MOHAN BABU UNIVERSITY

Sree Sainath Nagar, Tirupati – 517 102

MBU
MOHAN BABU
UNIVERSITY
DREAM. BELIEVE. ACHIEVE

SCHOOL OF COMMERCE AND MANAGEMENT

Bachelor of Business administration

(3 Years Degree)

Bachelor of Business Administration (Hons.)

(4 Years Degree)

CURRICULUM AND SYLLABUS

(From 2025-26 Admitted Batches)

FULLY FLEXIBLE CHOICE BASED CREDIT SYSTEM (FFCBCS)

MOHAN BABU UNIVERSITY

Vision

To be a globally respected institution with an innovative and entrepreneurial culture that offers transformative education to advance sustainability and societal good.

Mission

- Develop industry-focused professionals with a global perspective.
- Offer academic programs that provide transformative learning experience founded on the spirit of curiosity, innovation, and integrity.
- Create confluence of research, innovation, and ideation to bring about sustainable and socially relevant enterprises.
- Uphold high standards of professional ethics leading to harmonious relationship with environment and society.

SCHOOL OF COMMERCE AND MANAGEMENT

Vision

To be the preferred choice for commerce and management education recognised for excellence, innovation, entrepreneurship and societal consciousness

Mission

- Impart relevant knowledge of commerce and management, a broad set of skills, and an inquisitive attitude to provide appropriate and distinctive solutions to serve industry and community
- Offer an experience par excellence with our state-of-the-art research, innovation, and incubation ecosystem to realise our learners' fullest entrepreneurial potential
- Provide continued education and research support to working professionals in the field of commerce and management to augment their domain expertise in the cutting-edge technologies used for business developments
- Inculcate the true spirit of societal consciousness in managers of tomorrow in solving challenges in commerce and management.

DEPARTMENT OF MANAGEMENT

Vision

To become the centre of excellence for management education and research in the country, wherein learners are empowered with the advanced management knowledge to effectively utilise their potential in their career and as entrepreneurs for betterment of the society.

Mission

- To provide management knowledge to instil the spirit of curiosity, compassion, courage and commitment through effective teaching learning process.
- To uphold the leadership excellence among the learners through research and mentoring.
- To create an effective learning environment that empowers the learners with the right blend of skills with theory and practice to build a dynamic society.

B.B.A. – Bachelor of Business Administration

PROGRAM EDUCATIONAL OBJECTIVES

After few years of graduation, the graduates of B.B.A. will:

PEO1. Pursue higher education in the field of management in functional areas - Marketing, Finance and Human Resources and Digital Marketing, Business Analytics, Financial Technology, E Commerce and Supply chain management, Digital Transformation, International business, Logistics and supply chain management or any other areas of their interest.

PEO2. Solve key challenges of management in general and functional areas in particular through professional career in industry/teaching/research.

PEO3. Get inspiration to engage in entrepreneurial career.

PEO4. Manage teams through effective leadership skills.

PEO5. Exhibit societal consciousness and ethical behaviour in practicing management along with learnability.

PROGRAM OUTCOMES

On successful completion of the Program, the graduates of B.B.A. will be able to:

PO1. Gain the knowledge of management concepts relevant to corporate issues.

PO2. Analyse the real time problems of the contemporary management.

PO3. Develop solutions to the contemporary management challenges.

PO4. Interpret the emerging issues in management through proper investigations and analysis.

PO5. Utilize appropriate tools and techniques to solve managerial problems.

PO6. Provide solutions for managerial problems with social consciousness.

PO7. Offer sustainable and environmental friendly strategies in solving managerial issues.

PO8. Establish highly ethical and moral standards in the given environment in solving managerial challenges.

PO9. Lead the people and work with teams for acceptable outcomes.

PO10. Communicate effectively in all forms to the stakeholders.

PO11. Manage businesses effectively in a given environment.

PO12. Learn continuously on the contemporary issues and practice in the field of management.

PROGRAM SPECIFIC OUTCOMES

On successful completion of the Program, the graduates of B.B.A. will be able to:

PSO1. Use fundamental knowledge of management domains to solve complex business problems.

PSO2. Use simulated problems, case analysis, projects, and industrial training to gain multidisciplinary knowledge

PSO3. Make competent management professionals through life-long learning who are ethically sound and have an understanding of societal and ecological issues relevant to their profession

Bachelor of Business Administration (3 Years Degree Program)

Basket Wise - Credit Distribution

S. No.	Basket	Credits (Min. - Max.)
1	SCHOOL CORE	36-48
2	PROGRAM CORE	36-42
3	PROGRAM ELECTIVE	30-36
5	UNIVERSITY ELECTIVE	6-9
	TOTAL CREDITS	**Min. 120**

Bachelor of Business Administration (Hons.) (4 Years Degree Program)

Basket Wise - Credit Distribution

S. No.	Basket	Credits (Min. - Max.)
1	SCHOOL CORE	36-54
2	PROGRAM CORE	60-64
3	PROGRAM ELECTIVE	36-54
5	UNIVERSITY ELECTIVE	9-12
	TOTAL CREDITS	**Min. 160**

SCHOOL CORE

(36-48 Credits for 3 years Program) **(36-54 Credits for 4 years Program)**

Course Code	Title of the Course	Lecture	Tutorial	Practical	Project based Learning	Credits	Pre-requisite
		L	T	P	S	C	
25MG102001	Basics of Computers	2	-	2	-	3	-
25MG101001	Corporate Governance and Business Ethics	3	-	-	-	3	-
25MG101002	Business Economics	3	-	-	-	3	-
25CM103001	Fundamentals of Accounting	3	-	-	4	4	-
25MG101004	Quantitative Aptitude and Logical Reasoning	2	-	-	-	2	-
25MG101005	Leadership in Dynamic Business Environment	3	-	-	-	3	-
25MG101006	Management Concepts	3	-	-	-	3	-
25MG101008	Career Readiness and Leadership Management	3	-	-	-	3	-
25MG101022	Business Statistics	3	-	-	-	3	-
25CM101002	Business Environment	3	-	-	-	3	-
25LG102401	Business Communication	2	-	2	-	3	

25LG111001	English Language Proficiency	-	-	-	-	2	-
25MG111001	Internship	-	-	-	-	2	-
25MG108001	Capstone Project	-	-	-	-	8	-
Mandatory Courses (Min. 6 Credits to be earned) Earned Credits will not be considered for CGPA							
25CB107601	Essentials of Cyber Security *	2	-	-	-	2	-
25LG107601	Professional Ethics and Human Values	2	-	-	-	2	-
25CE107601	Environmental Science*	2	-	-	-	2	-
25CE107602	Disaster Mitigation and Management	2	-	-	-	2	-
25CE107603	Rural Technology	2	-	-	-	2	-
25LG107603	Spoken English	-	1	2	-	2	
25LG107602	Essential Life Skills for Holistic Development	2	-	-	-	2	
25AB107601	NSS Activities	-	-	-	-	2	
25AB107602	Yoga	-	-	-	-	2	
25AB107603	NCC Activities	-	-	-	-	2	
25MG107601	Innovation, Incubation and Entrepreneurship	2	-	-	-	2	
25EE107601	Intellectual Property Rights	2	-	-	-	2	
25EE107602	Fundamentals of Research Methodology	2	-	-	-	2	

*Compulsory Course

PROGRAM CORE

(36-42 Credits for 3 years Program) **(60-64 Credits for 4 years Program)**

Course Code	Title of the Course	Lecture	Tutorial	Practical	Project based Learning	Credits	Pre-requisite
		L	T	P	S	C	
25MG101012	Financial Management	3	-	-	-	3	-
25MG101013	Business Information Systems	3	-	-	-	3	-
25MG101014	Cross Cultural Management	3	-	-	-	3	-
25MG101015	Design Thinking	3	-	-	-	3	-
25MG101016	Entrepreneurship Development	3	-	-	-	3	-
25MG101017	Management Accounting	3	-	-	-	3	-
25MG101018	Innovation and Creativity in Business	2	1	-	-	3	-
25MG101019	Logistics and Supply Chain Management	3	-	-	-	3	-
25MG101020	Introduction to Digital Marketing	3	-	-	-	3	-
25MG101021	Marketing Management	3	-	-	-	3	-
25MG101009	Fundamentals of Human Resource Management	3	-	-	-	3	-
25MG101023	Production and Operations Management	3	-	-	-	3	-
25MG101024	Introduction to Financial Technology	3	-	-	-	3	-
25MG101025	Financial Mathematics	3	-	-	-	3	-
25MG101026	Management Control System	3	-	-	-	3	-
25MG102002	Financial Modelling	3	-	2	-	4	-
25MG101027	Financial Markets & Services	3	1	-	-	4	-
25MG101028	Retail Management	3	-	-	-	3	-

Course Code	Title of the Course	Lecture	Tutorial	Practical	Project based Learning	Credits	Pre-requisite
		L	T	P	S	C	
25MG101029	Customer Relationship Management	3	-	-	-	3	-
25MG101030	Integrated Marketing Communication	3	-	-	-	3	-
25MG101031	Industrial Relations Law	3	-	-	-	3	-
25MG101032	Compensation Management	3	-	-	-	3	-
25MG101033	International Human Resource Management	3	-	-	-	3	-

PROGRAM ELECTIVE

(30-36 Credits for 3 years Program) **(36-54 Credits for 4 years Program)**

Course Code	Knowledge Area	Title of the Course	Lecture	Tutorial	Practical	Project based Learning	Credits	Pre-requisite
			L	T	P	S	C	
25MG101035	General Management	Business Law	2	1	-	-	3	-
25MG101036		Cost Accounting	2	1	-	-	3	-
25MG101037		Organization Behavior	2	1	-	-	3	-
25MG101038		Business Decision Making	2	1	-	-	3	-
25MG101039		Strategic Management	2	1	-	-	3	-
25MG101040		Leadership Management	3	-	-	-	3	-
25MG101041		Business Research	3	-	-	-	3	-
25MG101042	Finance	Security Analysis and Portfolio Management	3	1	-	-	4	-
25MG101043		Financial Derivatives	3	1	-	-	4	-
25MG101044		Mergers and Acquisition	3	1	-	-	4	-
25MG101045	Marketing	Consumer Behaviour	3	-	-	-	3	-
25MG101046		Rural Marketing	3	-	-	-	3	-
25MG101047		Brand Management	3	-	-	-	3	-
25MG101048	Human Resource Management	Stress Management	3	-	-	-	3	-
25MG101049		Organizational Change and Development	3	-	-	-	3	-
25MG101050		Strategic Human Resource Management	3	-	-	-	3	-
25MG101051		Performance Management	3	-	-	-	3	-

UNIVERSITY ELECTIVE

(6-9 Credits for 3 years Program) **(9 - 12 Credits for 4 years Program)**

Course Code	Title of the Course	Lecture	Tutorial	Practical	Project based Learning	Credits	Pre-requisite
		L	T	P	S	C	
Course Code	**Title of the Course**	**L**	**T**	**P**	**S**	**C**	**Prerequisite**
25EC101701	AI in Healthcare	3	-	-	-	3	-
25CM101701	Banking and Insurance	3	-	-	-	3	-
25DS101701	Bioinformatics	3	-	-	-	3	-
25BS101701	Biology for Engineers	3	-	-	-	3	-
25CE101701	Civil Engineering and The Society	3	-	-	-	3	-
25SS101701	Constitution of India	3	-	-	-	3	-
25CM101702	Cost Accounting and Financial Management	3	-	-	-	3	-
25CB101701	Cyber Laws and Security	3	-	-	-	3	-
25EE101701	Electrical Safety and Safety Management	3	-	-	-	3	-
25MG101701	Entrepreneurship for Micro, Small and Medium Enterprises	3	-	-	-	3	-
25CE101702	Environmental Pollution and Control	3	-	-	-	3	-
25EC101702	Essentials of VLSI	3	-	-	-	3	-
25CB101702	Introduction to Ethical Hacking	3	-	-	-	3	-
25BS101703	Forensic Science	3	-	-	-	3	-
25SS101702	Gender and Environment	3	-	-	-	3	-
25ME101701	Global Strategy and Technology	3	-	-	-	3	-
25EE101704	Green Technologies	3	-	-	-	3	-
25ME101702	Human Resource Management	3	-	-	-	3	-
25SS101703	Indian Economy	3	-	-	-	3	-
25SS101704	Indian History	3	-	-	-	3	-
25SS101705	Indian Tradition and Culture	3	-	-	-	3	-
25EC101703	Instrumentation in Industries	3	-	-	-	3	-
25EC101704	Introduction to Nano technology	3	-	-	-	3	-
25AI101701	Introduction to Artificial Intelligence	3	-	-	-	3	-
25DS101702	Introduction to Data Science	3	-	-	-	3	-

25AI101702	Introduction to Machine Learning	3	-	-	-	3	-
25CS101701	Introduction to Python Programming	3	-	-	-	3	-
25CB101704	Introduction to Internet of Things	3	-	-	-	3	-
25ME101703	Management Science	3	-	-	-	3	-
25ME101704	Managing Innovation and Entrepreneurship	3	-	-	-	3	-
25ME101705	Material Science	3	-	-	-	3	-
25LG201701	Personality Development	3	-	-	-	3	-
25CE101703	Planning for Sustainable Development	3	-	-	-	3	-
25EC101705	Principles of Communication Engineering	3	-	-	-	3	-
25EE101702	Reliability and Safety Engineering	3	-	-	-	3	-
25CE101704	Remote Sensing, GIS and GPS	3	-	-	-	3	-
25CE101705	Smart Cities	3	-	-	-	3	-
25EC101706	Smart Sensors for Engineering Applications	3	-	-	-	3	-
25EE101703	Sustainable Energy Systems	3	-	-	-	3	-
25CS101702	Web Design Fundamentals	3	-	-	-	3	-
25SS101706	Women Empowerment	3	-	-	-	3	-
25SS101707	Indian Knowledge System in Science	3	-	-	-	3	-
25SS101708	Introduction to Indian Knowledge Systems	3	-	-	-	3	-
25CE101706	Indian Knowledge System in Town Planning and Architecture	3	-	-	-	3	-
25LG101702	Quantitative Aptitude and Verbal Ability	3	-	-	-	3	-
25LG101703	Logical Reasoning and Recruitment Essentials	3	-	-	-	3	-
25EC101707	Quantum AI	3	-	-	-	3	-
25CA101702	Software Engineer for AI	3	-	-	-	3	-
25CB101703	Advanced Artificial Intelligence	3	-	-	-	3	Artificial intelligence
25CA101704	Generative AI and Professional Practices	3	-	-	-	3	-
25LG101701	Business Communication and Career Skills	3	-	-	-	3	-
25SS101709	Stress Management and Wellbeing	3	-	-	-	3	-
25SS101710	Strategies for Sustainable Design	3	-	-	-	3	-

Note:

1. If any student has chosen a course or equivalent course from the above list in their regular curriculum then, he/she is not eligible to opt the same course/s under University Elective.
2. The student can choose courses from other disciplines offered across the schools of MBU satisfying the pre-requisite other than the above list.

SCHOOL CORE

Course Code	Course Title	L	T	P	S	C
25LG102401	**BUSINESS COMMUNICATION**	2	-	2	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: Business Communication is designed to equip individuals with essential skills and strategic practices for effective interaction and relationship-building among businesses, clients, and stakeholders

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Demonstrate proficiency in error-free writing using accurate business vocabulary and grammar.

CO2. Analyze multiple levels of organizational communication and identify potential barriers, fostering a deeper understanding of communication as a dynamic organizational process.

CO3. Compose effective business correspondence with clarity, precision, and conciseness.

CO4. Cultivate critical thinking by developing coherent, well-structured, and articulate writing skills

CO5. Integrate modern technology to enhance communication practices and strategies.

CO-PO Mapping Table:

Course Outcomes	Program Outcomes											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	-	-	-	-	-	2	-	3	-	-	-
CO2	2	3	-	-	-	-	2	-	2	-	-	-
CO3	2	2	-	-	-	-	2	-	3	-	-	-
CO4	2	-	-	-	-	-	2	-	3	-	-	-
CO5	-	2	-	-	2	-	2	-	3	-	-	-
Course Correlation Mapping	2	2	-	-	2	-	2	-	3	-	-	-

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: **INTRODUCTION TO BUSINESS ENGLISH** ***(06 Periods)***

Understanding Communication, Communication Process, Introduction to Business communication, Barriers to Communication: Linguistic Barriers, Psychological Barriers, Interpersonal Barriers, Cultural Barriers, Physical Barriers, Organizational Barriers.

Module 2: BUSINESS CORRESPONDENCE ***(06 Periods)***

Types of business letters, Format of a business letter, Inviting quotations, Sending quotations, Placing orders, Inviting tenders, Sales letters, claim & adjustment letters, Interoffice Memo, Notices.

Module 3: BUSINESS REPORT WRITING ***(06 Periods)***

Identify the types of reports, define the basic format of a report, identify the steps of report writing, write a report meeting the format requirements, and determine the process of writing a report.

Module 4: BUSINESS MEETINGS ***(06 Periods)***

Types of meeting, importance of business meetings, Conducting meetings, seminars, conferences, opening and closing, meetings, GDs, presentation guidelines for delivery, Agenda, Minutes, Difference between Meeting and GD.

Module 5: TECHNOLOGY IN BUSINESS COMMUNICATION ***(06 Periods)***

Utilizing technology in business communication, The strategic importance of e-communication: E-mail, text messaging, Instant messaging, Project Management Tools, Voice over IP (VoIP), Cloud storage, Video conferencing, and Social networking.

Total Periods: 30

EXPERIENTIAL LEARNING

1. Role-playing exercises (e.g., client meetings, negotiations)
2. Make a PowerPoint presentation on the modern communication system of any organization.
3. Analyze the pros and cons of video conferencing.
4. Prepare visual aids to support the presentation
5. Make a detailed study on social networking and its impact on modern business.
6. Case study on the e-commerce websites with reference to their communication strategy.
7. Deliver individual presentation using PowerPoint on a business topic of your choice

RESOURCES

TEXTBOOK:

1 Vikram Bisen & Priya. Business Communication. New Age International, 2009.

REFERENCE BOOKS:

1. Guffey Mary Ellen, Loewy Dana Almonte & Richard. Essentials of business communication. Nelson College Indigenous, 2018.
2. Anjanee Sethi & Bhavana Adhikari. Business Communication. Tata Mc Graw Hill, 2009.
3. P. D. Chaturvedi, & Mukesh Chaturvedi. Business Communication: for B. Com course of Uttar Pradesh Universities Pearson Education. 2011.
4. Jones, Leo & Richard Alexander. New International Business English. CUP, 2003.
5. Bovee. Courtland L & John V.Thill, Business Communication Today**,** Pearson Education, 2021
6. Levi, Daniel. Group Dynamics for Teams. 3 ed. Sage Publications India Pvt. Ltd. New Delhi, 2011.

7. Dona J. Young, Foundation of Business Communication: An Integrative Approach, Tata McGraw-Hill Publishing Company Limited, New Delhi.2005
8. R. C. Sharma& Krishna Mohan. Business correspondence and report writing: a practical approach to business & technical communication. Mc Graw Hill India, 2017.

VIDEO LECTURES:

1. https://nptel.ac.in/courses/110105052
2. https://edurev.in/courses/14522_Business-Communication-The-Ultimate-Guide
3. https://youtu.be/2hLe-dSD0rg

WEB RESOURCES:

1. http://www.rapodar.ac.in/pdf/elearn/Business%20Communication%20Semester%20I%20notes.
2. https://ebooks.inflibnet.ac.in/mgmtp07/chapter/purpose-of-business-reports-and-its-types/
3. https://www.vedantu.com/commerce/barriers-in-communication
4. https://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/S000023MA/P001401/M011193/ET/1532666465Mod5QuadIBarriersofCommunication.pdf
5. https://theintactone.com/2019/02/19/rm-u4-report-writing/
6. https://qnazone.com/types-of-business-communication/
7. https://clearinfo.in/blog/technology-in-business-communication/

SCHOOL CORE

Course Code	Course Title	L	T	P	S	C
25MG101002	**BUSINESS ECONOMICS**	**3**	**-**	**-**	**-**	**3**

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: The course aims to make the students aware of how the Economy deals in Micro (Small/single) market and get a better understanding of the business environment and real organizational problems.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Understand the principles of Managerial Economics

CO2. Analyze the demand and supply in business

CO3. Apply the production and its cost elements in practice

CO4. Analyze the Market Structure and Pricing practices to solve business problems

CO5. Understand the impact of macroeconomics on business

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	1	-	1	1	-	-	1	1	-	-
CO2	2	1	1	-	-	1	-	1	1	-	-	1	1	-	-
CO3	2	1	1	-	-	1	-	1	1	-	-	1	-	1	-
CO4	2	1	1	-	-	1	-	1	1	-	-	1	1	-	-
CO5	2	1	1	1	-	1	-	1	1	-	-	1	1	-	-
Course Correlation Mapping	**2**	**1**	**1**	**1**	**-**	**1**	**-**	**1**	**1**	**-**	**-**	**1**	**1**	**1**	**-**

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: INTRODUCTION TO ECONOMICS ***(09 Periods)***

Introduction–Basic concepts, Economic rationale of optimization, Nature and scope of business economics, Macro and Micro economics, Basic problems of an economy, Marginalism, Equi marginalism, Opportunity cost principle, Discounting principle.

Module 2: THEORY OF UTILITY ***(09 Periods)***

Theory of utility, cardinal and ordinal utility theory, law of diminishing marginal utility, law of Equi marginal utility, indifference curves, consumer equilibrium, consumer surplus

Module 3: CONCEPT OF DEMAND AND SUPPLY ***(09 Periods)***

Different concepts of demand, demand curve, Determinants of demand, Law of demand, Demand forecasting methods, Concepts of elasticity. Concept of supply, supply curve, Conditions of supply, Elasticity of supply.

Module 4: PRODUCTION AND COST ANALYSIS ***(09 Periods)***

The production function, Short-run and Long-run production function, law of diminishing returns and returns to scale. Fixed, variable and other cost concepts, least cost-input combination.

Module 5: PRICING IN DIFFERENT MARKET STRUCTURES ***(09 Periods)***

Market – Types – Structures – Features - Price determination (long run and short run) in Perfect Competition, Monopoly, Monopolistic and Oligopoly markets, pricing strategies.

Total Periods:45

EXPERIENTIAL LEARNING

1. To expose students of under graduates in management to basic Micro Economics Concepts and inculcate and the analytical approach to the subject matter.
2. To stimulate the student's interest by showing the relievable and use of various economic theories.
3. To apply economic reasoning to problems of business.

RESOURCES

TEXT BOOKS:

1. Ahuja H.L. Business Economics. S.Chand and Co.New Delhi.2009
2. Koustsoyianni. A Modern Micro Economics. Macmillan New Delhi. 2012

REFERENCE BOOKS:

1. Mithani, D. M., & Murthy, G. K. (2009). Fundamentals of business economics. New Delhi: Himalaya Publishing House.
2. Kaweri, R. (2010). Managerial economics. New Delhi: S. Chand and Co.
3. Zambre, G. N. (2011). Business economics. Nagpur: Pimplapure Publishers.

VIDEO LECTURES:

1. https://nptel.ac.in/courses/110101005
2. https://archive.nptel.ac.in/courses/110/105/110105075

WEB RESOURCES:

1. https://www.geektonight.com/business-economics-notes-pdf
2. https://archive.nptel.ac.in/content/syllabus_pdf/110105075.pdf
3. https://targetstudy.com/courses/bba-be.html

SCHOOL CORE

Course Code	Course Title	L	T	P	S	C
25MG101022	**BUSINESS STATISTICS**	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course makes students learn and apply statistical tools in daily life and create quantitative models to solve real-world problems in appropriate contexts. Also, able to understand the importance of Statistics in real life by providing the necessary data analysis for solving business problems

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Understand the basics of statistics, tabulation, and graphical representation of data.

CO2. Apply Statistical tools and techniques in Decision making.

CO3. Examine the measures of dispersion and skewness.

CO4. Develop knowledge of Correlation and Regression concepts.

CO5. Interpret the results of statistical tests and make statistically relevant conclusions/decisions.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	-	3	3	-	-
CO2	3	3	3	-	-	-	-	-	-	-	2	3	3	-	-
CO3	3	3	3	-	-	-	-	-	-	-	2	3	3	-	-
CO4	3	2	3	-	-	-	-	-	-	-	2	3	3	-	-
CO5	3	3	3	-	-	-	-	-	-	-	2	3	3	-	-
Course Correlation Mapping	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**3**	**3**	**-**	**-**

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: INTRODUCTION ***(09 Periods)***

Introduction to Statistics: Meaning, Definition, Features, Importance and limitations of statistics. Types of Statistics, Types of Variables, Data types, meaning and difference between primary and secondary data, data collection methods. Classification and tabulation of data (problems).

Module 2: MEASURES OF CENTRAL TENDENCY ***(09 Periods)***

Introduction to Measures of Central Tendency. Characteristics of an ideal measure of Central Tendency; Types of Measures of Central Tendency - mean, median, mode, geometric mean and harmonic mean. Merits, Limitations and Suitability of averages. Relationship between averages.

Module 3: MEASURES OF DISPERSION ***(09 Periods)***

Meaning and Significance. Absolute and Relative measures of dispersion Range, Quartile Deviation, Mean Deviation, Standard Deviation, Coefficient of Variation, Moments, Skewness, and Kurtosis.

Module 4: CORRELATION AND REGRESSION ***(09 Periods)***

Meaning, Definition, and Use of Correlation, Scatter diagram, Types of correlation - Karl Pearson's correlation coefficient, Spearman's Rank correlation, Probable Error. Regression- Meaning and utility of Regression analysis, Comparison between Correlation and Regression, regression lines –X on Y, Yon X, Regression Equations, and Regression Co-efficients.

Module 5: INDEX NUMBERS ***(09 Periods)***

Hypothesis-Procedure for testing hypothesis - Setting of Hypothesis, Types of errors in hypothesis testing - Level of significance, Test of significance for Large and small sample tests, Z and t-tests for mean, Chi-square test for goodness of fit and independence of attributes. Simple problems only.

Total Periods:45

EXPERIENTIAL LEARNING

1. Below is the frequency distribution

Selling Prices (Rs. thousands)	Frequency
15 up to 18	8
18 up to 21	23
21 up to 24	17
24 up to 27	18
27 up to 30	8
30 up to 33	4
33 up to 36	2
Total	80

Construct a histogram. What conclusions can you reach based on the information presented in the histogram?

2. Calculate the arithmetic mean for the wages of workers in a Factory

Wages (Rs).	4 6 8 10 15 16
Workers	5 15 6 7 8 2

3. Calculate the correlation coefficient between X and Y and comment on their relationship.

X	1	3	5	7	8
Y	2	5	7	9	10

4. The following sample observations were randomly selected.

X	4	5	3	6	10
Y	4	6	5	7	7

5. The following sample observations were randomly selected.

X	5	3	6	3	4	4	6	8
Y	13	15	7	12	13	11	9	5

a. Determine the regression equation.
b. Determine the value of Y' when X is 7.

RESOURCES

TEXT BOOKS:

1. Lind, D. A., Marchal, W. C., & Wathen, S. A. (2021). *Basic statistics for business and economics*. McGraw-Hill.
2. Sharma,J.K (2014) Business Statistics 4th edition Delhi: Vikas Publishing House
3. S.P.Gupta, Statistical Methods. Sultan Chand and sons.

REFERENCE BOOKS:

1. Das and Swain, Business statistics for managerial decision, HPH
2. Pillai &Bagavathi (2015) Statistics, S Chand
3. Levin, R. I., & Rubin, D. S. (2014). Statistics for management. Delhi: Pearson.

VIDEO LECTURES:

1. https://www.digimat.in/nptel/courses/video/110107114/L01.html
2. https://www.youtube.com/watch?v=ImpxCMX2i_k&list=PLd605q1Prvz8TlgPXANEQyuDBNb6VSYFj

WEB RESOURCES:

1. https://ug.its.edu.in/sites/default/files/Business%20Statistics.pdf
2. https://www.ascdegreecollege.ac.in/wp-content/uploads/2020/12/Business-Statistics-by-Gupta.pdf
3. http://web.uvic.ca/~nkarlson/col11776-1.34.pdf

PROGRAM CORE

Course Code	Course Title	L	T	P	S	C
25MG101025	FINANCIAL MATHEMATICS	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION:

This course enables knowledge on various mathematical tools, techniques and models which help in dealing with real-life business problems and provide solutions.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Understand the basic concepts of indices and functions.

CO2. Apply the concept of matrices to solving business problem.

CO3. Understand the concept of Calculus and Methods of differentiations and Integration.

CO4. Analyze the basic concepts of economics and their importance in business decisions.

CO5. Apply the results of mathematical calculations to help evaluate various options in reaching financial decisions.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	-	1	-	-	-	-	-	-	-	1	1	-	-
CO2	3	1	-	1	-	-	-	-	-	-	-	1	1	-	-
CO3	3	1	-	1	-	-	-	-	-	-	-	1	-	1	-
CO4	3	1	-	1	1	-	-	-	-	-	-	1	1	-	-
CO5	3	1	-	1	1	-	-	-	-	-	1	1	-	1	1
Course Correlation Mapping	**3**	**1**	**-**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**1**	**1**	**1**	**1**

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: BASIC MATHEMATICS ***(09 Periods)***

Theory of Indices: Definition, types of indices, properties of indices, basic problems on indices. Functions and its applications to business, limits of function and continuity.

Module 2: VECTORS AND MATRICES ***(08 Periods)***

Geometrical and physical interpretation of vectors, Introduction to Matrices Multiplication of Matrices, Inverse of a Matrix, Rank of a Matrix and Matrix applications in management.

Module 3: ELEMENTARY CALCULUS ***(09 Periods)***

Differentiation: Definition, rules of differentiation, logarithmic differentiation, partial differentiation of first and second order, maxima &minima. Integration: Definition, some standard rules of integration, integration by substitution.

Module 4: APPLICATION OF CALCULUS ***(10 Periods)***

Elasticity of demand, Average revenue, Marginal revenue, Average cost, Marginal cost, Total cost, Consumer's surplus, Supply curve of short period and long period in perfect competition, Maximum revenue, Minimum Cost.

Module 5: MATHEMATICS FOR FINANCE ***(09 Periods)***

Progressions: Arithmetic and Geometric progressions and their applications. Simple interest, Compound interest, Annuity, Concept of present value and amount of sum types of annuities, present value and amount of an annuity including the cases of continuous compounding, problems relating to sinking fund.

Total Periods: 45

EXPERIENTIAL LEARNING

LIST OF EXPERIMENTS:

1. Select any three products observe demand and supply or Demand and Price in the market. Using the data Construct the relationship.
2. A finance company has offices located in every division, every district and every taluka in a certain state in India. Assume that there are 5 divisions, 30 districts and 200 taluka in the state. Each office has one Head Clerk, One Cashier, One Clerk and One Peon. A divisional office has, in addition, an Office Superintendent,2 Clerks, one Typist and one Peon. A district office has in addition, one clerk and one peon. The basic monthly salaries are as follows: Office Superintendent Rs. 5000; Head Clerk Rs.2000; Cashier Rs.1750;Clerk and Typist Rs. 1500 and Peon Rs. 1000. Using matrix notations find.

   The total number of posts of each kind in all the offices taken together,
   The total basic monthly salary bill of each kind of office, and
   The total basic monthly salary bill of all the offices taken together.
3. Identify any five products. Gather information about the price and quantity demanded. Classify them according to whether their demand is elastic or inelastic
4. Identify any two or three banks/NBFCs. Gather Information about the schemes and interest rates. Do a comparative study and summarize the report.

RESOURCES

TEXT BOOKS:

1. M. Raghavachari :Mathematics for Management An Introduction, Tata McGraw Hill
2. Dr.C.Sancheti and V.K.Kapoor,Business Mathematics, Sultan Chand & Sons.

REFERENCE BOOKS:

1. J.K Sharma, Business Mathematics Theory & Applications, Ane Books Pvt. Ltd.
2. J.K Singh, Business Mathematics, Himalaya Publishing House.
3. Dr.Amarnath Dikshit & Dr.Jinendra Kumar Jain , Business Mathematics, Himalaya Publishing House.

VIDEO LECTURES:

1. NPTEL :: Mathematics - NOC:Matrix Analysis with Applications
2. Basic Calculus - 1 - Course (nptel.ac.in)
3. NPTEL :: Mathematics - NOC:Basic Calculus 1 and 2

WEB RESOURCES:

1. ICAI - The Institute of Chartered Accountants of India
2. (PDF) An Introduction to Business Mathematics (researchgate.net)
3. Std12-BM-EM.pdf (tn.gov.in)
   (*https://textbookcorp.tn.gov.in/Books/12/Std12-BM- EM.pdf*)

SCHOOL CORE

Course Code	Course Title	L	T	P	S	C
25CM103001	**FUNDAMENTALS OF ACCOUNTING**	3	-	-	4	4

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: The objective of the course is to equip the students with the understanding of accounting process and double entry system. The course is designed so that the students can understand the scientific preparation of accounting books with relevant interpretation. The course also provides students with knowledge of preparation of final accounts.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Apply the double-entry system to record the business transactions.

CO2. Prepare different types of subsidiary books to record the business transactions.

CO3. Understand and analyze Receipts and Payments A/c and Income and Expenditure A/c, and write Rectification entries for the errors in the books of accounts.

CO4. Determine the closing balance of assets under different Depreciation methods and measure the financial performance of the business at the end of the year.

CO-PO Mapping Table:

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	1	-	-	1	3	3	-
CO2	3	3	-	-	-	-	-	-	1	-	-	1	3	3	-
CO3	3	3	-	-	-	-	-	-	1	-	-	1	3	3	3
CO4	3	3	-	-	-	-	-	-	1	-	-	1	3	3	3
Course Correlation Mapping	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**1**	**3**	**3**	**3**

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: ACCOUNTING PROCESS *(09 Periods)*

Introduction–Evolution and Definition–Accounting Functions-Advantages and Limitations–Users of Accounting Information-Branches of Accounting - Accounting Principles: Concepts and Conventions- Double Entry System - Classification of Accounts – Accounting Cycle - Journal-Ledger and Trial Balance. (Including problems)

Module 2: SUBSIDIARY BOOKS *(08 Periods)*

Meaning –Types - Purchases Book - Purchases Returns Book - Sales Book - Sales Returns Book - Bills Receivable Book - Bills Payable Book – Cash Book - Single Column, Two Column, Three Column, and Petty Cash Book - Journal Proper (Including problems).

Module 3: NON-TRADING CONCERN ***(08 Periods)***

Introduction - Meaning – Definitions, features of Non-Trading Concern - Receipts and Payments A/c - Income and Expenditure A/c - Differences between Receipts and Payment A/c and Income and Expenditure A/c. (Including problems).

Module 4: RECTIFICATION OF ERRORS AND DEPRECIATION ***(10 Periods)***

Errors and their Rectification: Types of Errors - Suspense Account – Effect of Errors on Profit. Depreciation (AS-6): Meaning – Causes –Depreciation, Amortization and Depletion - Objectives of providing for depreciation – Factors affecting depreciation – Accounting Treatment – Methods of depreciation: Straight Line Method - Diminishing Balance Method – Annuity Method – Depletion Method (Including problems).

Module 5: FINAL ACCOUNTS ***(10 Periods)***

Final Accounts: Capital and Revenue Expenditure – Capital and Revenue Receipts - Differed Revenue Expenditure- Preparation of Final Accounts - Manufacturing, Trading and Profit & Loss Account and Balance Sheet – Adjustments –(Including problems).

Total Periods: 45

PROJECT BASED LEARNING

1. Journalise the following Transactions and prepare relevant ledger accounts and also trial balance in the books of a business.

Date	**Particulars**	Amount (Rs.)
2019		
Augst	Pradeep commenced business with a cash	50,000
1	Deposited with Bank	10,000
2	Sold goods to kiran	20,000
3	Goods sold for cash	5,000
4	Purchases	2,000
5	Bought goods from Jeevan	4,000
8	Returned goods by Kiran	1,000
12	Paid telephone bill	500
15	Bought furniture and paid by cheque	12,000
16	Goods returned to Jeevan	300
17	Paid for advertisement	1,500
18	Commission received	450
19	Goods sold to Thirumala for cash	5,000
22	Interest received from Nagesh	200
25	Cash received from Lal	2,000
27	Received cash from Kiran	4,000
28	Purchased goods from Rama for Cash	1,200
29	Rs.3650 cash paid to Jeevan in full settlement of Rs.3,700 (discount received Rs.50)	
30	Received cash from Kiran Rs.14,600 in full settlement of Rs.15,000 (discount allowed Rs.400)	

2. Prepare appropriate subsidiary books from the following transactions:

Opening Balances as on 1/Jan/2018:

Cash in hand – 3000, Cash at Bank-12000, Furniture – 5000, Debtors- 10000, Bills Receivable-8000, Machinery-22000, Creditors-20000, Bills Payables-5000, Banks Loan-10000.

Date	Particulars
2018	
Jan. 1	Goods purchased from Ramesh Rs 60,000.
2	Sold goods to Suresh Rs 40,000.
5	Sold goods by Mahesh to us Rs 25,000.
7	Goods purchased from Harish Rs 12,000.
9	Sold goods to Avinash Rs 27,500.
11	Goods returned to Ramesh Rs 5,000.
15	Goods returned from Suresh Rs 10,000.
17	Sold goods to Kamal Rs 33,000.
20	Bad debts written off on debtors Rs 500.
22	Goods returned from Kamal Rs 3,000.
25	Prepaid insurance Rs 150.
26	Outstanding salaries Rs 1,000.
28	Goods returned to Harish Rs 2,000.
30	Goods purchased from Ramesh Rs 5,000.

2. Prepare a three column cash book from the following transactions:

Date	Particulars
2006	
Apr. 1	Cash in Hand Rs 2,500; Cash at Bank Rs 10,000.
2	Paid in to bank Rs 1,000.
3	Bought furniture and issued cheque Rs 2,000.
4	Purchased goods for cash Rs 500.
10	Received from Mohan Rs 980 and discount allowed Rs 20.
12	Cash sales Rs 4,000.
14	Paid Amarnath by cheque Rs 1,450 and received discount Rs 50.
16	Withdrew from bank for private use Rs 600.
17	Received cheque from Patel Rs 1,430 and allowed to him discount Rs 20. Patel's cheque deposited in to bank.
20	Withdrew from bank for office use Rs 2,000.
22	Paid advertisement by cheque Rs 350.
23	Received cheque from Ali (in full settlement of debt of Rs 1,500) Rs 1,200. the Cheque deposited on the same day in to the bank.
25	Sale of machinery, payment received in cheque Rs 2,500.
26	New machinery purchased and issued cheque Rs 5,000.
28	Withdrew from bank and paid salaries of office staff Rs 1,500.
29	Drew cheque for petty expenses Rs 150.
30	Rent paid by cheque Rs 500.

3. Prepare Trial Balance from the following balances

rticulars	nount (Rs)	rticulars	nount (Rs)
sh at Bank	200	btors	30000
pital	78000	ls Payable	7210
ase Property	46000	ening Stock	5000
rniture	10500	nk Loan	40000
les	131020	nt & Machinery	48000
scount Allowed	540	rchases	81900
turns Inward	1500	rriage Outward	240
laries and Wages	17350	rchase Returns	380
% Govt. Securities	29960	ndry Expenses	1370
nk Charges	1000	xes	500
editors	22760	mmission Received	1690
awings	3000	py Rights	4000

4. The difference of Trial Balance of a trader Rs. 559 has been transferred Suspense account. Later the following errors were discovered pass rectification entries and prepare Suspense A/c.

    a) Total of Sales Returns book was under cast by Rs. 50
    b) Instead of crediting Rs. 512 to Mohan account Rs. 215 were debited to his account.
    c) Erection charges paid on Machinery Rs. 2000 wrongly debited to Factory expenses account.
    d) Sale of Rs. 172 was recorded in sales account as Rs. 217
    e) Discount of Rs. 41 allowed to Ramesh, but entered in his account as Rs. 14
    f) Depreciation charged Rs. 100 on Machinery, was not posted in Depreciation account.

5. Prepare Bank Reconciliation Statement as on 31-12-2017

    a) Bank balance as per Cash Book Rs. 25000
    b) Cheques deposited into bank, but not collected Rs.3200
    c) Cheques issued, but not presented for payment Rs.4000
    d) Interest on deposits credited in Pass book Rs.80
    e) Bank charges debited in Pass book Rs.20
    f) Interest on investments shown in pass book only Rs.250
    g) Insurance premium debited in pass book only Rs. 350
    h) Bank has credited for rent received Rs. 2000 but no information from bank
    i) The bank collected a bill for Rs. 4200, intimation received from bank on 15/1/2018
    j) A customer directly deposited into bank Rs. 1500
    k) Telephone charges paid by bank Rs. 500
    l) A bill discounted for Rs.950 (Discount Rs.50) was dishonoured and debited in Pass book inly

6. From the following balances of Mr. Aravind as at 31.12.2016, prepare Trading, Profit and Loss Account for the year ended and Balance Sheet as at that date after making the necessary adjustments.

Debit Balances	Amount (Rs.)	Credit Balances	Amount (Rs.)
Drawing Account	6,000	Capital	80,000
Plant and Machinery	25,000	Sundry Creditors	10,000
Stock (opening)	15,000	Sales	1,20,000
Purchases	82,000	Returns outwards	1,000
Return Inwards	2,000	R.B.D.D.	400
Sundry Debtors	20,600	Discounts	800
Furniture & Fixtures	5,000	Rent of Premises sublet	1,200
Freight and Duty	2,000	Reserve Fund	5,000
Carriage outwards	500		
Rent, Rates & Taxes	4,600		
Printing & Stationery	800		
Trade Expenses	400		
Postage and Telegrams	800		
Insurance charges	700		
Salaries and Wages	21,300		
Cash in Hand	6,200		
Cash at Bank	25,500		
	2,18,400		2,18,400

Adjustments:

- Stock on 31.12.2006 was Rs.14,600.
- Write off Rs.600 as bad debts and provide 5% for R.B.D.D.
- Provide for depreciation on furniture 5% & Plant & Machinery at 20%.
- Insurance prepaid was Rs.100.
- Outstanding salaries Rs. 700

- A fire occurred on 25th December, 2006 and stock worth Rs.5,000 was destroyed and the insurance company admitted a claim for Rs. 4500 only.

RESOURCES

TEXT BOOKS:

1. "Financial Accounting", S.P. Jain & K.L Narang, Kalyani Publishers, New Delhi, 2021.
2. "Introduction to Accountancy", T.S.Grewal, S.Chand and Co., New Delhi, 2021.
3. "Financial Accounting", Jawahar Lal, Himalaya Publishing House, Mumbai, 2021.

REFERENCE BOOKS:

1. "Accountancy", Haneef and Mukherjee, Tata McGraw Hill Company, New Delhi, 2021.
2. "Principles & Practice of Accounting", R.L. Gupta&V.K.Gupta, Sultan Chand, New Delhi, 2021.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=SUQMUc3Z3vs&list=PLLhSIFfDZcUUwKluDIB2exPUYc75Va37x
2. https://www.youtube.com/watch?v=4N0Dmzhi3Tw

WEB RESOURCES:

1. https://students.icai.org/?page_id=4893
2. https://icmai.in/upload/Students/Syllabus-2012/Study_Material_New/Foundation-Paper2-Revised.pdf
3. https://khatabook.com/blog/fundamentals-of-accounting/

SCHOOL CORE

Course Code	Course Title	L	T	P	S	C
25CM101002	**BUSINESS ENVIRONMENT**	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course will prepare future entrepreneurs to plan, launch and grow a business venture within the context of their local and national social, political, legal cultural and economic environment. It will ensure that They will be able to assess the impact of these different environments on the potential to succeed in their new business.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1 Understand the concept, significance and changing dimensions of Business Environment.

CO2 Interpret the role of economic systems and economic environment and its impact on business.

CO3 Infer the importance and impact of legal and political, Socio– Cultural environment on the business.

CO4 Understand the importance of Multinational corporations, foreign collaborations and international institutions in business.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	-	-	-	-	-	-	3	2	2	-	-	-
CO2	3	2	-	-	-	-	-	2	-	2	2	-	-	-
CO3	3	2	-	-	-	-	-	2	-	2	2	-	-	-
CO4	3	2	-	-	-	-	-	-	-	2	2	-	-	-
Course Correlation Mapping	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**2**	**3**	**2**	**2**	**-**	**-**	**-**

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: BUSINESS ENVIRONMENT ***(09 Periods)***

Concept, Nature, Scope, Significance, Types of Environments, Internal and External Environment, Factors Influencing Business Environment, Techniques of Environmental Scanning and Monitoring, Emerging Dimensions of Business Environment.

Module 2: ECONOMIC ENVIRONMENT ***(09 Periods)***

Concept, Nature, Scope, Elements of Economic Environment, Economic System and Business Environment, Economic planning, Industrial policy, Fiscal policy, Monetary Policy, New economic policy.

Module 3 POLITICAL AND LEGAL ENVIRONMENT ***(09 Periods)***

Concepts, Political institutions, Rationale and Extent of State Intervention, Reasons for State Intervention, Types of Intervention, Government Business Interface, Legal Environment, Changing Dimensions of Legal Environment.

Module 4 SOCIO– CULTURAL ENVIRONMENT ***(09 Periods)***

Concept, Elements of Socio, Cultural Environment, Impact, Social Responsibility of Business, Business Ethics, Corporate Governance.

Module 5 GLOBAL ENVIRONMENT ***(09 Periods)***

Concept, Nature, Scope, Significance, Foreign Investment in India, Benefits and problems of MNCs, Strategies for Going Global, EXIM Policy, FEMA, Emerging Challenges of Global Business.

Total Periods: 45

EXPERIENTIAL LEARNING

1 Prepare a mini project report regarding recent trends and changes in the Indian economic environment.

2 Submitting the assignment on emerging challenges of global business.

3 Presentation of seminar on the topics selected topics.

All the above is detailed in CHO.

RESOURCES

TEXT BOOKS:

1 K. Aswathappa, Essentials of Business environment, Himalaya Publishing House

2 Francis Cherunilam, Business environment – Text and cases, Himalaya Publishing House

REFERENCE BOOKS:

1 Sundaram& Black. International Business Environment Text and cases, PHI

2 Pandey G.N. Environmental Management, Vikas publishing house

VIDEO LECTURES:

1 https://www.youtube.com/watch?v=dUoRQia5e6k

2 https://www.youtube.com/watch?v=AOnG_0C2g6M

Web Resources:

1 https://archive.nptel.ac.in/

2 https://ncert.nic.in/textbook/pdf/lebs103.pdf

3 https://ncert.nic.in/textbook/pdf/lebs103.pdf

SCHOOL CORE

Course Code	Course Title	L	T	P	S	C
25MG102001	**BASICS OF COMPUTERS**	2	-	2	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: The course consists of an introduction to basic vocabulary and terminology related to computer and word processing, Microsoft Word, the Internet, web search and email.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Work with advanced features of MS Word, MS Excel & MS PowerPoint.

CO2. Create power point presentations.

CO3. Be aware of mathematical calculations in MS Excel

CO4. Be aware of MS Access and database

CO5. Able to use basic internet & social networking tools

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	-	-	-	-	-	-	-	-	-	3	-	3
CO2	3	3	3	-	-	-	-	-	-	-	-	2	3	-	3
CO3	3	3	-	-	-	-	-	-	-	-	2	-	3	-	3
CO4	2	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO5	2	2	1	-	-	-	-	-	-	-	1	-	3	2	1
Course Correlation Mapping	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	-	**-**	**2**	**2**	**3**	-	**3**

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: BASICS OF COMPUTERS ***(05 Periods)***

Introduction – Meaning – Characteristics – Types – Advantages and Limitations of a Computer – Computer Input Devices: Key Board – Mouse Scanners – Digital Camera – Touch Screen. Output Devices: Monitors – Printers. Storage Devices: Hard Disk – RAM – CD-ROM, Operating Systems: Windows

Module 2: MS WORD ***(07 Periods)***

Introduction – Menus – Shortcut menus – Tool bars Files: Creating – Opening – Saving – Renaming – Closing Documents and Text Format & Paragraph: Formatting and Paragraphs – Attributes – Moving – Copying – Pasting Bulleting: Bullet and Number lists – Nested lists – Formatting lists Tables : Draw – Insert – Rows & Columns – Moving– Resizing – Table Properties. Page Formatting: Margins Page Size & Orientation – Headers and Footers – Page Numbers –Preview and Printing-mail merge.

Module 3: MS EXCEL ***(06 Periods)***

Introduction to spread sheet – components of EXCEL opening screen Building worksheet. Entering data in worksheet – editing, deleting, copying and moving cells and ranges adjusting column width and row height – inserting and deleting cells, rows and columns using auto-fill – creating and working with formula – functions in EXCEL – Graphs and Charts: Types of charts – elements of a chart – creating a chart

Module 4: MS ACCESS ***(07 Periods)***

Introduction to Access and Database – Database objects – creating database – Creating tables: creating a table using data sheet, design view and table wizard – data types – primary key – entering and modifying data in a table – Creating forms: creating auto forms – creating forms using design view and form wizard – entering and editing records in forms – Creating queries: types of queries – creating queries using query wizard – Creating reports: creating auto reports – creating reports using report wizard.

Module 5: INTERNET ***(05 Periods)***

Internet – Scope – Uses and advantages - Applications of internet in business – Email - Opening an Email Account– Sending and Receiving e-mails using internet Introduction to online shopping

Total Periods: 30

EXPERIENTIAL LEARNING

LIST OF EXPERIMENTS:

1. Perform MS DOS commands in command prompt.
2. Create the Resume in MS word
3. Create an advertisement in MS Word document using page and content borders, patterns, and text formatting.
4. Create organization letterhead by using of MS office
5. Perform Mail-merge in MS word
6. Apply mathematical function and generate students grade sheet in excel
7. Represent sales forecasting of a firm using charts in excel

8. Create a data base in MS Access
9. Create email id
10. Sent a formal email to multiple persons using any emailing application

RESOURCES

TEXT BOOKS:

1 Vikas Guptha, 2012, Comdex Computer Course Kit, Reprint, Wiley – Dream tech, New Delhi.
2. Sanjay Saxena, S. Mohan Naidu, Rajneesh, 2016, Computer Application In Management, Agarwal Amit K Kashyap & Vikas Publishing House, New Delhi.
3. Nasib Singh Gill Handbook of Computer Fundamentals, 2016, 1st Edition, Khanna publication, New Delhi

REFERENCE BOOKS:

1. S.V. Srinivasa Vallaban, 2006, Computer applications in Business, Third edition, Sultan Chand and Sons, New Delhi.
2. Working in Microsoft Office, Ron Mansfield - TMH

VIDEO LECTURES:

1. https://support.microsoft.com/en-us/office/create-a-document-in-word-aafc163a-3a06-45a9-b451-cb7250dcbaa1?wt.mc_id=otc_word#
2. https://edu.gcfglobal.org/en/computerbasics/

WEB RESOURCES:

1. https://www.tutorialspoint.com/basics_of_computers/basics_of_computers_introduction.htm
2. https://testbook.com/learn/computer-fundamentals/

SCHOOL CORE

Course Code	Course Title	L	T	P	S	C
25MG101005	LEADERSHIP IN DYNAMIC BUSINESS ENVIRONMENT	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION:

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Use Leadership behavior theories, frameworks, principles, and tactics from emerging and, when problems are identified, intervene to fix them.

CO2. Develop greater confidence and dexterity when enacting a variety of leadership behaviors.

CO3. Investigate the complexities of the dynamic leadership and environment and our relationship with related to business

CO4. The Course highlights to Develop scientific, interpretive, and creative thinking skills.

CO5. Explore the problems we face in understanding the leadership and environment in living sustainability.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1	-	-	-	-	-	-	-	-	1	-	-
CO2	1	-	-	1	-	-	1	-	1	-	-	-	-	-	-
CO3	1	1	1	-	1	-	-	-	1	-	-	-	1	-	-
CO4	1	1	-	1	-	-	1	-	-	-	-	-	1	-	-
CO5	1	1	1	-	-	-	1	-	-	-	-	-	-	1	-
Course Correlation Mapping	**1**	**1**	**1**	**1**	**1**	**-**	**1**	**-**	**1**	**-**	**-**	**-**	**1**	**1**	**-**

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: INTRODUCTION ***(09 Periods)***

Meaning of Business Environment, Factors affecting environment to the business, Internal and external environment, micro environment, macro environment. Types of environment

Module 2: SOCIAL ENVIRONMENT ***(09 Periods)***

Business and society, business and culture, language, culture and organizational behaviour, other social/cultural factors, social responsibility of business.

Module 3: ECONOMIC ENVIRONMENT ***(09 Periods)***

Nature of economy, structure of the economy, economic policies, economic conditions.

Module 4: LEADERSHIP ***(09 Periods)***

Leadership - Traits, Skills and Styles- Leadership Development - Qualities of a Good Leader.

Module 5: NOTABLE LEADERS ***(09 Periods)***

Profiles of a few Inspirational Leaders in Business – Jemshedji Tata - Aditya Birla - Swaraj Paul - L N Mittal - N R Narayana Murthy - Azim Premji, etc

Total Periods: 45

EXPERIENTIAL LEARNING

1. Conducting Activities like Role Play and Case Analysis
2. Activities like Famous Personality Roles and provide same as Assignments

RESOURCES

TEXT BOOKS:

1. Neelmegham, Business environment, 2011, VrindaPublication
2. Aswathappa k, Essentials of Business environment, Himalaya Publishinghouse.
3. Hurlock, E.B (2006). Personality Development, 28th Reprint. New Delhi: Tata McGraw Hill

REFERENCE BOOKS:

1. Andrews, Sudhir. How to Succeed at Interviews. 21st (rep.) New Delhi.Tata McGraw-Hill 1988
2. Heller, Robert.Effective leadership. Essential Manager series. Dk Publishing, 2002

VIDEO LECTURES:

1. Developing Soft Skills and Personality - Course (nptel.ac.in)
2. Business Environment Models at Modern Era

WEB RESOURCES:

1. The Leadership Psychology of Personality Formation (verywellmind.com)

SCHOOL CORE

Course Code	Course Title	L	T	P	S	C
25MG101006	**MANAGEMENT CONCEPTS**	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course enables the students to study the evolution of management, functions and principles of management, application of the principles in an organization, system and process of effective controlling in the organization.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Understand managerial functions of business organisation.

CO2. Understand the planning process in the organization.

CO3. Understand the principles of Organizing.

CO4. Understand the concept and process of Staffing.

CO5. Demonstrate the ability to direct, leadership and communicate effectively.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	1	-	-	-	1	-	1	-
CO2	3	1	-	1	-	-	-	1	1	-	-	1	1	-	-
CO3	3	1	-	1	-	-	-	1	1	-	-	1	1	-	-
CO4	3	1	-	-	-	-	-	1	1	-	-	1	-	1	-
CO5	3	1	-	-	-	1	-	-	1	-	-	1	-	-	1
Course Correlation Mapping	**3**	**1**	**-**	**1**	**-**	**1**	**-**	**1**	**1**	**-**	**-**	**1**	**1**	**1**	**1**

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: INTRODUCTION TO MANAGEMENT ***(08 Periods)***

Meaning, definition, concept, scope and principles of management; Evolution of management thought - Management theories- classical, behaviour, system, contingency and contemporary perspectives on management. Management art or science and management as profession. Process and levels of Management. Introduction to Functions (POSDCORB) of Management.

Module 2: PLANNING – IMPORTANCE: ***(08 Periods)***

Planning – Importance, objectives, process, policies and procedures, types of planning, Decision making - Process of decision making, Types of decision, Problems involved in decision making

Module 3: ORGANIZING: ***(09 Periods)***

Meaning, importance, principles of organizing, span of management, Patterns of organization – formal and informal organizations, Common organizational structures; departmentalization, Authority- delegation, centralization and decentralization, Responsibility – line and staff relationship;

Module 4: STAFFING: ***(10 Periods)***

Sources of recruitment, Selection process, Training, Directing, Controlling – Meaning and importance, Function, span of control, Process and types of Control, Motivation, Coordination – Need and types and techniques of co-ordination - Distinction between coordination and co-operation - Requisites for excellent co-ordination - Systems Approaches and co-ordination.

Module 5: EMERGING ISSUES IN MANAGEMENT ***(10 Periods)***

Total Quality management, Technology Management, Talent and Knowledge Management, Leadership, Organizational change and Development, Corporate Social responsibility.

Total Periods:45

EXPERIENTIAL LEARNING

LIST OF EXCERISES:

1. Select students will be given a case on management theory and its relevance to contemporary business practices.
2. Case of Amazon India on Planning and Staffing personnel for its timely delivery in rural area
3. Students will be asked to have group discussion on Technology, Organisation and Management

   Above all will be detailed in CHO.

RESOURCES

TEXT BOOKS:

1 Charles W.L. Hill and Steven L. McShane, Principles of Management, Tata Mc-craw-Hill Company, New Delhi.

2 Griffin, Ricky W., Management. AITBS Publishers and Distributors, New Delhi.

REFERENCE BOOKS:

1 Hitt, MA., J.S. Black and Porter, L.W., Management, Pearson Education, New Delhi

2 Laurie J. M. Management and organizational Behaviour, Pearson, New Delhi

VIDEO LECTURES:

1. NPTEL : NOC: Principles of Management (2021) (Management) (digimat.in)

WEB RESOURCES:

1. Introduction to Management – Geeks for Geeks
2. anucde.info/bba1a.pdf
3. https://gfgc.kar.nic.in/punjalakatte/GenericDocHandler/199-b09e53be-ab6f-4952-9f51-b59b167a23ba.pdf

SCHOOL CORE

Course Code	Course Title	L	T	P	S	C
25CB107601	**ESSENTIALS OF CYBER SECURITY**	2	-	-	-	2

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: Cybercrime, Cyber offenses, Phishing, Identity theft, Cybercrime in mobile and wireless devices, Organizational measures for handling mobile devices, Security implications on using mobile devices, Tools and methods used in cybercrime, Forensics of computer and handheld devices.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Analyze methods of cybercrime, cyber offenses to maintain cybersecurity.

CO2. Investigate tools used for cybercrime to protect computational assets.

CO3. Apply appropriate authentication mechanisms to reduce attacks on mobile and wireless devices.

CO4. Use appropriate cyber forensics tools and techniques to maintain cybersecurity.

CO5. Recognize the need for cybersecurity and practice ethics to protect privacy, property rights in cyberspace.

CO-PO Mapping Table:

Course Outcomes	Program Outcomes											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	-	-		-	-	-	-	-	-	-
CO2	3	2	-	-	2	-	-	-	-	-	-	-
CO3	3	2	1	-		-	-	-	-	-	-	-
CO4	3	2	-	-	2	-	-	-	-	-	-	-
CO5	-	-	-	-		2	-	2	-	-	-	-
Course Correlation Mapping	**3**	**2**	**1**	**-**	**2**	**2**	-	**2**	**-**	**-**	**-**	**-**

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: CYBERCRIME ***(05 Periods)***

Cybercrime and information security, Cybercriminals, Classifications of cybercrimes, How criminals plan the attacks, Social engineering

Module 2: CYBER OFFENSES ***(07 Periods)***

Cyber stalking, Cybercafe and cybercrimes, Botnets, Attack vector, Cloud computing, Phishing – Methods, Techniques, Spear phishing, Phishing scams, Phishing toolkits, Spy phishing, Countermeasures; Identity Theft – Personally identifiable information, Types, Techniques, Countermeasures, Effacing online identity.

Module 3: CYBERCRIME IN MOBILE AND WIRELESS DEVICES ***(06 Periods)***

Proliferation of mobile and wireless devices, Trends in mobility, Credit card frauds in mobile and wireless computing era, Security challenges posed by mobile devices, Registry settings for mobile devices, Authentication service security, Attacks on mobile/cell phones, Security implications of mobile devices for organizations, Organizational measures for handling mobile devices related security issues.

Module 4: TOOLS AND METHODS USED IN CYBERCRIME ***(06 Periods)***

Proxy servers and anonymizers, Password cracking, Keyloggers and spywares, Virus and worms, Trojan horses and backdoors, Steganography, DoS and DDoS attacks, SQL Injection, Buffer Overflow, Attacks on wireless networks.

Module 5: CYBER FORENSICS ***(06 Periods)***

Cyber forensics, Cyber forensics and digital evidence, Forensics analysis of e-mail, Forensics and social networking sites, Forensics of handheld devices – Smartphone forensics

Total Periods:30

EXPERIENTIAL LEARNING

1. Think of a recent cybercrime news report you read.
    - What type of cybercrime was it?
    - Who do you think were the cybercriminals behind it, and what might have been their motive?
    - How could this attack have been prevented?

2. Analyze a phishing email sample.
    - What were the clues indicating it was a phishing attempt?
    - How could an ordinary user fall for it?
    - Suggest three preventive actions users can take against phishing.

3. Reflect on your online presence.
    - List down all Personally Identifiable Information (PII) you share publicly.
    - What risks does this pose for identity theft?
    - What changes will you make to protect your online identity?

4. Our organization allowing BYOD (Bring Your Own Device).
    - What security challenges can arise?
    - Suggest practical measures to ensure device security in such an environment.

RESOURCES

TEXT BOOKS:

1. Nina Godbole, SunitBelapure, *Cyber Security*: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley, 2013.

REFERENCE BOOKS:

1. Nilakshi Jain, Ramesh Menon, *Cyber Security and Cyber Laws*, Wiley, 2020.
2. Charles J. Brooks, Christopher Grow, Philip Craig, Donald Short, *Cybersecurity Essentials*, 1stEdition, Sybex, 2018.
3. ErdalOzkaya, *Cybersecurity: The Beginner's Guide*, 1stEdition, Packt Publishing, 2019.

VIDEO LECTURES:

1. https://nptel.ac.in/courses/106106129
2. https://www.coursera.org/specializations/intro-cyber-security

WEB RESOURCES:

1. https://www.interpol.int/en/Crimes/Cybercrime
2. https://owasp.org/www-project-mobile-top-10/
3. https://www.netacad.com/courses/cybersecurity-essentials?courseLang=en-US

PROGRAM CORE

Course Code	Course Title	L	T	P	S	C
25MG101012	**FINANCIAL MANAGEMENT**	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on various sources of finances for corporate and utilization of funds for taking effective decisions related to capital structure, financing and investment in order to achieve maximum business growth.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Understand the different basic concepts of Corporate Finance and practical application of time value of money concept.

CO2. Understand the recent trends of primary and secondary market and importance of cost of capital

CO3. Develop required skills to select optimal capital structure on the basis of cost of capital.

CO4. Provide right investment decisions based on cost- benefit analysis.

CO5. Develop different models for firm's optimum dividend payout.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	2	-	-	-	-	2
CO2	3	3	-	2	3	-	-	2	-	-	-	-	-	-	3
CO3	3	2	3	-	-	-	-	-	-	2	2		-	-	3
CO4	3	3	3	-	3	-	-	-	-	-	2	-	-	-	3
CO5	3	2	3	2	3	-	-	-	-	2	2	-	-	-	3
Course Correlation Mapping	**3**	**3**	**3**	**2**	**3**	-	-	**2**	-	**2**	**2**	-	-	-	**3**

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: FINANCIAL MANAGEMENT FUNCTION ***(08 Periods)***

Introduction to Financial Management*:* Meaning and scope - Profit vs. Wealth maximization- Functions of Financial manager in the modern age- Time value of money-Agency problem.

Module 2: COST OF CAPITAL & LEVERAGE ***(12 Periods)***

Cost of capital: Sources of finance- Estimating the Cost of Capital: meaning- significance - computation of cost of specific sources of finance (cost of Debt, Equity & Preference shares & Retained earnings)- Computation of weighted average cost of capital-Marginal cost of capital (Theory and Problems)

Leverages: Meaning- Types- Financial Leverage- Operational Leverage- Composite Leverage- EBIT and EPS Analysis (Theory and Problems)

Module 3: FINANCING DECISIONS ***(09 Periods)***

Capital Structure: Introduction – Importance – Factors determining Capital Structure-Optimal Capital structure-Theories of Capital Structure: Relevance and Irrelevancy theories- (Theory and Problems)

Module 4: INVESTMENT DECISION ***(10 Periods)***

Capital Budgeting Decisions: Traditional methods, discounted cash flow methods, risk analysis in capital budgeting.
Working capital Management: Operating cycle estimation, Cash management, Inventor management, receivable management.

Module 5: DIVIDEND DECISIONS ***(06 Periods)***

Dividend decisions: influencing factors, forms and special dividends. Walter, Gordon and MM models Linter's model, dividend practices in India. Buy back of shares, taxation of dividends and capital gains.

Total Periods: 45

EXPERIENTIAL LEARNING

1. Take Nifty 50 companies and understand their capital structure.
2. Analyze the financial statements of BSE SENSEX- 30 companies

RESOURCES

TEXT BOOKS:

1. I.M.Pandey, (2015), Financial Management, 11th edition, Vikas Publishing, India
2. James C. Van Horne, Sanjay Dhamija, (2011), Financial Management and Policy, 12th edition, Pearson Education.
3. Eugene F Brigham, Michael C. Ehrhardt, (2014), Financial Management Theory and Practice, 14th edition, Cengage Learning

REFERENCE BOOKS:

1. Khan M.Y, Jain P.K, (2014), Financial Management- Text, Problems and Cases, 7th edition, McGraw Hill.

2. Prasanna Chandra, (2011), Financial Management : Theory and Practice, 8th edition, McGraw Hill, India

VIDEO LECTURES:

1. https://www.digimat.in/nptel/courses/video/110107144/L01.html
2. https://www.youtube.com/watch?v=Sx-dy96_tCQ

WEB RESOURCES:

1. https://students.icai.org/?page_id=5210
2. https://mdu.ac.in/UpFiles/UpPdfFiles/2020/Jan/FinancialManagement.pdf
3. https://backup.pondiuni.edu.in/content/study-material-question-bank

PROGRAM CORE

Course Code	Course Title	L	T	P	S	C
25MG101020	**INTRODUCTION TO DIGITAL MARKETING**	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide the student with a good understanding of the concepts, strategies, and trends associated with digital marketing and provide insights into key strategies using Internet-based platforms. It helps the students to explore the skills in technological based marketing approaches.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Understand basic knowledge about Digital marketing.
CO2. Know various Digital marketing tools used for Business.
CO3. Understand the social media marketing strategies
CO4. Analyze E mail and mobile marketing strategies
CO5. Understand the various data analytics and measurement tools in digital marketing

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	1	-	1	1	-	-
CO2	3	1	-	1	-	1	-	1	-	-	-	1	1	-	-
CO3	3	1	-	1	2	-	-	1	-	-	-	1	1	-	-
CO4	3	1	2	1	1	-	-	-	1	1	-	-	-	1	-
CO5	3	1	-	1	1	-	-	-	-	1	-	1	-	-	1
Course Correlation Mapping	**3**	**1**	**2**	**1**	**1**	**1**	**-**	**1**	**1**	**1**	**-**	**1**	**1**	**1**	**1**

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: **INTRODUCTION TO DIGITAL MARKETING** ***(09 Periods)***

Origin and Development of Digital Marketing – Traditional vs Digital Marketing – Opportunities & Challenges- Online Marketing Mix

Module 2: **DIGITAL MARKETING TOOLS** ***(09 Periods)***

Content Marketing – Content creation process – Content pillar - Types – A/B Testing – Display Advertising – Search Engine Marketing –Search Engine Optimization (On page & Off page optimization) - Email Marketing, – Mobile Marketing

Module 3: SOCIAL MEDIA MARKETING ***(09 Periods)***

Introduction, Types of Social Media/Key Terms to Understand, How Social Media Influences Audience and Google, integrating social media into your Website and Blogs, How to Choose Right social media for your Business/Brand

Module 4: EMAIL MARKETING VS MOBILE MARKETING ***(09 Periods)***

Introduction, email marketing process, design and content, delivery, discovery. Concept and Process of mobile marketing: goals, setup, monitor, analyze; Enhancing Digital Experiences with Mobile Apps.

Module 5: DIGITAL ANALYTICS & MEASUREMENT ***(09 Periods)***

Importance of Analytics in digital space – Data capturing in online space – Types – Tracking Mechanism – Google Analytics structure – Conversion tracking – Digital Engagement funnel

Total Periods: 45

EXPERIENTIAL LEARNING

1 Presentations on digital media tools

2 Collect and present the case studies relating to digital marketing

RESOURCES

TEXTBOOKS:

1 Digital Marketing current trends ,vandanahuja,7th edition2015 Oxford University press

2 Understanding Digital Marketing,Damian ryan,4th Edition 2017 publisher

REFERENCE BOOKS:

1 Digital Marketing essentials you always wanted to know,7th edition, Vibrant publishers

2 Journal of Digital & Social Media Marketing

VIDEO LECTURES:

1 https://onlinecourses.swayam2.ac.in/ugc19_hs26/preview

2 https://onlinecourses.swayam2.ac.in/cec19_mg23/preview

WEB RESOURCES:

1 https://www.scribd.com/document/513372531/Digital-marketing-notes

2 https://kamarajcollege.ac.in/wp-content/uploads/Core-14-Digital-Marketing.pdf

3 https://baou.edu.in/assets/pdf/PGDM_203_slm.pdf

4 https://www.tutorialsduniya.com/notes/digital-marketing-notes/#google_vignette

PROGRAM CORE

Course Code	Course Title	L	T	P	S	C
25MG101021	**MARKETING MANAGEMENT**	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course enhances students' knowledge as regards to basics of marketing, develop practical insights into application of marketing concepts.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Understand the need and importance of marketing in the current business scenario

CO2. Analyze the need and importance of market segmentation, targeting and positioning.

CO3. Understand the steps involved in designing a marketing mix.

CO4. Evaluate and apply the knowledge of expanded marketing mix.

CO5. Understand the recent trends in marketing.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	1	-	1	1	-	-
CO2	3	1	-	1	-	1	-	1	-	-	-	1	1	-	-
CO3	3	1	-	1	2	-	-	1	-	-	-	1	1	-	-
CO4	3	1	2	1	1	-	-	-	1	1	-	-	-	1	-
CO5	3	1	-	1	1	-	-	-	-	1	-	1	-	-	1
Course Correlation Mapping	**3**	**1**	**2**	**1**	**1**	**1**	**-**	**1**	**1**	**1**	**-**	**1**	**1**	**1**	**1**

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: INTRODUCTION TO MARKETING FUNDAMENTALS ***(06 Periods)***

Concept, scope, and Value of marketing, core marketing principles, Marketing and Customer Value.

Module 2: MARKET SEGMENTATION, TARGETING & POSITIONING (STP) ***(09 Periods)***

Market Segmentation, meaning, its benefits, Bases for segmenting Consumer market and Industrial market, Market Targeting, Product positioning concept

Module 3: MARKETING RESEARCH ***(10 Periods)***

Nature & Scope, Marketing Research Process, Questionnaire designing & methods of data collection.

Module 4: MARKETING MIX ***(10 Periods)***

Product, Price, Place, Promotion, Process, People, and Physical evidence.

Module 5: RECENT TRENDS IN MARKETING ***(10 Periods)***

Digital Marketing – Meaning, Importance, Green Marketing - Meaning, Importance, Use of Information Technology in marketing practices – Virtual marketing, E-buying behavior etc.

Total Periods:45

EXPERIENTIAL LEARNING

LIST OF EXERCISES:

1. Mystery Shopping in Super Markets / Malls
2. Storytelling of Customer experiences in the Purchase Process of Goods & Services
3. Field Trip/ Outdoor Learning through interaction with Marketing Executives
4. Business Plan (4Ps) Presentations.
5. Case Discussions and fish bowl exercises on Marketing issues & Challenges

Above all will be detailed in CHO.

RESOURCES

TEXT BOOKS:

1. Kotler.P, &Keller.K.L., Koshy &Jha (2020). Marketing Management, 20th edition, Pearson
2. Saxena, Rajan, Marketing Management, Tata-McGraw Hill, New Delhi.

REFERENCE BOOKS:

1. Kotler & Armstrong, 15th ed., Principles of Marketing Management, Pearson publication.
2. Marshall & Johnston, Marketing Management, McGraw Hill.

VIDEO LECTURES:

1. https://www.digimat.in/nptel/courses/video/110104068/L01.html
2. https://www.digimat.in/nptel/courses/video/110104070/L01.html

WEB RESOURCES:

1. Basics of Marketing: http://www.umsl.edu/~chewl/ba206.htm.
2. https://www.pdfdrive.com/principles-of-marketing-e154804.html
3. https://ipsedu.in/downloads/MBABooks/principles-of-marketing-philip-kotler.pdf

PROGRAM CORE

Course Code	Course Title	L	T	P	S	C
25MG101009	**FUNDAMENTALS OF HUMAN RESOURCE MANAGEMENT**	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course highlights the basics of contemporary and key human resource management skills that are required by management professionals.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Understand current basic concepts in the functional areas of HRM.
CO2. Evaluate the concepts of Recruitment and Selection, Job Evaluation practices.
CO3. Evaluate the Training and Development activities and Promotion policies of the organizations.
CO4. Analyze the Compensation and Wage Policies, and Merit Rating of the Employees.
CO5. Analyze and Integrate Wage Policy and the conditions of working to retain the employees in the organization.

CO-PO Mapping Table:

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	1	-	1	1	-	-	1	1	-	-
CO2	3	1	1	-	-	1	-	1	1	-	-	1	1	-	-
CO3	3	1	1	-	-	1	-	1	1	-	-	1		1	-
CO4	3	1	1	-	-	1	-	1	1	-	-	1	1	-	-
CO5	3	1	1	1	-	1	-	1	1	-	-	1	1	-	-
Course Correlation Mapping	**3**	**1**	**1**	**1**	-	**1**	-	**1**	**1**	-	-	**1**	**1**	**1**	-

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: Introduction ***(08 Periods)***

Importance of Human Resource Management – Meaning, Nature and Scope, Functions and Role of HR Manager – Advisory and service function to other department – HRM planning – objectives and process.

Module 2: Procurement and Development Functions ***(08 Periods)***

Job Analysis, Job description, job specification, recruitment, selection, placement and induction and socialization.

Module 3: Training & development ***(09 Periods)***

Types and method, job change – career planning, promotion, demotion, transfer, separations.

Module 4: Compensation Function ***(10 Periods)***

Job evaluation – Merit rating – Methods of wage, payment, incentive compensation – Types, advantages, perquisites. Wage system in India – Minimum wage, fair wage, living wage.

Module 5: Maintenance and Integration Functions in HRM ***(10 Periods)***

Administration of welfare, amenities & fringe benefits, safety & accident prevention work, accident prevention. Employee grievances and their redressal, administration of discipline.

Total Periods:45

EXPERIENTIAL LEARNING

1. Collect the case studies related to recent trends in HRM and other Contemporary HR Practices and Present them as a seminar.
2. Different Case Studies Will be Given to students as per the topic that will be collected and evaluated.
3. The case studies will be collected as Assignments and the same will be evaluated.

Above all will be detailed in CHO.

RESOURCES

TEXT BOOKS:

1. National. SeemaSanghi Human Resource Management 2011 Macmilan Publication
2. National V.S.P. Rao Human Resource Management 2006 Excel Books
3. Essentials of HRM and Text Cases 2011 Himalaya Publishing House

REFERENCE BOOKS:

1. National . K. Ashwathappa Human Resource Management 2007 Tata McGraw--Hill
2. International Gary Dessler, BijuVarkey Human Resource Management 2016 Pearson Publication, 12thEdition
3. Fundamentals of Human Resource Management by Dr T.Chandrasekhar Yadav 2021 by Asia Pacific Publications

VIDEO LECTURES:

1. https://hbsp.harvard.edu/cases/
2. https://open.umn.edu/opentextbooks/textbooks/human-resource-management
3. https://www.google/services.com/hrm

WEB RESOURCES:

1. https://www.managementstudyguide.com/human-resource-management.htm

PROGRAM CORE

Course Code	Course Title	L	T	P	S	C
25MG101023	PRODUCTION AND OPERATIONS MANAGEMENT	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course deals with the design and operation of the systems for production of goods and services. It will explore the approaches and analyze strategic decisions in operations management with a focus on designing products and processes, allocating scarce resources to strategic alternatives, and do long-range capacity and facility planning

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Identify the elements of operations management and various transformation processes to enhance productivity and competitiveness

CO2. Evaluate concepts of facilities location and maintenance in the productiondepartment

CO3. Analyse and evaluate Production Schedule for Competitive Advantage

CO4. Explain the key terms, Methods, and techniques of inventory control in thefield of Production practices in the organization.

CO5. Assess the tools and techniques for project review and evaluation

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	2	1	-	-	-	-	-	-	-	-	-	-	-
CO2	1	1	2	2	-	-	2	-	1	-	-	-	-	-	-
CO3	2	2	1	2	1	-	-	1	-	-	2	-	-	-	-
CO4	3	1	2	2	1	-	-	-	-	-	-	2	-	-	-
CO5	2	2	1	2	1	1	-	-	-	-	-	1	-	-	-
Course Correlation Mapping	**2**	**2**	**2**	**2**	**1**	**1**	**2**	**1**	**1**	**-**	**2**	**2**	**-**	**-**	**-**

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: INTRODUCTION ***(09 Periods)***

Introduction to operations: Nature, scope and Importance, Evolution Scope and Development Stages of Operation Management, Operations strategy: As a competitive weapon & Concept of productivity

Module 2: PLANT LOCATION AND LAYOUT ***(09 Periods)***

Plant location-Plant Layout-Classification and merits. Plant Maintenance Methods-Breakdown, Preventive and Productive maintenance. Replacement Policies-Unit and Group Replacement policies

Module 3: CAPACITY PLANNING ***(10 Periods)***

Planning Capacity Across the Organization, Planning Long-Term Capacity, Capacity Timing and Sizing Strategies

Module 4: MATERIALS MANAGEMENT ***(09 Periods)***

Materials Handling, Role of purchase department, Inventory Basics, ERP, KANBAN System, Lean operations and JIT.

Module 5: PERT & CPM ***(08 Periods)***

Concepts of project Management, CPM, PERT and Project Network Crashing and Cost Analysis, Applications of Network techniques.

Total Periods:45

EXPERIENTIAL LEARNING

LIST OF EXPERIMENTS:

1. Give a seminar on operation strategy as a competitive tool and submit a report.
2. Generate the idea of a new product and develop a prototype product.
3. Collect any case study of material management related to manufacturing company and present a summary report.

RESOURCES

TEXT BOOKS:

1. Richard B. Chase, Ravi Shankar and F. Robert Jacobs (2014); Operations & Supply ChainManagement; McGraw-Hill - 2014 (14th Edition)
2. Chary S. N. Theory and Problems in Production & Operations Mgt.; Tata McGraw Hill(14th Edition).

REFERENCE BOOKS:

1. Krajewski Lee; Operations Mgt. Process for Value Chains; Prentice Hall (8th Edition)
2. Russell S. Roberta & Taylor, Operations Mgt., Prentice Hall (4th Edition).

VIDEO LECTURES:

1. Operations Management: Understanding and Using It (investopedia.com)
2. https://nptel.ac.in/courses/112107238

WEB RESOURCES:

1. https://www.iare.ac.in/sites/default/files/lecture_notes/IARE_OM_NOTES.pdf
2. https://mrcet.com/downloads/digital_notes/ME/III year/POM NOTES.pdf
3. Operations Management - Overview, Responsibilities, Skills Required (corporatefinanceinstitute.com)

PROGRAM ELECTIVE

Course Code	Course Title	L	T	P	S	C
25MG101037	**ORGANISATIONAL BEHAVIOUR**	2	1	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course enables the students to know the principles in an organization, the system and process of effective controlling in the organization.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Interpret the scope of organizational behavior and its significance.

CO2. Understand the managerial strategies in achieving the organizational goals of an organization

CO3. Demonstrate the impact of motivation and leadership in group dynamics.

CO4. Solve organizational conflicts through negotiation and team building.

CO5. Improve the results – performance outcome through human behavior and organizational behaviour can aid them in their purist of the goals.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	-	-	-	2	-	2	-	2	-	2	2	1	1
CO2	1	-	2	1	-	2	-	-	-	-	-	2	2	2	3
CO3	2	-	2	-	1	-	-	-	-	2	-	2	2	2	2
CO4	1	2	-	1	-	-	-	-	-	2	-	2	2	2	2
CO5	1	2	1	-	-	-	-	-	-	2	2	2	2	2	2
Course Correlation Mapping	**2**	**2**	**2**	**3**	**2**	**2**		**2**		**2**	**2**	**2**	**2**	**2**	**2**

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: INTRODUCTION ***(06 Periods)***

Nature and scope – Linkages with other social sciences- Individual roles and organizational goals – perspectives of human behavior - Perception– perceptual process

Module 2: LEARNING ***(06 Periods)***

Learning - Learning Process- Theories- (Pavlov, Skinner and Thorndike) - Personality and Individual Differences - Determinants of Personality - Values, Attitudes and Beliefs .

Module 3: MOTIVATION AND LEADERSHIP ***(06 Periods)***

Definition and nature of motivation, Theories of Motivation (Maslow, Alderfer) - Leadership –Traits-Styles –Leadership skills– Challenges to leaders– Groups – stages formation of groups – Group Dynamics – Collaborative bargaining Processes in Work Groups - Johari -Window theory.

Module 4: ORGANIZATIONAL CONFLICTS ***(06 Periods)***

causes and consequences-conflict and Negotiation Team Building, Conflict Resolution in Groups and problem solving Techniques Stress, types of stress causative factors of stress in organizations, preventive measures

Module 5: ORGANIZATIONAL COMMUNICATION ***(06 Periods)***

Communication, types and process, importance and barriers – Organizational change - change process - resistance to change – Organizational development and OD interventions.

Total Periods:30

EXPERIENTIAL LEARNING

LIST OF EXPERIMENTS:

1. Collect the case studies related to recent topics in OB and other Contemporary OB Practices and Present them as a seminar.
2. Different Case Studies Will be Given to students as per the topic that will be collected and evaluated.
3. The case studies will be collected as Assignments and the same will be evaluated.

RESOURCES

TEXT BOOKS:

1. Robbins.P. Stephen (2006), Organizational Behaviour, Pearson Education, New Delhi.
2. Luthans Fred (1998), Organizational Behaviour, Tata Mc Graw Hill International Edition, New Delhi
3. K.Aswathappa "Organisational Behaviour-Text, Cases and Games", HimalayaPublishingHouse, New Delhi, 2008.

REFERENCE BOOKS:

1. Steven L Mc Shane, Mary Ann Von Glinow, Radha R Sharma: "Organisational Behaviour",TMH Education, NewDelhi,2008
2. PareekUdai (2007), Understanding Organizational Behaviour, Oxford University Press, New Delhi
3. Jerald Greenberg and Robert.A. Baron, (2009), Organizational Behaviour, PHI learning Private Ltd., New Delhi.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=Sg64udtQ300&list=PL3Y_p3e-Lne2no2K5cNa8y7ti1uqCjZw8
2. https://www.youtube.com/watch?v=pHg3ZfGk5j0

WEB RESOURCES:

1. https://www.icmrindia.org
2. https://www.citeob.com/ 5 https://www.ob-guide.com

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25EC101701	**AI IN HEALTHCARE**	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on Concepts of Artificial Intelligence (AI) in Healthcare; The Present State and Future of AI in Healthcare Specialties; The Role of Major Corporations in AI in Healthcare; Applications of AI in Healthcare.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

)1 Understand the fundamental concepts of AI in Healthcare sector.

)2 Analyse the present state and future of AI in Healthcare specialties for different scenarios.

)3 Apply design concepts and metrics for AI in Healthcare.

)4 Demonstrate basic concepts and terminologies of future applications of Healthcare in AI.

)5 Develop AI applications through AI techniques for healthcare

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	2	2	-	-	-	-	-	-	-	-
CO2	2	3	-	2	-	2	2	-	-	-	-	-
CO3	2	-	2	2	-	-	-	-	-	-	-	-
CO4	2	-	-	-	2	2	-	-	-	-	-	-
CO5	-	-	3	-	-	-	-	-	-	-	-	-
Course Correlation Mapping	**2**	**-**	**3**	**2**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: **INTRODUCTION TO ARTIFICIAL INTELLIGENCE IN HEALTHCARE** ***(08 Periods)***

Introduction to AI in Healthcare, Benefits & Risks, AI in the health sector, AI versus human intelligence, The future of AI in health sector, AI & Neural networks.

Module 2: THE PRESENT STATE & FUTURE OF AI IN HEALTHCARE SPECIALTIES ***(10 Periods)***

Artificial Intelligence in: preventive healthcare, Radiology, Pathology, Surgery, Anesthesiology, Psychiatry, Cardiology, Pharmacy, Dermatology, Dentistry, Orthopedics, Ophthalmology.

Module 3: THE ROLE OF MAJOR CORPORATIONS IN AI IN HEALTHCARE ***(08 Periods)***

IBM Watson, The role of Google & Deep mind in AI in Healthcare, Baidu, Facebook & AI in Healthcare, Microsoft & AI in Healthcare.

Module 4: FUTURE OF HEALTHCARE IN AI ***(10 Periods)***

Evidence-based medicine, personalized medicine, Connected medicine, Virtual Assistants, Remote Monitoring, Medication Adherence, Accessible Diagnostic Tests, Smart Implantables, Digital Health and Therapeutics, Incentivized Wellness, Block chain, Robots, Robot-Assisted Surgery, Exoskeletons, Inpatient Care, Companions, Drones, Smart Places, Smart Homes, Smart Hospitals.

Module 5: APPLICATIONS OF AI IN HEALTHCARE ***(09 Periods)***

Case Study 1: AI for Imaging of Diabetic Foot Concerns and Prioritization of Referral for Improvements in Morbidity and Mortality.

Case Study 2: Outcomes of a Digitally Delivered, Low-Carbohydrate, Type 2 Diabetes Self-Management.

Case Study 3: Delivering A Scalable and Engaging Digital Therapy.

Case Study 4: Improving Course Outcomes for Junior Doctors through the Novel Use of Augmented and Virtual Reality for Epilepsy.

Case Study 5: Big Data, Big Impact, Big Ethics: Diagnosing Disease Risk from Patient Data.

Total Periods: 45

Topics for self-study are provided in the lesson plan.

EXPERIENTIAL LEARNING

1. Analyze how the artificial intelligence is used to predict the disease result and Prognosis Assessment of a patient.
2. How does drug discovery happen and how does AI is helping in drug discovery and Labs.
3. Justify that artificial intelligence provide engineering solutions for early detection and Diagnosis of diseases.
4. Demonstrate the prediction of bladder volume of a patient.

(Note: It's an indicative one. Course Instructor may change activities and shall be

reflected in course Handout)

RESOURCES

TEXT BOOKS:

1. Dr. Parag Mahajan, *Artificial Intelligence in Healthcare*, MedManthra Publications, First Edition 2019.

   Arjun Panesar, *Machine Learning and AI for Healthcare Big Data for Improved Health*, Apress Publications, 2019.

REFERENCE BOOKS:

1. Michael Matheny, Sonoo Thadaney Israni, Mahnoor Ahmed, and Danielle Whicher, *Artificial Intelligence in Health Care: The Hope, the Hype, the Promise, the Peril*, National Academy of Medicine Publication, First Edition 2019.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=-aHBwTQQyNU
2. https://intellipaat.com/blog/artificial-intelligence-in-healthcare/

WEB RESOURCES:

1. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6616181/
2. https://www.ibm.com/topics/artificial-intelligence-healthcare
3. https://builtin.com/artificial-intelligence/artificial-intelligence-healthcare

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25CM101701	**BANKING AND INSURANCE**	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: Introduction to Banking; Bank-Customer Relationship; Electronic Payment System and Business Models; Introduction to Risk and Insurance; Insurance Overview.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1 Demonstrate the importance of Banking and functions of the Reserve Bank of India and its role in the country's sustainable development.

CO2 Demonstrate the role, relationships, and operations between Banker and Customer.

CO3 Demonstrate the Online Banking system, various types of Electronic Payments, and Business models.

CO4 Demonstrate the concept of risk and principles, functions, and, types of Insurance companies.

CO5 Understand the principles of insurance and its functions.

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	-	-	-	-	-	-	2	-	-	-	1
CO2	3	-	-	-	-	-	-	2	-	-	-	1
CO3	3	-	-	-	-	-	-	2	-	-	-	1
CO4	3	-	-	-	-	-	-	2	-	-	1	1
CO5	3	-	-	-	-	-	-	2	-	-	1	1
Course Correlation Mapping	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**1**	**1**

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: INTRODUCTION TO BANKING ***(09 Periods)***

Meaning - Importance of banking- Functions of banking - Reserve Bank of India: Functions – Role of RBI in sustainable development.

Module 2: BANK-CUSTOMER RELATIONSHIP **(09 Periods)**

Debtor-creditor relationship, deposit products or services, payment, and collection of cheques. Accounts – Types of accounts, the procedure for opening and closing an account - Loans and Advances- principles of lending.

Module 3 ELECTRONIC PAYMENT SYSTEM&BUSINESS MODELS **(09 Periods)**

Introduction to Online Banking - types of e-payment system, e-cash, NEFT, RTGS, Credit cards, Electronic Wallet and Debit cards. **Business models**- B2B, B2C, C2C, and B2G.

Module 4 INTRODUCTION TO RISK AND INSURANCE **(09 Periods)**

Insurance: Definition, Insurance as risk mitigation mechanism, elements of insurance. Concept of risk, risk *Vs* uncertainty.

Module 5 INSURANCE OVERVIEW ***(09 Periods)***

Principles of insurance - insurance types - LIC & GIC – insurance functions, IRDA - Insurance Players in India.

Total Periods: 45

Topics for self-study are provided in the lesson plan.

EXPERIENTIAL LEARNING

1. Make a PowerPoint presentation on the banking system in India.
2. Submit a report on the working of insurance companies.
3. Prepare a report on the functions of RBI & IRDA in India.
4. Submit a report on electronic banking facilities provided by Indian banks.

(Note: It's an indicative one. The course instructor may change the activities and the same shall be reflected in course handout.)

RESOURCES

TEXT BOOKS:

1. RanganadhaChary, A.V. and Paul, R.R., *Banking and Financial system*, Kalyani Publisher, New Delhi, 3rdedition, 2016.
2. Sharma, R.K., Shashi K. Gupta and Jagwant Singh, *Banking and Insurance*, Kalyani Publishers, New Delhi, 17th edition, 2014

REFERENCES BOOKS:

1. *Indian Institute of Banking & Finance, Digital Banking*, Taxman Publications Pvt. Ltd., 2016 edition, 2016.
2. Jyotsna Sethi and Nishwan Bhatia, *Elements of Banking and Insurance*, PHI Learning Pvt. Ltd., 2nd edition, 2012.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=a1_p8zhbAfE
2. https://www.youtube.com/watch?v=bxNw9VB5Y_0

WEB RESOURCES:

1. https://unacademy.com/content/railway-exam/study material/economics/importance-of-banking-sector-in-the-country/
2. https://www.geeksforgeeks.org/ life-insurance-meaning-elements-and-types-of-life-insurance-policies/

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25DS101701	**BIOINFORMATICS**	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course focus on Biological Data Acquisition, Databases, Data Processing, Methods of Analysis, Applications of Bio-informatics.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1 Understand basic biological data acquisition in bioinformatics.

CO2 Identify the proper databases for the information search by choosing the biological databases and also submission and retrieval of data from databases.

CO3 Analyze the results of bioinformatics data using text and sequence-based searching techniques.

CO4 Analyze the secondary and tertiary structures of proteins by applying different alignment programs

CO5 Design biological databases by using contextual knowledge on bioinformatics.

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	2	3	-	-	-	-	-	-	-	-	-	-
CO3	2	3	-	-	-	-	-	-	-	-	-	-
CO4	2	3	-	-	-	-	-	-	-	-	-	-
CO5	3	2	3	3	3	-	-	-	-	-	-	-
Course Correlation Mapping	**3**	**3**	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: BIOLOGICAL DATA ACQUISITION ***(09 Periods)***

Biological information, Retrieval methods for DNA sequence, protein sequence and protein structure information

Module 2: DATABASES ***(09 Periods)***

Format and Annotation: Conventions for database indexing and specification of search terms, Common sequence file formats. Annotated sequence databases - primary and secondary sequence databases, protein sequence and structure databases.

Module 3: DATA PROCESSING ***(09 Periods)***

Data – Access, Retrieval and Submission: Standard search engines; Data retrieval tools

– Entrez, DBGET and SRS; Submission of (new and revised) data; Sequence Similarity Searches: Local and global. Distance metrics. Similarity and homology. Scoring matrices, PAM and BLOSUM

Module 4: METHODS OF ANALYSIS ***(09 Periods)***

Dynamic programming algorithms, Needleman-Wunsch and Smith-waterman.Heuristic Methods of sequence alignment, FASTA and BLAST; Multiple Sequence Alignment and software tools for pair wise and multiple sequence alignment, CLUSTAL program, Prediction of Tertiary structure of proteins.

Module 5: APPLICATIONS ***(09 Periods)***

Genome Annotation and Gene Prediction; ORF finding; Phylogenetic Analysis, Genomics, Proteomics, Genome analysis – Genome annotation, DNA Microarray, computer aided drug design (CADD).

Total Periods: 45

Topics for self-study are provided in the lesson plan.

EXPERIENTIAL LEARNING

1. Calculate the dynamic programming matrix and one or more optimal alignment(s) for the sequences GAATTC and GATTA, scoring +2 for a match, −1 for a mismatch and with a linear gap penalty of d = 2.
2. Determine whether the RNA string GGACCACCAGG should be folded into two substructures.
3. Discuss how to carry out the multiple sequence alignment of the following three sequences: TTTTAAAA, AAAACCCC, CCCCTTTT.

(Note: It's an indicative one. The course instructor may change the activities and the same shall be reflected in course handout.)

RESOURCES

TEXT BOOKS:

1. Lesk, A. K., *Introduction to Bioinformatics*, Oxford University Press, 4th Edition, 2013
2. Dan Gusfield, *Algorithms on Strings, Trees and Sequences: Computer Science and Computational Biology*, Cambridge University Press, 1997.

REFERENCE BOOKS:

1. Baldi, P. and Brunak, S., *Bioinformatics: The Machine Learning Approach*, MIT Press, 2nd Edition, 2001.
2. Mount, D.W., *Bioinformatics Sequence and Genome Analysis*, Cold Spring Harbor Laboratory Press, 2nd Edition, 2004.
3. Tindall, J., *Beginning Perl for Bioinformatics: An introduction to Perl for Biologists*, O'Reilly Media, 1st Edition, 2001.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=liNblw4x50E
2. https://www.youtube.com/watch?v=eZfyWdHnzR0

WEB RESOURCES:

1. https://www.britannica.com/science/bioinformatics
2. https://www.ebi.ac.uk/training/online/courses/bioinformatics-terrified/what-bioinformatics/

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25BS101701	**BIOLOGY FOR ENGINEERS**	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on Introduction to living organisms, Proteins, Nucleic acids and enzymes, Genetics and Molecular biology, Recombinant DNA technology, Human physiology and applied biology.

COURSE OUTCOMES: After successful completion of the course, students will be able to

CO1 Identify difference between cells, Cellular components and their functions.

CO2 Understand Proteins, Nucleic acids structure and function and also Mechanism of enzyme action.

CO3 Identify Central dogma of Molecular biology and processes of Molecular Biology.

CO4 Understand Recombinant DNA technology and its importance in creating new Animals and Plants.

CO5 Understand basics and Mechanism of different Physiological process including nerve function and applications of biological sciences.

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-

CO3	3	3	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	-
Course Correlation Mapping	**3**	**2**	-	-	-	-	-	-	-	-	-	-

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: LIVING ORGANISMS ***(09 Periods)***

Comparison of biological organisms with manmade systems, Classification of living organisms, Cellular basis of life, differences between prokaryotes and eukaryotes, classification on the basis of carbon and energy sources, molecular taxonomy

Module 2: PROTEINS, NUCLEIC ACIDS AND ENZYMES ***(10 periods)***

Biomolecules, structure, function and Classification of proteins, structure, function and Classification of and Nucleic acids, Enzymes, Enzyme nomenclature, Classification of Enzymes and Mechanism of Enzyme action, Industrial applications of enzymes, Fermentation and its industrial applications

Module 3 GENETICS AND MOLECULAR BIOLOGY ***(11 Periods)***

Mendel's laws, single gene disorders in humans, Genetic code, DNA replication, Transcription, Translation.

Module 4 RECOMBINANT DNA TECHNOLOGY ***(08 Periods)***

Recombinant DNA Technology: recombinant vaccines, transgenic microbes, plants and animals, animal cloning, biosensors, biochips.

Module 5 HUMAN PHYSIOLOGY AND APPLIED BIOLOGY ***(07 Periods)***

Fundamentals of Human physiology, neurons, synaptic and neuromuscular junctions, Introduction to EEG, DNA fingerprinting, DNA Micro array and Genomics.

Total Periods: 45

Topics for self-study are provided in the lesson plan.

EXPERIENTIAL LEARNING

1. Identify the Cell and Cellular organelle spotters and write the functions of spotters identified
2. Prepare a table of Enzymes and their importance.
3. Assignments on Central dogma of Molecular biology
4. Identify different organs in the organ system diagrams.
5. Assignments on photosynthesis.
6. Quiz related to organ system and functions.

(Note: It's an indicative one. The course instructor may change the activities and the same shall be reflected in course handout.)

RESOURCES

TEXT BOOKS:

1. Rajiv Singal, Gaurav Agarwal, *Biology for Engineers*, CBS, 2019.
2. S. Sing and T. Allen, *Biology for Engineers*, Vayu Education of India, 2014.

REFERENCE BOOKS:

1. B. Alberts, A. Johnson et al., *The molecular biology of the cell*, Garland Science, 6th edition, 2014.
2. A. T. Johnson, *Biology for Engineers*, CRC press, 2011.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=N0Y386SVGN8
2. https://www.youtube.com/watch?v=1Pzk-UqilW4
3. https://www.youtube.com/watch?v=208pMhKoQeo

WEB RESOURCES:

1. Structure and function of Proteins: https://nptel.ac.in/courses/104102016/16
2. Enzyme catalysis: https://nptel.ac.in/courses/103103026/module3/lec35/4.html
3. Biochips: https://nptel.ac.in/courses/112104029/3

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25LG101701	**BUSINESS COMMUNICATION AND CAREER SKILLS**	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: Nature and Scope of Communication, Corporate Communication, Writing Business Messages & Documents, Careers & Résumés, and Interviews.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Demonstrate knowledge of professional communication by analyzing and applying the styles and strategies of business communication in Communication Networks, Interpersonal, and Informal communication.

CO2. Analyze the limitations of communication by applying and demonstrating corporate and cross-cultural communication strategies effectively in a business context and Crisis Management situations.

CO3. Apply appropriate strategies and techniques in writing business messages, business letters, and résumé for effective professional communication and career building.

CO4. Demonstrate appropriate communication techniques and answering strategies by analyzing the expectations during presentations and interviews.

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	1	-	-	2	-	-	-	-	3	-	-
CO2	1	2	-	-	2	-	-	-	-	3	1	-
CO3	1	-	-	-	2	-	-	-	-	3	-	-
CO4	1	2	-	-	2	-	-	-	-	3	-	-
Course Correlation Mapping	**2**	**2**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**3**	**1**	**-**

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: NATURE AND SCOPE OF COMMUNICATION ***(09 Periods)***

Introduction – Communication Basics – Functions of Communication – Communication Networks – Interpersonal Communication – Informal Communication – Communication Barriers – Roles of a Manager.

Module 2: CORPORATE COMMUNICATION ***(09 Periods)***

Introduction – Corporate Communication – Cross-Cultural Communication; Concept & Styles – Corporate Communication Strategy – Corporate Citizenship – Crisis Communication: Case Study.

Module 3: WRITING BUSINESS MESSAGES & DOCUMENTS ***(09 Periods)***

Introduction – Importance of Written Business Communication – Types of Business Messages – Five Main Stages of Writing Business Messages – Business Letter Writing – Kinds of Business Letters – Common Components of Business Letters – Strategies for Writing the Body of a Letter.

Module 4: CAREERS AND RÉSUMÉS ***(09 Periods)***

Introduction – Career Building – Résumé Formats: Traditional, Electronic and Video Résumé – Sending Résumés – Follow-up Letters – Business Presentations and Speeches: Planning –Structuring – Organizing – Delivery.

Module 5: INTERVIEWS ***(09 Periods)***

Introduction – General Preparation for an Interview – Success in an Interview – Important Non-verbal Aspects – Types of Interviews – Styles of Interviewing – Types of Interviewing –Online Recruitment Process.

Total Periods: 45

Topics for self-study are provided in the lesson plan.

EXPERIENTIAL LEARNING

1. People often get confused in identifying or using English vocabulary on most occasions. Prepare a list of confusing words and find methods to overcome the difficulties in using those words to uplift the career of professionals.
2. Organizations and institutions use modern technology in communicating with their colleagues, clients, and stakeholders. Make a PowerPoint presentation on the modern communication system of any organization and its role in the success of the organization and its career.
3. As a student in the modern technological world, organizing or attending webinars is inevitable. Analyze the pros and cons of video conferencing by organizing webinars and preparing a report.
4. Form a team and act as a team leader. Prepare a performance appraisal report of the team using visual aids to support the presentation.
5. Make a detailed study on social networking and its impact on modern business and Career.

(Note: It's an indicative one. The course instructor may change the activities and the same shall be reflected in course handout.)

RESOURCES

TEXT BOOKS:

1. Meenakshi Raman, Prakash Singh, *Business Communication*, Oxford University Press, New Delhi, 2nd edition, 2012.
2. Neera Jain, Sharma Mukherji, *Effective Business Communication*, Tata Mc Graw–Hill

REFERENCE BOOKS:

1. Courtland L. Bovee et al., *Business Communication Today*, Pearson, New Delhi, 2011.
2. Krizan, *Effective Business Communication*, Cengage Learning, New Delhi, 2010.

VIDEO LECTURES:

1. https://nptel.ac.in/courses/110105052
2. https://edurev.in/courses/14522_Business-Communication-The-Ultimate-Guide

WEB RESOURCES:

1. http://www.career.vt.edu/interviewing/TelephoneInterviews.html
2. http://job-search-search.com/interviewing/behavioral_interviews
3. https://goo.gl/laEHOY (dealing with complaints)
4. http://www.adm.uwaterloo.ca/infocecs/CRC/manual/resumes.html
5. https://goo.gl/FEMGXS
6. http://www.resumania.com/arcindex.html

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25CE101701	**CIVIL ENGINEERING AND THE SOCIETY**	3	-	-	-	3

Pre-Requisite -
Anti-Requisite -
Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on introduction to civil engineering, aesthetics of historic and modern civil engineering structures, unpredictable nature and the civil engineering; civil engineering solutions for the problems of traffic, pollution, water and waste management; building sustainable smart cities.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Analyze principles of civil engineering to basic civil engineering problems following ethics and latest developments considering society, environment and sustainability besides communicating effectively in graphical form.

CO2. Analyze aesthetics of historic and modern civil engineering structures to solve complex civil engineering problems using tools and techniques by following ethics and latest trends considering society, environment and sustainability besides communicating effectively in graphical form.

CO3. Analyze unpredictable nature and the role of civil engineering to solve complex civil engineering problems using tools and techniques by following ethics and considering society, environment and sustainability besides communicating effectively in graphical form.

CO4. Analyze civil engineering solutions for the problems of traffic, pollution, water and waste management to solve complex problems using appropriate tools and techniques following relevant standards considering society, health, safety, environment, economics and management besides communicating effectively in graphical form.

CO5. Analyze the building principles of sustainable smart cities to solve complex problems using appropriate tools and techniques following relevant standards considering society, health, safety, environment, economics and management besides communicating effectively in graphical form.

CO-PO Mapping Table:

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	2	3	2	-	1	-	1
CO2	3	3	-	1	2	2	2	2	-	1	-	1
CO3	3	3	-	1	2	2	2	2	-	1	-	-

CO4	3	3	-	1	2	2	2	2	-	1	2	-
CO5	3	3	-	1	2	2	2	2	-	1	2	-
Course Correlation Mapping	**3**	**3**	**-**	**1**	**2**	**2**	**2**	**2**	-	**1**	**2**	**1**

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: INTRODUCTION TO CIVIL ENGINEERING ***(07 Periods)***

Philosophy of civil engineering, Disciplines of civil engineering, Evolution of construction and civil engineering in the world; Civil engineer - Duties and responsibilities, Role of Civil engineer in the society; Civil engineering materials and their applications, Latest advancements in civil engineering.

Module 2: AESTHETICS OF HISTORIC AND MODERN CIVIL ENGINEERING STRUCTURES ***(09 Periods)***

Aesthetics in civil engineering structures; Aesthetic principles and techniques - Analysis of materials, textures and colors in aesthetic design, Integration of aesthetics with structural engineering principles; Historic civil engineering structures - Case studies of iconic historic structures (e.g. Colosseum, Taj Mahal, Eiffel Tower); Modern civil engineering structures - Exploration of contemporary iconic structures (e.g. Burj Khalifa, Sydney Opera House, Golden Gate Bridge); Integration of aesthetics and functionality - Ethical considerations in balancing aesthetics, functionality and sustainability; Future trends in aesthetic engineering.

Module 3 UNPREDICTABLE NATURE AND THE CIVIL ENGINEERING ***(09 Periods)***

Unpredictable nature, Examples of unpredictable natural disasters - Earthquakes, Floods, Landslides, Hurricanes, Tsunamis, Impacts of unpredictable natural events on infrastructure; Role of civil engineering; Resilience in civil engineering - Strategies for building resilient structures, Risk assessment and analysis, Incorporating safety factors, Using robust construction materials, Implementing redundancy and backup systems, Sustainable design practices; Case studies of successful resilient designs.

Module 4 CIVIL ENGINEERING SOLUTIONS FOR THE PROBLEMS OF TRAFFIC, POLLUTION, WATER AND WASTE MANAGEMENT ***(11 Periods)***

Introduction to urban challenges and sustainable development; Traffic management solutions - Causes and impacts of traffic congestion, Intelligent transportation systems; Pollution control and environmental engineering, Sources and types of urban pollution, Air quality monitoring and control strategies, Water pollution control, Noise pollution management, Sustainable construction practices to reduce pollution; Water resource management, Water demand and supply management in urban areas, Rainwater harvesting techniques, Water conservation and wastewater treatment technologies; Waste management strategies, Solid waste generation and disposal challenges, Waste-to-energy conversion technologies, Case studies of successful waste management initiatives; Integration and synergies among Solutions, Multi-disciplinary approach for holistic solutions.

Module 5 BUILDING SUSTAINABLE SMART CITIES ***(09 Periods)***

Smart city; Elements of smart city infrastructure – Buildings, Mobility, Energy, Water, Waste management, Health and digital layers; Need for an integrated approach; Role of science, technology and innovation in the implementation of smart infrastructure; Smart infrastructure design principles and policies; Case studies: Gujarat International Finance Tech-City in India.

Total Periods: 45

Topics for self-study are provided in the lesson plan.

EXPERIENTIAL LEARNING

1. Group discussion on compatibility of modern construction materials compared to that of traditional civil engineering materials
2. Poster presentation on historic and modern civil engineering structures.
3. Submit a case study report on Life Cycle Analysis (LCA) of any one of the historic civil engineering structure.
4. Submit a case study report on the theme of severity of the natural disasters on the Civil engineering structures.
5. Debate on challenges, limitations and solutions for design and implementation of smart city.

(Note: It's an indicative one. The course instructor may change the activities and the same shall be reflected in course handout.)

RESOURCES

TEXT BOOKS:

1. David Muir Wood., *Civil Engineering: A Very Short Introduction*, Oxford University Press, 1st Edition, 2012.
2. Roger Scruton, *The Aesthetics of Architecture*, Princeton University Press, 2nd Edition, 2013.

REFERENCE BOOKS:

1. Anubha Kaushik and C. P. Kaushik, *Perspectives in Environmental Studies*, New Age International (P) Ltd Publications, 6th Edition, 2018.
2. Sang Lee (Editor), *Aesthetics of Sustainable Architecture*, 010 publishers, 1st Edition, 2013.
3. Marc Kushner, *The Future of Architecture in 100 Buildings*, Simon and Schuster, 1st Edition, 2015.
4. Nicholas J. Garber and Lester A. Hoel, *Traffic and Highway Engineering*, Nelson Engineering, 1st Edition, 2008.
5. Stephen M. Wheeler and Timothy Beatley, *Sustainable Urban Development*, Reader Routledge Urban Reader Series, 3rd Edition, 2014.
6. Larry W. Mays, *Water Resources Engineering*, Wiley India Private Limited, 3rd Edition, 2011.
7. Hans Straub, *A History of Civil Engineering: An Outline from Ancient to Modern Times*, The MIT Press, 4th Edition, 1964.
8. Brian Vanden Brink, *Iconic: Perspectives on the Man-Made World*, Down East Books, Illustrated Edition, 2012.

VIDEO LECTURES:

1. https://archive.nptel.ac.in/courses/123/105/123105001/
2. https://onlinecourses.nptel.ac.in/noc22_ce42/preview
3. https://onlinecourses.nptel.ac.in/noc19_ce31/preview
4. https://onlinecourses.nptel.ac.in/noc20_ce07/preview

WEB RESOURCES:

1. https://bregroup.com/insights/aesthetics-in-architecture-how-beauty-and-design-are-inspiring-each-other/
2. https://keckwood.com/news-updates/how-civil-engineers-help-during-disaster-recovery/#:~:text=Civil%20engineers%20provide%20humanitarian%20and,shortages%20to%20hard%2Dhit%20communities
3. https://smartcities.gov.in/
4. https://www.twi-global.com/technical-knowledge/faqs/what-is-civil-engineering
5. https://www.ice.org.uk/engineering-resources/knowledge-resources/water-and-waste-water-management

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25SS101701	**CONSTITUTION OF INDIA**	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides and in-depth knowledge about Constitution of India's Preamble and its Philosophy; Union Legislature; Federalism in India; Judiciary and Public Services; Nation Building. The students can gain first-hand information and knowledge about these dynamics and accordingly act based on these sources in their professional and routine activities.

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1: Demonstrate knowledge in the Parliamentary proceedings, Election Commission, Public Services and Foreign Policy of India.

CO2: Apply the reasoning informed by the various aspects of the Constitution and its provisions to assess societal issues and the consequent responsibilities relevant to the professional engineering practice.

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1	-	-	-	-	3	2	-	-	-	-	-
CO2	2	-	-	-	-	3	-	3	-	-	-	-
Course Correlation Mapping	**2**	**-**	**-**	**-**	**-**	**3**	**2**	**3**	**-**	**-**	**-**	**-**

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: PREAMBLE AND ITS PHILOSOPHY ***(09 Periods)***

Introduction to Indian Constitution; Evolution of Indian Constitution; preamble and its philosophy

Module 2: UNION LEGISLATURE ***(09 Periods)***

The Parliament, Parliamentary Structure, Process of Legislation; President of India – Powers and Functions; Prime Minister and Council of Ministers; Constitution Amendment Procedure.

Module 3: FEDERALISM IN INDIA ***(09 Periods)***

Centre-State Administrative Relationship; Governors – Powers and Functions; State Legislature - Composition and powers; Chief Ministers - Powers and Functions; The Election Commission – Powers and Functions.

Module 4: JUDICIARY AND PUBLIC SERVICES ***(09 Periods)***

The Union Judiciary - Supreme Court and High Court; Fundamental Rights and Duties All India Services - Central Civil Services -State Services - Local Services.

Module 5: INTERNATIONAL PARTICIPATION ***(09 Periods)***

Foreign Policy of India; International Institutions Influence: UNO, WTO, WHO, SAARC, International Summits: BRICS, NSS, UNEP – India's Role in International Negotiations; Environmentalism in India.

Total Periods: 45

EXPERIENTIAL LEARNING

1. Review newspapers and submit a report on critical analysis of Indian Civil Servants exercise of powers, in the awake of constitutionally assigned authority.
2. Visit your village Panchayat office or Municipality office and generate a report on your observations about maintained Constitutional symbolism.
3. Watch few videos on recent Indian Independence Day and Republic Day celebrations as marked in New Delhi and present a detailed report, by considering the following aspects:
   a) Comparatively analyze the speeches of the President of India and Prime Minister of India as delivered on these two occasions.
   b) Compare these two events relevance in terms of Indian Armed Forces presence.
   c) Observe, compare and analyse 'flag code' relevance as marked in these two events.
4. Watch a few videos on recent 'proceedings' of any state Legislative Assembly session and submit a detailed report.

(Note: It's an indicative one. The course instructor may change the activities and the same shall be reflected in course handout.)

RESOURCES

TEXT BOOKS:

1. Briji Kishore Sharma, *Introduction to the Constitution of India*, Prentice Hall of India, 2005

REFERENCE BOOKS:

1. Mahendra Pal Singh,V. N. Shukla's, *Constitution of India*, Eastern Book Company, 2011
2. Pandey J. N., *Constitutional Law of India*, Central Law Agency, 1998

VIDEO LECTURES:

1. Doctrine of Basic Structure: https://www.youtube.com/watch?v=cvUf9ZeEe8Y
2. Significance of the Constitution: https://www.youtube.com/watch?v=vr1Dc_-ZKbQ

WEB RESOURCES:

1. The Constitution of India: https://www.youtube.com/watch?v=of2SoO8i8mM
2. Protection of Constitutional Democracy: https://www.youtube.com/watch?v=smJ99cdPrns

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25CM101702	COST ACCOUNTING AND FINANCIAL MANAGEMENT	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: Cost accounting; cost sheet & preparation of cost sheet; standard costing & variance analysis; financial management & ratio analysis; introduction to investment**.**

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1 Demonstrate the concepts of Cost Accounting and Management Accounting and the elements of costing.

CO2 Determine the Cost of Production for pricing decisions.

CO3 Apply the Standard Costing and Variance techniques for the control of the cost of production

CO4 Analyze the Profitability and financial condition of an organization using Ratios.

CO5 Apply Capital Budgeting techniques for making investment decisions in an organization.

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	2	-	-	1	-	-	-	-
CO2	3	-	-	-	2	-	-	1	-	-	1	-
CO3	3	-	-	-	2	-	-	1	-	-	1	-
CO4	3	-	-	-	2	-	-	1	-	-	1	-
CO5	3	-	-	-	2	-	-	1	-	-	-	-
Course Correlation Mapping	**3**	**-**	**-**	**-**	**2**	**-**	**-**	**1**	**-**	**-**	**1**	**-**

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: COST ACCOUNTING ***(09 Periods)***

Meaning of Cost and Cost Accounting, Objectives, Scope, Advantages, and Disadvantages – Cost Accounting *Vs* Management Accounting – Elements of Costing – Installation of costing system – Material Control, Labor Control, Overhead Control.

Module 2: COST SHEET & PREPARATION OF COST SHEET (09 Periods)

Analysis of Cost – Preparation of cost sheet, estimate, tender, and quotation (Simple problems) – Importance of Costing while pricing the products

Module 3 STANDARD COSTING & VARIANCE ANALYSIS (09 Periods)

Introduction to Standard Costing & Variances – Variance Analysis: Material variances, Labor variances (Simple Problems).

Module 4 FINANCIAL MANAGEMENT & RATIO ANALYSIS (09 Periods)

Meaning, Objectives - Nature and Scope, Importance of FM – Ratio Analysis**:** Types of Ratios: Solvency Ratios, Liquidity Ratios, Turnover Ratios, and Profitability Ratios - Financial Statement Analysis through Ratios (Simple Problems).

Module 5 INTRODUCTION TO INVESTMENT ***(09 Periods)***

Investment - Meaning and Definition- concept of risk and returns - Capital budgeting techniques – Security Analysis and Portfolio Management (Basic concepts).

Total Periods: 45

Topics for self-study are provided in the lesson plan.

EXPERIENTIAL LEARNING

1. Prepare a report on the role of cost accountants in the growth of a company.
2. To visit the manufacturing unit to observe how they used various techniques for analyzing the financial health of a company.
3. Prepare a report on factors influencing the form of business organization.
4. Prepare the cost sheet with practical examples of any two manufacturing companies.

(Note: It's an indicative one. The course instructor may change the activities and the same shall be reflected in course handout.)

RESOURCES

TEXT BOOKS:

1. S.P. Jain and K.L. Narang: *Cost Accounting*, Kalyani Publishers, Ludhiana, 10th edition, 2016.
2. I.M. Pandey, *Financial Management*, Vikas Publishing House Pvt. Ltd., 14th edition, 2016.

REFERENCE BOOKS:

1. The Institute of Company Secretaries of India, *Cost and Management Study Material*, New Delhi.
2. CA Saravana Prasath, *Cost Accounting and Financial management*, Wolters Kluwer India Pvt. Ltd., New Delhi, 2018.

VIDEO LECTURES:

1 https://www.youtube.com/watch?v=ESqO8sFgQa0&list=PLLhSIFfDZcUVE2kzOhEubO9rkvUOAgZbz

2 https://www.youtube.com/watch?v=tzasFmP1CpAhttps://www.youtube.com/watch?v=tzasFmP1CpA

WEB RESOURCES:

1 https://www.tutorialspoint.com/accounting_basics/management_versus_cost_accounting.htm

2 https://www.netsuite.com/portal/resource/articles/financial-management/financial-management.shtml

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25CB101701	**CYBER LAWS AND SECURITY**	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on Cyber Crimes and Indian IT Act; Cyber Offenses; Tools and Methods used in Cyber Crime; Phishing ad Identity Theft; Indian and Global Perspective on Cyber Crimes and Cyber Security; Organizational Implications on Cyber Security; IPR Issues; Cyber

Crime and Terrorism; Cyber Crime Illustrations

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Demonstrate knowledge in Cyber security, Cybercrimes and its related laws in Indian and Global Act.

CO2. Analyze the legal perspectives and laws related to cybercrimes in Indian context.

CO3. Apply security and privacy methods in development of modern applications and in organizations to protect people and to prevent cybercrimes.

CO4. Solve Cyber security issues using privacy policies and Use antivirus tools to minimize the impact of cyber threats.

CO5. Apply security standards for the implementation of Cyber Security and laws.

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-
CO3	3	2	3	-	-	-	-	-	-	-	-	-
CO4	3	2	3	-	-	-	-	-	-	-	-	-
CO5	3	2	2	-	-	-	-	-	-	-	-	-

Course Correlation Mapping	**3**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: INTRODUCTION TO CYBER CRIMES AND OFFENSES ***(09 Periods)***

Cyber Crimes: Introduction, Definition, Origin, Cybercrime and information security, Cyber criminals, Classifications of cybercrimes, The legal perspectives and Indian perspective, Cybercrime and Indian ITA 2000, Global perspective on cybercrimes.

Cyber Offenses: Introduction, Criminals planning on attacks, Social engineering, Cyber stalking, Cyber cafe and crimes, Botnets.

Module 2: TOOLS AND METHODS USED IN CYBER CRIME AND PHISHING AND IDENTITY THEFT ***(09 Periods)***

Introduction, Proxy servers and Anonymizers, Phishing, Password cracking, Key loggers and Spywares, Virus, Worms and Ransomware, Trojan horses and Backdoors, Steganography, DoS and DDoS attacks.

Phishing and Identity Theft: Introduction, Phishing, Identity Theft (ID Theft).

Module 3 CYBER CRIMES AND CYBER SECURITY-LEGAL PERSPECTIVES ***(08 Periods)***

Introduction, Cyber laws in Indian context, The Indian IT act, Challenges to Indian law and Cybercrime scenario in India, Consequences of not addressing the weakness in IT act, Digital signatures and the Indian IT Act, Cyber Crime and Punishment, Cyber law, Technology and Students in India scenario.

Module 4 CYBER SECURITY-ORGANIZATIONAL IMPLICATIONS ***(10 Periods)***

Introduction, Web threats for organizations – evils and perils, Security and privacy implications from cloud computing, Social Media Marketing-Security risks and Perils for organizations, Social computing and associated challenges for organizations, Protecting people's privacy in organization, Organizational guidelines for internet usage, Safe computing and Usage policy, Incident handling and Best practices.

Module 5 CYBER CRIME AND TERRORISMAND ILLUSTRATIONS ***(09 Periods)***

Cyber Crime & Terrorism: Introduction, Intellectual property in the cyber space, The ethical dimension of cybercrimes, The psychology, Mindset and skills of hackers and cyber criminals, Sociology of cyber criminals, Information warfare.

Cyber Crime Illustrations: Indian banks lose millions of rupees, Justice vs. Justice, Parliament attack, The Indian case of online gambling, Bank and credit card related frauds, Purchasing goods and services scam, Nigerian 419 scam.

Total Periods: 45

Topics for self-study are provided in the lesson plan.

EXPERIENTIAL LEARNING

1. The Cyber Security Risks on Social Media – Learn from Case Studies: https://www.rswebsols.com/tutorials/internet/cyber-security-risks-social-media
2. SIX automates key cybersecurity tasks to actively protect itself against social media threats: https://www.hootsuite.com/resources/six-group-case-study
3. Important Cyber Law Case Studies : https://www.cyberralegalservices.com/detail-casestudies.php

(Note: It's an indicative one. The course instructor may change the activities and the same shall be reflected in course handout.)

RESOURCES

TEXT BOOKS:

1. Nina Gobole, SunitBelapure, *Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives*, Wiley India, 2011.

REFERENCE BOOKS:

1. Prashant Mali, *Cyber Law and Cyber Crimes*, Snow White Publications Pvt. Ltd., 2013.

2. Alfred Basta and et al, *Cyber Security and Cyber Laws*, Cengage Learning India 2018

VIDEO LECTURES:

1. Learn Cyber Security | Cyber Security Training:
   https://www.youtube.com/watch?v=PlHnamdwGmw

2. Cyber Security For Beginners: https://www.youtube.com/watch?v=4RE4d23tDFw

WEB RESOURCES:

1. https://study.com/academy/course/computer-science-110-introduction-to-cybersecurity.html

2. https://www.pandasecurity.com/en/mediacenter/panda-security/types-of-cybercrime/

3. https://mediasmarts.ca/digital-media-literacy/digital-issues/cyber-security/cyber-security-spam-scams-frauds-identity-theft

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25EE101701	**ELECTRICAL SAFETY AND SAFETY MANAGEMENT**	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION:

The course deals with the various aspects of potential risk due to electrical shock; safety precautions to be followed while working in hazardous zones; safe practices while handling various electrical equipment and during maintenance; and relevant electrical safety standards and Indian rules and acts.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Understand the Indian electricity rules, regulations and various standards to be maintained for the safety of life and equipment.

CO2. Understand the potential effects of electrical shock and safety measures to protect against such risk.

CO3. Understand the safety aspects and safe practices to be followed while installing residential, commercial, and agricultural appliances.

CO4. Identify various hazardous working zones and take necessary precautionary measures while working in such areas.

CO5. Follow safety measures during installation, testing and commissioning, and maintenance of electrical equipment/plant.

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	-	-	-	1	3	1	3	-	-	-	1
CO2	3	-	-	-	1	2	2	-	-	-	-	1
CO3	3	-	-	-	1	2	2	-	-	-	-	1
CO4	3	-	-	-	2	3	2	2	-	-	-	1
CO5	3	-	-	-	-	3	2	2	-	-	-	1
Course Correlation	**3**	-	-	-	**1**	**3**	**2**	**3**	-	-	-	**1**

Mapping												

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: INDIAN ELECTRICITY RULES AND ACTS, AND THEIR SIGNIFICANCE ***(10 Periods)***

OSHA standards of electrical safety, Basic electrical safety rules as per OSHA; Objectives and scope of IE acts and IE rules, Ground clearance and Section Clearances, Clearance in transmission and distribution lines, Significance of Equipment Earthing, Earthing of equipment bodies, structures and non-current carrying metallic parts, Earthing of system neutral; Rules regarding first aid and firefighting facility, Electrical safety general requirements as per IE rules.

Module 2: INTRODUCTION TO ELECTRICAL SAFETY AND SAFETY MANAGEMENT ***(10 Periods)***

Electric Safety: Terms and definitions, objectives of safety and security measures, Hazards associated with electric current and voltage, Protection against electrical hazards and types, Effect of current on the human body, Principles of electrical safety and approach to prevent accidents.

Electric shocks and its prevention: Primary and secondary electrical shocks, possibilities of getting an electrical shock and its severity, medical analysis of electric shocks and its effects, shocks due to flash/ Spark over's, prevention of shocks, safety precautions against contact shocks, flash shocks, burns, Safety precautions in LV installations and electric plant.

Module 3: ELECTRICAL SAFETY IN RESIDENTIAL, COMMERCIAL, AND AGRICULTURAL INSTALLATIONS ***(08 Periods)***

Introduction—Wiring and fitting; Domestic appliances—water tap giving a shock, shock from wet wall, fan firing shock; Multi-storied building, Temporary installations, Agricultural pump installation; Do's and Don'ts for safety in the use of domestic electrical appliances; Principles of safety management in electrical plants, safety auditing, and economic aspects.

Module 4: ELECTRICAL SAFETY IN HAZARDOUS AREAS ***(07 Periods)***

Hazardous zones—class 0, 1 and 2; Sparks, flashovers and corona discharge in electrical plants; equipment for hazardous locations; scope for live line work, principles of live line maintenance, special tools for live line maintenance, safety instructions for working on HV lines/apparatus.

Module 5: SAFETY DURING INSTALLATION TESTING AND MAINTENANCE ***(10 Periods)***

Safety during installations: Preliminary preparations, preconditions for the start of installation work and safe sequence, safety aspects during installations of Transformers and Rotating machines.

Safety during testing: Purpose of commissioning checks and tests, equipment tests, high voltage energization tests, performance and acceptance tests, and safety aspects during commissioning.

Safety during maintenance: Operators' safety, Types of safety maintenance, Safety procedures, safety precautions during maintenance, and planning of maintenance.

Total Periods: *45*

Topics for self-study are provided in the lesson plan.

EXPERIENTIAL LEARNING

1. Study and submit a report on various electrical safety standards followed in abroad countries.
2. Visit a nearby industry and submit a report on various safety measures followed in the industry.
3. Study and submit a report on standard practices followed during the maintenance/commissioning of the electrical apparatus in any industry.
4. Collect information about various safety/alert sign boards and the relative measures for a particular situation.
5. Should practice preliminary first aid assistance such as Cardiopulmonary resuscitation (CPR) and shall demonstrate.

(Note: It's an indicative one. The course instructor may change the activities and the same shall be reflected in course handout.)

RESOURCES

TEXT BOOKS:

1. Rao, Prof. H.L. Saluja, *Electrical Safety, Fire Safety Engineering and Safety Management*, Khanna Publishers. New Delhi, 2nd Edition, 2018 Reprint.

REFERENCE BOOKS:

1. Cadick, John, Mary Capelli-Schellpfeffer, and Dennis K. Neitzel, *Electrical safety Handbook,* McGraw-Hill Education, 2012.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=g-ofq7i_u48

WEB RESOURCES:

1. https://cercind.gov.in/Act-with-amendment.pdf
2. https://www.edapp.com/blog/electrical-safety-training-topics/

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25MG101701	**ENTREPRENEURSHIP FOR MICRO, SMALL AND MEDIUM ENTERPRISES**	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: To understand the setting up and management of MSMEs and initiatives of Government and other institutions support for growth and development of MSMEs

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Understand the basic of SME and challenges of MSMEs

CO2. Explain the opportunities to Set-Up SSI/SME Units and role of rural & women entrepreneurship.

CO3. Illustrate roles of various institutions supporting MSMEs.

CO4. ıderstand Management of MSME, NPA & sickness units

CO5. ·aluate role of Government in Promoting Entrepreneurship

CO-PO Mapping Table:

Course Outcomes	Program Outcomes											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	1	2	1	-	-	-	-	-	-	-	-
CO2	1	1	2	-	-		2		1			-
CO3	2	2	1	-	-	-	-	1	-	-	2	
CO4	3	1	2	-	-	-	-	-	-	-	-	2
CO5	2	2	1	-	-	1	-	-	-	-	-	1
Course Correlation Mapping	**2**	**2**	**2**	**2**	**1**	**1**	**2**	**1**	1	**-**	**2**	**2**

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: Introduction2 ***(07 Periods)***

Concept & Definition, Role of Business in the modern Indian Economy SMEs in India, Employment and export opportunities in MSMEs. Issues and challenges of MSMEs

Module 2: MSME Setting ***(09 Periods)***

Identifying the Business opportunity, Business opportunities in various sectors, formalities for setting up an enterprise - Location of Enterprise – steps in setting up an enterprise – Environmental aspects in setting up, Incentives and subsidies.

Module 3: MSMEs Supporting Institutions ***(09 Periods)***

Forms of Financial support, Long term and Short term financial support, Sources of Financial support, Development Financial Institutions, Investment Institutions, Central level institutions, State level institutions, Other agencies, Commercial Bank – Appraisal of Bank for loans

Module 4: Management of MSME ***(10 Periods)***

Management of Product Line; Communication with clients – Credit Monitoring System - Management of NPAs - Restructuring, Revival and Rehabilitation of MSME, Problems of entrepreneurs – sickness in SMI – Reasons and remedies –– Evaluating entrepreneurial performance

Module 5: Entrepreneurship Promotion ***(10 Periods)***

MSME policy in India, Agencies for Policy Formulation and Implementation: District Industries Centers (DIC), Small Industries Service Institute (SISI), Entrepreneurship Development Institute of India (EDII), National Institute of Entrepreneurship & Small Business Development (NIESBUD), National Entrepreneurship Development Board (NEDB)

Total Periods: 45

Topics for self-study are provided in the lesson plan.

EXPERIENTIAL LEARNING

1. Present a case study on MSMEs Business Strategies.
2. Collect the data about nearby MSMEs and Present their structures in a PPT
3. Discuss in the group MSMEs opportunities in terms of Orientation and Develop mentation.

(Note: It's an indicative one. The course instructor may change the activities and the same shall be reflected in course handout.)

RESOURCES

TEXT BOOKS:

1. Vasant Desai, *Small Scale Industries and Entrepreneurship*, Himalaya Publishing House, 2003..
2. Poornima M Charanthimath, *Entrepreneurship Development Small Business Enterprises*, Pearson, 2006.

REFERENCE BOOKS:

1. Suman Kalyan Chaudhury, *Micro Small and Medium Enterprises in India Hardcover*, Raj Publications, 2013.
2. Aneet Monika Agarwal, *Small and medium enterprises in transitional economies, challenges and opportunities*, DEEP and DEEP Publications
3. Paul Burns & Jim Dew Hunt, *Small Business Entrepreneurship*, Palgrave Macmillan publishers, 2010.

VIDEO LECTURES:

https://sdgs.un.org/topics/capacity-development/msmes

https://blog.tatanexarc.com/msme/msme-schemes-in-india-for-new-entrepreneurs-and-start-ups/

WEB RESOURCES:

1. ncert.nic.in/textbook/pdf/kebs109.pdf
2. https://www.jetir.org/papers/JETIR1805251.pdf

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25CE101702	ENVIRONMENTAL POLLUTION AND CONTROL	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on fundamentals of air pollution, dispersion of pollutants, effects and control of air pollution, water pollution, soil pollution and control, and municipal solid waste management.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1 Analyze air and noise pollution using appropriate tools and techniques to solve complex environmental issues following relevant standards considering society, environment and sustainability besides communicating effectively in graphical form.

CO2 Analyze air and noise pollution control measures using appropriate tools and techniques to solve complex environmental issues following relevant standards and latest developments considering society, environment and sustainability besides communicating effectively in graphical form.

CO3 Analyze water pollution and its control measures using appropriate tools and techniques to solve complex environmental issues following relevant standards and latest developments considering society, environment and sustainability besides communicating effectively in graphical form.

CO4 Analyze soil pollution and its control measures using appropriate tools and techniques to solve complex environmental issues following relevant standards and latest developments considering society, environment and sustainability besides communicating effectively in graphical form.

CO5 Analyze solid waste and its management measures using appropriate tools and techniques to solve solid waste disposal issues following relevant standards and latest developments considering society, environment and sustainability besides communicating effectively in graphical form.

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	-	2	2	3	3	2	-	1	-	-
CO2	2	3	-	2	2	3	3	2	-	1	-	1
CO3	2	3	-	2	2	3	3	2	-	1	-	1
CO4	2	3	-	2	2	3	3	2	-	1	-	1
CO5	2	3	-	2	2	3	3	2	-	1	1	1
Course Correlation Mapping	**2**	**3**	**2**	**2**	**2**	**3**	**3**	**2**	**-**	**1**	**1**	**1**

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: AIR AND NOISE POLLUTION ***(08 Periods)***

Air Pollution: Scope, Significance, Classification, Sources – Line, Area, Stationary, Mobile; Effects of air pollutants on man, material and vegetation; Global effects of air pollution; Air pollution meteorology - Lapse rate, Inversion, Plume pattern; Dispersion of air pollutants - Dispersion models and applications; Ambient air quality standards.
Noise Pollution: Sound pressure, Power and intensity, Impacts of noise, permissible limits of noise pollution, measurement of noise, Noise standards.

Module 2: AIR AND NOISE POLLUTION CONTROL ***(10 Periods)***

Self-cleansing properties of the environment, Dilution method, Control at source, Process changes and equipment modifications, Control of particulates – Types of equipment, Design and operation - Settling chambers, Centrifugal separators, Bag house filters, Wet scrubbers, Electrostatic precipitators; Control of gaseous pollutants – Adsorption, Absorption, Condensation, Combustion; Control of air pollution from automobiles, Control of noise pollution, Case studies, Latest developments in the air and noise pollution control.

Module 3: WATER POLLUTION AND CONTROL ***(10 Periods)***

Water pollution – Sources, Causes, Effects; Surface and groundwater quality – Physical, Chemical, Biological; Drinking water quality standards, Water purification – Processes, Engineered systems – Aeration, Solids separation, Settling operations, Coagulation, Softening, Filtration, Disinfection; Wastewater – Sources, Causes, Effects, Treatment process and disposal – Primary, Secondary, Tertiary; Case studies, Latest developments in the water pollution control.

Module 4: SOIL POLLUTION AND CONTROL ***(08 Periods)***

Soil pollutants, Sources of soil pollution, Causes, Effects and control of soil pollution, Diseases caused by soil pollution, Methods to minimize soil pollution, Effective measures to control soil pollution, Soil quality standards, Case studies, Latest developments in the soil pollution control.

Module 5: MUNICIPAL SOLID WASTE MANAGEMENT ***(09 Periods)***

Municipal solid waste – Types, Composition and characteristics; Methods of collection and transportation; Methods of disposal – Open dumping, Sanitary landfill, Composting and Incineration; Utilization - 6R Concept, Recovery and recycling and Energy Recovery; Latest developments in solid waste management.

Total Periods: 45

Topics for self-study are provided in the lesson plan.

EXPERIENTIAL LEARNING

1. Explain plume patterns due to air pollution and meteorology effects and draw a neat sketch of plume pattern from any chimney that you have observed in recent times.
2. Compare the different air pollution control equipment used in India and draw a neat sketch line diagram of equipment you have seen in any of your industrial visit.
3. Submit a study report on Coagulation, Flocculation, Sedimentation, Filtration and Disinfection in your own words after watching a YouTube video on water treatment.
4. Enumerate the effective measures to control soil pollution with any two case studies.

5. Submit a report on case studies on the use of 6Rs concept of Municipal Solid Waste Management.

(Note: It's an indicative one. The course instructor may change the activities and the same shall be reflected in course handout.)

RESOURCES

TEXT BOOKS:

1. Peavy, H. S, Rowe, D. R., and Tchobanoglous, G., *Environmental Engineering*, McGraw Hill Inc., 1985.
2. C. S. Rao, *Environmental Pollution Control Engineering*, New Age International Pvt. Ltd., 2nd Edition, 2007.
3. Ibrahim A. Mirsa, *Soil Pollution: Origin, Monitoring & Remediation*, Springer, UK, 2nd Edition, 2008.

REFERENCE BOOKS:

1. M. N. Rao and H. V. N. Rao, *Air Pollution,* Tata McGraw–Hill Education Pvt. Ltd., 19th Edition, 2010.
2. Daniel Vallero, *Fundamentals of Air Pollution,* Academic Press (Elsevier), 5th Edition, 2014.
3. S. M. Khopkar, *Environmental Pollution Monitoring and Control,* New Age International Pvt. Ltd., 2nd Edition, 2007.
4. V. M. Domkundwar, *Environmental Engineering*, DhanpatRai & Co. Pvt. Ltd., New Delhi, 2014.

VIDEO LECTURES:

1. https://archive.nptel.ac.in/courses/123/105/123105001/
2. https://archive.nptel.ac.in/courses/105/107/105107213/
3. https://archive.nptel.ac.in/courses/103/107/103107084/

WEB RESOURCES:

1. https://www.lkouniv.ac.in/site/writereaddata/siteContent/20200501211601643 5Ranvijay-Pratap-Singh-Environmental-Pollution.pdf
2. https://www.deshbandhucollege.ac.in/pdf/resources/1585622878_HIST_(HONS.)_II_Env-Pollution.pdf
3. https://www.jica.go.jp/jica-ri/IFIC_and_JBICI-Studies/english/publications/reports/study/topical/health/pdf/health_08.pdf
4. https://www.iitr.ac.in/wfw/web_ua_water_for_welfare/education/proceeding_of_short-term_training/diploma/Environmental_Sciences_May_24-28_2007/Lecture_notes/Env_Pollution-rb.pdf
5. https://anits.edu.in/online_tutorials/es/Unit%203.pdf

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25EC101702	**ESSENTIALS OF VLSI**	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course contains the topics that make student realize the need for Testing. The various types of testing along with Fault Modeling. Test methods for evaluation and test generation algorithms, Delay Tests, IDDQ Tests for testing the circuits , Ad-Hoc DFT Methods, Scan Based Designs, Built-In Self Test.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Understand the importance of Testing, fault models and related theorems.

CO2. Analyze various test methods as applicable to digital circuits.

CO3. Appraise the various combinational and sequential circuit test generation algorithms for functional verification of digital circuits

CO4. Assess delay test algorithms and IDDQ test algorithms for at-speed testing of CMOS Integrated Circuits.

CO5. Recognize the concepts and architectures for Built-In Self Test to satisfy industry specifications.

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3					-	-	-	-	-	-	-
CO2	3	3	2	2	2	-	-	-	-	-	-	
CO3	3	3	2	2	2	-	-	-	-	-		-
CO4	3	3	2	2	2	-	2	3	-	-	-	-
CO5	3	-	-	-	-	-	-	3	-	-	-	-
Course Correlation Mapping	**3**	**3**	**2**	**2**	**2**	**-**	**2**	**3**	**-**	**-**	**-**	**-**

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: INTRODUCTION TO VLSI ***(09 Periods)***

Levels of Abstraction, VLSI Design Flow, MOS Transistor - Characteristics, I_{DS} – V_{DS} Relation, NMOS and CMOS Logic – Logic Gates Design, NMOS and CMOS Fabrication Process.

Module 2: CMOS CIRCUIT DESIGN PROCESS ***(10 Periods)***

MOS Layers, Stick Diagrams, NMOS and CMOS Design Styles, Lambda based Design Rules, NMOS and CMOS Layouts for Inverter and Universal Gates, Sheet Resistance, Capacitance and Delay Calculations, Effects of Scaling.

Module 3: SUBSYSTEM DESIGN ***(11 Periods)***

Adders – Manchester Carry Chain Adder, Carry Look Ahead Adder, Carry Select Adder, Carry Skip adder, Barrel Shifter, Multiplier – Array Multiplier, Booth Multiplier.

Module 4: PROGRAMMABLE HARDWARE ***(06 Periods)***

Design Styles, Programmable Interconnects, Field Programmable Gate Arrays, Complex Programmable Logic Devices, Cell based Design Methodology.

Module 5: DESIGN FOR TESTABILITY ***(09 Periods)***

Ad-Hoc DFT Methods, Full Scan Design, Partial Scan Design, Random Logic BIST – Test-per-Clock and Test-per-Scan BIST Systems; Boundary Scan Standard – TAP Controller and Port.

Total Periods: 45

Topics for self-study are provided in the lesson plan.

EXPERIENTIAL LEARNING

1. Develop and Illustrate D – algorithm for Sequential Circuits.
2. Illustrate the applicability of existing testing algorithms for circuits with multiple stuck-at-faults.

(Note: It's an indicative one. The course instructor may change the activities and the same shall be reflected in course handout.)

RESOURCES

TEXT BOOKS:

1. Michael L. Bushnell, Vishwani D. Agrawal*, Essentials of Electronic Testing for Digital, Memory and Mixed-Signal VLSI Circuits,* Kluwer Academic Pulishers, Springer US, New York, 2006*.*

REFERENCE BOOKS:

1. Miron Abramovici, Melvin A. Breur, Arthur D.Friedman, *Digital Systems Testing and Testable Design*, Wiley, Jaico Publishing House, 1st Edition, 2001.
2. Alfred L. Crouch, *Design for Test for Digital ICs & Embedded Core Systems*, Pearson Education, 1st Reprint Edition, 2007.
3. Robert J.Feugate, Jr., Steven M.Mclntyre, *Introduction to VLSI Testing*, Prentice Hall, 1st Illustrated Edition, 1998.

VIDEO LECTURES:

1. https://nptel.ac.in/courses/117105137
2. https://nptel.ac.in/courses/117103125
3. https://nptel.ac.in/courses/106103016
4. https://archive.nptel.ac.in/courses/106/103/106103116/

WEB RESOURCES:

1. https://www.electronics-tutorial.net/vlsi-design-for-testability/IC-Testing.html
2. https://alexromanov.github.io/2022/08/14/what-is-testability/

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25CB101702	**INTRODUCTION TO ETHICAL HACKING**	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on ethical hacking overview, role of security and penetration testers, foot printing, reconnaissance and scanning networks, enumeration and vulnerability analysis, system hacking, network protection systems.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Understand and recognize role of security and penetration testers to protect the system from malware attacks.

CO2. Apply the foot printing tools to find the vulnerabilities in the system.

CO3. Analyze vulnerabilities to find the system security loopholes or flaws in networked systems within a given range of IP

CO4. Apply the web attackers tools to assess the website's security

CO5. Identify the possible incidents and threats, alert administrators, and prevent potential attacks using IDS

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-
CO3	3	3	3	-	-	-	-	-	-	-	-	-
CO4	3	3	3	2	-	-	-	-	-	-	-	-
CO5	3	2	3	2	-	-	-	-	-	-	-	-
Course Correlation Mapping	**3**	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: INTRODUCTION ***(10 Periods)***

Ethical Hacking Overview, Role of Security and Penetration Testers .Penetration, Testing Methodologies, Laws of the Land, Overview of TCP/IP, The Application Layer, The Transport Layer, The Internet Layer, IP Addressing, Network and Computer Attacks, Malware, Protecting Against Malware Attacks, Intruder Attacks, Addressing Physical Security.

Module 2: FOOT PRINTING, RECONNAISSANCE AND SCANNING NETWORKS ***(09 Periods)***

Foot printing Concepts, Foot printing through Search Engines, Web Services, Social Networking Sites, Website, Email, Competitive Intelligence, Foot printing through Social Engineering, Foot printing Tools, Network Scanning Concepts, Port-Scanning Tools, Scanning Techniques, Scanning Beyond IDS and Firewall

Module 3: ENUMERATION AND VULNERABILITY ANALYSIS ***(09 Periods)***

Enumeration Concepts, NetBIOS Enumeration, SNMP, LDAP, NTP, SMTP and DNS Enumeration, Vulnerability Assessment Concepts, Desktop and Server OS Vulnerabilities, Windows OS Vulnerabilities, Tools for Identifying Vulnerabilities in Windows, Linux OS Vulnerabilities, Vulnerabilities of Embedded Oss.

Module 4: SYSTEM HACKING ***(10 Periods)***

Hacking Web Servers, Web Application Components, Vulnerabilities, Tools for Web Attackers and Security Testers Hacking Wireless Networks, Components of a Wireless Network, Wardriving, Wireless Hacking, Tools of the Trade.

Module 5: NETWORK PROTECTION SYSTEMS ***(07 Periods)***

Access Control Lists, Cisco Adaptive Security Appliance Firewall, Configuration and Risk Analysis Tools for Firewalls and Routers, Intrusion Detection and Prevention Systems, Network, Based and Host-Based IDSs and IPSs, Web Filtering, Security Incident Response Teams, Honeypots.

Total Periods: 45

Topics for self-study are provided in the lesson plan.

EXPERIENTIAL LEARNING

1. **List out various ways used to Protect Yourself from Hackers.**
2. **Demonstrate how do White Hackers work?**
3. **Demonstrate The bug bounty program.**

(Note: It's an indicative one. The course instructor may change the activities and the same shall be reflected in course handout.)

RESOURCES

TEXT BOOKS:

1. Michael T. Simpson, Kent Backman, and James E. Corley, *Hands-On Ethical Hacking and Network Defense, Course Technology*, Delmar Cengage Learning, 2010.
2. Patrick Engebretson, *The Basics of Hacking and Penetration Testing*, SYNGRESS, Elsevier, 2013.

REFERENCE BOOKS:

1. Dafydd Stuttard and Marcus Pinto, *The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws*, Wiley, 2nd Edition, 2011.
2. Justin Seitz, *Black Hat Python: Python Programming for Hackers and Pentesters*, 2nd Edition, 2014.

VIDEO LECTURES:

1. https://www.coursera.org/learn/ethical-hacking-essentials-ehe
2. https://www.udacity.com/course/ethical-hacker-nanodegree--nd350

WEB RESOURCES:

1. https://github.com/PacktPublishing/Python-Ethical-Hacking
2. https://www.youtube.com/watch?v=x3IwvPvDpKE

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25BS101703	**FORENSIC SCIENCE**	3	-		-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on Concepts of Forensic Science, Tools and Techniques in Forensic Science, Forensic Photography, Crime Scene Management, Crime Scene Management Laws and Forensic Science.

COURSE OUTCOMES: *After successful completion of the course, students will be able to*:

CO1 Understand the basic concepts of Forensic science.

CO2 Apply various tools and techniques in forensic science for crime investigation.

CO3 Understand Forensic Photography fundamentals.

CO4 Perform Crime scene investigation, scene reconstruction and prepare reports.

CO5 Understand Legal aspects of Forensic Science.

CO-PO Mapping Table:

Course Outcomes	Program Outcomes											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2	2	2	-	-	-	-	-	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-
CO4	3	3	2	2	2	-	-	-	-	-	-	-
CO5	3	3	2	2	2	-	-	-	-	-	-	-
Course Correlation Mapping	**3**	**3**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: INTRODUCTION ***(09 Periods)***

Introduction, Need, Scope, Concepts and Significance of Forensic Science, History and Development of Forensic Science, Laws and Basic principles of Forensic Science, Branches of forensic science, Organizational set-up of a Forensic Science Laboratory. Investigative strategies. Expert testimony and eye-witness report.

Module 2: TOOLS AND TECHNIQUES IN FORENSIC SCIENCE ***(09 Periods)***

Basic principles of microscopy, spectroscopy, chromatography, Electrophoresis, Enzyme_Linked Immunosorbent Assay (ELISA), Radio Immuno Assay (RIA). Measuring and optical instruments. Research methodologies; Formation of research design on a specific problem. Central tendency and Dispersion. Test of significance. Analysis of variance, Correlation and Regression.

Module 3: FORENSIC PHOTOGRAPHY ***(8 Periods)***

Basic principles of Photography, Techniques of black & white and color photography, cameras, lenses, shutters, depth of field, film; exposing, development and printing techniques; Different kinds of developers and fixers; UV, IR, fluorescence illumination guided photography; Modern development in photography- digital photography, working and basic principles of digital photography; Surveillance photography. Videography and Crime Scene & laboratory photography.

Module 4: CRIME SCENE MANAGEMENT ***(11 Periods)***

Crime scene investigations, protecting and isolating the crime scene; Documentation, sketching, field notes and photography. Searching, handling and collection, preservation and transportation of physical evidences, Chain of custody and Reconstruction of scene of crime. Report writing.

Module 5: LAW AND FORENSIC SCIENCE ***(8 Periods)***

Legal aspects of Forensic Science: Forensic Science in the Criminal Justice System, The Criminal Investigation Process, Production of Evidence: The Subpoena, The Rules of Evidence, Authentication of Evidence: The Chain of Custody, The Admissibility of Evidence, Laboratory Reports, Examples of Analysis and Reports, Expert Testimony, Getting into Court, Testifying, Being a Witness and an Expert, Considerations for Testimony.

Total Periods: 45

Topics for self-study are provided in the lesson plan.

EXPERIENCIAL LEARNING

ıdy of Computer Forensics and different tools used for forensic investigation

ıtify and list the steps for hiding and extract any text file behind an image file/ Audio file using Command Prompt

(Note: It's an indicative one. The course instructor may change the activities and the same shall be reflected in course handout.)

RESOURCES

TEXT BOOKS:

1. Houck M.M and Siegel J.A, Fundamentals of Forensic Science, Elsevier, 2nd edition, 2010.
2. Sharma B.R, Forensic Science in Criminal Investigation and Trials, Universal Publishing Co., New Delhi, 2003.

REFERENCE BOOKS:

1. Nanda B.B and Tewari, R.K, Forensic Science in India- A vision for the Twenty First Century, Select Publisher, New Delhi, 2001.
2. James, S.H and Nordby, J.J, Forensic Science- An Introduction to Scientific and Investigative Techniques, CRC Press, USA, 2003.
3. Saferstein, Criminalistics, An Introduction of Forensic Science, Prentice Hall Inc, USA, 2007.
4. Barry, A.J. Fisher, Techniques of Crime Scene Investigation, CRC Press, New York, 7th edition, 2003.

VIDEO LECTURES:

1. :ps://nptel.ac.in/courses/106106178
2. https://www.youtube.com/watch?v=X5fo1H7bc0g

WEB RESOURCES:

1. :ps://www.nist.gov/forensic-science
2. https://www.coursera.org/learn/forensic-science

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25EC101703	**INSTRUMENTATION IN INDUSTRIES**	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on measurement of various parameters like displacement, force, torque, acceleration, velocity, density, viscometer, hygrometers, temperature, pressure, level and flow.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1 Select appropriate displacement, force and torque measuring devices for specific measurement application.

CO2 Identify suitable acceleration, velocity and density measuring devices for specific measurement application.

CO3 Apply suitable viscometer and hygrometer for measurement of viscosity, humidity and moisture for a specific application.

CO4 Select appropriate temperature and pressure transducer for an industrial requirement.

CO5 Identify appropriate level and flow transducer for measurement of level and flow for a specific application.

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	-	3	-	-	-	-	-	-	-	-
CO2	3	2	-	3	-	-	-	-	-	-	-	-
CO3	3	2	-	3	-	-	-	-	-	-	-	-
CO4	3	2	-	3	-	-	-	-	-	-	-	-
CO5	3	2	-	3	-	-	-	-	-	-	-	-
Course Correlation Mapping	**3**	**2**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: DISPLACEMENT, FORCE & TORQUE MEASUREMENT ***(08 Periods)***

Displacement Measurement: Introduction, Strain gauge, LVDT, Capacitive Gauges and applications.

Force Measurement: Introduction, Analytical Balance, Spring Balance, Load cells.

Torque Measurement: Introduction, Strain gauge, Relative angular twist and applications.

Module 2: ACCELERATION, VELOCITY & DENSITY MEASUREMENT ***(08 Periods)***

Acceleration Measurement: Introduction, LVDT, Piezoelectric, Strain gauge and Variable reluctance type accelerometers and applications.

Velocity Measurement: Introduction, Revolution Counter, Capacitive Tacho, Drag-cup Type, Tacho and Stroboscope and applications.

Density Measurement: Introduction, Pressure type densitometers, Float type densitometers, Ultrasonic densitometer and gas densitometer.

Module 3: VISOCITY, HUMIDITY & MOISTURE MEASUREMENT ***(09 Periods)***

Viscosity Measurement: Introduction, friction tube viscometer, say bolt's viscometer, rotameter viscometer, Searle's rotating cylinder, cone and plate viscometer.

Humidity Measurement: Introduction, Dry and wet bulb psychrometers, Resistive and capacitive type hygrometers

Moisture Measurement: Introduction, Thermal Conductivity and Capacitive sensors, Applications of moisture measurement, Moisture measurement in solids.

Module 4: TEMPERATURE & PRESSURE MEASUREMENT ***(10 Periods)***

Temperature Measurement: Definitions and standards, RTD, Thermistor, Thermocouples: Laws of thermocouple, Reference junctions compensation, Radiation fundamentals, Radiation methods of temperature measurement, Total radiation pyrometers, Optical pyrometers, Applications.

Pressure Measurement: Introduction, manometer and its types, elastic transducers Bourdon tube, diaphragm, bellows, electrical types, resistive, inductive and capacitive, Thermal conductivity gage, Ionization gage, Sound level meter, Microphone, Applications.

Module 5: LEVEL & FLOW MEASUREMENT ***(10 Periods)***

Level Measurement: Introduction, Gauge Glass technique, Float Types – Float–and– tape method, Float–and–shaft method, Magnetic float types. Electrical types – Resistance switch type, Inductive and Capacitance type. Ultrasonic methods. Applications

Flow Measurement: Introduction, Head types – Orifice, Venturi, Flow Nozzle. Rotameter & types. Coriolis flow meter, Gyroscopic flow meter, Liquid bridge mass flow meter, Calorimetric flow meter. Electromagnetic flow meter, Ultrasonic flow meter, Hotwire anemometer type. Applications.

Total Periods: 45

Topics for self-study are provided in the lesson plan.

EXPERIENTIAL LEARNING

1. Record temperature from RTD and convert temperature in to voltage.
2. Measure the speed of rotating shaft using stroboscope.
3. Record level of the tank using suitable device.
4. Measure the flow rate of water in boiler plant.
5. Measure the displacement using LVDT.

(Note: It's an indicative one. The course instructor may change the activities and the same shall be reflected in course handout.)

RESOURCES

TEXT BOOKS:

1. K. Sawhney, *A Course in Electrical and Electronics Measurements and Instrumentation*, Dhanpat Rai and Sons, New Delhi, 19th Revised Edition, 2013
2. D. Patranabis, *Principles of Industrial Instrumentation*, TMH, 3rd Edition, 2010.

REFERENCE BOOKS:

1. Ernest Doebelin & Dhanesh Manik, *Measurement Systems*, McGraw Hill International, 6th Edition, 2011.

VIDEO LECTURES:

1. https://www.vlab.co.in/
2. https://archive.nptel.ac.in/courses/103/103/103103135/
3. https://nptel.ac.in/courses/103103135

WEB RESOURCES:

1. https://www.tutorialspoint.com/electronic_measuring_instruments/index.htm
2. https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/108105064/lec1.pdf
3. https://www.ibiblio.org/kuphaldt/socratic/sinst/book/liii.pdf.

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25AI101701	**INTRODUCTION TO ARTIFICIAL INTELLIGENCE**	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion and hands-on experience on Introduction to Artificial Intelligence, Designing intelligent agents, Solving general purpose problems, Search in complex environments, Represent knowledge, Robotics, Ethics.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1 alyze and Architect intelligent agents using Artificial Intelligence Techniques and principles

CO2 Analyze the usage of Knowledge representation techniques in Artificial Intelligence

CO3 Analyze and interpret the problem, identify suitable solutions using heuristic functions and search algorithms

CO4 Investigate robot hardware and frameworks for intelligent robotic perception.

CO5 Demonstrate knowledge on ethical implications of intelligent machines for providing privacy, trust, security and safety.

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	1	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	-
CO4	3	-	-	-	-	1	-	-	-	-	-	-
CO5	-	-	-	-	-	1	-	2	-	-	-	-
Course Correlation Mapping	**3**	**3**	**2**	**-**	**-**	**1**	**-**	**2**	**-**	**-**	**-**	**-**

Correlation Levels: ***3: High;*** ***2: Medium; 1: Low***

COURSE CONTENT

Module 1: INTRODUCTION TO ARTIFICIAL INTELLIGENCE ***(09 Periods)***

Foundations of artificial intelligence, History of artificial intelligence, State of the art, Risks and benefits of AI, Intelligent agents – Agents and environments, The concept of rationality, Structure of agents.

Module 2: KNOWLEDGE & REASONING ***(09 Periods)***

Logic, Propositional Logic, Propositional Theorem Proving: Inference and proofs, Proof by resolution, Horn clauses and definite clauses.

First-Order Logic - Syntax and Semantics of First-Order Logic, Using First Order Logic, Knowledge Engineering in First-Order Logic. Inference in First-Order Logic: Propositional vs. First-Order Inference, Unification, Forward Chaining, Backward Chaining, Resolution.

Module 3: PROBLEM SOLVING BY SEARCHING ***(09 Periods)***

Problem solving agents, Search algorithms, Uninformed search strategies, Informed search strategies – Greedy best-first search, A* search; Heuristic functions.

Module 4: SEARCH IN COMPLEX ENVIRONMENTS ***(09 Periods)***

Local search algorithms and optimization problems – Hill-climbing search, Simulated annealing, Local beam search, Evolutionary algorithms; Optimal decisions in games – The minimax search algorithm, Optimal decisions in multiplayer games, Alpha-Beta pruning, Move ordering; Monte Carlo tree search.

Module 5: ROBOTICS ***(09 Periods)***

Robots, Robot hardware, Robotic perception, Alternative robotic frameworks, Application domains.

Limits of AI, Ethics of AI – Surveillance, security and privacy, Fairness and bias, Trust and transparency, AI safety

Total Periods: 45

Topics for self-study are provided in the lesson plan.

EXPERIENTIAL LEARNING

LIST OF EXERCISES:

1. Design and implement agent programs for Table-driven agents using the agent function of vacuum-cleaner world. The agent cleans the current square if it is dirty, otherwise it moves to the other square.
2. Implement agent programs for Simple reflex agents and Model-based reflex agents using the agent function of vacuum-cleaner world.
3. Solve the travelling sales man problem using Hill Climbing search algorithm

(Note: It's an indicative one. The Course Instructor may change the activities and the same shall be reflected in Course Handout)

RESOURCES

TEXT BOOKS:

1. Stuart Russell, Peter Norvig, *Artificial Intelligence: A Modern Approach*, Prentice Hall, 4th Edition, 2020.

REFERENCE BOOKS:

1. Stephen Lucci, Danny Kopec, *Artificial Intelligence in the 21st Century*, Mercury Learning and Information, 3rd Edition,2018
2. Rich, Knight, Nair*, Artificial intelligence*, Tata McGraw Hill, Third Edition, 2009.
3. Deepak Khemani, *A First Course in Artificial Intelligence*, McGraw Hill Education, 2017.
4. Saroj Kaushik, *Artificial Intelligence*, Cengage Learning, 2011.

SOFTWARE/TOOLS:

1. Python
2. pandas, matplotlib

VIDEO LECTURES:

1. https://searchenterpriseai.techtarget.com/definition/AI-Artificial-Intelligence
2. http://aima.cs.berkeley.edu/
3. https://ai.google/education/
4. https://www.coursera.org/courses?query=artificial%20intelligence
5. https://www.edureka.co/blog/artificial-intelligence-with-python/

WEB RESOURCES:

1. http://www.airesources.org/
2. https://allthingsai.com/
3. https://designmodo.com/ai-tools-designers/
4. https://www.ulethbridge.ca/teachingcentre/chatgpt-ai-resources

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25DS101702	**INTRODUCTION TO DATA SCIENCE**	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on Introduction to Data Science; Data Collection and Data Pre-Processing, Exploratory Data Analytics, Model Development, and Model Evaluation**.**

COURSE OUTCOMES: *After successful completion of the course, students will be able to*:

CO1. Demonstrate knowledge on Data science concepts.
CO2. Perform data collection and pre-processing.

CO3. Perform exploratory data analytics.

CO4. Design and develop data visualization models.

CO5. Evaluate performance of data models.

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	2	2	3	2	2	-	-	-	-	-	-	-
CO3	2	2	2	3	2	-	-	-	-	-	-	-
CO4	2	3	2	2	2	-	-	-	-	-	-	-
CO5	3	2	2	2	2	-	-	-	-	-	-	-
Course Correlation Mapping	**3**	**2**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

Correlation Levels: ***3: High*** ***2: Medium*** ***1: Low***

COURSE CONTENT

Module 1: INTRODUCTION **(09 Periods)**

Introduction to Data Science, Evolution of Data Science, Data Science Roles, Stages in a Data Science Project, Applications of Data Science in various fields, Data Security Issues.

Module 2: DATA COLLECTION AND DATA PRE-PROCESSING **(09 Periods)**

Data Collection Strategies, Data Pre-Processing- Overview, Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization.

Module 3: EXPLORATORY DATA ANALYTICS (09 Periods)

Descriptive Statistics, Mean, Standard Deviation, Skewness and Kurtosis, Box Plots, Pivot Table, Heat Map, Correlation Statistics, ANOVA.

Module 4: MODEL DEVELOPMENT (09 Periods)

Simple and Multiple Regression, Model Evaluation using Visualization, Residual Plot, Distribution Plot, Polynomial Regression and Pipelines, Measures for In-sample Evaluation, Prediction and Decision Making.

Module 5: MODEL EVALUATION (09 Periods)

Generalization Error, Out-of-Sample Evaluation Metrics, Cross Validation, Overfitting, Under Fitting and Model Selection, Prediction by using Ridge Regression, Testing Multiple Parameters by using Grid Search.

Total Periods:45

Topics for self-study are provided in the lesson plan.

EXPERIENTIAL LEARNING

1. **Use Case:** A human can express his emotions in any form, such as the face, gestures, speech and text. The detection of text emotions is a content-based classification problem. Detecting a person's emotions is a difficult task, but detecting the emotions using text written by a person is even more difficult as a human can express his emotions in any form. Recognizing this type of emotion from a text written by a person plays an important role in applications such as chatbots, customer support forum, customer reviews etc. So, you have to train a machine learning model that can identify the emotion of a text by presenting the most relevant emoji according to the input text.
2. **Use Case:** Customer Personality Analysis is a detailed analysis of a company's ideal customers. It helps a business to better understand its customers and makes it easier for them to modify products according to the specific needs, behaviours and concerns of different types of customers.
   You have to do an analysis that should help a business to modify its product based on its target customers from different types of customer segments. For example, instead of spending money to market a new product to every customer in the company's database, a company can analyze which customer segment is most likely to buy the product and then market the product only on that particular segment.

(Note: It's an indicative one. The Course Instructor may change the activities and the same shall be reflected in Course Handout)

RESOURCES

TEXT BOOKS:

1. Cathy O'Neil and Rachel Schutt, Doing Data Science, O'Reilly, 2015

REFERENCE BOOKS:

1. David Dietrich, Barry Heller, Beibei Yang, Data Science and Big Data Analytics, EMC 2013.
2. Davy cielen, Introducing Data Science, Manning Publications, 2022.
3. Chirag Shah, A Hands-on Introduction to Data Science, Cambridge University Press, 2020

VIDEO LECTURES:

1. :ps://www.youtube.com/watch?v=JL_grPUnXzY&list=PLeo1K3hjS3us_ELKYSj_Fth2tIEkdKXvV
2. https://www.youtube.com/watch?v=-ETQ97mXXF0

WEB RESOURCES:

1. :ps://swayam.gov.in/nd1_noc19_cs60/preview
2. :ps://towardsdatascience.com/
3. https://www.w3schools.com/datascience/
4. :ps://github.com/jakevdp/PythonDataScienceHandbook
5. :ps://www.kaggle.com

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25AI101702	**INTRODUCTION TO MACHINE LEARNING**	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on Introduction to machine learning, Bayesian concept learning, Supervised learning, Unsupervised learning, Artificial neural networks.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1 Analyze the process of machine learning modeling and evaluation to automatically infer a general description for a given learning problem.

CO2 Analyze the underlying mathematical models within machine learning algorithms and learning tasks.

CO3 Design and implement machine learning solutions for classification, regression, and clustering problems.

CO4 Design and implement efficient neural architectures to model patterns for a given learning problem.

CO5 Develop intelligent solutions to solve societal problems related to computer vision, information security, healthcare and other areas.

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	2	3	-	-	-	-	-	-	-	-	-	-
CO3	2	3	3	3	3	-	-	-	-	-	-	-
CO4	3	3	3	1	-	-	-	-	-	-	-	-
CO5	1	3	3	3	3	3	-	-	-	-	-	-
Course Correlation Mapping	**3**	**3**	**3**	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: INTRODUCTION TO MACHINE LEARNING ***(10 Periods)***

Machine Learning: Human learning, Types of human learning, Machine learning, Types of machine learning, Applications of machine learning, Issues in machine learning, Machine learning activities, Types of data, Selecting a model, Training a

model, Model representation and interpretability, Evaluating performance of a model, Improving performance of a model.

Module 2: BAYESIAN CONCEPT LEARNING ***(07 Periods)***

Introduction, Importance, Bayes' theorem, Bayes optimal classifier, Naïve Bayes classifier, Applications of Bayes classifier.

Module 3: SUPERVISED LEARNING ***(10 Periods)***

Classification: Classification model, Classification learning steps, K-Nearest Neighbor, Decision Tree, Support vector machines.

Regression: Introduction, Simple linear regression, Improving accuracy of the linear regression model, Multiple linear regression, Assumptions and problems in regression analysis.

Module 4: UNSUPERVISED LEARNING ***(09 Periods)***

Introduction, Unsupervised vs supervised learning, Applications of unsupervised learning, Clustering as a machine learning task, Types of clustering techniques, Partitioning methods, K-Medoids, Hierarchical clustering, DBSCAN.

Module 5: ARTIFICIAL NEURAL NETWORKS ***(09 Periods)***

Artificial neuron, Types of activation functions, Early implementations of ANN, Architectures of neural network, Learning process in ANN, Backpropagation.

Total Periods: 45

Topics for self-study are provided in the lesson plan.

EXPERIENTIAL LEARNING

1. Use Naïve Bayes classifier to solve the credit card fraud detection problem.
2. Build a neural network that will read the image of a digit and correctly identify the number.

(Note: It's an indicative one. The Course Instructor may change the activities and the same shall be reflected in Course Handout)

RESOURCES

TEXT BOOKS:

1. Tom M. Mitchell, *Machine Learning*, McGraw Hill, 1997.
2. Saikat Dutt, Subramanian Chandramouli, Amit kumar das, *Machine Learning*, Pearson, 2019.

REFERENCE BOOKS:

1 Manaranjan Pradhan, U Dinesh Kumar, *Machine Learning Using Python*, Packt Publishing, 2019.

2 Aurelien Geron, *Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems*, O'Reilly, 2nd Edition, 2019.

3 Ethem Alpaydin, *Introduction to Machine Learning*, MIT Press, 4th Edition, 2020.

4 Shai Shalev Shwartz, Shai Ben David, *Understanding Machine Learning: From Theory to Algorithms*, Cambridge University Press, 2014.

VIDEO LECTURES:

1 https://nptel.ac.in/courses/106106202/
2 https://www.coursera.org/learn/machine-learning
3 https://onlinecourses.nptel.ac.in/noc23_cs18/preview
4 https://onlinecourses.nptel.ac.in/noc23_cs87/preview
5 https://onlinecourses.nptel.ac.in/noc23_ee87/preview
6 https://www.coursera.org/learn/ntumlone-algorithmicfoundations
7 https://www.coursera.org/specializations/machine-learning-introduction
8 http://ndl.iitkgp.ac.in/document/YkxlRXFvZXJrTDBkVzVVZi9ESjl6eXpRZkxRc2lhOWhlVXBhUVVWaXZlNDNyZUVldU9LdlYvd20wbkQ4MC92UQ
9 https://www.coursera.org/learn/unsupervised-learning-recommenders-reinforcement-learning

WEB RESOURCES:

1 https://www.ibm.com/topics/machine-learning
2 https://www.simplilearn.com/tutorials/machine-learning-tutorial/what-is-machine-learning
3 https://www.w3schools.com/python/python_ml_getting_started.asp
4 https://developers.google.com/machine-learning/crash-course
5 https://www.greenteapress.com/thinkstats/
6 https://info.deeplearning.ai/machine-learning-yearning-book
7 https://www.kaggle.com/code/kanncaa1/machine-learning-tutorial-for-beginners
8 https://machinelearningmastery.com/machine-learning-in-python-step-by-step/

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25CS101701	**INTRODUCTION TO PYTHON PROGRAMMING**	3	-	-	-	3

Pre-Requisite -
Anti-Requisite -
Co-Requisite -

COURSE DESCRIPTION: This course is aimed at offering the fundamental concepts of Python scripting language to the students. It starts with the basics of Python programming and deals with lists, dictionaries, functions, exceptions and files. The objective of this course is to enable the students to develop the applications using the concepts of Python.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Understand the basic terminology used in computer programming to write, compile and debug programs in Python programming language.
CO2. Use appropriate data type for handling user data and write optimized programs using the functions, and statements.
CO3. Manage the exceptions raised during the program execution and avoid abrupt termination of the program execution.
CO4. Process files and solve real world problems using classes and objects in the Python programming environment.

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	3	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	-	-	2	-	-	-	-	-
CO3	3	3	3	-	-	-	-	-	-	-	2	-
CO4	2	3	3	-	-	-	-	2	-	-	-	-
Course Correlation Mapping	**3**	**3**	**3**	**-**	**-**	**-**	**2**	**2**	-	**-**	**2**	**-**

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: DATA TYPES AND INPUT/OUTPUT ***(09 Periods)***

Internal working of Python, Python character set, Tokens, Python Core Data Types (list, set, tuple, and dctionary), The print () function, Assignment of values to variables, The input() function, The eval() function.

Module 2: OPERATORS AND CONTROL STATEMENTS ***(09 Periods)***

Operators- Arithmetic Operators, Operator precedence and Associativity, Bitwise operator,

The compound assignment operator; Decision statements- Boolean operators, Boolean Expressions and Relational operators, Decision making statements; Loop Control Statements-while loop, range() function, for loop; break statement, continue statement.

Module 3: FUNCTIONS AND LISTS ***(09 Periods)***

Functions- Syntax and basics of a function, Use of a function, Parameters and arguments in a function, The local and global scope of a variable, The return statement, Recursive functions, The lambda function; Lists-Creating Lists, Accessing the elements of a List, List slicing, Python in-built functions for lists, List Comprehension, List Methods, Passing list to a function, Returning a list to function.

Module 4: TUPLES, SETS AND DICTIONARIES ***(09 Periods)***

Tuples - Creating tuples, tuple() function, Inbuilt functions for tuples, Indexing and Slicing, Operations on tuples, Passing variable length arguments to tuples, Sort tuples, Traverse tuplesfrom a list, The zip()function, The Inverse zip(*) function; Sets - Creating sets, The set in and not in operator, The Python Set Class, Set operations; Dictionaries -Basics of Dictionaries, Creating a Dictionary, Adding and replacing values, Retrieving values, Formatting dictionaries, Deleting items, Comparing two dictionaries, Methods of dictionary class, Traversing dictionaries, Nested dictionaries, Traversing nested dictionaries.

Module 5: V FILES ***(09 Periods)***

File Handling-Opening a file, Writing Text, Closing files, Writing numbers to a file, Reading Text, Reading numbers from a file, Appending data, seek() function.

Total Periods: 45

Topics for self-study are provided in the lesson plan.

RESOURCES

TEXTBOOKS:

1. hok Namdev kamthane and Amit Ashok Kamthane, Programming and Problem solving with PYTHON, McGraw Hill Education, 1st Edition, 2016.

REFERENCE BOOKS:

1. en Downey, Think Python, Green Tea Press, 1st Edition, 2016.
2. J. Chun, Core Python Programming, Prentice Hall, 3rd Edition, 2013.
3. nneth A. Lambert, Fundamentals of Python, Cengage, 2nd Edition, 2015.

VIDEO LECTURES:

1. https://onlinecourses.nptel.ac.in/noc19_cs41/preview
2. https://www.coursera.org/specializations/python
3. https://www.coursera.org/learn/python-for-applied-data-science-ai
4. https://www.youtube.com/watch?v=WGJJIrtnfpk
5. https://www.youtube.com/watch?v=_uQrJ0TkZlc
6. https://www.udemy.com/topic/python/
7. https://freevideolectures.com/course/2512/python-programming

WEB RESOURCES:

1. https://www.w3schools.com/python/
2. https://www.programiz.com/python-programming
3. https://www.geeksforgeeks.org/python-programming-language/
4. https://www.javatpoint.com/python-lists
5. https://www.learnpython.org/

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25CB101704	**INTRODUCTION TO INTERNET OF THINGS**	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is emphasize on the Architecture of IoT and Summarize the roles of various organizations for IoT, To Develop simple applications using Arduino and Rasberry, Test for errors in the application, Predict the market value, Experiment with embedded boards for creating IoT prototypes, To understand the domain specific IoTs and IoT system management.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1 Understand the fundamental concepts of IoT and physical computing.

CO2 Demonstrate knowledge on variety of embedded boards and IoT Platforms

CO3 Understand the communication protocols in IoT communications.

CO4 Demonstrate knowledge on Domain specific IoT applications.

CO5 Understand the IoT System management and network management protocols.

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-
CO4	3	3	3	-	-	-	-	-	-	-	-	-
CO5	3	2	2				-	-	-	-	-	-
Course Correlation	**3**	**3**	**3**	**-**	**-**	**-**	-	-	-	-	-	-

Mapping												

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: Overview of IoT ***(09 Periods)***

The Internet of Things: An Overview, The Flavour of the Internet of Things, The "Internet" of "Things", The Technology of the Internet of Things, Enchanted Objects, Who is Making the Internet of Things?

Design Principles for Connected Devices: Calm and Ambient Technology, Privacy, Web Thinking for Connected Devices, Affordances.

Prototyping: Sketching, Familiarity, Costs Vs Ease of Prototyping, Prototypes and Production, Open source Vs Close source, Tapping into the community.

Module 2: Embedded Devices: ***(09 Periods)***

Electronics, Embedded Computing Basics, Arduino, Raspberry Pi, Mobile phones and tablets, Plug Computing: Always-on Internet of Things

Module 3 Communication in the IoT: ***(09 Periods)***

Internet Communications: An Overview, IP Addresses, MAC Addresses, TCP and UDP Ports, Application Layer Protocols

Prototyping Online Components: Getting Started with an API, Writing a New API, Real-Time Reactions, Other Protocols Protocol

Module 4 Domain specific IoTs ***(09 Periods)***

Introduction: Home automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health and Lifestyle

Module 5 IoT and M2M ***(09 Periods)***

Introduction- M2M, Difference between IoT and M2M, SDN and NFV for IoT

IoT System Management with NETCONF-YANG: Need for IoT Systems Management, Simple network management protocol(SNMP), Network operator requirements, NETCONF,YANG

Total Periods: 45

Topics for self-study are provided in the lesson plan.

EXPERIENTIAL LEARNING

1. (a) Design and Simulate LED 7-Segment Display interfacing with Arduino.
   (b) Design and Simulate Servo motor interfacing with Arduino.
2. (a) Design and Simulate ultrasonic sensor and LCD interfacing with Arduino.
   (b) Design and Simulate Flame Sensor interfacing with Arduino.

(Note: It's an indicative one. The Course Instructor may change the activities and the same shall be reflected in Course Handout)

RESOURCES

TEXT BOOKS:

1. rian McEwen, Hakim Cassimally, Designing the Internet of Things, Wiley Publications, 2012

2. shdeep Bahga, Vijay Madisetti, Internet of Things: A Hands-On Approach, Universities Press, 2014.

REFERENCE BOOKS:

1. thuru Raj, Anupama C. Raman, The Internet of Things, Enabling technologies and use cases, CRC Press.

VIDEO LECTURES:

1. :ps://www.digimat.in/nptel/courses/video/106105166/L01.html

2. :ps://www.youtube.com/watch?v=oBZnySDgst8

WEB RESOURCES:

1. :ps://www.arduino

2. https://www.raspberrypi.org/

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25ME101705	**MATERIAL SCIENCE**	**3**	**-**	**-**	**-**	**3**

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: Materials Structure and Constitution of Alloys; Heat treatment of steels; Properties of ferrous materials and its alloys; Properties of non-ferrous materials and its alloys; Properties and applications of Ceramics, Polymers and Composite materials.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Ability to understand and apply the principles of materials science to analyze and design materials for specific applications.

CO2. Analyze the properties of materials and enhance the same through heat-treatment processes.

CO3. Demonstrate the knowledge of ferrous and Non-ferrous materials and its alloys for engineering applications.

CO4. Understand the relationship between materials properties and structure at the atomic and molecular level.

CO5. Demonstrate the knowledge of Ceramics, Polymers, and Composite materials for suitable engineering applications.

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	1	-	-	-	-	-	-	1	-	-
CO2	3	3	1	-	-	-	-	-	-	1	-	-
CO3	3	1	-	-	-	-	-	-	-	-	-	-
CO4	3	1	-	-	-	-	-	-	-	-	-	-
CO5	3	1	-	-	-	-	-	-	-	-	-	-
Course Correlation Mapping	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: MATERIALS STRUCTURE AND CONSTITUTION OF ALLOYS ***(09 Periods)***

Materials Structure: Space lattice, Unit cells and Metallic crystal structures (SC, BCC, FCC

and HCP), Crystal defects: Point, Line, Interstitial and Volume, Primary and secondary bonding in materials.

Constitution of Alloys: Necessity of Alloying, Gibbs's phase and Hume Rothery rule, Iron Iron-carbide diagram and its microstructural aspects.

Module 2: HEAT TREATMENT OF STEELS ***(09 Periods)***

Annealing, Normalizing, Tempering, Carburization and Hardening- Austempering, Martempering, Carburizing, Nitriding, Cyaniding, Carbo-Nitriding, Flame and Induction Hardening, Vacuum and Plasma Hardening, Time-Temperature-Transformation Diagrams and Continuous Cooling Transformation Diagrams.

Module 3: FERROUS MATERIALS AND ALLOYS ***(09 Periods)***

Steels: Structure, properties, classifications and applications of plain steels, Specifications of steels, Structure, properties, classifications and applications of low alloy steels, Hadfield manganese steels, Stainless steel and Tool steels.

Cast iron: Structure, properties and applications of Gray cast iron, White cast iron, Malleable cast iron, Nodular cast iron and Alloy cast iron.

Module 4: NON-FERROUS MATERIALS AND ALLOYS ***(09 Periods)***

Structure, properties and applications of Copper and its alloys, Aluminium and its alloys, Titanium and its alloys, Nickel and its alloys, Magnesium and its alloys, Refractory and Precious metals.

Module 5: CERAMICS, POLYMERS AND COMPOSITES MATERIALS ***(09 Periods)***

Ceramics: Classifications, Properties and Applications, Glass-ceramics, Polymers: Classification, Properties and Applications, Polymerization Reaction,

Composites: Classifications, Properties and Applications of Polymer matrix composites, Ceramic matrix composites, Metal matrix composites and Nanocomposites.

Total Periods: 45

Topics for self-study are provided in the lesson plan.

EXPERIENTIAL LEARNING

1. ɔoratory experiments allow students to apply theoretical concepts and learn how to conduct experiments safely and effectively. Some examples of laboratory experiments include mechanical testing of materials, heat treatment of metals, and microscopy analysis of materials.
2. terials characterization techniques such as X-ray diffraction, scanning electron microscopy, and transmission electron microscopy can provide valuable insights into the structure and properties of materials. Students can gain hands-on experience with these techniques by conducting experiments and analyzing the results.

(Note: It's an indicative one. Course instructor may change the activities and the same shall be reflected in course handout)

RESOURCES

TEXT BOOKS:

1. V. Raghavan, *Materials Science & Engineering*, Prentice Hall of India, 5th edition, 2004.
2. R. Balasubramaniam, Callister's, *Materials Science & Engineering*, John Wiley and sons, 2nd edition, 2014.

REFERENCE BOOKS:

1. Sidney H. Avner, *Introduction to Physical Metallurgy*, Tata McGraw Hill, 2nd edition,1997.
2. George E Dieter, *Mechanical Metallurgy*, Tata McGraw Hill, 3rd edition, 2013.
3. Kodigre V D, *Material Science and Metallurgy*, Everest Publishing House, 31st edition, 2011.

VIDEO LECTURES:

1. ttps://ocw.mit.edu/courses/materials-science-and-engineering/3-012-fundamentals-of-materials-science-fall-2005/lecture-notes/
2. ttps://nptel.ac.in/courses/116/104/116104045/
3. ttps://www.youtube.com/watch?v=tsX-VYvkiJ8&list=PLJV_OG0NLkV8VRNFk-0AyDZz1pZym6V8j
4. ttps://www.khanacademy.org/science/materials-science

WEB RESOURCES:

1. https://www.doitpoms.ac.uk/tlplib/teachers.php
2. https://www.springer.com/journal/10853
3. http://dmse.mit.edu/
4. http://dmse.mit.edu/

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25LG201701	PERSONALITY DEVELOPMENT	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course gives awareness to students about the various dynamics of personality development.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Demonstrate knowledge in Self-Management and Planning Career.

)2. alyze the functional knowledge in attitudes and thinking strategies.

)3. arn and apply soft skills for professional success.

)4. nction effectively as an individual and as a member in diverse teams.

)5. mmunicate effectively in public speaking in formal and informal situations.

CO-PO Mapping Table:

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	-	-	-	-	-	-	-	-	-	-
CO2	2	3	-	-	-	-	-	-	-	-	-	-
CO3	2	2	-	-	3	-	-	-	-	2	-	-
CO4	1	1	-	-	-	-	-	-	3	3	-	-
CO5	-	-	-	-	-	-	-	-	-	3	-	-
Course Correlation Mapping	**2**	**2**	**3**	**-**	**3**	**-**	**-**	**-**	**3**	**3**	**-**	**-**

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: SELF-ESTEEM & SELF-IMPROVEMENT ***(09 Periods)***

Know Yourself – Accept Yourself; Self-Improvement: Plan to Improve - Actively Working to Improve Yourself- Exercises- case studies

Module 2: DEVELOPING POSITIVE ATTITUDES ***(09 Periods)***

How Attitudes Develop – Attitudes are Catching – Improve Your Attitudes – Exercises- case studies

Module 3 SELF-MOTIVATION & SELF-MANAGEMENT ***(09 Periods)***

Show Initiative – Be Responsible Self-Management; Efficient Work Habits – Stress Management – Employers Want People Who can Think – Thinking Strategies- Exercises- case studies

Module 4 GETTING ALONG WITH THE SUPERVISOR ***(09 Periods)***

Know your Supervisor – Communicating with your Supervisor – Special Communication with your Supervisor – What Should you Expect of Your Supervisor? – What your Supervisor expe of you - Moving Ahead Getting Along with your Supervisor- Exercises- case studies

Module 5 WORKPLACE SUCCESS ***(09 Periods)***

First Day on the Job – Keeping Your Job – Planning Your Career – Moving Ahead- Exercises- case studies

Total Periods: 45

Topics for self-study are provided in the lesson plan.

EXPERIENTIAL LEARNING

7. List out the self-improvements in you on the charts and explain in detail.
8. Discuss different famous personalities and their attitudes.
9. Describe different personalities with respect to self-motivation and self-management.
10. Imagine you are a supervisor and illustrate different special communications.
11. Assume and Interpret different experiences on the first day of your job.

(Note: It's an indicative one. Course instructor may change the activities and the same shall be reflected in course handout)

RESOURCES

TEXTBOOK:

1. Harold R. Wallace and L. Ann Masters, *Personal Development for Life and Work*, Cengage Learning, Delhi, 10th edition Indian Reprint, 2011. (6th Indian Reprint 2015)
2. Barun K. Mitra, *Personality Development and Soft Skills,* Oxford University Press, 2011.

REFERENCE BOOKS:

1. K. Alex, *Soft Skills*, S. Chand & Company Ltd, New Delhi, 2nd Revised Edition, 2011.
2. Stephen P. Robbins and Timothy A. Judge*, Organizational Behaviour*, Prentice Hall, Delhi, 16th edition, 2014

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=6Y5VWBLi1es
2. https://www.youtube.com/watch?v=H9qA3inVMrA

WEB RESOURCES:

1. :ps://www.universalclass.com/.../the-process-of-perso...
2. :ps://www.ncbi.nlm.nih.gov/pubmed/25545842
3. :ps://www.youtube.com/watch?v=Tuw8hxrFBH8

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25CE101703	**PLANNING FOR SUSTAINABLE DEVELOPMENT**	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on sustainable development, environmental impact, sustainable policies, governance, theories and strategies, media and education for sustainability.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1 Compare sustainable development theories in national and global context to protect the society and environment.

CO2 Analyze the unforeseen environmental impacts on sustainable development to protect the society and environment.

CO3 Analyze policies and governance for sustainable development considering ethics, economics, society and environment.

CO4 Analyze systems and strategies for sustainable development using appropriate tools and techniques considering ethics, economics, society and environment.

CO5 Analyze the role of media and education in sustainable development using appropriate tools and techniques considering ethics, society and environment besides communicating effectively.

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	2	2	-	-	-	-	-
CO2	3	3	-	-	-	2	2	-	-	-	-	1
CO3	3	3	-	-	-	2	2	2	-	-	1	-

CO4	3	3	-	-	2	2	2	2	-	-	1	-
CO5	3	3	-	-	2	2	2	2	-	1	-	-
Course Correlation Mapping	**3**	**3**	**-**	**-**	**2**	**2**	**2**	**2**	-	**1**	**1**	**1**

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: SUSTAINABLE DEVELOPMENT ***(09 Periods)***

Definition and concepts of sustainable development, Capitalization of sustainability-National and global context; Sustainable development goals, Emergence and evolution of sustainability and sustainable development, Theories of sustainability, Case studies.

Module 2: ENVIRONMENTAL IMPACT ***(09 Periods)***

Climate change – Science, Knowledge and sustainability; Unforeseen environmental impacts on development, Challenges of sustainable development, Centrality of resources in sustainable development, Case studies.

Module 3: SUSTAINABLE POLICIES AND GOVERNANCE ***(09 Periods)***

Governance - Democracy and Eco–welfare; Global civil society and world civil politics, Civic environmentalism, Policy responses to sustainable development, Economics of sustainability, Social responsibility in sustainability, National action, ISO 14001: Environmental management system.

Module 4: SUSTAINABLE SYSTEMS AND STRATAGIES ***(09 Periods)***

Need for system innovation, Transition and co–evolution, Theories and methods for sustainable development, Strategies for eco–innovation, Ecological foot print analysis, Socio ecological indicators – Eco labels; Policy programmes for system innovation, Case studies.

Module 5: MEDIA AND EDUCATION FOR SUSTAINABILITY ***(09 Periods)***

Role of emerging media, Remarkable design and communication art, Activism and the public interest, Education for sustainability, Participation in decision making, Critical thinking and reflection, Case studies.

Total Periods: 45

Topics for self-study are provided in the lesson plan.

EXPERIENTIAL LEARNING

1. Submit a study report on the importance and implementation of United Nationals sustainable goals 17 among all the ratified nations.
2. Submit a study report on any one case study that the challenges being faced during the sustainable development goals implementation.

3. Submit a study report on the social responsibility in implementation of sustainability concept.
4. Prepare and submit a report on any two case studies that how the eco labels put on their products shall make the consumers feel satisfaction over the sustainable development.
5. Submit a report on the communication art and activism through media which makes the public interest that helps to contribute towards sustainable development.

RESOURCES

TEXT BOOKS:

1 John Blewitt, *Understanding Sustainable Development*, Earth Scan Publications Ltd., 2nd Edition, 2008.

2 Jennifer A. Elliot, *An Introduction to Sustainable Development*, Earth Scan Publications Ltd., 4th Edition, 2006.

REFERENCE BOOKS:

1 Peter Rogers, Kazi F Jalal and John A Boyd, *An Introduction to Sustainable Development*, Earth Scan Publications Ltd., 2006.

2 Simon Dresner, *The Principles of Sustainability*, Earth Scan Publications Ltd., 2nd Edition, 2008.

3 Peter Bartelmus, *Environment Growth and Development: The Concepts and Strategies of Sustainability*, Routledge, 3rd Edition, 2003.

4 Gabriel Moser, Enric Pol, Yvonne Bernard, MiriliaBonnes, Jose Antonio Corraliza and Maria Vittoria Giuliani, *People Places and Sustainability*, Hogrefe& Huber Publishers, 2nd Edition, 2003.

VIDEO LECTURES:

1 https://www.youtube.com/watch?v=a5i9RVyhBtc

2 https://www.youtube.com/watch?v=fH_iIVPTujE

3 https://www.youtube.com/watch?v=c2eNrFK5M8I

4 https://www.youtube.com/watch?v=qfOgdj4Okdw

5 https://www.youtube.com/watch?v=_qLqLJq2954

WEB RESOURCES:

1 https://civil.gecgudlavalleru.ac.in/images/admin/pdf/1594706742_III-II-OE-Planning-for-Sustainable-Development.pdf

2 https://www.academia.edu/26950843/Sustainable_Development_in_Practice_Case_Studies_for_Engineers_and_Scientists

3 https://www.academia.edu/24286208/The_Role_of_the_Professional_Engineer_and_Scientist_in_Sustainable_Development

4 https://byjusexamprep.com/liveData/f/2022/8/sustainable_development_goals_upsc_notes_43.pdf

5 https://sdgs.un.org/sites/default/files/2020-10/course%201_Peter_Tarr%20%20-%20%20Compatibility%20Mode.pdf

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25EC101705	**PRINCIPLES OF COMMUNICATION ENGINEERING**	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: Fundamentals of Communications; Analog and digital - modulation and Demodulation Techniques; Information theory and coding.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Analyze different Analog and Digital Modulation Schemes to improve bandwidth and power efficiency.

CO2. Analyze Pulse Analog modulation Schemes.

CO3. Understand the concepts of Baseband & Passband Digital Transmission.

CO4. Analyze various error detection and correction codes for reliable transmission.

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-
CO4	3	3	2	1	-	-	-	-	-	-	-	-
Course Correlation Mapping	**3**	**3**	**2**	**1**	**-**	**-**	**-**	-	-	-	-	-

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: ANALOG MODULATION ***(13 Periods)***

Block diagram of Electrical Communication System, Types of Communications, Need for Modulation, Types of Amplitude Modulation- AM, DSBSC, SSBSC, Power and BW requirements, Generation of AM, DSBSC, SSBSC. Detection of AM - Diode detector, Product demodulation for DSBSC & SSBSC. Frequency & Phase Modulations.

Module 2: PULSE MODULATION ***(07 Periods)***

Elements & Advantages of Digital communication systems, PAM, Regeneration of Base band Signal, PWM and PPM, Time Division Multiplexing, Frequency Division Multiplexing.

Module 3: BASE BAND DIGITAL TRANSMISSION ***(07 Periods)***

Pulse Code Modulation- Advantages, Block diagram of PCM, Quantization, effect of Quantization, Quantization error. DM, ADM and Comparison of PCM,DM & ADM.

Module 4: PASS BAND DIGITAL TRANSMISSION ***(10 Periods)***

Digital Binary Schemes-ASK, FSK, PSK, DPSK, QPSK, Modulation and Demodulation - Coherent and Non-coherent techniques.

Module 5: INFORMATION THEORY AND CODING ***(08 Periods)***

Concept of Information, Entropy and Rate of Information, Coding efficiency, Shannon-Fano and Huffman Coding.

Error Correction and Detection Codes- Linear Block Codes, Cyclic Codes, Convolution Codes.

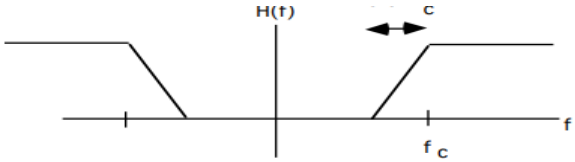
Total Periods: 45

Topics for self-study are provided in the lesson plan.

EXPERIENTIAL LEARNING

1 Suppose that a non-linear device is available for which the output current i0 and the input voltage vi are related by: $i_0(t) = a_1 vi(t) + a_3 v_3\, i(t)$ where a_1 and a_3 are constants. Explain how this device may be used to provide(a) a product modulator (b) an amplitude modulator.

2 A voice signal occupying the frequency band 0.3 - 3.4 KHz is to be modulated onto a carrier wave of frequency 11.6 MHz. High pass filters such as the one shown below are available. Design a system to generate the USB wave using DSB modulators and these filters.



3 In a binary PCM system, the output signal to-quantizing noise ratio is to be held to a minimum of 40 dB. Determine the number of required levels, and find the corresponding output signal to quantizing-noise ratio.

4 A bipolar binary signal $S_I(t)$ is a +1V or -1V pulse during the interval (O, T). Additive white noise with power spectral density $\eta/2 = 10^{-5}$ W /kHz. W/Hz is added to the signal. Determine the maximum bit rate that can be sent with a bit error probability of $Pe \leq 10^{-7}$

5 A compact disc (CD) recording system samples each of two stereo signals with a 16-bit analog-to digital converter (ADC) at 44.1 kb/s.

a) Determine the output signal-to-quantizing-noise ratio for a full-scale sinusoid.

b) The bit Stream of digitized data is augmented by the addition of error-correcting bits, clock extraction bits, and display and control bit fields. These additional bits represent 100 percent overhead. Determine the output bit rate

of the CD recording system.

c) The CD can record an hour's worth of music. Determine the number of bits recorded on a CD. For a comparison, a high-grade collegiate dictionary may contain 1500 pages, 2 columns per page, 100 lines per column, 8 words per line, 6 letters per word, and 7 b per letter on average. Determine the number of bits required to describe the dictionary, and estimate the number of comparable books that can be stored on a CD.

(Note: It's an indicative one. The course instructor may change the activities and the same shall be reflected in course handout.)

RESOURCES

TEXT BOOKS:

1 R.P. Singh and S D Sapre, *Communication Systems - Analog and Digital*, TMH, 2nd edition 2007.

2 Simon Haykin, *Communication Systems*, John Wiley, 2nd edition 2007.

REFERENCE BOOKS:

1 Herbert Taub & Donald L Schilling, *Principles of Communication Systems*, Tata McGraw-Hill, 3rd Edition, 2009.

Sham Shanmugam, *Digital and Analog Communication Systems*, Wiley-India edition, 2006.

VIDEO LECTURES:

1 https://nptel.ac.in/courses/108/104/108104091/

2 https://onlinecourses.nptel.ac.in/noc19_ee47/preview

WEB RESOURCES:

1 https://studiousguy.com/basic-principles-of-communication/

2 https://www.tutorialspoint.com/principles_of_communication/principles_of_communication_modulation.htm

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25EE101702	**RELIABILITY AND SAFETY ENGINEERING**	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on the fundamentals of reliability and safety engineering. The course emphasizes on various reliability measures used in assessing the performance of the system, evaluating the critical parameters of the network, and the techniques to assess the reliability of the system. The course also deals with safety management and measures in industrial and other hazardous environments.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. apply the various probability and statistics fundamentals into engineering systems to evaluate performance.

CO2. develop mathematical models for engineering networks/systems to evaluate the critical parameters for the reliability of a network/system.

CO3. analyze the time-dependent/independent characteristics of a repairable system and frequency durations techniques to assess the reliability

CO4. understand various safety management, policy, and planning strategies for personal and industrial safety.

CO5. understand various safety and hazard identification techniques and follow appropriate safety measures in industry and society.

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	-	-	2	1	1	1	-	-	-	-
CO2	3	3	-	-	2	1	1	-	-	-	-	-
CO3	3	2	-	2	1	1	1	-	-	-	-	3
CO4	3	2	-	-	2	1	1	1	-	-	-	-
CO5	3	2	-	-	2	1	1	1	-	-	-	-
Course Correlation Mapping	**3**	**2**	**--**	**2**	**2**	**1**	**1**	**1**	**--**	**--**	**--**	**3**

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: FUNDAMENTALS OF RELIABILITY ENGINEERING ***(09 Periods)***

Random variables, probability concepts, rules for probabilities of events. Probability density and distribution functions. Binomial distribution - Expected value and standard deviation for binomial distribution. Reliability functions, f(t), F(t), h(t) - Relationship between these functions, Exponential density and distribution functions, expected value and standard deviation of exponential distribution. Measures of reliability - MTTF, MTTR, MTBF. Bathtub curve.

Module 2: NETWORK MODELING AND RELIABILITY EVALUATION ***(09 Periods)***

Basic concepts - Evaluation of network reliability/unreliability, series systems, parallel systems, series - Parallel configuration systems. Redundant systems and its types. Evaluation of network reliability/unreliability using conditional probability method, tie-set and cut-set based approach, complete event tree and reduced event tree methods.

Module 3: MARKOV CHAIN AND MARKOV PROCESSES ***(09 Periods)***

Basic concepts, stochastic transitional Probability matrix, time dependent probability evaluation, Limiting State Probability, Absorbing states. Modelling concepts – State space diagrams, time dependent reliability evaluation of single component repairable model, two component repairable model. Frequency and duration techniques.

Module 4: BASICS OF SAFETY CONCEPTS ***(08 Periods)***

Introduction, goals, need for safety, history of safety movement – the evolution of modern safety concept, general concepts of safety management. Planning for safety-productivity, quality and safety, line and staff functions, budgeting for safety, safety policy.

Module 5: SAFETY TECHNIQUES AND APPLICATIONS ***(10 Periods)***

Introduction to safety techniques, Incident Recall Technique (IRT), disaster control, job safety analysis, safety survey, safety inspection, safety sampling, evaluation of the performance of supervisors on safety. Hazard identification techniques, components of safety audit, types of audit, audit methodology, and process of safety reporting. Applications of industrial Safety, environmental safety, health safety, electrical safety, fire safety.

Total Periods: 45

Topics for self-study are provided in the lesson plan.

EXPERIENTIAL LEARNING

1. The students shall understand various IEEE reliability standards to be followed in the engineering systems for the evaluation of reliability and asses performance.
2. Should collect various engineering components assembled and their network models for evaluations of network reliability indices.
3. The students to visit a nearby power or process industry to know about various types of failures and repair performance of various engineering components and cause of replacements.
4. Should collect information about various safety/alert sign boards and the relative

measures for a particular situation.

5. Should understand the standard practices followed during the maintenance/commissioning of the electrical apparatus in any industry following the various safety precautions.

(Note: It's an indicative one. The course instructor may change the activities and the same shall be reflected in course handout.)

RESOURCES

TEXT BOOKS:

1. Roy Billinton and Ronald N Allen, *Reliability Evaluation of Engineering Systems*, 2nd Edition, Springer, New York, 2013.
2. Frank R. Spellman, Nancy E. Whiting, *Safety Engineering: Principles and Practices*, 3rd Edition, Rowman & Littlefield, 2018.

REFERENCE BOOKS:

1. Charles E. Ebeling, *An introduction to reliability and maintainability engineering*, 2nd Edition Tata McGraw-Hill Education, 2010.
2. Dan Petersen, *Techniques of Safety Management: A Systems Approach*, 4th Edition American society of safety engineers, 2003.
3. Ajit Kumar Verma , Srividya Ajit , Durga Rao Karanki*, Reliability and Safety Engineering,* Springer London, 2016.

VIDEO LECTURES:

1. https://nptel.ac.in/courses/105/108/105108128/
2. https://nptel.ac.in/courses/110/105/110105094/
3. https://www.youtube.com/watch?v=uutg8jKrL9w
4. https://www.youtube.com/watch?v=_c-iZ2BAXPw
5. https://www.youtube.com/watch?v=GeMCF3s5EDk
6. https://www.youtube.com/watch?v=xYWyype7cxE

WEB RESOURCES:

1 https://ieeexplore.ieee.org/document/9353567

2 https://www.ualberta.ca/engineering/mechanical-engineering/research/reliability-and-safety.html

3 https://ieeexplore.ieee.org/document/9353567

4 https://www.taylorfrancis.com/books/edit/10.1201/9781003140092/industrial-liability-safety-engineering-dilbagh-panchal-mangey-ram-prasenjit-chatterjee-anish-kumar-sachdeva

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25CE101704	**REMOTE SENSING, GIS AND GPS**	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on photogrammetry, remote sensing, geographic information system, GIS spatial analysis. This course also examines remote sensing and GIS applications, global positioning system and its real-time applications.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1 Analyze photogrammetry and remote sensing to solve complex surveying problems using appropriate tools and techniques following the relevant guidelines and latest developments considering society and environment besides communicating effectively in graphical form.

CO2 Analyze GIS to solve complex surveying problems using appropriate tools and techniques following latest developments besides communicating effectively in graphical form.

CO3 Analyze GIS spatial analysis to solve complex surveying problems using appropriate tools and techniques following latest developments besides communicating effectively in graphical form.

CO4 Analyze remote sensing and GIS applications to solve complex civil engineering problems using appropriate tools and techniques following the relevant guidelines and latest developments considering society, environment, sustainability and management principles besides communicating effectively in graphical form.

CO5 Analyze global positioning system to solve complex surveying problems using appropriate tools and techniques considering society and environment besides communicating effectively in graphical form.

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	3	-	2	2	1	1	1	-	1	-	1
CO2	2	3	-	-	2	1	1	-	-	1	-	1
CO3	2	3	-	2	2	1	1	-	-	1	-	1
CO4	2	3	-	-	2	1	1	1	-	1	1	1
CO5	2	3	-	-	2	1	1	-	-	1	-	-
Course Correlation Mapping	**3**	**3**	**-**	**2**	**2**	**1**	**1**	**1**	-	**1**	**1**	**1**

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: PHOTOGRAMMETRY AND REMOTE SENSING **(10 Periods)**

Photogrammetry: Principle of photogrammetry, Types of aerial photographs, Planning and execution of photographic flights, Geometry of aerial photographs, Scale of aerial photographs and its determination, Stereoscopy, Ground control, Mosaics, Parallax measurements for height determinations, Latest developments in photogrammetry.

Remote Sensing: Elements of remote sensing, Electromagnetic spectrum, Energy resources, Physics of radiant energy, Energy interactions with earth surface features and atmosphere, Data acquisition platforms Spectral reflectance curves, Resolution; Spectral properties of water bodies, soil and vegetation; Sensors and platforms, Visual interpretation techniques.

Module 2: GEOGRAPHIC INFORMATION SYSTEM **(09 Periods)**

GIS categories, Components of GIS, Fundamental operations of GIS, Spatial and non spatial data, Raster data and vector data, File management, Layer based GIS, Feature based GIS, Map projections, Latest developments.

Module 3: GIS SPATIAL ANALYSIS **(08 Periods)**

Database models, Data storage, Vector data storage, Attribute data storage, Data manipulation and analysis, Integrated analysis of the spatial and attribute data - DTM/DEM, Softwares – Arc GIS, QGIS and Global mapper, Latest developments in GIS software.

Module 4: REMOTE SENSING AND GIS APPLICATIONS **(09 Periods)**

Land use/Land cover classification, Rainfall-runoff studies, Flood and drought impact assessment and monitoring, Drainage morphometry, Watershed management for sustainable development, GIS based precision farming, GIS based natural resources management, Inland water quality survey and management, Regional and urban planning and management, GIS based highway alignment, GIS based traffic congestion analysis, GIS for public health – Case Studies.

Module 5: GLOBAL POSITIONING SYSTEM **(09 Periods)**

Global Positioning System (GPS) – Fundamental concepts, Components of GPS – Space segment, Control segment, User segment, Reference systems, Satellite orbits; Classification of GPS receivers, GPS observations, GPS measurements and accuracy of GPS, Applications.

Total Periods: 45

Topics for self-study are provided in the lesson plan.

EXPERIENTIAL LEARNING

1. Sound composing project: In this assignment, Select area and collect the geometry of aerial photographs and analyze the views.
2. Visit any meteorological department and understand about rain gauges and collect, analyse the data
3. Visit Geographical Information Systems Laboratory and understand about GIS and GPS Systems

(Note: It's an indicative one. The course instructor may change the activities and the same shall be reflected in course handout.)

RESOURCES

TEXT BOOKS:

1. Shivam, P. and Shashikanth, T., *A Text Book of Basic Concept of Remote Sensing*, *GPS and GIS*, Sankalp Publication, 2020.
2. Anji Reddi, M., *A Text Book of Remote Sensing and Geographical Information Systems*, B. S. Publications, 2nd Edition, 2012.

REFERENCE BOOKS:

1. Bhatta, B., *Remote Sensing and GIS*, Oxford University Press, 2nd Edition, 2011.
2. Lillesand, T. M., Kiefer, R. W. and Chipman, J. W., *Remote Sensing and Image Interpretation*, John Willey and Sons (Asia) Pvt. Ltd., 7th Edition, 2014.
3. Chandra, A. M. and Ghosh, S. K., *Remote Sensing and Geographic Information System*, Narosa Publishing House, 2nd Edition, 2015.
4. Panigrahi, N., *Geographical Information Science*, University Press, 2nd Edition, 2013.
5. Peter A. Burragh and Rachael Mc Donnell, *Principles of Geographical Information Systems*, Oxford University Press, 2nd Edition, 2014.

VIDEO LECTURES:

1. http://nptel.ac.in/courses/105/107/105107206/
2. https://syslab.ceu.edu/videos/geospatial-technologies

WEB RESOURCES:

1. Digital Audio Signal Processing: https://www.udemy.com/course/introduction-to-geospatial-technologies-and-arcgis-interface/
2. Learn Audio Editing - for Beginners: https://www.youtube.com/ watch?v=xGgaV9r_kH8
3. https://storymaps.arcgis.com/stories/47e984aae614442cb80aa40d121b5fe

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25CE101705	**SMART CITIES**	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a discussion on smart city and infrastructure, smart governance, smart mobility, smart economy, smart environment, smart buildings, smart energy, smart water, smart living, smart people and case studies.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1 Understand the concept of smart cities and its infrastructure for ensuring safety and sustainability using appropriate techniques and management principles in India besides lifelong learning.

CO2 alyse smart cities to solve problems associated with mobility and governance for the growing population by ensuring safety and sustainability, management using appropriate standards in India besides lifelong learning.

CO3 alyse smart cities to solve problems associated with economy and environment for ensuring safety and sustainability, management using appropriate techniques and standards in India besides lifelong learning.

CO4 alyse buildings, energy and water resource systems in smart cities to solve problems associated with the growing population for ensuring safety and sustainability, management using appropriate standards in India besides lifelong learning.

CO5 alyse the smart cities to solve complex problems associated with people and living systems for ensuring safety and sustainability, management using appropriate techniques in India besides lifelong learning.

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	-	-	-	2	3	1	2	-	1	1	2
CO2	3	3	-	1	2	3	3	2	-	1	1	2
CO3	3	3	-	1	2	3	3	2	-	1	1	2
CO4	3	3	-	1	2	3	3	3	-	-	1	2
CO5	3	3	-	1	2	3	3	2	-	-	1	2
Course Correlation Mapping	**3**	**3**	**-**	**3**	**2**	**2**	**2**	**2**	**-**	**1**	**1**	**2**

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: SMART CITY AND INFRASTRUCTURE ***(09 Periods)***

Smart city - Concept, Objectives, History, Need; Key trends in smart city development, Government of India – Policy for smart city.

Infrastructure: Smart city infrastructure – Components, Challenges; Managing - Principle stake holders, Infrastructure in India and World, Dimensions of smart cities, Global standards and performance benchmarks, Practice codes, Infrastructure development, Integrated infrastructure management systems for smart city, Infrastructure management system applications for existing smart city, Various types of infrastructure systems, Infrastructure assessment.

Module 2: SMART GOVERNANCE AND SMART MOBILITY ***(09 Periods)***

Smart Governance: Definition, smart governance to citizens, Industries and commerce, Smart governance within government, Emerging trends in smart governance, Future of smart governance, Guidelines and standards for smart governance; IOT and ICT Application – Broadband city, Use of sensors, Intelligent city governance.

Smart Mobility: Intelligent transportation systems, Accessibility, Smart vehicles and fuels, GIS, GPS, Navigation system, Public transport, Traffic safety management, Logistics flows in cities, Mobility services, E-ticketing.

Module 3: SMART ECONOMY AND SMART ENVIRONMENT ***(09 Periods)***

Smart Economy: City branding, Market places and crowd funding, Innovation, entrepreneurship – E-business, E-commerce, Online integrated business platforms and networks; Local and global interconnectedness, Productivity, Flexibility of labour market.

Smart Environment: Network and environmental monitoring, Energy efficiency, Urban planning and urban refurbishment, Smart buildings and building renovation, Resource management, Environmental protection.

Module 4: SMART BUILDINGS, SMART ENERGY AND SMART WATER ***(09 Periods)***

Smart Buildings: Definition, Sustainable city – A green approach, Housing, Sustainable green building - Solar energy for smart city, Waste water management, solid waste management, 3Rs Policy, Green ratings.

Smart Energy: Current energy demand, Alternate energy sources, Renewable energy, Production, Solar energy, Wind energy, Energy from solid waste, Applications, Challenges in smart energy

Smart Water: Storage and conveyance system of water, Sustainable water and sanitation, Sewage systems, Flood management, Conservation system.

Module 5: SMART LIVING, SMART PEOPLE AND CASE STUDIES ***(09 Periods)***

Smart Living: Definition, Cultural facilities, World-class education, Tourist attractions, World-class hospitals, Latest technologies, Quality housing, Community and urban life management, Social cohesion.

Smart People: Definition, Human development index, Level of qualification, Graduate enrolment ratio, Lifelong learning, ICT Skills, Quality of smart people – Flexibility, Creativity to contribute to education, Democratic nature; Personality dimensions – Extroversion, Agreeableness, Consciousness, Emotional Stability, Open to experience.

Case Studies: Helsinki – Finland; Zurich - Switzerland; Oslo - Norway; Amsterdam - The Netherlands; New York - United States; Seoul (World's first Smart City) - South Korea.

Total Periods: 45

Topics for self-study are provided in the lesson plan.

EXPERIENTIAL LEARNING

LIST OF EXERCISES:

1. Prepare a report on smart city infrastructure for south Indian cities.
2. Prepare a review on need for changes in transportation and governing policies in India.
3. Write a report on energy conservation and economy stability in world's first smart city.
4. Write a report on need and technologies to be adopted for green buildings in a smart city.
5. Prepare a case study report on Hyderabad, Telangana.

(Note: It's an indicative one. The course instructor may change the activities and the same shall be reflected in course handout.)

RESOURCES

TEXT BOOKS:

1. Li Xian Yi, *Smart City on Future Life - Scientific Planning and Construction*, Posts and Telecom Press, 2012.
2. Arpan Kumar Kar, Manmohan Prasad Gupta, P. Vigneswara Ilavarasan and Yogesh K. Dwivedi, *Advances in Smart Cities*, CRC Press, Taylor & Francis Group, Boca Raton, 2017.

REFERENCE BOOKS:

1. cos Komninos, *The Age of Intelligent Cities: Smart Environments and Innovation-for-all Strategies (Regions and Cities)*, Routledge Taylor & Francis Group, London, 2015.
2. eonora Riva Sanseverino, *Smart Rules for Smart Cities – Managing Efficient Cities in Euro-Mediterranean Countries*, springer for innovation, Springer, Italy, 2014.
3. Smart Cities Mission: A Step Towards Smart India, National Portal of India
4. Anthony M. Townsend, *Smart Cities – Big Data, Civic Hackers and The Quest for a New Uthopia*, W. W. Norton & Company, Inc., New York, 2013.
5. IoT Technician (Smart City) – MHRD, Govt. of India, 2nd Edition, 2022.

VIDEO LECTURES:

1. City of the Future: Singapore – Full Episode | National Geographic - YouTube
2. Integrated Waste Management for a Smart City - Course (nptel.ac.in)

WEB RESOURCES:

1. Smart Cities (nationalgeographic.org)
2. NPTEL :: Civil Engineering - NOC: Sustainable Materials and Green Buildings
3. Smart cities (europa.eu)
4. Top 7 Smart Cities in the World in 2023 (earth.org)

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25EC101706	**SMART SENSORS FOR ENGINEERING APPLICATIONS**	3	-	-	-	3

Pre-Requisite -
Anti-Requisite -
Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on Basics of sensors, characteristics of sensors and their responses; Smart sensors for Engineering, Science and Health Monitoring Applications; Applications of smart sensors and advancements in sensing Techniques.

COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. alyse the characteristics of transducers and estimate the response of sensors.
CO2. Understanding the working of various sensors in the context of their specialised domains.
CO3. Apply smart sensors for real time applications.
CO4. Apply the advanced techniques to smart sensors to provide solution to real time applications.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-
CO3	3	-	-	-	-	-	-	-	-	-	-	-
CO4	3	-	-	-	-	-	-	-	-	-	-	-
Course Correlation Mapping	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	-	**-**	**-**	**-**

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: CONCEPTS OF SENSORS ***(08 Periods)***

Introduction to sensors and transducers. Need for sensors in the modern world. Different fields of sensors based on the stimuli, various schematics for active and passive sensors. Static and dynamic characteristics of sensors. ***zero, I and II order sensors:*** Response to impulse, step, ramp and sinusoidal inputs. Environmental factors and reliability of sensors.

Module 2: SENSORS IN ENGINEERING ***(07 Periods)***

Physical principles of sensors, Electric Sensors: Resistive, Capacitive, Inductive. Piezoelectric sensor. Photo elastic sensors, Fluid Mechanic sensors.

Module 3: HUMAN AND BIOMIMETIC SENSORS ***(10 Periods)***

Human sensors: vision, Taste and smell, Hearing, Somatic, Biomimetic Sensors, Electrochemical, Thermoelectric sensors, Optic sensors.

Module 4: APPLICATIONS OF SMART SENSORS ***(11 Periods)***

WSN Based Physiological Parameters Monitoring System: Measurement of Human Body Temperature. Intelligent Sensing System for Emotion Recognition: Aim of the Emotion Recognition System, Development of Intelligent Sensing System for Emotion Recognition. WSN Based Smart Power Monitoring System.

Module 5: ADVANCEMENTS IN SENSING TECHNOLOGY ***(09 Periods)***

Ecological Monitoring Using Wireless Sensor Networks: Overview, Challenges, and Opportunities. Development of an Embedded System-Based Gateway for Environmental Monitoring in Wild Fields. Advancements in Structural Health Monitoring.

Total Periods: 45

Topics for self-study are provided in the lesson plan.

EXPERIENTIAL LEARNING

1. Build a wireless sensor system for Environmental pollution monitoring.
2. Design a smart temperature measurement system using required accessories.

(Note: It's an indicative one. The course instructor may change the activities and the same shall be reflected in course handout.)

RESOURCES

TEXT BOOKS:

1. Patrick F Dunn, *Fundamentals of sensors for engineering and science*, CRC Press,2012.
2. Subhas C. Mukhopadhyay, Krishanthi P. Jayasundera, and Anton Fuchs, *Smart Sensors, Measurement and Instrumentation*, Springer,2013.

REFERENCE BOOKS:

1 Subhas Chandra Mukhopadhyay*, Intelligent Sensing, Instrumentation and Measurements*, Springer, Kluwer Academic Publishers,2013.

2 Henry Bolte, *Sensors – A Comprehensive Sensors,* John Wiley.

VIDEO LECTURES:

1 https://www.youtube.com/watch?v=oRydUfgMdgA

2 https://onlinecourses.nptel.ac.in/noc22_ee36/

WEB RESOURCES:

1. https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1199&context=nasapub#:~:text=The%20smart%20materials%20examined%20include,%2C%20magneto%2Doptical%20materials%2C%20and
2. https://www.youtube.com/watch?v=q8UuRkOQ9A0
3. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8433768/
4. https://www.mdpi.com/1424-8220/21/17/5890

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25EE101703	**SUSTAINABLE ENERGY SYSTEMS**	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course designed emphasizes the operating principle of a range of non-conventional energy resources, energy harvesting and conversion principles and key performance characteristics. The energy conversion technologies will include energy conversion from, Solar, Wind, Ocean, Biomass, Geothermal and Fuel cells. The course also emphasizes on various types of hybrid energy storage systems with their relative advantages and disadvantages.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1 Understand the fundamental concepts of renewable energy sources and their endurance for sustainability.

CO2 Understand the various methods of harvesting solar energy, energy conversion principles, and operational aspects and environmental impacts of solar technologies.

CO3 Understand the various methods of harvesting wind energy, conversion principles, operational aspects, and environmental impacts of wind energy systems.

CO4 Understand the various methods of harvesting ocean energy, Biomass energy and geothermal energy, energy conversion technologies, operational aspects, and their impacts on the environment.

CO5 Understand the principle of harvesting energy from fuel cells and the operational aspects of hybrid energy storage systems.

CO-PO Mapping Table:

Course Outcomes	Program Outcomes											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	-	-	-	--	2	2	-	-	-	-	1
CO2	3	-	-	-	2	2	2	-	-	-	-	1
CO3	3	-	-	-	2	2	2	-	-	-	-	1
CO4	3	-	-	-	2	2	2	-	-	-	-	1
CO5	3	-	-	-	2	2	2	-	-	-	-	1
Course Correlation Mapping	**3**	**-**	**-**	**-**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**1**

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: INTRODUCTION TO SUSTAINABLE ENERGY SOURCES ***(07 Periods)***

Impact of conventional sources on Environment—acid rain, ozone layer depletion, Global warming, greenhouse effect and nuclear waste; Limitation of fossil fuels; Renewable energy sources; Renewable sources and their sustainable development.

Module 2: ENERGY FROM SOLAR ***(10 Periods)***

Introduction, solar radiation, Measurement of solar radiation—Pyranometer; Solar energy collectors; Flat plate collectors— Liquid and air (non-porous) types; Focusing type— Parabolic and Point types; Solar photovoltaic system— PV cell and its types, Configuration of solar panel, PV system; Applications: Solar pump, Solar water heater

Module 3: ENERGY FROM WIND ***(08 Periods)***

Introduction, power extraction from the wind, Wind turbines— Horizontal axis wind turbine—Propeller type and Vertical axis wind turbine— Darrieus rotor type; Basic components of wind energy conversion systems, Applications: Energy storage, Water pumping; Environmental impacts.

Module 4: ENERGY FROM OCEAN, BIOMASS AND GEOTHERMAL RESOURCES ***(12 Periods)***

Energy from ocean: Introduction, ocean thermal energy conversion (OTEC): Open and closed cycle power plants; Tidal energy: Schematic diagram of tidal power plant; Advantages and disadvantages.
Energy from Biomass: Introduction, biomass conversion technologies-direct, Thermochemical and Biochemical conversions; Biogas generation—Anaerobic digestion process.
Geothermal energy: Introduction, Geothermal resources, Geothermal power plants—Vapour dominated and liquid dominated; Environmental issues.

Module 5: FUEL CELLS AND HYBRID ENERGY SYSTEMS ***(08 Periods)***

Fuel Cells: Introduction, principle and operation of fuel cell, classification of fuel cells, advantages and disadvantages of fuel cells.

Hybrid energy systems: Need for hybrid systems, configuration and coordination, Block diagram approach of Stand-alone PV-wind system, PV-Diesel and Wind-diesel; energy storage systems — Ultra capacitors, SMES, Battery.

Total Periods: *45*

Topics for self-study are provided in the lesson plan.

EXPERIENTIAL LEARNING

1. The students shall visit a solar power plant, understand the operational aspects and should prepare a technical report on the plant visited.
2. The students shall visit a wind farm, understand the operational aspects, and should prepare a technical report on the plant visited.
3. The students shall visit a bio-mass energy conversion plant, understand the operational aspects and should prepare a technical report on the plant visited.
4. The students shall prepare a technical report on the need of a hybrid plant and find new avenues for a new hybrid system.

(Note: It's an indicative one. The course instructor may change the activities and the same shall be reflected in course handout.)

RESOURCES

TEXT BOOKS:

1. Rai, G.D., *Non-conventional Energy Sources*, Khanna Publishers, New Delhi, 2017.
2. G.N. Tiwari and M.K. Ghosal, *Renewable energy resources: Basic principles and applications*, Alpha Science International Ltd., 2005.

REFERENCE BOOKS:

1. JhonTwidell and Tony Wier, *Renewable Energy Resources*, Taylor & Francis, 2nd edition, London and Newyork, 2006.
2. K.M. Mittal,*Non-conventional Energy Systems-Principles*, Progress and Prospects, Wheeler Publications, 1997.
3. S.Rao, Dr.B.B. Parulekar, *Energy Technology*, Third edition, Khanna Publications, 2013.
4. R. K. Rajput, *A textbook of power system engineering*, Laxmi publications (P) Ltd, 2016

VIDEO LECTURES:

1. https://nptel.ac.in/courses/103103206
2. https://nptel.ac.in/courses/121106014
3. https://youtu.be/mh51mAUexK4
4. https://youtu.be/UW4HYJ36q0Y

WEB RESOURCES:

1. www.mnre.gov.in
2. www.ireda.in

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25CS101702	WEB DESIGN FUNDAMENTALS	3	-	-	-	3

Pre-Requisite -
Anti-Requisite -
Co-Requisite -

COURSE DESCRIPTION: This course is designed to introduce the student to the technologies and facilities of web design: CSS, javascript, and jquery. Students will understand the web design process and use these software technologies together to produce web design projects.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Understand the fundamentals of HTML 5 and the principles of web design.
CO2. Construct basic websites using HTML and Cascading Style Sheets.
CO3. Build dynamic web pages with validation using Java Script objects and by applying different event handling mechanisms.
CO4. Learn how to use HTML5 and other Web technologies to develop interactive and responsive web pages.

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	-	-	2	-	-	-	-	-
CO3	3	3	3	-	-	-	-	-	-	-	2	-
CO4	2	3	3	-	-	-	-	2	-	-	-	-
Course Correlation Mapping	**3**	**3**	**3**	**-**	**-**	**-**	**2**	**2**	-	**-**	**2**	**-**

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: INTRODUCTION ***(09 Periods)***

Elements – Data types - Working with Text - Arranging Text - Displaying Lists - VAR Element - BDO Element - SPAN Element – DIV Element.

Module 2: LINKS AND URLS ***(09 Periods)***

Hyperlinks – URLs - Linking to a Mail System - Creating Tables - Inserting Images in a Web Page – Colors – Form Elements - Multiple-Choice Elements – Multimedia

Module 3: DYNAMIC HTML ***(09 Periods)***

Features of JavaScript - Programming Fundamentals - JavaScript Functions, Events, Image Maps, and Animations – JS Objects - Document Object - Validation, Errors, Debugging, Exception Handling, and Security

Module 4: CASCADING STYLE SHEET ***(09 Periods)***

CSS Syntax - CSS Selectors - Backgrounds and Color Gradients - Fonts and Text Styles - Creating Boxes and Columns - Displaying, Positioning, and Floating an Element - Table Layouts - : Effects, Frames, and Controls in CSS

Module 5: ADVANCED FEATURES OF HTML5 ***(09 Periods)***

Creating Editable Content - Checking Spelling Mistakes - Custom Data Attributes - Client-Side Storage - Drag and Drop Feature - Web Communication –**jQuery -** Fundamentals of jQuery - Callback Functions - jQuery Selectors - jQuery Methods to Access HTML Attributes.

Total Periods: 45

Topics for self-study are provided in the lesson plan.

EXPERIENTIAL LEARNING

1. Design a blog layout that includes header, navigation menu, content area, sidebar. Apply appropriate styling to each section.
2. Develop a java script based quiz that presents MCQs to the user and provides immediate feedback on their answers. Keep track of the score and display the final results at the end.
3. Build a web page that displays and image gallery. Each image should be a clickable link that opens the image in a larger view when clicked.

(Note: It's an indicative one. The course instructor may change the activities and the same shall be reflected in course handout.)

RESOURCES

TEXT BOOKS:

1. DT Editorial Services, *HTML 5 Black Book*, Dream tech Press, 2nd Edition, 2016.
.

REFERENCE BOOKS:

1. Jennifer Niederst Robbins, *HTML5 Pocket Reference,* O'Reilly, 5th Edition, 2018.
2. Ben Frain, *Responsive Web Design with HTML5 and CSS3*, Packt, 2nd Edition, 2020.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=h_RftxdJTzs
2. https://www.youtube.com/watch?v=dlkWNdnO8ek

WEB RESOURCES:

1. https://www.w3schools.com/html/
2. https://www.w3schools.com/css/
3. https://www.geeksforgeeks.org/web-technology/
4. https://www.smashingmagazine.com/2021/03/complete-guide-accessible-front-end-components/

5. https://css-tricks.com/
6. https://davidwalsh.name/css-optional

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25SS101707	**INDIAN KNOWLEDGE SYSTEM IN SCIENCE**	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course aims to raise awareness among students about the diverse aspects of the Indian Knowledge System in the context of science.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1 Understand a sense of rootedness and pride in India, along with an appreciation for its rich, diverse, ancient, and modern culture, knowledge systems, and traditions.

CO2 Demonstrate the rich scientific and technological heritage of the country.

CO3 alyse the Indian concept of multidisciplinary learning systems, integrating them with modern science.

CO4 Demonstrate the importance of intellectual property rights in safeguarding Indian knowledge.

CO-PO Mapping Table:

Course Outcomes	Program Outcomes											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	1	-	-	-	-	-	-	-	-	-	-
CO2	2	3	-	-	-	-	-	-	-	-	-	-
CO3	2	2	-	-	3	-	-	-	-	2	-	-
CO4	1	1	-	-	-	-	-	-	3	3	-	-
Course Correlation Mapping	2	2	3	-	3	-	-	-	3	3	-	-

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: ANCIENT PHILOSOPHY OF KNOWLEDGE ***(09 Periods)***

Vedas, Vedangas, sutras – Gurukulparampara

Module 2: ASTRONOMY IN INDIA ***(12 Periods)***

Astronomy in India: The Beginnings of Indian Astronomy - The Early Historical Period-The Siddhāntic Era - The Kerala School - Aryabhatta - Varahamihira- Bhaskara I – Brahamagupta- Bhaskara II – Brief notes on Astronomical instruments

Module 3: CHEMISTRY IN INDIA ***(12 Periods)***

Early Chemical Techniques, Atomism in Vaiśeṣika - Rishi Kanad- Nagarjuna- Al-Bīrūnī', Vāgbhaṭa- Sushruta- Carak Metallurgy in India - Definition, Metallurgy in Harappan Civilization, Metallurgy of Gold- Copper-Zinc- Bronze - Iron and steel.

Module 4: DEVELOPMENTS IN MATHEMATICS ***(12 Periods)***

Number systems- Geometry- works of Pingala- Baudhayana- Jaina Mahavira-Sridharacharya – Madhava Siddanthas and Calender systems

Total Periods: 45

EXPERIENTIAL LEARNING

1	List out the aspects of ancient philosophy of the Vedason the charts and explain in detail.
2	Discuss different astronomical instruments.
3	Describe different metals with respect to civilizations.
4	Imagine you are a mathematician and illustrate different number systems.
5	Assume and interpret different siddhanthas and calendar systems.

RESOURCES

TEXTBOOK:

1 "Indian Knowledge Systems": by ParthaPratim Ray (2024 edition).

2 "Introduction to Indian Knowledge System: Concepts and Applications": by B. Mahadevan and others (various editions available, with a 2022 edition noted).

REFERENCE BOOKS:

1. Concise History of Science in India – Bose, Sen &Subbarayappa- INSA Publications (2009 edition)
2. Encyclopedia of Classical Indian Sciences- Roddam Narasimha, Universities Press, 2007.

VIDEO LECTURES:

1 https://iksindia.org/lectures-and-videos.php

2 https://www.youtube.com/watch?v=D3f3jIcEZho

WEB RESOURCES:

1 tps://nep.puchd.ac.in/iks.pdf

2 :ps://www.millenniumassessment.org/documents/bridging/papers/balasubramian.a.pdf

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25SS101708	**INTRODUCTION TO INDIAN KNOWLEDGE SYSTEMS**	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: The course introduces students to key areas of the Indian Knowledge System (IKS), such as research methods, astronomy, literature and arts, agriculture and food, Ayurveda, and architecture.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1 Demonstrate the various pramanas used in the Indian Knowledge System.

CO2 Analyse fields of IKS related to Astronomy, Arts, Ayurveda, and Architecture.

CO3 derstand the Earth and Atmosphere related specifically to earthquakes, clouds, rainfall, soil, agriculture, and food science

CO4 Explore different fields of study in IKS further with the references and the resources provided during the course.

CO5 Analyse various materials in āyurveda, rasaśāstra, and vāstuvidyā

CO-PO Mapping Table:

Course Outcomes	Program Outcomes											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	1	-	-	-	-	-	-	-	-	-	-
CO2	2	3	-	-	-	-	-	-	-	-	-	-
CO3	2	2	-	-	3	-	-	-	-	2	-	-
CO4	1	1	-	-	-	-	-	-	3	3	-	-
CO5	1	1	-	-	-	-	-	-	3	3	-	-
Course Correlation Mapping	2	2	3	-	3	-	-	-	3	3	-	-

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: ASTRONOMY AND MATHEMATICS ***(10 Periods)***

Introduction to various fields in the traditional Indian Knowledge system. Methods and sources - Ancient Indian Observational astronomy. Foundation concepts - nakṣatra, graha, time units, phenomena like meteors, eclipses- Mathematical thinking - numerical and spatial thinking, śulbasūtra, zero, sundials, water clock, time measurement.

Module 2: LANGUAGE, LITERATURE AND ART ***(10 Periods)***

Formation of words in saṃskṛta and some ideas from Pāṇini and Patañjali. Technical words and examples of their usage- Music Vedic chants, sāma, some concepts in ancient treatises like nāradīyaśikṣā, nāṭyaśāstra. Basics of related concepts like dance, meter and rasa in poetry.

Module 3: EARTH AND ATMOSPHERE ***(05 Periods)***

Anomalous phenomena, Earthquakes, clouds, rainfall, soil, agriculture, and food science

Module 4: ARCHITECTURE AND CIVIL ENGINEERING ***(10 Periods)***

Sindhu-Sarasvatī cities, description in purāṇa, arthaśāstra. A glance at select texts like nāradaśilpa, Mayamata, and mānasāra.

Module 5: MATERIAL SCIENCE ***(10 Periods)***

Knowledge and use of various materials in āyurveda, rasaśāstra and vāstuvidyā.

Total Periods: 45

EXPERIENTIAL LEARNING

1 List out the aspects of astronomy and mathematics on the charts and explain in detail.
2. Discuss differenttechnical words and examples of their usage
3. Prepare a poster of anomalous phenomena of Earth and the atmosphere.
4. Demonstrate the role of architecture in the modern world.
5. Illustrate how Materials science can draw upon principles from physics, chemistry, and engineering to understand and manipulate materials.

RESOURCES

TEXTBOOK:

1. Introduction to Indian Knowledge System - A Textbook for UG Students as per NEP 2020 (English, Paperback, Dr. Rohidas Nitonde).
2. "Introduction to Indian Knowledge System: Concepts and Applications": by B. Mahadevan and others (various editions available, with a 2022 edition noted).

REFERENCE BOOKS:

1. **Indian Knowledge System Principles and Practices Hardcover –Big Book, 18 December 2024 by Dr. Ajay Kumar Singh.**
2. Encyclopedia of Classical Indian Sciences- Roddam Narasimha, Universities Press, 2007.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=Gexiwsa7Gc0
2. https://www.youtube.com/watch?v=D3f3jIcEZho

WEB RESOURCES:

1. :ps://nep.puchd.ac.in/iks.pdf
2. :ps://www.millenniumassessment.org/documents/bridging/papers/balasubramian.a.pdf

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25LG101702	**QUANTITATIVE APTITUDE AND VERBAL ABILITY**	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course explores essential quantitative, verbal, and analytical reasoning skills for competitive exams and placements. It covers arithmetic, algebra, geometry, data interpretation, probability, and logical problem-solving.Verbal modules focus on grammar, vocabulary, reading comprehension, and critical reasoning techniques.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Demonstrate knowledge of number systems, percentages, ratios, and averages to solve real-time quantitative problems.

CO2. Apply algebraic techniques, progressions, and geometric concepts to compute and analyze mathematical scenarios.

CO3. Utilize combinatorics, probability, and data interpretation for decision-making under constraints.

CO4. Apply core grammar rules, sentence structures, reading comprehension, and critical reasoning techniques to communicate effectively.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	-	-	2	-	-	-	-	-	-	-
CO2	3	2	-	-	2	-	-	-	-	-	-	-
CO3	3	3	2	3	2	-	-	-	-	-	-	-
CO4	3	2	2	2	2	-	-	-	-	3	-	-
Course Correlation	3	2	2	3	2	-	-	-	-	3	-	-

Mapping												

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: NUMBER SYSTEMS, PERCENTAGES, RATIOS & AVERAGES ***(9 Periods)***

Number system, power cycle, remainder cycle, factors, multiples, HCF, LCM, Percentages, fraction-to-decimal conversions, increase/decrease calculations, simple and compound interest, Ratio, proportion, variation, problems on ages, profit and loss vocabulary, partnership, cost/selling price, Averages, weighted averages, mixtures and alligations.

Module 2: ALGEBRA, PROGRESSIONS, GEOMETRY ***(9 Periods)***

Logarithms, rules and simplifications, solving quadratic equations, Arithmetic and geometric progressions, nth term, sum formulas, Geometry and mensuration, triangles, circles, area, perimeter, volume, surface area, Time and work, efficiencies, pipes and cisterns, division of wages, Speed, distance, relative motion, trains, boats and streams, races.

Module 3: COMBINATORICS, PROBABILITY, AND DATA INTERPRETATION ***(9 Periods)***

Permutation and combination, counting principles, factorials, arrangements, selections, Probability concepts, events, rules of probability, real-life applications, Data interpretation from tables, pie charts, bar graphs, Data sufficiency techniques, evaluating adequacy of given data, Basic logical reasoning within quantitative problem-solving.

Module 4: CORE VERBAL GRAMMAR AND SENTENCE STRUCTURE ***(9 Periods)***

Sentence correction, subject-verb agreement, modifiers, parallelism, tenses, comparisons, Articles and prepositions, omission rules, compound structures, interrogatives, Active and passive voice, direct and indirect speech rules, Sentence completion, para-jumbles, context clues, logical connectors, Vocabulary building, synonyms, antonyms, word usage, analogies.

Module 5: READING COMPREHENSION AND CRITICAL REASONING ***(9 Periods)***

Reading comprehension types, speed reading, tone/inference-based questions, Critical reasoning – arguments, assumptions, conclusions, strengthen/weaken/inference, Word roots, prefixes, suffixes, sentence structure clues, Logical structuring of arguments, spotting fallacies, Application of reasoning in RCs, data-based questions, verbal puzzles.

Total Periods: 45

EXPERIENTIAL LEARNING

1) **NUMBER SYSTEMS, PERCENTAGES, RATIOS & AVERAGES**

   A trader has 3 varieties of rice 13529 kg, 9617 kg, 7987 kg by weights. Find the minimum number of bags of equal size in which he can store the rice without

mixing.

a) 163
b) 191
c) 246
d) 212

2) **NUMBER SYSTEMS, PERCENTAGES, RATIOS & AVERAGES**

The ratio of the ages of A and B is 3:4. After 5 years, the ratio becomes 4:5. What are their present ages?

a) 15 and 20
b) 18 and 24
c) 30 and 40
d) 20 and 25

3) **ALGEBRA, PROGRESSIONS, GEOMETRY**

Solve for x:
If $2x + 3 = 7$, then what is the value of x?

a) 1
b) 2
c) 3
d) 4

4) **ALGEBRA, PROGRESSIONS, GEOMETRY**

The perimeter of a rectangle is 36 cm. If the length is 10 cm, what is the width?

a) 8 cm
b) 9 cm
c) 6 cm
d) 7 cm

5) **COMBINATORICS, PROBABILITY, AND DATA INTERPRETATION**

A card is drawn at random from a standard deck of 52 playing cards. What is the probability that it is a red king?

a) 1/13
b) 1/26
c) 1/52
d) 2/13

6) **COMBINATORICS, PROBABILITY, AND DATA INTERPRETATION**

The number of students in five different classes is as follows:
Class A – 40, Class B – 35, Class C – 50, Class D – 45, Class E – 30.
What is the average number of students per class?

a) 38
b) 40
c) 42
d) 45

7) **CORE VERBAL GRAMMAR AND SENTENCE STRUCTURE**

Identify the grammatically correct sentence:

a) He go to the gym every morning.
b) He goes to the gym every morning.
c) He going to the gym every morning.
d) He gone to the gym every morning.

8) **CORE VERBAL GRAMMAR AND SENTENCE STRUCTURE**

Despite the heavy rain, the match _____.

a) has cancel
b) was cancelled
c) will be cancelled
d) continued as scheduled

9) **READING COMPREHENSION AND CRITICAL REASONING**

Passage:

The Earth's climate has changed throughout history. However, the current trend of global warming is particularly alarming because it is occurring at an unprecedented rate. Scientists overwhelmingly agree that human activities, especially the burning of fossil fuels, are the primary cause of this rapid change.

According to the passage, what is the main cause of current global warming?

a) Natural changes in the climate
b) Increase in solar activity
c) Volcanic eruptions
d) Human activities like burning fossil fuels

10 **READING COMPREHENSION AND CRITICAL REASONING**

A new study shows that students who take handwritten notes retain more information than those who type notes. Therefore, schools should ban laptops during lectures to improve student learning.

Which of the following, if true, most seriously weakens the argument?

a) Many students find typing faster than writing by hand.
b) Some students need laptops to access course materials.
c) The study did not account for the difficulty level of the lectures.
d) The students who typed their notes reviewed them more often than those who wrote by hand.

RESOURCES

TEXTBOOK:

1. "R.S. Aggarwal", *Quantitative Aptitude for Competitive Examinations*, S. Chand Publishing, 2025.
2. "Abhijit Guha", *Quantitative Aptitude for Competitive Examinations*, 7th edition,Tata McGraw Hill Education, 2021.

REFERENCE BOOKS:

1. "Arun Sharma", *How to Prepare for Quantitative Aptitude for CAT*, 11th Edition, McGraw Hill Education, 2024.
2. "Nishit Sinha", *Quantitative Aptitude for CAT*, 5th edition, Pearson Education, 2020.

SOFTWARE/TOOLS:

1. Microsoft Excel or Google Sheets (for solving DI sets)
2. Any Scientific Calculator (if permitted)
3. Online Aptitude Test Platforms like:
   a. India Bix (https://www.indiabix.com)
   b. Lofoya (https://www.lofoya.com)
   c. Test book (https://testbook.com)

VIDEO LECTURES:

1. NPTEL: Aptitude Learning (Verbal & Quant)
2. Un academy: Quantitative Aptitude by Arun Sharma
3. YouTube: Talent Sprint Aptitude Classes
4. YouTube: Study Smart – Full Aptitude Playlist
5. Udemy: Quantitative Aptitude for Competitive Exams

WEB RESOURCES:

1. https://www.indiabix.com/aptitude/questions-and-answers/
2. https://www.geeksforgeeks.org/aptitude/
3. https://www.lofoya.com
4. https://www.placementseason.com/aptitude-questions
5. https://www.campusgate.co.in/p/quantitative-aptitude.html

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25LG101703	**LOGICAL REASONING AND RECRUITMENT ESSENTIALS**	3	-	-	-	3
Pre-Requisite	-					
Anti-Requisite	-					
Co-Requisite	-					

COURSE DESCRIPTION: This course develops essential logical reasoning, analytical skills, and practical communication for competitive exams and placements. It covers data arrangements, coding-decoding, pattern recognition, counting principles, probability, and data interpretation. Learners also acquire skills in logical connectives, syllogisms, time and direction sense, along with group discussions, resume writing, and interview preparation.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Apply concepts of data arrangements, blood relations, ranking, and direction sense to solve spatial and logical reasoning problems.

CO2. Analyze patterns in coding-decoding, series, analogies, odd-one-out, and visual reasoning to improve abstraction and recognition skills.

CO3. Apply principles of combinatorics, probability, data interpretation, logical connectives, syllogistic reasoning, and time-space analysis to construct effective solutions and derive valid conclusions.

CO4. Demonstrate effective communication skills in group discussions, resume writing, and personal interviews through structured activities.

CO-PO Mapping Table:

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	2	-	-	-	-	-	-	-
CO2	3	2	3	2	2	-	-	-	-	-	-	-
CO3	3	3	2	3	2	-	-	-	-	-	-	-
CO4	3	2	-	-	2	-	-	-	-	3	-	-
Course Correlation Mapping	3	2	2	3	2	-	-	-	-	3	-	-

Correlation Levels: **3: High;** **2: Medium;** **1: Low**

COURSE CONTENT

Module 1: DATA ARRANGEMENTS AND BLOOD RELATIONS ***(08 Periods)***

Linear arrangement, circular arrangement, multi-dimensional arrangement, coded and descriptive blood relations, family trees, ranking, and ordering problems. Focus on directional logic, positional comparisons, and attribute-based placement. Enhances spatial reasoning and logical deduction skills.

Module 2: CODING-DECODING, SERIES, ANALOGY, ODD ONE OUT & VISUAL REASONING ***(08 Periods)***

Letter coding, number coding, substitution patterns, alphanumeric series, analogy-based reasoning, identifying odd one out in sequences, visual reasoning including mirror images, paper folding, figure sequences. Builds pattern recognition and abstraction abilities.

Module 3: COUNTING PRINCIPLES, P&C, PROBABILITY, DATA INTERPRETATION & SUFFICIENCY ***(09 Periods)***

Fundamental counting principle, permutation and combination, probability theory and applications, interpreting pie charts, tables, and bar graphs, data sufficiency problems requiring logical assessment of given facts. Develops analytical thinking and quantitative aptitude.

Module 4: LOGICAL CONNECTIVES, SYLLOGISMS, VENN DIAGRAMS, CLOCKS, CALENDARS & DIRECTION ***(08 Periods)***

IF-THEN logic, syllogistic reasoning with Venn diagrams, calendar-based date/day calculations, clock-angle problems, direction sense and cube-based spatial puzzles. Trains logical sequencing and time-space orientation.

Module 5: RECRUITMENT ESSENTIALS – GD, RESUME & INTERVIEW SKILLS ***(12 Periods)***

Basics of group discussion, resume writing guidelines, and key sections, personal interview structure, HR and technical questions, body language tips, mock GD and interview sessions for real-time practice and evaluation. Equips students with communication and interview readiness.

Total Periods: 45

EXPERIENTIAL LEARNING

LIST OF EXERCISES:

1) **DATA ARRANGEMENTS AND BLOOD RELATIONS**
Six people – A, B, C, D, E, and F – are sitting in a row, facing north.
- B is sitting to the immediate right of D.
- C is at one of the ends.
- A is sitting between E and F.
- D is not at either end.
- E is sitting to the left of A.

Who is sitting in the middle?
Options:
A) A
B) B
C) D
D) F

2) **DATA ARRANGEMENTS AND BLOOD RELATIONS**
Pointing to a man, Mira says, "He is the son of my mother's only daughter."
How is the man related to Mira?
Options:
A) Son
B) Nephew
C) Cousin
D) Brother

3) **CODING-DECODING, SERIES, ANALOGY, ODD ONE OUT & VISUAL REASONING**
In a certain code language, **GAMES** is written as **HZNFT**.
How is **PLANE** written in that code?
Options:
A) QMBOF
B) QMBOD
C) QNCOD
D) OKZMD

4) **CODING-DECODING, SERIES, ANALOGY, ODD ONE OUT & VISUAL REASONING**
Which word does **not** belong to the group?
Options:
A) Apple
B) Mango
C) Banana
D) Carrot

5) **COUNTING PRINCIPLES, P&C, PROBABILITY, DATA INTERPRETATION & SUFFICIENCY**
If the sales of Company A in 2021 were 80 units and in 2022 were 120 units, what was the percentage increase?
Options:
A) 33.3%
B) 50%
C) 40%
D) 60%

6) **COUNTING PRINCIPLES, P&C, PROBABILITY, DATA INTERPRETATION &**

SUFFICIENCY
The number of students in five different classes is as follows:
Class A – 40, Class B – 35, Class C – 50, Class D – 45, Class E – 30.
What What is the value of x?
Statement I: $x^2 = 49$
Statement II: x is a negative number
A) Only I is sufficient
B) Only II is sufficient
C) Both I and II together are sufficient
D) Each alone is sufficient

7) **LOGICAL CONNECTIVES, SYLLOGISMS, VENN DIAGRAMS, CLOCKS, CALENDARS & DIRECTION**
Statements:
1. All engineers are logical.
2. Some logical people are creative.
3. No creative person is careless.

Conclusion:
I. Some engineers are creative.
II. No engineer is careless.
Choose the correct option:
A) Only I follows
B) Only II follows
C) Neither I nor II follows
D) Both I and II follow

8) **LOGICAL CONNECTIVES, SYLLOGISMS, VENN DIAGRAMS, CLOCKS, CALENDARS & DIRECTION**
Ravi starts from his home at 3:00 PM and walks 4 km East, then turns left and walks 3 km. He then turns left again and walks 4 km. What direction is he facing, and what time will it be if each km takes him 15 minutes?
A) Facing North, 3:45 PM
B) Facing West, 4:00 PM
C) Facing South, 4:00 PM
D) Facing West, 3:45 PM

9) **RECRUITMENT ESSENTIALS – GD, RESUME & INTERVIEW SKILLS**
Improves Communication Skills – Students learn to express their thoughts clearly and confidently in a group setting.
Builds Critical Thinking – It enhances analytical skills by encouraging students to think on their feet, structure arguments, and respond to different viewpoints.
Boosts Teamwork & Listening Skills – GD teaches the importance of active listening, respecting others' opinions, and working collaboratively, which are essential in professional environments.

10) **RECRUITMENT ESSENTIALS – GD, RESUME & INTERVIEW SKILLS**
Boosts Confidence – Simulated interviews reduce anxiety and prepare students to face real interviews with ease.
Improves Self-Presentation – Students learn how to present their strengths, goals, and experiences effectively.
Provides Constructive Feedback – Personalized feedback helps identify areas for improvement in communication, attitude, and body language.

RESOURCES

TEXTBOOK:

1. "R.S. Aggarwal", *Quantitative Aptitude for Competitive Examinations*, S. Chand Publishing, 2025.

2. "Abhijit Guha", *Quantitative Aptitude for Competitive Examinations*, 7th edition,Tata McGraw Hill Education, 2021.

REFERENCE BOOKS:

1. "Arun Sharma", *How to Prepare for Quantitative Aptitude for CAT*, 11th Edition, McGraw Hill Education, 2024.
2. "Nishit Sinha", *Quantitative Aptitude for CAT*, 5th edition, Pearson Education, 2020.

SOFTWARE/TOOLS:

1. Microsoft Excel or Google Sheets (for solving DI sets)
2. Any Scientific Calculator (if permitted)
3. Online Aptitude Test Platforms like:
   a. India Bix (https://www.indiabix.com)
   b. Lofoya (https://www.lofoya.com)
   c. Test book (https://testbook.com)

VIDEO LECTURES:

1. NPTEL: Aptitude Learning (Verbal & Quant)
2. Un academy: Quantitative Aptitude by Arun Sharma
3. YouTube: Talent Sprint Aptitude Classes
4. YouTube: Study Smart – Full Aptitude Playlist
5. Udemy: Quantitative Aptitude for Competitive Exams

WEB RESOURCES:

1. https://www.indiabix.com/aptitude/questions-and-answers/
2. https://www.geeksforgeeks.org/aptitude/
3. https://www.lofoya.com
4. https://www.placementseason.com/aptitude-questions
5. https://www.campusgate.co.in/p/quantitative-aptitude.html

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25EC101707	**QUANTUM AI**	3	-	-	-	3

Pre-Requisite -
Anti-Requisite -
Co-Requisite -

COURSE DESCRIPTION: This course introduces the fundamentals of Quantum Artificial Intelligence (Quantum AI), an emerging field that combines quantum computing with artificial

intelligence to develop intelligent systems capable of solving complex problems more efficiently than classical methods. Students will explore core concepts of quantum computation, classical and quantum problem-solving, reversible logic, quantum probability, and quantum-inspired cognitive models.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Understand the foundational concepts of Quantum AI, including its advantages, working principles, challenges, and its relation to classical and quantum computation.

CO2. Analyze classical computation frameworks such as decision problems, P vs NP, and the Church–Turing–Deutsch principle, and apply them to knowledge representation and production systems.

CO3. Apply the concepts of reversible computation and probabilistic models like Bayes's theorem and Naïve Bayes to categorize and process information effectively.

CO4. Evaluate quantum problem-solving methods using heuristic search, quantum tree search, and production systems for cognitive architectures and structured problems like the n-puzzle.

CO5. Explore quantum cognition approaches including quantum probability, decision-making strategies, quantum walk, and quantum neural computation to understand emerging models of intelligent behavior.

CO-PO-PSO Mapping Table:

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	–	–	–	–	–	–	–	2	–	2	3	2	–
CO2	3	3	2	2	–	–	–	–	–	2	–	2	3	2	2
CO3	2	3	2	2	–	–	–	–	–	–	–	2	3	3	3
CO4	3	3	3	3	2	–	–	–	–	2	–	2	3	3	3
CO5	3	2	2	3	2	–	–	–	2	3	–	3	3	3	3
Course Correlation Mapping	**3**	**3**	**3**	**3**	**2**	–	–	–	**2**	**3**	–	**3**	**3**	**3**	**3**

Correlation Level: **3-High;** **2-Medium;** **1-Low**

COURSE CONTENT

Module 1: INTRODUCTION **(08 Periods)**

Definition of quantum AI, Advantages of QAI (Quantum AI), How Quantum AI Works, Why is Quantum AI Important, Current Challenges, Future of Quantum AI, Motivation and Goals, Classical computation, Quantum computation.

Module 2: COMPUTATION, PROBLEM SOLVING AND PRODUCTION SYSTEM. **(10 Periods)**

Cantor's diagonal argument, Decision problems,, P and NP, Church–Turing–Deutsch principle, Knowledge Representation, Rules ,Logic-based operators ,Frames, Categorial representation, Binary vector representation, Deduction systems, Reaction systems, Human problem-solving, Example, Proto logic, Binding problem, Icons, Euclidian geometry of the world.

Module 3: REVERSIBLE ALGORITHMS AND PROBABILITY (08 Periods)

Reversible Computation, Boolean gates, Reversible Boolean gates, Toffoli gate, Circuit, Conditional probability, Bayes's rule, Joint distribution, Naıve Bayes and counting, Counting and categorization.

Module 4: QUANTUM PROBLEM-SOLVING (10 Periods)

Symbols and Quantum Reality, Uninformed Tree Search, Heuristic functions, Invention of heuristic functions, Quality of heuristic, Principles of quantum tree search, Iterative quantum tree search, No constant branching factor, Quantum Production System, 3-puzzle, Extending for any n-puzzl, Pure production system, Cognitive architecture, Representation.

Module 5: QUANTUM COGNITION AND RELATED APPROACHES (09 Periods)

Quantum Probability, Decision Making, Unpacking Effects, Quantum Walk : Random walk, Quantum insect, Quantum walk on a graph, Quantum walk on one dimensional lattice, Quantum walk and search, Quantum walk for formula evaluation, Adiabatic Computation, Quantum Neural Computation.

Total Periods: 45

EXPERIENTIAL LEARNING:

1. Build a quantum random number generator
2. Simulate a quantum walk

RESOURCES

TEXT BOOK:

1. Andreas Wichert, principles of quantum artificial intelligence, Copyright © 2014 by World Scientific Publishing Co. Pte. Ltd., ISBN 978-981-4566-74-2.

REFERENCE BOOK:

1. Noson S.Yanofsky, Mirco A. Mannucci, "Quantum Computing for Computer Scientis

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=F3nwNK28LzA&pp=0gcJCf0Ao7VqN5tD
2. https://www.youtube.com/channel/UCgUUiDMmN9AsC2LyQSh_KXw/playlists

WEB RESOURCES:

1. https://www.researchgate.net/publication/262883357_Principles_of_Quantum_Artificial_Intelligence_World_Scientific
2. https://www.worldscientific.com/worldscibooks/10.1142/8980?srsltid=AfmBOop7WiTj56KDDqGnXwRcFMrOlyhVcN5HyIE3S9JO67M_AI45Lwsw
3. https://www.coursera.org/articles/what-is-quantum-ai

UNIVERSITY ELECTVE

Course Code	Course Title	L	T	P	S	C
25CA101702	**SOFTWARE ENGINEERING FOR AI**	3	-	-	-	3
Pre-Requisite	Software engineering					
Anti-Requisite	-					
Co-Requisite	-					

COURSE DESCRIPTION: This course introduces the principles and practices of software engineering specifically tailored for AI-based systems. It covers the full lifecycle of AI software development, integrating traditional software engineering methods with modern AI and machine learning workflows. Students will learn how to define requirements, design modular and interpretable systems, engineer data pipelines, develop and test AI models, and deploy them responsibly. Emphasis is placed on maintainability, scalability, fairness, and ethical considerations in building AI-driven applications.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Analyze the fundamental differences between conventional software engineering and AI-based systems,

CO2. Apply incremental and exploratory system engineering methodologies, to design AI systems.

CO3. Analyze exploratory programming practices for managing evolving AI software systems.

CO4. Evaluate the design and engineering aspects of machine learning systems and expert systems.

CO5. Design AI-driven practical software using engineering toolboxes, support environments.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	–	–	–	2	–	–	–	2	–	2	3	2	–
CO2	3	3	2	2	2	–	–	–	–	–	–	2	3	2	2
CO3	2	3	3	2	2	–	–	–	–	2	–	2	3	3	2
CO4	3	3	2	3	2	–	–	–	–	2	–	2	3	3	3
CO5	3	3	3	3	2	2	–	–	2	3	–	3	3	3	3
Course Correlation Mapping	**3**	**3**	**3**	**3**	**2**	**2**	**-**	**-**	**2**	**3**	**-**	**3**	**3**	**3**	**3**

Correlation Level: 3-High; 2-Medium; 1-Low

COURSE CONTENT

Module 1: INTRODUCTION TO COMPUTER SOFTWARE FOR AI, AI PROBLEMS AND CONVENTIONAL SE PROBLEMS **(10 periods)**

Computers and software systems, An introduction to Software engineering, Bridges and buildings versus software systems, the software crisis A need for Al systems What is an AI problem, Ill-defined specifications, correct versus 'good enough' solutions, Context-free problems, SAV methodology, the myth of complete specification, what is verifiable, SAT methodology, testing for reliability, the strengths, the weaknesses

Module 2: INCREMENTAL AND EXPLORATORY METHODOLOGY FOR SYSTEM ENGINEERING (09 periods)

Classical methodology and AI problems, The RUDE cycle, Malleable software, AI muscles on a conventional skeleton Conventional paradigms Automatic programming, Transformational implementation, The "new paradigm" of Blazer, Cheatham and Green, Operational requirements of Kowalski, The POLITE methodology

Module 3: EXPLORATORY PROGRAMMING (09 periods)

Reverse engineering, Reusable software Design knowledge, Stepwise abstraction, The problem of decompiling, Controlled modification, Structured growth Self-adaptive software, The threat of increased software problems

Module 4: MACHINE LEARNING AND EXPERT SYSTEMS (09 periods)

Practical machine learning examples, Multisession inductive programming, Expert Systems: Expert systems as Al software, Engineering expert systems, The lessons of expert systems for engineering Al software

Module 5: AI INTO PRACTICAL SOFTWARE (08 periods)

Support environments, Reduction of effective complexity, Moderately stupid assistance, An engineering toolbox, Self-reflective software, Over engineering software, Future Holds

Total Periods: 45

RESOURCES

TEXT BOOK:

1. Derek Partridge, "Artificial Intelligence and Software Engineering", Glenlake Publishing Company, 1998.

REFERENCE BOOKS:

1. "The role of Artificial Intelligence in Software Engineering", K. Nitalksheswara Rao,2020
2. "Farid Meziane &Sunil Vadera, "Artificial Intelligence Applications for Improved Software Engineering Development", Information Science Reference, 2009

VIDEO LECTURES

1. https://www.youtube.com/watch?v=Ccku34DU7k4
2. https://www.youtube.com/watch?v=WNxc85aFFbM
3. https://www.youtube.com/watch?v=KIC-sFz5OT8
4. https://www.youtube.com/playlist?list=PLDS2JMJnJzdkQPdkhcuwcbJpjB84g9ffX

WEB RESOURCES

1. https://www.geeksforgeeks.org/software-engineering/ai-in-software-engineering
2. https://www.coursera.org/learn/team-software-engineering-with-ai
3. https://ckaestne.github.io/seai/S2020/
4. https://www.seerene.com/ai4se
5. https://www.coursera.org/specializations/generative-ai-for-software-developers

UNIVERSITY ELECTVE

Course Code	Course Title	L	T	P	S	C
25CB101703	**ADVANCED ARTIFICIAL INTELLIGENCE**	3	-	-	-	3

Pre-Requisite Artificial intelligence

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course offers an in-depth exploration of advanced concepts and methodologies in Artificial Intelligence (AI), preparing students for real-world applications. Beginning with a comprehensive introduction to the foundations and evolution of AI, the course covers cognitive modeling, expert systems, and intelligent robotics. Students delve into advanced reasoning mechanisms including deductive, inductive, abductive, and common-sense reasoning that are essential for building intelligent systems capable of human-like decision-making.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Summarize the evolution and history of Artificial Intelligence and its major research domains.

CO2. Apply reasoning techniques to real-world and AI problem contexts.

CO3. Apply Game Theory models such as zero-sum and evolutionary games to decision-making problems in AI.

CO4. Apply Bayesian and Gaussian Process models in real-world transfer learning applications.

CO5. Design solution strategies using AI platforms for domain-specific scientific challenges.

CO-PO-PSO Mapping Table:

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	–	–	–	–	–	–	–	2	–	2	3	–	–
CO2	3	3	3	2	–	–	–	–	–	2	–	2	3	2	2
CO3	2	3	3	2	2	–	–	–	–	–	–	2	3	2	3
CO4	3	3	2	3	2	–	–	–	–	–	–	2	3	3	2
CO5	3	2	3	3	2	–	–	–	2	3	–	3	3	3	3
Course Correlation Mapping	**3**	**3**	**3**	**3**	**2**	–	–	–	**2**	**3**	–	**3**	**3**	**3**	**3**

Correlation Level: 3-High; 2-Medium; 1-Low

COURSE CONTENT:

Module 1 INTRODUCTION TO ARTIFICIAL INTELLIGENCE (10 Periods)

Brief History of AI, Basic Content of Artificial Intelligence Research: Cognitive Modeling, Knowledge Representation, Automatic Reasoning, New Generation Artificial Intelligence, Expert System, Natural Language Processing, Intelligent Robot, Distributed Artificial Intelligence, Internet Intelligence Game ,AI for Science .

Module 2: CAUSAL REASONING (09 Periods)

Deductive Reasoning, Inductive Reasoning, Abductive Reasoning, Reasoning by Analogy, Non-Monotonic Reasoning, Common Sense Reasoning.

Module 3: GAME THEORY (09 Periods)

History of Game Theory, Basic Concepts of Game Theory, Applications of Game Theory, Representation of Games: Extensive Form, Normal Form, Characteristic Function Form, Alternative Game Representations, Type of Game Theory, Zero-Sum Game, Evolutionary Game Theory, Game Dynamics: MDA Model, Applications.

Module 4: TRANSFER LEARNING (09 Periods)

History, Important Concepts, Similarity Measure, Classifications, Negative Transfer, Inductive Transfer Learning, Transfer Learning, Model-Based Transfer Learning, Bayesian Models. Gaussian Process (GP), Deep Transfer Learning, Heterogeneous Transfer Learning, Multi-task Transfer Learning, Domain Adaptation Transfer Learning.

Module 5: ARTIFICIAL INTELLIGENCE FOR SCIENCE (08 Periods)

Introduction, Knowledge Discovery, Protein Structure Prediction, Drug Development, Genetic Research, Biological Breeding, New Materials, Superconducting Materials, Graphene, Liquid Metal, Climate Change Climate Model, Long-Term Impacts, Solution Strategy, Platform of Artificial Intelligence for Science.

Total Periods: 45

EXPERIENTIAL LEARNING

Real-World Case Study Analysis on

1. AI in healthcare
2. AI in finance or e-commerce (credit scoring, dynamic pricing)

RESOURCES

TEXT BOOK:

1. Zhongzhi SHI, Advanced Artificial intelligence, World Scientific Publishing Co. Pte. Ltd,3rd edition, ISBN 9789811293986 (hardcover) ,3rd edition.

REFERENCE BOOKS:

1. Stuart Russell, Peter Norvig, Artificial Intelligence: A Modern Approach, 4th (2020) edition, Pearson publications.
2. Ian Goodfellow, Yoshua Bengio, Aaron Courville, Deep Learning, MIT Press

VIDEO LECTURES

1. ***https://www.youtube.com/watch?v=1HpYwa52LeY***
2. ***https://www.youtube.com/watch?v=kOkehUZrjBM***
3. **https://www.youtube.com/playlist?list=PLxf3-FrL8GzRALeq_9BtdQclN6SF4bTCG**

WEB RESOURCES

1. ***https://people.engr.tamu.edu/guni/csce625/slides/AI.pdf***
2. ***https://dokumen.pub/advanced-artificial-intelligence-3nbsped-9789811293986-9789811293993- 9789811294006.html***
3. https://nou.edu.ng/coursewarecontent/CIT%20903%20Advanced%20Artificial%20Intelligence_0.pdf
4. ***https://home.schoolnutritionandfitness.com/index.jsp/uploaded-_files/M2E709/AdvancedArtificialIntelligenceBook.pdf***

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25CE101706	**INDIAN KNOWLEDGE SYSTEM IN TOWN PLANNING AND ARCHITECTURE**	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course explores the profound and time-tested wisdom of the Indian Knowledge System (IKS) as it applies to town planning and architecture. Drawing from ancient texts like the Vastu Shastra, Artha shastra, Manasara, and Silpa Shastra, the course delves into how traditional Indian principles harmonized built environments with nature, climate, cosmology, and societal needs. The course provides a historical and philosophical framework to understand the design of cities, temples, dwellings, water management systems, and public spaces in ancient and medieval India.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Demonstrate knowledge of traditional Indian architectural and urban planning systems.

CO2. Interpret ancient design treatises and relate their principles to real-world examples.

CO3. Integration of culture, environment, and functionality in traditional planning.

CO4. Apply IKS principles to modern urban and architectural contexts with sustainability in focus.

CO5. Interpret the concept of ancient stone carving and their significance in architecture.

CO-PO Mapping Table:

Course Outcomes	Program Outcomes											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-
CO4	3	1	-	-	-	-	-	-	-	-	-	-
CO5	3	1	-	-	-	-	-	-	-	-	-	-
Course Correlation Mapping	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: ANCIENT TEXT AND TOWN PLANNING ***(09 Periods)***

Introduction to ancient text in the context of Town Planning and Governance; terminologies; Indic languages in which the knowledge is embedded; Chronology of development of ancient text and changing principles.

Module 2: PRINCIPLES OF TOWN PLANNING ***(09 Periods)***

Ancient India progressed towards urbanisation with cities of various sizes and shapes. Elaboration of basic understanding of the layouts in terms of geometry, formulae and theory based on population, geography, and various communities shall be understood.

Module 3: ANCIENT TOWNS AND PRESENT PLANNING PRACTICES ***(09 Periods)***

Evolution of the cities following the ancient town planning principles in urban centres. Interconnection between ancient knowledge of town planning and present planning practices to establish the relationship between theory and practice.

Module 4: CLAY ARCHITECTURE ***(09 Periods)***

Terracotta and Terracruda, Brick structures and urns from the Indus Valley and Megalithic sites in south India, Sculptures of terracotta and bronze from Harappa, Terracruda or unbaked clay-made objects and rituals.

Module 5: **STONE AND GARDEN** ***(09 Periods)***

Stone: Memorials, Architectural Remnants and Objects- Types of stone in India: Mathura Sandstone, Deccani Basalt, Rajasthani Marble, Stone carving for architecture and their social significance. Garden: Islam, the garden of paradise and afterlife, Tombs, palace, garden and waterways from the Mughal and Deccani context.

Total Periods: 45

Topics for self-study are provided in the lesson plan.

EXPERIENTIAL LEARNING

1. Heritage Walks & On-Site Case Studies (Nearby towns)

2. Hands-on mapping of **temple towns**

3. Students make small prototype using traditional techniques.

4. Students document traditional water harvesting system

(Note: It's an indicative one. Course Instructor may change activities and shall be reflected in course Handout)

RESOURCES

TEXT BOOKS:

1. Ali, Daud and Emma Flatt eds, Garden and landscape practices in pre-colonial India: histories from the Deccan, New Delhi: Routledge 2020.

   Dehejia, Vidya, Chola: Sacred Bronzes of Southern India, London: Royal Academy of Arts 2006.

REFERENCE BOOKS:

1. Goswamy, B. N., and Eberhard Fischer, Pahari Paintnings: The Horst Metzger collection in the Museum Rietberg, New Delhi: Niyogi Books 2017.
2. Hardy, Adam, The Temple Architecture of India. Chichester (GB), J. Wiley and Sons 2007.
3. Pandey, Shailaja, Mayamata : An Indian treatise on housing architecture and iconography, Chaukhamba Surbharati Prakashan 2007.
4. Sharma, Sudarshan Kumar, Samarangana Sutradhara, Parimal Publications 2008.
5. Sharma B.L, Vishvakarma - Vastushastram, Parimal Publications 2010.
6. Jugnu, Shri Krishna, Aparajitpraccha, Parimal Publications 2011.
7. Patrick Olivelle, King, governance, and law in ancient India : Kauṭilya's Arthasastra : a new annotated translation, Oxford University Press 2013.
8. Apte, Prabhakar, Samarangana Sutradhara, IGNCA 2023.

VIDEO LECTURES:

1. https://iksindia.org/lectures-and-videos.php

2. https://www.youtube.com/watch?v=4NT9reg4G3s
3. https://onlinecourses.swayam2.ac.in/imb23_mg53/preview
4. https://www.youtube.com/@IKS_Media_MoE/videos

WEB RESOURCES:

1. https://nitkkr.ac.in/ndian-knowledge-systems-iks
2. https://iksindia.org/research-proposal-form.php
3. https://en.wikipedia.org/wiki/Indian_Knowledge_Systems

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25SS101702	**GENDER AND ENVIRONMENT**	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: Gender and the environment relationship, Gendered Roles in the Family & Community, Gender and sustainable development, Gender in environmental justice, Gender & Environmental Security.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

- **CO1.** Apply the knowledge of gender & environmental connections by analyzing key issues and topics within global environmental politics in environmental decision-making.
- **CO2.** Demonstrate knowledge of the concepts of gender and sustainable development through debates and policy documents.
- **CO3.** Analyze the concept of environmental security and justice by identifying the sources of insecurity.

CO-PO Mapping Table:

Course Outcomes	Program Outcomes											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	1	-	-	-	3	3	-	-	-	-	-
CO2	3	-	-	-	-	2	3	1	-	2	-	-
CO3	3	1	-	-	-	3	3	-	-	-	-	2
Course Correlation Mapping	**3**	**1**	**-**	**-**	**-**	**3**	**3**	**1**	**-**	**2**	**-**	**2**

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: GENDER AND ENVIRONMENT RELATIONSHIP ***(09 Periods)***

Introduction – Gender and Environment – Development of gender roles – Society, gender & environment – Understanding environmental politics – Gender-environment connections–Eco-feminism – Cultural eco-feminism – Social eco-feminism – Feminist political ecology

Module 2: GENDERED ROLES IN THE FAMILY & COMMUNITY ***(09 Periods)***

Organization of the household – Domestic division of labour – Food: growing, harvesting, shopping, preparing, and cooking

Gender & Power – Planning – Politics – NGO – Gendering of environmental protest – Environmental decision-making

Module 3: GENDER AND SUSTAINABLE DEVELOPMENT ***(09 Periods)***

Concept of sustainability & its achievement – Concept of sustainable development – Ecological Modernization – Gender & sustainability debates – Gender & sustainable development debates - Gender in policy documents – Gender, poverty & equity in sustainable development

Module 4: GENDER IN ENVIRONMENTAL JUSTICE ***(09 Periods)***

Normative Concerns (Fairness, Inequality & Justice) –Making sense of Environmental justice – Ecological debt, Transnational harm, & human rights – Ecological justice – Gender &Environmental Justice – Gender, Vulnerability & risk – Women in environmental justice movements – Knowledge & participation – Gender, sustainability & justice as guiding concepts.

Module 5: GENDER AND ENVIRONMENTAL SECURITY ***(09 Periods)***

Connections between security & the environment – **Gender, environment & security:** Sustainability as security – poverty & insecurity – Insecurity as injustice – Competing ways of thinking security – Reflecting on sources of insecurity – **Case Study** – Food Security -**Case Study** – The impacts of natural disasters

Total Periods: 45

EXPERIENTIAL LEARNING

1. Prepare a poster presentation on the impact of globalization on family structure and society.
2. Prepare a presentation on the family setup of different countries and their peculiar customs.
3. Prepare poster presentation on "Ancient hominines walked like humans but climbed like apes."
4. Find out the problems of present society and being part of future generations how you may help to strengthen environmental security.

(Note: It's an indicative one. Course Instructor may change activities and shall be reflected in course Handout)

RESOURCES

TEXT BOOKS:

1. Nicole Detraz, *Gender and the Environment,* Polity Press, Cambridge, UK. 2017

   Susan Buckingham- Hatfield, *Gender and Environment*, Rutledge, London. 2000

REFERENCE BOOKS:

1. Promillakapur ed., *Empowering Indian Women*, Publication Division, Government of India, New Delhi. 2000.
2. Ronnie Vernooy, Ed., *Social and Gender Analysis Natural Resource Management: Learning Studies and Lessons from Asia,* Sage, New Delhi. 2006
3. Swarup Hemlata and Rajput, Pam, *Gender Dimensions of Environmental and Development Debate: The Indian Experience,* In Sturat S. Nagel, (ed). *India's Development and Public Policy*. Ashgate, Burlington. 2000

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25SS101703	**INDIAN ECONOMY**	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: Introduction; Elementary Economic Analysis; Economic Planning; Time Value of Money; Value Analysis/Value Engineering.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Understand the basic concepts of economics, economic analysis, economic planning and strata.

CO2. Demonstrate knowledge in capital budgeting, evaluation of engineering projects, depreciation policy and familiarize with the concepts of value analysis vs value engineering.

CO3. Analyze and apply financial information for the evaluation of finance.

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	2	-	-	-	-	-	-
CO2	3	-	-	-	-	2	-	-	-	-	-	2
CO3	3	-	-	-	-	2	-	-	-	-	-	2
Course Correlation Mapping	3	-	-	-	-	2	-	-	-	-	-	2

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: INTRODUCTION *(09 Periods)*

Economics-Flow in an Economy, Law of Supply and Demand; Micro and Macro Economics; Relationship between Science, Engineering, Technology and Economic Development; Concept of Engineering Economics-Types of Efficiency, Definition and Scope of Engineering Economics.

Module 2: ELEMENTARY ECONOMIC ANALYSIS *(09 Periods)*

Economic Analysis – Meaning, Significance, Simple Economic Analysis; Material Selection for a Product, Substitution of Raw Material; Design Selection for a Product; Material Selection-Process Planning, Process Modification.

Module 3: ECONOMIC PLANNING *(09 Periods)*

Introduction - Need For Planning in India, Five-year plans(1951-2012), NITI Aayog (from 2014 onwards); Inclusive Growth-Meaning, Significance, Need for inclusive growth in India,

Strategy for more inclusive growth, Challenges and Prospects; Employment and Inclusive Growth in India, Role of engineers in sustaining inclusive growth.

Module 4: TIME VALUE OF MONEY ***(12 Periods)***

Concepts and Application; Capital Budgeting-Traditional and Modern Methods; Simple and Compound Interest, Cash Flow Diagram, Principle of Economic Equivalence; Evaluation of Engineering Projects - Present Worth Method, Future Worth Method, Annual Worth Method, Internal Rate of Return Method, Cost-benefit Analysis in Public Projects; Depreciation Policy-Depreciation of Capital Assets, Causes of Depreciation, Straight Line Method and Declining Balance Method.

Module 5: VALUE ANALYSIS/VALUE ENGINEERING ***(06 Periods)***

Introduction-Value Analysis, Value Engineering, Functions, Aims; Value Analysis vs Value Engineering; Value Engineering Procedure- Advantages, Application Areas.

Total Periods: 45

EXPERIENTIAL LEARNING

1. Prepare a poster presentation on the impact of globalization on family structure and society.
2. Prepare a presentation on family setups of different countries and their peculiar customs if any.
3. Prepare a poster presentation on "Ancient hominin walked like a human but climbed like an ape."
4. Find out the problems of present society and being part of future generations and how you may help to strengthen environmental security.

(Note: It's an indicative one. Course Instructor may change activities and shall be reflected in course Handout)

RESOURCES

TEXT BOOKS:

1. Panneerselvam. R., *Engineering Economics*, PHI Learning Private Limited, New Delhi, 2nd edition, 2013.
2. Jain. T. R., V. K. Ohri, O. P. Khanna., *Economics for Engineers*, VK Publication, 1st edition, 2015.

REFERENCE BOOKS:

1. DuttRudar & Sundhram K. P. M., *Indian Economy*, S. Chand, New Delhi, 62nd revised edition, 2010.
2. Misra, S. K. & V. K. Puri., *Indian Economy*: *Its Development Experience*, Himalaya Publishing House, Mumbai, 32nd edition, 2010.

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25SS101704	**INDIAN HISTORY**	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: Introduction; Ancient India; Classical and Medieval era; Modern India; India after independence.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Demonstrate contextual knowledge in the evolution of ancient and medieval Indian History and acquire an awareness of societal and cultural transformation.

CO2. Analyze the situations before and after Independence and assess the societal reforms implemented in India after Independence.

CO3. Practice culture transformations and appreciate its influence to adapt themselves in global scenarios.

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	-	1	-	-	-	-	-	-
CO2	1	2	-	-	-	1	-	-	-	-	-	-
CO3	1	1	-	-	-	2	-	-	-	-	-	-
Course Correlation Mapping	2	1	-	-	-	2	-	-	-	-	-	-

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: INTRODUCTION TO INDIAN HISTORY *(08 Periods)*

Elements of Indian History; History Sources: Archaeology, Numismatics, Epigraphy & Archival research; Methods used in History; History & historiography; Sociological concepts-structure, system, organization, social institutions, Culture and social stratification (caste, class, gender, power), State& Civil Society.

Module 2: ANCIENT INDIA *(09 Periods)*

Mohenjo-Daro civilization; Harappa civilization; Mauryan Empire.

Module 3: CLASSICAL & MEDIEVAL ERA *(12 Periods)*

Classic Era (200 BC - 1200 AD); Hindu - Islamic Era (1200 - 1800 AD).

Module 4: MODERN INDIA ***(06 Periods)***

Age of Colonialism (17th - 19th centuries); First war of Indian Independence; Freedom Struggle (1857-1947)

Module 5: INDIA AFTER INDEPENDENCE (1947 -) ***(10 Periods)***

The Evolution of the Constitution and Main Provisions; Consolidation of India as a Nation; Politics in the States; Indian economy; Modernization and globalization, Secularism and communalism, Nature of development, Processes of social exclusion and Inclusion, Changing Nature of Work and Organization.

Total Periods: 45

EXPERIENTIAL LEARNING

1. Prepare a write-up on how to safeguard ancient monuments.
2. Analyze the most famous historically important place you visited.
3. Prepare a presentation on the ancient Seven Wonders of the World with their significance and how they are destroyed.
4. Prepare a presentation on "Wars of the past not only destroyed people and their livelihood but also the people's tradition and culture."
5. Prepare a poster on " Continents that No Longer Exist" with causes

(Note: It's an indicative one. Course Instructor may change activities and shall be reflected in course Handout)

RESOURCES

TEXT BOOKS:

1. K. Krishna Reddy, *Indian History,* Tata McGraw-Hill, 21st reprint, 2017.

REFERENCE BOOKS:

1. Guha, Ramachandra, *India after Gandhi*, Pan Macmillan, 2007.
2. Romila Thapar, *Early India***,** Penguin India, New Delhi 2002.

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25SS101705	**INDIAN TRADITION AND CULTURE**	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: Basic traits of Indian Culture; Humanistic Reforms under Jainism and Buddhism; Culture in the medieval period; Socio Religious reforms in Indian Culture; Reform movements for harmonious relations.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Demonstrate knowledge of Vedic and Upanishadic culture and society to consider human aspirations, values and theories.

CO2. Understand the contributions of Buddhism and Jainism to Indian culture.

CO3. Examine the cultural conditions and achievements of India under Mouryas and Guptas.

CO4. Analyze social religious reforms and reform movements.

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	-	-	-	-	1	-	-	-	-	-	-
CO2	3	-	-	-	-	1	-	-	-	-	-	2
CO3	2	-	-	-	-	3	-	-	-	-	-	-
CO4	2	-	-	-	-	3	-	-	-	-	-	2
Course Correlation Mapping	**3**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**2**

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: BASIC TRAITS OF INDIAN CULTURE ***(08 Periods)***

Meaning and definition and various interpretations of culture - Culture and its features - The Vedic and Upanishad culture and society - Human aspirations and values in these societies – Chaturvidha purushardhas, Chaturashrma and Chaturvarna theory.

Module 2: HUMANISTIC REFORMS UNDER JAINISM AND BUDDHISM ***(09 Periods)***

Salient features of Jainism - contributions of Jainism to Indian culture - Contributions of Aachaarya and Mahaapragya - Buddhism as a humanistic culture - The four noble truths of Buddhism - Contributions of Buddhism to Indian culture.

Module 3: CULTURE IN THE MEDIEVAL PERIOD ***(09 Periods)***

Unifications of India under Mouryas and Guptas and their cultural achievements - Cultural conditions under satavahanas - Contributions to Pallavas and cholas to art and cultural achievements of Vijayanagara rulers

Module 4: SOCIO RELIGIOUS REFORMS IN INDIAN CULTURE ***(09 Periods)***

Western impact on India - Introduction of Western education - social and cultural awakening and social reform movements of Raja ramohan Roy - Dayanandha Saraswathi - Anne Besant (theosophical society).

Module 5: REFORM MOVEMENTS FOR HARMONIOUS RELATIONS ***(09 Periods)***

Vivekananda, Eswarchandra vidyasagar and Veeresalingam - emancipation of women and struggle against caste - Rise of Indian nationalism - Mahatma Gandhi – Non-violence and satyagraha and eradication of untouchability.

Total Periods: 45

EXPERIENTIAL LEARNING

1. Identify different cultural festivals of Indian States and prepare a write-up on their uniqueness.
2. India has a rich history with numerous architectural wonders. Prepare a report on any three famous architectural wonders in India.
3. Explore the diverse flavors of Indian cuisine and prepare a poster on the different dishes and their distinctiveness.
4. India is a country of Unity in Diversity. Make a PowerPoint presentation on different traditional dresses of various cultural people.

(Note: It's an indicative one. Course Instructor may change activities and shall be reflected in course Handout)

RESOURCES

TEXT BOOKS:

1. Valluru Prabhakaraiah, *Indian Heritage and Culture*, Neelkamal Publications Pvt. Ltd. Delhi, 1/e, reprint 2015.

REFERENCE BOOKS:

1. L. P. Sharma, *History of Ancient India*, Konark Publishers, Pvt. Ltd. New Delhi, 2010.
2. L. P. Sharma, *History of Medieval India*, Konark Publishers, Pvt. Ltd. New Delhi, 2010.
3. The Cultural Heritage of India Vol-I, II, III, IV, V, The Ramakrishna Mission Institute of Culture, Calcutta

UNIVERSITY ELECTIVE

Course Code	Course Title	L	T	P	S	C
25SS101706	**WOMEN EMPOWERMENT**	3	-	-	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: Concept & Framework, Status of Women, Women's Right to Work, International Women's Decade, and Women Entrepreneurship.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Demonstrate the knowledge of the characteristics and achievements of empowered women and women's empowerment techniques by analyzing women's legal and political status.

CO2. Apply the knowledge of women's rights by analyzing various societal issues and obstacles in different fields, including science and technology.

CO3. Demonstrate the knowledge of the significance of women's participation in policy debates, National conferences, and common forums for equality and development by identifying and analyzing issues.

CO4. Analyze the concept of women's entrepreneurship, government schemes, and entrepreneurial challenges and opportunities.

CO-PO Mapping Table

Course Outcomes	Program Outcomes											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	1	-	-	1	3	-	1	–	–	-	-
CO2	3	1	-	-	-	2	-	-	-	–	-	-
CO3	3	1	-	-	-	2	-	-	-	3	-	-
CO4	3	1	-	-	-	-	-	-	-	-	2	-
Course Correlation Mapping	**3**	**1**	**-**	**-**	**1**	**3**	**-**	**1**	**–**	**3**	**2**	**-**

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: CONCEPT & FRAMEWORK ***(09 Periods)***

Introduction– Empowered Women's Characteristics – Achievements of Women's Empowerment **Concept of Empowerment:** Meaning & Concept – Generalizations about Empowerment – Empowerment Propositions – Choices women can make for empowerment – Women's participation in decision making, development process & in Governance.

Framework for Empowerment – Five levels of equality – Tenets of Empowerment– Elements – Phases and aspects – Techniques – Categories and Models – Approaches.

Module 2: STATUS OF WOMEN ***(09 Periods)***

Legal Status: Present Scenario – Call for Social Change – Significant Trends – Legal & Schemes – Personal Law – Joint Family – Criminal Law – Shift towards Dowry – Deterrent Punishment – Criminal Law (II Amendment) – Discrimination in Employment.

Political Status: Present Scenario – Political Participation & its NatureSocio–economic Characteristics – Political Mobilization: Mass Media – Campaign Exposure – Group Orientation – Awareness of issues and participation – Progress & Future Thrust.

Module 3: WOMEN'S RIGHT TO WORK ***(09 Periods)***

Introduction – Present Scenario – Changes in Policy & Programme – National Plan of Action– Women's Cells and Bureau – Increase in the work participation rate – Discrimination in the labour market – Women in unorganized sector – Issues and Obstacles– Women in Education – Women in Science & Technology – Case Study: Linking Education to Women's Access to resources.

Module 4: WOMEN'S PARTICIPATORY DEVELOPMENT ***(09 Periods)***

Dynamics of social change – conscious participation – Information Explosion – Organized Articulation – National Conference – Common Forums – Participatory Development – New Issues Identified – Role of other Institutions.

Module 5: WOMEN ENTREPRENEURSHIP ***(09 Periods)***

Introduction – Definition – Concept – Traits of women Entrepreneurs – Role of Women Entrepreneurs in India – Reasons for Women Entrepreneurship – Government schemes & Financial Institutions to develop Women Entrepreneurs – Key policy recommendations – Project Planning – Suggestions and measures to strengthen women entrepreneurship – Growth & Future challenges – Training and Opportunities – Case Study: Training Women as Hand–pump Mechanics– Case Study: Literacy for Empowering Craftswomen

Total Periods: 45

EXPERIENTIAL LEARNING

1. Prepare poster presentation on "impact of women's self-help groups on their empowerment and socio-economic development."
2. Prepare a comparative analysis chart on the status of women in various countries.
3. Prepare a presentation on women and cultural responsibilities in different societies.
4. Prepare a presentation on the women of the past, present and future in terms of responsibilities and duties.
5. Prepare a presentation on the great women entrepreneurs of India.

(Note: It's an indicative one. Course Instructor may change activities and shall be reflected in course Handout)

RESOURCES

TEXT BOOKS:

1. SahaySushama, *Women and Empowerment,* Discovery Publishing House, New Delhi, 2013.

   NayakSarojini, Jeevan Nair, *Women's Empowerment in India*, Pointer Publishers, Jaipur, 2017.

REFERENCE BOOKS:

1. Baluchamy. S, *Women's Empowerment of Women*, Pointer Publishers, Jaipur, 2010.
2. Khobragade Grishma, *Women's Empowerment: Challenges and Strategies Empowering Indian Women*, Booksclinic Publishing, Chhattisgarh, 2020.

WEB RESOURCES:

1. https://www.economicsdiscussion.net/entrepreneurship/women–entrepreneurs–in–india
2. https://www.businessmanagementideas.com/entrepreneurship–2/women entrepreneurs

Note:
Syllabus is updated upto B.B.A I year as per BoS approval and remaining syllabus will be updated after next BoS approval.