PG Courses

Table -II
Multidisciplinary Open Elective -I Courses

Students of all M.Tech programmes are required to study one Multidisciplinary open elective course in each of the 2nd and 3rd Semesters and one foundation elective course in 2nd Semester 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).

SN	Course Code	Course Name	Offered by Department
1	OEC-130A	Basic of Economics	Management Department
2	OEC-132A	Fundamentals of Management	Management Department
3	OEC-134A	Disaster Management	Civil Engineering
4	OEC-136A	Industrial Safety	Fire Technology and Safety
5	OEC-138A	Indian Literature in Translation-I	Applied Science and Humanities (English)
6	OEC-140A	Environmental Issues	Applied Science and Humanities (Chemistry)
7	OEC-142A	Quantitative Techniques	Applied Science and Humanities (Mathematics)
8	OEC-144A	Sources of Energy-I	Electrical Engineering
9	OEC-146A	Operations Research	Mechanical Engineering
10	OEC-148A	Multimedia Communication	Electronics and Communication Engineering
11	OEC-150A	Introduction to Information Technology	Computer Science and Applications
12	OEC-152A	Cyber Forensics and Security	Computer Science and Engineering
13	OEC-154A	Computer Science and Principles	Computer Science and Engineering
14	OEC-156A	Software Engineering Practices	Computer Science and Engineering

Table -III
Foundation Elective Courses

SN	Course Code	Course Name	Offered by Department
1	FEC-158A	Basics of Accounting	Management Department
2	FEC-160A	Basics of E-commerce	Management Department
3	FEC-162A	Elements of Banking	Management Department
4	FEC-164A	Computer Fundamentals	Computer Science and Engineering
5	FEC-166A	Communication and Soft Skills	Applied Science and Humanities (English)
6	FEC-168A	Entrepreneurship Development	Management Department
7	FEC-170A	Electronics Engineering	Electronics and Communication Engineering

Course Code	**OEC-130A**				
Category	Multidisciplinary Open Elective Courses				
Course Title	**Basics of Economics**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	**3**	
Course Objectives	The objectives of this course are • To make the students aware of the fundamental concepts related to economies, including core economic problems, opportunity costs, and basic consumer behavior principles. • To enable the students to go beyond understanding concepts and start analyzing economic issues.				
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	RBT Level
CO1	**Define** the fundamental concepts of business economics.	Level 1: Remember
CO2	**Interpret** the theories of consumption and production.	Level 2: Understand
CO3	**Apply** the theories and laws of micro economics to solve business problems.	Level 3: Apply
CO4	**Analyze** the process of decision making by consumers and producers.	Level 4: Analyze

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-I

Introduction: Meaning, Nature and scope of Microeconomics, Concept of resources, Meaning and types of economy, Difference between Micro and Macro-economics, Central problems of an economy (what, how and for whom to produce), Production possibility curve, Meaning, Assumptions and its properties, Shifting of curve and opportunity cost, Characteristics of various economic resources, Factors of production.

Unit-II

Consumer Behavior (Utility Analysis): Meaning of utility, Marginal utility, Law of diminishing marginal utility, Law of equi- marginal utility, Conditions of consumer's equilibrium.

Consumer Behavior (Indifference curve analysis): Assumptions, Properties of indifference curve, Consumer equilibrium, Short run and long run production functions, Law of variable proportions, Law of return to scale, Factors affecting the location of firms.

Unit-III

Demand and Supply Analysis: Law of demand, market demand, determinants of demand, demand schedule, Demand Curve, Types of Goods, Normal goods, Inferior goods, Substitute goods, Complimentary goods, Giffen goods, Price elasticity of demand, Factors affecting price elasticity of demand, Methods to measure price elasticity of demand, Law of supply, Determinants of Supply, Elasticity of supply.

Unit-IV

Cost and revenue: Total cost, Total fixed cost, Total variable cost, Average cost, Average fixed cost, Average variable cost, Meaning and relationship of total revenue and marginal revenue, Market and forms of market, Equilibrium of the firm and industry, Perfect competition, Monopoly, Monopolistic competition, Discriminating monopoly, Aspects of non-price competition.

Suggested Readings:

- Modern Microeconomics by A. Kout Soyiannis, Macmillan Press, London
- Microeconomics Theory and Applications, by A. Sen, Oxford University Press
- Microeconomic Analysis by H. Varian, W.W. Norton, New York
- Economic Theory and Operations Analysis by W.J. Baumol, Prentice Hall of India, New Delhi
- Barriers to New Competition by J. Bain, Harvard University Press, Harvard
- Microeconomic Theory A Mathematical Approach by J.M. Henderson & R.E. Quandt, McGraw Hill

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Concept of production possibility function	https://youtu.be/vzz2E7fU7Kk?feature=shared
Unit-II	Concepts of Utility	https://youtu.be/6MGjlbn7kO0
Unit-III	Price elasticity of demand	https://youtu.be/CG46N6R-bwo?feature=shared
Unit-IV	Theory of Cost	https://youtu.be/svespJwNQNo

Course Code	**OEC-132A**				
Category	Multidisciplinary Open Elective Courses				
Course Title	**Fundamentals of Management**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	**3**	
Course Objectives	The objectives of this course are to • Understand management concepts, functions, skills, roles, and challenges in organizational settings. • Learn planning strategies, decision-making processes, and management by objectives for organizational growth. • Grasp organizing principles, structure, delegation, and centralization for efficient resource management. • Learn control techniques and systems to monitor performance, ensure quality, and achieve goals				
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	RBT Level
CO1	Define the fundamental concepts of management.	Level 1: Remember
CO2	Explain the functional areas of management and various management theories.	Level 2: Understand
CO3	Apply organizational principles to develop effective structures, allocate responsibilities, and manage decision-making.	Level 3: Apply
CO4	Analyze management techniques and systems to ensure their organizational effectiveness.	Level 4: Analyze

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-I

Overview of Management: Concept, Nature, Process, Managerial levels (Technical, Conceptual, Interpersonal), Skills, Functions and Role of managers, Challenges of management.

Unit-II

Planning: Nature and purpose of planning, Planning process, Types of plans, Management by Objectives (MBO), Strategies, types of strategies (Corporate Strategy, Business Strategy, Differentiation Strategy, Retrenchment Strategy, Growth Strategy), Decision making: Types of decision, Decision making process, Rational decision making.

Unit-III

Organizing: Meaning, Nature and purpose of organizing, organization structure, Departmentation, Span of control, Centralization and Decentralization, Delegation of authority and responsibility.

Unit-IV

Controlling: Meaning, Nature and scope of control, Types of control, Control process, Control techniques (Budgetary Control, Financial Control, Quality Control, Inventory Control, Statistical Control, Production Control), Cost Control, Effective control system.

Suggested Readings:

- Management Theory and Practice by C. B. Gupta, Sultan Chand and Sons
- Essentials of Management by Koontz and Wechrich, Tata McGraw-Hill
- Management: Concepts and Strategies by J. S. Chandan, Vikas Publishing House, New Delhi
- Management by Robbins and Coulter, Prentice Hall of India, New Delhi
- Developing Communication Skills by Krishna Mohan and Meera Banerji, Macmillan India Ltd., New Delhi
- Management and Organisational Behaviour by Wendy Blaoisi, Curtis W. Cook, and Phillip L. Hunsaker, McGraw Hill

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Introduction to Management	https://youtu.be/TtbImDfUt4c?feature=shared
Unit-II	Decision Making	https://youtu.be/B96-Gpn56sU?feature=shared
Unit-III	Delegation of Authority	https://youtu.be/GlLXV7JLVnk?feature=shared
Unit-IV	Controlling: Issues, Types, Techniques and Importance	https://youtu.be/v7XmhnenEGs?feature=shared

Course Code	**OEC-134A**				
Category	Multidisciplinary Open Elective Courses				
Course Title	**Disaster Management**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	**3**	
Course Objectives	The objectives of this course are to • Make the students familiar with the causes, phases, and types of disasters and effects of natural and human factors on geo-hazards, coastal changes, and seismic activities. • Enable the students to understand forecasting, management, and risk reduction strategies to mitigate their impact. • Make the students aware of causes, characteristics, and risks of earthquakes, volcanic eruptions, and landslides, and explore early warning systems and risk mitigation strategies. • Learn about international efforts and policies for disaster reduction, • including the UN's humanitarian coordination and challenges infinancing and insurance for disaster response.				
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	RBT Level
CO1	Define the causes, phases, and types of disasters, including geo-hazards and environmental changes.	Level 1: Remember
CO2	Explain the nature, causes, and risks of floods, cyclones, tsunamis, and earthquakes, including mitigation strategies.	Level 2: Understand
CO3	Apply flood management, risk mitigation techniques, and early warning systems for disaster preparedness and response.	Level 3: Apply
CO4	Analyze the impact of disasters, the role of international policies, and strategies for disaster reduction.	Level 4: Analyze

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-I

Disaster: Causes and phases of disaster, Rapid onset and slow onset disasters. Nature and responses to geo-hazards, trends in climatology, meteorology and hydrology. Seismic activities. Changes in Coastal zone, coastal erosion, beach protection. Coastal erosion due to natural and manmade structures.

Unit-II

Floods and Cyclones: Causes of flooding, Hazards associated with flooding. Flood forecasting. Flood management, Integrated Flood Management and Information System (IFMIS), Flood control. Water related hazards- Structure and nature of tropical cyclone, Tsunamis – causes and physical characteristics, mitigation of risks.

Unit-III

Earthquakes: Causes and characteristics of ground-motion, earthquake scales, magnitude and intensity, earthquake hazards and risks, Volcanic land forms, eruptions, early warning from satellites, risk mitigation and training. Landslides.

Unit-IV

Mitigation efforts: UN draft resolution on Strengthening of Coordination of Humanitarian Emergency Assistance, International Decade for Natural Disaster Reduction (IDNDR), Policy for disaster reduction, problems of financing and insurance.

Suggested Readings:

- Earthquakes by B.A. Bolt, W. H. Freeman and Company, 1988.
- Disaster Management: A Disaster Manager's Handbook by N.W. Carter, Asian Development Bank,1992.
- Earthquake: A Natural Disaster by Ashutosh Gautam, Ashok Publishing House, 1994.
- Disaster Risk Reduction in South Asia edited by P. Sahni and M. Malagola, Prentice-Hall of India, 2003.
- Disaster Management edited by V.K. Sharma, Indian Institute of Public Administration (IIPA), 1995.
- Disaster Management Approaches and Strategies by T. Singh, Akansha Publishing House, 2006.
- Towards Basics of Natural Disaster Reduction by D.K. Sinha, Research Book Centre, 2006.
- Environmental Health, Assessing Risk and Reduction Disaster (3rd ed.) by K. Smith, Routledge, 2001.

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Causes and phases of disaster	https://youtu.be/DExlZTfKZAM?si=tG7pJwlsMdska3io
Unit-II	Floods and Cyclones	https://youtu.be/z62WbYrMhRU?si=L0sfH0rgR1DctnVG
Unit-III	Disaster and Disaster Management	https://youtu.be/DExlZTfKZAM?si=5-cQzza7iPZHLAcb
Unit-IV	Disaster Recovery and Build Back Better	https://youtu.be/gQxs2VJPf4o?si=HMdGNwnopAdtrbe2

Course Code	**OEC-136A**				
Category	Multidisciplinary Open Elective Courses				
Course Title	**Industrial Safety**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	**3**	
Course Objectives	The objectives of this course are • To familiarize with the safety methodology, education and training for an organization and environment. • To learn about the different types of accident and its preventive methods. • To make the students familiar with the rules of safety and safety management system.				
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	RBT Level
CO1	Define the fundamentals of safety, accident prevention, and safety organizations in industrial environments.	Level 1: Remember
CO2	Explain the importance of safety audits, risk analysis, and the role of safety education and training.	Level 2: Understand
CO3	Apply accident investigation techniques, safety performance metrics, and risk quantification methods.	Level 3: Apply
CO4	Analyze the effectiveness of safety systems, safety rules, and emergency response plans in mitigating risks.	Level 4: Analyze

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-I

Safety: Introduction to safety, need for integration of health and environment safety,safety and productivity, fundamental of safety, important points for consideration ofsafety, general instructions for safety.

Safety Organization: Objectives, types and functions, safety committee, need, types,advantages, safety audits, types of audit, audit methodology, non-conformity report, audit checklist and report, Safety in design and operations, inherent and engineered safety.

Unit-II

Accident: Introduction, types of accidents, causes of accidents, principle of accident prevention, accident investigation, process of investigation, reporting, analysis, technique, Mort capital, multi event sequencing-TOR, theories of accident, onsite andoffsite emergency response plan, cost of accident.

Unit-III

Safety Education and Training: Importance, various training methods, effectiveness of training, behavior oriented training, communication, purpose, barrierto communication, creating awareness, domestic safety and training.

Monitoring Safety Performance: Frequency rate, severity rate, incidence rate, activity rate, and safety "t" score, Safety surveys, Job Safety Analysis (JSA).

Unit-IV

Risk Analysis Quantification: Fault Tree Analysis, Event Tree Analysis, Logic symbols, methodology, minimal cut set ranking, fire explosion and toxicity index (FETI), various indices, Hazard analysis (HAZAN), Failure Mode and Effect Analysis (FMEA).

Safety Rules: Safety rules for industries (including management and labour) safety culture, safety policy, safety management system, safety reporting.

Suggested Readings:

- Fundamentals of Industrial Safety & Health by K.U.Mistry, Siddharth Prakashan.
- Safety Management by R.K. Mishra, AITBS Publishers.
- Safety Management in Industry by N.V. Krishnan, Jaico Publishing House, 1997.
- Industrial Safety by Ronald P. Blake, Prentice Hall, New Delhi, 1973.
- Occupational Safety and health by David L. Goetsch, Prentice Hall
- Modern Accident Investigation and Analysis by Ted S. Ferry, John Wiley & Sons
- Fire Safety in Buildings by V K Jain, New Age publishers, New Delhi
- Fundamentals of Fire Safety in Building Design by Dr. Than Singh Sharma, Aayush Publications, N.Delhi

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Safety	https://www.youtube.com/watch?v=v-eltsixu4I https://www.youtube.com/watch?v=MQ3xuV98wwM
Unit-II	Accident Investigation	https://youtu.be/VhuZ6M7a8N8
Unit-III	Safety Performance	https://www.youtube.com/watch?v=pwkjK0Zqa3w
Unit-IV	Risk Analysis Quantification	https://www.youtube.com/watch?v=PAh0TPSAZOM https://www.youtube.com/watch?v=ZEShNJX3kcg

Course Code	**OEC-138A**				
Category	Multidisciplinary Open Elective Course				
Course Title	**Indian Literature in Translation -I**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	**3**	
Course Objectives	The objective of this course is to familiarize the students with contemporary Indian narratives written in regional languages.				
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	RBT Level
CO1	Define the key themes, characters, and cultural contexts in works like *Pinjar* and *The Blue-Necked God*.	Level 1: Remember
CO2	Explain the narrative techniques and socio-political critiques in *Raag Darbari* and *A Suitable Boy*.	Level 2: Understand
CO3	Apply literary analysis to interpret symbolism, characterization, and themes in selected works.	Level 3: Apply
CO4	Analyze the stylistic features and cultural impact of Indian authors in post-colonial literature.	Level 4: Analyze

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-I

Amrita Pritam: Pinjar (from Pinjar: The Skeleton and Other Stories translated and adapted by Khushwant Singh)

Unit-II

Indira Goswami: The Blue- Necked God (trans. Gayatri Bhattacharya)

Unit-III

Shrilal Shukla: Raag Darbari (trans. Gillian Wright)

Unit-IV

Vikram Seth: A Suitable Boy

Suggested Readings:

- Amrita Pritam: A Biography by Gurvinder Singh, National Book Trust, 2003
- The Partition of India: A Historical Analysis by Ian Talbot, Cambridge University Press, 2000
- Indira Goswami: A Critical Study by S.C. Kar, Sahitya Akademi, 2006
- Raag Darbari: A Sociological Perspective by Shailendra Pandey, Vikas Publishing House, 2001
- Vikram Seth: The Novelist as a Cultural Mediator by John G. Peters, Oxford University Press, 2007
- Postcolonial Theory and the Indian Novel by Rukmini Bhaya Nair, Orient Longman, 2002
- A Suitable Boy: A Critical Companion edited by Meenakshi Bharat and Nivedita Menon, Oxford University Press, 2007

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Pinjar- Amrita Pritam	https://www.youtube.com/watch?v=TSJn_bEmevo https://www.youtube.com/watch?v=bbXLIlIHD8E
Unit-II	The blue necked Gods- Indira Goswami	https://www.youtube.com/watch?v=umz1X-re3lk
Unit-III	Raag Darbari-Srilal Shukla	https://www.youtube.com/watch?v=8sDYddihU08 https://www.youtube.com/watch?v=MhZ2PMW9Sg8
Unit-IV	A Suitable Boy	https://www.youtube.com/watch?v=Oz4WO0Gyz3A

Course Code	**OEC-140A**				
Category	Multidisciplinary Open Elective Courses				
Course Title	**Environmental Issues**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	**3**	
Course Objectives	The objectives of this course are • To understand the global Environmental issues • To explore regional environmental issues • To assess the Environmental Impact of mining and Oil exploration • To analyze air Pollution, water pollution and their effects • To investigate solid and soil pollution				
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	RBT Level
CO1	Define the causes, effects, and hazards associated with global and regional environmental issues.	Level 1: Remember
CO2	Explain the concepts and methods for managing environmental problems related to pollution and resource depletion.	Level 2: Understand
CO3	Apply strategies for waste management and pollution control in real-world environmental contexts.	Level 3: Apply
CO4	Analyze the impact of human activities on ecosystems and evaluate the effectiveness of mitigation strategies.	Level 4: Analyze

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-I

Global Environmental Issues: Green House effect – causes and associated hazards, Ozone layer depletion – causes and associated hazards, Deforestation, Human Population Growth. Environmental problems associated with urbanization, industrialization, modernization of agriculture.

Unit-II

Regional Environmental Issues: Forest and Wildlife management, desertification, reclamation of degraded land; Human intervention on wetlands, siltation and eutrophication, reclamation of wetlands, Mining and Environment, Open cast mining, Oil exploration and transportation, Deforestation and their impact on environment.

Unit-III

Air Pollution: Causes of air pollution, Some important pollutants of air (CO, SOX, NOX and HC and Particulates) – their sources and effects on living and non-living organisms.

Water Pollution: Sources of pollution of surface and ground water, Types of water pollutants. Soil Pollution: Introduction, Sources of soil pollution, Pollution and residual toxicity from the application of insecticides, pesticides and fertilizers; Soil erosion.

Unit-IV

Solid Wastes: Environmental, aesthetic and health risk, Sources, quantities and composition of solid wastes, Storage, collection and transportation of urban solid waste, disposal options- sanitary landfills, composting and its variations, anaerobic digestion, incineration and pyrolysis, Vermi composting, Recovery alternative, Monitoring of solid wastes.
Hazardous Wastes: Definition and classification, health and environmental effects, treatment, disposal and management of hazardous wastes, legal frame work for hazardous waste management in India.

Suggested Readings:

- Fundamentals of Environmental Science: G. S. Dhaliwal, G. S. Sangha and P. K. Raina, KalyaniPublication
- Environmental Pollution Control Engineering by C.S. Rao, New Age International (P) Ltd Publishers, latest edition.
- Wastewater Treatment by M.N. Rao and A.K. Dutta, Oxford & IBH, Publishing Co. Pvt. Ltd, N. Delhi.
- Handbook of solid waste Disposal and Management by J. L. Pavani.
- Waste Water Engineering: Treatment, Disposal, Reuse by Metcalf and Eddy Inc.
- Environmental Impact Assessment by L.W. Canter
- Environmental Engineers Handbook by Liu

Useful Video links:

Unit No.	Topics	Links
Unit-I	Green House effect	https://www.youtube.com/watch?v=h3lecZW3XTQ
	Ozone Layer Depletion	https://www.youtube.com/watch?v=UGfLzeF6_vs
	Population Growth.	https://www.youtube.com/watch?v=_R_wPXlRRoE
Unit-II	Forest and Wildlife Management	https://www.youtube.com/watch?v=KVZu-AmcsHw
	Desertification, reclamation of degraded land	https://www.youtube.com/watch?v=YaRkQ6mYNC4
	Mining and Environment	https://www.youtube.com/watch?v=RBJJ0lcQV24
	Deforestation and their impact on environment.	https://www.youtube.com/watch?v=yfXkLjeLfAE
Unit-III	Air Pollution	https://www.youtube.com/watch?v=_KUuOCrJEA4
	Water Pollution	https://www.youtube.com/watch?v=-zoloMKOKxc
Unit-IV	Solid Waste	https://www.youtube.com/watch?v=fsNXIvzDx9w

Course Code	**OEC-142-A**				
Category	Multidisciplinary Open Elective Courses				
Course Title	**Quantitative Techniques**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	**3**	
Course Objectives	The objectives of this course are ● To acquire knowledge about Probability, Random Variables, various Discrete, Continuous Probability distributions and their properties. ● To learn various Statistical methods and techniques to study data samples.				
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	RBT Level
CO1	Define and explain the fundamental concepts, measures, and methods of descriptive statistics.	Level 1: Remember
CO2	Describe the concepts and methods for analyzing and fitting probability distributions and statistical models.	Level 2: Understand
CO3	Apply correlation, regression, and statistical techniques to analyze and interpret data sets.	Level 3: Apply
CO4	Analyze data using time series, index numbers, and quality control methods to make informed decisions.	Level 4: Analyze

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-I

Classification of Data, variable and measurement scales. Presentation of Data. Measures of Central tendency and Dispersion, Skewness and Kurtosis. Measures of Association of Attributes. Correlation and Regression. Principle of Least Squares, Multiple and Partial correlation. Fitting of Polynomial and Exponential Curves.

Unit-II

Random variables: Probability mass function, Probability density function and Cumulative distribution function. Expectation and its properties. Moments, moment generating function and probability generating function. Discrete Probability distributions: Bernoulli, Binomial, Poisson, Negative Binomial, Geometric and Uniform. Continuous Probability distributions: Normal, Exponential, Log Normal andUniform, Fitting of Binomial, Poisson and normal distribution.

Unit-III

Index numbers: Types, uses and their construction. Cost of living index numbers. Testof adequacy of Index numbers.
Time Series: Components and Models of time series. Measurements of trend andseasonal indices, Forecasting and Estimation.

Unit-IV

Statistical Quality Control: Purposes and construction of control charts for variables and attributes using 3 sigma limits and 6 sigma limits. Single and double Sampling Inspection plans. Natural tolerance limit and modified control limits. Vital statistics: Methods of obtaining Demographic data, Measurement of Mortality and Fertility, Complete Life and Abridged Life Tables.

Suggested Readings:

- Outline of Statistics Volume-I & II by A.M. Goon, M.K. Gupta and B. Dasgupta.
- Fundamental of Statistics Volume-I &II by A.M. Goon, M.K. Gupta and B. Dasgupta.
- An Introduction to Probability and Statistics by V. K. Rohtagi, and Md. A. K. Ehsanes Saleh.
- An Introduction to Theory of Statistics by A.M. Mood, F.A. Graybill and D. C. Boes.
- Applied General Statistics by F.E. Croxton and D. J. Cowden.
- The Advanced Theory of Statistics by S. M. Kendall and A. Stuart.

Useful Video Links:

Unit No.	Topics	Links
Unit-I	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
	Miscellaneous	https://onlinecourses.nptel.ac.in/noc22_ma81/preview
Unit-II	Introduction of Probability	https://youtu.be/60vHy2lA4o4
	Random Variables	https://youtu.be/2CP3m3EgL1Q
	Discrete Random variable & Probability Distribution	https://youtu.be/Sv9UYnp9tbs?si=eHqwSJETA5SO3NFI
Unit-III	Index numbers	http://digimat.in/nptel/courses/video/109104182/L22.html
	Time Series	https://gec.digimat.in/nptel/courses/video/109104182/L21.html
Unit-IV	Statistical Quality Control	https://archive.nptel.ac.in/courses/110/101/110101150/
	Vital statistics	https://nptel.ac.in/courses/109104045

Course Code	**OEC-144A**				
Category	Multidisciplinary Open Elective Courses				
Course Title	**Sources of Energy-I**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	**3**	
Course Objectives	The objectives of this course are to • Understand the principles and applications of renewable energy sources like solar, wind, and geothermal. • Analyze the environmental impact, limitations, and growth potential of alternative energy technologies and systems. • Explore the design, operation, and performance of solar thermal power generation and solar energy systems. • Investigate the thermodynamics and applications of geothermal energy and fuel cells in sustainable 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	RBT Level
CO1	Define the basic principles and concepts of renewable energy systems and their significance.	Level 1: Remember
CO2	Explain the working, applications, and limitations of solar, geothermal, wind, and fuel cell technologies.	Level 2: Understand
CO3	Apply principles of energy conversion to design efficient renewable energy systems for diverse applications	Level 3: Apply
CO4	Analyze the performance, feasibility, and environmental impact of various renewable energy systems	Level 4: Analyze

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-I

Introduction: Limitation of conventional energy sources, need and growth of alternative energy sources, basic scheme and application of direct energyconservation, Solar energy: Introduction, The characteristics of the sun, Definitions related to solar radiations, solar radiation geometry, Estimation of daily solar radiation, Theory of solar cells, Solar cell materials, solar drying, solar furnaces, Solar cooking, solar greenhouse technology, solar thermal power generation, solar cell array.

Unit-II

Solar Thermal Energy: Solar radiations, flat plate collectors and their materials, applications and performance, focusing of collectors and their materials, applications and performance; solar thermal power plants, thermal energy storage for solar heating and cooling, limitations.

Unit-III

Geothermal Energy: Resources of geothermal energy, thermodynamics of geo- thermal energy conversion-electrical conversion, non-electrical conversion, environmental consideration, estimates of geothermal power, nature of

geothermal fields, advantages & disadvantages of geothermal energy forms, applications of geothermal energy, Geothermal power plant.
Fuel Cells: Principle, working of various types of fuel cells, performance and limitations

Unit-IV

Wind Energy: Wind power and its sources: Principle of working of Wind Energy, performance and limitations of energy conversion systems. Site selection, criteria, momentum theory, Wind characteristics.

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 A.K. Raja, Scitech Publications.
- Fundamentals of Solar cells: Photovoltaic Solar Energy by A. Fahrenbruch and R. Bube.

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Use, need, growth of Conventional and non-conventional source of energy	https://archive.nptel.ac.in/courses/121/106/121106014/
	Solar Energy	https://archive.nptel.ac.in/courses/115/103/115103123/
	Solar Photo-voltaic devices, Performance and durability of solar devices	https://archive.nptel.ac.in/courses/121/106/121106014/
Unit-II	Solar energy technologies, Solar Thermal devices	https://archive.nptel.ac.in/courses/121/106/121106014/
Unit-III	Geothermal Energy	https://archive.nptel.ac.in/courses/121/106/121106014/
Unit-IV	Wind energy, technology and geographical aspects	https://archive.nptel.ac.in/courses/121/106/121106014/
	Characteristics and Power generation from wind energy	https://archive.nptel.ac.in/courses/103/103/103103206/

Course Code	**OEC-146A**				
Category	Multidisciplinary Open Elective Courses				
Course Title	**Operations Research**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	**3**	
Course Objectives	The objectives of this course are to • Grasp the knowledge of operations research in aiding decision-making processes, along with its applications across various industries. • Gain knowledge of LP, including problem formulation, solution methods. • Learn various solution methods including North-West corner, Vogel's method, MODI, and Stepping Stone methods, as well as sensitivity analysis in LP. • Develop an understanding of queuing theory and familiarize with project management tools such as PERT and CPM. • Learn foundational concepts of multi-degree freedom systems andvibration modes in various continuous systems				
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	RBT Level
CO1	Define key terms and foundational concepts in operations research.	Level 1: Remember
CO2	Explain various methods and techniques for problem optimization in various real-world scenarios.	Level 2: Understand
CO3	Apply appropriate operations research methods and techniques to solve problems.	Level 3: Apply
CO4	Analyze efficiency and performance of systems under constraints to improve decision-making in complex environments.	Level 4: Analyze

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-I

Introduction: Definition, role of operations researches in decision making, applications in industry. Concept on O.R. model building - Types & methods.

Linear Programming (LP): Programing definition, formulation, solution - graphicalsimplex Gauss Jordan reduction process in simplex methods, BIG-M methods computational, problem.

Unit-II

Deterministic Model: Transportation model-balanced & unbalanced; North west rule, Vogel's Method, least cost or matrix minimal, stepping stone method, MODI methods, degeneracy, assignment, travelling salesman, problem.

Advanced Topic of LP: Duality, PRIMAL-DUAL, reactions-its solution, shadow price, economic interpretation, dual simplex, post-optimality & sensitivity analysis, problems.

Unit-III

Waiting Line Models: Introduction, queue parameters, M/M/1 queue, performance of queuing systems, applications in industries, problems.

Project Line Models: Network diagram, event activity, defects in network, PERT &CPM, float in network, variance and probability of completion time, project cost- direct, indirect, total optimal project cost by crashing of network,

resources leveling in project problems.

Unit-IV

Multi degrees of Freedom systems and Numerical Methods: Introduction Influence Coefficients, Stiffness Matrix, Flexibility Matrix, Natural frequencies and Normal Modes, Orthogonality of Normal Modes, Dunkerley's Equation, Method of Matrix Iteration, The Holzer Type Problem Geared and Branched Systems, Beams. Normal Mode Vibrations of Continuous System: Vibrating String, Longitudinal Vibrations of Rod, Torsional Vibrations of Rod, Lateral Vibrations of Beam.

Suggested Readings:

- Operation Research – TAHA, PHI, New Delhi.
- Principle of Operations Research – Ackoff, Churchaman, arnoff, Oxford IBH, Delhi.
- Operation Research- Gupta & Sharma, National Publishers, New Delhi.
- Operation Research – Sharma, Gupta, Wiley Eastern, New Delhi.
- Theory of Vibration with Applications W.T. Thomson, Prentice Hall of India.
- Mechanical Vibration: G.K. Grover and S.P. Nigam, Nem Chand and Sons.
- Mechanical Vibrations by J.K. Narwal, Vayu Education of India

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Linear Programming	https://youtu.be/a2QgdDk4Xjw?feature=shared
	Introduction to operations researches	https://youtu.be/BDBhpxRzImI?feature=shared
Unit-II	Transportation Problems	https://youtu.be/Q31jKiEXxdc?feature=shared
	Vogel's Method	https://youtu.be/Ow3XWYnPgSM?feature=shared
Unit-III	Queueing Models	https://youtu.be/xGkpXk-AnWU?feature=shared
	PERT	https://youtu.be/2AOhCWhwOKo?feature=shared
	CPM	https://youtu.be/Tm2HhqMu5Jg?feature=shared
Unit-IV	Durkerley's Equation	https://youtu.be/qK9Fayqm6XI?feature=shared
	Holzer's Method	https://youtu.be/McKDD4Q4dhM?feature=shared
	Torsional Vibration of Rods	https://youtu.be/NkzcQDHQ-MY?feature=shared

Course Code	**OEC-148A**				
Category	Multidisciplinary Open Elective-I				
Course Title	**Multimedia Communication**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	3	
Course Objectives	The objectives of this course are to • Understand the fundamental elements of multimedia systems. • Learn the representations, perceptions and applications ofmultimedia. • Develop the skills for making multimedia projects.				
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	RBT Level
CO1	Define fundamental concepts, applications and standards of multimedia systems.	Level 1: Remember
CO2	Explain the principles of digital audio, video compression and multimedia communication systems	Level 2: Understand
CO3	Apply multimedia technologies, compression techniques and system protocols for real-time applications.	Level 3: Apply
CO4	Analyze the performance and behavior of components, architectures and web based communication methods of multimedia information systems.	Level 4: Analyze

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-I

Introduction: Concept of Multimedia, Emerging Applications, Multimedia Systems and Appliances. Distributed Multimedia Systems, Synchronization, Orchestration and QOS Architecture standards.

Digital audio representation and processing: Audio in computer applications, its digital representation, transmission and digital processing, speech recognition and generation.

Digital video and image compression: Video compression techniques and standardization of algorithms, JPEG, MPEG, DVI technology.

Unit-II

Multimedia Information Systems: Workstation OS, New OS support, Real Time Mach, Multimedia system service architecture, Media Stream Protocol, service and window system, client control of continuous media, Hyper applications. Multimedia Information systems, File system support, Data Models.

Unit-III

Multimedia communication systems: Public Network services and N/W Protocols, Quick time Movie File (QMF), format, OMFI, MHEG, Format function Real time Interchange, Track Model and Object Model Teleconferencing systems, Shared Amlication Architectures, Embedded Distributed objects, Multimedia conferencing architecture, architecture of team workstation.

Unit-IV

Multimedia and Internet: The internet, client server technology, Communication Protocols, Internet Addressing, WWW, HTML, and Web Authorizing, Web page browsers and development, bandwidth .and applications considerations, Design Considerations for Web pages, Accessing Content on internet.

Suggested Readings:

- Multimedia Systems by John F. Koegel Bufod, Addison Wesley, Edition.
- Multimedia Technology and Application by David Hillman, Galgotia Publication.
- Multimedia Communications by Fred Halsall, Pearson Publications
- Multimedia Comm. System: Technology Std. & Network by Rao, Bojkovic & Milovanovic, PHI
- Principles of Multimedia by Ranjan Parkesh, TMH
- Multimedia System Design by P.K. Andleigh, Pearson

Useful Video Links:

Unit no	Topics	Links
Unit-I	Introduction to Digital Image Processing	https://www.youtube.com/watch?v=CVV0TvNK6pk&list=PL1F076D1A98071E24
Unit-II	Sampling and Quantization	https://www.youtube.com/watch?v=own93zNYAI4
Unit-III	Multimedia communication systems	https://www.youtube.com/watch?v=JjFiueOn6CY
Unit-IV	Multimedia Networks	https://www.youtube.com/watch?v=KHGxigA8Jko

Course Code	**OEC-150A**				
Category	Multidisciplinary Open Elective Courses				
Course Title	**Introduction to Information Technology**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	**3**	
Course Objectives	The objectives of this course are to • Understand the evolution of information technology and its impact on society and business. • Gain knowledge of the components and roles of information systems, including hardware, software, and data. • Evaluate IT infrastructure, including servers, cloud computing, and governance practices for efficient service delivery. • Develop skills in database management, SQL, and administration, focusing on security, backup, and performance optimization.				
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	RBT Level
CO1	Define the fundamental concepts and types of information systems in business management.	Level 1: Remember
CO2	Explain the components of information systems and emerging technologies for business decision-making.	Level 2: Understand
CO3	Apply business intelligence techniques and database management to improve business performance.	Level 3: Apply
CO4	Analyze security, control measures, and enterprise applications for managing information systems in organizations.	Level 4: Analyze

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-I

Evolution of Information Technology: Historical Overview of IT Evolution, Key Milestones in IT History, The Impact of IT on Society and Business, Emerging Trends in Information Technology.

Unit-II

Components of Information Systems: Hardware Components, Memory and Storage Devices, Software Components, System Software vs. Application Software, The Role of Firmware, Data Components Types of Data and Data Representation, Databases and Data Management, People and Procedures, IT Personnel and Their Roles, IT Procedures and Best Practices.

Unit-III

Information Technology Infrastructure: IT Infrastructure Components - Servers and Data Centers Networking Equipment, Cloud Computing Resources, IT Services and Service Models, Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS), IT Governance and Compliance, ITIL (Information Technology Infrastructure Library), Regulatory and Compliance Frameworks, Green IT and Sustainability, Energy-efficient IT Practices, E-waste Management.

Unit-IV

Database Management Systems: Introduction to Databases - What is a Database, Importance of Databases in IT, Types of Databases (Relational, NoSQL, etc.).SQL Fundamentals - Structured Query Language (SQL), Basic SQL Commands (SELECT, INSERT, UPDATE, DELETE), Database Administration Basics - Database Administration Roles and Responsibilities, Backup and Recovery Procedures, Security and User Permissions, Performance Tuning and Monitoring.

Suggested Readings:

- Discovering Computers by Gary Shelly, Misty Vermaat, and Thomas J. Cashman, Cengage Learning.
- Information Technology for Managers by George Reynolds and Judith S. Reynolds, Pearson Education.
- Systems Analysis and Design by Kenneth E. Kendall and Julie E. Kendall, Pearson Education.
- Information Technology by V. Rajaraman, PHI Learning Private Limited.
- Computer Fundamentals and Information Technology by Alexis Khosla, BPB Publications.
- Information Technology for Management by C.S.V. Murthy, Himalaya Publishing House.
- Information Technology: An Introduction by K.C. Laudon and Jane P. Laudon, Pearson Education India.
- Fundamentals of Information Technology by Leon Albert and Salvator Fernandez, Kalyani Publishers.
- Information Technology: Principles, Practices and Applications by Dinesh Goyal, Tata McGraw-Hill Education.

Useful Video Links:

Unit No.	Topics	Links
Unit-I	The Role of Information Systems in Business	https://www.youtube.com/watch?v=RzVwZosIbqs
	Components of an Information System	https://www.youtube.com/watch?v=sELO4JlJ0g0
	Trends in Information Systems	https://www.youtube.com/watch?v=xjPBd7geC8E
Unit-II	IT Infrastructure and Components	https://www.youtube.com/watch?v=Q3X_fh7dq74
	Emerging Technologies in Information Systems	https://www.youtube.com/watch?v=rdEZfPpvDKY
	Business Intelligence and Databases	https://www.youtube.com/watch?v=2CxXM7gn8eA
Unit-III	Information Systems Security	https://www.youtube.com/watch?v=I7nbYVbY5DQ
	Key System Applications: ERP, CRM, SCM	https://www.youtube.com/watch?v=7_LPdttKXPc
	Security Technologies and Tools	https://www.youtube.com/watch?v=bYVZgrwCw6Y
Unit-IV	Decision Support Systems (DSS)	https://www.youtube.com/watch?v=06Rm9O4sNrg
	Intelligent Decision Making	https://www.youtube.com/watch?v=ZK6G6nLs4Jg

Course Code	**OEC-152-A**				
Category	Multidisciplinary Open Elective Courses				
Course Title	**Cyber Forensics and Security**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	**3**	
Course Objectives	The objectives of this course are • To understand the types of information systems and evaluate securitythreats to organizational assets. • To apply forensic techniques to protect data and identify vulnerabilities like spyware and adware. • To learn ethical hacking practices, including network, web, andpassword hacking techniques. • To gain proficiency in digital evidence handling and understand legal protocols and cyber laws, including the Information Technology Act2000.				
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	RBT Level
CO1	Define the fundamental concepts of information systems, cyber security and ethical hacking.	Level 1: Remember
CO2	Explain the principles and technologies of cyber security ethical hacking and their role in protecting information systems.	Level 2: Understand
CO3	Apply the concepts and techniques of ethical hacking and cyber security to identify and mitigate vulnerabilities in computer systems and networks.	Level 3: Apply
CO4	Analyze cyber crimes, security standards, and legal frameworks in the context of information technology and forensics.	Level 4: Analyze

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-I

Introduction to Information Systems: Types of information Systems, Introduction to information security, Need for Information security, Threats to Information Systems, Information Security Investigations. Security threats - Sources of security threats- Motives - Target Assets and vulnerabilities – Consequences of threats- E-mail threats- Web-threats - Intruders and Hackers, Insider threats, Security Threats to E- Commerce, Cyber-crimes.

Unit-II

Cyber Forensics: Cyber Security, Cyber Security roles, Cyber Security Principles, Difference between information Security and Cyber Security, Types of Computer Forensics Technology, Types of Military Computer Forensic Technology, Types of Law Enforcement: Computer Forensic Technology, Types of Business ComputerForensic Technology, Specialized Forensics Techniques, Hidden Data and How to Find It, Spyware and Adware, Encryption Methods and Vulnerabilities, Protecting Data from Being Compromised Internet Tracing Methods, Security and Wireless Technologies, Avoiding Pitfalls with Firewalls Biometric Security Systems.

Unit-III

Ethical Hacking: Essential Terminology, Hacking windows – Network hacking – Webhacking – Password hacking, Malware, Scanning, Cracking. Digital Evidence in Criminal Investigations: The Analog and Digital World, Training

and Education in digital evidence, Evidence Collection and Data Seizure: Why Collect Evidence, Collection Options Obstacles, Types of Evidence, The Rules of Evidence, Volatile Evidence, General Procedure, Collection and Archiving, Methods of Collection, Artifacts, Collection Steps, Controlling Contamination: The Chain of Custody, Reconstructing the Attack, The digital crime scene, Investigating Cybercrime, Duties Support Functions and Competencies.

Unit-IV

Cyber Crimes and Cyber Security Standards: Crime incident Handling Basics: Cyber activism, Tracking hackers, clues to cyber-crime, privacy act, search warrants, common terms, organizational roles, procedure for responding to incidents, reporting procedures, legal considerations, Information Technology Act 2000: Scope, jurisdiction, offense and contraventions, powers of police, adjudication, Intellectual property issues in cyberspace, ISO, Copyright Act, Patent Law, Cyber Laws in India.

Suggested Readings:

- Cryptography and Information Security by V.K. Pachghare, PHI Learning Private Limited, India.
- Computer Security: Principles and Practice by William Stallings and Lawrie Brown, Prentice Hall.
- Ethical Decision making and IT: An Introduction with Cases by Earnest A. Kallman, J.P Grillo, McGrawHill Publication.
- Cyber Security and Global Information Assurance: Threat Analysis and Response Solutions by Kenneth J. Knapp, IGI Global.
- Principles of Information Security by Michael E. Whitman, Herbert J. Mattord, Cengage Learning Pub.
- Computer Network Security by Joseph M Kizza, Springer Verlag.

Useful Video links:

Unit No.	Topics	Links
Unit-I	IT Revolution	https://www.youtube.com/watch?v=bwq74PuiH9o
	Internet Security Threats	https://www.youtube.com/watch?v=2tiZ89N4izc
	Authentication Based Attacks	https://www.youtube.com/watch?v=ch-7pCZZzUg
Unit-II	Cyber Security and Privacy	https://www.youtube.com/watch?v=ozsxJCM4BGs
	Cyber Security policy	https://www.youtube.com/watch?v=snROvNy3wf8&list=PLyqSpQzTE6M-jkJEzbS5oHJUp2GWPsq6e&index=16
Unit-III	Introduction to Ethical Hacking	https://www.youtube.com/watch?v=t8nwQ6At0CU&list=PL7AT7LU4byRKMBCEWpeZ4QOd2VWvdIHXU
	MITM Attack	https://www.youtube.com/watch?v=C9Xo31D1J0g&list=PL7AT7LU4byRKMBCEWpeZ4QOd2VWvdIHXU&index=23
Unit-IV	Security Management Governance, risk and compliance	https://www.youtube.com/watch?v=1okOQCY6Bsk
	Cyber Security Technologies	https://www.youtube.com/watch?v=3rkIe2ZkkfY

Course Code	**OEC-154-A**				
Category	Multidisciplinary Open Elective Courses				
Course Title	**Computer Science and Principles**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	**3**	
Course Objectives	The objectives of this course are • To be familiar with the fundamental computing concepts including problem-solving, data representation, and abstraction. • To learn web development using HTML, CSS, and JavaScript tocreate interactive web pages. • To understand data mining techniques for extracting patterns and insights from large datasets. • To grasp networking and OS principles, including protocols,resource management and system operations.				
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	RBT Level
CO1	Define the fundamental concepts of computer science and engineering.	Level 1: Remember
CO2	Explain the principles and concepts of computer science.	Level 2: Understand
CO3	Apply methods and techniques of computer science to solve engineering problems.	Level 3: Apply
CO4	Analyze network structures, web designing, operating systems, and data mining techniques to identify problems and propose optimal solutions.	Level 4: Analyze

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-I

Fundamental of Computer Science and Computational Thinking: logical reasoning, problem solving, data representation, processing of data, abstraction, managing complexity, operation of computers and networks, effective Web searching, ethical, legal and social aspects of information technology.

Unit-II

HTML and XTML basics: List, unordered list, nested and ordered list, Basic HTML Tables, Intermediate HTML Table and Formatting, Basic HTML Forms and Formatting, More Complex HTML Forms, Frameset Element, Nested Frameset.

Style Sheets and Graphics: Introduction to Style sheets, Formatting Text by Using Style Sheets, Formatting Paragraphs by Using Style Sheets, Java Script Basics.

Unit-III

Data Mining: Introduction, Motivation, Importance, Knowledge Discovery Process, KDD and Data Mining, Data Mining vs. Query Tools, Kind of Data mining, kind of data, Functionalities, interesting patterns, Classification of data mining systems, Major issues, from Data warehousing to data Mining.

Unit-IV

Computer Networks: Network Fundamentals, Local Area Networks (LAN), Metropolitan Area Networks (MAN), Wide Area Networks (WAN), Wireless Networks, Inter Networks. Reference Models: The OSI model, TCP/IP model. Operating Systems: Main functions of operating systems. Multi Programming, multiprocessing, and multitasking. Deadlock and CPU scheduling algorithms.

Suggested Readings:

- Blown To Bits: Your Life, Liberty and Happiness After the Digital Explosion by Hal Abelson, KenLeeden and Harry Lewis, 2010.
- HTML & CSS: The Complete Reference by Thomas A. Powell, Osborne Media; 5thEdition, 2010.
- Data mining: a knowledge, discovery approach by Krzysztof J. Cios, Witold Pedrycz, Roman W. Swiniarski, Springer, 2007.

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Effective Web searching	https://www.youtube.com/watch?v=vUvmCyM2C40
	Technology and Ethics	https://youtu.be/cVA80jjesSc
Unit-II	HTML	https://youtu.be/QEtWL4lWlL4
	Stylesheets	https://youtu.be/h_RftxdJTzs
Unit-III	Knowledge Discovery Process	https://youtu.be/ykZ-_UGcYWg
	Data Mining and Knowledge Discovery	https://youtu.be/m5c27rQtD2E
Unit-IV	LAN, WAN, MAN	https://youtu.be/u2UboyYSc4Q
	TCP/IP	https://youtu.be/zzXs0EnCin0
	Network Models	https://youtu.be/3DZLItfbqtQ

Course Code	**OEC-156-A**				
Category	Multidisciplinary Open Elective Courses				
Course Title	**Software Engineering Practices**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	**3**	
Course Objectives	The objectives of this course are • To understand software process models and their application indevelopment. • To develop expertise in requirements engineering by effectivelygathering, analyzing, and validating requirements. • Apply design principles and ensure software quality through effective design practices. • To learn software testing and maintenance strategies for ensuringreliable and sustainable software.				
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	RBT Level
CO1	Define the key concepts of software engineering processes, models, and agile development practices.	Level 1: Remember
CO2	Explain requirements engineering techniques, including use case development, validation, and modeling strategies.	Level 2: Understand
CO3	Apply software engineering principles in software design and architecture.	Level 3: Apply
CO4	Analyze software engineering, testing, maintenance strategies, and practices for enhancing software quality.	Level 4: Analyze

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-I

Software Engineering, Software Process, Generic process model, Prescriptive process model-specialized, unified process, Agile Development, Agile Process, Extreme Programming, Other Agile Process Models, Software engineering Knowledge, core, Principles, Principles that guide each framework Activity.

Unit-II

Requirements Engineering, Establishing the Groundwork, Eliciting Requirements, Developing use cases, Building the requirements model, Negotiating, validating Requirements, Requirements Analysis, Requirements Modeling Strategies.

Unit-III

Design Process: Design concepts, Abstraction, Architecture, patterns, Separation of Concerns, Modularity, Information Hiding, Functional Independence, Refinement, Aspects, Refactoring, Object Oriented Design Concepts, Design Classes

Design Model: Data, Architectural, Interface, Component, Deployment Level Design Elements, Software Quality, Software Quality Dilemma, Achieving Software Quality.

Unit-IV

Testing: Strategic Approach to software Testing, Strategic Issues, Testing Strategies for Conventional Software, Object oriented software, Web Apps, Validating Testing, System Testing, Art of Debugging, Software Maintenance, Software Supportability, Reengineering, Business Process Reengineering, Software Reengineering, Reverse Engineering, Restructuring, Forward Engineering, Economics of Reengineering.

Suggested Readings:

- Software Engineering – A Practitioner's Approach by Roger S. Pressman, 7th edition, 2010.
- Software Engineering by Ian Sommerville, Pearson Edu, 9th edition, 2010.
- Software Engineering: Principles and Practices by Hans Van Vliet, 2008.
- Software Engineering Fundamentals Oxford University by Ali Behforooz and Frederick J. Hudson,JW&S, 1995.
- An Integrated Approach to software engineering by Pankaj Jalote,Narosa, 1991.

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Introduction of Software Engineering	https://www.youtube.com/watch?v=Ln_LP7c23WM&list=PLbRMhDVUMngf8oZR3DpKMvYhZKga90JVt
	Agile Model of Software Development Life Cycle	https://www.youtube.com/watch?v=x90kIAFGYKE&list=PLbRMhDVUMngf8oZR3DpKMvYhZKga90JVt&index=12
	Emergence of Software Engineering Techniques	https://www.youtube.com/watch?v=cNG4KuoyfiI&list=PLbRMhDVUMngf8oZR3DpKMvYhZKga90JVt&index=5
Unit-II	Requirement gathering and analysis	https://www.youtube.com/watch?v=ul6nW1g3xK0&list=PLbRMhDVUMngf8oZR3DpKMvYhZKga90JVt&index=16
	Functional requirements	https://www.youtube.com/watch?v=PR_ZwLfjWrA&list=PLbRMhDVUMngf8oZR3DpKMvYhZKga90JVt&index=17
Unit-III	Introduction to structured analysis and structured design	https://www.youtube.com/watch?v=69PIhEvYmm8&list=PLbRMhDVUMngf8oZR3DpKMvYhZKga90JVt&index=23
	Developing DFD Model	https://www.youtube.com/watch?v=PvYTyXJiwuo&list=PLbRMhDVUMngf8oZR3DpKMvYhZKga90JVt&index=25
	Use Case Modeling	https://www.youtube.com/watch?v=7wo9PHfkyik&list=PLbRMhDVUMngf8oZR3DpKMvYhZKga90JVt&index=31
	An Object-Oriented design process	https://www.youtube.com/watch?v=Ie7qzy3SY-E&list=PLbRMhDVUMngf8oZR3DpKMvYhZKga90JVt&index=40
Unit-IV	Basic concepts in Testing	https://www.youtube.com/watch?v=_9bmWEMhGFU&list=PLbRMhDVUMngf8oZR3DpKMvYhZKga90JVt&index=43
	White box Testing	https://www.youtube.com/watch?v=pXkCkRgPFrc&list=PLbRMhDVUMngf8oZR3DpKMvYhZKga90JVt&index=55
	Software Re engineering	https://www.youtube.com/watch?v=UXERB3xFgc4

Course Code	**FEC-158A**				
Category	Foundation Elective Courses				
Course Title	**Basics of Accounting**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	**3**	
Course Objectives	The objectives of this course are • To understand the basics of accounting, including key concepts and accounting equations. • To learn about journalizing and account classifications, and record simple transactions. • To gain the knowledge of preparation of subsidiary books, such as cash, purchase, and sales books. • To make the students familiar with the preparation of financial statements, including trial balances and balance sheets for sole proprietorships.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	3 Hours				

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

COs	Skills Demonstrated	RBT Level
CO1	Define the fundamental concepts of a financial accounting system and their application in organizations.	Level 1: Remember
CO2	Describe the concepts of accounting system.	Level 2: Understand
CO3	Apply financial and accounting techniques to solve business problems.	Level 3: Apply
CO4	Analyze the financial information & provisions to make decisions in the real world.	Level 4: Analyze

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-I

Introduction to Accounting: Concept of Accounting, Accountancy and Book Keeping, Objectives of Accounting, Scope of Accounting, Types of Accounting, Limitations, Basic Accounting Terms, Double Entry System of Book Keeping, GAAP (Generally Accepted Accounting Principal), Basic accounting Equations.

Unit-II

Journalizing: Classification of Accounts, Personal, Real and Nominal; Recording and posting of simple transactions only.

Unit-III

Preparation of Subsidiary Books: Cash Book (single column cash book) PurchaseBook, Sales Book, Purchase Return, Sales Return Book, B/R and B/P Book.

Unit-IV

Preparation of Financial Statements : Preparation of Trial Balance, Preparing the Financial Statements Trading Account, Profit and Loss Account and Balance Sheet of sole proprietary business (Without Adjustment).

Suggested Readings:

- Financial Accounting by D.K. Goyal, Arya Publications Pvt Ltd.
- An introduction to Accounting by S.N. Maheshwari, Vikas Publishing House Pvt. Ltd.
- Basic Accounting: The step-by-step course in elementary accountancy by Nishat Azmat and Andy Lymer
- Accounting Principles by R.N.Anthony and J.S. Reece, D. Richard Irwin, Inc.
- Financial Accounting: Concepts and Applications by J.R. Monga, Mayoor Paper Backs, New Delhi.
- Advanced Accounts by M.C. Shukla, T.S. Grewal and S.C.Gupta, S.Chand & Co., New Delhi.
- Advanced Accountancy by R.L. Gupta, and M. Radhaswamy, Sultan Chand & Sons, New Delhi.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Introduction to Financial Accounting	https://youtu.be/jhtVVJxbPU0
	Types of Accounts	https://youtu.be/vlz8emciXLc?feature=shared
Unit-II	Journalizing: Classification of Accounts, Personal, Real and Nominal	https://www.youtube.com/watch?v=-DU9MoP0mw4
Unit-III	Preparation of Subsidiary Books	https://www.youtube.com/watch?v=XvxsVUNaoUc
Unit-IV	Trial Balance	https://www.youtube.com/watch?v=z_KO49Pk3DM
	Balance Sheet of sole proprietary business (Without Adjustment).	https://www.youtube.com/watch?v=jV-OgNRTTfY

Course Code	**FEC-160A**				
Category	Foundation Elective Courses				
Course Title	**Basics of E-Commerce**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	**3**	
Course Objectives	The objectives of this course are • To understand concepts, categories, key components and supporting environment for E-commerce. • To gain the comprehensive understanding of M-Commerce by studying its origin, components, and applications in the mobile commerce landscape. • To make the students familiar with the E-payment technologies by learning about various systems, including online banking, e-wallets, and e-cash. • To analyze the impact of electronic commerce on marketing and e-marketing tools.				
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	RBT Level
CO1	Identify key elements of digital business frameworks and their foundational environments.	Level 1: Remember
CO2	Explain the evolution and functionality of E-Commerce business systems.	Level 2: Understand
CO3	Demonstrate the use of advanced digital technologies in E-Commerce.	Level 3: Apply
CO4	Analyze the impact of digital platforms on business strategies and decision-making.	Level 4: Analyze

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-I

E-Commerce: Meaning, Concept, Definitions, Origin and Development, Categories of E- Commerce- B2B, B2C, B2G, G2G, G2C; The Constitution of the E- Commerce- Portal of the Network, Customer Relationship Management, Supply Chain Management, Logistic Management, Decision Support; Supporting Environment for E-Commerce- Technical Environment, Legal Environment, Credit Environment and Financial Environment.

Unit-II

M-Commerce: The Origin of M-Commerce, M-Commerce Components, TheDevelopment of M-Commerce, The Application of M-Commerce.

Unit-III

Payment Technologies for E-Commerce: Online Bank, E-Payment Tools, E- Payment System, Intelligent Card, E-check, E-wallet, E-Cash.

Unit-IV

Electronic Commerce: Influence on Marketing, Product, Physical Distribution, Price, Promotion, Marketing Communication, Common e-Marketing Tools.

Suggested Readings:

- E-Commerce - An Indian Perspective by P.T. Joseph, PHI
- E-Commerce Strategy, Technologies and Applications by David Whiteley, Tata McGraw Hill
- Frontiers of Electronic Commerce by Ravi Kalakota and B Andrew Whinston, Pearson
- E-commerce by Jeffery F. Rayport, Bernard J. Jaworski, TMCH, 2002.
- Electronic Commerce by E. Frami Turban, JAE Lee, David King and K. Michale Chung, Pearson Education, 2000.

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Introduction to E-Commerce	https://www.bing.com/videos/riverview/relatedvideo?q=Lecture++35+Electronic+Commerce&mid=E04FD94C23F536BC0EBCE04FD94C23F536BC0EBC&FORM=VIRE
Unit-II	M-Commerce	https://www.bing.com/videos/riverview/relatedvideo?&q=+M+commerce+nptel&&mid=84937C989B5D2638A64E84937C989B5D2638A64E&&FORM=VRDGAR
Unit-III	E-Payment System	https://www.youtube.com/watch?v=Tbnl-_gTfC8
Unit-IV	E-Commerce Marketing	https://www.youtube.com/watch?v=qNxP066HaAo

Course Code	**FEC-162A**				
Category	Foundation Elective Course				
Course Title	**Elements of Banking**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	**3**	
Course Objectives	The objectives of this course are • To learn about the history, functions, and recent developments in various banking sectors. • To understand the structure of the Indian banking system and the role of different types of banks. • To understand the structure and functions of co-operative banks and regional rural banks. • To outline the role of apex banking institutions like NABARD, NHB, SIDBI, and EXIM Bank.				
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	RBT Level
CO1	Define the key concepts, structures, and roles of various banking institutions and their historical and functional significance.	Level 1: Remember
CO2	Explain the evolution, structure, and relationships within the Indian banking system, including commercial, co-operative, and apex banking institutions.	Level 2: Understand
CO3	Apply knowledge of banking operations and systems to differentiate the roles and contributions of commercial, co-operative, and apex banking institutions in India.	Level 3: Apply
CO4	Analyze the impact on the Indian financial ecosystem.	Level 4: Analyze

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-I

Introduction to Banking: Meaning, Concept, History of Banking, Business of Banking, Functions of Banking, Banker Customer Relationship, Recent Developments inBanking Industry: Corporate Banking, Retail Banking, International Banking, Rural Banking, Non-Banking Financial Intermediaries.

Unit-II

Structure of Commercial Banks in India: Structure of Indian Banking System, Reserve Bank of India, Commercial Banks, Public Sector Banks, Private Sector Banks, Foreign Banks, Indian Banks vs. Foreign Banks.

Unit-III

Structure of Co-operative Banks in India: Co-operative Banks: Meaning, Definitions, Commercial vs. Co-operative Banks, Regional Rural Banks.

Unit-IV

Structure of Apex Banking Institution in India: Meaning, Definitions, National Bank for Agriculture and Rural Development (NABARD), National Housing Bank (NHB), Small Industries Development Bank of India (SIDBI), Export Import Bank of India (EXIM Bank).

Suggested Readings:

- Management of Banking and financial services by Paul Justin and Suresh Padmalatha, TMH.
- Core banking solution by M. Ravathy Sriram and P.K. Bamanan, PHI .
- Elements of Banking and Insurance by Jyotsna Sethi and Nishevan Bhatia, PHI.
- Introduction to Banking by Vijayaragavan Iyengar, Excel Books Pvt. Itd.
- Banking, law and practice by Viganim, BML, Konak Publication
- Banking, theory and practice by K.C. Shekhar, Lakshmy Shekhar, Pearson publications.

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Introduction to Banking	https://www.bing.com/videos/riverview/relatedvideo?&q=Introduction+to+Banking+lecture&&mid=6885EE4A711D46AE5C346885EE4A711D46AE5C34&&FORM=VRDGAR
Unit-II	Structure of Commercial Banking Institution in India	https://www.bing.com/videos/riverview/relatedvideo?q=Structure+of+Commercial+Banking+Institution+in+India&&view=riverview&mmscn=mtsc&mid=33F8F433B6D78008EE0D33F8F433B6D78008EE0D&&aps=0&FORM=VMSOVR
Unit-III	Structure of Banking System	https://www.bing.com/videos/riverview/relatedvideo?q=Chapter+1++Structure+of+Indian+Banking+System++YouTube&mid=2DF705DA7A77597561F42DF705DA7A77597561F4&FORM=VIRE
Unit-IV	National Bank for Agriculture and Rural Development	https://www.youtube.com/watch?v=gUAPtJKq9Q0

Course Code	**FEC-164A**				
Category	Foundation Elective Courses				
Course Title	**Computer Fundamentals**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	**3**	
Course Objectives	The objectives of this course are to • Understand the development of computing systems, their characteristics, and classifications. Learn number systems and codes. • Gain knowledge about memory types, storage devices, memory and their impact on performance and data management. • Learn the functions of operating systems, system utilities, application software, and user interfaces. • Gain skills in word processing, spreadsheets, and presentations, including formatting, data manipulation, formula creation, and document presentation. • Understand network types, topologies, and applications, and their role in modern communication and data sharing.				
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	RBT Level
CO1	Recall the fundamental concepts of computer systems and office tools.	Level 1: Remember
CO2	Explain the basic concepts of computers, office productivity suite, Internet and its impact on society.	Level 2: Understand
CO3	Apply principles, tools and techniques of computer engineering to solve real world problems.	Level 3: Apply
CO4	Analyze the applications of computer technology, its societal impact, and the importance of network security.	Level 4: Analyze

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-I

Historical Evolution of Computing Systems: Overview of Data Processing, History of Computing, Computer Generations; Characteristics of Computer, Anatomy of Computer,Classification of Computers.

Number Systems and Codes: Introduction, Number Systems and its types, and inter-conversion of Number Systems; ASCII and EBCDIC codes, Types of Input Devices; Output Devices – Printers, Plotters and Monitors.

Unit-II

Memory and Storage Devices: Characteristics of memory systems, memory hierarchy,Types of Memory – RAM, ROM, etc.; Magnetic Disks, Magnetic Tapes, Optical Disks;Concept of Cache Memory and Virtual Memory.

Software and Operating System Concepts: Introduction, Software Types, Language translators, System Utility Software, Application Software; Operating System– Characteristics, its functions, and its classification; User Interfaces – CUI and GUIs, DOS and Windows operating system.

Unit-III

Word Processing Tool: Opening and Closing of documents, Text creation and Manipulation, Moving Around in a Document, Formatting of text, Table handling, Spellcheck, language setting and thesaurus, Handling Multiple Documents, Printing of word document.

Spreadsheet tool: Basics of Spreadsheet; Manipulation of cells, Formulas and Functions, Editing of Spread Sheet, Page setups, header and footer, printing of Spread Sheet.

Slide Presentation Tool: Basics of power point, Preparation and Presentation ofSlides, Slide Show, Formatting and Clip Arts, Taking printouts of presentation /handouts.

Unit-IV

Computer Networks: Basics of Computer networks, types of computer network - LAN, MAN, WAN; Network Topologies and Applications of Computer Networks.

Internet Basics: Concept of Internet, Application of Internet, WWW, Web-sites and URLs, Search Engine, email, Instant Messaging, Web Browsing software, surfing.

Social Concern: Positive and Negative Impacts of Computer Technology, Computer Crimes, Computer Virus-Definition, Types of viruses, Characteristics of viruses, anti- virus software, Computer Applications.

Suggested Readings:

- Handbook of Computer Fundamentals by Nasib Singh Gill, Khanna Books Publishing Co.(P) Ltd., New Delhi, 2016.
- Computer Fundamentals by P.K Sinha, BPB Publications.
- Computing Fundamentals and Programming in C by Nasib Singh Gill, Khanna Book Publishing Co.(P) Ltd.,New Delhi.
- Fundamentals of Computers by V. Rajaraman, PHI.
- Introduction to Computers by Leon, Alexis & Leon, Mathews, Leon Tech World.
- Data Processing and Information Technology by C.S. French, BPB Publications.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Evolution of Computers	https://youtu.be/TS2odp6rQHU
	Number Systems and Codes	https://youtu.be/juJR_JDJRa0
Unit-II	Memory	https://youtu.be/cjNORC_00_A
	Cache Memory	https://youtu.be/OvWZ1uQ767U
Unit-III	Word Processing Tool	https://youtu.be/y-AiPdAYixI
	Slide Presentation Tool	https://youtu.be/KqgyvGxISxk
Unit-IV	Internet	https://youtu.be/YOXwcbwSEUo
	WWW	https://youtu.be/q9THx--fAFw

Course Code	**FEC-166A**				
Category	Foundation Elective Courses				
Course Title	**Communication and Soft Skills**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	3	
Course Objectives	The objective of this course is to expose the students to basic communication and soft skills and to familiarize them with behavioral skills and business etiquettes.				
Course Pre-requisite	Basic knowledge of English language				
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	RBT Level
CO1	Describe the fundamental concepts and principles of communication, including verbal, non-verbal communication, and body language.	Level 1: Remember
CO2	Explain the process of effective presentation, audience interaction, and the techniques for structuring and delivering a presentation.	Level 2: Understand
CO3	Apply behavioral skills, including problem-solving, time management, and teamwork, in personal and professional settings.	Level 3: Apply
CO4	Analyze business etiquette and professionalism, including dress, grooming, and etiquette for meetings and special occasions.	Level 4: Analyze

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-I

Communication Skills: Concept, characteristics and process of communication; 7C's of communication; listening skills, verbal communication, non-verbal communication, body language, art of meeting and greeting, making effective conversation.

Unit-II

Presentation Skills: Difference between speech and presentation, handling of presentation audience questions, holding meetings, group discussion and interviews; structuring a presentation, delivering the presentation; situational presentation.

Unit-III

Behavioral Skills: Positive altitude, self-management, problem solving skills, time management skills, anger management, coping skills, assertiveness team building skills.

Unit-IV

Business Etiquettes: Business dress and grooming, office courtesies, etiquette for special occasions, meeting etiquette, dining etiquette.

Suggested Readings:

- The Effective Presentation by Asha Kaul, Response Books, New Delhi
- Business Etiquette for Dummies by She Fox, Wiley Publishing Inc.
- The Essential Guide to Business Etiquette by Lillian Chaney and Janette Martin, Praeger,London

- Towards Personal Excellence by Seema Sanghi, Response Books, New Delhi
- Developing Soft Skills by Robert M. Sherfield, R. J. Montgomery, and Patricia G. Moody,Pearson Education, New Delhi
- The Essential Guide to Business Etiquette by Lillian Chaney and Janette Martin, Praeger,London

Useful Video links:

Unit No.	Topics	Links
Unit-I	Communication Skills	https://www.youtube.com/watch?v=DUlsNJtg2L8&list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q&index=1
	7C's of communication; listening skills, effective conversation	https://www.youtube.com/watch?v=pLoOmJ_1Pz8&list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q&index=2
	Verbal communication, non-verbal communication	https://www.youtube.com/watch?v=_YMNbAbAUNk&list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q&index=5
	Body language, art of meeting and greeting	https://www.youtube.com/watch?v=EtUWCUWhILU&list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q&index=45
	Etiquette for special occasions, meeting etiquette, dining etiquette	https://www.youtube.com/watch?v=LpO0HCcGKIQ&list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q&index=58
Unit-II	Presentation Skills	https://www.youtube.com/watch?v=ykTuooKDVRU
	Business Etiquette	https://www.youtube.com/watch?v=D1TUh6_obJI&list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q&index=46
Unit-III	Self-management	https://www.youtube.com/watch?v=Jpoj0h4H520&list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q&index=56
	Team building Skills	https://www.youtube.com/watch?v=mjK0YwwT-vs
Unit-IV	Business dress and grooming	https://www.youtube.com/watch?v=5sPXxLYaoHg&list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q&index=57

Course Code	**FEC-168A**				
Category	Foundation Elective Course				
Course Title	**Entrepreneurship Development**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	3	
Course Objectives	The objectives of this course are • To learn about the concept of entrepreneurship, required skills, and its role in economic development. • To understand the sources of generating business ideas, feasibility analysis, and business planning. • To gain the knowledge of development of marketing, organizational, and financial plans for new ventures. • To understand the sources of finance and legal aspects of intellectual property rights for entrepreneurs.				
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	RBT Level
CO1	Recall fundamental concepts and processes related to entrepreneurship	Level 1: Remember
CO2	Explain the various elements and dynamics of entrepreneurship.	Level 2: Understand
CO3	Examine plans and strategies for entrepreneurial ventures.	Level 3: Apply
CO4	Analyze the factors and frameworks influencing entrepreneurial process.	Level 4: Analyze

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-I

Entrepreneurship: Concept, knowledge and skills requirement; characteristics of successful entrepreneurs; Role of entrepreneurship in economic development; entrepreneurship process; factors impacting emergence of entrepreneurship.

Unit-II

Starting the venture: Generating business idea – sources of new ideas, methods of generating ideas, opportunity recognition; environmental scanning, competitor and industry analysis; feasibility study– market feasibility, technical/operational feasibility, financial feasibility: drawing business plan.

Unit-III

Functional plans: Marketing plan – marketing research for the new venture, steps in preparing marketing plan, contingency planning; organizational plan – form of ownership, designing organization structure; financial plan – cash budget, working capital.

Unit-IV

Sources of finance: Debt or equity financing, commercial banks, venture capital, financial institutions supporting

entrepreneurs.
Legal Issues: Intellectual property rights patents, trademarks, copyrights, trade secrets, licensing.

Suggested Readings:

- Entrepreneurship by Hisrich, Robert D., Michael Peters and Dean Shephered, Tata McGraw Hill, New Delhi
- Entrepreneurship by Barringer, Brace R., and R. Duane Ireland, Pearson Prentice Hall, New Jersy (USA)
- Entrepreneurship Development and Small Business by Charantimath, Poornima, Pearson Education, New Delhi
- Entrepreneurship by Lall, Madhurima, and Shikha Sahai, Excel Books, New Delhi

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Role and Importance of Entrepreneur in Economic Development	https://www.youtube.com/watch?v=l9ydpY8Vsek
Unit-II	Feasibility study	https://www.bing.com/videos/riverview/relatedvideo?&q=feasibility+study+in+entrepreneurship+nptel+video+lecture&&mid=38AB0CDBB6F87A962E7338AB0CDBB6F87A962E73&&FORM=VRDGAR
Unit-III	Functional plans	Functional Strategy Within Context of a Firm - YouTube
Unit-IV	Marketing Plan	https://www.youtube.com/watch?v=SWr_cziQC78

Course Code	**FEC-170A**				
Category	Foundation Elective Course				
Course Title	**Electronics Engineering**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	3	
Course Objectives	The objectives of this course are to • Explore principles, behavior and applications of semiconductor devices. • Learn number conversion system and applications of logic gates for designing digital circuits. • Gain knowledge of combinational and sequential circuits.				
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	RBT Level
CO1	Define basic terminologies and concepts related to semiconductor devices.	Level 1: Remember
CO2	Explain the operation, biasing, principles and characteristics of electronic circuits.	Level 2: Understand
CO3	Design electronic circuits using various components for real-life applications.	Level 3: Apply
CO4	Analyze the performance, techniques and stability criteria for optimized operation of electronic devices.	Level 4: Analyze

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-I

Semiconductor Diode: P-N junction and its V-I Characteristics, P-N junction as a rectifier, Switching characteristics of Diode. Diode as a circuit element, the load-line concept, half -wave and full wave rectifiers, clipping circuits, clamping circuits, filter circuits, peak to peak detector and voltage multiplier circuits.

Unit-II

Transistor: Bipolar junction transistor: operation, characteristics, Ebers-moll model of transistor, CE, CB, CC configurations.

Transistor Biasing: Operating point, bias stability, collector to base bias, self-bias, emitter bias, bias compensation, thermistor & sensistor compensation.

Unit-III

Field Effect Transistors: Junction field effect transistor, pinch off voltage, volt- ampere characteristics, small signal model, MOSFET Enhancement& Depletion mode, V- MOSFET. Common source amplifier, source follower, biasing of FET, applications of FET as a voltage variable resistor (VVR).

Unit-IV

Digital Electronics: Binary, Octal and Hexadecimal number system andconversions, Boolean Algebra, Truth tables of logic gates (AND, OR, NOT) NAND, NOR as universal gates, Difference between combinational circuits and sequential circuits, Introduction to flip- flops (S-R & J-K).

Suggested Readings:

- Integrated Electronics by Millman & Halkias, McGraw Hill
- Modern Digital Electronics by R.P. Jain, McGraw-Hill
- Electronics Principles by Malvino, McGraw Hill
- Electronics Circuits by Donald L. Schilling & Charles Belove, McGraw Hill
- Electronics Devices & Circuits by Boylestad & Nashelsky, Pearson.
- Electronics Devices & Circuits by J.B. Gupta, Katson Books.

Useful Video Links:

Unit No.	Topics	Video Links
Unit-I	P-N junction and its V-I Characteristics	https://www.youtube.com/watch?v=h0Y9jDKqScQ&list=PLgMDNELGJ1CaNcuuQv9xN07ZWkXE-wCGP
	Clipping circuits, clamping circuits	https://www.youtube.com/watch?v=aO6tA1z933k
Unit-II	Ebers-moll model of transistor	https://www.youtube.com/watch?v=dro_5MYgkg
	Thermistor & Sensistor compensation	https://www.youtube.com/watch?v=5_MpULxwijg
Unit-III	Small signal model	https://www.youtube.com/watch?v=PUR4x4yanWk
	Applications of FET as a voltage variable resistor (V V R)	https://www.youtube.com/watch?v=Q0nhtmYT6uA
Unit-IV	Boolean Algebra	https://www.youtube.com/watch?v=oaOm2pnKkyY&list=PLbMVogVj5nJQ-tIzyygzzLLxomzlbIiE4
	Difference between combinational circuits and sequential circuits	https://www.youtube.com/watch?v=ibQBb5yEDlQ