

# Chhattisgarh Swami Vivekananda Technical University, Bhilai

Name of program: **Bachelor of Technology**  
Branch: **Mechatronics Engineering**  
Subject: **Machine Design**  
Total Theory Periods: **03**  
Class Tests: **Two (Minimum)**  
ESE Duration: **Three Hours Maximum**

Semester: **VI**  
Code: **C067611(067)**  
Total Tutorial Periods: **01**  
Assignments: **Two (Minimum)**  
**Marks: 100    Minimum Marks: 35**

## *Course Objectives:*

- To choose proper materials to different machine elements depending on their physical and mechanical properties.
- To design and analyze basic elements of machine e.g. key, shaft and axle.
- To design and analyze various type of joints for members with axial load.
- To design and analyze spur, helical and bevel gears.
- To design and analyze rolling contact bearings.
- To design and analyze journal bearing.

## **UNIT I (Introduction & Machine Elements)**

General Considerations: Selection of Materials, Design Stress, Factor of Safety, Stress concentration factor intension, bending and torsion, theories of failures. Notch sensitivity, design stress for variable and repeated loads, fatigue stress concentration factor, endurance diagrams.

Spring: Spring materials and their mechanical properties, equation for stress and deflection, helical coil springs of circular section for tension, compression and torsion, dynamic loading, fatigue loading, Wahl line, leaf spring and laminated spring.

## **UNIT III (Machine Elements)**

Shafts and Axles: Transmission shaft, Design against static load, Design for strength, rigidity and stiffness, design under continuous loading for fatigue.

Clutches: Friction clutches, Friction materials, Torque transmitting capacity, Single & Multiple plate clutch, centrifugal clutches.

## **UNIT II (JOINTS)**

Threaded fasteners: Geometry of thread forms, terminology of screw threads and thread standards, specifications of steel bolts, initial tension, and relation between bolt tension and torque, design of statically loaded tension joints, design of bolted joints due to eccentric loading.

Riveted Joints: Types of rivet heads, types of riveted joints, failure of riveted joint, strength of rivet joint, efficiency of riveted joint, design of riveted joint for boiler.

Welded joints: Types of welded joints, stresses in butt and fillet welds, strength of welded joints, location and dimension of weld design, eccentrically loaded joint, welded joint subjected to bending moment, design procedure, fillet welds under varying loads, stress relieving techniques.

#### **UNIT IV (GEARS)**

GEARS: Spur Gears, Gear Drives, Classification of Gears, Selection of Type of Gears, Force Analysis, Gear Tooth Failures, Selection of Material, Number of Teeth, Face Width, Beam Strength of Gear Tooth, Effective Load on Gear Tooth, Estimation of Module Based on Wear Strength, Lewis equation, Gear Design for Maximum Power Transmitting Capacity, Gear Lubrication.

Helical Gears: Virtual Number of Teeth, Tooth Proportions, Force Analysis, Beam Strength of Helical Gears, Effective Load on Gear Tooth, Wear Strength of Helical Gears.

#### **UNIT V (BEARINGS)**

Bearings: Rolling Contact Bearings - Types of ball and roller bearings, selection of bearing for radial and axial load, bearing life, Mounting and lubrication, shaft scales – contact type and clearance type.

#### **TEXT BOOKS:**

1. Design of Machine Elements- V.B.Bhandari - TMH, New Delhi
2. Mechanical Engineering Design - Shigley – McGraw Hill, Delhi

#### **REFERENCE BOOKS:**

1. Machine Design - Movnin – MIR Publishers, Moscow
2. Machine Design - Fundamental & Application – Gope – PHI, New Delhi
3. Machine Design - Sharma & Agrawal – Katson, New Delhi
4. Principles of Mechanical Design - R. Phelan – McGraw Hill, New Delhi.
5. Machine Design – Sundarajamoorthy & Shanmugum – Anuradha Agencies, Chennai

#### ***Course Outcomes:***

- Apply knowledge of machine design for understanding, formulating and solving engineering problems.
- Acquire knowledge and hands-on competence in applying the concepts in the design and development of mechanical systems.
- Demonstrate creativeness in designing new systems components and processes in the field of engineering in general and mechanical engineering in particular.
- Identify, analyze, and solve mechanical engineering problems useful to the society.
- Work effectively with engineering and science teams as well as with multidisciplinary designs.

**Chhattisgarh Swami Vivekananda Technical University, Bhilai**

Name of program: **Bachelor of Technology**  
Branch: **Mechatronics Engineering**  
Subject: **Industrial and Power Electronics**  
Total Theory Periods: **03**  
Class Tests: **Two (Minimum)**  
ESE Duration: **Three Hours Maximum**

Semester: **VI**  
Code: **C067612(067)**  
Total Tutorial Periods: **01**  
Assignments: **Two (Minimum)**  
**Marks: 100 Minimum Marks: 35**

***Course Objectives:***

- To understand the basics of Power Electronic Devices such as SCRs
- To obtain concepts of various types of power conditioning circuits
- To study various types of heating and welding control.
- To get knowledge of various types of a.c. power conditioners

**UNIT I Silicon Controlled Rectifiers:** General idea of thyristor family members. SCR- Construction, Principle of operation, characteristics & SCR Terminologies, Different methods of turning on of SCRs. Different methods of turning off of SCRs. Different methods of triggering SCR Circuits, Series & Parallel operation of SCRs, Load commutation; Forced commutation; External pulse commutation.

**UNIT II Power Conditioning Circuits:** Inverters: Line Commutated Inverters, Forced Commutated Inverters. Dual Converters: Phase controlled dual converter, Single-phase dual converter, Three phase dual converter, Circulating current type dual converter – Mid-point configuration & Dual bridge configuration. Choppers: Principle of operation, Chopper control technique, Voltage step-down & Step-up chopper, Jones Chopper.

**UNIT III Cyclo-converters & Protection Circuits:** Single phase/Single phase – Midpoint configuration & Bridge configuration, Three phase/Single phase cyclo-converter: Types-Circulating current type, Non-circulating current type. . Protection of devices and circuits: Cooling and heat sinks, Snubber circuits, Reverse recovery transients.

**UNIT IV Heating and Welding Control: Induction heating:** Theory, Principle, Effects of supply frequency, and Choice of frequency, Applications. **Dielectric heating:** Electronic theory, Principle, heating in materials of irregular shape, Limitations, Effect of variation of supply voltage & frequency, Applications. **Welding:** Theory of Resistance welding, Classification of Resistance welding, and Scheme for AC Resistance welding.

**UNIT V AC Power Conditioner:** Power supply Noise: Origin, Effect on computer & Communication systems, Reduction of noise, Different forms of noise, Requirements and characteristics of the computer power supply system, Types of power line disturbances, Effects of power line disturbances on sensitive electronic equipment. Servo System: Servo Motor, Principle of Buck-Boost control Servo controlled voltage stabilizer, Servo-controlled voltage stabilizer. Constant voltage transformer UPS: On-line & Off-line.

**Text Books:**

1. Power Electronics: M. D. Singh, Khanchandani, TMH
2. Power Electronics: Devices. Circuit & MATLAB Simulation by Alok Jain, PENRAM publications
3. Industrial and Power Electronics : Deodatta Shingare, Electrotech Publication

**Reference Books:**

1. Industrial & Power Electronics: H.C. Rai, Umesh Publications.
2. Power Electronics: P.C. Sen, TMH

3. Power Electronics circuits, devices and application By M.H.Rashid. (PHI)
4. Power Electronics By Bimbra Khanna Publications.
5. Power Electronic systems: Theory and design By J. P. Agrawal (Pearson Education)

***Course outcomes:***

- The students will get knowledge of basic power electronic devices and how they differ from other electronic devices.
- To get the basic knowledge of inverter, cylo-converter, dual converter and choppers.
- The basic knowledge of heating and welding control is obtained.
- The knowledge of voltage stabilizer and UPS is obtained.

**Chhattisgarh Swami Vivekananda Technical University, Bhilai**

Name of program: **Bachelor of Technology**

Branch: **Mechatronics Engineering**

Subject: **Digital Signal Processing and its Applications**

Total Theory Periods: **03**

Class Tests: **Two (Minimum)**

ESE Duration: **Three Hours Maximum**

Semester: **VI**

Code: **C067613(067)**

Total Tutorial Periods: **01**

Assignments: **Two (Minimum)**

**Marks: 100 Minimum Marks: 35**

***Course Objectives:***

- To understand the concepts of Fourier and Z transform associated with discrete time systems.
- To receive knowledge of various linear time invariant systems.
- To realize FIR & IIR filters and its MATLAB programming.
- To get knowledge of various applications of DSP

**UNIT I** Realization of Systems: Realization of digital linear system, IIR Structure: Ladder structure, Lattice Structure, state space structure, FIR structure: Linear phase FIR system, MATLAB Programming for realization of IIR & FIR Structure Only.

**UNIT II** Infinite Impulse Response Filter design (IIR): Analog & Digital Frequency transformation. Designing by impulse invariance & Bilinear method. Butterworth and Chebyshev Design Method.

**UNIT III** Finite Impulse Response (FIR) Filter Design: Rectangular, Triangular, Hamming, Blackman & Kaiser Window. Linear Phase and Optimal Filter.

**UNIT IV** Multirate DSP: Introduction, Sampling, Sampling rate alteration, Polyphase filter structure: Polyphase decomposition, Digital filters Design, Multistage Decimator and Interpolators.

**UNIT V** Applications of Digital Signal Processing: Introduction, Applications of DSP: Digital Sinusoidal Oscillators, Digital Time Control Circuits, Applications of DSP in Image Processing Applications of DSP in speech processing, Digital and binary images, Spatial image Processing and noise removal, Computer vision fundamentals, Edge detection and processing.

**Text Books:**

1. Digital Signal Processing, Vallavaraj, Salivahanan, Gnanapriya, TMH
2. Digital Signal Processing, Proakis, Manolakis & Sharma, Pearson Education

**Reference Books:**

1. Digital Signal Processing, Nair, PHI
2. Discrete Time Signal Processing, Oppenheim & Schaffer, Pearson - PHI
3. Digital Signal Processing by Hussain, Umesh Publications.
4. Digital Signal Processing, J. Johnson, Pearson - PHI

***Course Outcomes:***

- The students will get knowledge about application of Fourier and Z transform with respect to Digital signal processing.
- They will receive the basic knowledge of FIR and IIR filters and its design.
- The basic knowledge of various application of DSP is obtained.
- All the aforementioned design will also be studied using MATLAB.

**Chhattisgarh Swami Vivekananda Technical University, Bhilai**

Name of program: **Bachelor of Technology**

Branch: **Mechatronics Engineering**

Subject: **Hydraulic and Pneumatic Control Systems  
(Professional Elective –II)**

Semester: **VI**

Code: **C067631(067)**

Total Theory Periods: **02**

Class Tests: **Two (Minimum)**

ESE Duration: **Three Hours Maximum**

Total Tutorial Periods: **01**

Assignments: **Two (Minimum)**

**Marks: 100 Minimum Marks: 35**

***Course Objectives:***

- To understand the different types of Fluid Logic Elements.
- To understand the Fluid Power System.
- To study about the pumps and the actuators.
- To gain knowledge about hydraulic circuits.

**UNIT I**

**Fluid Power System:** Components, Advantages, Applications in the field of machine tools, Material handling, Presses, Mobile and stationary machines, Clamping & indexing devices etc., Transmission of power at static and dynamic states.

**Hydraulic Fluid:** Types of hydraulic fluids, Properties of fluid, Selection of fluids, JIC/ISO symbols for hydraulic circuits.

**UNIT II**

**Pumps:** Types, Classification, Principle and working of vane, Gear, Radial and axial plunger pumps, Power and efficiency calculations, Selection of pumps for hydraulic transmission.

**Actuators:** Linear and Rotary actuators, Hydraulic motor types & construction methods of control of acceleration, Types of cylinder and mountings, Calculation of piston velocity, Thrust under static and dynamic application.

**UNIT III**

**Control of Fluid Power:** Principle, Working types of the following valves, Pressure control, Direction control, Flow control, Relief valves, Sequence valves.

**Hydraulic Circuits:** Meter in, Meter out circuits, Pressure control for cylinders, Flow divider circuits, Circuit illustrating use of pressure reducer valves, Counter balance valves, Unloading valves with the use of electrical control, Regenerative, Pump unloading, Double-pump, Air-over oil, Sequence, Reciprocation, Synchronization, Fail-safe, Speed control, Hydrostatic transmission, Mechanical hydraulic servo systems.

**UNIT IV**

**Pneumatic System:** General features, Brief system comparison between hydraulics and pneumatics, Properties of air, Compressor, Air compressor types-reciprocating, Rotary and screw type, Air dryers

**Air Preparation Units:** FRL unit, Service unit, Pneumatic valves and actuators, Pneumatic circuits with single acting and double acting cylinders, Filters, Regulator, Lubricator, Muffler, Air control valves, `Or`, `And`, Quick exhaust and time delay valves

**Concept Of Low Cost Automation:** Technologies used, Electro-pneumatics

## UNIT V

**Accumulators and Intensifiers:** Types, Function, Application, Selection and design procedure.

**Trouble Shooting and Applications:** Installation, Selection, Maintenance, Trouble shooting and remedies in hydraulic and pneumatic systems, Design of hydraulic circuits for drilling, Surface grinding, Press and forklift applications, Design of pneumatic circuits for pick and place applications and tool handling in CNC machine tools.

### TEXT BOOKS:

- 1.Oil Hydraulic Systems-Principles and Maintenance by S.R.Majumdar, TMH
- 2.Hydraulic and Pneumatic Controls by R Srinivasan ,Vijay Nicole Imprints Private Limited
- 3.Hydraulic and Pneumatic Controls (Understanding Made Easy ) by K Shanmuga Sundaram, S Chand and Company

### REFERENCE BOOKS:

1. Industrial Hydraulics – Pipenger & Hicks, Mc Graw Hill Company, New York
2. Fluid Power – Goodwin
3. Hydraulics and Pneumatics – A Technician and Engineers Guide by Andrew Parr, JAICO Books

### *Course Outcomes:*

- The students will get knowledge about Fluid Logic Elements.
- They will receive the knowledge of Fluid Power System.
- The knowledge of Pumps and Actuators will be obtained.
- The knowledge of Hydraulic Circuits and Accumulators will be obtained

**Chhattisgarh Swami Vivekananda Technical University, Bhilai**

Name of program: **Bachelor of Technology**

Branch: **Mechatronics Engineering**

Subject: **Computer Graphics(Professional Elective-II)**

Total Theory Periods: **02**

Class Tests: **Two (Minimum)**

ESE Duration: **Three Hours Maximum**

Semester: **VI**

Code: **C067632(067)**

Total Tutorial Periods: **01**

Assignments: **Two (Minimum)**

**Marks: 100    Minimum Marks: 35**

**Course Objectives:**

- To understand the different types of Computer Devices.
- To understand basic Raster Graphics Algorithm for drawing 2-D primitives.
- To study about 2-D geometric transformation.
- To gain knowledge about 3-D Concepts and curves .

**UNIT - I**

**Introduction,**

Application Areas. Input and Output Devices:- Keyboard, Mouse,Z mouse Trackball, Joysticks, Data Glove, Digitizers, Light pen, Touch Panels, Image scanners, Printers and Plotters. Video Display Devices: Refresh CRT; Raster & Random scan display; Color CRT monitor; Flat panel display; Co-ordinate representation.

**UNIT – II**

**Basic Raster Graphics Algorithm for drawing 2-D primitives**

Output Characteristics: Aspect ratio; Aliasing and Anti-aliasing. Line Drawing Algorithms: DDA algorithm; Bresenham's algorithm. Circle Generation Algorithm: Midpoint circle algorithm. Ellipse Generation Algorithm: Mid-point ellipse algorithm. Area filling: Inside-outside test; Boundary fill algorithm- 4 and 8 connected area; flood-fill algorithm.

**UNIT - III**

**2-D Geometric Transformation**

Window and View port: Window and View port relationship; World co-ordinates; Normalized device co-ordinates and Homogenous co-ordinates. Basic Transformations: Translation; Rotation and Scaling. Other Transformation: Reflection and Shear. Composite Transformation.

**UNIT - IV**

**2-D Viewing and Clipping**

Viewing world coordinates system, normalized coordinate system, device, image coordinate system, window definition, view port definitions, viewing transformation. Clipping: Point clipping; Line: Cohen-Sutherland algorithm, Mid-point Polygon.

**UNIT - V**

**3-D Concepts and curves**

3-D Display Methods: Parallel and Perspective projections; 3-D Transformation: Basic Transformations: translation, rotation and scaling

**Curves**

Spline Representation, Bezier Curves single and multiple segments , Cubic-spline.and their parametric forms

## **TEXT BOOKS**

1. Computer Graphics – N. Krishnamurthy –TMH
2. Donald Hearn and M. Pauline Baker- Computer Graphics with C version - Low Price Edition, 2nd Edition, 2002.

## **REFERENCE BOOKS**

1. Rogers and Adams - Mathematical Elements for Computer Graphics – TMH
2. Xiang and Plastok - Schaum's Outlines Computer Graphics - TMH, 2nd Edition, 2002.
3. Harrington - Computer Graphics - McGraw Hill
4. Rogers, "Procedural Elements for Computer Graphics – TMH
5. Cad Cam Theory and Practice by Ibrahim Zeid - TMH publications

### ***Course Outcomes:***

- The students will get knowledge about the computer devices.
- They will receive the knowledge of Raster Graphics Algorithm.
- The knowledge of 2-D geometric transformation.
- The students will know the basics of 3-D Concepts and curves

**Chhattisgarh Swami Vivekananda Technical University, Bhilai**

Name of program: **Bachelor of Technology**

Branch: **Mechatronics Engineering**

Subject: **Numerical Analysis (Professional Elective-II)**

Total Theory Periods: **02**

Class Tests: **Two (Minimum)**

ESE Duration: **Three Hours Maximum**

Semester: **VI**

Code: **C067633(067)**

Total Tutorial Periods: **01**

Assignments: **Two (Minimum)**

Marks: **100**    **Minimum Marks: 35**

**Course Objectives:**

- To understand the different types of Approximation and Errors in Computation.
- To understand basic Empirical laws, Curve Fitting & Interpolation.
- To study about Numerical Solution of Ordinary Differential Equations.
- To study about Numerical Solutions of Partial Differential Equations.
- To gain knowledge about MATLAB Fundamentals.

**UNIT- I**

**Approximation and Errors in Computation:** Approximation and round of errors, truncation errors and Taylor Series, Determination of roots of polynomials and transcendental equations by Graphical methods and Bisection, Regula-falsi, Secant and Newton-Raphson methods, Solution of Linear simultaneous, linear algebraic equations by Gauss Elimination Gauss-Jordan and Gauss-Seidel iteration method.

**UNIT-II**

**Empirical laws, Curve Fitting & Interpolation:** Curve fitting linear and non-linear regression analysis (Method of group average and Least squares) Finite differences, backward, forward and central difference relation and their use in Numerical differentiation and integration and their application in interpolation.

**UNIT- III**

**Numerical Solution of Ordinary Differential Equations:** Numerical integration by Trapezoidal rule, Simpson's (1/3rd & 3/8th) rule and its error estimation. Application of difference relations in the solution of partial differential equations. Application of difference relations in the solution of partial differential equations. Numerical solution of ordinary differential equations by Taylor's series, Euler, Modified Euler, Runge-Kutta and Predictor-Corrector method.

**UNIT-IV**

**Numerical Solutions of Partial Differential Equations:** Introduction, Classification of second order equations, Finite difference approximations to partial derivatives, Elliptic equations, solution of Laplace equation, Solution of Poisson's equation, Solution of elliptic equations by relaxation method, Parabolic equations, Solution of one-dimensional heat equation, Solution of two-dimensional heat equation, Hyperbolic equations, solution of wave equation.

**UNIT-V**

**MATLAB Fundamentals:** Brief introduction, Use of MATLAB, Key features, Command window, Workspace, Command history, Working with the MATLAB user interface, Basic commands, Assigning variables, Operations with variables, Character and string, Arrays and vectors, column vector, row vector, BODMAS rules, Arithmetic operations and special characters, Mathematical and logical operators, solving arithmetic equations, Creating rows and

columns, Matrix, Matrix operations, Finding transpose, determinants and inverse, trigonometric functions, fractions, real numbers, basic plotting functions, 2D and 3D plots, simple programming codes

**Text Books:**

1. Numerical Methods in Engineering & Science – Dr. B.S. Grewal – Khanna Publishers
2. Numerical Methods – P. Kandasamy, K. Thilagavathy & K. Gunavathy – S. Chand & Co
3. Getting Started with MATLAB: A quick introduction for scientist and engineers – Rudra Pratap - Oxford University Press, New York

**Reference Books:**

1. Introductory Methods of Numerical Analysis – S.S. Sastry, 3rd Edn. – PHI – New Delhi, 2003
2. Numerical Mathematical Analysis – James B. Scarborough, 6th Edn. – Oxford & IBH Publishing Co. – New Delhi
3. Theory & Problems in Numerical Methods – T. Veerarajan, T. Ramchandran – TMH, New Delhi, 2004
4. Numerical Methods for Engineers – Steven C. Chapra, Raymond P. Canale, 4th Edn. – TMH, New Delhi
5. Advanced Guide to MATLAB: Practical Examples in Science and Engineering - S. N. Alam, S. Islam, S. K. Patel - I K International Publishing House Pvt. Ltd – New Delhi

***Course Outcomes:***

- The students will get knowledge about Approximation and Errors in Computation.
- They will receive the knowledge of Empirical laws, Curve Fitting & Interpolation.
- The knowledge of Numerical Solution of Ordinary and partial Differential Equations.
- The students will know the basics of MATLAB.

**Chhattisgarh Swami Vivekananda Technical University, Bhilai**

Name of program: **Bachelor of Technology**

Branch: **Mechatronics Engineering**

Subject: **Principle of Management (Professional Elective-II)**

Total Theory Periods: **02**

Class Tests: **Two (Minimum)**

ESE Duration: **Three Hours Maximum**

Semester: **VI**

Code: **C067634(067)**

Total Tutorial Periods: **01**

Assignments: **Two (Minimum)**

**Marks: 100 Minimum Marks: 35**

**Course Objectives:**

- To introduce the basic concepts and functions of management.
- To understand Production Planning and Control .
- To study about marketing and finance management.
- To understand inventory management.

### **UNIT I**

**Basic concepts and functions of management:** Nature, Purpose and Objectives of basic functions of management, Authority and Responsibility, social responsibility of manager, management ethics.

**Production Planning and Control:** Functions, Organization, Aggregate planning and strategies, Materials Requirement Planning, Routing, Loading, Scheduling Dispatching - priority rules, Sequencing, Johnson's algorithm for n jobs; 2 machines, 3 machines, and m machines, Break even analysis, Gantt's chart, Flow process chart.

### **Unit II**

**Marketing and Financial Management:** Marketing Environment, Advertising and Sales Promotion, Sales forecasting; Purposes, methods - linear regression, time-series analysis, moving average, exponential smoothing.

**Inventory Management:** Objectives, scope and functions of inventory control, types of inventories, inventory control techniques, Economic ordering quantity Procurement cost, carrying charges, lead-time, reorder point, simple problems, ABC analysis.

### **Unit III**

**Work Study:** Definition, advantages and procedure of work-study, Difference between production and productivity, Factors to improve productivity.

**Method Study:** Definition, objectives and procedure of method study. Symbols, flow process chart (man-machine and material), flow diagram, machine chart, two hand process chart. Principles of motion economy. Therblig symbols, SIMO chart and simple problems.

**Work Measurement:** Time study, definition, principle and method of time study Stop watch study - calculation of basic time, rating techniques, normal time, allowances and standard time simple numerical problems. Work Sampling - Definition, method, advantages and disadvantage of work sampling Applications.

## UNIT IV

**Job Evaluation:** Objective, Methods of job evaluation, job evaluation procedure, merit rating (Performance appraisal).

**Wages and incentive plans;** Rowan plan, Taylor's differential piece rate system, Emerson's efficiency plan, Halsey's 50-50 plan, Bedaux plan

## Unit V:

**Human resource management:** Nature and Scope of Human Resource Planning, Recruitment and Selection, Training and Development, Career Growth, Grievances, Motivation – needs and types, Maslow hierarchy of needs theory, Herzberg two factor theory, job enrichment and job enlargement.

**Statistical quality control:** Difference between inspection and quality control, acceptance sampling, procedure's risk and consumer's risk, operating characteristic curve for single sampling plan, AOQL quality of design, quality of performance, quality of conformance, SQC charts for variables and attributes; Introduction to JIT manufacturing, Kanban system.

## TEXT BOOKS:

1. Industrial Engineering and Production Management -Martand Telsang - S.Chand.
2. Production and operations Management - Panneerselvam. R-PHI
3. Introduction of work study - ILO, Geneva - Universal Publishing Corporation, Bombay
4. Production & Operation Management – S.N. Chary – TMH, Delhi
5. Statistical Quality Control – M. Mahajan – Dhanpat Rai & Co. (P) Ltd.

## REFERENCE BOOKS:

1. Industrial Engineering & Management,A new perspective- Philip E Hicks - McGraw Hill
2. Industrial Engineering & Management - S. Dalela& Mansoor Ali - Standard Publishers.
3. Production and operation Management - By R. Mayer - TMH, New Delhi
4. Production and operations Management by –Adam and Ebert –PHI,New Delhi
5. Marketing Management- Kotler Philip- Prentice Hall of India
6. Human Resource Management - Luthans Fred - McGraw Hill, Inc.
7. Statistical Quality Control – R.C. Gupta – Khanna Publishers, Delhi

### ***Course Outcomes:***

- The students will know about the Organization , Production systems and Cost analysis.
- The students will know about the Inventory Management.
- They students will understand the work study and method study.
- The students will be able to appreciate the methods of Quality Control

**Chhattisgarh Swami Vivekananda Technical University, Bhilai**

**Name of program: Bachelor of Technology**

**Branch: Mechatronics Engineering**

**Subject: Computer Aided Modeling & Analysis Lab**

**Total Periods: 02**

**Semester: VI**

**Code: C067621(067)**

**Maximum Marks: 40**

**Minimum Marks: 20**

**List of Experiments (Minimum ten experiments):**

**Solid Modeling**

- i. Part modeling 1
- ii. Part modeling 2
- iii. Part modeling 3
- iv. Assembly modeling 1
- v. Assembly modeling 2
- vi. Assembly modeling 2

**Simulation Lab**

- i. Simulation and analysis of a truss
- ii. Simulation and analysis of a cantilever beam with load
- iii. Simulation and analysis of a cantilever beam with UD
- iv. Thermal analysis of a copper plate
- v. Thermal analysis of a pipe
- vi. Fluid flow analysis through a pipe

**Chhattisgarh Swami Vivekananda Technical University, Bhilai**

**Name of program: Bachelor of Technology**

**Branch: Mechatronics Engineering**

**Subject: Digital Signal Processing and its Applications Lab**

**Total Periods: 02**

**Maximum Marks: 40**

**Semester: VI**

**Code: C067622(067)**

**Minimum Marks: 20**

**List of Experiments (Minimum ten experiments):**

1. Program to generate discrete signal (sine, cosine, exponential, unit ramp, unit step, unit impulse).
2. Program for linear convolution and circular convolution of any two sequences.
3. Program for cross-correlation and autocorrelation of any two sequences.
4. To sample a sinusoidal signal at Nyquist rate.
5. Program for computing discrete Fourier transform.
6. Program for implement inverse discrete Fourier transform.
7. Program to generate fast Fourier transform of signal.
8. To implement IIR filter (LP/HP/BPF) using Butterworth filter.
9. To implement FIR filter (LP/HP/BPF) using any window technique.
10. Program for down sampling a sinusoidal sequence by a factor M.
- 11 Program for down sampling and up sampling the sum of two sinusoidal using inbuilt decimation and interpolation function by a factor M.
12. Program for computing convolution and m-fold decimation by polyphase decomposition.
13. Study of an ADPCM system implementation using a DSP simulator.
14. Implementation of an ADPCM system using a DSK.
- 15 Simulation of the CELP Speech coder using the Code Composer.
- 16 Simulation of the ADPCM Speech coder using the Code Composer.
- 17.Simulation of the LPC Speech coder using the Code Composer.
- 18.Study of a clock recovery system implementation using a DSP simulator.
19. Implementation of Carrier recovery system using a DSK.

**List of Equipments/Machine Required:**

C++ Compiler, MATLAB with Tool boxes, DSP Processor kit, Digital Storage CRO, Spectrum Analyzer.

**Recommended Books:**

1. Digital Signal Processing, Vallavaraj, Salivahanan, Gnanapriya, TMH

**Chhattisgarh Swami Vivekananda Technical University, Bhilai**

**Name of program: Bachelor of Technology**

**Branch: Mechatronics Engineering**

**Subject: Simulation Laboratory**

**Total Periods: 02**

**Maximum Marks: 40**

**Semester: VI**

**Code: C067623(067)**

**Minimum Marks: 20**

**Experiments to be performed (Minimum Ten experiments to be performed)**

1. To Design, implement and Simulate Fixed bias and self bias transistorized circuit for determining the bandwidth
2. To Design, implement and Simulate Fixed bias and self bias for studying the low frequency and high frequency effect.
3. To Design, implement and Simulate Miller integrator for determining the nonlinearities.
4. To Design, implement and simulate current Sweep generator for determining the nonlinearities.
5. To Design, implement and Simulate Inverting and non inverting amplifier for determining the bandwidth
6. To Design, implement and Simulate Integrator & differentiator for studying output responses for different inputs.
7. To Design, implement and Simulate zero crossing detector & comparator for studying output responses for different inputs.
8. To Design, implement and Simulate Series Voltage regulator.
9. To Design, implement and Simulate 1st & 2nd order LPF for determining the bandwidth and studying output responses for different inputs.
10. To Design, implement and Simulate 1st & 2nd order HPF for determining the bandwidth
11. To Design, implement and Simulate Half wave & Full wave rectifier with op-Amp for determining the bandwidth.
12. To Design, implement and Simulate Series and Shunt Clipper for studying output responses
13. To Design, implement and Simulate Clamping circuit for studying output responses for different inputs
14. To Design, implement and Simulate Clamping Circuit with op-Amp for studying output responses for different inputs.
15. To Design, implement and Simulate Instrumentation Amplifier using three op-Amp for determining the bandwidth
16. To Design, implement and Simulate Monostable & Astable using 555 timer
17. To Design, implement and Simulate R -2R ladder type Digital to analog converter
18. To Design, implement and Simulate Flash type Analog to digital

**List of Equipments/Machine Required:**

Desktop PCs, Simulation Software for Analog Circuits like MULTISIM, PSPICE etc.

**Recommended Books:**

1. Experiments and SPICE Simulations in Analog Electronics Laboratory, Maheswari & Anand, PHI
2. Manuals of MULTISIM
3. Manuals of PSPICE

**Chhattisgarh Swami Vivekananda Technical University, Bilai**

**Name of program: Bachelor of Technology**  
**Branch: Mechatronics Engineering**  
**Subject: Hydraulics and Pneumatics control Lab**  
**(Professional Elective II Lab)**

**Semester: VI**  
**Code: C067624(067)**

**Total Periods: 02**  
**Maximum Marks: 40**

**Minimum Marks: 20**

**LIST OF EXPERIMENTS**

**Experiments to be performed (Minimum Ten experiments to be performed)**

1. To understand the working and construction of hydraulic components and basic circuits
2. Speed control of Hydraulic cylinder through Throttle valve/Flow Control Valve.
3. Electro Hydraulic circuit –Speed and Pressure control of double acting cylinder
4. Electro Hydraulic circuit—Sequential operation of double acting cylinder through Limit switches/Proximity Switches.
5. To control double acting hydraulic cylinder through 4/3 solenoid operated D.C. valve.
6. To understand the working and construction of pneumatic components and basic circuits
7. To carry out memory control of Double Acting Pneumatic Cylinder
8. Time dependent control of a pneumatic double acting cylinder
9. Pressure-dependent control of a pneumatic double acting cylinder
10. To understand use of Quick Exhaust & Flow control valve.
11. To control the speed of Double acting pneumatic cylinder by Flow Control valves (Meter -Out)
12. To control Double acting pneumatic cylinder through 5/2 D.C. Valve
13. To illustrate pneumatic circuit involving two pneumatic cylinders, operated by a single DC Valve
14. To understand use of Logic element ‘OR’ gate and ‘AND’ gate
15. To illustrate the use of Time Delay valve

List of Equipments required:

1. Electro-Hydraulic Trainer Kit
2. Pneumatic Trainer Kit
3. Hydraulics and Pneumatics Software

**Chhattisgarh Swami Vivekananda Technical University, Bilai**

**Name of program: Bachelor of Technology**

**Branch: Mechatronics Engineering**

**Subject: Computer Graphics Lab  
(Professional Elective II Lab)**

**Semester: VI**

**Code: C067625(067)**

**Total Periods: 02**

**Maximum Marks: 40**

**Minimum Marks: 20**

**EXPERIMENTS TO BE PERFORMED (MINIMUM TEN NUMBERS)**

1. To develop the concept of Computer Graphics in C
2. DDA Line drawing algorithm
3. Bresenham's Line drawing algorithm
4. Bresenham's Circle drawing algorithm
5. Mid point circle drawing algorithm
6. Bezier curve
7. Cohen Sutherland Clipping algorithm
8. Mid point clipping algorithm
9. Mid point Ellipse drawing algorithm
10. Matrix Multiplication
11. 2-D Transformation (Move, Rotate, Scale)
12. Cubic Spline

**LIST OF EQUIPMENTS/MACHINES REQUIRED**

1. P-IV, 2.6 G. Hz., 128/256 MB SDRAM, 40 GB HDD, 1.44 MB FDD, 14" Colour Monitor, 52 X CD RW, Laser Scroll Mouse
2. Software Required – C & C++

**Chhattisgarh Swami Vivekananda Technical University, Bilai**

**Name of program: Bachelor of Technology**  
**Branch: Mechatronics Engineering**  
**Subject: Numerical Analysis Lab**  
**(Professional Elective II Lab)**

**Semester: VI**  
**Code: C067626(067)**

**Total Periods: 02**  
**Maximum Marks: 40**

**Minimum Marks: 20**

**EXPERIMENTS TO BE PERFORMED (MINIMUM TEN EXPERIMENTS)**

1. To study introduction to MATLAB
2. To study basic matrix operations
3. To solve linear equation
4. To study 2D and 3D plotting with interpretation.
5. Solution of Linear equations for Underdetermined and Overdetermined cases using MATLAB.
6. Determination of Eigen values and Eigen vectors of a square matrix.
7. Solution of Difference Equations.
8. Solution of Difference Equations using Euler Method.
9. Solution of differential equation using Runge- Kutta method.
10. Determination of roots of a polynomial.
11. Determination of polynomial using method of Least Square Curve Fitting.
12. Determination of polynomial fit, analyzing residuals, exponential fit and error bounds from the given data.
13. Write a program to calculate the area and perimeter of the rectangle. The length and breadth of a rectangle are input through keyboard.
14. Write a program to calculate the area and circumference of the circle. The radius of a circle will be input through keyboard.
15. Determination of time response of an R-L-C circuit.

**Chhattisgarh Swami Vivekananda Technical University, Bhilai**

**Name of program: Bachelor of Technology**

**Branch: Mechatronics Engineering**

**Subject: Principle of Management Lab  
(Professional Elective II Lab)**

**Semester: VI**

**Code: C067627(067)**

**Total Periods: 02**

**Maximum Marks: 40**

**Minimum Marks: 20**

**EXPERIMENTS TO BE PERFORMED (MINIMUM TEN EXPERIMENTS)**

1. To prepare the charts & diagrams for a selected problem according to the existing method and an improved method -men type flow process chart.
2. To prepare the charts & diagrams for a selected problem according to the existing method and an improved method -material type flow process chart
3. To prepare the charts & diagrams for a selected problem according to the existing method and an improved method -machine type flow process chart
4. Study of principles of fundamentals of hand motion.
5. To draw two handed process chart for bolt, washer & nut assembly
6. Pin board study experiment.
7. Standard time calculation problems.
8. Stop watch time study of a job.
9. Case study on Sales Forecasting.
10. Quality Analysis of a product carried out in a manufacturing organization.
11. To study and construct Xbar and R charts for given process
12. To study and construct p chart for given process
13. To study and construct c chart for given process
14. Case study on Analysis of Inventory control in an organization.
15. To study and calculate coefficient of correlation or time study person using performance rating technique.

## Chhattisgarh Swami Vivekananda Technical University, Bhilai

|   |   |
|---|---|
| Program / Semester: <b>B.Tech (VI)</b>                    | Branch: <b>Humanities</b>               |
| Subject: <b>Technical Communication &amp; Soft Skills</b> | Course Code: <b>C000601(046)</b>        |
| Total Marks (Internal Assessment): 10                     | L: 0 T:0 P: 2 Credit(s): 0              |
| Internal Assessments to be conducted: 02                  | Duration (End Semester Exam): <b>NA</b> |

**UNIT-1 Communication Skills-Basics:** Understanding the communicative environment, Verbal Communication; Non Verbal Communication & Cross Cultural Communication, Body Language & Listening Skills; Employment Communication & writing CVs, Cover Letters for correspondence .Common errors during communication, Humour in Communication.

**UNIT-2 Interpersonal communication:** Presentation, Interaction and Feedbacks, Stage Manners, Group Discussions (GDs) and facing Personal Interviews, Building Relationships, Understanding Group Dynamics- I, Emotional and Social Skills, Groups, Conflicts and their Resolution, Social Network, Media and Extending Our Identities.

**UNIT- 3 Vocational skills:** Managing time: Planning and Goal setting, managing stress: Types of Stress; Making best out of Stress, Resilience, Work-life balance, Applying soft-skills to workplace.

**UNIT-4 Mindsets and Handling People:** Definitions and types of Mindset, Learning Mindset, Developing Growth Mindset, Types of People, How to Lead a Meeting, How to Speak Effectively in Meetings, Behavior & Roles in Meetings, Role Play: Meeting. On Saying “Please”, How to say “NO”.

**UNIT-5 Positive Psychology:** Motivating oneself, Persuasion, Survival Strategies, Negotiation, Leadership and motivating others, controlling anger, Gaining Power from Positive Thinking.

### Text Books:

1. Petes S. J., Francis. Soft Skills and Professional Communication. New Delhi: Tata McGraw-Hill Education, 2011.
2. Stein, Steven J. & Howard E. Book. The EQ Edge: Emotional Intelligence and Your Success. Canada: Wiley & Sons, 2006.
3. Dorch, Patricia. What Are Soft Skills? New York: Execu Dress Publisher, 2013.

### Reference Books:

- Kamin, Maxine. Soft Skills Revolution: A Guide for Connecting with Compassion for Trainers, Teams, and Leaders. Washington, DC: Pfeiffer & Company, 2013.
- Peale Norman Vincent. The Power of Positive Thinking: 10 Traits for Maximum Result. Paperback Publication. 2011.
- Klaus, Peggy, Jane Rohman & Molly Hamaker. The Hard Truth about Soft Skills. London: Harper Collins E-books, 2007.

### Course Outcomes

1. Learn to listen actively to analyse audience and tailor the delivery accordingly.
2. Increase their awareness of communication behaviour by using propriety-profiling tool.
3. Master three “As” of stressful situation: Avoid, Alter, Accept; to cope with stressors and create a plan to reduce or eliminate them.
4. Develop growth mind-set and able to handle difficult person and situations successfully.
5. Develop technique of turning negativity into positivity and generate self-motivation skills.