# ANNA UNIVERSITY OF TECHNOLOGY COIMBATORE

## DIRECTORATE OF ONLINE AND DISTANCE EDUCATION

**ADVANCED DIPLOMA**
**(Calendar Year: 2008)**

# SYLLABUS

**WITH CURRICULAM & REGULATIONS**

# ANNA UNIVERSITY OF TECHNOLOGY COIMBATORE

## DIRECTORATE OF ONLINE AND DISTANCE EDUCATION

**REGULATIONS: 2008**

This regulation is applicable to all candidates admitted into Advanced Diploma Programmes from the calendar year 2008 onwards.

### 1. PRELIMINARY DEFINITIONS AND NOMENCLATURE

In this Regulation, unless the context otherwise requires:

i) **"Programme"** means Advanced Diploma programme.

ii) **"Branch"** means specialization or discipline of Advanced Diploma programme.

iii) **"Course"** means a theory or practical subject that is normally studied.

iv) **"University"** means ANNA UNIVERSITY OF TECHNOLOGY COIMBATORE.

### 2. PROGRAMMES OFFERED

1. Animation, Graphics and Multimedia
2. Architectural Computer Aided Design
3. Automobile Maintenance
4. Computer Aided Design
5. Computer Aided Manufacturing
6. Garment Manufacturing Technology
7. Interior Design
8. Knitwear Technology
9. Network Administration
10. Software Testing
11. Spinning Supervisorship
12. Tool and Die Making

### 3. ADMISSION

1. Candidates seeking admission to the Advanced Diploma Programme should possess any three year diploma in polytechnic college or equivalent.
2. The eligibility criteria shall be prescribed by the Syndicate of the University from time to time.

## 4. STRUCTURE OF PROGRAMME

1. Every Programme shall have a curriculum comprising of theory and practical courses, and a project work with well defined syllabi.
2. The medium of instruction, examinations and project report shall be in English.

## 5. DURATION AND PATTERN

A student is normally expected to complete the Advanced Diploma Programme in one year but in any case not more than 3 years from the admission.

## 6. INTERACTIVE LEARNING PROGRAMME

1. Interactive Learning Programmes are arranged on Saturdays and Sundays or on Public Holidays. University will arrange Tele Conference / Case Studies in different centres after due notification.
2. Students need to effectively use the ILPs where they can interact with the faculty. The schedule of ILP will be notified in the website. However attending the ILP classes are not mandatory for Advanced Diploma programmes.

## 7. SYSTEM OF EXAMINATION

1. Each course (theory and practical) and project work shall be evaluated for a maximum of 100 marks.
2. The University examinations of 3 hours duration shall ordinarily be conducted between December & January and between May & June.

## 8. REQUIREMENTS FOR APPEARING FOR UNIVERSITY EXAMINATION

A candidate shall normally be permitted to appear for the University examination of the current year if he/she satisfied the following condition requirement:

- Student is expected to attend all ILP classes and secure 100% attendance. However, in order to allow for certain unavoidable reasons, the student is expected to attend at least 50% of the ILP classes (Three pair of Saturday and Sunday). For Advanced Diploma programmes the attendance in ILP classes is not mandatory.
- Registration is mandatory for current semester / year examinations as well as arrears examinations. Student is expected to register for examination for all courses of that semester / year.

## 9. PASSING REQUIREMENTS

1. A candidate, who secures not less than 40% of total marks prescribed for all the courses, shall be declared to have passed the Examination. If a candidate fails to secure a pass / absent in a particular course, it is mandatory that he/she register and reappear for the examination in that course during the next examination is conducted in that course; he/she should continue the same till he/she secures a pass.
2. A candidate who opts for project work shall be declared to have passed in the Project work and Viva–voce examination, if he/she secures an overall minimum of 40% marks. If a candidate fails to secure a pass / absent in the Project work and Viva-voce examination may be permitted to resubmit a project and appear for the viva – voce for the second time if so recommended by the examiners. No candidate shall be permitted to submit the project work and appear for the Viva – Voce on more than two occasions.

   *Note: - If a student indulges in malpractice in any of the University examinations, he/she shall be liable for punitive action as prescribed by the University from time to time.*

## 10. ELIGIBILITY FOR THE AWARD OF DEGREE

A student shall be declared to the eligible for the award of the Advanced Diploma Degree provided the student has

- Successfully completed the course requirements and passed all the prescribed examinations within a maximum period 3 years reckoned from the commencement of the course to which the candidates was admitted.
- The award of Degree must have been approved by the Syndicate of the University.

## 11. CLASSIFICATION OF THE DEGREE AWARDED

1. A candidate who qualifies for the award of the Degree having passed the examination in all the courses in his/her first appearance within a maximum period of 1 year (1 year from the admission) and securing an aggregate of not less than 75% of total marks shall be declared to have passed the examination in Distinction.
2. A candidate who qualifies for the award of the Degree having passed the examination in all the courses within a maximum period of 1 year reckoned from the commencement of study and securing an aggregate of not less than 60% of total marks shall be declared to have passed the examination in First Class.

3. A candidate who qualifies for the award of the Degree having passed the examination in all the courses not within a maximum period of 1 year reckoned from the commencement of study and / or securing an aggregate of less than 60% of total marks shall be declared to have passed the examination in Second Class.
4. All other candidates shall be declared as failed candidates.

## 12. GRADING SYSTEM

| Marks | Grade | Grade Legend | Grade Points |
|---|---|---|---|
| 95% - 100% | O | Outstanding | 10.0 |
| 90% - 94% | E | Excellent | 9.5 |
| 86% - 89% | A | Very Good | 9.0 |
| 76% - 85% | B | Good | 8.0 |
| 66% - 75% | C | Above Average | 7.0 |
| 56% - 65% | D | Average | 6.0 |
| 40% - 55% | S | Satisfactory | 5.0 |
| Below 40% | RA | Reappearance | - |
| - | W | Withheld | - |
| - | AB | Absent | - |

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# ANNA UNIVERSITY OF TECHNOLOGY COIMBATORE

## DIRECTORATE OF ONLINE AND DISTANCE EDUCATION

## ADVANCED DIPLOMA CURRICULUM

| ADVANCED DIPLOMA IN ARCHITECTURAL COMPUTER AIDED DESIGN<br>Branch Code - 401 | | | |
|---|---|---|---|
| **Course Code** | **Course** | **Marks** | **Credits** |
| 140101 | CIVIL AUTOCAD | 100 | 3 |
| 140102 | ARCHITECTURAL DESIGN | 100 | 3 |
| 140103 | CONSTRUCTION ENGINEERING MATERIALS | 100 | 3 |
| 140104 | SOLID MODELING | 100 | 3 |
| 140105 | ECOLOGY AND ENVIRONMENT | 100 | 3 |
| 140106 | PROJECT WORK | 100 | 3 |
| | **Total Credits** | | **18** |

| ADVANCED DIPLOMA IN COMPUTER AIDED DESIGN<br>Branch Code - 402 | | | |
|---|---|---|---|
| **Course Code** | **Course** | **Marks** | **Credits** |
| 140201 | AUTO CAD | 100 | 3 |
| 140202 | ENGINEERING DESIGN | 100 | 3 |
| 140203 | INDUSTRIAL ROBOTICS AND AUTOMATION | 100 | 3 |
| 140204 | PRO ENGINEER | 100 | 3 |
| 140205 | COMPUTER AIDED DESIGN AND MANUFACTURING | 100 | 3 |
| 140206 | PROJECT WORK | 100 | 3 |
| | **Total Credits** | | **18** |

| ADVANCED DIPLOMA IN COMPUTER AIDED MANUFACTURING<br>Branch Code - 403 | | | |
|---|---|---|---|
| **Course Code** | **Course** | **Marks** | **Credits** |
| 140201 | AUTO CAD | 100 | 3 |
| 140202 | ENGINEERING DESIGN | 100 | 3 |
| 140203 | INDUSTRIAL ROBOTICS AND AUTOMATION | 100 | 3 |
| 140301 | CNC PROGRAMMING | 100 | 3 |
| 140302 | COMPUTER INTEGRATED MANUFACTURING | 100 | 3 |
| 140303 | PROJECT WORK | 100 | 3 |
| | **Total Credits** | | **18** |

| ADVANCED DIPLOMA INTERIOR DESIGN<br>Branch Code - 404 | | | |
|---|---|---|---|
| **Course Code** | **Course** | **Marks** | **Credits** |
| 140401 | ART AND ARCHITECTURE | 100 | 3 |
| 140402 | INTERIOR DESIGN CONCEPTS AND APPLICATIONS | 100 | 3 |
| 140403 | SPACE DESIGNING | 100 | 3 |
| 140404 | FURNITURE AND FURNISHINGS | 100 | 3 |
| 140405 | BUILDING SERVICES | 100 | 3 |
| 140406 | PROJECT WORK | 100 | 3 |
| | **Total Credits** | | **18** |

| ADVANCED DIPLOMA IN SOFTWARE TESTING<br>Branch Code - 405 | | | |
|---|---|---|---|
| **Course Code** | **Course** | **Marks** | **Credits** |
| 140501 | SOFTWARE QUALITY ASSURANCE | 100 | 3 |
| 140502 | FUNDAMENTALS OF SOFTWARE TESTING | 100 | 3 |
| 140503 | SOFTWARE TESTING TOOLS | 100 | 3 |
| 140504 | SOFTWARE PROJECT MANAGEMENT | 100 | 3 |
| 140505 | MANAGING THE TESTING PROCESS | 100 | 3 |
| 140506 | SOFTWARE TESTING LAB | 100 | 3 |
| | **Total Credits** | | **18** |

| ADVANCED DIPLOMA NETWORK ADMINISTRATION<br>Branch Code - 406 | | | |
|---|---|---|---|
| **Course Code** | **Course** | **Marks** | **Credits** |
| 140601 | DATA COMMUNICATION AND COMPUTER NETWORKS | 100 | 3 |
| 140602 | NETWORK OPERATING SYSTEMS | 100 | 3 |
| 140603 | TCP AND IP | 100 | 3 |
| 140604 | ESSENTIALS OF NETWORK PROGRAMMING | 100 | 3 |
| 140605 | ADVANCED SOCKET PROGRAMMING | 100 | 3 |
| 140606 | PROJECT WORK | 100 | 3 |
| | **Total Credits** | | **18** |

| ADVANCED DIPLOMA TOOL AND DIE MAKING<br>Branch Code - 407 | | | |
|---|---|---|---|
| **Course Code** | **Course** | **Marks** | **Credits** |
| 140201 | AUTO CAD | 100 | 3 |
| 140301 | CNC PROGRAMMING | 100 | 3 |
| 140701 | ENGINEERING MATERIALS | 100 | 3 |
| 140702 | TOOL AND DIE TECHNIQUES | 100 | 3 |
| 140703 | MANUFACTURING TECHNOLOGY | 100 | 3 |
| 140704 | PROJECT WORK | 100 | 3 |
| | **Total Credits** | | **18** |

| ADVANCED DIPLOMA AUTOMOBILE MAINTENANCE<br>Branch Code - 408 | | | |
|---|---|---|---|
| **Course Code** | **Course** | **Marks** | **Credits** |
| 140801 | AUTOMOBILE ENGINES | 100 | 3 |
| 140802 | AUTOMOTIVE FUELS AND COMBUSTION | 100 | 3 |
| 140803 | CHASSIS, SUSPENSION AND TRANSMISSION | 100 | 3 |
| 140804 | AUTOMOBILE BRAKING AND ELECTRICAL SYSTEM | 100 | 3 |
| 140805 | MAINTENANCE MANAGEMENT | 100 | 3 |
| | **Total Credits** | | **15** |

| ADVANCED DIPLOMA IN KNITWEAR TECHNOLOGY<br>Branch Code - 409 | | | |
|---|---|---|---|
| **Course Code** | **Course** | **Marks** | **Credits** |
| 140901 | FUNDAMENTALS OF TEXTILE MATERIALS | 100 | 3 |
| 140902 | PROCESSING OF KNIT FABRIC | 100 | 3 |
| 140903 | KNITTING TECHNOLOGY | 100 | 3 |
| 140904 | TEXTILE TESTING | 100 | 3 |
| 140905 | APPAREL MARKETING AND MERCHANDISING | 100 | 3 |
| | **Total Credits** | | **15** |

| ADVANCED DIPLOMA IN GARMENT MANUFACTURING TECHNOLOGY<br>Branch Code - 410 | | | |
|---|---|---|---|
| **Course Code** | **Course** | **Marks** | **Credits** |
| 140901 | FUNDAMENTALS OF TEXTILE MATERIALS | 100 | 3 |
| 140902 | PROCESSING OF KNIT FABRIC | 100 | 3 |
| 140904 | TEXTILE TESTING | 100 | 3 |
| 140905 | APPAREL MARKETING AND MERCHANDISING | 100 | 3 |
| 141001 | FASHION AND APPAREL DESIGN | 100 | 3 |
| | **Total Credits** | | **15** |

| ADVANCED DIPLOMA IN SPINNING SUPERVISORSHIP<br>Branch Code - 411 | | | |
|---|---|---|---|
| **Course Code** | **Course** | **Marks** | **Credits** |
| 140901 | FUNDAMENTALS OF TEXTILE MATERIALS | 100 | 3 |
| 141101 | FIBRE PREPARATION | 100 | 3 |
| 141102 | YARN MANUFACTURING AND QUALITY CONTROL | 100 | 3 |
| 141103 | SPINNING MAINTENANCE | 100 | 3 |
| 141104 | INDUSTRIAL MANAGEMENT | 100 | 3 |
| | **Total Credits** | | **15** |

| ADVANCED DIPLOMA IN ANIMATION, GRAPHICS AND MULTIMEDIA<br>Branch Code - 412 | | | |
|---|---|---|---|
| **Course Code** | **Course** | **Marks** | **Credits** |
| 141201 | INTRODUCTION TO GRAPHICS AND MULTIMEDIA | 100 | 3 |
| 141202 | MULTIMEDIA AND WEB DESIGNING TOOLS | 100 | 3 |
| 141203 | FLASH AND 3DS MAX | 100 | 3 |
| 141204 | ANIMATION USING MAYA | 100 | 3 |
| 141205 | PRINCIPLES OF VIRTUAL REALITY | 100 | 3 |
| | **Total Credits** | | **15** |

# ADVANCED DIPLOMA SYLLABUS

## 140101 - CIVIL AUTOCAD

**OBJECTIVE:** To provide comprehensive guide to understand concepts, create perfect designs and manage every stage of the project through AutoCAD Civil 3D 2008.

**MODULE 1:**

The Basics of Civil 3D – Toolspace – Panorama – Civil 3D Styles – Label Styles – Object Styles – Lines and Curves - Label Lines and Curves – Curves – Transparent Commands – Inquiry Commands – Drawing Settings – The Basic Concepts of Survey – Survey Databases - Anatomy of a Point – Creating and Editing Basic Points – Changing Point Elevations – Point Styles – Point Label Styles – Point Tables – User-Defined Properties

**MODULE 2:**

Surfaces in Civil 3D – Major Limitations – Creating, Refining and Editing Surfaces – Surface Styling and Analysis – Comparing Surfaces – Labeling the Surface – Parcels in Civil 3D - Creating and Managing Sites – Creating a Boundary Parcel – Creating a Wetlands Parcel – Editing Parcels by Deleting Parcel Segments – Best Practices for Parcel Creation Labeling Parcel Areas – Labeling Parcel Segments – Alignments in Civil 3D - Alignments, Pickles, and Freedom – Creating an Alignment – Editing Alignment Geometry – Styling Alignments.

**MODULE 3:**

Profiles in Civil 3D – Ways of Profile Generation – Surface Sampling – Layout Profiles – Editing Profiles – Profile Styles – Slice and Dice – Creating Profile View – Splitting Views – Profile Utilities - Editing Profile Views - Subassemblies – Building Assemblies – Working with Generic and Daylight Subassemblies –Basic Corridors – Creating a Simple Road Corridor – Corridor Anatomy – Applying a Hatch Pattern to Corridor – Creating a Corridor Surface – Creating a Corridor With a Lane Widening – Advanced Corridors – Modeling a Peer-Road Intersection – Modeling a Cul-de-sac – Modeling a Widening with an Assembly Offset.

**MODULE 4:**

The Corridor – Creating the Views – Creating a Materials List – Generating a Volume Report - Annotating the Sections – Parts Lists and Part Builder - The Part Catalog – Part Builder – Part Styles – Part Rules – Parts List – Pipe Networks - Exploring Pipe Networks – Creating and Editing a Sanitary Sewer Network – Changing Flow Direction – Creating an Alignment from Network Parts – Adding Pipe Network Labels.

**MODULE 5:**

Grading - Working With Features Lines – Grading Objects – Sharing the Model: Data Shortcuts – Definition of Data Shortcuts – Creating Data Shortcut Files – Uses of Data Shortcuts to Create, Update and Managing References – Autodesk Data Management Server (ADMS) – Definition of Vault – Installing ADMS – Managing ADMS – Vault Management via Vault Explorer - Vault Client and Civil 3D - Vault and Project Theory – Working in Vault – Team Management in Vault.

**MODULE 6:**

Plan Production – Preparation of Plan Sets – Uses of Views Frames and Match Lines – Uses of Sheets – Supporting Components – LDT and LandXML – Definition of LandXML – Handling Inbound Data – Sharing the Model – Visualization - AutoCAD 3D Modeling Workspace – Visualizing Civil 3D Objects.

**Text Books:** Dana Probert, James Wedding, “Mastering AutoCAD Civil 3D 2008”, Wiley India, 2007

## 140103 - CONSTRUCTION ENGINEERING MATERIALS

**OBJECTIVE:** To provide a thorough understanding of the properties of various types of engineering materials commonly used in civil industry

**MODULE 1:**

Engineering Materials – Definition - Classification – Properties of Materials – Chemical Properties – Building Stones - Classification of Rocks – Common Rock Forming Minerals – Characteristics of Good Building Stones – Uses of Stones and their Selection – Deterioration, Preservation, Testing of Stones – Common Building Stones – Quarrying of Building Stones – Artificial Stones – Dressing of Stones – Bricks and Other Clay Products - Comparison of Stone and Brick – Constituents of Brick Earth – Requirements of a Good Brick Earth – Field Testing of Brick Earth – Manufacture of Bricks – Qualities of Good Bricks – Classification of Bricks – Tests for Bricks – Special Bricks – Building Tiles

**MODULE 2:**

Lime – Sources – Properties – Uses – Important Technical Terms – Constituents of Lime stones – Classification – Manufacture – Storage - Determining the Slaking Nature of Lime – Precautions in Handling of Lime – Testing of Lime stones – Cement – Classification – Properties – Uses – Comparison between Cement and Lime – Chemical Constituents of Cement – Functions of Ingredients of Cement – Site for Cement Factory – Manufacture and Testing of Portland Cement – Setting and Hardening of Cement – Types and Storage of Cement – Cement Water Proofers - Admixtures – Various Cement Products – Mortar – Functions, Uses, Ingredients, Types of Mortar – Properties of a Good Building Mortar –Precautions in the Use of Mortars – Tests for Mortars – Selection of Mortars for Different Engineering Works – Plastering – Pointing.

**MODULE 3:**

Concrete - Characteristics of Good Concrete – Advantages and disadvantages of Concrete - Uses of Concrete – Classification of Concretes – Plain Cement Concrete – Properties of Cement Concrete – Water-proof Concrete – Precast Concrete – Reinforced Cement Concrete – Prestressed Concrete – Special Concretes – Concreting Under Water – Placing Concrete in Cold water – Placing Concrete in Hot-weather – Deterioration of Concrete and its Prevention – Admixtures – Joints in Concrete – Formwork – General Precautions in Cement Concrete Construction – Hollow Block Partitions of Concrete – Strengths of Concrete – Quality Control of Concrete.

**MODULE 4:**

Timber and Wood-based Products - Characteristics of Good Timber – Advantages and Disadvantages of Timber – Uses of Timber – Classification of Trees – Structure and Growth of Tree – Felling of Tress – Defects in Timber – Seasoning of Timber – Decay of Timber – Preservation of Timber – Conversion of Timber – Testing of Timber – Timber Suitable for Various Uses – Timber Trees of India – Wood-based Products – Paints – Varnishes – Distempers – Wall paper, Whitewashing and Colourwashing – Anti-termite Treatment

**MODULE 5:**

Asphalt – Bitumen – Tar – Comparison between Asphalt, Bitumen and Tar - Asbestos – Adhesives – Abrasives – Plastics – Definition – Constituents – Classification – Properties – Uses – Trade names and Typical Applications – Commercial Forms – Glass – Definition – Constituents – Classification – Uses – Insulating Materials – Definition - Classification – Heat Insulating Materials – Sound Insulating Materials – Fly Ash, Gypsum and Gypsum Plaster

**MODULE 6:**

Material Science of Metals - Meaning of Material Science – Structure of Atoms and Molecules – Crystal structure for metallic elements – Bonds in solids – Deformation of Metals – Heat Treatment – Testing of Materials – Corrosion – Manufacturing Process.

**Text Books:** R. K. Rajput, “Engineering Materials”, S. Chand Publication, 2008

## 140104 - SOLID MODELING

**OBJECTIVE:** To impart the fundamental aspects of solid modeling techniques that improves the quality of real time models in the mechanical engineering industry.

**MODULE 1:**

Introduction to SolidWorks 2007 – System Requirements – Command Manager – Dimensioning Standard and Units – Important Terms and Their Definitions –Color Scheme - Starting a New Session and New Document in SolidWorks 2007 – Understanding the Sketching Environment – Document Options – Sketcher Terms – Drawing: Lines, Circles, Arcs, Rectangles, Parallelograms, Polygons, Splines, Ellipses, Elliptical Arcs, Parabolic Curves, Display Tools – Zoom In/Out - Editing Sketched Entities – Creating and Editing Patterns – Writing Text in the Sketching Environment – Modifying Sketched Entities.

**MODULE 2:**

Adding Geometric Relations to Sketches – Dimensioning the Sketch – Concept of a Fully Defined Sketch – Deleting Over Defining Dimensions – Advanced Dimensioning Techniques – Measuring Distances and Viewing Section Properties – Creating Base Features by Extruded and Revolving Features – Modifying the View Orientation – Restoring Previous View – Display Modes of the Model – Assigning Materials and Textures to the Models - Importance of Sketching Planes – Reference Geometry – Other Boss/Base Options – Modeling Using the Contour Selection Method – Creating Cut Features – Concept of the Feature Scope.

**MODULE 3:**

Advanced Modeling Tools I – Creation of Simple Holes, Standard Holes, Filets, Chamfers, Shell Features and Wrap Features – Selection Methods – Advanced Modeling Tools II – Creation of Mirror Features, Linear Pattern Features, Circular Pattern Features, Sketch Driven Pattern and Curve Driven Pattern.

**MODULE 4:**

Editing Features - Editing Features of the Model – Cutting, Copying, and Pasting Features and Sketches from One – Copying Features Using Drag and Drop – Deleting Features - Advanced Modeling Tools III – Creation of Sweep Features, Cut Sweep Features, Loft Features, Lofted Cuts, 3D Sketches, Curves and Draft Features – Editing 3D Sketches – Extruding a 3D Sketch - Advanced Modeling Tools IV – Creation of Dome Features, Shape Features, Indents, Deform Features and Flex Features – Creation of Fastening Features and Freeform Features.

**MODULE 5:**

Assembly Modeling I - Assembly Modeling – Creating of Bottom-up and Top-Down Assemblies – Creation of Components in the Top-down Assembly – Moving and Rotating Individual Components – Moving and Rotating Individual Components Using the Triad – Assembly Modeling II - Advanced Assembly Mates – Creating Subassemblies – Deleting Components and Subassemblies – Editing Assembly Mates – Editing Components – Editing Subassemblies – Dissolving Subassemblies – Replacing Components – Mirroring Components – Checking Interferences in an Assembly – Creating Assemblies for Mechanism

**MODULE 6:**

Drawing Views I - The Drawing Mode – Starting a Drawing Document – Types of Views – Generating Standard Drawing Views – Generating Derived Views – Editing and Modifying Drawing Views – Modifying the Hatch Pattern in Section Views - Drawing Views II - Adding Annotations to Drawing Views – Editing Annotations – Adding the Bill of Material (BOM) to a Drawing – Adding Balloons to Drawing Views – Adding New Sheets to Drawing Views – Editing the Sheet Format – Creating User-Defined Sheet Formats.

**Text Books:**

Sham Tickoo, Deepak Maini, “SolidWorks 2007”, DreamTech Press, 2007

## 140102 – ARCHITECTURAL DESIGN

**MODULE 1:**

Art-History Of art, Types of Arts- Sculpture, Engraving, Paintings and Drawings- Types, Techniques and tools in drawing and paintings. Traditional Indian Arts, Review of Western Arts and its relevance in modern interior designing

**MODULE 2:**

Architecture- Defenition and meaning, Bases for Development, Principles and elements, qualities, and Goals of Architecture

**MODULE 3:**

Aesthetic components of design and aesthetic qualities, Factors influencing architectural design-Environmental factors, Litigation factors

**MODULE 4:**

World Architecture- Egyptian, Greek, Roman, Gothic- Characteristic features Indian Architecture-Hindu-North and South Characteristic features, Christian And Muslim-Characteristic features

**MODULE 5:**

Contemporary Architecture-Theme, philosophy and works of famous architects- Frank Lloyd
Wright, Le Corbusier, Louis Isadore Kahn (Germany), Charles Correa and B.V. Doshi (India)

**MODULE 6:**

Landscape Architecture-Meaning and definition, Principles of landscape design, Elements, Parking lot design Styles of garden, planting-Trees, shrubs, Ground cover flowerbeds etc. Design of parks –Analysis, zoning Climate- Temperature, Solar radiation, wind, humidity and precipitation climate control techniques- effect of vegetation, wind flow, water ponds wall openings

**Text Books:**

Muthu Shoba Mohan G, “Principles of Architecture”, Oxford University Press, New Delhi

## 140105 - ECOLOGY AND ENVIRONMENT

**OBJECTIVE:** To understand the environmental problems and to protect the environment from the natural disasters.

**MODULE 1:**

Ecology – Meaning - Environmental Science – History of Ecology – Ecology Today – Scope of Ecology – The Subdivisions of Ecology – Models in Ecology – Fundamental Concepts – Environmentalism – Conservation Ethics – Air pollution- Water pollution -Noise pollution - Radioactive pollution - Solid waste pollution - Land pollution

**MODULE 2:**

Origin of Atmosphere – Vertical Structure of the Atmosphere – Ecological Significance of Air – Horizontal Motion of Atmosphere – vertical Movements – Upper Air Circulation (Jet Streams) – Air Masses – Important Properties of the Atmosphere – Acid Rain

**MODULE 3:**

Zonal Structure of the Earth – The Geologic Cycle – Minerals and Rocks – Soil – Pedogenesis – Soil Types – Soil Classification – Types of Rocks and Minerals – Soil profile – Soil Erosion in India – Soil Conservation – Biota of the Soil – Soil Adaptations in Animals

**MODULE 4:**

Hydrologic – Water Budget – Fresh Water Environment – Lakes – Eutrophication of Lakes – Reservoirs – Running Water – The Open Ocean – Physico-chemical Aspects of Marine Environment – Wetlands and Coastal Environment – Antarctic Research Programme – Coral Reef – Exclusive Economic Zone (EEZ) – Estuaries – Biosphere -Introduction – concept of Biome – Evolution and Diversity in Biomes – Major Biomes of Earth – Landforms

**MODULE 5:**

Ecosystem Biodiversity – Species Diversity – Genetic Diversity – Global Diversity – The Value of Biodiversity – Biodiversity and Ecosystem function – Biodiversity – Hot Spots – Bio-wealth – Biotic Impoverishment – Biodiversity conservation – Biotechnology and Biodiversity – Milestones of Convention of Biodiversity (CBD) – Main Players in CBD.

**MODULE 6:**

Resource Cycle – Mineral Resources – Marine Resources – Mineral Resources of Antarctica – Energy Resources – Renewable Sources of Energy – Energy from Biomass – Non-renewable Sources of Energy – Nuclear Energy – Geothermal Energy – Ocean Thermal Energy – Energy for the Future – Forest Resources – Deforestation – Water A Vital Resources – India's Water Budget

**Text Books:**

S.V.S.Rana, "Essentials of Ecology and Environmental Science", Prentice-Hall India, 3rd Edition, 2007

## 140201 - AUTOCAD

**OBJECTIVE:** To provide comprehensive guide to learn the basic of AutoCAD 2008 for building quality 2D drawings and 3D models.

**MODULE 1:**

Introduction to AutoCAD – The AutoCAD Window – Procedure for Drawing - Panning and Zooming – Understanding the Layout View – Working of Command Options – The Drawing Tools – AutoCAD Coordinate System – Setting Up a Drawing – Visual Reference with Grid Mode – Snapping to the Grid – Changing the Grid – Selecting Exact Locations – Aligning Objects – Temporary Tracking Point Feature

**MODULE 2:**

2D Objects – The 2D Control Panel – Straight Lines – Circles and Arcs – Curves – Parallel Lines – Revision Clouds – Hatch Patterns and Solid Fills – Regular Polygons – Drawing Layout – Selecting Objects – Editing the Windows – Changing Objects with Grips and Dynamic Input – Controlling Objects using Properties Palette – 2D Draw Control Panel Tools – Selecting Objects – Erasing Objects – Joining Objects – Moving and Copying – Scaling, Stretching and Rotating – Breaking an Object – Editing Xrefs and Blocks – Editing Polylines

**MODULE 3:**

3D Drawings – About 3D Modeling Workspace – 3D Using Solids and Surfaces – Changing Point of View – Creation of 3D Forms from 2D Shapes – Specification of Distances in 3D Space – Controlling the Appearance of Model

**MODULE 4:**

Introduction to Layers – Creating and Assigning Layers – Setting the Layer – Controlling the Layer – Locking Layers – Finding the Layer – Taming of Layer – Layers II Toolbar – Uses of Blocks – Organizing Objects using Groups – External References – Use of DesignCenter – Palettes Window

**MODULE 5:**

Text – Adding and Formatting Text – Text and Scale – Styles and Fonts – Adding Tables – Parts of AutoCAD Dimension – Model Tab – Linear Dimensions – Nonorthogonal Objects – Leader Tool – Ordinate Dimensions – Tolerance Notation – Editing Dimensions – Dimension's Appearance

**MODULE 6:**

Measuring Areas – Finding the Coordinate of a Pont – Measuring Distances – Measuring Angles – Getting the General Status of the Drawing – Finding Text in Drawing – Locating and Selecting Components – Printing – Storing the Printer Settings – Plot Styles – Named Plot Styles - Conversion from Color Plot Styles to Named Plot Styles

**Text Books:**

George Omura, "Introducing AUTOCAD 2008", Wiley India, 2007

## 140202 - ENGINEERING DESIGN

**OBJECTIVE:** To impart the basic knowledge of traditional engineering graphical communication and design modeling using Unigraphics NX.

**MODULE 1:**

Introduction to Engineering Design Communication and Modeling – Relationship between Engineering Design Communication and Modeling – Feature Based Parametric Design Modeling – Computer Integrated Problem Solving – Good Engineering Practice – Major Tools – Introduction to Engineering Graphics – Multiview Projection – Auxiliary Views – Section Views – Descriptive Geometry.

**MODULE 2:**

Introduction to Dimensioning and Tolerancing – Engineering Dimensioning Systems – Preferred Engineering Practice – Tolerancing – Geometric Dimensioning and Tolerancing – Problem Solving in Engineering Design – Combination Curling and Flat Iron – Design Modeling of a De-Rotator.

**MODULE 3:**

Base Design Features – Stock Types of Base Features – Modifying Models – Modeling by Combining Standard Base Features – Basic Functional Element Features and their Usage – Basic Functional Feature Modeling – Feature Modification – Feature Datum References – Advanced Placement of Datum References.

**MODULE 4:**

Design Modeling – Application of Sketching – Basic Sketching – Sketching to Facilitate Modeling – Sketch Animation – Additional Modeling Features – Edge and Face Features – Models with Patterned Features – Models with Hollow Features – Advanced Design Modeling – Surface Profiles – Surface Models – Solid Models – Mechanical Component Designs.

**MODULE 5:**

Acquiring Model Information – Assignment of Material Properties – Model Geometric Properties – Model Mechanical Properties – Machine Assembly Design Modeling – Concepts of Engineering Design – Types of Installation Relationships between Machine Components – Combined Placement Relationships Design Assembly Models with Patterned Components.

**MODULE 6:**

Engineering Working Drawings – Engineering Working Drawing Basics – Generating Views on Working Drawings – Dimensioning – Geometric Dimensioning and Tolerancing – Generating Design Assembly Drawings

**Text Books:**

Gang Qi, “Engineering Design Communication and Modeling using Unigraphics NX”, Thomson, 2007

## 140203 - INDUSTRIAL ROBOTICS AND AUTOMATION

**OBJECTIVE:** To provide fundamentals of robotics including components, characteristics, languages and applications.

**MODULE 1:**

Robotics – Definition, Advantages and Laws of Robotics – Motivating Factors - Overview of Robot – Objectives of Industrial Robots – Advantages and Disadvantages of Robots – Types of Industrial Robots – Robotic Systems – Robot Classifications – Mechanical Design of a Robot – Types of Mechanical Joints – Robot Arms and Hands – Robots Qualities and Specifications – Robots Performance Testing and Kinematic Control – Conversion of Motion – Techniques of Robot Calibration – Robot Sensing and Vision – Robot Programming Languages - Introduction – Types of End-effectors – Classification of End-effectors – Mechanical Grippers – Vacuum Grippers – Magnetic Grippers – Adhesive Grippers – Design Of Gripper – Remote Center Compliance Devices.

**MODULE 2:**

Introduction to Robotic Sensors – Characteristics of Sensing Device – Types Of Sensors – Touch or Tactile Sensors – Position and Displacement Sensors – Force/Torque Sensors (FTS) – Proximity Sensors – Range Sensors – Selection of a Right Sensor – Introduction to Robot Vision – Robot Vision Systems – Advantages and Applications of Machine Vision – Industrial Applications of Vision-controlled Robotic Systems - . Introduction to Robot Programming – Methods to Programme the Robot's Work Cycle – Robot Programming Languages – Requirements and Problems of a Robot Programming Language – Description of Robot Languages – Comparison of Various Existing Robot Control Languages.

**MODULE 3:**

Introduction to Robot Drives, Actuators and Control – Fluid Power-General Aspects – Hydraulic Actuators – Pneumatic Actuators – Electrical Actuators – Single-Phase Motors – Three-Phase Induction Motors – Electronic Control of A.C. (Induction) Motor – Synchronous Motor-types, Starting, Speed Control and Testing – Comparison of Robot Drive Systems.

**MODULE 4:**

Electrical and Electronic Controls - Sensors and Transducers – Control Systems – Electronic Devices – Digital Electronics – Microprocessors – Microprocessor Systems – Intel 8085 Microprocessor – Programmable Logic Controllers.

**MODULE 5:**

Introduction to Hydraulic and Pneumatic Symbols – Comparison of Hydraulic, Pneumatic and Hydro pneumatic Systems – Hydraulic Circuits – Pneumatic Circuits – Pneumatic Logic Circuits -Introduction to Fluidics – Advantages, Disadvantages and Applications of Fluidic Devices/Fluidics – Fluidic Elements – Comparison Among Different Switching Elements

**MODULE 6:**

Industrial Automation - General Aspects – Advantages and Limitations of Automation – Application of Automation – Elements of Automation – Aims of Automation – Mechanisation and Automation – Types of Automation – Low Cost Automation – Assembly Automation Equipment – Transfer Devices and Feeders – Flexible Manufacturing System (FMS) – Computer Integrated Manufacturing (CIM) – Mechatronics and Concurrent Engineering – Computer Aided Process Planning (CAPP) System – Group Technology - Advantages, Disadvantages and Shortcomings of Robots – Applications of Robots – Summary of Features and Applications of Future Industrial Robots.

**Text Book:** R.K Rajput, "Robotics and Industrial Automation", S. Chand Publication, 2008

## 140204 - PRO ENGINEER

**OBJECTIVE:** To provide fundamental aspects of designing complex models with great precision through Pro E Wildfire 3.0

**MODULE 1:**

Introduction to Pre Engineer Wildfire 3.0 – The Sketch Mode I – Definition – Steps in Using the Sketch Mode – The Sketcher Environment – Working with the Sketch – Drawing a Sketch – Dimensioning the Sketch – Dimensioning the Basic Sketched Entities – Working With Constraints – Modifying Dimensions of a Sketch – Deleting, Trimming and Mirroring the Sketched Entities – The Sketch Mode II - Dimensioning the Sketch – Creating Fillets – Working With Splines – Scaling and Rotating Entities – Importing 2D Drawings - Creating Base Features – Creating a Protrusion – Parent-Child Relationship.

**MODULE 2:**

Datums – Definition – Default Datum Planes – Need for Datums in Modeling – Datum Options: Datum Planes, Creating Datum Planes, Embedded Datum Planes, Datum Axes, Datum Points - Creating Cuts – Removing Material by Extruding a Sketch – Removing Material by Revolving a Sketch

**MODULE 3:**

Options Aiding Constructions of Parts – Creating Holes – Creating Rounds – Creating Chamfers – Creating Ribs – Editing Features of a Model - Creating Features Patterns – Copying Features – Mirroring a Geometry – Creating a Section of the Solid Model.

**MODULE 4:**

Advanced Modeling Tools I - Protrusion Options – Sweep Features – Blend Features – The Blend Vertex – Shell Option – Datum Curves – Creating Draft Features – Advanced Modeling Tools II - Advanced Feature Creation Tools – Advanced Modeling Tools III - Advanced Modeling Tools.

**MODULE 5:**

Assembly Modeling – Definition - Important Terms Related to the Assembly Mode – Creating Top-down and Bottom-Up Assemblies – Placement Constraints – Assembly Datum Planes – Assembling and Packaging the Components – Creating Simplified Representations – Redefining the Components of the Assembly – Reordering the Components – Suppressing the Components – Replacing Components – Assembling Repeated Copies of a Component – Modifying the Components of the Assembly – Offset Lines – The Bill Of Material (BOM).

**MODULE 6:**

Drawing Views - The Drawing Mode – Generating, Editing, Modifying the Drawing Views – Dimensioning the Drawing Views – Modifying and Editing Dimensions – Adding Notes to the Drawing – Adding Balloons to the Assembly Views - Surface Modeling – Definition - Creating Surfaces – Surface Editing Tools - Introduction to Pro/Sheetmetal – Invoking the Sheetmetal Mode – Introduction to Sheetmetal Walls – Creating a Flat Wall.

**Text Books:**

Sham Tickoo, “Pro/ENGINEER Wildfire 3.0”, DreamTech Press, 2008

## 140205 - COMPUTER AIDED DESIGN AND MANAUFACTURING

**OBJECTIVE:** To provide a comprehensive guidance of how every aspect of design and production operations is integrated and automated to improve productivity and efficiency.

**MODULE 1:**

Introduction to CAD/CAM – Definition – Product Cycle and CAD/CAM – Automation and CAD/CAM – Introduction to Computer Technology – Central Processing Unit – Types of Memory – Input/Output – Data Representation – Computer Programming Languages – Operating System – Minicomputers – Microcomputers – Programmable Controllers.

**MODULE 2:**

Fundamentals of CAD – Definition and Importance – Design Process – Application of Computers – Creating the Manufacturing Data Base – Benefits of CAD – Hardware in CAD – Design Workstation – Graphics Terminal – Input Devices – Plotters and Other Output Devices – CPU – Secondary Storage – Software in CAD – Software Configuration and Functions of Graphics System – Geometry Construction – Transformation – Database Structure and Content – Wire Frame Vs Solid Modeling.

**MODULE 3:**

Numerical Control – Definition – Basic Components – NC Coordinate and Motion Control System – Applications and Economics of NC – NC Part Programming – Punched Tape and Coding – Manual and Computer Assisted Part Programming – APT Language – The MACRO Statement in APT – NC Programming with interactive Graphics – Computer Controls in NC – Difficulties – NC Controller – CNC – DNC – Combined DNC/CNC Systems – AC Machining Systems – New Trends in NC.

**MODULE 4:**

Group Technology – Part Families – Parts Classification and Coding – Three Parts Classification and Coding Systems – Group Technology Machine Cells – Benefits of Group Technology – Computer Aided Process Planning – The Planning Function – Retrieval – Type Process Planning Systems k – Generative Process Planning Systems – Benefits of CAPP – Machinability Data System – Computer – Generated Time Standards.

**MODULE 5:**

Production Planning and Control – Functions and Problems Associated with Production Planning and Control – Computer Integrated Production Management Systems – Cost Planning and Control – Inventory Management – Basic MRP Concepts – Inputs to MRP – Working of MRP – MRP Output Reports – Benefits to MRP – MRP II – Shop Floor Control – Functions – Shop Floor Control System – Operation Scheduling – Factory Data Collection System – Computer Process Monitoring.

**MODULE 6:**

Computer Process Interfacing – Manufacturing Process Data and System Interpretation – Interface Hardware Devices – Computer Structure and Networking – Computer Process Control – Structural Model – Process Control Strategies – Distributed Vs Central Control – Direct Digital Control – Supervisory Computer Control – Computer Aided Quality Control – Computer in QC – Contact Inspection Methods – Noncontact Inspection Methods – Optical, Nonoptical – CIMS – Definition – Types – Machine Tools – Computers Control System – Human Labor – CIMS Benefits – Turnkey CAD/CAM Systems – Selection Criteria.

**Text Books:**

P. Groover, and W.Zimmers “Computer Aided Design and Manufacturing”, Prentice Hall India, 2008.

## 140201 - AUTOCAD

**OBJECTIVE:** To provide comprehensive guide to learn the basic of AutoCAD 2008 for building quality 2D drawings and 3D models.

**MODULE 1:**

Introduction to AutoCAD – The AutoCAD Window – Procedure for Drawing - Panning and Zooming – Understanding the Layout View – Working of Command Options – The Drawing Tools – AutoCAD Coordinate System – Setting Up a Drawing – Visual Reference with Grid Mode – Snapping to the Grid – Changing the Grid – Selecting Exact Locations – Aligning Objects – Temporary Tracking Point Feature

**MODULE 2:**

2D Objects – The 2D Control Panel – Straight Lines – Circles and Arcs – Curves – Parallel Lines – Revision Clouds – Hatch Patterns and Solid Fills – Regular Polygons – Drawing Layout – Selecting Objects – Editing the Windows – Changing Objects with Grips and Dynamic Input – Controlling Objects using Properties Palette – 2D Draw Control Panel Tools – Selecting Objects – Erasing Objects – Joining Objects – Moving and Copying – Scaling, Stretching and Rotating – Breaking an Object – Editing Xrefs and Blocks – Editing Polylines

**MODULE 3:**

3D Drawings – About 3D Modeling Workspace – 3D Using Solids and Surfaces – Changing Point of View – Creation of 3D Forms from 2D Shapes – Specification of Distances in 3D Space – Controlling the Appearance of Model

**MODULE 4:**

Introduction to Layers – Creating and Assigning Layers – Setting the Layer – Controlling the Layer – Locking Layers – Finding the Layer – Taming of Layer – Layers II Toolbar – Uses of Blocks – Organizing Objects using Groups – External References – Use of DesignCenter – Palettes Window

**MODULE 5:**

Text – Adding and Formatting Text – Text and Scale – Styles and Fonts – Adding Tables – Parts of AutoCAD Dimension – Model Tab – Linear Dimensions – Nonorthogonal Objects – Leader Tool – Ordinate Dimensions – Tolerance Notation – Editing Dimensions – Dimension's Appearance

**MODULE 6:**

Measuring Areas – Finding the Coordinate of a Pont – Measuring Distances – Measuring Angles – Getting the General Status of the Drawing – Finding Text in Drawing – Locating and Selecting Components – Printing – Storing the Printer Settings – Plot Styles – Named Plot Styles - Conversion from Color Plot Styles to Named Plot Styles

**Text Books:**

George Omura, "Introducing AUTOCAD 2008", Wiley India, 2007

## 140202 - ENGINEERING DESIGN

**OBJECTIVE:** To impart the basic knowledge of traditional engineering graphical communication and design modeling using Unigraphics NX.

**MODULE 1:**

Introduction to Engineering Design Communication and Modeling – Relationship between Engineering Design Communication and Modeling – Feature Based Parametric Design Modeling – Computer Integrated Problem Solving – Good Engineering Practice – Major Tools – Introduction to Engineering Graphics – Multiview Projection – Auxiliary Views – Section Views – Descriptive Geometry.

**MODULE 2:**

Introduction to Dimensioning and Tolerancing – Engineering Dimensioning Systems – Preferred Engineering Practice – Tolerancing – Geometric Dimensioning and Tolerancing – Problem Solving in Engineering Design – Combination Curling and Flat Iron – Design Modeling of a De-Rotator.

**MODULE 3:**

Base Design Features – Stock Types of Base Features – Modifying Models – Modeling by Combining Standard Base Features – Basic Functional Element Features and their Usage – Basic Functional Feature Modeling – Feature Modification – Feature Datum References – Advanced Placement of Datum References.

**MODULE 4:**

Design Modeling – Application of Sketching – Basic Sketching – Sketching to Facilitate Modeling – Sketch Animation – Additional Modeling Features – Edge and Face Features – Models with Patterned Features – Models with Hollow Features – Advanced Design Modeling – Surface Profiles – Surface Models – Solid Models – Mechanical Component Designs.

**MODULE 5:**

Acquiring Model Information – Assignment of Material Properties – Model Geometric Properties – Model Mechanical Properties – Machine Assembly Design Modeling – Concepts of Engineering Design – Types of Installation Relationships between Machine Components – Combined Placement Relationships Design Assembly Models with Patterned Components.

**MODULE 6:**

Engineering Working Drawings – Engineering Working Drawing Basics – Generating Views on Working Drawings – Dimensioning – Geometric Dimensioning and Tolerancing – Generating Design Assembly Drawings

**Text Books:**

Gang Qi, “Engineering Design Communication and Modeling using Unigraphics NX”, Thomson, 2007

## 140203 - INDUSTRIAL ROBOTICS AND AUTOMATION

**OBJECTIVE:** To provide fundamentals of robotics including components, characteristics, languages and applications.

**MODULE 1:**

Robotics – Definition, Advantages and Laws of Robotics – Motivating Factors - Overview of Robot – Objectives of Industrial Robots – Advantages and Disadvantages of Robots – Types of Industrial Robots – Robotic Systems – Robot Classifications – Mechanical Design of a Robot – Types of Mechanical Joints – Robot Arms and Hands – Robots Qualities and Specifications – Robots Performance Testing and Kinematic Control – Conversion of Motion – Techniques of Robot Calibration – Robot Sensing and Vision – Robot Programming Languages - Introduction – Types of End-effectors – Classification of End-effectors – Mechanical Grippers – Vacuum Grippers – Magnetic Grippers – Adhesive Grippers – Design Of Gripper – Remote Center Compliance Devices.

**MODULE 2:**

Introduction to Robotic Sensors – Characteristics of Sensing Device – Types Of Sensors – Touch or Tactile Sensors – Position and Displacement Sensors – Force/Torque Sensors (FTS) – Proximity Sensors – Range Sensors – Selection of a Right Sensor – Introduction to Robot Vision – Robot Vision Systems – Advantages and Applications of Machine Vision – Industrial Applications of Vision-controlled Robotic Systems - . Introduction to Robot Programming – Methods to Programme the Robot's Work Cycle – Robot Programming Languages – Requirements and Problems of a Robot Programming Language – Description of Robot Languages – Comparison of Various Existing Robot Control Languages.

**MODULE 3:**

Introduction to Robot Drives, Actuators and Control – Fluid Power-General Aspects – Hydraulic Actuators – Pneumatic Actuators – Electrical Actuators – Single-Phase Motors – Three-Phase Induction Motors – Electronic Control of A.C. (Induction) Motor – Synchronous Motor-types, Starting, Speed Control and Testing – Comparison of Robot Drive Systems.

**MODULE 4:**

Electrical and Electronic Controls - Sensors and Transducers – Control Systems – Electronic Devices – Digital Electronics – Microprocessors – Microprocessor Systems – Intel 8085 Microprocessor – Programmable Logic Controllers.

**MODULE 5:**

Introduction to Hydraulic and Pneumatic Symbols – Comparison of Hydraulic, Pneumatic and Hydro pneumatic Systems – Hydraulic Circuits – Pneumatic Circuits – Pneumatic Logic Circuits -Introduction to Fluidics – Advantages, Disadvantages and Applications of Fluidic Devices/Fluidics – Fluidic Elements – Comparison Among Different Switching Elements

**MODULE 6:**

Industrial Automation - General Aspects – Advantages and Limitations of Automation – Application of Automation – Elements of Automation – Aims of Automation – Mechanisation and Automation – Types of Automation – Low Cost Automation – Assembly Automation Equipment – Transfer Devices and Feeders – Flexible Manufacturing System (FMS) – Computer Integrated Manufacturing (CIM) – Mechatronics and Concurrent Engineering – Computer Aided Process Planning (CAPP) System – Group Technology - Advantages, Disadvantages and Shortcomings of Robots – Applications of Robots – Summary of Features and Applications of Future Industrial Robots.

**Text Book:** R.K Rajput, "Robotics and Industrial Automation", S. Chand Publication, 2008

## 140301 - CNC PROGRAMMING

**OBJECTIVE:** To understand the development process, principles of operation and manufacturing features of CNC machines.

**MODULE 1:**

Introduction to CNC Machine – Definition – Classifications of Numerical Control System – Advantages, Principle of Operation, Distance Measurement, Axis Arrangement, Types, Configuration, Parts Construction of CNC Machines – Coordinate Systems – Grid System – Reference Points – Machine, Part, Program Origin – Coding System – CNC Syntax and Word Address Format – End of Block Code – Accuracy and Repeatability of CNC Machine.

**MODULE 2:**

Constructional Features of CNC Machine – Selection of CNC Machine – Specifications and Format for CNC System – CNC OS - FANUC Operating System – Sinumerik / Hinumerik Operating System – List of Operating Switches

**MODULE 3:**

Programmable Logic Controller Characteristics – G-Function and G-Codes – Cutter Compensation Function – Incremental Programming

**MODULE 4:**

Setting the CNC Machine – Home Position – Coordinate System Preset – Work Coordinates – Tool Offset Consideration – Setting up Tools on the Lathe – Imaginary Tool Tip Method – CNC Turning Centre – Setting up Tools on the Machining Centre – CNC Programming – CNC Machining Centre – CNC Turning Centre – APT Language – Motion Statements

**MODULE 5:**

CNC Metal Cutting Tools – Characteristics of Tool Materials – Cutting Tool Materials – Cutting Tool Material Chart – Calculation Formulae for Turning and Milling – ISO Designation for Tools, Round Shank Tools and Cartridges – Widax-gw Full Form – ISO Designation for Indexable Inserts – Chart for Determining Spindle Speeds – Machining Parameters – Nomogram for Machining Parameters – Widalon/Widadur/Widia Grades for Machining

**MODULE 6:**

Troubleshooting of Machining Process – Drilling – Tapping – Reaming – Spot Facing – Turning – Boring – Milling – Flexible Manufacturing System – Computer Integrated Manufacturing - Robots

**Text Books:**

Binit Kumar Jha, “CNC Programming”, Vikas Publishing House, 2007

## 140302 - COMPUTER INTEGRATED MANUFACTURING

**OBJECTIVE:** To present the basic principles of computer integrated manufacturing and highlight the interactions among its elements.

**MODULE 1:**

Introduction to CIM – Evolution of CIM – CIM II – Benefits of CIM - Overview of Manufacturing – Standard Industrial Classifications for Manufacturing – Meaning of Manufacturing – Types of Manufacturing – Manufacturing as a System – Implementation Concept of CIM – Financial Justification – Challenges and Trends

**MODULE 2:**

Computer Technology and Manufacturing – Fundamentals of Computer Technology – Recent Advances – Computers in Manufacturing – Needs of CIM - Fundamentals of Communications – Data and Information – Communications Matrix – Fundamentals of Computer Communications – Network Architectures – Tools and Techniques - Introduction to Database – Manufacturing Data – Database Technology – Database Management

**MODULE 3:**

Introduction to Product Design – Needs of the Market – Design and Engineering – The Design Process – Design for Manufacturability – Computer Aided Design – Three Dimensional Capabilities – Computer Aided Engineering – Transportability – Reverse and Simultaneous Engineering – Introduction to Production Planning – Computer Aided Cost Estimating – Production Planning and Control – Group Technology - Simulation – Part Programming

**MODULE 4:**

Introduction to Production – Basic Processes – NC, CNC and DNC – FMC and FMS – Tool Management – Flexible Fixturing – Flexible Assembly Systems – Flexibility – Shop-Floor Control – Data Logging and Acquisition – Automated Data Collection – Control Types – Sensor Technology

**MODULE 5:**

Introduction to Robotics and Materials Handling – Robotics – Automated Guided Vehicles – AS/RS – Palletization – Introduction to Quality – Modern Concepts of Quality – Statistical Quality Control – Statistical Process Control – Process Capability – Machining Inspection Continuum – Coordinate Measuring Machine – Touch Probes

**MODULE 6:**

Management of CIM – Role – Conventional Wisdom Challenged – Cost Justification – Expert Systems – Participative Management – Impact of CIM on Personnel – Role of Manufacturing Engineers – Roles of Institutions – Emerging Technologies – Expert Systems – Computer Vision – Lasers in Manufacturing – Concurrent Engineering - Multimedia Communications

**Text Books:**

S. Kant Vajpayee, “Principles of Computer Integrated Manufacturing”, Prentice Hall India, 2007

## 140401 – ART AND ARCHITECTURE

**MODULE 1:**

Art-History Of art, Types of Arts- Sculpture, Engraving, Paintings and Drawings- Types, Techniques and tools in drawing and paintings. Traditional Indian Arts, Review of Western Arts and its relevance in modern interior designing

**MODULE 2:**

Architecture- Definition and meaning, Bases for Development, Principles and elements, qualities, and Goals of Architecture

**MODULE 3:**

Aesthetic components of design and aesthetic qualities, Factors influencing architectural design-Environmental factors, Litigation factors

**MODULE 4:**

World Architecture- Egyptian, Greek, Roman, Gothic- Characteristic features Indian Architecture-Hindu-North and South Characteristic features, Christian And Muslim-Characteristic features

**MODULE 5:**

Contemporary Architecture-Theme, philosophy and works of famous architects- Frank Lloyd Wright, Le Corbusier, Louis Isadore Kahn (Germany), Charles Correa and B.V. Doshi (India)

**MODULE 6:**

Landscape Architecture-Meaning and definition, Principles of landscape design, Elements, Parking lot design Styles of garden, planting-Trees, shrubs, Ground cover flowerbeds etc. Design of parks –Analysis, zoning Climate- Temperature, Solar radiation, wind, humidity and precipitation climate control techniques- effect of vegetation, wind flow, water ponds wall openings

**Text Books:**

Muthu Shoba Mohan G, “Principles of Architecture”, Oxford University Press, New Delhi

**Reference:**

G.K.Hiraskar, “The Great Ages of World Architecture with introduction to landscape architecture”, Dhanpat Rai Publications Ltd., New Delhi

## 140402 – INTERIOR DESIGN CONCEPTS AND APPLICATIONS

**MODULE 1:**

Design- definition, requirements of a good design, Types- natural and decorative, types of decorative design. Design development –types of motifs. Process of designing

**MODULE 2:**

Elements of design- line and direction, shape, form, pattern, texture, space, size, and light. Characteristics of different elements and its application in interior design

**MODULE 3:**

Principles of design- Balance, rhythm, emphasis, harmony and scale and proportion. Types and ways to achieve the principles and its application in interior design.

**MODULE 4:**

Colour- colour theories- prang colour chart, Ostwald and Munsell colour system. Qualities and characteristics. Colour harmonies- related and contrast. Planning colour- colour plan, development of colour plan, application of principles of design in use of colour, colour schemes for specific areas. Colour psychology and after image. Inter relationships of colours

**MODULE 5:**

Light- importance in Interior design, types of lighting- natural and artificial, methods of lighting, effect of light on colour, Use of light in different areas. Light fixtures and accessories- modern market trends-a survey. Accessories in Interiors- types and selection. Use of accessories in different areas and different occasions. Plants and flower arrangement-natural and artificial- role in interior decoration

**MODULE 6:**

Project on application of design elements and principles in Interior and evaluation, -Case studies

**Text Books:**

Pratap Rao, Interior Design Principles and Practice, Standard Publishers Distributors, New Delhi

## 140403 – SPACE DESIGNING

**MODULE 1:**

Planning Life space- Types of life spaces- Residential, Commercial, Institutional. Public Private and Work spaces in different buildings. Planning principles and factors determining planning.

**MODULE 2:**

Types of plans- site plan, criteria for selection of site; Floor plan, section and elevation plans and perspective views and landscape plan. Building byelaws and Space standards.

**MODULE 3:**

Allocation of space for various activities in house/ Apartments-living, dining, sleeping, studying, personal activities and cooking. Bathrooms- planning, finishes used, Lighting and accessories Kitchen planning-factors to be considered, work triangle, types of work space in kitchen, sequence of activities, Dimensions of work centres, use of anthropometry in kitchen design, Materials and finishes used. Types and styles of kitchen, Accessories in kitchen, Modular kitchen, Merits and de merits. Drawing kitchen designs

**MODULE 4:**

Office planning and interior designing- objectives and benefits of space planning, Work flow, work stations, Executive core, Rest rooms, Partitions and false ceiling-types, Furniture and Equipment accommodation, Prestige symbol, materials used for different components and landscaping. Banks- administration, banking and safe deposit vaults. Layout plan

**MODULE 5:**

Planning of Commercial and recreational buildings - location, allocation of space for different areas- administration, public areas- car parking, rest rooms, planning of shops and departmental stores, Recreational centres- Cinema theatres, auditorium, Hotels, Restaurants, club house, health centres, community centres, public library and Town halls. Layout plan

**MODULE 6:**

Planning of hospitals and educational buildings-Hospitals-Dispensaries, clinics, Maternity homes and nursing homes, Location, administrative blocks, Outpatient departments, Wards, Duty rooms, Surgery unit, Canteen and staff accommodation. Educational –Teaching area, play area, administrative block, examination block, Demonstration area, auditorium, Comfort stations and other amenities. Layout plan

**Text Books:**

Gurucharan Singh, Jagdish Singh, “Building Planning Designing and Scheduling”, Standard Publishers Distributors

**References:**

Agarwala S.C. Interior Decoration, Dhanpat Rai and Co. New Delhi

## 140404 – FURNITURE AND FURNISHINGS

**MODULE 1:**

Furniture-Importance, classification- purpose, materials, place of use. Styles of furniture-Traditional, contemporary modern and combination of styles, Upholstered and case goods,

**MODULE 2:**

Design Development- General features, construction details-Types of Joints, materials used, Modular furniture, mobile furniture, moulded furniture, innovative materials and use of anthropometry in furniture design

**MODULE 3:**

Room plans and Furniture arrangements- planning for different activities and different buildings, Traffic pattern and furniture layouts

**MODULE 4:**

Soft furnishings- meaning, importance, classification, floor coverings-rugs and carpets, importance, types and materials used and modern trends. Cushions, slip covers, bed linen, table linen, kitchen linen, and bath room linen. - Types, care and maintenance.

**MODULE 5:**

Window treatments- Types of windows, types of window treatments, curtains and draperies, Decorative heads-cornice, valance and swag, materials used and method of construction, Fabric and selection of design, types of pleats. Creating designs for different areas. Curtain accessories- curtain rod, hooks and fasteners.

**MODULE 6:**

Professional presentation- Visualisation- envisioning the end result and selecting right fabric and colour suitable for each mood and concept, occasion and theme. Estimation of cost using a market survey. Preparing power point presentation.

**Text Books:**

Dantyagi S, Fundamentals of Textiles and their care. Orient Longmann Ltd. New Delhi

## 140405 – BUILDING SERVICES

**MODULE 1:**

Building services - Introduction, meaning and definition, Classification of buildings based on occupancy and type of construction (NBC). Chief considerations in building designs

**MODULE 2:**

Electrical systems and Illumination in buildings - Basics of electricity, single phase/three phase supply, Earthing for safety, types of earthing, Wiring systems and their choice, Planning electrical wiring for building - Visual tasks, Factors affecting visual tasks, Luminous flux, Candela, Utilisation factor, Depreciation factor, Classification of lighting, Artificial light source, Luminous efficiency, Colour temperature and colour rendering Design of modern lighting, ,Lighting for stores, offices, schools, hospitals and house lighting. Special features required and minimum level of illumination needed for physically handicapped and elderly in building types.

**MODULE 3:**

Water supply and sanitation- Water supply requirements for Buildings, WS Fittings, Storage capacities, flushing storage, Maintenance of House pipe lines, Sanitary Fittings, Principles of house Drainage, Drainage plans for building, Rainwater drainage, Septic Tanks- house, Public, Design and Commissioning

**MODULE 4:**

Lifts and Escalators, Meaning, Purposes, Classification, types of lifts, Lift codes and Rules, Components of lifts, Quantity and quality of service, car Speed, Accidents in elevators and safety precautions, and Provisions for Fire safety.

**MODULE 5:**

Acoustics and Integrated Services- Noise and its control, Noise in buildings and its Reduction- at source, by proper planning and layout, Noise insulation, Classes of occupancies for sound insulation and sound proofing schemes - Air conditioning systems- types, construction and working, packaged air conditioners, cooling loads, AC Systems for different types of buildings, Protection against fire caused by AC Systems.

**MODULE 6:**

Fire safety Installation-Causes of fire, Safety regulations, NBC- Planning considerations in buildings. Heat and Smoke Detectors, Fire alarm system, snorkel ladder, Fire fighting pump and water storage, Dry and wet risers, and Automatic sprinklers. Special features required for physically handicapped and elderly in building types.

**Text Books:**

R.Udayakumar, A Text book on building services, Eswar Press, T. Nagar,Chennai

**References:**

Er.V.K.Jain, Designing and Installation of services in building Complexes and High Rise buildings, Khanna Publishers, Delhi

## 140501 - SOFTWARE QUALITY ASSURANCE

**OBJECTIVE**: To imbibe the knowledge of managing and maintaining quality issues concerned with the software design, development and maintenance.

**MODULE 1:**

Overview - People's Quality Expectations - Software Quality Perspectives and Expectations - Quality Frameworks and ISO – 9126 - Correctness and Defects - Definitions, Properties and Measurements A Historical Perspective of Quality

**MODULE 2:**

Quality Assurance – Classification - QA as Dealing with Defects - Defect Prevention - Education and training - Formal method - Other defect prevention techniques Defect Reduction - Direct fault detection and removal- Other techniques and risk identification-Defect Containment- Software fault tolerance- Safety assurance and failure containment.

**MODULE 3:**

Handling Discovered Defect During QA Activities - QA Activities in Software Processes - Verification and Validation Perspectives - Quality Engineering - Activities and Process - Quality Planning - Goal Setting and Strategy Formation - Quality Assessment and Improvement.

**MODULE 4:**

Quality Assurance beyond testing- Defect Prevention and Process Improvement - Basic Concepts and Generic Approaches - Root Cause Analysis for Defect Prevention - Education and Training for Defect Prevention - Analysis and modeling for Defect Prevention - Technologies, Standards and methodologies for defect prevention --Software tools to block defect injection.

**MODULE 5:**

Focusing on Software Processes - Process selection, definition and conformance Process maturity - Process and quality improvement - Fault Tolerance and Failure Containment - Basic Ideas and Concepts - Fault Tolerance with Recovery Blocks - Fault Tolerance with N - Version Programming - Failure Containment - Safety Assurance and Damage Control - Application in Heterogeneous Systems.

**MODULE 6:**

Comparing Quality Assurance Techniques and Activities - General Questions - Cost, Benefit and Environment - Applicability to Different Environments - Effectiveness Comparison - Defect perspective - Problem types - Defect level and pervasive level - Result interpretation and constructive information - Cost Comparison - QA Monitoring and Measurement - Direct and Indirect quality measurements - Models for Quality Assessment.

**Text Books:**

Jeff Tian, Software Quality Engineering: Testing, Quality Assurance, and Quantifiable Improvement, Wiley-India Edition

## 140502 – FUNDAMENTALS OF SOFTWARE TESTING

**OBJECTIVE:** To address the resource needs of software testing professionals and to equip them by providing step-by-step guidelines, checklists, and templates for each testing activity

**MODULE 1:**

Assessing Testing Capabilities and Competencies - Define a World - Class Software Testing Model.-Developing Baselines for Organization. Assessing the Test Environment, Existing. Test Processes, competency of testers.

**MODULE 2:**

Building Software Testing Environment-Building the Software Testing Process. Software Testing Guidelines.-Selecting and Installing Software Testing Tools. Building Software Tester Competency

**MODULE 3:**

Overview of the Software Testing Process - Organizing for Testing.-test manager appointment-scope of testing-appointing test teams-documentation-estimation of project status-Developing the Test Plan.-software project profile-project risk-testing technique-buid and inspect test plan-Verification and validation Testing.-reports.

**MODULE 4:**

Acceptance Testing.- Pre-Operational Testing.- Post-Operational Testing.- Post-Implementation Analysis.-assessment objectives setting – measuring - selecting evaluation approach - effectiveness of testing.

**MODULE 5:**

Incorporating Specialized Testing Responsibilities - Software Development Methodologies - Testing Client / Server Systems - Assess Key Components and client needs.

**MODULE 6:**

Rapid Application Development Testing - appropriateness of RAD - test planning iterations - Testing Internal Controls - review and testing application controls - Testing COTS and Contracted Software - Test Compatibility - Testing in a Multiplatform Environment - Testing Software System Security - Testing Web - Based Systems - Using Agile Methods to Improve Software Testing.

**Text Books:**

William E.Berry,"Effective methods for Software Testing", Wiley – India

**References:**

1. Louise Tamres, "Introducing software testing", Pearson
2. Renu Rajani Pradeep oak, "Software Testing", Tata McGraw Hill

## 140503 - SOFTWARE TESTING TOOLS

**OBJECTIVE:** To impart the fundamental concepts with details of the testing process and widely used automated, sophisticated testing tools.

**MODULE 1:**

Overview of Software Quality Assurance - The Software Crisis – The Birth of Software Engineering – Definition and Importance of Software Engineering – The Software Chaos – Criteria for the Success of a Software Project – Process Oriented Software Development – Phases in Software Development Life Cycle – Software Development Life Cycle Models – The Management Process – Software Quality Assurance – Quality Management Systems – Process Change Management.

**MODULE 2:**

Introduction to Software Testing Process - Psychology of Testing – Verification and Validation – Testing Team and Development Team – Cost of Quality – Characteristics of Test Engineers – Difficulties of Testing – Levels of Testing – Testing Approaches – Types of Testing – Test Plan – Criteria for Completion of Testing – Software Reliability – Manual Testing and its Limitations – Overview of Software Testing Tools - Need for Automated Testing Tools – Taxonomy of Testing Tools – Functional, Performance, Management and Source Code Testing Tools – Selection of Testing Tool.

**MODULE 3:**

Overview of WinRunner – Testing and Application Using WinRunner – Test Script Language (TSL) – GUI MAP File – Synchronization of Test Cases – Data-Driven Testing – Rapid Test Script Wizard – Mapping Custom Objects to a Standard Class – Checking GUI Objects - Overview of Silk Test – Architecture of Silk Test – Testing an Application Using Silk Test – The 4Test Scripting Language – Checkpoints – Data-Driven Test Cases.

**MODULE 4:**

Overview of SQA Robot – Testing an Application Using SQA Robot – Synchronization of Test Procedures – Creating Checkpoints - Overview of LoadRunner – Creating Vuser script using Virtual User Generator – Creating Virtual User Using LoadRunner Controller - Overview of JMeter – JDBC Test – HTTP Test.

**MODULE 5:**

Overview of Test Director – Testing Management Process – Managing the Testing Process Using Test Director - GNU Tools – Timing of Programs – Profiler – Code Optimization – Productivity Tools – Portability Testing Tools – Configuration Management Tools – Coding Guidelines and Standards.

**MODULE 6:**

Overview of QuickTest Professional – Testing an Application Using QTP – Synchronization of Test Cases – Creating Checkpoints – Testing Calculator with Parameterization – Testing Database Application – Testing A web Application.

**Text Book:**

Dr. K.V.K.K. Prasad, “Software Testing Tools”, Dreamtech Press, 2008

## 140504 - SOFTWARE PROJECT MANAGEMENT

**OBJECTIVE:** To inculcate the fundamental practices of good project management needed by software industry.

**MODULE 1:**

Meaning – Software projects versus other types of project – Contract Management – Activities – Problems with software projects – Project Planning – Steps.

**MODULE 2:**

Programme management – Strategic Programme management – Evaluation –Choosing technologies for a selection of a project – Structure versus speed of Delivery – Waterfall Model – V-processes Model – Spiral Model – Prototype – Dynamic System Development method.

**MODULE 3:**

Estimation – Problems – Basis – Techniques – Activity planning – Schedules – Scheduling Activities – Activity float – Identifying Critical Activities – Activity-on arrow networks.

**MODULE 4:**

Risk Management – Framework – Evaluating risk to the schedule – Monte Carlo Simulation – Critical Chain Concepts – Resource allocation – Identifying resource requirements –Scheduling resources – counting the cost.

**MODULE 5:**

Monitoring and Control – Creating the framework – Collection of data – Change Control – Managing Contracts – ISO 12207 approach – Types of Contract – Contract Management.

**MODULE 6:**

Managing People – Understanding Behaviour – Motivation – Oldham - hackman Model – Decision Making Influence of Culture – Stress – Software Quality – Meaning and importance – Product versus process quality management.

**Text Books:**

Bob Hughes and Mike Cotterell – Software Project Management – Tata McGraw Hill – Fourth Edition – 2006

## 140505 – MANAGING THE TESTING PROCESS

**OBJECTIVE:** To provide the fundamental aspects of practical tools and techniques for managing the software testing process.

**MODULE 1:**

The Foundation of a Test Project – Test Granularity - Test Phases – Benefits of Phased Test Approach – Test Phase Sequencing – Defining Quality – Experience of Quality – Informal Methods of Assessing Quality Risks – Formal Method for Understanding Quality Risks – Schedule, Resource and Budget – Test Plans – Definition – Ways of writing Test Plans – Test Plan Template - Bounds – Quality Risks – Transitions – Entry and Exit Criteria – Test Configurations and Environments – Test Development – Test Execution – The IEEE 829 Template – Other Test Planning Templates

**MODULE 2:**

Test System Architecture – Principles for Test System Architecture – Test Cases – Coverage and Regression Test Gaps – Test Case Incremental Improvement – Formal Bug Tracking System – Failure Description – Construction of Bug Tracking Database - Capturing Bug Data for Analysis – Extracting Metrics from the Bug Tracking Database - Managing Bug Tracking – Case Study

**MODULE 3:**

Test Tracking Spreadsheet – Making Enhancements – Test Tracking System in Motion – Extracting Metrics from the Test Tracking Spreadsheet – Defining Test Execution Process – Managing Test Hardware and Software Configuration Logistics – Change Management Database – Case Study

**MODULE 4:**

Need for Test Lab - Selecting and Planning a Lab Area – The Test Lab Inventory – Security and Tracking Concerns – Managing Equipments and Configurations – Keeping the Test Environment Clean – Human Factors – Qualities of Good Test Engineers – Defining the Test Team – Organizational Modules – Hiring Testers – Motivation of Test Team – Temporary Experts and Implementers – Case Study

**MODULE 5:**

Test Group – Functions of Test Group – Directions of Test Management – Documentation – Layoffs and Liquidation – Importance of Accuracy and Audience – Test Partners – Planning a Distributed Test Effort – Managing a Distributed Test Effort – Case Study

**MODULE 6:**

Economic Justification for the Testing Investment – Testing Life Cycle Themes – System, Subsystem, Commercial and Component Integration – Process Maturity – Managing the Test Process – Case Study

**Text Books:**

Rex Black, “Managing the Testing Process”, Wiley Publishing, Second Edition, 2008

## 140601 - DATA COMMUNICATION AND COMPUTER NETWORKS

**OBJECTIVE:** To impart the fundamental concepts, terminologies and technologies used in modern days data communication and computer networking.

**MODULE 1:**

Introduction to Data Communication – Overview of Networks – Protocols and Standards – Layered Tasks – The OSI Model – Layers in the OSI Model – TCP/IP Protocol Suite – Addressing

**MODULE 2:**

Introduction to Physical Layer and Media - Analog and Digital Data, Analog and Digital Signals – Transmission Impairment – Performance – Line Coding and Line Coding Schemes - Transmission modes – Guided Transmission media – Structure of a Switch – Telephone Network – Dial-Up Modems – Digital Subscriber Line (DSL)

**MODULE 3:**

Introduction to Data Link Layer – Error and Types of Error - Error Detection and Error Correction – Parity – LRC – CRC - Hamming Code – Checksum – Flow and Error Control – Stop and Wait – Go-Back N ARQ – Selective Repeat ARQ – Sliding Window – HDLC – LAN – IEEE 802.3 - IEEE 802.4 – IEEE 802.5 – IEEE802.11 – FDDI – SONET - Bridges

**MODULE 4:**

Introduction to Network Layer – Internetworks - Circuit Switching – Packet Switching – Datagram, Virtual Circuit – Message Switching – IP Addressing Methods – Subnetting – Routing – Distance Vector Routing – Link State Routing - Routers

**MODULE 5:**

Introduction to Transport Layer – Duties of Transport Layer – Multiplexing – Demultiplexing – Sockets – UDP – TCP – Congestion Control – Quality of Service – Integrated Services - Introduction to Application Layer – Domain Name Space – Distribution of Name Space – Resolution – DNS Messages – Types of Records – Encapsulation - Remote Logging – Electronic Mail – File Transfer – WWW – HTTP

**MODULE 6:**

Introduction to Network Management System – SNMP – Introduction to Cryptography – Symmetric Key Cryptography – Asymmetric Key Cryptography – Introduction to Network Security - Security Services – Message Confidentiality – Message Integrity – Message Authentication – Digital Signature – Entity Authentication – Key Management – Internet Security - IP Sec – SSL – PGP - Firewalls

**Text Books:**

Behrouz A Forouzan, “Data Communications and Networking”, Tata McGraw Hill, 4$^{th}$ Edition

## 140602 - NETWORK OPERATING SYSTEMS

**OBJECTIVE:** To provide comprehensive guidance to deployment and administration of windows server.

**MODULE 1:**

Windows Server 2008 and Windows Vista – Networking Tools and Protocols – Domain Controllers, Member Servers, and Domain Services – Name-Resolution Services – Frequently Used Tools - Server Roles, Role Services, and Features for Windows Server 2008 – Full-Server and Core-Server Installation of Windows Server 2008 – Installing Windows Server 2008 – Managing Roles, Role Services, and Features - Performing Initial Configuration Tasks – Managing Your Servers – Managing System Properties – Managing Dynamic-Link Libraries.

**MODULE 2:**

Managing Applications, Processes, and Performance – Managing System Services – Event Logging and Viewing – Monitoring Server Performance and Activity – Tuning System Performance - Understanding Group Policies – Navigating Group Policy Changes – Managing Local Group Policies – Managing Site, Domain, and Organizational Unit Policies – Maintaining and Troubleshooting Group Policy – Managing Users and Computers with Group Policy - Using Security Templates – Using the Security Configuration Wizard.

**MODULE 3:**

Introducing Active Directory – Working with Domain Structures – Working with Active Directory Domains – Understanding the Directory Structure - Tolls for Managing Active Directory – Using the Active Directory Users And Computers Tool – Managing Domain Controllers, Roles, and Catalogs – Managing Organizational Units – Managing Sites – Maintaining Active Directory – Troubleshooting Active Directory

**MODULE 4:**

The Windows Server 2008 Security Model – Differences Between User and Group Accounts – Default User Accounts and Groups – Account Capabilities – Using Default Group Accounts - User Account Setup and Organization – Configuring Account Policies – Configuring User Rights Policies – Adding a User Account – Adding a Group Account – Handling Global Group Membership - Managing User Contact Information – Configuring the User's Environment Settings – Setting Account Options and Restrictions – Managing User Profiles – Updating User and Group Accounts – Managing Multiple User Accounts – Troubleshooting Logon Problems – Viewing and Setting Active Directory Permissions.

**MODULE 5:**

Managing the File Services Role – Adding Hard Disk Drives – Working with Basic and Dynamic Disks – Using Basic Disks and Partitions – Managing Existing Partitions and Drives - Using and Enabling File Sharing – Configuring Standard File Sharing – Managing Share Permissions – Configuring NFS Sharing – Connection to Network Drives – File and Folder Permissions – Auditing System Resources – Using, Configuring, and Managing Resource Manager – Disk Quotas - Creating a Backup and Recovery Plan – Backing Up Your Data: The Essentials – Performing Server Backups – Managing Encryption Recovery Policy – Backing Up and Restoring Encrypted Data and Certificates.

**MODULE 6:**

Navigating Networking in Windows Server 2008 – Networking Enhancements in Windows Vista and Windows Server 2008 – Installing TCP/IP Networking – Configuring TCP/IP Networking – Managing Network Connections - Managing the Print Services Role – Installing Printers – Configuring Printer Properties – Configuring Print Server Properties – Managing Print Jobs on Local and Remote Printers - Understanding DNS – Installing DNS Servers – Managing DNS Servers – Managing DNS Records – Managing DNS Server Configuration and Security.

**Text Books:**

William R. Stanek, “Window Server 2008 – Administrator’s Pocket Consultant”, Prentice Hall India – Microsoft, 2008

**140603 - TCP / IP**

**OBJECTIVE:** To understand their fast growing technologies related to networks and internetworking.

**MODULE 1:**

ARPANET - Birth of Internet-Protocols and Standards - Internet Standards - Internet Administration - OSI Model –Layers in the OSI Model –TCP/IP Protocol Suite - Addressing - IP Versions - LAN's – Point to Point WAN's -Switched WAN's – Connecting Devices.

**MODULE 2:**

Classful Addressing – Subnetting and Supernetting - Variables length blocks-Delivery – Forwarding Techniques - Static versus Dynamic Routing –Structure of a Router – ARP - ARP Package – RARP.

**MODULE 3:**

Datagram – Fragmentations - Checksum - IP Package - Message format-Error Reporting – Query - Debugging Tools –IGMP Messages-Encapsulation - Port Numbers-Socket Address – UDP Operation - UDP Package.

**MODULE 4:**

TCP Services – TCP Features – Segment – Flow Control – Error Control – Congestion Control – TCP Timers - TCP Package – SCTP Services – Packet Format – SCTP Association - State Transition Diagram.

**MODULE 5:**

Distance Vector Routing –RIP- Link State Routing – OSPF – Path Vector Routing – BGP – Unicast, Multicast and Broadcast – Multicast Applications – Routing – CBT – PIM - BOOTP – DHCP – Name Space – DNS in the Internet – NVT – Embedding – Options, Sub options Negotiations.

**MODULE 6:**

FTP – TFTP – SMTP – POP – SNMP – Web Documents – HTTP – Mobile IP – Digitizing audio and video – VNP – IPV6 – Cryptography Digital Signature – Key Management – Security in the Internet –Firewalls.

**Text Books:**

Behrouz A.Forouzan, "TCP/IP Protocol Suite", Tata McGraw Hill, 3rd Edition

## 140604 - ESSENTIALS OF NETWORK PROGRAMMING

**OBJECTIVE:** To provide comprehensive guidance for building robust, high performance networked systems in any environment.

**MODULE 1:**

Introduction to Client and Server – A Simple Daytime Client – Protocol Independence – Error Handling: Wrapper Functions - A Simple Daytime Server – OSI Model - BSD Networking History - Test Networks and Hosts – Unix Standards – 64-Bit Architectures - The Transport Layer – Overview of TCP / IP Protocols – UDP – TCP – SCTP – TCP Connection Establishment and Termination – TIME_WAIT State – SCTP Association Establishment and Termination – Port Numbers and Concurrent Servers – Buffer Sizes and Limitations – Standard Internet Services – Protocol Usage by Common Internet Applications.

**MODULE 2:**

Introduction to Sockets – Socket Address Structure – Value Result Arguments – Byte Ordering Functions – Byte Manipulation Functions – inet_aton, inet_addr and inet_ntoa Functions – inet_pton and inet_ntop Functions – sock_ntop and Related Functions – readn, writen and writeline Functions – Elementary TCP Sockets – socket Function – connect Function – bind Function – listen Function – accept Function – fork and exec Functions – Concurrent Servers – close Function – getsockname and getpeername

**MODULE 3:**

TCP Echo Server: main and str_echo Functions – TCP Echo Client: main and str_cli Functions – Normal Startup and Termination – POSIX Signal Handling – Handling SIGCHLD Signals – wait and waitpid Functions – Connection Abort before accept Returns – Termination of Serve Process – SIGPIPE Signal – Crashing, Rebooting and Shutdown – Data Format – Introduction to I/O Multiplexing – I/O Models – select and str_cli Functions – Batch Input and Buffering – shutdown Function – pselect and poll Functions

**MODULE 4:**

Introduction to Socket Options – getsockopt and setsockopt Functions – Socket States – Generic Socket Options – Ipv4 Socket Options – ICMPv6 Socket Options – Ipv6 Socket Options – TCP Socket Options – SCTP Socket Options – fcntl Function – Introduction to Elementary UDP Sockets – recvfrom and sendto Functions – UDP Echo Server: main and dg_echo Functions – UDP Echo Client: main and dg_cli Functions – Lost Datagrams – Verifying Received Response – connect Function with UDP – Lack of Flow Control with UDP – Determining Outgoing Interface with UDP

**MODULE 5:**

Introduction to Elementary SCTP Sockets – Interface Models – Various SCTP Related Socket Functions – SCTP One to Many Style Streaming Echo Server: main Function - SCTP One to Many Style Streaming Echo Client: main Function – SCTP Streaming Echo Client: str_cli Function – Exploring Head-of-Line Blocking – Controlling the Number of Streams – Controlling Termination

**MODULE 6:**

Introduction to Name and Address Conversion – Domain Name System (DNS) – gethostbyname Function – gethostbyaddr Function – getservbyname and getservbyport Functions – getaddrinfo Function – gai_strerror Function – freeaddrinfo Function getaddrinfo Function: IPv6 – Examples – host_serv Function – tcp_connect Function – tcp_listen Function – udp_client Function – udp_connect Function - udp_server Function – getnameinfo Function – Re-entrant Functions – gethostbyname_r and gethostbyaddr_r Functions – Other Networking Information

**Text Books:**

Richard Stevens, “UNIX Networking Programming”, Prentice Hall India, Volume 1, 3rd Edition

## 140605 - ADVANCED SOCKET PROGRAMMING

**OBJECTIVE:** To import the fundamental aspects of advanced socket programming for building high performance networked systems.

**MODULE 1:**

IPv4 and IPv6 Interoperability - IPv4 Client, IPv6 Server – IPv6 Client, IPv4 Server – IPv6 Address-Testing Macros –Daemon Processes - syslogd Daemon – syslog Function- daemon_init Function – inetd Daemon – daemon_inetd Function – Advanced I/O Functions - Socket Timeouts – recv and send Functions – recvmsg and sendmsg Functions – Sockets and Standard I/O – Advanced Polling – UNIX Domain Protocols - Unix Domain Socket Address Structure – socketpair Function – Socket Functions – Unix Domain Stream Client/Server – Unix Domain Datagram Client/Server.

**MODULE 2:**

Routing Sockets - Datalink Socket Address Structure – Reading and Writing – sysctl Operations – Broadcasting - Broadcast Addresses – Unicast Vs Broadcast – dg_cli Function Using Broadcasting – Race Conditions – Multicasting - Multicast Addresses – Multicasting Vs Broadcasting on a LAN – Multicasting on a WAN – Source-Specific Multicast – Multicast Socket Options – mcast_join and Related Functions – dg_cli Function Using Multicasting – Sending and Receiving – Simple Network Time Protocol (SNTP).

**MODULE 3:**

Advanced UDP Sockets - Receiving Flags, Destination IP Address, and Interface Index – Datagram Truncation – When to Use UDP Instead of TCP – Adding Reliability to a UDP Application – Binding Interface Addresses – Concurrent UDP Servers – IPv6 Packet Information – IPv6 Path MTU Control – Advanced SCTP Sockets - Partial Delivery – Notifications – Unordered Data – Binding a Subset of Addresses – Determining Peer and Local Address Information – Controlling Timing – When to Use SCTP Instead of TCP.

**MODULE 4:**

Signal-Driven I/O for Sockets – UDP Echo Server Using sigio – Threads - Basic Thread Functions: Creation and Termination – str_cli Function Using Threads – TCP Echo Server Using Threads – Thread-Specific Data – Web Client and Simultaneous Connections – Mutexes: Mutual Exclusion – Condition Variables – Web Client and Simultaneous Connections – IP Options - IPv4 Options – IPv4 Source Route Options – IPv6 Extension Headers –IPv6 Routing Header – IPv6 Sticky Options.

**MODULE 5:**

Raw Sockets - Raw Socket Creation – Raw Socket Output – Raw Socket Input – ping Program – traceroute Program – An ICMP Message Daemon – Datalink Access - BSD Packet Filter (BPF) – Datalink Provider Interface (DLPI) – libpcap: Packet Capture Library – libnet: Packet Creation and Injection Library – Examining the UDP Checksum Field.

**MODULE 6:**

Client / Server Design Alternatives - TCP Client Alternatives – TCP Test Client – TCP Iterative Server – TCP Concurrent Server, One Child per Client – TCP Perforked Server - TCP Prethreaded Server, per-Thread accept – TCP Prethreaded Server, Main Thread accept – Streams - germsg and putmsg Functions – getpmsg and putpmsg Fuctions – ioctl Function – Transport Provider Interface (TPI)

**Text Books:**

Richard Stevens, “UNIX Networking Programming”, Prentice Hall India, Volume 1, 3rd Edition

## 140201 - AUTOCAD

**OBJECTIVE:** To provide comprehensive guide to learn the basic of AutoCAD 2008 for building quality 2D drawings and 3D models.

**MODULE 1:**

Introduction to AutoCAD – The AutoCAD Window – Procedure for Drawing - Panning and Zooming – Understanding the Layout View – Working of Command Options – The Drawing Tools – AutoCAD Coordinate System – Setting Up a Drawing – Visual Reference with Grid Mode – Snapping to the Grid – Changing the Grid – Selecting Exact Locations – Aligning Objects – Temporary Tracking Point Feature

**MODULE 2:**

2D Objects – The 2D Control Panel – Straight Lines – Circles and Arcs – Curves – Parallel Lines – Revision Clouds – Hatch Patterns and Solid Fills – Regular Polygons – Drawing Layout – Selecting Objects – Editing the Windows – Changing Objects with Grips and Dynamic Input – Controlling Objects using Properties Palette – 2D Draw Control Panel Tools – Selecting Objects – Erasing Objects – Joining Objects – Moving and Copying – Scaling, Stretching and Rotating – Breaking an Object – Editing Xrefs and Blocks – Editing Polylines

**MODULE 3:**

3D Drawings – About 3D Modeling Workspace – 3D Using Solids and Surfaces – Changing Point of View – Creation of 3D Forms from 2D Shapes – Specification of Distances in 3D Space – Controlling the Appearance of Model

**MODULE 4:**

Introduction to Layers – Creating and Assigning Layers – Setting the Layer – Controlling the Layer – Locking Layers – Finding the Layer – Taming of Layer – Layers II Toolbar – Uses of Blocks – Organizing Objects using Groups – External References – Use of DesignCenter – Palettes Window

**MODULE 5:**

Text – Adding and Formatting Text – Text and Scale – Styles and Fonts – Adding Tables – Parts of AutoCAD Dimension – Model Tab – Linear Dimensions – Nonorthogonal Objects – Leader Tool – Ordinate Dimensions – Tolerance Notation – Editing Dimensions – Dimension's Appearance

**MODULE 6:**

Measuring Areas – Finding the Coordinate of a Pont – Measuring Distances – Measuring Angles – Getting the General Status of the Drawing – Finding Text in Drawing – Locating and Selecting Components – Printing – Storing the Printer Settings – Plot Styles – Named Plot Styles - Conversion from Color Plot Styles to Named Plot Styles

**Text Books:**

George Omura, "Introducing AUTOCAD 2008", Wiley India, 2007

## 140301 - CNC PROGRAMMING

**OBJECTIVE:** To understand the development process, principles of operation and manufacturing features of CNC machines.

**MODULE 1:**

Introduction to CNC Machine – Definition – Classifications of Numerical Control System – Advantages, Principle of Operation, Distance Measurement, Axis Arrangement, Types, Configuration, Parts Construction of CNC Machines – Coordinate Systems – Grid System – Reference Points – Machine, Part, Program Origin – Coding System – CNC Syntax and Word Address Format – End of Block Code – Accuracy and Repeatability of CNC Machine.

**MODULE 2:**

Constructional Features of CNC Machine – Selection of CNC Machine – Specifications and Format for CNC System – CNC OS - FANUC Operating System – Sinumerik / Hinumerik Operating System – List of Operating Switches

**MODULE 3:**

Programmable Logic Controller Characteristics – G-Function and G-Codes – Cutter Compensation Function – Incremental Programming

**MODULE 4:**

Setting the CNC Machine – Home Position – Coordinate System Preset – Work Coordinates – Tool Offset Consideration – Setting up Tools on the Lathe – Imaginary Tool Tip Method – CNC Turning Centre – Setting up Tools on the Machining Centre – CNC Programming – CNC Machining Centre – CNC Turning Centre – APT Language – Motion Statements

**MODULE 5:**

CNC Metal Cutting Tools – Characteristics of Tool Materials – Cutting Tool Materials – Cutting Tool Material Chart – Calculation Formulae for Turning and Milling – ISO Designation for Tools, Round Shank Tools and Cartridges – Widax-gw Full Form – ISO Designation for Indexable Inserts – Chart for Determining Spindle Speeds – Machining Parameters – Nomogram for Machining Parameters – Widalon/Widadur/Widia Grades for Machining

**MODULE 6:**

Troubleshooting of Machining Process – Drilling – Tapping – Reaming – Spot Facing – Turning – Boring – Milling – Flexible Manufacturing System – Computer Integrated Manufacturing - Robots

**Text Books:**

Binit Kumar Jha, “CNC Programming”, Vikas Publishing House, 2007

## 140703 - MANUFACTURING TECHNOLOGY

**OBJECTIVE:** To impart the practical knowledge about analytical and design aspects of various manufacturing processes.

**MODULE 1:**

Introduction - Manufacturing Processes - Breakeven Analysis - Engineering Prosperities and their Measurement – Strength – Hardness – Ductility – Toughness - Ferrous Materials – Iron - Structure of Materials - Plain Carbon Steels - Cast Irons - Other Alloying Elements - Non-Ferrous Materials – Aluminum – Copper - Other Materials - Heat Treatment of Metals - Hardening – Tempering - Annealing and Normalizing - Case Hardening

**MODULE 2:**

Metal Casting Processes - Patterns - Pattern Allowances - Core Prints - Elimination of Details -Pattern Materials - Types of Patterns - Pattern Color Code - Moulding Materials - Moulding Sand Composition - Testing Sand Properties - Sand Preparation - Moulding Sand Proprieties - Indian Sands -Other Sands – Fluidity - Types of Sand Moulds – Moulding Machines – Cores - Core Sand – Types of Cores - Core Prints – Chaplets - Forces Acting on the Moulding Flasks - Elements of Gating System – Gates - Casting Yield

**MODULE 3:**

Gating System Design - Risering Design - Caline's Method - Modulus Method - Naval Research Laboratory Method - Melting Practice – Casting Cleaning and Casting Defects – Product Design for Sand Castings - Designing for Economical Moulding - Designing for Eliminating Defects - Features to Aid Handling - Special Casting Processes - Shell Moulding Precision Investment Casting - Permanent Mould Casting - Die Casting - Centrifugal Casting - Continuous Casting

**MODULE 4:**

Metal Forming Processes – Rolling – Principle - Stand Arrangements - Rolling Load - Roll Passes - Breakdown Passes - Roll Pass Sequences – Forging - Forging Operations – Forging Types and their Description - Forging Defects and Design - Drop and Upset Forging Die Design - Extrusion Processes -Extrusion Principle – Hot and Cold Extrusion Processes - Tooling for Cold Extrusion – Extruding Tubes - Wire Drawing – Rod and Tube Drawing - Swaging Tube Making - Sheet Metal Die Design - Types Of Die - Die Construction - Punch Design – Pilots - Stripper and Stock Guide - Die Stop - Stock Strip Layout -Components Design for Blanking - Strip Development - Centre Line of Pressure

**MODULE 5:**

Introduction To Fabrication Processes - Gas Welding and Cutting - Electric Arc Welding - Principle of Arc - Arc Welding Equipment – Electrodes - Manual Metal Arc Welding - Carbon Arc Welding - Inert Gas Shielded Arc Welding - TIG - GMAW - SAW - Other Arc Welding Processes

**MODULE 6:**

Resistance Welding - Principle – Resistance Spot Welding - Resistance Seam Welding - Projection Welding - Upset Welding Flash Welding - Other Welding Processes - Welding Design - Heat Input - Heat Flow – Distortions - Defects in Welding - Brazing, Braze Welding and Soldering - Brazing – Braze Welding - Soldering.

**Text Books:**

P.N. Rao, “Manufacturing Technology”, Tata McGraw Hill, 2nd Edition, 2008

## 140702 - TOOL AND DIE TECHNIQUES

**OBJECTIVE:** To provide the major broad general areas of tooling and related techniques.

**MODULE 1:**

Introduction – The Design Procedure – Statement of the problem – The Needs Analysis – Research and Ideation – Tentative Design Solutions – The Finished Design – Drafting and Design Techniques in Tooling drawings – Screws and Dowels – Hole location – Jig-boring practice – Installation of Drill Bushings – Punch and Die Manufacture – Electro-discharge machining – Electro-discharge machining for cavity.

**MODULE 2:**

Introduction – Properties of Materials – Ferrous Tooling Materials – Tool steels – Cast Iron – Mild, or low-carbon Steel – Nonmetallic Tooling Materials – Nonferrous Tooling Materials – Metal cutting Tools – Single-point cutting tools – Milling cutters – Drills and Drilling – Reamer classification – Taps – Tap classification- the selection of carbide cutting tools – Determining the insert thickness for carbide tools

**MODULE 3:**

Introduction – Fixed Gages – Gage Tolerances – The selection of material for Gages – Indicating Gages – Automatic gages – Principles of location – Locating methods and devices – Principles of clamping – Drill jigs – Chip formation in drilling – General considerations in the design of drill jigs – Drill bushings – Methods of construction – Drill jigs and modern manufacturing

**MODULE 4:**

Introduction – Fixtures and economics – Types of Fixtures – Vise Fixtures – Milling Fixtures – Boring Fixtures – Broaching Fixtures – Lathe Fixtures – Grinding Fixtures – Types of Die construction – Die-design fundamentals – Blanking and Piercing die construction – Pilots – Strippers and pressure pads- Presswork materials – Strip layout – Short-run tooling for Piercing

**MODULE 5:**

Introduction - Bending dies – Forming dies – Drawing operations – Determining Blank Size – Drawing Force – Single and Double action Draw Dies – Plastics used as Tooling Materials – Application of Epoxy Plastic Tools – Construction Methods of Plastic Tooling – Metal forming Operations – Calculating Forces

**MODULE 6:**

Introduction – The need for numerical control – A basic explanation of numeric control – Numerical control systems in use today – Fixture design for numerically controlled machine tools – Cutting tools for numerical control – Tool holding methods for numerical control – Automatic tool changers and tool positioners – Tool presetting – Introduction – General explanation of the Brown and sharp machine – tooling for Automatic screw machines

**Text Books:**

Cyrll Donaldson, George H.LeCain, V.C. Goold, “Tool Design”, Tata McGraw Hill, 3rd Edition, 2008.

## 140701 - ENGINEERING MATERIALS

**OBJECTIVE:** To provide a thorough understanding of the properties of metallic materials and metallurgical aspects of various engineering metals and alloys.

**MODULE 1:**

Introduction to Engineering Materials and Carbon Steels – Definition – Classification and Properties of Engineering Materials – Materials Selection

**MODULE 2:**

Introduction to Carbon Steels – Definition – Plain Carbon Steels – Classification of Carbon Steels – Types of Steel – Effect of Minor Elements on Steel Properties – Effect of Carbon on Properties of Steel – Specifications for Steels

**MODULE 3:**

Introduction to Alloy Steels – Alloying Elements in Steels – Effect of Alloying Elements – Classification of Alloy Steels – Miscellaneous Alloy Steels

**MODULE 4:**

Introduction to Cast Irons – Gray Cast Iron – White Cast Iron – Nodular Cast Iron – Malleable Cast Iron – Meehanite – Compacted Graphite Cast Iron – Alloying Elements in Cast Irons – Alloy Cast Irons – Light Metals and Alloys – Aluminium – Magnesium – Beryllium – Titanium

**MODULE 5:**

Introduction to Copper and its Alloys – Commercial Grades of Copper – Copper Alloys – Brasses – Bronzes – Copper-Nickel Alloys

**MODULE 6:**

Introduction to Nickel, Cobalt and their Alloys – Nickel – Nickel Base Alloys – Cobalt – Cobalt Base Alloys – White Metals and their Alloys – Zinc – Cadmium – Lead – Tin – Refractory Metals and Alloys

**Text Books:**

C. P. Sharma, “Engineering Materials”, Prentice Hall India, 2007.

## 140801 - AUTOMOBILE ENGINES

**MODULE 1:**

Introduction to automobile- Brief history- Classification- parts of an automobile- Description- performance- rolling wind and gradient resistance. Heat engines- internal and external combustion engines- development and classification- Application of IC Engines- Engine cycle- energy balance

**MODULE 2:**

Parts of IC engines- cylinder, head, piston, Rings, connecting rod, Crankshaft-Flywheel and Governor –Types of Governors- Value operating mechanisms- Valve -Petrol engine parts- Sparkplug- Operating range- Firing voltage -Carburetor –Fuel pump- Diesel engine parts- Fuel atomizer- IC Engines bore, stroke, BDC, TDC, Swept volume compression ratio.

**MODULE 3:**

Working cycles- Otto cycle, Diesel cycle, Dual combustion cycle- four stoke Ottocycle engines- four stoke diesel cycle engine- Valve timing diagrams- Two stroke petrol engine- Compression ignition engines- Comparison of four stoke and Two stroke engines- SI and CI engines .

**MODULE 4:**

Testing and performance of IC engines-power and mechanical efficiency-basic measurement-speed ,fuel consumption, air consumption ,smoke density, measurement of indicated power-engine friction-measurement of fractional power- engine performance curves- SFC –Fuel consumption load output and exhaust composition-Governing of IC engines-Noise abatment-Heat balance sheet-Morse test

**MODULE 5:**

Miscellaneous engines-dual fuel and multi fuel engines and working- factors affecting combustion- -performance, advantages and applications-stratified charged engine- classification – sterling engine-engine geometry and driving mechanism- sterling vs. Conventional engines- wankel rotary combustion engine-features construction and working- rotor housing ,seals, sparkplug location-clearance and swept volume –power and fuel combustion-advantages and application of rotary combustion engines.

**MODULE 6:**

Construction and working of Two stoke engines- Port timing diagram- disadvantage of Two stoke SI engines and CI engines- Scavenging efficiency- scavenging systems- Loop scavenging- Cross scavenging- Crankcase scavenging-Scavenging pumps blowers.

**Text Books:**

R. K. Rajput, ”Text book of automobile engineering”, Laxmi Publication, New Delhi.

## 140802 - AUTOMOTIVE FUELS AND COMBUSTION

**MODULE 1:**

Fuels for IC engines-Conventional fuels- Gaseous fuels- Liquid fuels- Structure of petroleum-Paraffins, iso paraffins olefins, napthenes, aromatics-composition of crude oil-Fractional distillation-Fuels for SI engines-Volatility-ASTM set- EAD-effects of volatility-vapour lock- Knock rating of SI engine fuels- Highest useful compression ratio- Octane numbers- antiknock index

**MODULE 2:**

Advantages of high octane fuel-properties of SI engine fuels-Diesel fuel- Cetane number-diesel index- alternative fuels for IC engines- -advantages and disadvantages-alcohol as fuels-methane as a fuel –ethanol as fuel-properties of ethanol and methanol –fuel blends-hydrogen as fuel advantages and disadvantages-Natural gas fuel advantages and disadvantages-Biogas.

**MODULE 3:**

Purpose of supercharging-object-supercharging of SI engines-boost pressure and pressure ratio- supercharging power-supercharging of CI engines –Superchargers-supercharging arrangements- turbochargers- altitude compensation-methods of turbo charging-Problems

**MODULE 4:**

Combustion in SI engines- Combustion phenomenon- affecting engine variables on flame propagation – Factors affecting normal combustion – Abnormal combustion - Ignition lag- Spark advance – Effects of pre ignition- detonation effects- control of detonation- knocks

**MODULE 5:**

Performance chamber –Combustion chamber design- Induction Swirl- Squish and table-Quench area- Turbulence- Surface to volume ration- Compression ration- Types of combustion chambers – Divided combustion chamber- Combustion in CI engines- Three phases of CI engine combustion- factors affecting combustion- combustion in diesel engines- Delay period in CI engines –Diesel knock- CI engine combustion chambers- Types- Cold starting aids.

**MODULE 6:**

Cooling air and water requirements. Cooling systems- Role of anti-freeze solution-Phenonmosyphon cooling- Forces cool systems- Prescribed water cooling- Evaporation cooling-Components of water cooling systems. Water jacket ,water pump fan, thermostat, connecting hoses, radiators- Specification -the cooling system cooling system data of some Indian vehicles.

**Text Books:**

R. K. Rajput, ”Text book of automobile engineering”, Laxmi Publication, New Delhi.

## 140803 - CHASSIS, SUSPENSION AND TRANSMISSION

**MODULE 1:**

Chassis- Classification- Fitting of engine- Engine fitted ingrown but crosswise- Frame- Functions- types of frames- defects in chassis frame- body – vehicle dimensions- Introduction to suspension system- Functions and requirements- Elements of a supervision system

**MODULE 2:**

Springs- Types of springs- Dampers- telescopic, rocking lever- Suspension systems- Independent suspension- Four wheel independent front suspension- Stabilizer- Rigid suspension- Independent rear suspension-Interconnected suspension systems- Hydroelectric, hydra gas- Suspension systems of Indian automobiles

**MODULE 3:**

Wheels and tyros – Wire wheel- Light alloy cast rip wheels –Tyres- Functions- Types of tyres- Tubeless tyre- Tyre construction – Radial ply construction - Tyre material- Tyre shape- tread pattern- Tyre markups- type inflation pressure- causes of tyro wear- Factors affecting tyre life- Tyre maintenance- Enhancing tyre life- Wheel balancing systems

**MODULE 4:**

Requirements of transmission system- Types- clutch- gearbox- and line axle transmission- Circles' of transmission system- clutch- Function and requirements – Principal of operation- Friction materials- Friction and cone clutch –Single plate clutch- Multiplate clutch- Plate clutch parts- Centrifugal clutch- automatic clutch adjustment- Gearbox- Ratios- Types of gear boxes- sliding mesh gear box- Constant mesh gear box-

**MODULE 5:**

Synchromesh- Progressive type gear boxes- Maruthi800 Gearbox- Gear shifting- Transfercase- Troubleshooting of gearbox- Gear boxes used in India automobiles – Automatic transmission- Overdrive- Four-wheel unit – Propeller shaft- Hotchkiss type propeller shaft- Crowrushorting universal joints- Construction and working- Type of universal joints- Final drive and differcital- Bevel and hypoid- Bevel gear- Differential-rear axles- Half floating rear axle- Causes of axle failures- Real axle noises-

**MODULE 6:**

Purpose of steering system- Function- Requirements of a good steering system- General arrangement- Working of steering mechanism—Description of steering parts-Steering gears- Worm and roller sleeping gear- rack and pinion sleeping gear- sleeping ration- Reversibiling- Sleeping geometry- Wheel alignment- King pin inclination caster- Toe –Out- Checking of wheel alignment – Steering Mechanisms –Steering gear mechanisms- Under steering and over treeing- steering linkages- steering wheel and column – Steering arm- Draglink –Power steering- Fundamentals- Types of power steering systems- Electronic power steering- steering geometry- steering troubleshooting- Front axle- Construction- Type of front axles- Stub axles- Braking system.

**Text book:**

R. K. Rajput, "Text book of automobile engineering", Laxmi Publication, New Delhi.

## 140804 - AUTOMOBILE BRAKING AND ELECTRICAL SYSTEM

**MODULE 1:**

Introduction- necessity of a braking system-functions of brakes-requirements of a good braking system-classification of brakes mechanical brakes- hand brakes –disc brakes- hydra tic brakes-advantages- bleeding of brakes-hill holder-power brakes-air brakes- main parts-engine exhaust brake-vacuum brakes-electric brakes-factors controlling the stop of an automobile-break shoes and linkages brake testers-break service

**MODULE 2:**

Introduction to electrical system-typical automotive electrical system-battery system-types of batteries-chemistry of a lead acid battery-Zinc air battery-Capacity of a battery-Efficiency, primary, secondary cells-battery rating-battery maintenance-battery charging-battery data of automobiles-factors affecting battery life-battery faults and troubles-dry charged batteries-battery testing-specific gravity test, high rate discharge test-starting motor-description field coil windings –drive unit-Overrunning clutch-Magnetic switch or relay.

**MODULE 3:**

Charging system -Introduction –Necessity and function- requirements-Generator-Working principle of DC generator-Parts of a dynamo-Dynamo regulation-Cut out relay-Regulation for DC generators-Trouble shooting of a dynamo-Alternator-advantages-Working principle of an alternative-Operations-Charging circuits-Alternator regulation-Transistorized regulator.

**MODULE 4:**

Ignition system-Introduction-Purpose of an ignition system-Requirement –Basic ignition systems-Battery system-Working-Components of battery ignition systems-Maintenance- Magnetic ignition system-Firing order-Ignition timings-Spark advance mechanism –Vacuum spark-Spark plugs-Factors affecting ARC-Hot and cold spark plug-Spark plug failure-Limitations of conventional ignition system-Electronic ignition systems-TCI and CDI systems-Break less electronic ignition system-Trouble shooting .

**MODULE 5:**

Lighting and accessories-Main circuits of the automobile electrical system-Car wiring diagram-Symbols used-Lighting system-Wiring circuit –Fuses-Head lights-Pre focus bulb-Head lamp-Head lamp double filament-Light switch-Dimmer and stop light switch-Indicating lights

**MODULE 6:**

Trouble shooting of lighting system-Essential accessories-Types of horn-Windscreen wiper-Water temperature gauge-Speedometer and odometer assembly-Ventilating system-Heating system- Air conditioning system-Components

**Text Books:**

R. K. Rajput, ”Text book of automobile engineering”, Laxmi Publication, New Delhi.

## 140805 – MAINTENANCE MANAGEMENT

**MODULE 1:**

Maintenance Management Perspective – An Overview – Tool of Planned Productivity – Extended Role of Maintenance – Challenges of Technology – Definition – Basic Problems of a Plant Manager – Changing Environment – Maintenance of Environmental Factors – Automation and its Impact – Factors having Adverse Effects on Maintenance Efficiency

**MODULE 2:**

Need for Maintenance Planning – Benefits – Maintenance Objectives – Down Time Management – Two-Pronged Attack – Functions of subsections of Maintenance – Maintenance Engineering and Facilities Management – Organizational Prerequisites – Levels of Organization – Hierarchical Levels – Factors determining Effectiveness of a Maintenance Organization – Objectives of a Organization Design

**MODULE 3:**

Maintenance Systems – Breakdown Maintenance – Routine Maintenance - Planned Maintenance – Preventive Maintenance – Predictive and Corrective Maintenance – Design out of Maintenance – TPM – Contract Maintenance – Design of Maintenance Systems – Criticality Determination – Downtime Costs – Age of Plant – Skill Availability – Bath Tub Curve – Maintenance System Design Optimization

**MODULE 4:**

Analysis of Surveillance Data – Predicted Trend – Objectives of Predictive Maintenance – Optimal Maintenance Costs – Methods of Condition Monitoring – Non-destructive Testing Methodologies – Principles of Trending – Diagnostic Instruments – TPM Documentation – System Components – Facility Register – Maintenance Schedule – Principle of Scheduling – Scheduling Process – Work Specification – Maintenance Research and Documentation

**MODULE 5:**

Maintenance Work Order – Performance Report – Maintenance Control System – Outage Management – Turnaround – Turnaround Manager – Opportunity Maintenance – Network Analysis – Inspection Check list – Frequency of Inspection – Planning for Inspection – Inspection and Testing Facilities – Lubrication – Tribology – Calibration System – Maintenance Quality – Need for Maintenance Training – Levels of Training – Maintenance Incentives

**MODULE 6:**

Safety and its Significance – Safety Principles and Guidelines – Proforma – Fault Tree Analysis – Computer Application – Maintenance Budget – Work Study – Aims, Scope and Methods – Ergonomics – Man as a Component – Activity Sampling – Boiler Maintenance – FID and Lifecycle Costing – Facility Investment Decisions – Evaluation of Maintenance Management – Spares Management – Survey on Spare Practices – Categorization of Spares – Music 3D View of Spares – Relativity and Quality of Spares – Procurement – Stores Representative – Spare Parts Marketing and Pricing – Management of Obsolete Spares – Concept of Maintenance Spares – Simulation of Spares Planning – Insurance Spare Parts – Rotable and Overhauling Spares – Need for Reconditioning – MIS for Spare Parts

**Text Books:** P. Gopalakrishnan, A.K. Banerji, “Maintenance and Spare Parts Management”, Prentice Hall India, 2002.

## 140901 – FUNDAMENTALS OF TEXTILE MATERIALS

**OBJECTIVE:** To provide in-depth knowledge of the origins, properties and manufacture of fabric.

**MODULE 1:**

Plant Fibres – Cellulosic of Vegetable Fibres - Cotton – Linen – Jute – Hemp – Ramie – Sunn – Abaca – Sisal – Coir – Rayon

**MODULE 2:**

Animal Fibres – Wool – Silk – Casein – Fibre – Soyabean Protein Fibre – Peanut Fibre – Corn Fire

**MODULE 3:**

Acetate – Nylon – Dacron – Vinyon – Orlon – Care of Synthetic Fibres – Absestos – Glass Fibre – Metallic Fibres – Rubber – Alginates – Paper Yarns – Plastic

**MODULE 4:**

Making Yarn – Fabric Construction – Finishes and Finishing Materials – Mixed and Blended Yarns – Dyes – Traditional Colors – Dyeing at Home – Batik – Judging and Selecting Clothes – Clothing Plan – Woman's and Children's Clothe – Shoes – Household Textiles

**MODULE 5:**

Laundry Materials and Equipment – Water – Laundry Soaps – Soapless Detergents – Starch – Other Stiffening Agents – Laundry Blues – Additional Laundry Reagents – Absorbents – Bleaches – Laundry Equipment – Irons and Ironing Boards

**MODULE 6:**

Principles of Washing and their Application – Laundering Cottons and Linens – Ironing – Laundering Woolens and Colored Fabrics – Laundering Skills and Rayon & Nylon – Special Types of Laundering – Dry-cleaning – Removing Stains – Cleaning Carpets – Disinfecting Clothing – Storing Clothes

**Text Books:**

Susheela Dantyagi, "Fundamentals of Textiles and their Care", 5th Edition, Orient BlackSwan, 2008

## 140902 - PROCESSING OF KNIT FABRIC

**OBJECTIVE:** To make the students to understand the basics of processing the knitted fabric.

**MODULE 1:**

Fabric Preparation – Objectives – Chemical Processing Treatment – Impurities Present in Gray Cotton and Cotton Fabric - Singeing – Gas Singeing - Desizing Process – Definition and Classification – Merits and Demerits – Applications - Scouring – Definition and Mechanism – Scouring of Cotton Fabric using Kiers - Bleaching – Definition - Hypochlorite and Hydrogen Peroxide Bleaching – Merits and Demerits – Full Bleaching – Brightening and Blueing Agents - Continuous Scouring and Bleaching using J Box – Vertical Drying Range

**MODULE 2:**

Dyeing - Dyes – Definition – Basic Terms related to Dyeing – Classification of Dyes – Dyeing of Cotton with Azoic Dyes – Dyeing of Cotton with Vat Dyes – Dyeing of Cotton with Sulphur Dyes – Dyeing of Cotton with Reactive Dyes – Dyeing of Polyester with Disperse Dyes – Dyeing of Protein Fibres – Dyeing of other Synthetic Fibres – Dyeing Machines

**MODULE 3:**

Printing – Definition – Comparison between Dyeing and Printing – Styles and Methods of Printing – Important Ingredients in the Printing Paste – Printing of Cellulosic Fibre with Reactive and Pigments – Discharge Print Technique on Reactive Dyed Fabric – Resist Style of Printing using Reactive Dyes – Printing of Polyester with Disperse Dyes – Batik printing – Screen Preparation – Table Screen, Flat Bed Screen, Rotary Screen Printing – Curing Chamber – Loop Ager

**MODULE 4:**

Finishing – Definition – Advantages – Types of Finish – Classification of Textile Finishes – Finishing of Cotton Fabric with Stiffeners – Finishing of Cotton Fabric with Softeners – Anti Crease Finish – Anti Shrink Finish – Sanforising Machines - Use of Silicones in Finishing

**MODULE 5:**

Mercerisation – Definition – Advantages of Mercerisation – Effects of Mercerisation – Changes during Mercerisation – Woven Fabric Mercerising – Chain Mercerisation – Chainless Mercerisation – Damping – Calendering - Definition and Objectives – Swizzing Calender – Stenter – Hot Air Stenter

**MODULE 6:**

Importance and Need for Quality Control - Colour Fastness – Colour Fastness to Washing – Colour Fastness to Rubbing – Colour Fastness to Light – Computer Colour Matching – Importance and Need for Environment Protection – Pollution and their Types – Effluent Treatment – Importance of Eco-Friendly Processing – Eco Labels – ISO 14000 EMS

**Text Books:**

P. Angappan, A. Edwin Sunder, V. Ilango, “Textile Chemical Processing”, SSMITT Publication.

## 140903 – KNITTING TECHNOLOGY

**OBJECTIVE:** To make the students to understand the basics of Knitting Technology.

**MODULE 1:**

Weft Knitting Machines and Industry – Knitting Terms and Functional Elements – Selection Criteria in Weft Knitting – Principal Stitches in Weft Knitting – Basic Structures and Notations in Weft Knitting – Basic Machines and Fabrics

**MODULE 2:**

Double Knit Structures – Patterning in Weft Knitting – Needle Selection Techniques in Circular Knitting Machines – Weft Knit Fabric Geometry

**MODULE 3:**

Knitting Dynamics – Quality Control in Circular Weft Knitting – Circular Knitting Developments – Calculations in Weft Knitting

**MODULE 4:**

Finishing of Knitted Fabrics – Wrap Knitting – Functional Elements of Wrap Knitting – Patterning in Wrap Knitting – Tricot and Raschel Machines – Principal Stitches of Wrap Knitting

**MODULE 5:**

Structures of Wrap Knitting – Yarn Preparation, Yarn Feed and Fabric Take-up – Wrap Knit Fabric Geometry and Calculations

**MODULE 6:**

Specialty Wrap Knits – Warp Knitted Technical Textiles – Flat Bed Knitting – Hosiery Socks Knitting

**Text Books:**

N. Anbumani, “Knitting Fundamentals, Machines, Structures and Developments”, 1st Edition, New Age International Publishers, 2007.

## 140904 - TEXTILE TESTING

**OBJECTIVE:** To impart the fundamental aspects of textile testing in different stages like fibre, yarn, and in fabric.

**MODULE 1:**

Introduction to Textile Testing – Importance – Objective of Testing – Testing Bureau – Humidity – Regain and Moisture Content – Atmospheric Conditions and Relative Humidity – Moisture Determination – Effect of Moisture on Properties – Moisture Regain and Moisture Content – Fibre Testing – Fibre Length Measurement – Measurement of the Fibre-fineness – Principles of Fineness Measurement – Maturity of Fibre – Yarn Testing – Direct and Indirect System of Yam-numbering – Length and Weight Measurement – Court Calculations – Yarns Twist and Twist Measurement – Amount of Twist – Twist Measurement.

**MODULE 2:**

Fabric Testing – Length and Width of the Fabric – Fabric Thickness – Crimp of Yarn in Fabric – Air Permeability – Thermal Property of Fabrics – Fabric Stiffness, Handle and Drape – Shirely's Stiffness Tester – Drape Meter – Crease Resistance and Crease Recovery – Measurement of Crease Recovery – Testing of Abrasion Resistance – Assessment of Abrasion Damage – The B.F.T Abrasion Testing Machine – and its Features – Flex Abrasion Tester – Pilling of Fabrics – Water and Fabric Relationship – Wetting of Fabric and Methods of Testing.

**MODULE 3:**

The Tensile Testing – Terminologies and Definitions – Factors affecting the Tensile Properties of Textiles – Yarn Strength Testing – Fabric Strength Testing – Physical Tests – Microscopic Examination – Chemical Tests – Testing Of Yarn – Fibrous Adulteration of Yarn – General Examination of Yarn – Physical Properties of Yarn – Count Calculations – Equivalent Counts – Testing of Woven Fabrics – Width and Length – Determination of Warp and Welt – The Face Side of the Cloth – Determination of Thread Per inch

**MODULE 4:**

Testing of Knitted Fabrics – Testing and Analysis of Textiles – Varieties of Fabrics – The Examination of Cloth – Testing of Bleached Fabrics – Testing of Dyed Fabrics – Testing of Fastness

**MODULE 5:**

Specification of Textile Stores – Testing and Analysis of Textile – Defects in Yarn, Woven Fabrics, Bleached Fabrics, Dyed Fabrics, Knitted Fabrics and Rayon Fabric – Defects due to Faulty Dyeing – Tenderness – Capillarity Tests – Testing of Dyed Materials – Determination of Light Fastness – Fastness to Washing – Fastness to Perspiration – Fastness to Chlorinated Water – Fastness to Chlorination – Fastness to Cross Dyeing – Fastness to Mercerizing – Identification of Dyes – Chromatography

**MODULE 6:**

Testing of Colour – Description of Ostwald's and Munsell's Systems Of Colour Classification – Measurement of Colour – The Costing of Textiles – Costing and Cost Accounting – Elements of Cost – Allocation and Recovery of Expenses – Costing of Yarn – The Cost of Running the Machine – Manufacturing, Training, Profit and Loss Account – Business Phrases – Cloth Contract Terms – Metrication and SI Units in Textile Testing.

**Text Books:**

Raul Jewel, "Textile Testing", APH Publishing, 2009

## 140905 - APPAREL MARKETING AND MERCHANDISING

**OBJECTIVE**: The subject aims at familiarizing the students with world fashion scenario.

**MODULE 1**:

Merchandising and Supply Chain Management –Supply Chain management – lean retailing – Design and Procurement – Grey Market sourcing – Supplier search – Global sourcing – Supplier Assessment criteria – Supplier Development – Evaluation – Monitoring – Visual Merchandising – Brand management – Brand Engagement .

**MODULE 2**:

Fashion Merchandising – Fashion Shows – Skills for Fashion Merchandising - Seasonal Fashion Merchandising – Readymade clothing – Technology for Apparel Manufacturing – Overview of Textile and Apparel Industries – Fabric Friction.

**MODULE 3**:

Apparel Production Planning and Control – Production Planning – Employment – Textile and Apparel Sourcing – Labour, Material and Shipping Costs – Trade Agreements.

**MODULE 4:**

Costing of Apparel Product – Earnings – Impact of Labour cost on Apparel Retail Prices – The Personal Apparel Assessment – Ansell's Cost Reduction Mandates - Revenue Model.

**MODULE 5:**

Fashion Marketing and Merchandising – Retail Growth – Multiunit Retailing – Political climate – Conglomeration – Concentration – Internationalization – Mass market Generalists – Warehouse clubs – Mass market specialists - Suburban malls – Retail line of Business Shifts – Limits to Growth – Implications.

**MODULE 6:**

Apparel Production Management – Spread of Organizational Innovation – Determinants of Organizational Innovation – Strategies for Competitiveness – Organizational Innovation in the Apparel Industry – High Involvement Practices – Cluster of Practices and the Presence of Complementaries – Determinants of the Adoption of Innovative Practices – Apparel Quality Management.

**Text Books**:

Mathew Robin, "Apparel Merchandising", Book Enclave Publishers, First Edition, 2008.

## 140901 – FUNDAMENTALS OF TEXTILE MATERIALS

**OBJECTIVE:** To provide in-depth knowledge of the origins, properties and manufacture of fabric.

**MODULE 1:**

Plant Fibres – Cellulosic of Vegetable Fibres - Cotton – Linen – Jute – Hemp – Ramie – Sunn – Abaca – Sisal – Coir – Rayon

**MODULE 2:**

Animal Fibres – Wool – Silk – Casein – Fibre – Soyabean Protein Fibre – Peanut Fibre – Corn Fire

**MODULE 3:**

Acetate – Nylon – Dacron – Vinyon – Orlon – Care of Synthetic Fibres – Absestos – Glass Fibre – Metallic Fibres – Rubber – Alginates – Paper Yarns – Plastic

**MODULE 4:**

Making Yarn – Fabric Construction – Finishes and Finishing Materials – Mixed and Blended Yarns – Dyes – Traditional Colors – Dyeing at Home – Batik – Judging and Selecting Clothes – Clothing Plan – Woman's and Children's Clothe – Shoes – Household Textiles

**MODULE 5:**

Laundry Materials and Equipment – Water – Laundry Soaps – Soapless Detergents – Starch – Other Stiffening Agents – Laundry Blues – Additional Laundry Reagents – Absorbents – Bleaches – Laundry Equipment – Irons and Ironing Boards

**MODULE 6:**

Principles of Washing and their Application – Laundering Cottons and Linens – Ironing – Laundering Woolens and Colored Fabrics – Laundering Skills and Rayon & Nylon – Special Types of Laundering – Dry-cleaning – Removing Stains – Cleaning Carpets – Disinfecting Clothing – Storing Clothes

**Text Books:**

Susheela Dantyagi, "Fundamentals of Textiles and their Care", 5th Edition, Orient BlackSwan, 2008

## 140902 – PROCESSING OF KNIT FABRIC

**OBJECTIVE:** To make the students to understand the basics of processing the knitted fabric.

**MODULE 1:**

Fabric Preparation – Objectives – Chemical Processing Treatment – Impurities Present in Gray Cotton and Cotton Fabric - Singeing – Gas Singeing - Desizing Process – Definition and Classification – Merits and Demerits – Applications - Scouring – Definition and Mechanism – Scouring of Cotton Fabric using Kiers - Bleaching – Definition - Hypochlorite and Hydrogen Peroxide Bleaching – Merits and Demerits – Full Bleaching – Brightening and Blueing Agents - Continuous Scouring and Bleaching using J Box – Vertical Drying Range

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Dyeing - Dyes – Definition – Basic Terms related to Dyeing – Classification of Dyes – Dyeing of Cotton with Azoic Dyes – Dyeing of Cotton with Vat Dyes – Dyeing of Cotton with Sulphur Dyes – Dyeing of Cotton with Reactive Dyes – Dyeing of Polyester with Disperse Dyes – Dyeing of Protein Fibres – Dyeing of other Synthetic Fibres – Dyeing Machines

**MODULE 3:**

Printing – Definition – Comparison between Dyeing and Printing – Styles and Methods of Printing – Important Ingredients in the Printing Paste – Printing of Cellulosic Fibre with Reactive and Pigments – Discharge Print Technique on Reactive Dyed Fabric – Resist Style of Printing using Reactive Dyes – Printing of Polyester with Disperse Dyes – Batik printing – Screen Preparation – Table Screen, Flat Bed Screen, Rotary Screen Printing – Curing Chamber – Loop Ager

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Finishing – Definition – Advantages – Types of Finish – Classification of Textile Finishes – Finishing of Cotton Fabric with Stiffeners – Finishing of Cotton Fabric with Softeners – Anti Crease Finish – Anti Shrink Finish – Sanforising Machines - Use of Silicones in Finishing

**MODULE 5:**

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**MODULE 6:**

Importance and Need for Quality Control - Colour Fastness – Colour Fastness to Washing – Colour Fastness to Rubbing – Colour Fastness to Light – Computer Colour Matching – Importance and Need for Environment Protection – Pollution and their Types – Effluent Treatment – Importance of Eco-Friendly Processing – Eco Labels – ISO 14000 EMS

**Text Books:**

P. Angappan, A. Edwin Sunder, V. Ilango, “Textile Chemical Processing”, SSMITT Publication.

## 141001 – FASHION AND APPAREL DESIGN

**OBJECTIVE:** To provide a fundamental concepts and principles of fashion and apparel designing.

**MODULE 1:**

Fashion and Fashion Designing – Definition and Importance – Elements of Fashion – Classification of Fashion – Fashion Cycle – Factors Influencing Fashion – Fashion Creation – Basic Terminologies Related to Fashion Industry and Fashion Technology

**MODULE 2:**

Divisions of Cloth Designing – Basic Silhouettes – Elements of Art – Principles of Design – Colors and their Meanings – Color Wheel – Using of Colors – Color Schemes – Qualities of Colors – Some Traditional Textiles of India – Costumes and Fashion

**MODULE 3:**

Terms used for Clothing – Fashion Industry – Importance – Reportage in the Trade and Commercial Press – Present Structure of the Fashion Industry – Textiles and Materials in the Fashion Industry – Structure of the Fashion Market

**MODULE 4:**

Fashion Promotion – Basics – Fashion Advertising – Fashion Journalism – Fashion Shows – Fashion Message Windows – Fashion Designers and their Famous Labels – International Designers View of Well Dressing – Future Fashions

**MODULE 5:**

Prints – Definition and Importance – Types of Prints – Necklines – Definition and Importance – Types of Necklines – Sleeve Styles – Cuffs

**MODULE 6:**

Collars – Definition and Basic Styles – Types of Collars – Skirts Shapes and Silhouettes – Basic Silhouettes – Pants – Pockets – Hats – Waist Bands – Bows and Ties

**Text Books:**

G.J. Sumathi, “Elements of Fashion and Apparel Design”, New Age International Publishers, 2008.

## 140904 - TEXTILE TESTING

**OBJECTIVE:** To impart the fundamental aspects of textile testing in different stages like fibre, yarn, and in fabric.

**MODULE 1:**

Introduction to Textile Testing – Importance – Objective of Testing – Testing Bureau – Humidity – Regain and Moisture Content – Atmospheric Conditions and Relative Humidity – Moisture Determination – Effect of Moisture on Properties – Moisture Regain and Moisture Content – Fibre Testing – Fibre Length Measurement – Measurement of the Fibre-fineness – Principles of Fineness Measurement – Maturity of Fibre – Yarn Testing – Direct and Indirect System of Yam-numbering – Length and Weight Measurement – Court Calculations – Yarns Twist and Twist Measurement – Amount of Twist – Twist Measurement.

**MODULE 2:**

Fabric Testing – Length and Width of the Fabric – Fabric Thickness – Crimp of Yarn in Fabric – Air Permeability – Thermal Property of Fabrics – Fabric Stiffness, Handle and Drape – Shirely's Stiffness Tester – Drape Meter – Crease Resistance and Crease Recovery – Measurement of Crease Recovery – Testing of Abrasion Resistance – Assessment of Abrasion Damage – The B.F.T Abrasion Testing Machine – and its Features – Flex Abrasion Tester – Pilling of Fabrics – Water and Fabric Relationship – Wetting of Fabric and Methods of Testing.

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**MODULE 6:**

Testing of Colour – Description of Ostwald's and Munsell's Systems Of Colour Classification – Measurement of Colour – The Costing of Textiles – Costing and Cost Accounting – Elements of Cost – Allocation and Recovery of Expenses – Costing of Yarn – The Cost of Running the Machine – Manufacturing, Training, Profit and Loss Account – Business Phrases – Cloth Contract Terms – Metrication and SI Units in Textile Testing.

**Text Books:**

Raul Jewel, "Textile Testing", APH Publishing, 2009

## 140905 - APPAREL MARKETING AND MERCHANDISING

**OBJECTIVE**: The subject aims at familiarizing the students with world fashion scenario.

**MODULE 1**:

Merchandising and Supply Chain Management –Supply Chain management – lean retailing – Design and Procurement – Grey Market sourcing – Supplier search – Global sourcing – Supplier Assessment criteria – Supplier Development – Evaluation – Monitoring – Visual Merchandising – Brand management – Brand Engagement .

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**MODULE 4:**

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**MODULE 6:**

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## 140901 – FUNDAMENTALS OF TEXTILE MATERIALS

**OBJECTIVE:** To provide in-depth knowledge of the origins, properties and manufacture of fabric.

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**MODULE 2:**

Animal Fibres – Wool – Silk – Casein – Fibre – Soyabean Protein Fibre – Peanut Fibre – Corn Fire

**MODULE 3:**

Acetate – Nylon – Dacron – Vinyon – Orlon – Care of Synthetic Fibres – Absestos – Glass Fibre – Metallic Fibres – Rubber – Alginates – Paper Yarns – Plastic

**MODULE 4:**

Making Yarn – Fabric Construction – Finishes and Finishing Materials – Mixed and Blended Yarns – Dyes – Traditional Colors – Dyeing at Home – Batik – Judging and Selecting Clothes – Clothing Plan – Woman's and Children's Clothe – Shoes – Household Textiles

**MODULE 5:**

Laundry Materials and Equipment – Water – Laundry Soaps – Soapless Detergents – Starch – Other Stiffening Agents – Laundry Blues – Additional Laundry Reagents – Absorbents – Bleaches – Laundry Equipment – Irons and Ironing Boards

**MODULE 6:**

Principles of Washing and their Application – Laundering Cottons and Linens – Ironing – Laundering Woolens and Colored Fabrics – Laundering Skills and Rayon & Nylon – Special Types of Laundering – Dry-cleaning – Removing Stains – Cleaning Carpets – Disinfecting Clothing – Storing Clothes

**Text Books:**

Susheela Dantyagi, "Fundamentals of Textiles and their Care", 5th Edition, Orient BlackSwan, 2008

## 141101 – FIBRE PREPARATION

**OBJECTIVE:** To make the students to understand the processes involved in preparation of the textile fibre material before converting into yarn.

**MODULE 1:**

Ginning – Objectives of Ginning – Types of Gins – Pre and Post Ginning Equipments – Influence on Ginning of Cotton Fibre – Precautions to be taken in Ginning – Factors Affecting Ginning Performance – Pressing and Baling of Cotton

**MODULE 2:**

Blow Room – Objectives – Stages Involved in Blow Room Process – Auto Mixer and Multimixer Machine - Opener and Cleaning Section – Classification of Openers and Beaters – Feeding Techniques – Beater Elements – Conventional Openers and Beaters – Improved Openers and Beaters – Features of Recent Development in Openers and Beaters.

**MODULE 3:**

Lap Forming – Conventional Scutchers – Automatic Modern Scutchers – Fibre Recovery Plants – Categories of Waste – Economical Importance – TEMOFA's Clean Star System – TRUTZCHLER's Fibre Recovery System – Reiter System – Process of Clean Waster

**MODULE 4:**

Carding – Definition and Objectives – Passage of Cotton through a Revolving Flat Card and Functions of Various Parts – Card Clothing – Flexible Wire Clothing – Stripping - Objectives of Stripping – Major Developments of Stripping – Grinding – Purposes of Grinding – Types of Grinding – Grinding Medium – Types of Grinding Rollers – Procedure for Grinding a Card – Metallic Card Clothing – Salient Features of High Production Cards – Doffing Devices – Cros Rol Varga and India Rol

**MODULE 5:**

Combing – Objectives and Advantages – Preparatory Machines for Combing – Silver Lap Machine - Ribbon Lap Machine – Super Lap Machine – Lap Former – Heilmann Comber – Nasmith Comber – Comparison between Heilmann and Nasmith Combers – Settings and Timings Procedure for New Comber.

**MODULE 6:**

Drawing Process – Objectives – Draw Frames – Passage of Card Silver through Draw Frame – Weighting System for Top Rollers – Loose Boss Rollers - Stop Motions – Concepts of Mechanical and Electrical Stop Motions – Top and Bottom Clearers – Gearing Arrangements of Draw Frames - Roller Drafting – Rollers Slip.

**Text Books:**

A. Venkatasubramani, "Spun Yarn Technology - Volume I, II, III", Saravana Publications, Madurai.

## 141102 – YARN MANUFACTURING AND QAULITY CONTROL

**OBJECTIVE:** To familiarize the students with the finial processes involved in preparation of the yarn.

**MODULE 1:**

Blending – Definition of Perfect Blending and Mixing - Objectives of Blending – Selection of Cotton – Blending Techniques – Blending Equipments – Precautionary Steps for Better Blending – Volume Vs Weight Blending – Weighing Hopper Feeder – Modern Bale Openers – Limitations of Blenders.

**MODULE 2:**

Fly Frame – Definition and Objectives – Passage of Roving Material through Fly Frame – Drafting and Weighting System – Traverse Motion – Flyers – Roving Bobbin – Presser and its Functions – Gearing Arrangement of Fly Frame – Principle of Winding – Differential Motion – Rovematic Speed Frame.

**MODULE 3:**

Simplex Frame – Objectives – Functions of Various Parts of Simplex Frame – Doubling – Objectives – Draw Frame Doubling and its Merits - Modern High Speed Draw Frames – Salient Features of Zinser, ER700, Blending and RSB51 Draw Frames.

**MODULE 4:**

Quality Control – Selection of Efficient Blow Room Lines – Modern Blow Room Lines for Good Grade Cotton – Process Parameters – Quality Forms – Achieving Quality Forms – Build of Lap – Nep Control and Waste Losses - Process Control in Carding – Performance Assessment – Waste – Cleaning Efficiency – Nep Control – Measurement of Evenness – Defects and Remedies.

**MODULE 5:**

Quality Control in Draw Frame – Objectives – Unevenness – Wrapping Variability – Average Hank – Sliver Breakage Rate – Effect of Poor Draw Frame Performance – Process Parameters – Various Maintenance Checks – Defects and Remedies.

**MODULE 6:**

Quality Control in Combing – Objectives – Performance Assessment – Waste and Waste Variation – Short Fibre and Nep Removal – Principles of Settings and Timings for Best Results – Lap Quality – U% of Comber Sliver – Comber Stoppages – Nature of Effects and its Impact – Improving Performance of Comber.

**Text Books:**

A. Venkatasubramani, “Spun Yarn Technology - Volume I, II, III”, Saravana Publications, Madurai.

## 141103 – SPINNING MAINTENANCE

**OBJECTIVE:** To make the students to understand the various aspects of maintaining spinning machineries.

**MODULE 1:**

Tools – Spanners – Sockets and Accessories – Allen Key – Try Square – Steel Rule – Feeler and Dial Gauge – Hammers – Spirit Level – Vernier and Digital Vernier Caliper – File – Chisels – Screw Drivers – Vices – Punch – Hacksaw - Taps – Die and Die Stock – Grinding Wheels – Stud Extractor – Kit for Mounting of Bearing – Pullers – Micrometer – Drilling – Requirements of Tools for Erection and Installation.

**MODULE 2:**

Temporary Fasteners – Screwed Joints – Types of Bolts and Screws – Washer – Locking Device – Key – Tension Element – Pins – Retaining Rings – Taper Lock – Bearings – Elements of Bearings – Materials for Bearings – Types of Bearings – Ball Bearings – Roller Bearings – Thrust Bearings – Bearing Construction – Internal Clearance – Lubrication of Bearings – Mounting and Dismounting of Bearings – Bearing Failures and Examinations.

**MODULE 3:**

Lubricants – Types of Lubrication – Types of Lubricants – Liquid Lubricants – Lubricating Oils – Properties of Liquid Lubricants – Semisolid Lubricants – Solid Lubricants – Lubricants used in Spinning Mill – Conservation of Lubricants – Oil Seals – Material Selection – Necessity of Garter Spring – Procedure for Installation – Seal Failure.

**MODULE 4:**

Belts – Types of Belt Drives – Flat Belt Drives: Types, Installation, Jointing Procedure, Spindle Tapes – Flat Pulley – V Belts: Constructional Details, Types, Storage Procedure, Installation, Mounting Procedure, Maintenance – V Pulleys – Timing Belts: Tensioning Rollers, Dimensions, Installation, Mounting Procedure, Maintenance, Storage Procedure – Types of Belts Used in Spinning Mills.

**MODULE 5:**

Ropes – Classification of Ropes – Chains – Chain Lubrication – Gears – Spur Gears – Helical and Spiral Gears – Worm Gears – Bevel Gears – Gear Trains – Reasons for the Failure of Gear Teeth – Fluid Drive – Clutches – Positive Clutches – Friction Clutches and its Types – Brakes – Types of Brakes.

**MODULE 6:**

Pneumatic System – Advantages and Disadvantages – Compression of Air – Free Air – Production of Compressed Air – Selection of Compressor – Receiver for Air Compressor – Moisture – Quality of Water Required for Compressor – Pneumatic Cylinder – Regulator – Lubricator – Moisture Separator – Minimum Pressure Switch – Filters – Different Types of Valves – Speed Control Device – Silencer – Piping – Pressure Hoses – Push Type Fitting – Connectors – Dial Indicator – Maintenance of Pneumatic Systems.

**Text Books:**

Neeraj Nijhawan, “Comprehensive Hand Book on Spinning Maintenance – Part 3”, The Textile Association of India, 2006.

## 141104 – INDUSTRIAL MANAGEMENT

**OBJECTIVE:** To familiarize the students with the installation, production, and maintenance of the industrial operation.

**MODULE 1:**

Project Planning – Concept and Factors Governing Plant Location – Rural Vs Urban Plant Sites – Plant, Process and Product Layouts – Methods of Plant and Factory Layouts – Process Planning – Basic Concept – Process Planning Procedure – Machine Capacity – Equipment Selection Procedure – Selection of Materials – Process Charts and Flow Diagrams.

**MODULE 2:**

Inspection and Quality Control – Definition and Objectives – Kinds of Inspection – Inspection of Incoming Materials – Inprocess Inspection – Inspection of Finished Goods – Statistical Quality Controls - Plant Maintenance – Objectives and Importance – Duties of Plant Maintenance Department – Organization Structure – Types of Maintenance – Plant Maintenance Schedule – Replacement Analysis – Reasons for Replacement – Factors to be Considered for Replacing Equipments.

**MODULE 3:**

Concepts of Management, Administration and Organization – Functions of Management – Evolution of Management Thought : Taylor's Scientific Management, Fayol's Principles of Management – Systems Approach to Management – Levels and Types of Management – Industrial Management – Project Management – Supervisory and Leadership.

**MODULE 4:**

Industrial Psychology – Objectives – Industrial Psychology Vs Personnel Management - Theory X and Y – Hawthorne Experiment - Morale and Motivation - Personnel Management – Objectives – Characteristics of a Good Personnel Policy - Education and Training – Safety Engineering – Accidents - Good Housekeeping – Labour Welfare – Communication in Industry..

**MODULE 5:**

Materials Management – Functions and Objectives – Concept of Procurement – Buying Techniques – Purchasing Procedure – Stores and Material Control – Store Records – Inventory Control – Inventory Management – Objectives and Functions – EOQ – ABC Analysis – MRP – Material Handling – Functions – Types and Maintenance of Material Handling Equipments.

**MODULE 6:**

HRM – Functions of HRM – Job Evaluation – Merit Ratings – Wage Payment and Incentive Plans – Marketing Management – Functions - Marketing Vs Selling - Marketing Mix - Role and Concept of Small Scale Industries – Entrepreneurship – Functions and Qualities of Entrepreneur – Environmental Pollution – Ecology – Factors Causing Pollution – Effects of Pollution – Types of Pollution and its Control – Solid Waste Management.

**Text Books:**

O. P. Khanna, "Industrial Engineering and Management", Dhanpat Rai Publications, New Delhi, 2009.

## 141201 – INTRODUCTION TO GRAPHICS AND MULTIMEDIA

**OBJECTIVE:** To impart the fundamental concepts of Computer Graphics and Multimedia.

**MODULE 1:**

Introduction – Graphical Input and Output Devices – Raster Scan Video Principles – Random Scan Devices – Graphic Accelerators and Graphics Co-Processors – Scan Conversion – Polynomial Method – DDA Algorithms – Bresenham's Algorithms – Midpoint Methods – Problems of Scan Conversion – Solid Areas or Polygons – Inside-Outside Test – Solid Area Filling Algorithms

**MODULE 2:**

2D Geometrical Transformation – Basic Transformations – Homogenous Coordinate System – Other Transformations – Combined Transformations – Inverse of Combined Transformations – Display File – Segments – Algorithms for Segment Table and Display File – 3D Geometrical Transformation – Basic Transformations – Other Transformations – Parallel Projection – Perspective Projection – Image Formation Inside a Camera

**MODULE 3:**

2D Viewing and Clipping – Windows and View ports – Viewing Transformation – Clipping of Lines in 2D – Concepts of Parametric Clipping – Generalized 2D Line Clipping – Polygon Clipping – Clipping Against Concave Windows – 3D Viewing and Clipping – Viewing Transformation Matrix in 3D – Clipping of Lines in 3D – Clipping in Homogenous Coordinates – Clipping Using Normalized Windows – Curve Design

**MODULE 4:**

Hidden Surface Elimination – Modeling Illumination – Shading – Shadow – Assigning Intensity Levels to Gray Shades – Concepts of Colors – CIE Color Standard

**MODULE 5:**

Multimedia Basics – Concepts of Multimedia – Digital Video – MIDI – Image Compression Standards – Video Compression and Encoding – Hypertext and Hypermedia – Virtual Reality – Basics – Virtual Reality Markup Language (VRML) – Building a VRML World

**MODULE 6:**

Image File Formats – BMP Format – JPEG and JFTF – GIF Format – TIFF File – Animation and Flash Overview – Development of Animation – Non-Computer and Computer Based Animation – Flash Basics – The Flash Work Environment – Drawing Overview – Using Layers – Creating Text Boxes – Creating Animation – Publishing and Exporting

**Text Books: -**

Malay K. Pakhira, "Computer Graphics-Multimedia and Animation", Prentice Hall India, New Delhi

**References: -**

Donald Hearn, M. Pauline Baker, "Computer Graphics"- Prentice Hall India, 2nd Edition

## 141202 - MULTIMEDIA AND WEB DESIGNING TOOLS

**OBJECTIVE:** To provide all-round exposure on various multimedia and web development tools

**MODULE 1:**

Introduction to Computers – Computer Hardware - Introduction to Windows – Windows XP – Mouse Basics – Working in Windows XP – Learning More About the Mouse – Performing Mouse Actions – Components of a Window – Quitting Windows XP

**MODULE 2:**

Introduction to Photoshop CS2 – Photoshop Basics - Working with Images – Making Selections – Painting, Drawing and Retouching Tools – Layers – Filters

**MODULE 3:**

CorelDraw Basics – Drawing and Selecting – Working with Text – Working with Images – Page Layout and Background

**MODULE 4:**

Introduction to HTML – Document Overview – Head Elements – Section Headings – Block Oriented Elements – Lists – Uniform Resource Locators – Hypertext Links – Images – Tables – Frames - Forms

**MODULE 5:**

Introduction to Dreamweaver MX – Working with Tables, Anchors and Frameset – Layers and Style sheets – Forms and Media Elements

**MODULE 6:**

Introduction to Sound Forge – Creating a Project in Sound Forge – Opening an Audio File and Saving it as Workspace – Import a Media File – File Properties – Editing in Sound Forge – Effects – Recording in Sound Forge

**Text Books:**

Vikas Gupta, “Multimedia and Web Design”, Dreamtech Press, 2008

## 141203 – FLASH AND 3DS MAX

**OBJECTIVE:** To provide all the aspects of various animation tools

**MODULE 1:**

Introduction to Flash – Flash Files and Flash Player – The Flash Workspace – The Panels – Component Inspector Panel – Working with Graphics and Colors – Understanding Vector and Bitmap Graphics – Drawing Models in Flash – Selecting Objects in Flash – Creating Graphics in Flash – Setting Pen Tool Preferences – Fills and Outlines – The Color Palette – Using the Color Swatches Panel – Using the Color Mixing Panel – Applying a Locked Gradient as a Fill

**MODULE 2:**

Transforming and Aligning Graphics – Grouping the Objects – Understanding the Stacking Order of Objects – Breaking Apart Groups and Objects – Transforming the Objects – Aligning the Objects – Symbol and Library – Creating Library – Creating a Button – Editing Symbols – Modifying the Instance of a Symbol – Using the Library – Using the Common Libraries – Opening the Library – Creating the Custom Libraries.

**MODULE 3:**

Animation in Flash – Working with Timeline Effects – Using the Transform Timeline Effect – Using the Explode Timeline Effect – Using the Frame-by-Frame Animation Technique – Using Motion Tweening to Create Animations – Using Shape Tweening to Create Animations – Animating Filters – Applying the Bevel Filter – Applying the Glow Filter – Animating the Filter using the Motion Tween.

**MODULE 4:**

Introduction to 3dsMax – Understanding the 3dsMax Interface Elements – Working with Viewports – Setting System Units – Managing 3dsMax Files – Working with Objects – Working with Primitive Objects – Modifying the Primitives – Selecting Objects – Transforming Objects – Hiding / Freezing the Objects – Cloning Objects – Mirroring Objects – Grouping Objects – Aligning Objects – Aligning the Objects Using Quick Align Tool.

**MODULE 5:**

Modifiers – Types – Modifier Stack – Using Modifiers – Objects and Modifiers sub-objects – Applying the Bend Modifier – Applying the Taper Modifier – Applying the Twist Modifier – Applying the Noise Modifier – Applying the Stretch Modifier – Applying the Squeeze Modifier – Working with 2D Shapes – Shape Primitives – Creating a Line, Star, Text – Creating Multi Spline Shapes – Modifying the Splines – Rendering Splines – Making Splines Editable – Combining Shapes – Cross Section Feature – Editing Vertices.

**MODULE 6:**

Lights – Standard and Photometric Lights – Key Light, Fill Light and Back Light – Default Lightning – Creating Standard Light Objects – Modifying Parameters of Light Object – Animation in 3dsMax – Understanding Frames, Key Frames and Keys – 3dsMax Animation Tools – Changing the number of Frames – Animating Objects in Auto Key and Set Key Mode – Working with the Motion Panel – Assigning a Path Constraint

**Text Books:** Vikas Gupta, “Multimedia and Web Design”, Dreamtech Press, 2008

## 141204 – ANIMATION USING MAYA

**OBJECTIVE:** To provide clear knowledge about the use, design and implementation of animation software development using Maya 2008

**MODULE 1:**

Introduction to Maya 2008 – Workflow of 3D Content Development – Installing Maya 2008 – Steps to Start Maya 2008 – Exploring Maya 2008 User Interface – Exiting Maya 2008 – Working with Projects and Scenes – Viewing the Workspace – Working with Objects – Grouping and Ungrouping Objects – Duplicating Objects – Working with Construction History

**MODULE 2:**

Polygon Modeling in Maya 2008 – Exploring the Components of a Polygon Mesh – Creating a Polygon Mesh – Modifying a Polygon Mesh

**MODULE 3:**

NURBS Modeling – NURBS Curves – Creating a NURBS Curve – Editing a NURBS Curve – Creating NURBS Surface – Editing a NURBS Surface

**MODULE 4:**

Animating Objects in Maya 2008 – Basics – Types of Animation – Using the Animation Controls – Animating an Object Using Key Frame Animation – Adding Sound to an Animation – Previewing an Animation

**MODULE 5:**

Shading, Texturing and Lighting – Shader Types – Shader Attributes – Hyper shade – Using Hyper shade – Maya Lights – Adding Shadows – Mental Ray Lighting – Lightning Effects

**MODULE 6:**

Rendering Scenes in Maya 2008 – Types of Rendering and Renderers – Using the Render Settings Window - Working with a Camera – Adding Depth of Field – Adding Motion Blur – Rendering a Scene using Maya Software Renderer – Rendering Nodes – Working with Rendering Layers – Using the Mental Ray for Maya Renderer

**Text Books:**

“Maya 2008 – Simple Steps”, Dreamtech Press, 2008

## 141205 – PRINCIPLES OF VIRTUAL REALITY

**OBJECTIVE:** To impart the fundamental aspects, principles and applications of virtual reality technology.

**MODULE 1:**

Introduction to Virtual Reality – Definition – Three I's of Virtual Reality – Virtual Reality Vs 3D Computer Graphics – Components of VR System - Input Devices – 3D Position Trackers - Performance Parameters – Types of Trackers - Navigation and Manipulation Interfaces – Gesture Interfaces – Types of Gesture Input Devices.

**MODULE 2:**

Output Devices – Graphics Display – Human Visual System – Personal Graphics Displays – Large Volume Displays – Sound Displays – Human Auditory System – The Convolvotron – Speaker Based 3D Sound – Haptic Feedback – Human Haptic System – Tactile and Force Feedback Interfaces.

**MODULE 3:**

Computing Architectures of VR – Rendering Principle – Graphics and Haptics Rendering – PC Graphics Architecture – Graphics Accelerators – Graphics Benchmarks – Workstation Based Architectures – Sun Blade 1000 Architecture – SGI Infinite Reality Architecture – Distributed VR Architectures – Multipipeline Synchronization – Collocated Rendering Pipelines – Distributed Virtual Environments.

**MODULE 4:**

Modeling – Geometric Modeling – Virtual Object Shape – Object Visual Appearance – Kinematics Modeling – Transformation Matrices – Object Position – Transformation Invariants – Object Hierarchies – Viewing the 3D World – Physical Modeling – Collision Detection – Surface Deformation – Force Computation – Force Smoothing and Mapping – Behavior Modeling – Model Management.

**MODULE 5:**

VR Programming – Toolkits and Scene Graphs – WorldToolKit – Java 3D – Comparison of WorldToolKit and Java 3D - GHOST – PeopleShop – Human Factors in VR – Methodology and Terminology – VR Health and Safety Issues – VR and Society.

**MODULE 6:**

VR Applications – Medical Applications of VR – Education, Arts and Entertainment – Military VR Applications – Emerging Applications of VR – VR Applications in Manufacturing – Applications of VR in Robotics – Information Visualization.

**Text Books:**

Grigore C. Burdea, Philip Coiffet, "Virtual Reality Technology", 2nd Edition, Wiley India, 2006.