Chhattisgarh Swami Vivekanand Technical University, Bhilai

SCHEME OF TEACHING AND EXAMINATION

BE (MECHATRONICS ENGINEERING) III Semester

S. No.	Board of Study	Sub. Code	SUBJECT	PERIODS PER WEEK			SCHEME OF EXAM Theory/Practical			TOTAL MARKS	Credit L+(T+P)/2
				L	T	P	ESE	CT	TA		
1.	Applied Mathematics	367351(14)	Mathematics - III	4	1	-	80	20	20	120	5
2.	Mechatronics	367352(67)	Metrology and Instrumentation	4	1	-	80	20	20	120	5
3.	Mechatronics	367353(67)	Strength of Materials	4	1	-	80	20	20	120	5
4.	Mechatronics	367354(67)	Digital Circuits & Logic Design	4	1	-	80	20	20	120	5
5.	Mechatronics	367355(67)	Electronic Devices	4	1	-	80	20	20	120	5
6.	Mechatronics	367356(67)	'C' Programming	3	1	-	80	20	20	120	4
7.	Mechatronics	367361(67)	Electronic Devices Lab	-	-	2	40	-	20	60	1
8.	Mechatronics	367362(67)	Metrology and Instrumentation Lab	-	-	2	40	-	20	60	1
9.	Mechatronics	367363(67)	Digital Circuits & Logic Design Lab	-	-	2	40	-	20	60	1
10.	Mechatronics	367364(67)	'C' Programming Lab	-	-	2	40	-	20	60	1
11.	Humanities	367365(46)	Value Education	-	-	2	-	-	40	40	1
12.			Library	-	-	1	-	-	-	-	-
			Total	**23**	**6**	**11**	**640**	**120**	**240**	**1000**	**34**

L: Lecture, T: Tutorial, P: Practical, ESE: End Semester Exam, CT: Class Test, TA: Teachers Assessment
Note: Duration of End Semester Examination of all theory papers will be of Three Hours

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program:	**Bachelor of Engineering**		
Branch:	**Mechatronics Engineering**	Semester:	**III**
Subject:	**Mathematics - III**	Code:	**367351(14)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
Class Tests:	**Two (Minimum)**	Assignments:	**Two (Minimum)**
ESE Duration:	**Three Hours**	**Maximum Marks: 80**	**Minimum Marks: 28**

Course Objectives:

1. To make the students understand that Fourier series analysis is a powerful method where the formulas are integrals and to have knowledge of expanding periodic functions that explore variety of applications of Fourier series.
2. To provide knowledge of Laplace transform of elementary functions including its properties and applications to solve ordinary differentials equations.
3. To have a thorough knowledge of PDE which arise in mathematical descriptions of situations in engineering.
4. To provide a sound background of complex analysis to perform a thorough investigation of major theorems of complex analysis and to apply these ideas to a wide range of problems that include the evaluation of both complex line integrals and real integrals.
5. To study about a quantity that may take any of a given range of values that can't be predicted exactly but can be described in terms of their probability

UNIT- I **FOURIER SERIES:** Euler's Formula, Functions having points of discontinuity, Change of interval, Even & Odd functions, Half range series, Harmonic analysis.

UNIT-II **LAPLACE TRANSFORM:** Definition, Transform of elementary functions, Properties of Laplace transform, Transform of derivatives & integrals, Multiplication by tn, Division by t, Evaluation of integrals, Inverse Laplace Transform, Convolution theorem, Unit step function, Unit impulse function, Periodic function, Application to solution of ordinary differential equations.

UNIT- III **PARTIAL DIFFERENTIAL EQUATION:** Formation, Solution by direct integration method, Linear equation of first order, Homogeneous linear equation with constant coefficients, Non-homogeneous linear equations, Method of separation of variables.

UNIT-IV **COMPLEX VARIABLES:** Derivative, Cauchy-Riemann equations, Analytic functions, Harmonic functions, Flow problems, Complex integration, Cauchy theorem, Cauchy integral formula, Taylor & Laurent series, Singularity, Residue, Evaluation of real definite integrals.

UNIT-V **STATISTICS:** Random variables, Discrete & continuous probability distributions, Expectation, Mean & Standard Deviation, Moments & moment generating function, Distributions- Binomial, Poisson and Normal distributions.

Text Books:

1. Higher Engg. Mathematics by Dr. B.S. Grewal– Khanna Publishers.
2. Advanced Engg. Mathematics by Erwin Kreyszig – John Wiley & Sons.

Reference Books:

1. Advanced Engg.Mathematics by R.K. Jain and S.R.K. Iyengar – Narosa Publishing House.
2. Applied Mathematics by P.N.Wartikar & J.N. Wartikar. Vol- II– Pune Vidyarthi Grih Prakashan,Pune
3. Applied Mathematics for Engineers & Physicists by Louis A. Pipes- TMH.

Course Outcome: After studying the contents of the syllabus in detail the students will be able to

1. define Fourier series including half range series, Harmonic analysis and variety of its applications.
2. define (mathematically) Unit step, Unit impulse, Laplace transforms, its properties, Inverse and applications to solve ordinary differential equations.
3. form and solve by direct integration method Linear equation of first order including Homogeneous and Non-homogeneous Linear equations and also method of separation of variables.
4. solve difficult problems using theorems of complex analysis and apply Residue theorem to evaluate real integrals.
5. understand discrete and continuous probability distribution and be able to find mean and standard deviation and use the Uniform distribution.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program:	**Bachelor of Engineering**		
Branch:	**Mechatronics Engineering**	Semester:	**III**
Subject:	**Metrology and Instrumentation**	Code:	**367352(67)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
Class Tests:	**Two (Minimum)**	Assignments:	**Two (Minimum)**
ESE Duration:	**Three Hours**	**Maximum Marks: 80**	**Minimum Marks: 28**

Course Objectives:

- To understand the Measuring Instruments and concept & classification of various sensor & Transducer.
- To understand Types of Gauges, Transducer & their working.
- To understand the Measurement of flow , Vibration & Noise.
- To understand the Data Acquisition System and their Application.
- To understand the measurement of Geometric forms and their Measuring instrument.
- To understand the Principle and use of Interferometry, Comparators.
- To understand the screw threads and gear measurement and surface texture measurement.

UNIT- I **Generalized Measurement System:** Introduction - Introduction to measurement and measuring instruments, Generalized measuring system and functional elements, units of measurement, static and dynamic performance characteristics of measurement devices, calibration, concept of error, sources of error, statistical analysis of errors sensors and Transducers – Types of sensors, type of transducers and their characteristics.

UNIT-II **Measurement:** Measurement of displacement and angular velocity. Measurement of pressure: Gravitational direct acting, elastic and indirect type pressure transducers. Measurement of very low pressure – Mcleod gauge and Pirani gauge. **Measurement of Strain**: Type of strain gauges and their working, strain gauge circuits, Mcleod guage, Pirani guage, temperature compensation. Strain rosettes. Measurement of force and torque. Measurement of temperature by thermometers, bimetallic, thermocouples, thermistors and pyrometers-total radiation and optical pyrometry.

UNIT- III **Measurement of flow :** Obstruction meters, variable head meters, hot wire and magnetic meters, ultrasonic flow meters. Vibration and noise measurement : Seismic instruments, vibration pick ups and decibel meters.
Data acquisition system : Introduction to data acquisition systems, single and multi channel systems, microprocessors and PC based data acquisition systems. Input – output devices signal transmission and Processing. Devices and systems.

UNIT-IV Standards of measurement. Linear and angular measurement devices and systems limit gauges, gauge blocks. Measurement of geometric forms like straightness, flatness, roundness and circularity, principles and application of optical projectors, tool makers, microscope, autocollimators etc.

UNIT-V Principle and use of interferometry, laser interferometer, Comparators, Measurement of screw threads and gears. Surface texture measurement, Coordinate Measuring Machine (CMM)- Constructional features – types, applications .

Text Books:

1. Mechanical Measurements and Control – D.S. Kumar – S.K. Kataria & Sons
2. Mechanical Measurements – G. Beckwith Thomas G. – Pearson Education

Reference Books:

1. Measurement Systems, Application Design – E.O. Deoblein - McGraw Hill
2. Engineering Metrology – K.J. Hume - MacDonald and Company
3. Engineering Metrology – I.C. Gupta - Dhanpat Rai & Sons
4. Mechanical & Industrial Measurements – R.K. Jain – Khanna Publishers

Course Outcome: After the completion of course, the students will be able

- To understand what is measuring instruments and their characteristics.
- To understand what is sensor and Transducer.
- To know construction & working principle of Mcleod and pirani gauge.
- To understand that how to measure force, torque, temperature,flow, vibration and noise.
- To understand the working principle of DAS and their application.
- To understand the working and use of measurement devices (calipers, micrometer,sine bar,gauge block) and working principle of toolmaker-microscope and autocollimator.
- To understand the working principle, types and use of interferometer, comparator and surface texture measurement, screw thread and gear measurement devices.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program:	**Bachelor of Engineering**		
Branch:	**Mechatronics Engineering**	Semester:	**III**
Subject:	**Strength of Materials**	Code:	**367353(67)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
Class Tests:	**Two (Minimum)**	Assignments:	**Two (Minimum)**
ESE Duration:	**Three Hours**	**Maximum Marks: 80**	**Minimum Marks: 28**

Course Objectives:

- To understand the application part of basics of stress strain.
- To understand the strain energy concept and application.
- To understand the Bending of Beams.
- To understand stress Deflection of Beams.
- To understand Deformation in circular shaft due to torsion.

UNIT- I **Introduction:** Basic of Stress & Strain, elastic constants, stress – strain diagram, Hooke's law, stresses in the components subjected to multi-axial forces, temperature stresses, statically indeterminate systems.

UNIT-II **Bending of Beams:** Bending of Beams with symmetric section, boundary conditions, pure bending, bending equations, Transverse shear stress distribution in circular / hollow circular / I & T section.

UNIT- III **Deflection of Beams:** Relation between slope deflection & radius of curvature, solution of beam deflection, problems by Macaulay's Method, Direct integration method, Moment Area method, Method of Super position.

UNIT-IV **Torsion:** Deformation in circular shaft due to torsion, basic assumptions, torsion equations, stresses in elastic range, angular deflection, hollow & stepped circular shaft.

UNIT-V **Energy Methods**: Introduction, principles of superposition, strain energy, reciprocal relations, elastic strain energy relation in tension and compression, strain energy in beams subjected to bending and shaft to torsion. Impact loading in tension and bending, first theorem of Castigliano and its applications

Text Books:

1. Strength of Material – Dr. Sadhu Singh – Khanna Publishers
2. Elements of Strength of Material – Timo Shenko & Young – EWP Press

Reference Books:

1. Strength of Material – Rider – ELBS
2. Mechanics of Material – F.P. Bear & E.E. Johnston – McGraw Hill
3. Mechanics of Material – J.M. Gera & Timoshenko – CBS Publishers
4. Introduction to Solid Mechanics – I. H. Shames – PHI
5. Engineering Mechanics of Solids – E.P. Popov – PHI
6. Strength of Material – Shaums Outline Series – McGraw Hill
7. Strength of Material – R.K. Rajput – Dhanpat Rai & Sons

Course Outcome:

- The students will be able to understand various elastic constants
- The student will be able to understand applications of stress and strain.
- The students will be able to understand pure bending phenomenon on various cross-section of beam.
- The students will learn about statically indeterminate beam and be able to draw shear fore, Bending moment & calculate slope and deflection.
- The students will be able to understand the failure of shaft due to torsion.
- The students will be able to understand energy methods and its application for different problems.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program:	**Bachelor of Engineering**		
Branch:	**Mechatronics Engineering**	Semester:	**III**
Subject:	**Digital Circuits & Logic Design**	Code:	**367354(67)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
Class Tests:	**Two (Minimum)**	Assignments:	**Two (Minimum)**
ESE Duration:	**Three Hours**	**Maximum Marks: 80**	**Minimum Marks: 28**

Course Objectives:

- Understand energy efficient use of modern digital electronics technology
- Understand the transmission of analogue data in a digital system
- Understand the selection and use of interface devices and logic devices for digital circuits
- Be able to build and test digital systems.

UNIT- I Number Systems, Codes: Introduction & Usefulness, Weighted & Non-Weighted Codes, Sequential Codes, Self Complementing Codes, Cyclic Codes, 8-4-2-1 BCD Code, Excess-3 Code, Gray Code: Binary To Gray And Gray To Binary Code Conversion, Error Detecting Code, Error Correcting Code, 7-Bit Hamming Code, ASCII Code, EBCDIC Code. Boolean Algebra, Minimisation of Switching Function , Demorgan's Theorem, Karnaugh's Map Method (limited up to 4-variables), Quine McCluskey's Method , Cases with Don't care conditions and multiple output switching functions.

UNIT-II **COMBINATIONAL CIRCUITS**: NAND/OR Gates, Adder & Subtractor: Half adder, Full adder, half subtractor, Full subtractor, Parallel Binary adder, Look Ahead carry adder, Serial adder, BCD adder. Code converter, Parity bit generator/Checker, Comparator. *Decoder*: 3-line to 8-line decoder, 8-4-2-1 BCD to Decimal decoder, BCD to Seven segment decoder. *Encoder*: Octal to binary and Decimal to BCD encoder. Multiplexer: 2- input multiplexer, 4-input multiplexer, 16-input multiplexer Demultiplexer*:* 1-line to 4-line & 1-line to 8- line demultiplexer, p-arity bit Generator/detector, error detector

UNIT- III **SEQUENTIAL CIRCUITS**: Flip-Flops & Timing Circuit: S-R Latch; Gated S-R Latch; D Latch; J-Kflip-Flop; T Flip-Flip: Edge Triggered S-R, D, J-K and T Flips-Flops; Master - Slave Flip-Flops; Preset and Clear Inputs. Shift Registers*:* PIPO, SIPO, PISO, SISO, Bi-Directional Shift Registers ;Universal Shift register. Counter*:* Asynchronous Counter: Ripple Counters; Design of asynchronous counters, Effects of propagation delay in Ripple counters, Synchronous Counters: 4-bit synchronous up counter, 4-bit synchronous down counter, Design of synchronous counters, Ring counter, Jhonson counter, Pulse train generators using counter, Design of Sequence Generators; Digital Clock using Counters.

UNIT-IV **DIGITAL LOGIC FAMILIES:** Introduction; Simple Diode Gating and Transistor Inverter; Basic Concepts of RTL and DTL; TTL: Open collector gates, TTL subfamilies, IIL, ECL; MOS Logic: CMOS Logic, Dynamic MOS Logic, Interfacing: TTL to ECL, ECL to TTL, TTL to CMOS, CMOS to TTL, Comparison among various logic families,

UNIT-V **Memories and Converters :** Introduction to various semiconductor memories and designing of ROM and PLA,PAL (PLDS), Analog to digital conversion, Introduction to analog to digital and digital to analog converters and their types (R-2R ladder network and successive approximation converters)

Text Books:

1. Fundamentals of Digital Circuits: A. Anand Kumar, PHI
2. Digital Integrated Electronics: H. Taub and D. Schilling: TMH

Reference Books:

1. Digital Fundamentals: Floyd & Jain: Pearson Education
2. Digital Electronics: A.P. Malvino: TMH.
3. Digital Circuits & Logic Design – LEE, PHI

Course Outcome: After the completion of course ,the students will be able

- To understand the methods for analysis and synthesis of combinational and sequential circuits.
- To understand the memory structure.
- To understand of adaption of digital circuits to the Electronics and Telecommunication.
- To design and implement digital circuit.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program:	**Bachelor of Engineering**		
Branch:	**Mechatronics Engineering**	Semester:	**III**
Subject:	**Electronic Devices**	Code:	**367355(67)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
Class Tests:	**Two (Minimum)**	Assignments:	**Two (Minimum)**
ESE Duration:	**Three Hours**	**Maximum Marks: 80**	**Minimum Marks: 28**

Course Objectives:

- To provide fundamentals of Diodes & Filter Circuits.
- To provide fundamentals of Transistor circuits.
- To do DC analysis of Amplifiers.
- To provide fundamentals of FETs.

UNIT- I Introduction, Transport Phenomena in semiconductor, Formation of P-N Junction, Properties of P-N Junction, P-N Junction Diodes; different types of Diodes, V-I Characteristics, Effect of Temperature on V-I Characteristics, Ideal Diode, Diode equation, Diode Resistance, Diode Capacitance: Transition and Diffusion Capacitance.(only basics of diode resistance and capacitance)

UNIT-II Rectifying circuits and DC Power Supplies: Load line analysis of diode circuit, Half wave rectifier: Voltage regulation, Ripple factor, ratio of rectification, Transformer Utilization factor. Full wave rectifier, Bridge rectifier. Filter circuits for power supply: Inductor filter, Capacitor filter, LC filter, Multiple LC filter, CLC or π filter. Zener diode: Break down mechanism, Characteristics, Specifications, Voltage regulator circuit using zener diode.

UNIT- III Transistor: Introduction, Construction, Types: npn and pnp, Current components. Transistor as an amplifier, Transistor Characteristics, Transistor Circuit Configuration: Common Base (CB) Configuration, Common Emitter (CE) Configuration, Common Collector Configuration (CC), Early Effect, maximum Voltage Ratings.

UNIT-IV Field Effect Transistor (FET): Introduction, Construction, Operation, V-I Characteristics, Transfer Characteristics, Drain Characteristics, Small-Signal Model. Metal Oxide Semiconductor Field Effect Transistor (MOSFET): Introduction, Construction, Operation and
characteristics, Depletion MOSFET, Enhancement MOSFET.

UNIT-V Transistor Biasing and Thermal stabilization: The operating point, Bias stability, Stability factor, Emitter bias, Collector – to – base bias, Voltage divider bias with emitter bias, Emitter bypass capacitor. Bias compensation.

Text Books:

1. Integrated Electronics: Analog & Digital Circuit Systems – Jacob Millman & Halkias, TMH.
2. Electronic Devices & Circuits – Allen Mottershead, PHI.

Reference Books:

1. Electronic Devices and Circuit Theory – Boylestad & Nashelsky, 8th Ed. PHI.
2. Electronic Devices & Circuit Analysis – K. Lal Kishore, BS Publications

Course Outcome: After the completion of course, the students will be able

- To solve the Diode based problems.
- To understand filter circuits.
- To become familiar with BJT analysis.
- To understand various biasing technique.
- To understand the basic features of different FETs.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program:	**Bachelor of Engineering**		
Branch:	**Mechatronics Engineering**	Semester:	**III**
Subject:	**'C' Programming**	Code:	**367356(67)**
Total Theory Periods:	**36**	Total Tutorial Periods:	**10**
Class Tests:	**Two (Minimum)**	Assignments:	**Two (Minimum)**
ESE Duration:	**Three Hours**	**Maximum Marks: 80**	**Minimum Marks: 28**

Course Objectives:

- To make the student learn about the basics of programming using C language.
- To understand about Decision making and branching.
- The student will be able to develop logic for various problems.
- Fundamental learning about arrays and pointers.
- To be able to make user defined functions.

UNIT- I **Introduction to C Language:** history and development .C-compilers. Data types, types of instructions, input/output functions. Operators, precedence and associativity of operators. Type casting, developing simple programs, compilation, debugging and testing of programs. Relevance of C language.

UNIT-II **Conditional constructs:** if statement, if-else statements, nested if-else, forms of if. Conditional operator, Switch case construct. Loop control structures, nested loops, break and continue statements. *goto* statement.

Arrays: Syntax and definition, one and multidimensional arrays, reading and writing an array. Pointers and arrays.

UNIT- III **Functions:** Declaring and defining functions, storage classes ,call by value, introduction to pointer data type ,call by reference, using library functions in programs, macro definitions. Preprocessor directives - #if, #elif, #define etc. Passing arrays into functions. Recursion.

UNIT-IV **Strings:** reading and writing strings, passing a string into a function, using library functions to manipulate strings. Array of strings.
Structures: Declaring and using structures. Array of structures, passing structures into function. Unions and enums, Pointers to structures Bit fields.

UNIT-V **File Handling:** reading and writing text files though C programs. File manipulating functions: fputc, fgetc, fgets, fputs, fseek, ftell etc. Working with Binary files, fread and fwrite. Command line arguments. Bitwise operators in C.

Text Books:

1. Let us C – Yashwant Kanetkar, BPB Publication
2. Programming in ANSI C – E. Balaguruswamy, Tata Mc-Gcraw Hill

Reference Books:

1. Programming in `C` - Stephen G Kochan , Pearson Education India

Course Outcome: After the completion of course, the students will be able

- To learn about the basics of programming.
- To develop ability to make decisions and do branching.
- To develop logic for various problems.
- To understand about arrays & pointers.
- To create user defined functions.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program:	**Bachelor of Engineering**		
Branch:	**Mechatronics Engineering**	Semester:	**III**
Subject:	**Electronic Devices Laboratory**	Code:	**367361(67)**
Total Lab Periods:	**24**	Batch Size:	**30**
Maximum Marks:	**40**	Minimum Marks:	**20**

List of Experiments: *(At least Ten experiments are to be performed by each student)*

1. To draw the characteristics of a semi conductor diode and to find cut-in voltage, reverse resistance, static resistance and dynamic resistance.
2. To draw the characteristics of a zener diode
3. To design a half wave rectifier and to determine its efficiency and ripple factor.
4. To design a- full wave rectifier and determine the ripple factor and efficiency with filter.
5. To design a- full wave rectifier and determine the ripple factor and efficiency without filter.
6. To draw the characteristics of FET using BFW – 10
7. To draw the characteristics of CE configuration of a transistor amplifier.
8. To draw the characteristics of CB configuration of a transistor amplifier.
9. To draw the characteristics of CC configuration of a transistor amplifier.
10. To design a Zener regulator circuit and to find the regulation characteristics.
11. To draw the load line of a transistor amplifier under CE configuration.
12. To design and verify the self bias circuit operation.
13. To design and verify the voltage divider biasing circuit.
14. To verify the effect of emitter bypass capacitor.
15. To design a regulator circuit using Zener diode.

Equipment/Machines/Instruments/Tools/Software Required:

Circuit components, Breadboard, Hook-up wire, Power supply, CRO, Function generator

Recommended Books:

1. Laboratory Manual for Electronic Devices and Circuits, 4th Ed., David A. Bell, PHI

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Engineering**
Branch: **Mechatronics Engineering** Semester: **III**
Subject: **Metrology & Instrumentation Laboratory** Code: **367362(67)**
Total Lab Periods: **24** Batch Size: **30**
Maximum Marks: **40** Minimum Marks: **20**

Measurement Laboratory (At least Six Experiments are to be performed)

1. To Measure Pressure Using Bourdon Pressure Gauge.
2. To Calibrate Pressure Gauge Using Dead Weight Pressure Gauge Tester.
3. To Measure Displacement Using LVDT
4. To Measure Temperature Using Thermister
5. To Measure Flow Rate Using Rotameter.
6. To Measure Angle Using Angular Sensor.
7. To Measure Torque Using Torque Transducer
8. To Measure Pressure Using Pressure Transducer.
9. To Measure Strain Using Strain Cantilever Beam.
10. To Measure Temperature Using RTD.
11. To Measure Temperature Using Thermo Couple.
12. To perform the following experiments using Data Acquisition System
    a) To measure Temperature by Themocouple
    b) To measure Temperature by Thermistor
    c) To measure Temperature by RTD.
    d) To measure Strain

Metrology Laboratory (At least Four Experiments are to be performed)

1. Measurements of lengths, heights, diameter by Vernier Calipers, Vernier Height Gauge, Micrometers.
2. Measurement of various angles using Bevel Protractor, Sine Bar & Combination Set.
3. Determining the accuracy of Electrical and Optical Comparator.
4. Determine the Surface Flatness and Contour using Interferometer.
5. Determine the Effective Diameter of screw threads by using Two wire & Three wire methods.
6. Measurement of Gear Elements using Profile Projector and image analyzer.
7. Measurement of Tool Angles of a Single Point Cutting Tool by using Tool Makers Microscope.
8. Measurement of thread element by Tool makers microscope.
9. Calibration of Vernier Caliper, Micrometer, Height Gauge, Depth Micrometer using Slip Gauges.

Equipment/Machines/Instruments/Tools/Software Required:

MEASUREMENT	METROLOGY
1. Data Acquisition System	1. Vernier Calipers
2. Software compatible with DAS	2. Vernier Height Gauge
3. Displacement Measurement Tutor Using (LVDT)	3. Depth Micrometers
4. Pressure Measurement Tutor Using Pressure Transducer	4. Set of Slip Gauges
5. Strain Measurement Tutor Using Strain Cantilever Beam	5. Interferometer
6. Torque Measurement Tutor Using Torque Transducer	6. Tool Makers Microscope
7. Temperature Measurement Tutor Using RTD Sensor	7. Profile Projector
8. Temperature Measurement Tutor Using Thermocouple	8. Bevel Protector
9. Temperature Measurement Tutor Using Thermister	9. Sine Bar
10. Angular Measurement Tutor Using Angular Sensor	10. Combination Set
11. Rotameter Trainer Module	11. Optical & Electrical Comparator
12. Dead Weight Pressure Gauge Tester	12. Optical Flats
13. Bourdon Gauge Trainer	13. Surface Plates
14. Image Analyzer	14. Dial Indicators
	15. Snap and Ring Gauges (GO and NO-GO type)

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program:	**Bachelor of Engineering**		
Branch:	**Mechatronics Engineering**	Semester:	**III**
Subject:	**Digital Circuits & Logic Design Laboratory**	Code:	**367363(67)**
Total Lab Periods:	**24**	Batch Size:	**30**
Maximum Marks:	**40**	Minimum Marks:	**20**

List of Experiments: *(At least Ten experiments are to be performed by each student)*

1. To Verify The Properties of NOR & NAND Gates As Universal Building Block.
2. Realization of Boolean Expression Using NAND Or NOR Gates.
3. To Construct X- OR Gate Using Only NAND Or NOR Gates Only.
4. To Construct A Half Adder Circuit. And Logic Gates And Verify its Truth table.
5. To Construct A Full Adder Circuit. And Verify its truth table (Using Two X-OR And 3 NAND Gates).
6. To Construct A Half Subtractor Circuit. By Using Basic Gates And Verify its truth table.
7. To Construct A Full Subtractor Circuit By Using Basic Gates And Verify its truth table.
8. To Construct A Circuit of 4 -Bit Parity Checker & Verify its truth table.
9. To Construct A Programmable Inverter Using X-OR Gates & Verify its truth table.
10. To Design A Comparator Circuit & Verify its truth table.
11. To Construct A RS Flip Flop Using Basic & Universal Gates (NOT,NOR & NAND)
12. To Construct A J.K. Master Slave Flip Flop & Verify its truth table
13. To Verify The Operation of A Clocked S-R Flip Flop And J. K. Flip Flop
14. To Construct A T & D Flip Flop Using J. K. Flip Flop And Verify Its Operations & truth table.
15. To Verify The Operation of A Synchronous Decade Counter
16. To Verify The Operation of Various Decoding And Driving Devices
17. To perform the operation of BCD Counter Using 7490

Equipment/Machines/Instruments/Tools/Software Required:

Circuit components, Power supply, CRO, Function generator

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program:	**Bachelor of Engineering**		
Branch:	**Mechatronics Engineering**	Semester:	**III**
Subject:	**'C' Programming Laboratory**	Code:	**367364(67)**
Total Lab Periods:	**24**	Batch Size:	**30**
Maximum Marks:	**40**	Minimum Marks:	**20**

List of Experiments: *(At least Ten experiments are to be performed by each student)*

1. Write a program to take the radius of a sphere as input and print the volume and surface and surface area of that sphere.
2. Write a program to take a 5-digit number as input and calculate the sum of its digits.
3. Write a program to take three sides of a triangle as input and verify whether the triangle is an isosceles, scalene or an equilateral triangle.
4. Write a program that will take 3 positive integers as input and verify whether or not they form a Pythagorean triplet or not.
5. Write a program to print all the Prime numbers between a given range.
6. Write a program to define a function that will take an integer as argument and return the sum of digits of that integer
7. Write a program to define a macro that can calculate the greater of two of its arguments. Use this macro to calculate the greatest of 4 integers.
8. Write a program to define a recursive function that will print the reverse of its integer argument.
9. Write a program to print the sum of first N even numbers using recursive function.
10. Write a program to sort an array using Bubble sort technique.
11. Write a program that will take the elements of two integer arrays of 5 element each, and insert the common elements of both the array into a third array (Set intersection)
12. Write a program to take 5 names as input and print the longest name.
13. Write a program to define a structure Student that will contain the roll number, name and total marks of a student. The program will ask the user to input the details of 5 students and print the details of all the students whose total marks is greater than a given value.
14. Write a program to define a union Contact that will contain the members Mobile no and E-mail id. Now define a structure Employee that will contain name, roll number, mode of contact (mob/e-mail) and a variable of type Contact as members. The program will ask the user to give the details of two Employees including mode of contact and the contact num/ E-mail. Print the details of both the Employees.
15. Write a program that will ask the user to input a file name and copy the contents of that file into another file.
16. Write a program that will take any number of integers from the command line as argument and print the sum of all those integers.

Equipment/Machines/Instruments/Tools/Software Required:

PCs, C-Compiler

Recommended Books:

Programming in ANSI C – E. Balaguruswamy Tata Mc-Gcraw Hill

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Engineering**

Branch: **Mechatronics Engineering** Semester: **III**

Subject: **Value Education** Code: **367365(46)**

No. Of Periods: **2 Periods/Week** Total Tutorial Periods: **NIL**

Maximum Marks: 40 **Minimum Marks: 24**

Course Objectives:

1. This course is designed to provide the importance of education with why, what & how.
2. To impart students with an understanding of fundamental humanitarian viewpoint and its outcomes.
3. To provide the knowledge about whole existence and its impact on values.
4. To bring the awareness about life long exercise so that they can fulfill their responsibility towards themselves, the family, the society, the planet.

UNIT- I **Aim of Education and Necessity for Value Education:** Education in values/wisdom/etc and education in traits/technologies/etc as the two fundamental strands of education; Answer to the frequently asked questions such as "Why to do studies", "What studies to do in overall", "How to do studies in a proper way", "How to think systematically and talk systematically"

UNIT-II **Humanitarian Viewpoint and Basic Human Objective:** Meaning and concept of happiness, Need for a fundamental viewpoint to judge things in all cases of human concerns, Proposal of the natural path of humanitarian coexistentialism; Consciousness development and its expression; Fundamental want of sustainable happiness in human being; Understanding the distinct activities and needs of self (I) and body in human being; Fundamental goal of human being; Sustainable-solution in individual (At the place of delusion); Sustainable-prosperity in family (At the place of poverty); Sustainable-cooperation in society (At the place of competition); Sustainable-coexistence in planet (At the place of struggle)

UNIT- III **Elements of Holistic and Systematic Perspective:** Need for study of fundamental information categories to develop holistic perspective; Particular-time actions and general-time laws; Need for fundamental information sequence to develop systematic perspective, Some examples for systematic study sequence

UNIT-IV **Elements of Society-friendly and Environment-friendly Goals:** Elements of Knowledge of whole existence; Elements of Knowledge of human being; Elements of fundamental Values and Wisdom; Value spectrum with reference to general relationships and particular relationships of the objects in nature; Elements of History and Contemporarity used to set current goals; Elements of Sciences and Techniques to formulate methods to achieve goals; Elements of Motoricity and Mattericity to make actions to execute the methods

UNIT-V **Lifelong Exercise for All-round Sustainability:** Collecting information for sustainability issues; Motivating people towards sustainable life-style; Ability to identify and develop appropriate technologies and management patterns for society-friendly and environment-friendly systems for production /protection/ utilization/ experimentation ; Ability to establish and execute the fundamental five-fold system in order to ensure sustainable peace-and-prosperity worldwide.

Text Books:

Value Education for Consciousness Development by Dr P B Deshmukh, Radha K Iyer, and Deepak K Kaushik (2nd Edition, 2012, ISBN: 978-81-924034-0-3)

Reference Books:

1. International Research Handbook on Values Education and Student Wellbeing by Terence Lovat, Ron Toomey, Neville Clement (Eds.), Springer 2010, ISBN: 978-90481-86747
2. Values Education and Lifelong Learning: Principles, Policies, Programmes by David N Aspin and Judith D Chapman (Eds.); Springer 2007, ISBN: 978-1-4020-6183-7
3. Fundamentals of Ethics for Scientists and Engineers by E G Seebaur and Robert L Berry, 2000, Oxford University Press