Programme schedule of short term course on
Design and Topology Optimization using Finite Element Method
21 - 23 December, 2017, Mechanical Engineering, IIT (B.H.U), Varanasi, U.P, India

Day↓ Time→	9.30-10.00	10.00-10.45	T E A	11.00-1.00	L U N C H	2.00-3.00	3.00-4.00	T E A	4.10-5.30	5.30 - 6.00
DAY 1: Thursday (21st December)	**Registration & Inauguration**			**Finite Element Method**		**Computer Aided Design (CAD)**			**FEM Boundary Conditions**	**O V E R N I G H T A S S I G N M E N T S**
	VENUE: New Seminar Hall, Dept. of Mechanical Engineering **VENUE** for rest of the classes: CAD lab			Introduction, Weighted Residual methods: Subdomain, Galerkin, Petrov-Galerkin, Least square, Collocation methods; Weak form, Rayleigh Ritz method		CAD: Design various parts and assembling techniques			Techniques for various types of FEM Loads and Constraints: pressure, forces, contacts, friction surfaces, thermal, concentrated mass, gravity loads, etc, various types of supports such as fixed, pin and roller joints, fasteners and joints. Connections: Techniques for modeling fasteners: nuts and bolts, crews etc.	
DAY 2: Frida (22nd December)	**Overnight assignment**	**Shape Optimization**	T E A	**Static Analysis**	L U N C H	**Dynamic Analysis**		T E A	**Topography Optimization**	
	Review and solution	Gradientless shape optimization using artificial neural networks.		Critical stress, von Mises stress, stress concentration factor, deflection of beams etc., designing within factor of safety, thermal stresses, comparing FEM results with theory		Theoretical background, modeling thin-walled 3D structures, extracting midsurfaces from solids, surface modeling, extracting natural frequencies (normal modes), fix and free modal analysis, analysis under buckling loads, extracting buckling modes etc.			Can stiffness be increased without adding mass? Frequency maximization principle; Generating various bead patterns: linear, circular and radial	
DAY 3 Saturday (23rd December)	**Overnight assignments**	**Topology Optimization I**		**Topology Optimization II**		**Topology Optimization III**			**Valedictory function:**	
	Review & solution	Theoretical background: How and why Topology optimization, various methods		Shape Controls: How to apply manufacturing constraints such as draw directions and symmetry		Minimization Objective: Maximize stiffness or minimize mass; Optimization with various constraints such as frequency, stress, gravity, thickness and minimum factor of safety constraint etc.			Feedback and vote of thanks **VENUE:** New Seminar Hall	