

# SVKM's NMIMS University

## Mukesh Patel School of Technology Management & Engineering

B. Tech. ( All Branches )

TRIMESTER – II

Subject :- Applied Mathematics II

Lecture : 4 Hrs/week

Tutorial : 2 Hrs/week

### Objective :

To provide an understanding of the basic concept of Applied Mathematics at post secondary level.

Detailed Syllabus		
Unit	Topics	Duration (Hour)
1	<b>Hyperbolic functions :</b> Complex numbers and De Moivre's theorem, roots of unity, Log Z, Sinh Z, Cosh Z; graphs, identities, derivatives and integrals; catenary (hanging cable); inverse hyperbolic functions.	05
2.	<b>Double and Triple integrals:</b> Set up and change of order; centre of mass and moments of inertia; radius of gyration; polar coordinates using the Jacobian; triple integrals in rectangular and spherical coordinates; application of double and triple integral to area, mass, volume and centroid.	10
3.	<b>Beta and Gamma Functions :</b> Definitions; relation between beta and gamma functions; duplication formula; evaluation of integrals.	10
4.	<b>Differential Equations :</b> First order and first degree exact differential equation and those which can be reduced to exact by use of integrating factor (only four rules of IF and IF by inspection), Linear differential equation and equation reducible to linear equation, Linear differential equation of higher order with constant coefficients. Complementary functions. Particular integrals for the equation of the type $f(D)y = X$ where $X = e^{ax}$ , $x^m$ , $\sin(ax + b)$ , $\cos(ax + b)$ , $e^{ax}V$ , $x.V$ where V is a function of x (Derivations of PI are not expected), Cauchy's linear homogenous equation and Legendre differential equation. Variation of parameter methods and method of undetermined coefficients. LRC circuit equation and its solution.	10

5.	<b>Standard Curves :</b> Straight line, circle, parabola, ellipse, hyperbola, regular hyperbola.	05
	<b>Total</b>	<b>40</b>

**Reference Books :**

Advanced Engineering Mathematics: Vertikar & Vertikar, Erwin Kreyszig, Wiley  
 Eastern Schaum Outline Series: McGraw Hill Book Co.

**Internet Reference :** nil

**Term Work :**

Ten assignments

Minimum two class tests

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# SVKM's NMIMS University

## Mukesh Patel School of Technology Management & Engineering

B. Tech. ( All Branches )

TRIMESTER – II

Subject :- Engineering Mechanics

Lectures : 4 Hrs/week  
Hrs/week

Practicals : 2

**Objective :**

To provide an understanding of resultant effect of action of forces on bodies, both in a state of rest and in motion.

DETAILED SYLLABUS		
Unit	STATICS	Duration (Hours)
1.	<b>Coplanar Forces:</b> <ul style="list-style-type: none"><li>Force, Resolution, System of forces, Principle of transmissibility of force, Moment of force, Varignon's theorem, Couples, Resultant of<ul style="list-style-type: none"><li>i. Concurrent forces</li><li>ii. Parallel forces</li><li>iii. General force system.</li></ul></li><li>Equilibrium of coplanar forces, Conditions of equilibrium, Free body diagrams, Types of supports and their reactions, Determination of support reactions, Lami's theorem.</li></ul>	8
2.	<b>Truss:</b> <ul style="list-style-type: none"><li>Analysis of determinate plane trusses by Method of Joints and Method of Sections.</li></ul>	4
3.	<b>Friction:</b> <ul style="list-style-type: none"><li>Frictional force, Laws of friction, Angle of friction, Angle of repose.</li><li>Application to problems involving blocks on inclined plane and wedges.</li></ul>	4
4.	<b>Centroid and Moment of Inertia:</b> <ul style="list-style-type: none"><li>Centroid of composite plane areas, Centroid of bent up wires.</li><li>Moment of Inertia of composite plane areas, Parallel axis theorem, Perpendicular axis theorem, Radius of gyration.</li></ul>	4

<i>Unit</i>	<b>DYNAMICS</b>	<b>Duration (Hours)</b>
<b>5.</b>	<b>Kinematics of Particles:</b> <ul style="list-style-type: none"> <li>• Rectilinear motion, Uniform velocity, Uniform acceleration, Variable acceleration, Graphical analysis using motion curves.</li> <li>• Curvilinear motion, Rectangular system, Normal and Tangential components of acceleration, Projectile motion.</li> <li>• Relative motion.</li> </ul>	<b>8</b>
<b>6.</b>	<b>Kinetics of Particles:</b> <ul style="list-style-type: none"> <li>• Newton's Second Law of Motion applied to particles in Rectilinear and Curvilinear motion.</li> <li>• Work done by Force, Work Energy Principle, Principle of Conservation of Energy, Power and Efficiency.</li> <li>• Linear Momentum, Impulse, Application of Impulse Momentum Equation, Principle of Conservation of Momentum, Direct Central Impact, Oblique Central Impact.</li> </ul>	<b>8</b>
<b>7.</b>	<b>Kinematics of Rigid Bodies:</b> <ul style="list-style-type: none"> <li>• Types of rigid body motion, Rectilinear Translation motion, Rotation about fixed axis, General plane motion.</li> <li>• Instantaneous center method for bodies in General plane motion.</li> </ul>	<b>4</b>

**TERM WORK**

1.	<ul style="list-style-type: none"> <li>• Six experiments (3 each from statics and dynamics) based on syllabus.</li> <li>• Assignment consisting of numerical problems (minimum 20).</li> </ul>	
2.	<ul style="list-style-type: none"> <li>• Two written test during the term.</li> </ul>	

**RECOMMENDED BOOKS :**

1. Engineering Mechanics Statics and Dynamics – M.D.Dayal
2. Engineering Mechanics Statics and Dynamics - Ferdinand Beer and Russell Johnston
3. Engineering Mechanics Statics and Dynamics - J.L.Meriam and L.G.Kraige .

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SVKM's NMIMS (University)

Mukesh Patel School of Technology Management & Engineering

B.Tech(All Branches)		Trimester II	
<b>Sub: Work Shop Practice</b>		<b>Code:</b>	
<b>Periods per week</b>	Lecture	--	
	Practical	04 Hrs.	
	Tutorial	-	
		<b>Hours</b>	<b>Marks</b>
<b>Evaluation system</b>	Theory Examination	-	-
	Term work		100
<b>Objective:</b> To impart training to help the students develop skill sets for creating entities from primitive engineering materials. This exercise also aims at inculcating respect for physical work and hard labour in addition to some amount of value addition by getting exposed to inter disciplinary engineering domains.			
<b>Prerequisite</b>			
<b>Detailed syllabus</b>			
<b>Unit</b>	<b>Topics</b>	<b>Duration (Hr)</b>	
1	<b>Fitting:</b> Use and setting of fitting tools for chipping, Instructions for Safety in various Workshop trades, cutting, filing, Marking, centre punching, drilling, tapping.	8	
2	<b>Fabrication of Metals &amp; Plastics:</b> Edge preparation for welding jobs. Arc welding for different jobs like; lap welding of two plates, butt-welding of plates with cover plates, welding to join plate at right angles, etc. Spot welding, Brazing and Soldering. Joining and forming of Plastics. Use of hand tools for sheet metal fabrication. Sheet metal fabrication of jobs involving cutting, shearing, bending, edge folding, soldering, brazing etc.	12	
3	<b>PCB Laboratory Exercises:</b> Layout drawing, +ve and -ve film making, PCB etching and drilling, tinning and soldering techniques.	12	
4	<b>Wiring:</b> Study of Cables used in Electrical & Electronic Transmissions. Study of Electrical Fittings – Switches, Plugs, Holders, Connectors, Earthing. Electrical Wiring for lighting and appliances Series & Parallel connections.	08	
<b>Total</b>		<b>40</b>	

**Books:**

**Reference books:** As given by the Faculty

**Internet references:** As given by the Faculty

**Term work:**

Minimum one job on each of the following:

1. Fitting
2. Welding

3. Sheet Metal
4. Plastics
5. Wiring

**SVKM's NMIMS University**  
**Mukesh Patel School of Technology Management & Engineering**

**B. Tech. ( All Branches )**

**TRIMESTER – II**

**Subject :- Workshop Practice**

**Practicals : 4 Hrs/week**

**Objective :**

To impart training to help the students develop skill sets for creating entities from primitive engineering materials. This exercise also aims at inculcating respect for physical work and hard labour in addition to some amount of value addition by getting exposed to inter disciplinary engineering domains.

<b>Detailed Syllabus</b>		
<b>Unit</b>	<b>Topics</b>	<b>Duration (Hour)</b>
1	<b>Fitting :</b> Use and setting of fitting tools for chipping, Instructions for Safety in various Workshop trades, cutting, filling, marking, centre punching, drilling, tapping.	8
2.	<b>Fabrication of Metals &amp; Plastics :</b> Edge preparation for welding jobs. Arc welding for different jobs like; tap welding of two plates, butt welding of plates with cover plates, welding to join plates at right angles etc. Spot welding, Brazing and Soldering. Joining and forming of Plastics. Use of hand tools for sheet metal fabrication. Sheet metal fabrication of jobs involving cutting, shearing, bending, edge folding, soldering, brazing etc.	12
3.	<b>PCB Laboratory Exercises :</b> Layout drawing, +ve and –ve film making, PCB etching and drilling, tinning and soldering techniques.	12
4.	<b>Wiring :</b> Study of Cables used in Electrical & Electronic Transmissions. Study of Electrical Fittings – Switches, Plugs, Holders, Connectors, Earthing. Electrical Wiring for lighting and appliances Series & Parallel connections.	8
<b>Total</b>		<b>40</b>

**Reference Books :** As given by the Faculty.

**Internet Reference :** As given by the Faculty.

**Termwork :**

Minimum 8 Jobs / Exercises (two in each topic) to be carried out and submitted for evaluation.

One Practical Test.

# SVKM's NMIMS University

## Mukesh Patel School of Technology Management & Engineering

**B. Tech. ( All Branches )**

**TRIMESTER – II**

**Subject :- Electronics I**

**Lectures : 4 Hrs/week**

**Practicals : 2 Hrs/week**

### **Objective :**

To provide a strong fundamental base for discrete electronics devices with emphasis on study of active electronic devices.

<b>Detailed Syllabus</b>		
<b>Unit</b>	<b>Topics</b>	<b>Duration (Hr)</b>
1	<b>Semiconductor materials and Diodes:</b> Review of Semiconductor materials and properties The PN junction, Introduction to Semiconductor Diode Theory. Diode Circuits: DC Analysis and Models, AC Equivalent Circuits. Diode Types - Solar Cell, photodiode, Light-Emitting Diode, Schottky Barrier Diode, Zener Diode, Temperature Effects, Understanding Manufacturer's Specifications.	5
2	<b>Applications of Diodes:</b> Design of Rectifier Circuits, Half Wave Rectification, Full Wave Rectification. Filter, Ripple Voltage and Diode Current. Voltage Doubler Circuit, Zener Diode Circuits, Zener diode as voltage regulator. Clipper and Clamper Circuits, Multiple-Diode Circuits, Photodiode and LED Circuits.	12
3	<b>The Bipolar Junction Transistor:</b> Basic Bipolar Junction Transistor, Transistor Structures, NPN Transistor: Forward-active Mode Operation, PNP Transistor: Forward-active Mode Operation, Circuit Symbols and Conventions, Current-Voltage Characteristics, Non ideal Transistor Leakage Currents and Breakdown, DC Analysis of Transistor Circuits, Common-Emitter Circuits, Load Line and Modes Of Operation, Common Bipolar Circuits: DC Analysis. Basic Transistor Application, as a Switch, as an Amplifier. Bipolar Transistor Biasing - Single Base Resistor Biasing, Voltage Divider Biasing and Bias Stability. Understanding Manufacturer's specifications	13
4	<b>The Field Effect Transistor</b> Junction Field-Effect Transistor, MOS Field-Effect Transistor, symbols, Input/Output characteristics & study of different parameters. MOSFET DC Circuit Analysis, Basic MOSFET applications: Switch, Digital Logic Gate and Amplifier. Temperature effects in MOSFETs, Input Protection in MOSFET. The Power FET (VMOS),	8

5	<b>SCR:</b> Study of SCR characteristics and its application as controlled rectifier.	2
	<b>Total</b>	<b>40</b>

**Reference Books:**

- I. Donald A. Neamen, Electronic Circuit Analysis and Design, Second edition, McGraw Hill International edition 2001.
2. Martin Roden, Gordon Carpenter, William Wieserman, Electronic Design, Fourth edition, Shroff.Publishers, 2002.
3. Electrical Technology: B.L.Theraja

**Additional Reading:**

- I. Donald Schilling & Charles Belove, Electronic Circuits Discrete and Integrated, Third edition, McGraw Hill International edition, 1989.

**Test & Termwork:**

The term work shall comprise of at least six laboratory experiments and assignments based on the whole syllabus, duly recorded and graded. Minimum two class tests.

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# SVKM's NMIMS University

## Mukesh Patel School of Technology Management & Engineering

<b>B.Tech.(All Branches)</b>		<b>Trimester : II</b>	
<b>Sub: Computer Programming - II</b>		<b>Code: CP-II</b>	
<b>Periods per week</b>	Lecture	4	
	Practical	2 hrs	
	Tutorial	-	
		<b>Hours</b>	<b>Marks</b>
Evaluation system	Theory Examination	3	100 (scaled down to 50)
	Test	--	20
	Term work	--	30
<b>Detailed Syllabus</b>			
<b>Unit</b>	<b>Topics</b>		
1.	<b>Principles of Object Oriented Programming</b>		<b>--- [ 02 hrs]</b>
	1.1 Software Crisis 1.2 Software Evolution 1.3 Basic Concepts of OOP		
2.	<b>Beginning with C++</b>		<b>--- [ 04 hrs]</b>
	2.1 What is C++? 2.2 Applications of C++ 2.3 Structure of C++ Program 2.4 Creating, Compiling, Linking		
3.	<b>Tokens, Expressions and Control Structures</b>		<b>--- [ 04 hrs]</b>
	3.1 Basic Data Types 3.2 User Defined Data Types 3.3 Derived Data Types 3.4 Variables 3.5 Operators in C++ 3.6 Scope Resolution Operator 3.7 Manipulators 3.8 Control Structures		
4.	<b>Functions in C++</b>		<b>--- [ 06 hrs]</b>
	4.1 Function Prototyping 4.2 Call by Reference 4.3 Return by Reference 4.4 Inline Functions 4.5 Default Arguments 4.6 Function OverLoading 4.7 Friend and Virtual Functions		
5.	<b>Classes and Objects</b>		<b>--- [ 04 hrs]</b>
	5.1 Specifying a Class 5.2 Memory Allocation for Objects 5.3 Static Members 5.4 Arrays of Objects 5.5 Objects as Function Arguments 5.6 Returning Objects		

6.	<b>Constructors &amp; Destructors</b> 6.1 Constructors : Parameterized , Multiple 6.2 Constructors with Default Arguments 6.3 Dynamic Initialization of Objects 6.4 Copy Constructor 6.5 Dynamic Constructors 6.6 Destructors	--- [ 04 hrs]
7.	<b>Operator OverLoading &amp; Type Conversions</b> 7.1 Overloading Unary Operators 7.2 Overloading Binary Operators 7.3 OverLoading Binary Operators Using Friends 7.4 Rules for OverLoading Operators 7.5 Type Conversion	--- [ 04 hrs]
8.	<b>Inheritance</b> 8.1 Defining Derived Classes 8.2 Single Inheritance 8.3 Making Private member Inheritable 8.4 Multilevel, Multiple, Hierarchical, Hybrid Inheritance 8.5 Virtual Base Classes 8.6 Abstract Classes 8.7 constructors in Derived Classes	--- [ 04 hrs]
9.	<b>Virtual Functions and Polymorphism</b> 9.1 Need for Virtual Functions 9.2 Pointer to Derived Class Object 9.3 Pure Virtual Functions 9.4 Dynamic or Late Binding	--- [ 03 hrs]
10	<b>File Handling</b> 10.1 Files and Streams 10.2 Opening and Closing a File 10.3 Sequential I/O Operations	--- [ 03 hrs]
11.	<b>Templates</b> 11.1 Function Templates 11.2 Class Templates	--- [ 02 hrs]

### Books Recommended for Reading and Reference

#### Main Reading

1. *E. Balaguruswamy*, "Programming in C++", Tata McGraw Hill
2. *Herbert Schildt*, "C++ Complete Reference", Tata McGraw Hill

#### Supplementary Reading

1. *Y. Kanetkar*, "Let us C++", BPB

#### Internet references: as given by the faculty

#### Term work & Test:

1. **Minimum 10 practical experiments covering all the topics.**
2. **Minimum two assignments.**
3. **Two tests.**

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