E.G.S. PILLAY ENGINEERING COLLEGE

(Autonomous)

Approved by AICTE, New Delhi | Affiliated to Anna University, Chennai

Accredited by NAAC with 'A' Grade | Accredited by NBA

NAGAPATTINAM – 611002

B.TECH. INFORMATION TECHNOLOGY
R-2019

FINAL YEAR

SEMESTER VII									
Course Code	Course Name	L	T	P	C	Maximum Marks			Category
						CA	ES	Total	
Theory Course									
1901MGX07	Universal Human Values and Ethics	3	0	0	3	40	60	100	HSSC
1902IT701	Cloud Computing	3	2	0	4	50	50	100	PCC
1903IT013	Software Architectures	3	0	0	3	40	60	100	PEC
1901HS006	Design Thinking for Innovation	3	0	0	3	100	0	100	HSSEC
	Open Elective II	3	0	0	3	40	60	100	OEC
Laboratory Course									
1904IT751	Software Development (Mini Project III)	0	0	2	1	50	50	100	EEC
1904GE751	Life Skills: Comprehensive Viva	2	0	0	2	100	-	100	EEC
1904IT752	Inplant Training / Internship Presentation	0	0	0	1	100	-	100	EEC
	Total	17	2	2	20	520	280	800	-

1901MGX07		**UNIVERSAL HUMAN VALUES AND ETHICS**	**L**	**T**	**P**	**C**
			3	**0**	**0**	**3**

AIM: The aim of this course is to give advanced understanding of the essential elements of the ethical and professional practice of psychology, dedicated to improving standards of behavior expected by professional

COURSE OBJECTIVES:

1. To help students distinguish between values and skills, and understand the need, basic guidelines, content and process of value education.
2. To help students initiate a process of dialog within themselves to know what they 'really want to be' in their life and profession
3. To help students understand the meaning of happiness and prosperity for a human being.
4. To facilitate the students to understand harmony at all the levels of human living, and live accordingly.
5. To facilitate the students in applying the understanding of harmony in existence in their profession and lead an ethical life

MODULE I	COURSE INTRODUCTION - NEED, BASIC GUIDELINES, CONTENT AND PROCESS FOR VALUE EDUCATION	9 Hours

1. Understanding the need, basic guidelines, content and process for Value Education
2. Self Exploration–what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self exploration
3. Continuous Happiness and Prosperity- A look at basic Human Aspirations
4. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority
5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
6. Method to fulfill the above human aspirations: understanding and living in harmony at various levels

MODULE II	UNDERSTANDING HARMONY IN THE HUMAN BEING - HARMONY IN MYSELF	9 Hours

7. Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
8. Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha
9. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
10. Understanding the characteristics and activities of 'I' and harmony in 'I'
11. Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail
12. Programs to ensure Sanyam and Swasthya

MODULE III	UNDERSTANDING HARMONY IN THE FAMILY AND SOCIETY- HARMONY IN HUMAN-HUMAN RELATIONSHIP	9 Hours

13. Understanding harmony in the Family- the basic unit of human interaction
14. Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti;
Trust (Vishwas) and Respect (Samman) as the foundational values of relationship
15. Understanding the meaning of Vishwas; Difference between intention and competence
16. Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship
17. Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals
18. Visualizing a universal harmonious order in society- Undivided Society (AkhandSamaj), Universal Order (SarvabhaumVyawastha)- from family to world family!

MODULE IV	UNDERSTANDING HARMONY IN THE NATURE AND EXISTENCE - WHOLE EXISTENCE AS CO-EXISTENCE	9 Hours

19. Understanding the harmony in the Nature
20. Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature
21. Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space
22. Holistic perception of harmony at all levels of existence

MODULE V	IMPLICATIONS OF THE ABOVE HOLISTIC UNDERSTANDING OF HARMONY ON PROFESSIONAL ETHICS	9 Hours

23. Natural acceptance of human values
24. Definitiveness of Ethical Human Conduct
25. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
26. 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,

technologies and management models
27. Case studies of typical holistic technologies, management models and production systems
28. 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

	TOTAL:	**45 Hours**

COURSE OUTCOMES

On completion of this course, the students will be able to

CO1: Understand the significance of value inputs in a classroom and start applying them in their life and profession

CO2: Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.

CO3: Understand the value of harmonious relationship based on trust and respect in their life and profession

CO4: Understand the role of a human being in ensuring harmony in society and nature.

CO5: Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work

REFERENCES:

1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.
2. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA
3. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
4. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
5. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.
6. A Nagraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak.
7. P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
8. A N Tripathy, 2003, Human Values, New Age International Publishers.
9. SubhasPalekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) KrishiTantraShodh, Amravati.
10. E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers , Oxford University Press
11. M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
12. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.
13. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.

1902IT701		CLOUD COMPUTING	L	T	P	C
			3	2	0	4

AIM: The main objective of this course is to understand top-down view of cloud computing, from applications and administration to programming and infrastructure

PREREQUISITES: Computer Networks, Security in Computing

COURSE OBJECTIVES:

1. Introduce the broad perceptive of cloud architecture and model
2. Understand the concept of Virtualization
3. Be familiar with the lead players in cloud.
4. Apply different cloud programming mode as per need
5. Understand the design of cloud Services.

UNIT I	CLOUD ARCHITECTURE MODEL	12 Hours

Technologies for Network-Based System – System Models for Distributed and Cloud Computing Cloud Models:- Characteristics – Cloud Services – Cloud models (IaaS, PaaS, SaaS)– OGSA architecture

UNIT II	VIRTUALIZATION	12 Hours

Basics of Virtualization - Types of Virtualization - Implementation Levels of Virtualization Virtualization Structures - Tools and Mechanisms - Virtualization of CPU, Memory, I/O devices - Virtualization for Data-center Automation.

UNIT III	CLOUD INFRASTRUCTURE	12 Hours

Architectural Design of Compute and Storage Clouds – Layered Cloud Architecture Development – Inter Cloud Resource Management – Resource Provisioning and Platform Deployment – Global Exchange of Cloud Resources.

UNIT IV	PROGRAMMING MODEL	12 Hours

Globus Toolkit (GT4) Architecture – MapReduce , – Hadoop Library from Apache - Google App Engine, Amazon AWS - Cloud Software Environments -Eucalyptus, Open Nebula. OpenStack.

UNIT V	SECURITY IN THE CLOUD	12 Hours

Security Overview – Cloud Security Challenges and Risks – Software-as-a-Service Security –– Risk Management – Security Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security - Identity Management and Access Control – Autonomic Security

	TOTAL:	60 Hours

FURTHER READING	Cyber Forensics, Security Management issues

COURSE OUTCOMES	

After learning the course the student should be able to:

CO1: Explain Cloud computing architecture and cloud models
CO2: Compare the strengths and limitations of cloud computing
CO3: Explain the architecture, infrastructure and delivery models of cloud computing
CO4: Create and run virtual machines on open source OS.
CO5: Apply the appropriate cloud player in real time situations
CO6: Explain the core issues of cloud computing such as security

REFERENCES:

1. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2016.

2. John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press, 2012.

3. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH, 2013.

4. Kumar Saurabh, " Cloud Computing – insights into New-Era Infrastructure", Wiley India,2011.

5. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud" O'Reilly, 2015

6. Katarina Stanoevska-Slabeva, Thomas Wozniak, Santi Ristol, "Grid and Cloud Computing – A Business Perspective on Technology and Applications", Springer, 2015

7. Rajkumar Buyya, Christian Vecchiola, S.Tamarai Selvi, 'Mastering Cloud Computing", TMGH, 2014.

8. http://nptel.ac.in//

1904IT751		SOFTWARE DEVELOPMENT	L	T	P	C
		(MINI PROJECT III)	0	0	2	1

AIM: This course is used to students develop technical, industry relevant, consultancy work and society related mini project

COURSE OBJECTIVES:

The students should be made to:
1. To develop knowledge to formulate a real world problem and project's goals.
2. To identify the various tasks of the project to determine standard procedures.
3. To identify and learn new tools, algorithms and techniques.
4. To understand the various procedures for validation of the product and analysis the cost effectiveness.
5. To understand the guideline to Prepare report for oral demonstrations.

			TOTAL:	**45 Hours**

COURSE OUTCOMES

At the end of this course, students will able to,

CO1: Formulate a real world problem, identify the requirement and develop the design solutions.

CO2: Express the technical ideas, strategies and methodologies.

CO3: Utilize the new tools, algorithms, techniques that contribute to obtain the solution of the project.

CO4: Test and validate through conformance of the developed prototype and analysis the cost effectiveness.

CO5: Prepare report and present the oral demonstrations.

1904GE751	LIFE SKILLS: COMPREHENSIVE VIVA	L	T	P	C
		2	0	0	2

Course Objectives:
1. Study the concepts of data structures, algorithms and computer architecture.
2. Study the process and implementation of Operating systems and design of compilers.
3. Familiar with the database and network concepts

Data Structures: Recursion. Arrays, Stacks, Queues, Linked lists, Trees, Graphs

Algorithms: Searching – Sorting - Asymptotic worst case time and space complexity – Greedy – Divide & Conquer – Dynamic Programming

Computer Organization: Machine instructions - Addressing modes - Hazards – Pipelining - Memory hierarchy - I/O interface

Operating System: Processes – Threads - Inter-process communication - Concurrency and synchronization – Deadlock - CPU scheduling - Memory management and virtual memory - File systems

Databases: ER-model - Relational model: Relational algebra, Tuple Calculus - SQL - Integrity constraints - Normal forms -Transactions and concurrency control

Computer Networks: Layering – Categories – Topology - Flow and Error control techniques – Switching - IPv4/IPv6 - Routing - TCP – UDP - Application layer protocols – Bluetooth - Wi-Fi - Network security – Firewalls - Digital signatures and certificates.

Compiler Design: Theory of Computation - Lexical analysis, parsing, syntax directed translation - Runtime environments - Intermediate code generation

	TOTAL	30 Hours

COURSE OUTCOMES:
At the end of this course, students will able to,
    CO1: Explore the concepts of data structures, algorithms and computer architecture.
    CO2: Elucidate the concepts of operating systems and designing compilers.
    CO3: Explain the concepts of networks and manage databases

REFERENCES:
1. M.A.Weiss, Data Structures and Algorithm Analysis in C, Pearson Education Asia, 2015.
2. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, Computer Organization, McGraw-Hill, Third Reprint 2015.
3. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne,"Operating System Principles", John Wiley & Sons (Asia) Pvt. Ltd, Ninth Edition, 2013.
4. Alfred V. Aho, Ravi Sethi and Jeffrey D. Ullman Compilers: Principles, Techniques and Tools , 2nd Edition, Pearson, 2012.
5. Abraham Silberschatz, Henry F. Korth and S. Sudarshan, Database System Concepts , McGraw -Hill, 2015.
6. Behrouz A.Forouzan, Data Communication and Networking, 5th Edition, Tata McGraw-Hill, 2014.

ASSESSMENT PATTERN :
Marks (Continuous Assessment Only) Test I 25 Test II 25 Final Examination 50
        Total Marks 100

1904IT752	INPLANT TRAINING / INTERNSHIP PRESENTATION	L	T	P	C
		0	0	2	1

In order to provide the experiential learning to the students, shall take efforts to arrange at least two inplant training and internship presentation in a year. A presentation based on Industrial visits shall be made in this semester and suitable credit may be awarded.

Internal Assessment Only	
Test	40
Presentation / Quiz / Group Discussion	40
Report	20
Grades (Excellent / Good / Satisfactory / Not Satisfactory)	

1903IT012	SOFTWARE ARCHITECTURES	L	T	P	C
		3	0	0	3

AIM: The main objective of this course to understand Concepts and methodologies for the systematic analysis, development, evolution, and reuse of software architectural design, styles, elements and connectors.

PREREQUISITE: Software Engineering

COURSE OBJECTIVES:

1. Understand architectural requirements
2. Identify architectural structure
3. Develop architectural documentation
4. Generate architectural alternatives
5. Evaluate the architecture against the drivers

UNIT I	ARCHITECTURAL DRIVERS	9 Hours

Introduction – Standard Definitions of Software Architecture– Architectural structures – Architecture Business Cycle – Quality Attribute Workshop (QAW) – Documenting Quality Attributes – Six part scenarios

UNIT II	ARCHITECTURAL VIEWS AND DOCUMENTATION	9 Hours

Introduction – Standard Definitions for views – Structures and views– Representing views-available notations – Good practices in documentation– Documenting the Views using UML – Need for formal languages - Architectural Description Languages – ACME

UNIT III	ARCHITECTURAL STYLES	9 Hours

Introduction – Data flow styles – Call-return styles – Shared Information styles – Event styles – Case studies for each style

UNIT IV	ARCHITECTURAL DESIGN	9 Hours

Approaches for architectural design – System decomposition – Attributes driven design – Architecting for specific quality attributes – Performance, Availability – Security – Architectural conformance.

UNIT V	ARCHITECTURE EVALUATION AND SOME SPECIAL TOPICS	9 Hours

Need for evaluation – Scenario based evaluation against the drivers – ATAM and its variations – Case studies in architectural evaluations – SOA and Web services – Cloud Computing – Adaptive structures

	TOTAL:	45 Hours

FURTHER READING: Working with Open Source Platforms

COURSE OUTCOMES

At the end of this course, students will able to,

CO1: Explain key architectural drivers
CO2: Explain the influence of architecture on business and technical activities
CO3: Identify key architectural structures
CO4: Adopt good practices for documenting the architecture
CO5: Explain how to use formal languages to specify architecture
CO6: Describe the recent trends in software architecture

REFERENCES:

1. Len Bass, Paul Clements, and Rick Kazman, "Software Architectures Principles and Practices", 2n Edition, Addison-Wesley, 2016.

2. Anthony J Lattanze, "Architecting Software Intensive System. A Practitioner's Guide", Auerbach Publications, 2013.

3. Paul Clements, Felix Bachmann, Len Bass, David Garlan, James Ivers, Reed Little, Paulo Merson, Robert Nord, and Judith Stafford, "Documenting Software Architectures. Views and Beyond", 2nd Edition, Addison-Wesley, 2012.

4. David Garlan and Mary Shaw, "Software architecture: Perspectives on an emerging discipline", Prentice Hall, 2011.

5. Mark Hansen, "SOA Using Java Web Services", Prentice Hall, 2013

6. David Garlan, Bradley Schmerl, and Shang-Wen Cheng, "Software Architecture-Based Self-Adaptation," 31-56. Mieso K Denko, Laurence Tianruo Yang, and Yan Zang (eds.), "Autonomic Computing and Networking". Springer Verlag, 2014.

7. http://nptel.ac.in/

1901HS006	DESIGN THINKING FOR INNOVATION	L	T	P	C
		3	0	0	3

PREREQUISITE:	
	The course assumes no prior skill or background in design, art, engineering, or prototyping. It is open to all undergraduates and graduate students with an interest in learning design thinking, and is especially recommended for those students planning social-venture and other kinds of design interventions

COURSE OBJECTIVES:		
	1.	Understand the terminology and conceptual models used in design disciplines
	2.	Understand how teaching and learning occurs in the design process
	3.	Recognize the ethical and social dilemmas and obligations of the practice of design
	4.	Diagnose common adoption barriers in individuals, groups and organizations.
	5.	Develop a design theory from independent and qualitative research and observations
	6.	Participate in and lead innovation in creative and collaborative settings
	7.	Undertake complex and unstructured problem-solving challenges in unfamiliar domains

Module I	Introduction to Design Thinking	8 Hours
Human Centered Design, Why Design Thinking, 5-Step Design Thinking Process, Applications, Creative Confidence, The culture of Innovation		
Module II	Design Thinking Approach	12 Hours
IDEO's method of Design Thinking, Divergent Thinking & Innovation Funnel, Customer Journey Maps to uncover Innovation Opportunities, Case Study : Turing Creative Ideas into Viable Companies		
Module III	Exploring Design Thinking ToolKit	5 Hours
Discovery, Interpretation, Ideation, Experimentation, Evolution		
Module IV	Design Challenge Project : Phase-1	5 Hours
Define a Challenge, Project Plan, How Might We statements, Project Timeline, Project Checklist		
Module V	Design Challenge Project : Phase-2	15 Hours
Discovery – Understand the Challenge, Prepare Research, Gather Inspiration, Interpretation – Tell Stories, Search for meaning, Frame Opportunities, Ideation – Generate Ideas, Refine Ideas, Experimentation – Make Prototypes, Get Feedback, Evolution – Track Learnings, Engage Others		
	TOTAL: 45 HOURS	

Course Outcomes:
1. Describe Key Concepts and basics of Design Thinking Principles
2. Elaborate the Design Thinking Approach through IDEO's method & Customer Journey Maps
3. Conduct user interviews and synthesize learnings to uncover insights and identify opportunities for innovation
4. Develop Design Driven Innovative Solutions to RealWorld Problems

FURTHER READING:		
	1.	Design for Social Impact : How to by IDEO.org
	2.	Design Thinking ToolKit by IDEO.org
	3.	The Field guide to Human Centered Design by IDEO.org

REFERENCES:	
1. Creative Confidence: Unleashing the Creative Potential Within Us All Book by David M. Kelley and Tom Kelley, 2013	
2. Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation Book by Tim Brown, 2009	
3. The art of Innovation by Tom Kelly, 2011	
4. Design Thinking for Strategic Innovation: What They Can't Teach You at Business Or Design School Book by Idris Mootee, 2013	
5. The Design of Everyday Things Book by Don Norman, 1988	
6. The Design Thinking Playbook: Mindful Digital Transformation of Teams, Products, Services, Businesses and Ecosystems Book by Michael Lewrick, 2017	
7. https://nptel.ac.in/courses/109104109/	