IV Year - I Semester	Name of the Course	L	T	P	C
HSE4101	Universal Human Values-2: Understanding Harmony	3	0	0	3

COURSE OBJECTIVE:

The students are expected to become more aware of themselves, and their surroundings (family, society, nature); they would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.

UNIT-I

Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

Purpose and motivation for the course, recapitulation from Universal Human Values-I. Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration. Continuous Happiness and Prosperity- A look at basic Human Aspirations. Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario. Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

UNIT-II

Understanding Harmony in the Human Being - Harmony in Myself!

Understanding human being as a co-existence of the sentient 'I' and the material 'Body'. Understanding the needs of Self ('I') and 'Body' - happiness and physical facility. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer). Understanding the characteristics and activities of 'I' and harmony in 'I'. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Health.

UNIT-III

Understanding Harmony in the Family and Society- Harmony in Human Relationship

Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship. Understanding the meaning of Trust; Difference between intention and competence. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goal. Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

UNIT-IV

Understanding Harmony in the Nature and Existence - Whole existence as Coexistence

Understanding the harmony in the Nature. Interconnectedness and mutual fulfilment among the four orders of nature recyclability and self regulation in nature. Understanding Existence as Co-existence of mutually interacting units in all pervasive space. Holistic perception of harmony at all levels of existence.

UNIT-V

Implications of the above Holistic Understanding of Harmony on Professional Ethics

Natural acceptance of human values. Definitiveness of Ethical Human Conduct. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems. Case studies of typical holistic technologies, management models and production systems. Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations

TEXTBOOKS

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010

REFERENCEBOOKS

1. JeevanVidya: EkParichaya, ANagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews

COURSE OUTCOMES:

1. Understanding the content and process for Value education.
2. Understanding the harmony in the human being, family, society and nature/existence
3. Apply the Strengthening of self-reflection.
4. Apply to All levels become sensitive to their commitment towards what they have understood (human values, human relationship and human society)
5. Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.

IV Year - I Semester	Name of the Course	L	T	P	C
PE4101	Insights of Big Data	3	0	0	3

Course Objectives:

1. To understand the complexity and volume of Big Data and their challenges.
2. To analyze the various methods of data collection.
3. To comprehend the necessity for pre-processing Big Data and their issues.
4. To understand predictive analytics and descriptive analytics.
5. To understand and implement Big Data Analytics with data convergence and Business Maturity Model.

UNIT– I

INTRODUCTION TO BIG DATA: Data, Characteristics of data and types of digital data, Sources of data, working with unstructured data, Evolution and definition of big data, Characteristics and need of big data, Challenges of big data.

OVERVIEW OF BIG DATA ANALYTICS: Overview of business intelligence, Data science and analytics, Meaning and characteristics of big data analytics, Need of big data analytics, Classification of analytics, Challenges to big data analytics, Importance of big data analytics, Basic terminologies in big data environment.

UNIT – II

INTRODUCTION TO HADOOP : Introducing hadoop, Need of hadoop, Limitations of RDBMS, RDBMS versus hadoop, Distributed computing challenges, History of hadoop , Hadoop overview, Use case of hadoop, Hadoop distributors, HDFS (Hadoop distributed file system), Processing data with hadoop, Managing resources and applications with hadoop YARN (yet another resource negotiator), Interacting with hadoop ecosystem.

UNIT – III

MAPREDUCE PROGRAMMING: Introduction-mapper, reducer, combiner, partitioner, searching, sorting, compression, real time applications using mapreduce, combiner, partitioner, matrix multiplication using mapreduce and page rank algorithm using mapreduce.

UNIT – IV

PIG BASICS: The anatomy of pig, Pig on hadoop, Pig philosophy, Usecase for pig, ETL processing, Pig Latin overview, Data types in pig, Running pig, Execution modes of pig, HDFS commands, Relational operators, Piggy bank, Word count example using pig, Pig at Yahoo.

UNIT - V

BASICS OF HIVE: Introduction to hive, Hive architecture, Hive data types, Hive file format, Hive query language (HQL), HIVE: Partitions and bucketing, RCFile Implementation, working with XML files, User-defined Function (UDF) in Hive, Pig versus Hive.

TEXT BOOKS:

1. Seema Acharya, Subhashini Chellappan, “Big Data and Analytics”, 1st edition, WileyPublishers, 2015.

REFERENCE BOOKS

1. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, "Professional Hadoop Solutions", 1st edition, Wiley, 2015.
2. Chris Eaton, Dirkderoosetal, "Understanding Big data ", 1st edition, McGraw Hill, 2012.
3. Tom White, "HADOOP: The definitive Guide", 1st edition, O Reilly 2012.
4. Vignesh Prajapati, "Big Data Analytics with R and Hadoop", 1st edition, Packet Publishing, 2013.

Course Outcomes

1. Identify the various sources of Big Data.
2. List the components of Hadoop and Hadoop Eco-System and Analyze file systems such as GFS and HDFS.
3. Apply map reduce concepts for desired applications.
4. Demonstrate the Pig architecture and evaluation of pig scripts.
5. Implement Big Data Activities using Hive

IV Year - I Semester	Name of the Course	L	T	P	C
PE4102	Cyber Security	3	0	0	3

Course Objectives

1. To understand various types of cyber-attacks and cyber-crimes
2. To learn threats and risks within context of the cyber security
3. To have an overview of the cyber laws & concepts of cyber forensics
4. To study the defensive techniques against these attacks.
5. To Analyze the Cyber Security needs of the Organizations.

UNIT-I

Introduction of Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security, Who are Cybercriminals? Classifications of Cybercrimes: Email Spoofing, Spamming, Internet Time Theft, Salami Attack/Salami Technique, Data Diddling, Forgery, Web Jacking, Newgroup Spam, Industrial Espionage, Hacking, Online Frauds, Pornographic offenses, Software Piracy, Computer Sabotage, E-Mail bombing, computer network intrusions, password sniffing, credit card frauds, identity theft, Cybercrime Era: Survival mantra for the Netizens.

UNIT-II

Cyber offenses: Criminals Plan: Categories of Cybercrime, Cyber Attacks: Reconnaissance, Passive Attack, Active Attacks, Scanning/Scrutinizing gathered Information, Attack, Social Engineering: Classification of Social Engineering, Cyberstalking: Types of Stalkers, Working of Stalking, Real-Life Incident of Cyber stalking, Cybercafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Botnet, Attack Vector: Theft, viruses, mishing, vishing, smishing, hacking Bluetooth, Cybercrime and cloud computing.

UNIT-III

Cybercrime: Mobile and Wireless Devices: Introduction, 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, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

UNIT-IV

Tools and Methods Used in Cybercrime: Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks.

UNIT-V

Cybercrimes and Cyber security: Organizational Implications–Introduction–Insider threats, Privacy, Key challenges to organizations, Cost of Cybercrimes and IPR issues, Incident Handling: Definitions, Why Organizations need Incident Response systems, Examples of incidents, what organizations can do to protect, best practices for organizations.

TEXT BOOKS

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

REFERENCES

[1] James Graham, R Howard, R Olson, "Cyber Security Essentials" CRC Press, 2018

[2] Michael E Whitman, Herbert J Mattord, "Principles of Information Security", 4th Edition,

Cengage Learning, 2012

[3] William Stallings, “Cryptography and Network Security- Principles and Practice”, 7th Edition, Pearson Education, 2017

Course Outcomes

CO 1. Analyze and evaluate the cyber security needs of an organization.

CO 2. Understand Cyber Security Regulations and Roles of International Law.

CO 3. Design and develop a security architecture for an organization.

CO 4. Understand fundamental concepts of data privacy attacks

CO 5. Analyze the cyber security needs of an organization.

IV Year - I Semester	Name of the Course	L	T	P	C
PE4103	Digital Interaction Design	3	0	0	3

COURSE OBJECTIVES

1. Demonstrate an understanding of guidelines, principles, and theories influencing human computer interaction.
2. Recognize how a computer system may be modified to include human diversity.
3. Select an effective style for a specific application.
4. Design mock ups and carry out user and expert evaluation of interfaces.
5. Carry out the steps of experimental design, usability and experimental testing, and evaluation of human computer interaction systems.
6. Use the information sources available, and be aware of the methodologies and technologies supporting advances in HCI

UNIT-I

Introduction to Usability of Interactive Systems: Introduction, usability goals and measures, usability motivations, universal usability, goals for our profession Managing.
Guidelines, Principles, and Theories: Introduction to Guidelines, Principles and Theories.

UNIT-II

Design Processes: Introduction, Organizational Support for design, The Design Process, Design Framework, Design Methods, Design Tools, Practices and patterns, Social Impact Analysis, Legal Issues.
Direct Manipulation and Immersive Environments: Introduction ,Direct Manipulation, Examples of Direct Manipulation, 2-D and 3-D Interfaces, Teleportation and Presence, Augmented and Virtual Reality.

UNIT-III

Fluid Navigation: Introduction, Navigation by Selection, Small Displays, Content Organization, Audio Menus, Form Fill-in and Dialog Boxes.
Expressive Human and Command Languages: Introduction, Speech Recognition, Speech Production, Human Language Technology, Traditional Command Languages.

UNIT-IV

Devices: Introduction to Keyboards and Keypads, Pointing Devices, Displays.
Advancing the User Experience: Introduction , Display Design , View (Window) ,Management , Animation , Webpage Design , Color , Non-anthropomorphic Design , Error Messages.

UNIT-V

User Documentation and Online Help: Introduction, Online Vs Paper Documentation, reading from paper Vs from Displays, Shaping the content of the Documentation, Accessing the Documentation, Online tutorials and animated documentation, Online communities for User Assistance, The Development Process.

Text Books

1. Ben Shneiderman, Catherine Plaisant, Maxine Cohen, Steven Jacobs, Niklas Elmqvist Designing the User Interface: Strategies for Effective Human,Computer Interaction, Sixth Edition, Pearson Education, 2017.

Reference Books

1. Preece, Rogers and Sharps, “Interaction Design”, 3rd edition, Wiley Dreamtech, 2011.
2. The Essential guide to user interface design,2/e, Wilbert O Galitz, Wiley DreamaTech.
3. Human Computer, Interaction Dan R.Olsan, Cengage ,2010.
4. Jenny Preece, Helen Sharp, Yvonne Rogers, Interaction Design: Beyond Human Computer Interaction, Wiley, 5th Edition, 2019. (Experiments)

COURSE OUTCOMES

1. List various classic Universal user, centric models
2. Outline complex interaction styles and techniques for contextual design.
3. Classify various applications to simulate natural language interaction.
4. Choose suitable designs for web and mobile applications.
5. Build the challenges for visualization researchers and practitioners alike.

IV Year - I Semester	Name of the Course	L	T	P	C
OE4101	Operations Research	3	0	0	3

COURSE OBJECTIVES

1. To understand the basics of linear programming, transportation, queueing, sequencing of jobs, replacement, inventory and simulation problems.
2. To apply linear programming, transportation and assignment models to solve real life problems.
3. To apply Sequencing, queueing, Game and Replacement theories to solve problems.
4. Apply knowledge of inventory control and simulation to solve practical industrial problems.

UNIT-1

Course Introduction - Need, Basic Guidelines, Content and Process for Value Education, INTRODUCTION TO OPERATIONS RESEARCH: History, definition, operations research models, phases of implementing operations research in practice, applications., LINEAR PROGRAMMING: Introduction, formulation, graphical solution, simplex method, Big M and two-phase methods, duality principle.

UNIT-II

Understanding Harmony in the Human Being - Harmony in Myself!
TRANSPORTATION: Introduction to the problem, LP formulation of a transportation problem. Basic feasible solution by north-west corner method, Vogel's approximation method, least cost method.
ASSIGNMENT: One to one assignment problem, optimal solutions, unbalanced assignment matrix, travelling salesman problem, maximization in A.P.

UNIT-III

Understanding Harmony in the Family and Society- Harmony in Human Relationship
QUEUING THEORY: Introduction, Kendall’s notation, classification of queuing models, single server and multi-server models, Poisson arrival, exponential service, infinite population.
SEQUENCING: Introduction, assumptions, processing n-jobs through two machines, n-jobs through three machines, and graphic solution for processing 2 jobs through n machines with different order of sequence.

UNIT-IV

Understanding Harmony in the Nature and Existence - Whole existence as Coexistence
GAME THEORY: Introduction, game with pure strategies, game with mixed strategies, dominance principle, graphical method for 2xn and mx2 games. REPLACEMENT THEORY: Introduction, replacement of items that deteriorate with time - value of money unchanging and changing, simple probabilistic model for replacement of items that fail completely.

UNIT-V

Implications of the above Holistic Understanding of Harmony on Professional Ethics
NETWORK ANALYSIS: Project planning, scheduling, and controlling – tools for project management – critical path method – Programme evaluation and review technique (PERT) – cost analysis and crashing – resource levelling – updating.

TEXTBOOKS

1. Operations Research, by S.D. Sharma, Kedarnath & Ramnath publications (15th edition),2013.
2. Introduction to Operations Research, by Taha, Pearson Education, New Delhi, (8th edition), 2008.

REFERENCEBOOKS

1. Operations Research, (4th edition) by A.M. Natarajan, P. Balasubramani, A. Tamilarasi, Pearson Education, New Delhi, 2009.
2. Operations Research, (2nd edition) by R. Panner Selvam, 2009, PHI Publications, Noida.
3. Operations Research, (2nd edition) by Wagner, 2007, PHI Publications, Noida
4. Operation Research, (4th edition) by J.K. Sharma, 2009, Macmillan publishers, India Ltd. NewDelhi.

COURSE OUTCOMES:

1. The understand the basics of linear programming, transportation, queueing, sequencing of jobs, replacement, inventory, and simulation problems {Understand level, KL2}
2. To apply linear programming, transportation, and assignment models to solve real life problems.
3. To apply queuing and sequencing theories to solve real life problems.
4. To Recognize and solve queuing and game theory problems.
5. The Model the project management problems through CPM and PERT.

IV Year - I Semester	Name of the Course	L	T	P	C
OE4102	Green Buildings	0	0	3	1.5

Course Objectives

1. This course aims to highlight importance of Energy- Efficient Buildings within the context of Energy issues in the 21st century.
2. To familiarize students with the concept of Energy efficiency, Renewable sources of energy and their effective adaptation in green buildings
3. To give a fuller understanding of Building Form and Fabric, Infiltration, ventilation, Lighting, cooling and water conservation.
4. To highlight the importance of Environmental Management as well as Environmental Impact Assessment methods in Energy efficient buildings.
5. To make students aware regarding various Green Building Certifications and Energy Conservation Building code

UNIT-I

Green Buildings within the Indian Context, Types of Energy, Energy Efficiency and Pollution, Better Buildings, Reducing energy consumption, Low energy design.

UNIT II

Renewable Energy sources that can be used in Green Buildings – Conventional and Non-Conventional Energy, Solar energy, Passive Solar Heating, Passive Solar collection, Wind and other renewables. A passive solar strategy, Photovoltaics, Rainwater Harvesting Climate and Energy, Macro and Microclimate. Indian Examples.

UNIT III

Building Form – Surface area and Fabric Heat Loss, utilizing natural energy, Internal Planning, Grouping of buildings. Building Fabrics- Windows and doors, Floors, Walls, Masonry, Ecological walling systems, Thermal Properties of construction material.

UNIT IV

Infiltration and ventilation, Natural ventilation in commercial buildings, passive cooling, modelling air flow and ventilation, Concepts of daylight factors and day lighting, daylight assessment, artificial lighting, New light sources. Cooling buildings, passive cooling, mechanical cooling. Water conservation- taps, toilets and urinals, novel systems, collection and utilization of rain water.

UNIT V

Energy awareness, monitoring energy consumption, Building Environmental Assessment - environmental criteria - assessment methods - assessment tools (e.g. LEED, GRIHA & IGBC Certification for buildings. Eco-homes, Sustainable architecture and urban design – principles of environmental architecture, Benefits of green buildings – Energy Conservation Building code - NBC -Case Studies – Green Buildings in Auroville and Dakshina Chitra, Tamil Nadu, India

TEXT BOOKS

1. William T. Meyer., Energy Economics and Building Design., New York: McGraw-Hill, Inc Indian Green Building Council

REFERENCE BOOKS

1. Public Technology, Inc. (1996). Sustainable Building Technical Manual: Green Building Design, Construction, and Operations. Public Technology, Inc., Washington, DC.
2. Sim Van Der Ryn, Stuart Cowan, "Ecological Design", Island Press (1996).

Course Outcomes

1. Understand why buildings should be made energy efficient.
2. Have a fuller grasp on Renewable Energy mechanisms such as Passive Solar heating and collection, Photovoltaics, and Ground source heat pumps, and their adaption to green building concepts.
3. Understand the concepts of Site and Climate, Building Form, Building Fabric
4. Understand the concepts of Infiltration and ventilation, Lighting, Heating, Cooling, Energy Management and water conservation.
5. Have the necessary skills to undertake an Environmental Impact Assessment study for Energy Efficient Buildings. They shall be equipped with the associated cutting-edge management strategies too.

IV Year - I Semester	Name of the Course	L	T	P	C
SAC4101	System Design Using UML	0	0	4	2

Course Objectives

1. To know the practical issues of the different object-oriented analysis and design concepts
2. Inculcate the art of object-oriented software analysis and design
3. Apply forward and reverse engineering of a software system
4. Carry out the analysis and design of a system in an object-oriented way

Week 1

Familiarization with Rational Rose/ Star UML/ Umbrella/ Visual Paradigm/ Microsoft Visio environment

Week 2:

Understanding different views that the UML aims to visualize through different modelling diagrams.

User's View: Use case Diagram, Structural View: Class Diagram, Object Diagram, Behavioral View: Sequence Diagram, Collaboration Diagram, State chart Diagram, Activity Diagram, Environmental View: Deployment diagram Implementation View: Component Diagram

Week 3:

Create a complete UML model for E-Mail Client system.

Week 4:

Create a complete UML model for Stock maintenance system.

Week 5:

Consider the User’s view of your respective system:Identify the use cases, actors involved in the system and develop the Use case and sub-use case diagrams.

Week 6:

Consider the Structural view of your respective system:

• Identify the classes, their attributes, methods, relationships and develop the Class diagram.

• Identify the objects and their links between and develop the Object diagram.

Week 7:

Consider the Behavioral view of your respective system:Visualize and ratify runtime framework of the system and develop the Sequence diagram by using life-lines, messages, execution occurrence, interaction fragments.Develop the Communication diagram/ Collaboration diagram to portray the object's architecture in the system.

Week 8:

Consider the Behavioral view of your respective system:

Develop the dynamic view of the system that portrays the behavior of the system using State-chart/ State-Machine diagram.

Develop the Activity diagram to demonstrate the flow of control within the system by considering concurrent and sequential activities.

Week 9:

Consider the Implementation view of your respective system:

Develop the Component diagram that visualizes the relationships as well as the organization between the components present in the system

Week 10:

Consider the Environmental view of your respective system:

Develop the Deployment diagram to depict how the software interacts with hardware to perform its execution by identifying nodes and their relationships in the system.

Week 11:

Create a system to design Student Mark Analysis System and generate code by using MS-Access as back end and VB as front end.

Week 12:

Consider your respective System UML model and generate code by using MS-Access as back end and VB as front end.

Course Outcomes:

1. Know the syntax of different UML diagrams
2. Create use case documents that capture requirements for a software system
3. Create class diagrams that model both the domain model and design model of a softwaresystem
4. Create interaction diagrams that model the dynamic aspects of a software system.
5. Write code that builds a software system.
6. Develop design for simple applications

IV Year -II Semester

S. No	Subject code	Course Name	L	T	P	C
1	PROJ4201	Major Project - Viva Voce	0	0	0	8
2	CSP01	Community Service Project	0	0	0	4
Internship (6 months)						