8PIU1.1: NEW ENTERPRISE AND INNOVATION MANAGEMENT

B.Tech. (P&I) 8th semester

3L+0T

Unit	CONTENTS	Contact Hours
I	Entrepreneurship: Entrepreneurship and enterprise: Concept, role in economic development. Entrepreneurial competencies: awareness, assessment and development. Simulation exercise on goal setting in entrepreneurship. Entrepreneurial & Intrapreneurial mind. International entrepreneurship opportunities. Starting the venture: Generating business idea – sources of new ideas, methods of generating ideas, creative problem solving, opportunity recognition; environmental scanning, competitor and industry analysis; feasibility study – market feasibility, technical/operational feasibility, financial feasibility.	**8**
II	Business Plan: Emerging Business Opportunities-sources & assessment. Business Plan: Concepts, Methods, analysis & interpretation. Functional plans: Marketing plan – marketing research for the new venture, steps in preparing marketing plan, contingency planning; organizational plan – form of ownership, designing organization structure, job design, manpower planning; Financial plan: cash budget, working capital, proforma income Statement, proforma cash flow, proforma balance sheet, break even analysis.	**7**
III	Sources of finance: Sources of external finance, short term as well as long term, Debt or equity financing, commercial banks, venture capital; financial institutions supporting entrepreneurs; legal issues –intellectual property rights patents, trade marks, copy rights, trade secrets, licensing; franchising.	**8**
IV	Start Up: Institutional support to start up and incentives for SSI. Statutory obligation in starting a unit (general like Income Tax, VAT, CST or GST, Service tax, excise and customs, labour laws, etc. Start up strategies. Dealing with outside agencies like consultant, contractors, etc. Key marketing issue of new venture. Starting a franchising business. Starting an e-commerce venture. Buying arunning business. Managing growing venture: Growth, objective and strategy. Managing growth. Assessing resource from external sources, for financing growth including public issue, merger, amalgamation, joint venture, collaboration & selling business.	**8**
V	Innovation Management: an introduction, organizational setups that facilitate innovations. Management of research and development. Strategic alliances and network. Incubators and Accelerators.	**7**
	TOTAL	**40**

TEXT BOOK

1 Hisrich, Robert D., Michael Peters and Dean Shephered, Entrepreneurship, Tata McGraw Hill,New Delhi.

REFERENCE BOOKS

Name of Authors /Books /Publisher

1. Barringer, Brace R., and R., Duane Ireland, Entrepreneurship, Pearson Prentice Hall, New Jersy,USA.
2. Lall, Madhurima, and Shikha Sahai, Entrepreneurship, Excel Book, New Delhi.
3. Charantimath, Poornima, Entrepreneurship Development and Small Business Enterprises,Pearson
4. Paul Trot, Innovation Management and New Product Development, Pearson Education
5. P Narayana Reddy, Entrepreneurship : Text and Cases, Cengage
6. Murdick, Ross & Claggett. Information Systems for Modern Management,. PHI of India.

CO1: **Understand** entrepreneurship and entrepreneurial process and its significance in economic development.
CO2: **Develop** an idea of the support structure and promotional agencies assisting ethical entrepreneurship.
CO3: **Identify** entrepreneurial opportunities, support and resource requirements to launch a new venture within legal and formal framework.
CO4: **Develop** a framework for technical, economic and financial feasibility.
CO5: **Evaluate** an opportunity and prepare a written business plan to communicate business ideas effectively.
CO6: **Understand** the stages of establishment, growth, barriers, and causes of sickness in industry to initiate appropriate strategies for operation, stabilization and growth.

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	1	-	-	3	-	-	3
CO2	-	-	-	-	-	-	1	2	-	1	-	1
CO3	-	-	-	-	-	2	3	2	2	2	1	2
CO4	-	-	-	-	-	-	2	-	-	1	2	2
CO5	-	-	-	-	-	3	-	2	-	3	1	2
CO6	-	-	-	-	-	-	-	2	2	2	2	3

8PIU1.2: ENGINEERING OPTIMIZATION

B.Tech. (P&I) 8th semester
3L+0T

UNIT	CONTENTS	CONTACT HOURS
I	**Introduction**- Engineering Applications of Optimization-Statement of an Optimization Problem-Classification of Optimization Problems-Optimization Techniques	5
II	**Classical Optimization Techniques**-Single-Variable Optimization-Multi variable Optimization with No Constraints-Multivariable Optimization with Equality Constraints- Multivariable Optimization with Inequality Constraints- Transportation	4
III	**Nonlinear Programming I**: 1DMinimization Methods-Unimodal Function, Elimination Methods-Unrestricted Search, Exhaustive, Dichotomous Search- Interval Halving Method- Fibonacci Method-Golden Section Method, Interpolation Methods-Quadratic, Cubic Interpolation Method - Direct Root Methods-Newton Method-Quasi-Newton, Secant Method	7
IV	**Nonlinear Programming II**: Unconstrained Optimization Techniques-Direct Search Methods- Indirect Search (Descent) Methods, Non-linear Programming III: Constrained Optimization Techniques- Direct Methods-Indirect Methods, Geometric Programming, Dynamic Programming, Integer Programming –Integer Linear Programming - Stochastic Programming.	4
V	**Modern Methods of Optimization**- Genetic Algorithms-Simulated Annealing-Particle Swarm Optimization- AntColony Optimization-Optimization of Fuzzy Systems- Neural- Network- Based Optimization, Practical Aspects of Optimization	4
	TOTAL	**40**

TEXT BOOK		
1	Kalyanmoy Deb, "Optimization for Engineering design –algorithms & examples", PHI, New Delhi	1995
REFERENCE BOOKS		
SN	**Name of Authors /Books /Publisher**	**Year of Pub.**
1	Singiresu S.Rao, "Engineering optimization– Theory and practices", John Wiley and Sons,	1998.
2	Garfinkel, R.S. and Nemhauser, G.L., "Integer programming", John Wiley & Sons,	1972.

CO1: **Describe** the basic concepts of engineering optimization.
CO2: **Solve** the problems using different techniques of optimization.
CO3: **Understand and implement** the modern methods of optimizations.

Course Outcomes	P01	P02	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12
C01	2	2	-	1	-	-	-	-	-	-	-	-
C02	3	3	2	2	1	-	-	-	-	-	-	-
C03	3	3	2	1	3	-	-	-	-	-	-	-

8PIU2.1: PRODUCT DEVELOPMENT AND LAUNCHING

B.Tech. (P&I) 8th semester

3L+0T

Unit	Contents	Contact Hours
I	**Importance of New Product:** Definition-importance-Development Process, Importance of new product for growth of enterprise, Definition of product and new product,	2
	Responsibility for new product development, Demands on product development team, Classification of products from new product development point of view- Need based/Market pull products, Tech. push, Platform based, Process based and customized products,	3
	New product development process and organization, Generic product development process for Market Pull Products, Modification of this process for other types of products.	3
II	**Need Analysis:** Problem Formulation Establishing economic existence of need, Need Identification and Analysis, Engineering Statement of Problem, Establishing Target Specification.	8
III	**Generation of Alternatives and Concept Selection:** Concept generation-a creative process, Creativity, Road Elects to creative thinking-Fear of criticism and Psychological set,	4
	Tools of creativity like brain storming, Analogy, Inversion etc., Creative thinking Process, Concept feasibility and Concept Selection, Establishing Engineering Specification of Products.	4
IV	**Preliminary and Detailed Design:** Design Review Preliminary design-Identification of subsystems, Subsystem specifications, Compatibility, Detailed design of subsystems, component design,	6
	Preparation of assembly drawings, Review of product design from point of view of Manufacturing, Ergonomics and aesthetics.	2
V	**Management of New Product:** Development and Launch New Product Management's Challenges, Maintaining focus, Promotion of Right Culture, Management of Creativity, Top Management attention, Design Team Staffing and Organization, Setting key mile stone, Identification of Risk Areas, Project Execution and Evaluation Product Launch Strategies,	8
	TOTAL	**40**

TEXT BOOK		
1	Product Design and Manufacturing, Chitale and Gupta. McGraw Hill.	
REFERENCE BOOKS		
SN	**Name of Authors /Books /Publisher**	**Year of Pub.**
1	Product Design and Development, Ulrich and Eppinger, McGraw Hill	**2003**
2	Project Management in New Product Development, Barkley B.T., Tata McGraw Hill.	**2008**
3	Product Management, Anandan C., McGraw Hill.	**2009**
4	Engineering Design Methods, Cross, Nigel, John Wiley and Sons.	**1995**
5	Product Design and Manufacture, Lindbeck, J.R., Prentice Hall of India.	**1995**

Course outcome

At the end of the course, the student will be able to

CO1: Explain the process of product development.

CO2: Analyse the need for a product and its economic existence.

CO3: Select a concept or product through feasibility study of different identified

solution.

CO4: Prepare the specifications and detailed design of components considering manufacturing aspects ,ergonomics and aesthetics.

CO5: Define new product management and launch strategies.

CO-PO Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO1	PO1 PSO1 PSO2
CO1	1	1	3	2	1	2	2		1			
CO2	1	2	3	2	1	2	2		1	1		
CO3	1	3	3	2	2	2	2		1	1		
CO4	2	3	3	2	1	2	1		1			
CO5	2	1	1	1	1	2			2		3	
Average	**1.4**	**2.0**	**2.6**	**1.8**	**1.2**	**2.0**	**1.8**		**1.2**	**1.0**	**3.0**	

8PIU2.2: MECHATRONICS AND MEMS

B.Tech. (P&I) 8th semester
3L+1T

Unit	CONTENTS	Contact Hours
I	**Overview of Mechatronics**: Historical perspective, Definition, Applications, Block diagram of Mechatronic system, Functions of Mechatronics Systems, Systems Engineering, Verification Vs Validation, Benefits of mechatronics in manufacturing	2
	Electrical and Electronic Systems: Electrical circuits and Kirchhoff's laws, Network Theorems and AC circuit Analysis, Transformers, Analog Devices, Signal Conditioning, Digital Electronics, Data Acquisition systems.	3
II	**Modeling, Analysis and Control of Physical Systems:** Basics of System Modeling: LTI and LTV systems, Need for modeling, Types of modeling, Steps in modeling, Building blocks of models, Modelling of one and two degrees of freedom systems, Modeling of Electro-mechanical systems, Mechanical Systems, Fluid systems, Thermal systems; Dynamic Responses, System Transfer Functions, State Space Analysis and System Properties, Stability Analysis using Root Locus Method, Stability Analysis using Bode Plots, PID Controllers (with and without Time Delay)	3
III	**Sensors and Actuators**: Static characteristics of sensors and actuators, Position, Displacement and Proximity Sensors, Force and torque sensors, Pressure sensors, Flow sensors, Temperature sensors, Acceleration sensors, Level sensors, Light sensors, Smart material sensors, Micro and Nano sensors, Selection criteria for sensors, Actuators: Electrical Actuators (Solenoids, Relays, Diodes, Thyristors, Triacs, BJT, FET, DC motor, Servo motor, BLDC motor, AC motor, Stepper motors), Hydraulic and Pneumatic actuators, Design of Hydraulic and Pneumatic circuits, Piezoelectric actuators, Shape memory alloys.	4
IV	**Microprocessors, Microcontrollers and Programmable Logic Controllers**: Logic Concepts and Design, System Interfaces, Communication and Computer Networks, Fault Analysis in Mechatronic Systems, Synchronous and Asynchronous Sequential Systems, Architecture, Microcontrollers, Programmable Logic Controllers (PLCs): Architecture, Number Systems Basics of PLC Programming, Logics, Timers and Counters, Application on real time industrial automation systems.	5
V	**Micro-Electro Mechanical Systems (MEMS):**History, Effect of scaling, Fabrication techniques: Oxidation, Sputter disposition, CVD, Lithography, Etching, Wafer bonding, LIGA, DRIE, Applications: Lab on chip	5
	Case Studies: Design of pick and place robot, Car engine management system, Automated manufacturing system, Automatic camera, Automatic parking system, Safety devices and systems.	3
	TOTAL	**40**

TEXT BOOK		**Ed.**
1	W.Bolton,Mechatronics,Electroniccontrolsystemsinmechanicalandelectricalengineering,PearsonEducation,5/e,2011.	2004
REFERENCE BOOKS		
SN	**Name of Authors /Books /Publisher**	**Pub Year .**
2	JamesJAllen,MicroElectroMechanicalSystemsDesign,CRCPress.	2013
3	DavidG.AlcaiatoreandMichelB.Histand,IntroductiontoMechatronicsandMeasuringSystems,Mc.GrawHillInt.Edition,3/e,	2006
4	CraigK.C.andStolfi,F.R.,IntroductiontoMechatronicSystemDesignwithApplications,IEEEEducationalActivitiesDepartment,.	1994
5	RobertH.Bishop.TheMechatronicsHandbook, CRCPress,2/e	2007

Course outcome

At the end of the course, the student will be able to

CO1: Discuss overview of mechatronics and MEMS with their applications.

CO2: Classify different sensors and actuators .

CO3: Construct control on mechatronics system.

CO4: Apply signal conditioning and discuss data acquisition system.

CO5: Develop various mechatronics system .

CO-PO Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO1	PO1 PSO1	PSO2
CO1	3	3	2	2	1	1		1					
CO2	3	2	1	1									
CO3	3	2	2	2									
CO4	3	2	2	2									
CO5	3	3	3	3	2		1		1				1
Average	**3.0**	**2.4**	**2.0**	**2.0**	**1.5**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**			

8PIU3.1: NON DESTRUCTIVE EVALUATION AND TESTING

B.Tech. (P&I) 8th semester
3L+0T

UNIT	CONTENTS	CONTACT HOURS
I	**Introduction**: An Overview, Factors influencing the Reliability of NDE, Defects in materials, Defects in composites. NDT methods used for evaluation of materials and composites.	3
	Visual Inspection: Basic Principle and Applications.	2
	Liquid Penetrant Testing: Principle, Procedure and Test Parameters, Materials, Limitations and Applications.	3
II	**Radiographic Inspection:** Principles of X – ray radiography, equipment, Absorption, Scattering, X-ray film processing, General radiographic procedures, Reading and Interpretation of Radiographs, Industrial radiographic practice, Limitations and Applications, Welding defects detection. Gamma ray radiography.	8
III	**Ultrasonic Testing:** Principle of wave propagation, Ultrasonic equipment, Variables affecting an ultrasound test, Basic methods: Pulse Echo and Through Transmission, Types of scanning.	5
	Applications of UT: Testing of products, Welding Inspection, Tube Inspection, Thickness Measurement, Elastic Constant Determination, Ultrasonic testing of composites.	3
IV	**Magnetic Particle Inspection:** Methods of generating magnetic field, Demagnetization of materials, Magnetic particle test: Principle, Test Equipment and Procedure, Interpretation and evaluation.	5
	Introduction to Accostic Emission Testing and Thermography.	3
V	**Eddy Current Testing:** Principle of eddy current, Factors affecting eddy currents, Test system and test arrangement, Standardization and calibration, Application and effectiveness.	5
	Comparison and Selection of NDT Methods, Codes and Standards	3
	TOTAL	40

TEXT BOOK		
1	Baldev Raj, T. Jay Kumar, M. Thavasimuthu,Practical Non-Destructive Testing, Narosa.	
REFERENCE BOOKS		
SN	**Name of Authors /Books /Publisher**	**Year of Pub.**
1	Loius Cartz, Non Destructive Testing, ASM International	1995
2	J PRASAD, C G K NAIR, NDT & Evaluation Of Materials, TMH	2008
3	R. Halmshaw, Introduction to the Non-Destructive Testing of Welded Joints,	1997
4	American Metals Society, Non-Destructive Examination and Quality Control, Metals Hand Book, Vol.17, 9th Ed.	1989

8PIU3.2: FUEL CELL AND HYBRID ENGINE TECHNOLOGY

B.Tech. (P&I) 8th semester

UNIT	CONTENTS	CONTACT HOURS
I	Introduction and types of Fuel cell: Introduction : the rational behind fuel cell development, basic principle of fuel cell, operational of fuel cell, efficiency of fuel cell, co generation of heat and power, important reaction such as hydrogen oxidation, methonal oxidation etc	3
	Types of fuel cell: DMFC (direct methanol fuel cell),PAFC (phosphoric acid fuel cells), MCFC (molten carbonate fuel cells), SOFC (solid oxide fuel cells)	4
II	Fuel processing and application of fuel cells: Fuel processing- general, producing hydrogen from alcohol, producing hydrogen from hydrocarbon, hydrogen from other sources, Gas cleanup, reformer system, hydrogen storage system Engineering	6
III	fuel cell engineering, vehicle cell design, stack engineering fuel processing system application: stationary power, propulsion of vehicle, portable application	4
	Electric Vehicle: Introduction, working. Electric car motors, electric car batteries, charging system of electric car, magna charge system. conversion system for transmission.	6
IV	Hybrid vehicle: Introduction, working. Power split devices. Hybrid car performance, gasoline hybrid structure. Gasoline Vs electric power	6
	Transmission components of hybrid vehicle. Advantage and limitation. Different types of hybrid vehicle.	4
V	Solar Vehicles: Introduction and working, photovoltaic cell, solar cell. Energy lose in solar cell. Solar powering house. Solar cost, anatomy of solar cells	7
	TOTAL	40

TEXT BOOK		
1	Electric and Hybrid Vehicles: Design Fundamentals, Second Edition, By Iqbal Husain, CRC press	2009
REFERENCE BOOKS		
SN	**Name of Authors /Books /Publisher**	**Year of Pub.**
1	Fuel cell technology, N. Sammes, Springer	2012
2	Microbial Fuel Cell, Bruce E. Logan , Willey publication	2008
3	Principle of Fuel Cell, Xiangeo Li, CRC Press	2006
4	Hydrogen fuel cells for road vehicles, corbo et.al, springers	2007
5	Electrical vehicle technology, James laraminie, Wiley	2008

8PIU13: SEMINAR

Course outcome

At the end of the course, the student will be able to

CO1: Review of recent industrial developments and scientific innovations.

CO2: compile informations from different sources in comprehensive manner

CO3: prepare technical report

CO4: present the identified development/innovations

CO5:

CO-PO Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO1	PO1
	PSO1	PSO2										
CO1	1	3	1				1	1	3	1		3
CO2	1	1							3	3		1
CO3	1	1					1	1	3	3		2
CO4	1	1			2				3	3		1
Average	**1.0**		**1.5**	**1.0**	**2.0**	**1.0**	**1.0**	**3.0**	**2.5**		**1.8**	

8PIU14: PROJECT STAGE -II

Course outcome

At the end of the course, the student will be able to

CO1: Arrange necessary resources and prepare project plans

CO2: Develop the required product/solution considering technical/financial viability

CO3: Test and validate the solutions based on experiment and field trials

CO4: Prepare project report and present results/solution

CO5:

CO-PO Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO1	PO1
	PSO1	PSO2										
CO1	1					1	2	1	2	2	3	3
CO2	2	2	3	1	2		1	1	3	2	2	3
CO3	2	2	1	3	2		1	1	3	2	1	3
CO4	2		1	1	1			1	2	3	1	3
Average	**1.8**	**2.0**	**1.7**	**1.7**	**1.7**	**1.0**	**1.3**	**1.0**	**2.5**	**2.3**	**1.8**	**3.0**

8PIU20: DISCIPLINE AND EXTRA CURRICULAR ACTIVITIES

Course outcome

At the end of the course, the student will be able to

CO1: Recognize their strength and those of others to work towards a shared vision (leadership)

CO2: Develop and sustain healthy and meaningful relationship with others (Interpersonal skills)

CO3: Identify and address the needs of the community collaboratively to facilitate positive social change (Social Responsibility)

CO4: Generate innovations through experimentation with novel ideas, forms, and methods (Critical and creative thinking)

CO5: Act as a disciplined citizen with ethical and moral values

CO-PO Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO1	PO1 PSO1 PSO2
CO1						2	1	3	2	1		2
CO2						2	1	2	3	3		1
CO3						3	2	2	2	2		2
CO4	3	2	2	2	2		1		2	1		2
CO5						2	1	3	1	1		2
Average	**3.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.3**	**1.2**	**2.5**	**2.0**	**1.6**		**1.8**