Course Code	21GNH101J	Course Name	PHILOSOPHY OF ENGINEERING	Course Category	H	HUMANITIES	L	T	P	C
							1	0	2	2

Pre-requisite Courses	*Nil*	Co- requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	---	*Data Book / Codes / Standards*		*Nil*	

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*
CLR-1 :	*Inspire a holistic overview of engineering*
CLR-2 :	*Enlighten the methods and methodologies for building ontologies for systems engineering*
CLR-3 :	*Acquaint with engineering knowledge, building engineering knowledge and value of engineering*
CLR-4 :	*Upskill the engineering design process in aspects of conceive, design, implement and operate methodology*
CLR-5 :	*Instill the role of engineers in society, code of ethics and socio-politics of technology and engineering*

Course Outcomes (CO):	*At the end of this course, learners will be able to:*	Program Outcomes (PO)											
		1	2	3	4	5	6	7	8	9	10	11	12
		Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning
CO-1:	*Analyze the relation between Arts, Mathematics, Science, Technology and Engineering and desired attributes of an engineer*	1	-	-	3	-	1	-	1	3	3	-	3
CO-2:	*Build ontologies for systems engineering using concept/mind mapping techniques*	3	-	-	3	3	-	-	-	3	3	-	3
CO-3:	*Analyze the knowledge base in engineering, distinctive features of engineering design and RIASEC model*	3	-	-	3	-	-	-	-	3	3	-	3
CO-4:	*Illustrate the engineering design process for the given application, analyze the requirements of CDIO engineers*	3	1	3	3	3	-	-	-	3	3	-	3
CO-5:	*Evaluate designs on their environmental and societal aspects and do organizational analysis on profession engineering organizations*	3	3	3	3	-	3	3	3	3	3	-	3

Unit-1 : Introduction to Philosophy of Engineering	**9 Hour**
Define Engineering - History of Engineering Development - Practice 1: Compare Prehistory, Medieval and Present Engineering Development - Relation between Arts, Mathematics, Science, Technology and Engineering - STEAM Pyramid - Practice 2: STEAM Pyramid Analysis: Is Art Context Necessary? - Desired Attributes of an Engineer - Engineering Habits of Mind - Practice 3: Case Study on Attributes of an Engineer.	
Unit-2 : Ontology of Engineering	**9 Hour**
Ontology - Reference Ontology and Application Ontology - Practice 4: Reference Ontology using Concept/Mind Mapping - Suites of Ontology Modules - Functions and Capabilities - Practice 5: Engineering Application Ontology using Concept/Mind Mapping - Product Life Cycle - Commodities, Services and Infrastructure - Practice 6: Product Life Cycle Ontology using Concept/Mind Mapping	
Unit-3: Epistemology of Engineering	**9 Hour**
Relations between Science, Technology and Engineering - Questions on Philosophy of Engineering - Practice 7: Analyze the nature, contents and complexity of the knowledge base in engineering Four Dimensions of Engineering - RIASEC Model - Practice 8: Case Study on RIASEC Theory of Career Choice - Epistemology of Engineering Design - Rigour, Creativity and Change in Engineering - Practice 9: Analyze Distinctive Features of Epistemology of Engineering Design	
Unit-4 : Methodology of Engineering	**9 Hour**
Difference between Scientific Method and Engineering Design (ADDIE)- CDIO Engineers in Industry - Practice 10: Relate ADDIE and CDIO Methodology - Conceive and Design - Engineering Design Process Practice 11: Illustrate the Engineering Design Process for the given Application - Implement and Operate - Operational Factors in System Design - Practice 12: Analyze the Requirements of Operational Engineers	
Unit-5: Axiology of Engineering	**9 Hour**
Engineering and Society- Engineers Code of Ethics - Practice 13: Evaluate Popular Inventions and apply their new point of view to Re-Design - Sustainability and Diversity - Engineer's role to achieve Sustainable Development - Practice 14: Case Study on Achieving Sustainable Development Goals - Socio-Politics of Technology & Engineering - Professional Engineering Organizations - Practice 15: Case Study on Professional Engineering Organizations	

Learning Resources	1. *Louis L. Bucciarelli, Engineering Philosophy, Illustrated, DUP Satellite, 2007* 2. *Gregory Bassett, Philosophical Perspectives of Engineering and Technology Literacy, I, Original writing Ltd, 2014* 3. *Philosophy of Engineering, Volume I, Royal Academic of Engineering (UK), 2010*	4. *Christensen, S.H, Engineering Identities, Epistemologies and Values, Springer, 2015* 5. *Van De Poel, Ibo, Philosophy and Engineering, An Emerging Agenda, Springer, 2010* 6. *Diane P. Michelfilder, The Routeledge Handbook of The Philosophy of Engineering, Routledge, 2020*

Learning Assessment

	Bloom's Level of Thinking	*Continuous Learning Assessment (CLA)*				*Summative Final Examination (40% weightage)*	
		Formative CLA-1 Average of unit test (45%)		*Life Long Learning CLA-2 – Practice (15%)*			
		Theory	*Practice*	*Theory*	*Practice*	*Theory*	*Practice*
Level 1	*Remember*	*20%*	-	-	*15%*	*20%*	-
Level 2	*Understand*	*20%*	-	-	*15%*	*20%*	-
Level 3	*Apply*	*20%*	-	-	*20%*	*20%*	-
Level 4	*Analyze*	*20%*	-	-	*20%*	*20%*	-
Level 5	*Evaluate*	*10%*	-	-	*15%*	*10%*	-
Level 6	*Create*	*10%*	-	-	*15%*	*10%*	-
	Total	*100 %*		*100 %*		*100 %*	

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
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