical Guide for Beginners by C.S. Solanki, PHI Learning.
- Advances in energy system and Technology by Peter Auer, Vol I & II Edited by Academic Press.
- Non-conventional Energy sources by G.D. Rai, Khanna Publishers
- Introduction to Non-Conventional Energy Resources by Scitech Publications
- Fundamentals of Solar cells. Photovoltaic Solar Energy by Fahrenbruch and Bube

Useful Video Links:

Unit No	Topics	Links
Unit-I	Bio-mass energy Biomass types and characterization	https://archive.nptel.ac.in/courses/103/103/103103207/ https://archive.nptel.ac.in/courses/103/103/103103206/
Unit-II	Ocean thermal energy	https://archive.nptel.ac.in/courses/108/105/108105058/
Unit-III	Petroleum energy Coal energy	https://archive.nptel.ac.in/courses/103/102/103102022/ https://archive.nptel.ac.in/courses/103/107/103107157/
Unit-IV	Fundamentals of nuclear power Radioactivity & nuclear reactions Nuclear fission Thermal reactors	https://archive.nptel.ac.in/courses/112/103/112103243/

Course Code	OEC-147A				
Category	Multidisciplinary Open Elective courses				
Course Title	Natural and Manmade Disaster				
Scheme and Credits	L	T	P	Credits	Semester-III
	3	0	0	3	
Course Objectives	The objectives of this course are to • Learn about natural disasters like earthquakes, tsunamis, and volcanic eruptions, and their mitigation. • Study the formation, impact, and management of cyclones, storms, forest fires, and floods. • Understand nuclear and chemical accidents, and pollution prevention techniques. • Explore climate change impacts, international cooperation, and disease outbreak management.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Define various types of natural and human-induced disasters, including their causes and effects.
CO2	Explain the processes of disaster formation, impacts, early warnings, and preparedness strategies for mitigation.
CO3	Apply disaster management techniques for mitigating environmental degradation, pollution, and managing hazard impacts.
CO4	Analyze global disaster responses, including climate change, epidemics, and international cooperation for disaster reduction.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	Disaster Classification: Types and categories of disasters, Environmental degradation. Natural Geological Disasters: Earthquakes: causes, effects, and mitigation, Tsunamis: formation and warning systems, Volcanic eruptions: types and hazard management, Landslides and avalanches: risk
Unit-II	Cyclones and Storms: Formation, tracking, and impact, Early warning and preparedness Forest Fires: Causes, prevention, and control, Impact on ecosystems Droughts and Desertification: Types, impacts, and management, Long-term mitigation strategies Floods: Types, prediction, and control measures, Flood plain management.
Unit-III	Human-induced disasters Nuclear Disasters: Types of accidents and safety protocols, Radiation protection and emergency response. Chemical Disasters: Industrial safety and regulations, Emergency procedures. Environmental Pollution: Soil and water contamination, Prevention and remediation.
Unit-IV	Global Environmental Disasters: Climate change impacts, International cooperation. Epidemics: Disease outbreak management, Public health measures.

Suggested Readings:

- Disaster Flood by Shaik Iftikhar Ahmed, Twenty First Century Publications
- Natural Hazard by Edwards Bryant, U.K. Publisher (likely Cambridge University Press or similar)
- Disaster Management by W. Nick Carter, Asian Development Bank, Manila
- Floods in India by Central Water Commission, New Delhi (1987)
- Manual on Flood Forecasting by Central Water Commission, New Delhi (1989)
- Vulnerability Atlas of India by Government of India, (Likely Building Materials and Technology Promotion Council, 1997)
- Vulnerable India: A Geographical Study of Disasters by Anu Kapur, Sage Publications, New Delhi (2010)
- Disasters in India: Studies of Grim Reality by Anu Kapur, Rawat Publications, Jaipur (2005)
- Disaster Management in India: Challenges and Reflections edited by Pardeep Sahni et al., Prentice Hall of India (2002)
- The Seismic Future of Cities by Roger Bilham, Earthquake Engineering Journal, Vol. 7, pp. 839–887 (2009)
- Criteria for Earthquake Resistant Design of Structures by Bureau of Indian Standards, IS Code (2002)
- Vulnerability Atlas of India by Government of India (Ministry of Housing & Urban Poverty Alleviation), Building Materials and Technology Promotion Council

Useful Video links:

Unit No.	Topics	Links
Unit-I	Natural Geological Disasters	https://youtu.be/Xsg8aydKyto?si=p-cMsUNrvU4cHdZf https://youtu.be/FYEQSBownPY?si=xxx8mf8U8P84yzM w
Unit-II	Cyclones and Storms	https://youtu.be/0GGuIM0Q0xc?si=BWexBRr5d0bY1Q Mg https://youtu.be/-JyB8q9e-XU?si=gRBipYWod0sol26O
Unit-III	Nuclear Disasters	https://youtu.be/QaOMddzwGGk?si=dlgm3AFKwBsI9P Mk
Unit-IV	Epidemics	https://youtu.be/bkEAWJwGFBQ?si=bOfYpdce4upkOY OU https://youtu.be/fVmJk19d3YE?si=5cgrVMegcqChRvP

Course Code	OEC-149A				
Category	Multidisciplinary Open Elective Courses				
Course Title	Optimization Techniques				
Scheme and Credits	L	T	P	Credits	Semester-III
	3	0	0	3	
Course Objectives	The objectives of this course are: • Understand classical and constrained optimization techniques for non-linear programming. • Solve the linear and integer programming problems using simplex methods, duality, and techniques. • Apply mathematical models and algorithms to transportation and assignment problems. • Analyze system reliability and queuing models using mathematical tools for performance and failure assessment.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Recall key concepts of linear/non-linear programming, transportation, assignment, reliability, and queuing models.
CO2	Explain problem-solving methodologies for optimization, reliability, and queuing systems.
CO3	Apply optimization techniques, to solve real-world decision-making and resource allocation problems.
CO4	Analyze and evaluate optimization, reliability, and queuing models for efficient decision-making.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	Linear Programming: Simplex Method, Big M-Method, Duality in Linear Programming, Sensitivity Analysis, Revised Simplex Method, Two-Phase Simplex Method, Dual Simplex Method. Integer Linear Programming: Branch and Bound Algorithms, Gomory Cutting Plane Method.
Unit-II	Transportation Problems: Types of Transportation Problems, Mathematical Models, Transportation Algorithms. Assignments: Definition, Differences between Transportation and Assignment Models, Representation Assignment Problem as Transportation Problem and as Linear Programming, Assignment Algorithm -Hungarian Method.
Unit-III	Non-Linear Programming: Classical optimization Techniques, NLP with constraints: Graphical Solution, Multivariable Optimization with Equality constraints (Lagrange Multipliers Method), with inequality constraints-Kuhn-Tucker conditions, Quadratic Programming and Separable Programming: Standard form, Wolf's Method, Beale's Method .Search Method for Unconstrained Non-Linear Programming Problems.

Unit-IV	Reliability: Basic concepts, conditional failure rate function, Failure time distributions, certain life Models, Reliability of a system in terms of the reliability of its components, series system, parallel system. Queuing Theory: Introduction, elements or Parameters of Queuing system, Steady state Balance Equation, Kendall's Notation for Representing Queuing /N/FCFS) Finite Models, Model 1: Single server Model (M/M/1/∞/∞/FCFS), Model 2: M/M/1/ Capacity Queue System, Model 3: Multi-server Model, Model 4: Machine Servicing Model.
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Suggested Readings:

1. Optimization Techniques by C. Mohan and Kusum Deep, New Age International.
2. Operations Research by K. Rajagopal, PHI, India.
3. Reliability Engineering by K K Aggarwal, Springer.
4. "Operations Research: An Introduction" by Taha H.A.
5. "Linear Programming and Network Flows" by Mokhtar S. Bazaraa, John J. Jarvis, and Hanif D. Sherali.
6. "Reliability Engineering" by Elsayed A. Elsayed.
7. "Fundamentals of Queuing Theory" by Donald Gross, John F. Shortle, James M. Thompson, and Carl M. Harris

Useful Video Links:

Unit No	Topics	Links
Unit-I	Operation Research	https://onlinecourses.nptel.ac.in/noc24_ma55/preview
	Linear Programming	https://www.nptelvideos.com/lecture.php?id=14985
Unit-II	Dual of the transportation problem and the optimality of the MODI method	https://www.youtube.com/watch?v=-tIfLz3Vsuk
	Hungarian Algorithm	https://www.youtube.com/watch?v=BUGIhEecipE
Unit-III	Nonlinear Programming	https://archive.nptel.ac.in/courses/111/107/111107104/
	Dynamic Programming	https://www.youtube.com/watch?v=qa9fnsdY0A8&t=1s
Unit-IV	Introduction to Queueing Theory	https://www.youtube.com/watch?v=4H9dMn919cs
	Birth-Death Queues: General Theory, M/M/1 Queues and their Steady State Solution	https://www.youtube.com/watch?v=AOcCMi7SPqM

Course Code	OEC-151A				
Category	Multidisciplinary Open Elective Courses				
Course Title	Composite Materials				
Scheme and Credits	L	T	P	Credits	Semester-III
	3	0	0	3	
Course Objectives	The objectives of this course are • To introduce the fundamental concepts of composite materials. • To learn the mechanical behaviour of composite materials. • To get an overview of the methods of manufacturing composite materials.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Define the basic concepts and fundamental of composite materials.
CO2	Describe the roles and characteristics of matrix and reinforcement materials in composite structures.
CO3	Apply preparation and processing methods for different types of composite materials.
CO4	Analyze the influence of composite composition & manufacturing techniques on material performance.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	Introduction: Definition – Classification and characteristics of Composite materials, Advantages and application of composites, Functional requirements of reinforcement and matrix, Effect of reinforcement (size, shape, distribution, volume fraction) on overall composite performance.
Unit-II	Reinforcements: Preparation-layup, curing, properties and applications of glass fibers, carbon fibers, Kevlar fibers and Boron fibers, Properties and applications of whiskers, particle reinforcements, Mechanical Behavior of composites, Rule of mixtures, Inverse rule of mixtures, Iso-strain and Iso-stress conditions.
Unit-III	Manufacturing of Metal Matrix Composites: Casting, Solid State diffusion technique, Cladding – Hot isostatic pressing, Properties and applications, Manufacturing of Ceramic Matrix Composites, Liquid Metal Infiltration – Liquid phase sintering, Manufacturing of Carbon – Carbon composites: Knitting, Braiding, Weaving, Properties and applications.
Unit-IV	Manufacturing of Polymer Matrix Composites: Preparation of moulding compounds and prepregs - hand layup method – Autoclave method – Filament winding method- Compression moulding – Reaction injection moulding, Properties and applications.

Suggested Readings

- Hand Book of Composite Materials by George Lubin.
- Composite Materials by K.K. Chawla.
- Composite Materials Science and Applications by Deborah D.L. Chung.
- Composite Materials Design and Applications by Danial Gay, Suong V. Hoa, and Stephen W. Tasi.

Useful Video links

Unit No	Topic	Link
UNIT-I	Classification and characteristics of composite materials.	https://www.youtube.com/watch?v=0kB0G6WKhKE&list=PLSGws_74K01-bdEEUElQ9-obrujIKGEhg
	Functional requirements of reinforcement and matrix.	https://www.youtube.com/watch?v=cB_5uqwB8Vc
	Effect of reinforcement on overall composite performance.	https://www.youtube.com/watch?v=_JAGKikeCSY
UNIT-II	Reinforcements: Preparation-layup, curing, properties and applications of glass fibers.	https://www.youtube.com/watch?v=649fIwvIvRc&list=PLwdnzlV3ogoVE2AIC-G4Uew8XsaINwJGo
	Mechanical Behavior of composites	https://www.youtube.com/watch?v=IZXH51QOrM
	Iso-strain and Iso-stress conditions	https://www.youtube.com/watch?v=dj8r0M5LsnQ
UNIT-III	Manufacturing of Metal Matrix Composites	https://www.youtube.com/watch?v=aNie6dhPKZk
	Manufacturing of Ceramic Matrix Composites	https://www.youtube.com/watch?v=bdC8yySkARs
	Manufacturing of Carbon – Carbon composites	https://www.youtube.com/watch?v=zC3M51uosDc
UNIT-IV	Manufacturing of Polymer Matrix Composites	https://youtu.be/uO8EMAUh1po?si=Pnc657NWmkuW2XOR
	Filament winding method- Compression moulding	https://www.youtube.com/watch?v=qos45EwMmd0
	Reaction Injection Moulding	https://www.youtube.com/watch?v=T4C4m0Q8a6Q

Course Code	OEC-153A				
Category	Multidisciplinary Open Elective Courses				
Course Title	Cost Management of Engineering Projects				
Scheme and Credits	L	T	P	Credits	Semester-III
	3	0	0	3	
Course Objectives	The objectives of this course are • To learn the cost concepts and strategic decision-making. • To learn the project planning and stages of project execution. • To familiarize with advanced costing methods and budgeting techniques. • To introduce to quantitative techniques for cost management.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Define the key cost concepts of cost management of engineering projects.
CO2	Explain the components and processes involved in cost & project management.
CO3	Apply appropriate methods, tools and models for decision-making in business operations.
CO4	Analyze the cost strategies, project controls, and quantitative tools for performance improvement.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	Introduction and Overview of the Strategic Cost Management Process, 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.
Unit-II	Project: Meaning, Different types, why to manage, cost overruns centers, 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.
Unit-III	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.
Unit-IV	Quantitative techniques for cost management, Linear Programming, PERT/CPM, Transportation problems, Assignment problems, Simulation, Learning Curve Theory.

Suggested Readings:

- Cost Accounting A Managerial Emphasis by Prentice Hall of India, New Delhi.
- Management & Cost Accounting by Robert S Kaplan, Anthony A. Alkinson.
- Principles & Practices of Cost Accounting by Ashish K. Bhattacharya, A. H. Wheeler publisher.
- Quantitative Techniques in Management by N.D. Vohra, Tata McGraw Hill Book Co. Ltd.

Useful Video links

Unit No	Topic	Link
Unit-I	Strategic Cost Management Process, Cost concepts in decision-making.	https://www.youtube.com/watch?v=Z-x0uzXDHSU
	Objectives of a Costing System	https://www.youtube.com/watch?v=RbkTuAdLzJ8&t=1971s
	Inventory valuation	https://www.youtube.com/watch?v=ybmDUg8S02g
Unit-II	Pre-project execution main clearances and documents, Project team.	https://www.youtube.com/watch?v=Rk6ba1UMQBY
	Project site: Data required with significance, Project contracts.	https://www.youtube.com/watch?v=h6i7TClGqOc
	Bar charts and Network diagram, Project commissioning: mechanical and process.	https://www.youtube.com/watch?v=IXw_6anGWFY
Unit-III	Cost Behavior and Profit Planning, Marginal Costing.	https://www.youtube.com/watch?v=5ONlGx-Nb1w
	Break-even Analysis, Cost-Volume-Profit Analysis.	https://www.youtube.com/watch?v=3OvCF_r1BOY&list=PLBsasm-LNOYV1sr8hAvmtfG_HA4cbkwjl
	Budgetary Control: Flexible Budgets, Performance budgets.	https://youtu.be/pYSgMGoK_Jo?si=9GJxp5zvGJaaRCJ2
Unit-IV	Transportation problems	https://www.youtube.com/watch?v=Q31jKiEXxdc
	Assignment problems	https://www.youtube.com/watch?v=BUGlhEcipE
	Simulation, Learning Curve Theory.	https://youtu.be/1xit5UaQ-rE?si=izx2vEwiVYEkM4Tl

Course Code	OEC-155A				
Category	Multidisciplinary Open Elective Courses				
Course Title	Voice and Data Network				
Scheme and Credits	L	T	P	Credits	Semester-III
	3	0	0	3	
Course Objectives	The objectives of this course are to: • Explore network design principles and their impact on network behavior. • Learn data link layer protocols and queuing models for analyzing network traffic. • Understand Internet architecture, IP addressing, and routing protocols. • Explain congestion control and quality of service methods in networks.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Define and apply network design principles, key protocols, and basic concepts in voice and data networks to optimize performance.
CO2	Explain data link layer protocols, queuing models, and their importance in managing network traffic behavior.
CO3	Apply Internet architecture, IP addressing, routing protocols, and transport layer mechanisms to solve real-world network problems.
CO4	Analyze and evaluate congestion control techniques, QoS mechanisms, and their effects on network reliability.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	Network Design Issues, Network Performance Issues, Network Terminology, centralized and distributed approaches for networks design, Issues in design of voice and data networks, Layered and Layer less Communication, Cross layer design of Networks, Voice Networks (wired and wireless) and Switching, Circuit Switching and Packet Switching, Statistical Multiplexing.
Unit-II	Data Networks and their Design, Link layer design- Link adaptation, Link Layer Protocols, Retransmission. Mechanisms (ARQ), Hybrid ARQ (HARQ), Go Back N, Selective Repeat protocols and their analysis.
Unit-III	Queuing Models of Networks, Traffic Models, Little's Theorem, Markov chains, M/M/1 and other Markov systems, Multiple Access Protocols, Aloha System, Carrier Sensing, Examples of Local area networks, Inter-networking, Bridging, Global Internet, IP protocol and addressing, Sub netting, Classless Inter domain Routing (CIDR), IP address lookup, Routing in Internet. End to End Protocols, TCP and UDP. Congestion Control , Additive Increase/Multiplicative Decrease , Slow Start, Fast Retransmit/ Fast Recovery
Unit-IV	Congestion avoidance, RED TCP Throughput Analysis, Quality of Service in Packet Networks. Network Calculus, Packet Scheduling Algorithms.

Suggested Readings:

- Data Networks by Bertsekas, Pearson Education
- Computer Networks: A Top-Down Approach by Forouzan, Behrouz A; Mosharraf, Firouz, TMH
- Computer Networks: A Systems Approach by Larry, L Peterson; Brace, S Dave, MORGAN KUFTRAN
- Communication Network by Alberto, Leon; Gancia; WidJaje, TMZ
- Vijay Ahuja, “Design and Analysis of Computer Communication Networks”, McGraw Hill, 1987

Useful Video Links:

Unit No	Topics	Links
Unit-I	Data link layer in computer Networks and its Responsibilities. Switching Techniques in Networking (Circuit Switching, Message Switching, Packet Switching).	https://www.youtube.com/watch?v=JRgmPco0KWI https://www.youtube.com/watch?v=zMn1IeEMk8E
Unit-II	Hybrid ARQ (HARQ) Stop and Wait ARQ protocol Data link layer	https://www.youtube.com/watch?v=TxsAvr8YHqQ https://www.youtube.com/watch?v=YIX1NfaUpsU
Unit-III	Queuing Models of Networks	https://www.youtube.com/watch?v=d9hpfrZxAc&list=PLU6SqdYcYsfJxRfVS-vKgVa-Oz-THIJNk
Unit-IV	RED TCP Throughput Analysis	https://www.youtube.com/watch?v=1eJHqyyjHqk

Course Code	OEC-157A				
Category	Multidisciplinary Open Elective Courses				
Course Title	IT for Professionals				
Scheme and Credits	L	T	P	Credits	Semester-III
	3	0	0	3	
Course Objectives	The objectives of this course are to • To provide foundational knowledge of essential IT tools and their relevance in modern professional environments. • To build proficiency in using digital productivity tools for data analysis, visualization, document creation, and professional communication. • To equip students with the ability to effectively collaborate and manage information using cloud-based and online platforms. • To expose students to decision-making technologies, including business intelligence and emerging trends like AI, to prepare them for technology-driven careers.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Describe key IT tools, digital platforms, and ethical practices relevant to professional work environments.
CO2	Explain the application and significance of productivity, communication, and decision-making tools in enhancing professional efficiency.
CO3	Use appropriate digital tools such as office suites, spreadsheets, and cloud platforms to create, analyze, and manage professional tasks and data.
CO4	Analyze how emerging technologies like business intelligence and AI can support decision-making and address real-world professional challenges.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	Introduction to IT Tools for Professional: Understanding the Role of IT in Management, Essential IT Tools for Professional, Ethical and Security Considerations, Document Creation and Presentation Tools-Microsoft Office Suite (Word, PowerPoint), Creating Professional Documents and Presentations.
Unit-II	Data Analysis with Spreadsheet Software: Microsoft Excel for Data Analysis, Data Visualization and Charts, Advanced Functions and Pivot Tables, Conditional Formatting, Google Workspace (Docs, Slides, Sheets, google forms, google drive, file sharing, Google scholar).
Unit-III	Communication and Collaboration Tools: Email and Calendar Management, Video Conferencing and Webinars, Cloud Storage, social media platform, linkedIn, indeed, skype, search engine optimization, introduction to job portals.
Unit-IV	IT Tools for Decision: Making- Business Intelligence Tools, IT Tools for Strategic Planning, Introduction to AI and ChatGpt. Emerging Trends and Challenges in IT sector related to professional.

sSuggested Readings:

- Management Information Systems: Managing the Digital Firm by K. C. Laudon & J. P. Laudon, Pearson
- Information Technology for Management: Advancing Sustainable, Profitable Business Growth by E. Turban, C. Pollard, & G. Wood, Wiley
- Information Technology Project Management by K. Schwalbe (2018), Cengage Learning
- The Data Warehouse Lifecycle Toolkit by B. H. Wixom & H. J. Watson, Wiley
- Enterprise Systems: Business, Process, and Technology by M. L. Markus & C. Tanis, Routledge

Useful Video links:

Unit No.	Topics	Links
Unit-I	Document Creation and Presentation Tools-	https://youtu.be/uisSkBOGIUM?si=eLuMBn9YILBryNhp
Unit-II	Data Analysis with Spreadsheet Software	https://youtu.be/rduIHLghiLY?si=WbDCUnUI0JFxVFgK
Unit-III	Communication and Collaboration Tools	https://youtu.be/hJjPz9g56RQ?si=MKe-gBUAnRc1_prQ
Unit-IV	IT Tools for Decision-Making	https://youtu.be/gWzZxzQmd4w?si=0QaYDUxKn5aDBWa