


EXPLOSIONS AND SAFETY

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TYPE OF COURSE : Rerun I Elective I UG/PG
COURSE DURATION : 12 Weeks (24 Jan' 22 - 15 Apr' 22)
EXAM DATE : 24 Apr 2022

PRE-REQUISITES : Basic Mechanics and Thermodynamics

INTENDED AUDIENCE : Engineering students and practicing engineers

INDUSTRIES APPLICABLE TO : Industries handling Chemicals and Explosives, Army, Navy, Air Force, DRDO, ISRO, HAL, Space and Defense and Process-related Industries

COURSE OUTLINE :

The physical principles governing the various kinds of explosions are dealt with. Starting with simple modeling of blast waves derived from energy release in explosions, predictions for the damage caused by explosions and methods of ensuring safety are considered. The mechanisms of energy release in gaseous, liquid, dust and solid explosives are examined. Physical explosions and explosions of pressure vessels are also considered. The interaction of blast waves from explosions with objects is dealt with and the damages that occur are quantified.

ABOUT INSTRUCTOR :

Prof. K. Ramamurthi worked in ISRO and thereafter in the Department of Mechanical Engineering at IIT Madras. He is presently Chairman of the Combustion and Shock Wave Panel (CDSW) of ARMREB in DRDO and Chairman of Extramural Research in Combustion of SERB. His research interests are in detonation, blast waves, combustion instability and thermodynamics.

Prof. Prasad Patnaik B.S.V is currently Professor in the Department of Applied Mechanics at IIT Madras. His research interests are in the field of Computational Fluid Dynamics (CFD) applied to Fluid Structure Interaction (FSI). He has worked on the development of CFD tools applied to FSI, Nuclear Thermal Systems, Bio-Fluid Mechanics etc.

COURSE PLAN :

Week 1**:** Introduction

Week 2**:** Theory of Blast Waves

Week 3**:** Characteristics of Blast Waves

Week 4**:** Interaction of Blast with Objects and Structures

Week 5**:** Energy Release in an Explosion

Week 6**:** Rate of Energy Release

Week 7**:** Modeling of Rate of Energy Release

Week 8**:** Modeling of Rate of Energy Release (Cont'd); Detonations

Week 9**:** Detonations (Cont'd)

Week 10**:** Different Types of Explosions

Week 11**:** Different Types of Explosions (Cont'd); Condensed Phase Explosions

Week 12**:** Condensed Phase Explosions (Cont'd)