Course Title	:	**Kinematics of Machines**	**Semester**	:	**III**
Course Code	:	**24UME301T**	**Course Category**	:	**PC-PCC**
Teaching Scheme	:	**L - T - P** **2 - 0 - 0**	**Total Credits**	:	**2**

Prerequisites :

- Student must have knowledge of the position, displacement, velocity, and acceleration of a body.

Course Objectives:

- Make student conversant with the process of motion transformation, develop ability to critically analyze the machines, mechanisms and controlling devices, and contrive new mechanisms.

Course Outcomes: Upon successful completion of the course, students should be able to:

CO1. Analyze various types of linkage mechanisms for obtaining specific motion.
CO2. Perform kinematic analysis (Displacement, Velocity, acceleration) of a given mechanism using graphical method.
CO3. Contrive or synthesize new mechanisms for specific requirements.
CO4. Construct cam profiles and analysis the follower motion

Course Content:

Unit I

8 Hrs.

Mechanisms: Basic concept of mechanism, link, kinematics pairs, kinematics chain, mechanism, Difference between machine and mechanism, Inversions, Degrees of freedom, Various types of mechanism such as Geneva wheel, Pawl and ratchet mechanism, Exact straight-line mechanism

Unit II

7 Hrs.

Kinematic Analysis of Simple Mechanisms: Displacement, velocity, and acceleration analysis; Velocity analysis using instantaneous enters, of Rotation method, Kennedy's theorem, Concept of Corioli's component of acceleration. Simulation of mechanism with SAM/ C/ Python

Unit III

8 Hrs.

Geometric Design of Mechanisms: Synthesis of mechanisms by Graphical method, Synthesis of mechanisms by analytical technique. Restricted to design of crank rocker and slider crank mechanism only.

Unit IV

7 Hrs.

Cams and Followers: Classification and terminology; Displacement, velocity, acceleration diagrams;

Uniform velocity, parabolic, simple harmonic, and cycloidal motions; Graphical disc cam profile synthesis for roller and flat face followers

Textbooks:

- Thomas Bevan, "Theory of Machines," CBS Publishers & Distributors, 2005.
- W. L. Cleghorn, "Mechanisms of Machines," Oxford University Press, 2005.
- R. L. Norton, "Kinematics and Dynamics of Machinery," Tata McGraw Hill, 2009.
- A. Ghosh and A.K. Mallick, "Theory of Mechanisms and Machines," Affiliated East-West Pvt. Ltd, New Delhi, 1988

Reference Book:

- Theory of Machines and Mechanisms, J. E. Shigley and J. J. Uicker, Oxford University Press.
- Theory of Machines, Sadhu Singh, Pearson publications. 3. Advanced Mechanism Design–Analysis and Synthesis, A.G.Erdman and G.N.Sandor, Vol. I and II,Prentice – Hall.
- "Mechanisms and Mechanical Devices Source Book", Neil Sclater, Nicholas P Chrironis, McGraw-Hill.
- Kinematics and Linkage Design, A. S. Hall, Jr., Prentice – Hall. 6. Mechanism Synthesis and Analysis, A. H. Soni, McGraw Hill.

Course Title	:	**Materials Engineering**	**Semester**	:	**III**
Course Code	:	**24UME302T**	**Course Category**	:	**PC-PCC**
Teaching Scheme	:	**L - T - P** **2 - 0 - 0**	**Total Credits**	:	**02**

Prerequisites:

- Basic knowledge of material engineering and science

Course Objectives:

- To impart Knowledge for analyzing different Microstructure and Crystalline nature of metals.
- To impart knowledge of Iron-Iron carbide equilibrium diagram and heat treatment processes.
- To provide the knowledge of steel and cast iron along with different hardening methods.
- To impart basic knowledge of hardness measurement and Powder metallurgical components

Course Outcomes: Upon successful completion of the course, students should be able to:

CO1. Demonstrate proficiency in programming fundamentals, including variables, data types, control structures, and functions.
CO2. Students will be capable of distinguishing microstructure and analyze the effect of Crystalline nature of metals, construct and analyze Iron-Iron carbide equilibrium diagram.
CO3. Students will be able to study the commercial steels and implement suitable heat treatment processes.
CO4. Students will be able to analyze the steel & Cast Iron.
CO5. Student will be able to perceive the basics of powder Metallurgy for powder metallurgical components.

Course Content:

Unit I:

8 Hrs.

Introduction to engineering materials their classification, properties & application. Difference between metals & nonmetals, Mechanical properties of metal, Macroscopic & microscopic examination, Imperfections in crystal, Solidification of pure metal, directional & progressive solidification, Ingot structure, Dendritic solidification, Solid solution & their types, Alloy & their formation, Mechanical Mixture, Hume Rothery Rule, grain shape & size, its effect on the properties. Types of cooling curves.

Unit II:

7 Hrs.

Study of equilibrium diagrams and invariant reactions. Iron-Iron carbide equilibrium diagram, critical temperatures. Microstructure of slowly cooled steels. Estimation of carbon from microstructures; structure property relationship. Heat treatment, Annealing, Normalizing and Hardening.

Unit III:

8 Hrs.

Steel: Classification and application of plain carbon steels. Hadfield Manganese Steel, ball Bearing Steels, etc. Stainless Steels - Classification, composition, application and general heat treatment practice for Stainless Steels. Effect of alloying elements.

Cast Iron – Classification, White cast Iron, Gray Cast Iron, Nodular Cast Iron, Malleable Cast Iron, Effects of various parameters on structure and properties of Cast Iron

TTT curves, hardenability test, Surface hardening methods

Unit IV:

7 Hrs.

Principles of hardness measurement, Hardness Test – Brinell, Rockwell, Vicker Non-destructive tests – Ultrasound Test, Die Penetration Test, radiography test

Powder Metallurgy: Powder manufacture and Conditioning, Production of Sintered Structural Components, Self-lubricating bearing, Cemented Carbides, Ceramics, Sintered Carbide cutting tools

Textbooks:

- Material Science & Engineering, V. R. Raghavan,1974.
- Material Science & Engineering, William Callister,1985.
- Material Science & Engineering, R. K. Rajput,2009.
- Material Science & Engineering, An Introduction, 6th Edition, Donald Askeland, 1984

Reference Book:

- Introduction to Physical Metallurgy 29st revised edition, 2009 Sidney H. Avner McGraw-Hill, 1964.
- Engineering Physical Metallurgy and Heat Treatment 21st revised edition, 1988 Yu Lakhtin Mir publishers, Moscow, Russia.
- Introduction to Engineering Metallurgy 21st revised edition, 2007 Dr. B K Agrawal Tata Mc-Gra-Hill.
- Metallurgy for Engineers 4th Revised edition 1987 E C Rollason E. Arnold.

Course Title	:	**Materials Testing**	**Semester**	:	**III**
Course Code	:	**24UME302P**	**Course Category**	:	**PC-PCC**
Teaching Scheme	:	**L - T - P** **0 - 0 - 2**	**Total Credits**	:	**01**

Prerequisites:

- Basic knowledge of material testing

Course Objectives:

- Create specimens for metallographic examination.
- Analyze the microstructure and investigate various properties of steel Materials.
- Analyze the microstructure and investigate various properties of cast iron Materials.
- Test different Engineering Materials.
- To familiarize with impact test methods for different materials
- To study and understand behavior of material under various loading conditions.
- Measurement of hardness on hardness measuring machine

Course Outcomes: Upon successful completion of the course, students should be able to:

CO1. Analyze the Microstructure and investigate various properties of ferrous and Nonferrous Materials.
CO2. Analyze the stress strain behavior of materials.
CO3. Analyze the effect of tensile, shearing force and can utilize the gained while tackling real life engineering problems for different types of Materials.
CO4. Understand Microstructures and their Applications for various uses.
CO5. Measure hardness of material
CO6. Incorporate the various important concepts learnt while designing components

Course Content:

List of practical

8 Hrs.

Note: Any 08 experiments should be included in the Journal

1. To study Metallurgical Microscopes & Preparation of specimen for metallographic examination.
2. Micro-structural examination of different types of Steels
3. Micro-structural study of White Cast Iron and Grey Cast Iron
4. Study of Universal Testing Machine
5. Determination of tensile properties of ductile material
6. Determination of properties of brittle material
7. Compression test on materials
8. Impact test on materials
9. Measurement of hardness with the help of Rockwell Hardness Tester
10. Measurement of hardness with the help of Brinell Hardness Tester

Course Title	:	**General Mathematical Techniques**	**Semester**	:	**III**
Course Code	:	**24UME303T**	**Course Category**	:	**MC-MDM**
Teaching Scheme	:	**L - T - P** **2 - 0 - 0**	**Total Credits**	:	**2**

Prerequisites:

- Basic knowledge of integration, probability, and differentiation

Course Objectives:

- To develop a logical understanding of the subject.
- To acquire mathematical skills such that the students can apply mathematical methods and principles to solve engineering problems of various fields.
- To make the students aware about the significance and interrelation between Mathematics and Engineering.

Course Outcomes: Upon successful completion of the course, students should be able to:

CO1. Evaluate the eigen values and eigen vectors, canonical forms of matrix to solve various engineering problems.
CO2. Analyze the functions of complex variables.
CO3. Examine the random variables with respect to probability function, distribution function.
CO4. Design an approximate solution of algebraic and transcendental equations, system of linear equations by numerical techniques.

Course Content:

Unit I: MATRICES

7 Hrs.

Linear dependence of vectors, Eigen values and Eigen vectors, Reduction to diagonal form, Sylvester's theorem (Statement only), Largest Eigen value and its corresponding Eigen vector by iteration method.

Unit II:

8 Hrs.

Analytic function, Cauchy-Riemann conditions, Harmonic function, Milne-Thomson method, Cauchy integral theorem & integral formula (Statement only), Residue theorem (Statement only), Taylor's & Laurent's series (Statement only)

Unit III:

7 Hrs.

Definition of Probability, Conditional Probability, Random variables: Discrete and Continuous random variables (for one variable), Probability function and Distribution function. Binomial Distribution, Poisson Distribution & Normal Distribution.

Unit IV:

8 Hrs.

Numerical integration by Trapezoidal Rule, Simpsons 1/3rd Rule and Simpsons 3/8th Rule Solution of Algebraic & Transcendent Equation: Newton Raphson method, method of false position and their Convergence. Solution of simultaneous linear equations: Gauss-Seidel method and Crout's method

Textbooks:

- H. K. Dass, Advanced Engineering Mathematics, S. Chand, Reprint, 2014.
- N.P. Bali and Manish Goyal, A textbook of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
- Chandrika Prasad, Advanced Mathematics for Engineers.
- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

Reference Book:

- Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley &Sons, 2006.
- Murray Spiegel, John Schiller, R. A. Srinivasan, Probability and Statistics, Schaum's Outline Series, McGraw Hills, 4th Edition, 2016.

Course Title	:	**Entrepreneurship Development**	**Semester**	:	**III**
Course Code	:	**24UME304T (1)**	**Course Category**	:	**MC-OE**
Teaching Scheme	:	**L - T - P** **3 - 0 - 0**	**Total Credits**	:	**3**

Prerequisites:

- Good and effective communication, and logical thinking

Course Objectives:

- To develop and strengthen entrepreneurial quality and motivation amongst the students.
- To motivate the entrepreneurial instinct and to develop necessary knowledge and skills among the students.

Course Outcomes: Upon successful completion of the course, students should be able to:

CO1. Understand entrepreneurship as a field of study and as a profession.
CO2. Study the creative process of opportunity identification and screening.
CO3. Know the importance of corporate entrepreneurship.
CO4. Recognize Professionalism vs family entrepreneurs.
CO5. Value the need of finance in a business model to ensure its viability.
CO6. Comprehend International Entrepreneurship Opportunities

Course Content:

Unit I:

8 Hrs.

Entrepreneurship: Definition of Entrepreneur, Internal and External Factors, Functions of an Entrepreneur, Entrepreneurial motivation and Barriers, Classification of Entrepreneurship, Theory of Entrepreneurship, Concept of Entrepreneurship, Development of entrepreneurship; Concept of entrepreneur, Manager and Entrepreneur (differences in their roles, responsibilities and Career Opportunities)

Unit II:

7 Hrs.

Creativity and Entrepreneurial Plan: The business plan as an entrepreneurial tool, Contents of a business plan, Idea Generation, Screening and Project Identification, Creative Performance, Feasibility Analysis: Economic, Marketing, Financial and Technical; Project Planning: Evaluation, Monitoring and Control segmentation. Creative Problem Solving: Heuristics, Brainstorming, Synectic's, Value Analysis, Innovation. Project Feasibility and Project Appraisal

Unit III:

7 Hrs.

Corporate entrepreneurship: Introduction, Flavors of corporate entrepreneurship, corporate venturing, Entrepreneurship, organizational transformation, Industry rule bending, Need for corporate entrepreneurship, domain of corporate entrepreneurship, conditions favorable for

Corporate entrepreneurship, benefits of Corporate entrepreneurship, issues related to Corporate entrepreneurship.

Unit IV:

8 Hrs.

Family and Non Family Entrepreneur & Women entrepreneurs: Role of Professionals, Professionalism vs family entrepreneurs, Role of Woman entrepreneur, Factors influencing women entrepreneur, Challenges for women entrepreneurs, Growth and development of women entrepreneurs in India

Unit V:

7 Hrs.

Project Finance: Need for finance, sources of finance, Venture capital, Nature and Overview, Venture capital process, locating venture capitalists. Supporting Organizations; Incentives and facilities; Financial Institutions and Small-scale Industries, Govt. Policies for SSIs. Case studies on Indian Start ups

Unit VI:

8 Hrs.

International Entrepreneurship Opportunities: The nature of international entrepreneurship, Importance of international business to the firm, International versus domestics' entrepreneurship, Stages of economic development. Institutional support for new ventures

Textbooks:

- Vasant Desai, Dynamics of Entrepreneurship Development, Himalaya Publication house
- David holt Entrepreneurship, New Venture Creation, Prentice Hall India.
- S.S. Khanka, Entrepreneurial Development S. Chand & Company Ltd. New Delhi
- Peter F. Drucker, Innovation and Entrepreneurship Pvt. Ltd., New Delhi

Reference Book:

- Kaplan, J. (2004). Patterns of entrepreneurship. Wiley.
- Khandwalla, P. (2003). Corporate creativity. New Delhi: Tata McGraw Hill.
- Mullins, J. (2004). New business road test. New Delhi: Prentice Hall.
- Nicholls, A. (Ed.). (2006). Social entrepreneurship new model of sustainable social change. Oxford University Press.

Course Title	:	**Introduction to Electric Vehicle**	**Semester**	:	**III**
Course Code	:	**24UME304T (2)**	**Course Category**	:	**MC-OE**
Teaching Scheme	:	**L - T - P** **3 - 0 - 0**	**Total Credits**	:	**3**

Prerequisites:

- Elementary knowledge of automobile and electric vehicle.

Course Objectives:

- To understand the basic principles, operation, various components, and technology pertaining to EV.
- To learn the working of EV and influence of various components on performance of an EV.

Course Outcomes: Upon successful completion of the course, students should be able to:

CO1. To compare IC engine vehicle and Electric vehicle.
CO2. To calculate the torque requirement in electric vehicle.
CO3. To understand the different types of electric vehicles
CO4. To understand various types of electric drive and controller used in electric vehicle
CO5. To know Energy Storage Solutions (ESS) & Energy Management System (EMS) in context of electric vehicle
CO6. To know Electric Vehicles charging station

Course Content:

Unit I: Introduction: Electric Vehicle

8 Hrs.

History, Components of Electric Vehicle, Comparison with Internal combustion Engine: Technology, Comparison with Internal combustion Engine: Benefits and Challenges, EV classification and their electrification levels. EV Terminology

Unit II: Motor Torque Calculations For Electric Vehicle

7 Hrs.

Calculating the Rolling Resistance, calculating the grade resistance, Calculating The Acceleration Force, Finding The Total Tractive Effort, Torque Required On The Drive Wheel

Unit III: Electric Vehicle Architecture Design

7 Hrs.

Types of Electric Vehicle and components, Electrical protection and system requirement, Photovoltaic solar based EV design, Battery Electric vehicle (BEV), Hybrid electric vehicle (HEV), Plug-in hybrid vehicle (PHEV), Fuel cell electric vehicle (FCEV), Electrification Level of EV, Comparison of fuel vs Electric and solar power, Solar Power operated Electric vehicles

Unit IV: Electric Drive and controller

7 Hrs.

Types of Motors, Selection and sizing of Motor, RPM and Torque calculation of motor, Motor Controllers, Component sizing, Physical locations, Mechanical connection of motor, Electrical connection of motor

Unit V: Energy Storage Solutions (ESS) & Energy Management System (EMS)

10 Hrs.

Cell Types (Lead Acid/Li/NiMH), Battery charging and discharging calculation, Cell Selection and sizing, Battery lay outing design, Battery Pack Configuration, Battery Pack Construction, Battery selection criteria

Need of EMS, Rule based control and optimization based control, Software-based high level supervisory control, Mode of power, Behavior of motor, Advance Features

Unit VI: Electric Vehicles charging station

6 Hrs.

Type of Charging station, Selection and Sizing of charging station, Components of charging station, Single line diagram of charging station

Textbooks:

- Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 2003.
- James Larminie, John Lowry, Electric Vehicle Technology Explained, Wiley, 2003

Reference Book:

- Mehrdad Ehsani, Yimi Gao, Sebastian E. Gay and Ali Emadi, "Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design", CRC Press, 2004.
- Chris Mi, M. Abul Masrur, David Wenzhong Gao, Hybrid Electric Vehicles: Principles and Applications with Practical Perspectives, John Wiley & Sons Ltd. 2011

Course Title	**:**	**Waste management**	**Semester**	**:**	**III**
Course Code	**:**	**24UME304T (3)**	**Course Category**	**:**	**MC-OE**
Teaching Scheme	**:**	**L - T - P** **3 - 0 – 0**	**Total Credits**	**:**	**3**

Prerequisites:

- Analytical skills.
- Problem-solving ability.

Course Objectives:

- To protect health, wellbeing, and environment through effective waste management techniques.
- To minimize the production of waste and to prevent pollution.
- To reduce and reuse waste.
- Safe disposal of waste.
- Industrial wastewater reuse.

Course Outcomes: Upon successful completion of the course, students should be able to:

CO1. Understand different aspects of solid waste, its sources and effects on man and material etc.
CO2. Understand problems arriving in handling large amount of solid waste generated, its collection and transportation, processing and will be able to design safe collection and disposal methods.
CO3. Design methods and equipment for solid waste management to reduce its impact on the environment.
CO4. Evaluate and analyze hazardous waste.
CO5. Design the appropriate disposal systems for hazardous wastes management.
CO6. Apply the wastewater management & Industrial water reuse.

Course Content:

Unit I:

8 Hrs.

SOLID WASTE: Definition of solid wastes – types of solid wastes – Sources - Industrial, mining, agricultural and domestic – Characteristics. Solid waste Problems - impact on environmental health – Concepts of waste reduction, recycling, and reuse. Waste characteristics, generation, collection, transport, and disposal.

Unit II:

7 Hrs.

COLLECTION, SEGREGATION AND TRANSPORT OF MUNICIPALSOLID WASTES: Handling and segregation of wastes at source. Collection and storage of municipal solid wastes; analysis of Collection systems. Transfer stations – labeling and handling of hazardous wastes.

Unit III:

8 Hrs.

MUNICIPAL SOLID WASTE MANAGEMENT: Solid waste processing technologies. Mechanical and thermal volume reduction. Biological and chemical techniques for energy and other resource recovery: composting, overcompensating, termigradation, fermentation. Regulatory aspects of municipal solid waste management

Unit IV:

7 Hrs.

HAZARDOUS WASTES: Hazardous waste definition. Physical and biological routes of transport of hazardous substances – sources and characterization categories and control. Sampling and analysis of hazardous wastes – analytical approach for hazardous waste characterization – proximate analysis – survey.

Unit V:

8 Hrs.

HAZARDOUS WASTES MANAGEMENT: Sources and characteristics: handling, collection, storage, and transport, TSDF concept. Hazardous waste treatment technologies - Physical, chemical, and thermal treatment of hazardous waste. Radioactive waste: Definition, Sources, Low level and high-level radioactive wastes and their management.

Unit VI:

7 Hrs.

WATER WASTES MANAGEMENT: Water demand, Water reclamation and reuse: Water reclamation technologies – process flow diagrams; Agricultural and landscape irrigation; Wastewater treatment: Municipal sewage treatment -Basic treatment processes and flow- sheets, Waste flow rates and their assessment ground: Industrial water reuse: Cooling tower makeup water. Sludge disposal: Sources and effects of sludge on environment. Methods of sludge disposal

Textbooks:

- Hazardous waste management Charles A. Wentz. Second edition 1995. Mc Graw Hill International.
- Integrated solid waste management George Tchobanoglous, Hilary Theisen & Sammuel A. Vigil.
- Hazardous waste management by Prof. Anjaneyulu.
- Biomedical waste management by Dr. Vishal Bathma.

Reference Book:

- Environmental Sciences by Daniel B. Botkin and Edward A. Keller, Wileystudent, 6th edition- 2009.
- Standard handbook of Hazardous waste treatment and disposal by HarryM. Freeman, Mc -Graw Hill 1997.

Course Title	:	**Professional Communication**	**Semester**	:	**III**
Course Code	:	**24UME305T**	**Course Category**	:	**HSSM-AEC**
Teaching Scheme	:	**L - T - P** **2 - 0 - 0**	**Total Credits**	:	**2**

Prerequisites:

- Basic knowledge of spoken and written English

Course Objectives:

- Students would be able to enhance their language skills and be prepared for placements

Course Outcomes: Upon successful completion of the course, students should be able to:

CO1. Construct correct sentences for spoken and written English.
CO2. Develop writing and speaking skills.
CO3. Demonstrate writing skills at workplace.
CO4. Prepare themselves for job placement.

Course Content:

Unit I:

7 Hrs.

Grammar for Spoken English: Tense, Active and Passive Voice, Negative, Interrogative and Negative-interrogative sentences, use of modal auxiliary verbs, reinforcement exercises

Unit II:

5 Hrs.

Writing and Speaking skills: Paragraph writing, Research papers writing, role play exercises for speaking (at shop, restaurant, bank, airport, office etc.), Public speaking, reinforcement exercises

Unit III:

7 Hrs.

Professional writing skills: Business letters, email, minutes of meeting, notices, circulars, memos, blog writing, virtual message drafting, one page report writing

Unit IV:

5 Hrs.

Job placement techniques: Job application letter, Resume writing, Group discussion, types of interviews, interview techniques, telephonic interview etiquettes

Reference Book:

- Technical Communication by Meenakshi Raman and Sangeeta Sharma, OUP
- Public Speaking and Influencing Men in Business by Dale Carnegie

- Professional Communication Skills by Bhatia and Sheikh, S. Chand Publications
- Communication Skills by Sanjeev Kumar and Pushpalata, OUP
- Functional English for Technical Students by Dr. Pratibha Mahato and Dr. Dora Thompson, Himalaya Publishing House
- Communication Skills by Lalita Bisen, Bhumika Agrawal, N.Thejo Kalyani, Himalaya Publishing House

Course Title	:	**Digital Economy and Management**	**Semester**	:	**III**
Course Code	:	**24UME306T**	**Course Category**	:	**HSSM-VEC**
Teaching Scheme	:	**L - T - P** **2 - 0 - 0**	**Total Credits**	:	**2**

Prerequisites:

- Basic knowledge of Digitalization of Economics and Management

Course Objectives:

- The objective of the course is to make learners aware about Digitalization and its impact on Indian Economy and Management techniques.

Course Outcomes: Upon successful completion of the course, students should be able to:

CO1. Develop knowledge of economic theories and share market.
CO2. Identify key trends in Digital economy.
CO3. Acquire knowledge of business strategies.
CO4. Analyze the problems of Small-Scale Industries.

Course Content:

Unit I:

8 Hrs.

Concept of demand and supply, Types of demand, Determinants of demand, Law of Demand and Supply, Elasticity of demand: concept and cases, Share Market: importance, procedure, and basic terminologies

Unit II:

7 Hrs.

Concept of Digital economy, Components of digital economy: E-business, Infrastructure, E-commerce, Merits and Demerits of digital economy, Contribution of Digitalization in economic growth of country, Labour intensive verses Capital intensive industry.

Unit III:

8 Hrs.

Concept of top line and bottom line growth, Break even analysis, Forward and Backward Integration, Merger and Acquisition, Types of merger and acquisition, hostile takeover, advantages of merger and acquisition.

Unit IV:

7 Hrs.

Sickness in small business, Major problems faced by SSIs, Technical consultancy organizations, Government Policies for Small Scale Enterprises, Tax holidays, Incentives to SSIs

Reference Book:

- Modern Economic theory by K.K. Dewett, S Chand Publication, 1 December 2006
- The Economics of Information Technology by Paul Jowett, Margaret Rothwell, St Martin Press New York.
- The Digital Economy, by Tim Jordan, Polity publishers January 28, 2020
- Merger & Acquisitions, The Art of Science, by Ashish Patil, Saaa Capital Pte. Ltd 1 August 2016
- Venture Capital and Angel Investing, Andrew M. Lane, Nicole P. Mifflin
- Small - Scale Industries and Entrepreneurship, By, Dr. Vasant Desai, Himalaya Publication

Course Title	:	**Environmental Science**	**Semester**	:	**III**
Course Code	:	**24UME307T**	**Course Category**	:	**HSSM-VEC**
Teaching Scheme	:	**L - T - P** **2 - 0 - 0**	**Total Credits**	:	**2**

Prerequisites:

- Students are expected to know the fundamental principles of theoretical and experimental Basic Science of HSC level.

Course Objectives:

- A systematic study of human interaction with the environment in the interest of solving complex problems.
- Study of physical and biological characters of the environment, also the social and cultural factors along with the impact of man on environment.
- Bring together the principles of various disciplines of sciences, to solve contemporary environmental problems.

Course Outcomes: Upon successful completion of the course, students should be able to:

CO1. Understand the Multidisciplinary nature of environmental science and gain in-depth knowledge of natural processes that sustain life and govern economy.
CO2. Develop critical thinking for shaping strategies (scientific, social, economic, and legal) for environmental protection and conservation of biodiversity, social equity, and sustainable development.
CO3. Acquire values and attitudes towards understanding complex environmental-economic-social challenges and participating actively in solving current environmental problems and preventing future ones.
CO4. Adopt sustainability as a practice in life, society and industry and know their roles and ethics, as citizens, and consumers in a complex, interconnected world.

Course Content:

Unit I: Environment as a multidisciplinary subject and Natural resources

6 Hrs.

Environment: Definition, Scope, basic terms, importance, need for public awareness. concept of sustainable development. Natural resources and associated problems. Forest, water, minerals, food, and land resources. Role of individuals in conservation of natural resources. Eqitable use of resources for sustainable lifestyle. Environmental Application of remote sensing and GIS. Relevant case studies, laws, and Legislations.

Unit II: Ecosystem and Biodiversity

8 Hrs.

Ecosystem: Concept, Structure and Functions, Energy Flow, Food Chain, Food web, and Ecological Pyramids; Grassland and pond Ecosystem. Ecological succession.
Biodiversity: Introduction, definition, Types (genetic, species & ecosystem). The value of biodiversity,

Biodiversity at Global, National, and local Levels. Hot spots of biodiversity; Threats to biodiversity; conservation, In-situ, and Ex-situ conservation; relevant case studies, laws, and Legislations

Unit III: Environmental Pollution, hazards, Disaster management & EIA

8 Hrs.

Pollution: Definition, causes, effects and control measures of Water, Air, solid, noise and nuclear pollution.

Environmental hazards & Disaster management: Definition, and types of mitigation. Preparedness and awareness.

Environmental impact assessment (EIA); scope, importance and need. Role of IT in the environment. Environmental Auditing; relevant case studies, laws, and Legislations.

Unit IV: Social Issues and Environment, Environmental conventions

8 Hrs.

Population explosion, Urban problems related to energy, resettlement and rehabilitation of people, their problems and concerns, family welfare program, human health, women and child welfare, environmental ethics & consumerism. Mass tourism and environment. Sustainable tourism. Stockholm convention, Kyoto Protocol, Montreal Protocol, COP (Conference of Parties), Ramsar Convention, Rio Summit, Convention on Biological Diversity; National Green Tribunal; relevant case studies, laws, and Legislations.

Textbooks:

- Environmental Studie: ISBN: 8188458-77-5
- Environmental StudiesISBN-978-81-317-2118-6

Reference Book:

- Environmental Studies Univ. Sci. PressISBN-978-81-318-0641-8
- Environmental Studie: ISBN: 8188458-77-5

Course Title	:	**M/C Drawing & Solid Modeling**	**Semester**	:	**III**
Course Code	:	**24UME308P**	**Course Category**	:	**PC-PCC**
Teaching Scheme	:	**L - T - P** **0 - 0 - 2**	**Total Credits**	:	**1**

Prerequisites:

- Elementary knowledge of Engineering Drawing and CAD software

Course Objectives:

- This course is designed to develop fundamental concepts of machine drawing using special software's of Mechanical engineering.

Course Outcomes: Upon successful completion of the course, students should be able to:

CO1. Ability to draw and read production drawings. & ability to convert 3D object to its 2D representation.
CO2. Ability to select standard machine elements as per the standards.
CO3. Ability to use the Drafting and Design package e.g. CREO 2.0.
CO4. Ability to model machine components using geometric modeling software and able to construct detailed draft views of part or assembly.

Course Content:

List of Experiments (Any Eight):

1. 2-D drawing of Mechanical parts
2. 3-D drawing of Mechanical parts
3. Drafting of Mechanical Parts
4. Assembly of Mechanical Components
5. Simulation of Assemble mechanical parts
6. Complete drawing, assembly, and simulation of knuckle joint
7. Complete drawing, assembly, and simulation of power screw
8. Complete drawing, assembly, and simulation universal joint
9. Complete drawing, assembly, and simulation of any commercial real-life problem

Textbooks:

- Machine Drawing by N. D. Bhat, Charotar Publications
- Machine Drawing by K.L.Narayan, R. Kannaiah, K.V.Reddy, New Age Int. Publishers
- Parametric Modeling with Creo Parametric 2.0 by Randy Shih, SDC Publications.

Reference Book:

- Machine Drawing by R. K. Dhawan, S. Chand Publications

- Machine Drawing by P. S. Gill, S. K. Kataria & Sons
- Engineering Drawing Practice for Schools & Colleges (SP-46:1988): Bureau of Indian Standards.
- Reference manuals for Creo 2.0 of PTC University

Course Title	:	**Industry Interaction (Visit)**	**Semester**	:	**III**
Course Code	:	**24UME309P**	**Course Category**	:	**ELC-CEP/FP**
Teaching Scheme	:	**L - T - P** **0 - 0 - 4**	**Total Credits**	:	**02**

Prerequisites:

- Basic knowledge of mathematics, including algebra and calculus.
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Course Objectives:

- The objective of industrial visits is to bridge the widening gap between theoretical learning and practical exposure by giving students first-hand exposure to identify the inputs and outputs of different business operations and processes performed at the workplace.

Course Outcomes: Upon successful completion of the course, students should be able to:

CO1. Opportunity to interact with Industry Experts
CO2. Learning experience
CO3. Enhanced employability and PPO's
CO4. Interpersonal skills enhancement
CO5. Day off from the usual melancholy

Course Content:

Unit I:

8 Hrs.

A student pursuing a certain degree will be taken to companies or industries related to their field for a visit and there the students will be exposed briefly to the procedures, processes, work environment, management efforts taking place in that industry.

Students should meet industry leaders, professionals, entrepreneurs, policymakers, and corporates who share their wisdom, learning, and experiences. Through these interactions students should develop leadership qualities, management skills, and learn about the industry working. Industry interaction can be helpful in updating the curriculum when there are significant changes in prevalent technologies; also, the faculty members get to know about the industry's latest trends.

Educational tours to industries provide an opportunity for students to see and experience real workstations, plants, machines, systems, assembly lines, and interact with highly trained and experienced personnel. Students should present a report on the industry he/she visits.

For students, such trips open many doors for corporate training and internships, which in turn increase the students' employability.

During the industrial visits, the students get an opportunity to experience how professionals live, learn about various management concepts like Just-In-Time or Lean manufacturing and how they are put into action. It is not easy to manage hundreds of skilled and unskilled workers at the same time and

meet the stringent quality norms and production targets of the company. How managers, production engineers, and employees work in tandem to achieve a common target is a management lesson. Students are supposed to understand them.

Industrial trips help students to enhance their interpersonal, communication skills, and teamwork abilities. These visits have, time and again, proved to be an excellent platform for networking as the students interact and connect with the corporates via official social media platforms like Facebook, Linked In, and Twitter. These educational/ industrial trips also help the students identify their learning towards a branch and decide their future work areas like marketing, finance, operations, IT, HR, etc.

NOTE: -

- Students' FEEDBACK form and Report must be collected and kept for reference during committee visits.
- A detailed report of all industries visited by the students must be prepared and kept for reference during committee Visits.
- A minimum of 70% of total teaching staff should have visited at least one company with students.