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 – 611 002

B.E. ELECTRICAL AND ELECTRONICS ENGINEERING

Full Time Curriculum and Syllabus

Fourth Year – SeventhSemester

SEMESTER VII								
Course Code	**Course Name**	**L**	**T**	**P**	**C**	**Maximum Marks**		
						CA	**ES**	**Total**
1901MGX07	Universal Human Values and Ethics	3	0	0	3	40	60	100
1902EE701	Power System Operation and Control	3	0	0	3	40	60	100
1903EE014	Elective-V (PEC-III)(Electrical Energy Generation Utilization And Conservation)	3	0	0	3	40	60	100
1901HS001	Elective-VI (HSSC Elective-II)(Innovation & Entrepreneurship Fundamentals)	3	0	0	3	40	60	100
1901HS006	Elective-VII (HSSC Elective-III)(Design Thinking For Innovation)	3	0	0	3	40	60	100
	Elective-VIII (Open Elective-II)	3	0	0	3	40	60	100
1902EE751	Power System Simulation Laboratory	0	0	2	1	50	50	100
1904GE751	Life Skills: Comprehensive Viva	2	0	0	2	100	0	100
1904EE752	In plant / Internship Training Presentation	0	0	0	1	100	0	100
Total		**20**	**0**	**2**	**22**	**490**	**410**	**900**

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

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

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

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,
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
6 A Nagraj, 1998, Jeevan VidyaEkParichay, 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
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

1902EE701	POWER SYSTEM OPERATION AND CONTROL	L	T	P	C
		3	0	0	3

PREREQUISITE:

1. Transmission and distribution.
2. Power system analysis.

COURSE OBJECTIVES:

1. To realize the basic operation of power system components.
2. To infer the economic operation of power system.
3. To summarize the various control methods & security schemes in power systems.

COURSE OUTCOMES:

After completion of the course, Student will be able to

CO1	Explain the principle and operation of various protection schemes.
CO2	Make use of the importance of real power & frequency control in power system.
CO3	Analyze the various methods of reactive power & voltage control in power system
CO4	Calculate the solution for unit commitment and least cost methodology for power generation.
CO5	Describe the SCADA, EMS and various security schemes in power system

MODULE I LOAD CHARACTERISTICS 9 Hours

Load and load duration curves - Load forecasting, Components of system load, Classification of base load, Forecasting of the base load by method of least square fit, P - F and Q - V control structure, Necessity for regulation of system frequency and voltage.

MODULE II REAL POWER - FREQUENCY CONTROL 9 Hours

Basics of speed governing mechanism and modelling, Speed - load characteristics, Load sharing between two synchronous machines in parallel, Control area concept - LFC control of a single area system, Static and dynamic analysis, LFC control of two area system, Overview of national grid integration.

MODULE III REACTIVE POWER - VOLTAGE CONTROL 9 Hours

Fundamental characteristics of excitation system, Types of excitation system, Block diagram model of exciter system, Analysis of AVR, Generation and absorption of reactive power, Methods of voltage control, Application of FACTS devices in Q - V control, Role of tap changing transformer in voltage control.

MODULE IV UNIT COMMITMENT AND ECONOMIC DISPATCH 9 Hours

Incremental cost curve, Co-ordination equations - Equation with and without losses, solution by lambda iteration, Introduction to unit commitment - Constraints on unit commitment, Unit commitment methods.

MODULE V COMPUTER CONTROL OF POWER SYSTEMS 9 Hours

Need for computer control of power systems, Concept of energy control centre - Functions, System monitoring, Data acquisition and control, System hardware configuration, SCADA and EMS functions, State transition diagram and control strategies.

TOTAL: 45 HOURS

REFERENCES:

1. Abhijit Chakrabarti, SunitaHalder, "Power System Analysis Operation and Control", PHI learning Pvt. Ltd. New Delhi, 3rd Edition, 2010.
2. Olle.I.Elgerd, "Electric Energy Systems theory - An introduction", Tata McGraw Hill Education Pvt. Ltd., New Delhi, 34th Reprint, 2016.
3. Nagrath I.J. and Kothari D.P., "Modern Power System Analysis", Tata McGraw-Hill, 4th Edition, 2011.
4. Hadi Saadat, "Power System Analysis", Tata McGraw Hill Education Pvt. Ltd., New Delhi, 21st reprint, 2010.
5. Allen. J. Wood and Bruce F. Wallenberg, "Power Generation, Operation and Control", John Wiley & Sons, Inc., 2003.

1902EE751	POWER SYSTEM SIMULATION LABORATORY	L	T	P	C
		0	0	2	1

PREREQUISITE:

1. Power system analysis
2. Generation, transmission and distribution

COURSE OBJECTIVES:

To analyze the power system data for load-flow and fault studies.

2. To apply computational methods for stable operation of power system networks.

COURSE OUTCOMES:

CO1 Understand and to solve the basic problems in power systems
CO2 Compute and model the transmission line parameters
CO3 Analyse the load flow in power systems
CO4 Model the power system dynamics components
CO5 Analyse the stability of the power systems

LIST OF EXPERIMENTS:

1. Calculation of per unit quantities.
2. Formation of Y-bus and Z-bus matrices.
3. Computation and modeling of transmission line parameters.
4. Formation of reduced Y_{bus}matrix by node elimination method.
5. Load Flow Analysis - I: Solution of Load Flow and Related Problems Using Gauss-Seidel Method.
6. Load Flow Analysis - II: Solution of Load Flow and Related Problems Using Newton Raphson Method.
7. Load – Frequency Dynamics of Single- Area and Two-Area Power Systems.
8. Transient and Small Signal Stability Analysis: Single-Machine Infinite Bus System.
9. Computation of line currents by symmetrical components.
10. Economic Dispatch in Power Systems.
11. Symmetrical and unsymmetrical fault analysis.
12. Study of EMTP, ETAP and MIPOWER software.

TOTAL: 30 HOURS

ADDITIONAL EXPERIMENTS:

1. Stability analysis of a power system using swing equation
2. Determination of load curve

REFERENCES:

1. J.P.Barret, P.Bornard and B.Meyer, “Power System Simulation”, Chapman & Hall publishers, 1997.
2. M.A.Pai, “Computer techniques in power system analysis”, New Delhi McGraw Hill Education (India) Private Limited, 2014.
3. Harrold Klee and Randal Allen, “Simulation of dynamic systems with MATLAB”, CRC press, Third edition, 2017.
4. Prof .Debapriyadass, IIT Kharaghpur, https://onlinecourses.nptel.ac.in/ “Power system analysis”.

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

COURSE OBJECTIVES:

1. To recollect the fundamentals of electrical and electronic systems.
2. To remember the analysis of electrical and electromagnetic theories, electrical circuits, electrical machines and other systems in electrical and electronics engineering.
3. To test the analytical skills of students in the field of electrical circuits, electronics, electrical machines and power systems.

Electric Circuit Analysis: DC Circuits and AC Circuits - Theorems, Transient Analysis of circuits, and Resonance circuits.

Analog and Digital Electronics: Diode, BJT, FET - Device Structures, Circuits and Applications; Logic Gates, Code Converters, Flip Flops, Counters, Analysis and Design of Sequential Circuits, Memory Logic Devices.

Electromagnetic Theory: Divergence Theorem, Stroke‟s Theorem, Coulombs Law, Gauss Law, Electric and Magnetic Field Intensity, Electric and Magnetic Flux Density, Magnetization and Permeability, Self-Inductance and Mutual Inductances, Maxwell‟s Equation.

Linear Integrated Circuits: Operational Amplifier – Characteristics, Applications – Inverting & Non-Inverting Amplifier, Summing & Differential Amplifier, Integrator, Differentiator, Oscillators and Signal Converters; Special Function ICs.

Electrical Machines: Generator, Motor and Transformer - Construction, Principle of Operation, Working, Characteristics and Classifications of, testing of electrical machines. Starting of electrical machines.

Electrical Drives and Control: Rectifier, Inverter, Chopper, AC Voltage Controller, Cycloconverter – Modes of Operation, V-I Characteristics, Power Converter Fed Electrical Drives, Closed Loop Operation of Electrical Drives with Speed and Current Controller. Quadrant of Operation of Electrical Drives, Microprocessor / Microcontroller – Instruction Set, Addressing Modes, Interfacing, Applications in Drives. Linear Control Systems - Stability Analysis, Time and Frequency Response

Power Generation, Transmission and Distribution: Power Generation from Thermal Plants, Hydro Power Plants, Diesel/Gas Plants, Nuclear Plants, Renewable Energy Sources, HVDC and HVAC Transmission Systems, Types of Conductors, Skin and Proximity effects, Classification of Lines, Ferranti Effect, Types and Testing of Insulators, Underground Cables.

Power System Analysis: Load Flow Analysis, Symmetrical Components, Symmetrical and Unsymmetrical Faults, Power System Stability.

TOTAL: 30 HOURS

REFERENCES:

1. A. Sudhakar and S.P. Shyammohan, “Circuits and Networks: Analysis and Synthesis”, TMH, 4th Edition, 2010.
2. M.Nahvi and Joseph A.Edminister, “Electric Circuits”, Schaum‟s Outline series, Tata McGraw Hill, New Delhi, 6th Edition,2014.
3. Milman, Halkias and Satyabrata Jit, ―Electronic Devices and Circuits 4th Edition, McGraw Hill Education (India) Private Ltd., 2015.
4. Robert L. Boylestad and Louis Nashelsky, Electronic Devices and Circuit Theory, 11th Edition, PHI Ltd., 2015.
5. M.MorrisMano,―DigitalLogicandComputerDesign‖,PrenticeHallofIndia,4thedition,2013.
6. William H.Hayt, “Engineering Electromagnetics”, Tata McGraw Hill,2005.
7. D Roy Choudhury and Sheil B.Jani, “Linear Integrated Circuits” 4th Edition, New Age International, New Delhi,2014.
8. Kothari D.P and I.J. Nagrath, “Electric Machines”, Published by Tata McGraw -Hill Education Pvt. Ltd,2010, 5 th Edition.
9. Rashid M H, “Power Electronics-Circuits, Devices and Applications”, Prentice Hall of India, New Delhi, 2011.

1904EE752	INPLANT / INTERNSHIP TRAINING PRESENTATION	L	T	P	C
		0	0	0	1

In order to provide the experiential learning to the students, the students undergo in-plant training or internship during summer / winter vacation between III and VII semesters. A presentation based on in-plant training / internship shall be made in this semester and suitable credit may be awarded.

INTERNAL ASSESSMENT ONLY

Test	40 Marks
Presentation / Quiz / Group Discussion	40 Marks
Report	20 Marks

1903EE014	ELECTRICAL ENERGY GENERATION UTILIZATION AND CONSERVATION	L	T	P	C
		3	0	0	3

PREREQUISITE:

1. Power Plant Engineering
2. Electrical Drives and Control

COURSE OBJECTIVES:

1. To impart knowledge on Generation of electrical power by conventional andNon–conventional methods.
2. To introduce the energy saving concept by different ways of illumination and understand the different methods of electric heating and electric welding.
3. To introduce the knowledge in industrial applications of electric drives and traction.
4. To acquire the knowledge of tariff and economic aspects in power generation.

MODULE I POWER GENERATION 9 Hours

Conventional Methods: Review of Thermal, Hydro and Nuclear based power generation.

Nonconventional methods: Tidal waves, Wind, Geothermal, Solar, Bio-mass, Municipal waste, Cogeneration, Effect of distributed generation on power system operation.

MODULE II ILLUMINATION 9 Hours

Introduction - Definition and meaning of terms used in illumination engineering, Classification of light sources - Incandescent lamps, Sodium vapor lamps, Mercury vapor lamps, Fluorescent lamps;Design of illumination systems - Indoor lighting schemes, Factory lighting halls, Outdoor lighting schemes, Flood lighting, Street lighting, Energy saving lamps, LED.

MODULE III HEATINGAND WELDING 9 Hours

Electric heating: Introduction, Advantages of electric heating, Modes of heat transfer, Methods of electric heating, Types - Resistance heating, Arc furnaces, Induction heating, Dielectric heating,

Electric welding: Types - Resistance welding, Arc welding, Power supply for arc welding, Radiation welding.

MODULE IV ELECTRIC DRIVE AND TRACTION 9 Hours

Fundamentals of electric drive, Types of electric drives, Merits of electric traction, Requirements of electric traction system, Supply systems, Mechanicsoftrainmovement, Tractionmotorsandcontrol, Braking,RecenttrendsinElectric traction.

MODULE V ENERGY AND ECONOMIC ASPECTS OF GENERATION 9 Hours

Economic aspects of power generation, Various factors affecting cost of generation, Load curves - Load duration curves, Connected load, Maximum load, Peak load, Base load and peak load power plants, Load factor, Plant capacity factor, Plant use factor, Demand factor, Diversity factor, Cost of power plant, Tariffs and types,Comparison of site selection criteria, Introduction to energy auditing.

TOTAL: 45 HOURS

FURTHER READING:

1. Solar rooftop PV system calculation for a home
2. Case study on Energy Auditing and Energy Conservation

REFERENCES:

1. N.V. Surya Narayana, “Utilization of Electric Power”, Wiley Eastern Limited, New Age International Limited, 1993.
2. J.B.Gupta, “Utilization Electric power and Electric Traction”, S.K.Kataria and Sons, 2000.
3. R.K.Rajput, “Utilization of Electric Power”, Laxmi publications Private Limited., 2007.
4. C.L.Wadhwa, “Generation, Distribution and Utilization of Electrical Energy”, New AgeInternational Private Ltd, 2014.
5. H.Partab, “Utilization of Electrical Energy”, Dhanpat Rai and Co., New Delhi, 2004.

		L	T	P	C
1901HS001	**INNOVATION & ENTREPRENEURSHIP FUNDAMENTALS**	**3**	**0**	**0**	**3**

PREREQUISITE:

The course assumes no prior skill or background in design, art or engineering. 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. Cultivate the mindset and skills of successful entrepreneurs
2. Lead innovative teams
3. Develop and refine your strategy in today's fast-changing, dynamic markets
4. Grow your customer base through inbound and outbound marketing

COURSE OUTCOMES:

1. Explain the basics of Entrepreneurship & Innovation
2. Analyze Leadership Styles and compare them
3. Choose business models based on the requirement and justify with cases
4. Develop a method or mechanism for Innovation marketing and sustainability
5. Develop a Business Model and Strategy framework and demonstrate through presentation

MODULE I ENTREPRENEURSHIP BASICS 9 Hours

Entrepreneurship Basics – Skills, Mindset, Myth vs Fact, Entrepreneurial Leadership: Navigating Uncertainty, Critical lessons in entrepreneurial leadership, innovation, teamwork, communications, and problem-solving & Risk management. Business Opportunity Identification, Idea Validation, Case Study : Entrepreneurs Story

MODULE II INNOVATION & CREATIVITY 9 Hours

Analyzing the Current Business Scenario, Innovation and Creativity- An Introduction, Innovation in Current Environment, Types of Innovation, School of Innovation. Challenges of Innovation, Steps of Innovation Management, Idea Management System, Divergent V/s Convergent Thinking, Design Thinking and Entrepreneurship

MODULE III BUSINESS MODELS & STRATEGIES FOR INNOVATION 9 Hours

Experimentation in Innovation Management, Idea Championship, Participation for Innovation, Co-creation for Innovation, Proto typing to Incubation. What is a Business Model, Who is an Entrepreneur, Social Entrepreneurship, Blue Ocean Strategy-I, Blue Ocean Strategy-II

MODULE IV MARKETING & SUSTAINABILITY OF INNOVATION 9 Hours

Marketing of Innovation, Technology Innovation Process, Technological Innovation Management Planning, Technological Innovation Management Strategies, Technology Forecasting. Sustainability Innovation and Entrepreneurship, Innovation Sustainable Conditions, Innovation: Context and Pattern, SME'S strategic involvement in sustainable development, Exploration of business models for material efficiency services

MODULE V MANAGING INNOVATION : IPR 9 Hours

Management of Innovation, creation of IPR ,Management of Innovation, creation of IPR, Types of IPR, Patents and Copyrights, Patents in India, Business Models and value proposition, Business Model Failure: Reasons and Remedies, Incubators : Business Vs Technology, Managing Investor for Innovation , Future markets and Innovation needs for India.

TOTAL: 45 HOURS

FURTHER READING:

1. 8 Steps To Innovation : Going From Jugaad To Excellence- Book by Rishikesha T. Krishnan and Vinay Dabholkar
2. Innovation and Entrepreneurship Book by Peter Drucker
3. HBS series on Innovation and Entrepreneurship

REFERENCES:

1.The Lean Startup Book by Eric Ries, 2013
2.Zero to One Book by Blake Masters and Peter Thiel, 2014
3. Founders at Work: Stories of Startups' Early Days Book by Jessica Livingston, 2001
4. Crossing the Chasm Book by Geoffrey Moore, 1991
5. Hooked: How to Build Habit-Forming Products Book by NirEyal, 2013
6. Rework Book by David Heinemeier Hansson and Jason Fried, 2010
7. https://nptel.ac.in/courses/127/105/127105007/

		L	T	P	C
1901HS006	**DESIGN THINKING FOR INNOVATION**	**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

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 Real World Problems

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

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/