	Pimpri Chinchwad Education Trust's **Pimpri Chinchwad College of Engineering** Sector No. 26, Pradhikaran, Nigdi, Pune – 411 044	

COURSE OUTLINE

Department: AS&H   A.Y.:2022-23 SEM-II   Date:27th Feb,2023.
Class: S.Y. B. Tech [All programs]

Name of the Course and Code: **[BAS4603] Calculus of Variation**

Relevance of the course:
Calculus of Variation is an extremely powerful prescriptive analytics technology that enables companies/organizations to solve some of the dynamic problems, optimization problems, Finite Element Methods, optimal control theory as, it allows us to solve non-complex control systems too. Calculus of variation gives us precise analytical techniques to find the shortest path between two points of a surface. It also used to achieve sustainable optimization of quality properties of stabilized for sustainable and optimal materials handling, design and construction. Calculus of variation allows capturing the key features to resolve the complex engineering problems as an optimization model.

 This course requires basic knowledge of following courses:

- Linear Algebra and Univariate calculus
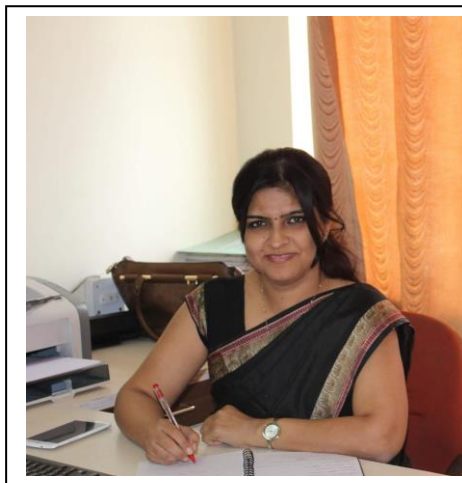- Multivariate calculus
- Applied Mathematics

Course Outcomes:

CO No.	CO Statement	No. of Lectures Planned	Content Delivery method	Assessment tools Planned
1	Construct variational problems to optimize constrained and unconstrained functional.	8	**PPT, chalk and board, Quiz, Group Discussion**	**MTE, ETE**
2	Apply Euler-Lagrange"s equation to determine stationary paths of a multivariable functional.	7	**PPT, chalk and board, Quiz, Group Discussion**	**MTE, ETE**
3	Understand basic operators, packages, syntax of software to develop programs for optimization of functional.	8	**PPT, Videos, Demonstration**	**IE-1(Task submission)**
4	Apply theory & techniques of calculus of variation to solve boundary value problems.	7	**PPT, chalk and board, Quiz, Group Discussion**	**MTE,ETE**
5	Analyze given problem to construct finite element structure and apply theory of calculus of variation to solve it	8	**PPT, chalk and board, Quiz, Group Discussion**	**MTE,ETE**
6	Develop programs for approximate and FEM models using open source software.	7	**PPT, Videos, Demonstration**	**IE2(Task submission), ETE**

Internal Evaluation:

Tools	Assessment tools with tentative dates (*Quizzes, mini project, research paper based assignment etc.*)	Marks	Mapped COs
IE1	Open Ended Activity: Task submission using Software programming on real life applications/problems related linear programming problems [17/04/2023]	10	CO3
IE2	Open Ended Activity: Task submission using Software programming on real life applications/problems related Transportation Problem, Assignment Problems, Network Analysis [02/06/2023]	10	CO6

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