Schedule of

Topology Optimization & Additive Manufacturing: FEM & Practices

03-09 June, 2019, Mechanical Engineering, IIT (B.H.U), Varanasi, U.P, India

Time / Day	9.30-10.00	10.00-10.45		11.00-1.00		2.00-3.00	3.00-4.00		4.10-5.30	5.30 - 6.0
DAY 1: Monday (3rd June)	**Registration & Inauguration** New Seminar Hall, Dept. of Mechanical Eng. **VENUE:** for rest of the classes: CAD lab & Seminar Hall (1st floor)		**TEA**	**Product Design and Intellectual Property Rights** Over view: Design Thinking, Additive manufacturing & IPR	**UNCH**	**Finite Element Method (FEM)** Introduction, Weighted Residual methods:Subdomain, Galerkin, Petrov-Galerkin, etc.		**TEA**	**Computer Aided Design (CAD)** CAD: 2D to 3D solid geometry, Designing various 3D parts, exploring design ideas	**OVERNIGHT ASSIGNMENTS**
DAY 2: Tuesday (4th June)	**Overnight assignment** Review and solution	**FEM Boundary Conditions** Techniques for various types of FEM:		**Static Analysis** Critical stress, von Mises stress, stress concentration factor, deflection of beams etc.,		**Dynamic Analysis** Theoretical background, modeling thin-walled 3D structures, ETC. .			**Topography Optimization** Can stiffness be increased without adding mass?	
DAY 3 Wed day (5th June)	**Overnight assignments** Review & solution	**TopoLOGY Optimization: Theory** Theoretical background: How and why Topology optimization, various methods		**TopoLOGY Optimization: Modeling** Shape Controls: How to apply manufacturing constraints such as draw directions and symmetry		**TopoGRAPHY Optimization** Minimization Objective: Maximize stiffness or minimize mass; etc.			**Gauge Optimization** Optimum part thickness, minimizing mass, maximizing mass or stiffness	
DAY 4 Thursday (6th June)	**Overnight assignments** Review & solution	**Lattice Structure Optimization** Optimizing cells, Lattice design parameters, factor of safety etc.		**Design for robustness** Basics concept-CAD & Additive Manufacturing, 2D and 3D geometry generation techniques, Trans & curves.		**Product design and lab work -1** Product Design & Dev. Processes & methodology, tools & Teams, customer needs			**Product design and lab work -1** Product function & structure, benchmarking & engineering specifications: case study	
DAY 5 Friday (7th June)	Review & solution	Portfolios and the architecture, concepts and morphological Evaluation		Product scoring & embodiment principles etc. Design for robustness & optimization:		Overview on Additive Manufacturing: concept & processes Lab work 1			Metal and Bio additive manufacturing, AM techniques: SLA, SLS, FDM, 3DP, LOM, SGC etc. - Lab work 2	
DAY 6 Saturday (8th June)	VISIT TO BHARAT KALA BHAWAN			Design for AM, process selection:		-Post processing & Application: By Dr. S K Mahato) - (3-4 PM) -AM & Product Lifecycle Management &			Future of AM & product development & digital entrepreneurship: Lab work 3	
DAY 7 Sunday (9th June)	Summary of Workshop & Feedback Interaction			Ceramic Engg AM Application: by Dr. Imtiyaz & CLOSING CEREMONY						