



SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

Accredited "A++" Grade by NAAC | 12B Status by UGC | Approved by AICTE

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SCHOOL OF MECHANICAL ENGINEERING

DEPARTMENT OF AUTOMOBILE ENGINEERING

Minutes of Board of Studies meeting

Board of Studies meeting for the Department of Automobile Engineering held on 17th october 2022 with the following agenda:

- Syllabus revision for the course SAUA1304-Solid and Fluid Mechanics"

Welcome Address

Dr.V.K.Bupesh Raja welcomed the members of BoS and placed the agenda for the deliberations of the members. The following decisions were made as per the items of the circulated agenda.

Agenda: Syllabus revision for the course SAUA1304-Solid and Fluid Mechanics in 2019 regulations

The following changes have been made in the third semester course "SAUA 1304-Solid and Fluid Mechanics" of Automobile Engineering Department 1. Unit-2 contents were revised and title of the unit has been renamed as " BENDING MOMENT IN BEAMS AND TORSION OF SHAFTS" 2. The contents of the units 3 and 4 have been swapped and title of unit 4 is renamed as " FLOW THROUGH ORIFICES, NOTCHES, WEIRS AND PIPES" 3. Course outcomes are reframed. The revisions made in the syllabus contents of the courses Solid and fluid mechanics has been approved by BoS members.

Vote of Thanks

Dr.S.Prakash thanked the expert members for accepting the invitation for attending the BOS meeting in a short notice. He also thanked internal members for their contribution towards the conduct of this BOS meeting

Members present:

External Members	Signature	Internal Members	Signature
Dr.G.Sathiyaseelan General Manager- Ashok Leyland- External Member		Dr.S.Prakash Dean/School of Mechanical Engineering	
Mr.A.J.Naveenan Lawrence Chief training officer TVS Training and services Ltd Chennai		Dr.V.K.Bupesh Raja, Head/Automobile Engineering	
Er.Dinesh Procurement Consultant Altron Deutschland S.A.S.&Co.KG, U.K (Alumni)		Dr.A.Karthikeyan Professor/ Automobile Engineering	

SAUA1304 SOLID AND FLUID MECHANIC (old)

COURSE OBJECTIVES

- To familiarize with the behaviour of structural components under different loading conditions
- To understand effect of component dimensions and shape on stresses and deformations.
- To understand fluid properties, flow characteristics and basic governing equations-mass, momentum, energy
- To understand the analysis of rotor dynamic machines and Velocity Triangles

UNIT 1 STRESS STRAIN AND DEFORMATION OF SOLIDS, STATES OF STRESS

9 Hrs.

Rigid bodies and deformable solids - stability, strength, stiffness - tension, compression and shear stresses - strain, elasticity, Hooke's law, limit of proportionately, modules of elasticity, stress-strain curve, lateral strain - temperature stresses deformation of simple and compound bars - shear modulus, bulk modulus, relationship between elastic constants - bi axial state of stress - stress at a point - stress on inclined plane - principal stresses and principal planes – Mohr's circle of stresses

UNIT 2 BENDING AND SHEAR STRESS DISTRIBUTION, TORSION & BEAMS

9 Hrs.

Stresses in Beams - Simple bending theory - Composite Beams - Combined bending and Direct stress – Shear stress distribution for Rectangular and I section - Simple Torsion theory - Stresses and deformations in Solid and Hollow circular shafts- Double integration method - Macaulay's method - Moment area method - Conjugate method for simply supported and cantilever beams, (only point loads & Uniformly distributed loads.)

UNIT 3 SLOPE AND DEFLECTION OF BEAMS

9 Hrs.

Flow through orifices: Classification - Hydraulic co-efficient - Flow through rectangular orifice, Notches and weirs. Laminar and Turbulent flow: Reynolds experiment - Major and minor losses in pipes - Darcy Weisbach's equation, Chezy's formula - pipes in series and pipes in parallel - total energy line - hydraulic gradient line - Equivalent pipe.

UNIT 4 FLUID PROPERTIES & EQUATIONS OF MOTION

9 Hrs.

Fluid Properties: Density - Specific Weight - Specific Gravity - Viscosity - Surface tension - Capillarity - compressibility. Fluid Statics: Hydrostatic Law - Pressure Variation in static fluid - Hydrostatic force on submerged plane-surfaces - Location of hydrostatic force. Manometers - Simple U tube and differential manometers - Buoyancy - Meta-centric height - determination of stability of floating bodies and submerged bodies- Basic equations of motion: Types of fluid flow - Continuity, momentum and energy equations - Euler's and Bernoulli's Equation and its applications. -Flow Measurement: Orifice meter, Venturi meter, Piezometer, Pitot Tube.

UNIT 5 PUMPS & TURBINES

9 Hrs.

Centrifugal Pumps: Definition - Operations - Velocity Triangles - Performance curves - Cavitations - Multistaging. Reciprocating Pumps: Operation - Slip - indicator Diagram - Separation - Air vessels. Hydraulic Turbines: Classification of hydraulic turbines - Working principle of Pelton wheel, Francis and Kaplan turbines - velocity triangles - draft tube - hydraulic turbine characteristics. Dimensional Analysis: Buckingham's Theorem, Non-Dimension Numbers, Similarities of Flow- Model studies

Max. 45 Hours

Course Outcomes:

On completion of the course, student will be able to

CO1: Analyze material strength using Stress-Strain relationships.

CO2: Acquire knowledge about principal stress and strain

CO3: Analyze Beam strength using Shear Force and Bending Moment Diagram.

CO4: Acquire knowledge on properties of fluids.

CO5: Understand the concept of kinematics and dynamics of fluids CO6: Understand the concept of incompressible flow

TEXT / REFERENCE BOOKS

1. Rajput.R.K. "Strength of Materials", 4th Edition, S.Chand & co, New Delhi, 2002.
2. Khurmi, R.S, "Strength of Materials", 23rd Edition, S.Chand & Co, 2008
3. Bansal.R.K,. "Fluid Mechanics & Hydraulics Machines", 9th Edition, Laxmi Publications, 2005.
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