PROFORMA FOR NEW COURSE

1.	Title of the Course	Convective Heat Transfer
2.	Course Number	ME5210
3.	Status of the Course	Core/Elective
4.	Structure of Credits	3-0-0-3
5.	Offered To	PG
6.	New Course/Modification to	New
7.	To be Offered by	Department of Mechanical Engineering
8.	To take effect from	July 2019
9.	Prerequisite	Nil
10.	Whether approved by the Program	Yes
11.	**Course Objective:** To provide an understanding of the physical mechanisms of momentum and heat transfer for various nonisothermal flows; to train students to obtain exact, approximate, and numerical solutions to various problems including flow and heat transfer in internal and external geometries, laminar and turbulent regimes.	
12.	**Course Content:** Governing equations for mass, momentum and energy; Boundary layer approximations; Laminar external flow and heat transfer: Blasius, Falkner-Skan and Eckert solutions, integral method solutions, Duhamel's method, von Karman-Pohlhausen method; Laminar internal flow and heat transfer: exact solutions to Navier-Stokes equations, fully developed forced convection in pipes, Graetz solution, heat transfer in the combined entrance region; Natural convection heat transfer: Boussinesq approximation, dimensional analysis, similarity solutions, natural and mixed convection in enclosures, mixed convection over vertical plate; Turbulent convection: RANS equations, Reynolds, Prandtl-Taylor and von Karman analogies, turbulent flow and heat transfer across flat plate and circular tube, turbulent natural convection.	
13.	**Text book(s):** 1. Bejan A, *Convection Heat Transfer*, 3rd Edition, John Wiley (2004) 2. Kays W M and Crawford M E, *Convective Heat and Mass Transfer*, 4th Edition, McGraw Hill International (2005)	
14.	**Reference(s):** 1. Incropera F P and Dewitt D, *Fundamentals of Heat and Mass Transfer*, 7th Edition, John Wiley (2011) 2. Schlichting H and Gersten K, *Boundary Layer Theory*, 8th Edition, Springer- Verlag (2000)	