

BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI (RAJ)
WORK INTEGRATED LEARNING PROGRAMMES DIVISION
B. S. ENGINEERING DESIGN

COURSE HANDOUT (FIRST SEMESTER 2009 – 2010)

COURSE NO : **EDLT ZC212**
COURSE TITLE : **ENGINEERING MECHANICS**

Course Description

Introduction to mechanics, statics of particles, statics of rigid bodies, analysis of structures, friction and its applications, centroid and center of gravity, moment of inertia and mass moment of inertia, method of virtual work, kinematics of particles: Newton's second law, energy and moment methods, kinematics of rigid bodies.

Scope and Objective

The subject deals with the mechanics of rigid bodies-statics and dynamics- without taking effect of their deformation into consideration. Study of the subject initiates from the study of fundamentals of the force system, computation of distribution of forces, properties of surface and material bodies and finally terminates at determination of various kinematic and kinetic parameters of rigid bodies.

Text Book

T1 F. P. Beer and E.R. Johnston, "Vector Mechanics for Engineers", Eighth Edition, Tata Mc-Graw Hill Publishing Co., New Delhi, Second Reprint 2008

Plan of Contact Sessions

Contact Session	S. No.	Topics to be covered	Chapter
I	1.	Statics of particles	2
	2.	Rigid Bodies: Equivalent systems of forces	3
	3.	Equilibrium of rigid bodies	4
	4.	Distributed forces: Centroids and centers of gravity	5
	5.	Analysis of structures	6
	6.	Friction	8
II	7.	Forces in beams and cables	7
	8.	Distributed force: moments of inertia	9
	9.	Method of virtual work	10
	10.	Kinetics of particles: Newton's second law	12
	11.	Kinetics of particles: energy and momentum methods	13
	12.	Kinematics of rigid bodies	15

Evaluation Scheme

EC No	Component	Duration	Weightage	Date
1.	Assignment - 1	One month approx.	20%	29/10/09
2.	Assignment – 2	One month approx.	20%	19/12/2009
3.	Compre. Exam (Closed book)	3 hrs	60%	19/12/2009 FN 9 AM to 12 Noon

Instructor In-charge

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COURSE HANDOUT (FIRST SEMESTER 2009 – 2010)

COURSE NO. : EDLT ZC222
COURSE TITLE : ENGINEERING MATHEMATICS – II

Course Description

1. Differential Equations: Laplace Transform, Series Solution, Fourier Series, Sturm – Liouville Problem, Partial differential equations, BVPs.
2. Numerical Methods: Gauss elimination, inverse of a matrix, power method, applications to ODEs, PDEs and BVPs.
3. Complex Variables: Functions of a complex variable, analyticity, integration in a complex plane, calculus of residues, evaluation of real integrals.

Scope and Objectives

The scope of this course is to make the students learn certain important methods used for solving differential (both ordinary and partial) equations exactly (wherever possible) and approximately (by numerical methods). These methods have applications in solving mathematical models of real life problems. One sometimes comes across an integral, while looking for the exact solution of an equation, which can be solved by complex variables method. So, such methods have also been included so that the students develop familiarity with these ideas.

Text Book

T1 Zill Dennis G. & Michael R. Cullen, Advanced Engineering Mathematics, Narosa Publishers, 3rd Ed., 2006

Reference Book

- R1. E. Kreyzig: Advanced Engineering Mathematics, John Wiley & Sons, 8th Edition, 2001
- R2. D. G. Duffy: Advanced Engineering Mathematics with MATLAB, 2nd Edition, Chapman & Hill / CRC, 2003

Plan of Contact Sessions

Contact Session	S No	Topics to be covered	Reference To Text Book
I	1.	Laplace Transform	T1 – Ch.4, 4.1 to 4.2
	2.	Properties & Applications of Laplace Transform	T1 – Ch.4, 4.3 to 4.6
	3.	Series Solution	T1 – Ch. 5, 5.1 to 5.3
	4.	Euler & Runge – Kutta Methods	T1 – Ch. 6, 6.1 to 6.2
	5.	Multi-step Methods, Higher order Equations & Systems of FODE	T1 – Ch. 6, 6.3 to 6.4
	6.	Fourier series	T1 – Ch.12, 12.1 to 12.5
II	7.	Partial Differential Equations	T1 – Ch. 13, 13.1 to 13.5
	8.	Complex numbers, polar form, roots, domains & regions	T1 – Ch.17, 17.1 to 17.4
	9.	Analyticity & analytic functions	T1 – Ch.17, 17.5 to 17.8
	10.	Residue theory	T1 – Ch. 19, 19.5
	11.	Evaluation of Real Integrals	T1 – Ch. 19, 19.6

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COURSE HANDOUT (FIRST SEMESTER 2009 – 2010)

COURSE NO : **EDLT ZC232**
COURSE TITLE : **ENGINEERING MATERIALS**

Course Description: Mechanical, electrical, electronic and chemical properties and applications of common engineering materials; ferrous and non-ferrous metals and alloys; thermosetting and thermoplastic plastics; natural and synthetic resins; rubber; glass; abrasives and ceramics; common building materials, namely, timber, stone, lime and cement; corrosion of metals and methods of preventing corrosion; protective and decorative coatings; insulating materials; testing of materials.

Scope and Objective: This course is an introductory course on Materials Science and engineering. It aims at providing a basic understanding of structure and properties of materials, which are important in various engineering applications. The mechanical, chemical, electrical and electronic properties of different class of materials such as metals, alloys, polymers, glasses, ceramics and composites will be discussed in detail from the viewpoint of their application in varied applications in industry and day to day life. Special emphasis will be given to Iron carbon alloys i.e., steels because of their importance to industry by considering their phase diagrams and methods to alter their microstructure so that a given set of properties may be attained for a particular application. The degradation of materials by phenomena known as corrosion and the ways to prevent it will be discussed at length.

Text Book

T1 William D Callister Jr,(Adapted by R.Balasubramaniam) Materials Science and Engineering, Revised Indian Edition, John Wiley and Sons, 2007.

Plan of Contact Sessions

Contact Session	S No.	Topics to be covered	Chapter
I	1.	Introduction to Engineering Materials, Bonding	1, 2.5 to 2.8
	2.	Fundamentals of Structure of Crystalline Solids	3 and 4
	3.	Imperfections in Solids	5
	4.	Diffusion	6
	5.	Phase Diagrams	7
	6.	Phase Transformations	8
	7.	Mechanical Properties of Metals	9
	8.	Dislocation and Strengthening Mechanisms in Metals	10
II	9.	Application and Properties of Ceramics	12
	10.	Structure of Polymers	13
	11.	Characteristics and Applications of Polymers	14
	12.	Composite Materials	15
	13.	Corrosion and Degradation	16

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COURSE HANDOUT (FIRST SEMESTER 2009 – 2010)

COURSE NO : **EDLT ZC242**
COURSE TITLE : **FLUID MECHANICS & MACHINES**

Course Description

Introduction and fundamental concepts, fluid statics, kinematics and dynamics of fluid flow, inviscid flows, pipe flow, open channel flow, incompressible viscous flow, laminar boundary layers, turbulent flows, essentials of compressible flow, dimensional analysis and similitude, flow measurements, hydraulic turbines, pumps and fluid couplings.

Scope and Objective

This course deals with some fundamental aspects of fluid motion, including important fluid properties, regimes of flow, and pressure variations in fluids at rest and in motion, fluid kinetics. Emphasis is placed on understanding how flow phenomena are described mathematically. The effects of fluid friction on pressure and velocity distributions are also considered in some detail. The dimensional analysis and flow measurement will be discussed along with working of hydraulic machines.

Text Book

T1 Dr. R.K. Bansal, “A Textbook of Fluid Mechanics and Fluid machines”, Laxmi Publications (P) Limited, Ninth Edition, Reprint 2008.

Plan of Contact Sessions

Contact Session	S No.	Topics to be covered	Chapter
I	1.	Properties of fluids	1
	2.	Pressure and its measurement	2
	3.	Hydrostatic forces on surfaces	3
	4.	Kinematics of flow and ideal flow	5
	5.	Dynamics of fluid flow	6
	6.	Orifices	7
	7.	Notches	8
	8.	Viscous flow	9
	9.	Turbulent flow	10
	10.	Flow through pipes	11
II	11.	Dimensional and model analysis	12
	12.	Flow in open channels	16
	13.	Hydraulic machines- Turbines	18
	14.	Centrifugal pumps	19
	15.	Reciprocating Pumps	20
	16.	Fluid System	21

Evaluation Scheme

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