Chhattisgarh Swami Vivekananda Technical University, Bhilai

Name of program: Bachelor of Technology
Branch: Mechatronics Engineering **Semester: III**
Subject: Mathematics – III **Code: B000311(014)**
Total Theory Periods: 03 **Total Tutorial Periods: 01**
Class Tests: Two (Minimum) **Assignments: Two (Minimum)**
ESE Duration: Three Hours **Maximum Marks: 100** **Minimum Marks: 35**

Course Objectives:

1. To provide knowledge of Laplace transform of elementary functions including its properties and applications to solve ordinary differential equations.
2. To have thorough knowledge of partial differential equations which arise in mathematical descriptions of situations in engineering.
3. To study about a quantity that may take any of a given range of values that can't be predicted as it is but can be described in terms of their probability.
4. To provide a thorough understanding of interpolation and methods to solve ordinary differential equation.

UNIT-I Laplace transform: Definition, Transform of elementary functions, Properties of Laplace transform, Transform of derivatives & integrals, Multiplication by t^n, 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- II 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- III Random variable: Discrete and continuous probability distributions, Mathematical expectation, Mean and Variance, Moments, Moment generating function, probability distribution, Binomial, Poisson and Normal distributions.

UNIT- IV Interpolation with equal and unequal intervals: Finite differences, Newton's Forward & Backward Difference Formulae, Central Difference Formula, Stirling's Formula, Bessel's Formula, Lagrange's Formula and Newton's Divided Difference Formula.

UNIT-V Numerical Solution of Ordinary Differential Equations: Picard's Method, Taylor's Series Method, Euler's Method, Euler's Modified Method, Runge-Kutta Methods, Predictor-corrector Methods- Milne's Method, Adams-Bashforth Method.

Text Books:

1. "Higher Engg. Mathematics", Dr. B.S. Grewal– Khanna Publishers.
2. "Advanced Engg. Mathematics" , Erwin Kreyszig – John Wiley & Sons.
3. "Numerical Methods in Engineering and Science" , Dr. B.S. Grewal, Khanna Publishers.
4. "Numerical Methods for Scientific and Engineering Computation" , M .K. Jain, S. R. K

Reference Books:

1. "Applied Mathematics", P. N. Wartikar& J. N. Wartikar. Vol-II Pune Vidyarthi Griha Prakashan, Pune.
2. "Applied Mathematics for Engineers & Physicists", Louis A. Pipes- TMH.
3. "Numerical Methods for Scientists and Engineers" K. Shankar Rao, Prentice Hall of India.
4. "Numerical Methods" P. Kandasamy, K. Thilagavathy and K. Gunavathi, S. Chand publication.

Course outcomes: After studying the contents of the syllabus in detail the students will be able to: Define (mathematically) unit step unit impulse, Laplace transform its properties, inverse and applications to solve ordinary differential equations and find Numerical solution of differential equations, which may be arising due to mathematical modelling based on engineering problems. Hands on these Mathematical topics will make them equipped to prepare for higher studies through competitive examinations.

Chhattisgarh Swami Vivekananda Technical University, Bhilai

Name of Program: Bachelor of Technology
Branch: Mechatronics Engineering **Semester: III**
Subject: Mechanics of Material **Code: B067312(067)**
Total Theory Periods: 03 **Total Tutorial Periods: 01**
Class Tests: Two (Minimum) **Assignments: Two (Minimum)**
ESE Duration: Three Hours **Maximum Marks: 100** **Minimum Marks: 35**

Course Objectives:

1. **To understand the application part of basics of stress strain.**
2. **To understand the strain energy concept and application.**
3. **To understand the bending of beams.**
4. **To understand stress deflection of beams.**
5. **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 – Timoshenko and 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 and 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 – Schaums Outline Series – McGraw Hill
7. Strength of Material – R.K. Rajput – Dhanpat Rai & Sons

Course Outcome:

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

1. Understand various elastic constants.
2. Understand applications of stress and strain.
3. Understand pure bending phenomenon on various cross-section of beam.
4. Understand statically indeterminate beam and be able to draw shear force and bending moment diagram and calculate slope and deflection.
5. Understand the failure of shaft due to torsion.
6. Understand energy methods and the application for different problems.

Chhattisgarh Swami Vivekananda Technical University, Bhilai

Name of Program: Bachelor of Technology
Branch: Mechatronics Engineering **Semester: III**
Subject: Electronic Devices and Digital Circuits **Code:B067313(067)**
Total Theory Periods: 03 **Total Tutorial Periods: 01**
Class Tests: Two (Minimum) **Assignments: Two (Minimum)**
ESE Duration: Three Hours **Maximum Marks: 100** **Minimum Marks: 35**

Course Objectives:

- **To understand practical applications of PN junction diode.**
- **To study basic principle of BJT, JFET, MOSFET their characteristics and amplifiers**.
- **To understand the digital circuits, combinational and sequential logic.**

Unit – I P-N JUNCTION DIODE

Introduction, Formation of P-N Junction, Properties of P-N Junction, P-N Junction Diodes; V-I Characteristics, Effect of Temperature on V-I Characteristics, Diode equation, Diode Resistance, Half wave rectifier, Full wave rectifier circuits, avalanche break down and Zener Break down mechanism, Voltage regulator circuit.

Unit – II TRANSISTOR and FET

Transistor: Introduction, Construction, Types: npn and pnp, Current components. Transistor Circuit Configuration: Common Base (CB), Common Emitter (CE) Configuration, Common Collector Configuration (CC). Introduction, V-I Characteristics of JFET, Introduction, characteristics, Depletion MOSFET, Enhancement MOSFET (introduction only)

Unit – III DIGITAL LOGIC CIRCUITS

Introduction; Simple Diode Gating and Transistor Inverter; Basic Concepts of TTL to implement universal gate, introduction of universal gates as NAND/ NOR gate, implementation of other logic gates using universal gates, laws & theorems of Boolean Algebra, Minimization of Boolean Expansion using Three variable K-Map

Unit – IV COMBINATIONAL CIRCUITS

Combinational circuits Half adder, Full adder, half subtractor, Full subtractor, Parallel Binary adder, Decoder (3:8), Encoder (8:3), Multiplexer: 8-input multiplexer, Demultiplexer: (1-line to 8-line)

Unit – V SEQUENTIAL CIRCUITS

Flip-Flops & Timing Circuit: S-R flip-Flop, D- flip-Flop ; J-K flip-Flop; T Flip-Flip. Shift Registers: PIPO, SIPO, PISO, SISO, Asynchronous Counter: Ripple Counters; Design of asynchronous counters, 4 bit Synchronous Counters: 4-bit synchronous up counter & down counter.

Text Books:

1.Integrated Electronics: Analog & Digital Circuit Systems, Jacob Millman and Halkias, TMH.
2.Fundamentals of Digital Circuits: A. Anand Kumar, PHI
3.Digital Electronics: A.P. Malvino: TMH

Reference Books :

1.Electronic Devices & Circuit Analysis, K. Lal Kishore, BS Publications
2.Digital Fundamentals: Floyd & Jain: Pearson Education
3.Digital Circuits & Logic Design – LEE, PHI

Course Outcome:

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

- **Design practical circuit using diodes.**
- **Get knowledge of BJT, JFET and MOSFET**
- **Gain knowledge about various codes, employ Boolean algebra and circuit minimization techniques.**
- **Get knowledge to interpret the operation of logic circuit such as adders, subtractors, multiplexers, flip-flops, shift registers and counters.**
- **Understand, Analyze & Design Digital Circuits.**

Chhattisgarh Swami Vivekananda Technical University, Bhilai

Name of Program: Bachelor of Technology
Branch: Mechatronics Engineering **Semester: III**
Subject: Metrology and Instrumentation **Code:B067314(067)**
Total Theory Periods: 02 **Total Tutorial Periods: 01**
Class Tests: Two (Minimum) **Assignments: Two (Minimum)**
ESE Duration: Three Hours **Maximum Marks: 100 Minimum Marks: 35**

Course Objectives:

1. **To understand the measuring instruments, the concept and classification of various sensors and transducers.**
2. **To understand types of gauges, transducers and their working.**
3. **To understand the measurement of flow ,vibration and noise.**
4. **To understand the data acquisition systems and their application.**
5. **To understand the measurement of geometric forms and their measuring instrument.**
6. **To understand the principle and use of interferometry, comparators.**
7. **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, 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 studying the contents of the syllabus in detail the students will be able

1. To understand the measuring instruments and their characteristics.
2. To understand sensors and transducers.
3. To know the construction and the working principle of Mcleod gauge and Pirani gauge.
4. To measure force, torque, temperature, flow, vibration and noise.
5. To understand the working principle of DAS and their application.
6. To understand the working and the use of measurement devices (calipers, micrometer, sine bar, gauge block) and working principle of toolmaker microscope and auto-collimator.
7. To understand the working principle, types and use of interferometer, comparator and surface texture measurement, screw thread and gear measurement devices.

Chhattisgarh Swami Vivekananda Technical University, Bhilai

Name of Program: Bachelor of Technology
Branch: Mechatronics Engineering **Semester: III**
Subject: Engineering Materials **Code:B067315(067)**
Total Theory Periods: 02 **Total Tutorial Periods: 00**
Class Tests: Two (Minimum) **Assignments: Two (Minimum)**
ESE Duration: Three Hours **Maximum Marks: 100** **Minimum Marks: 35**

Course Objectives:

1. To understand various mechanical properties of materials.
2. To understand how and why the properties of materials are controlled by its structure at the microscopic and macroscopic levels.
3. To understand how and why the structure and composition of a material may be controlled by processing.
4. To understand the inter-relationship between composition, structure and properties of engineering materials.
5. Get knowledge about different materials, their properties and application.

UNIT I Solidification of Metals and Alloys: Mechanism of solidification, nucleus formation and crystal growth, Homogeneous and Heterogeneous nucleation, Metal ingot structure-dendritic and columnar grains, grain boundaries, grain growth, solidification process, effect of grain size on properties of metals.

Mechanical Property measurement: Tensile, compression and torsion tests; Young's modulus, relations between true and engineering stress-strain curves, generalized Hooke's law, yielding and yield strength, ductility, resilience, toughness and elastic recovery; Hardness: Rockwell, Brinell and Vickers and their relation to strength.

UNIT II Deformation of Metals: Elastic deformation: Elastic after effect, Plastic deformation: Deformation by Slip (shear deformation)- Critical Resolved Shear Stress, Deformation by twinning, Dislocation theory-Edge dislocation, Screw dislocation. Imperfection in solids: Point, line, interfacial and volume defects; Cold and Hot working processes, effect on properties like recovery, recrystallization, grain growth and grain size.

UNIT III Phase Diagrams: Phase and phase equilibrium: solidification of pure metals and alloys, Gibb's phase rule, Hume-Rothery's rule, Types of Phase Equilibrium diagrams: Isomorphous- Lever rule, Monotectic, Eutectic-Hyper, hypoeutectic, Eutectoid- Hyper, hypoeutectoid, Peritectic and Peritectoid system. Allotrophy of iron and Fe-C diagram.

UNIT IV Heat Treatment of Metal : TTT curves, Continuous cooling curves, Annealing and its types, Normalizing, Hardening, Tempering, Martempering, Austempering, hardenability, Surface hardening methods like Carburizing, Cyaniding ,Nitriding, flame hardening and induction hardening, age hardening.

UNIT V Engineering Materials:

Ferrous and Non- Ferrous Metals: Alloying of steel, properties of stainless steel and tool steels, maraging steels- cast irons; grey, white, malleable and spheroidal cast irons- copper and copper alloys; brass, bronze and cupro-nickel; Aluminium and Al-Cu – Mg alloys- Nickel based super-alloys and Titanium alloys

Smart Materials: Piezoelectric Materials, Electro-strictive Materials, Magneto-strictive Materials, Magneto-electric Materials. Magneto-rheological Fluids, Electro-rheological Fluids, Shape Memory Materials, Fiber-Optic Sensors.

Text Books:

1. Material Science & Engg. – A first course – V. Raghavan – PHI (P) Ltd., Delhi, 2003.
2. A Text Book of Material Science & Science & Metallurgy - O.P. Khanna , Dhanpat Rai & Sons, New Delhi.
3. Materials Science and Engineering - William D. Callister Jr., John Wiley & Sons. Inc, 5th Edition, 2001.

Reference Books:

1.Elements of Material Science & Engg. – Van Vlack. – Addison – Wesley Longman, 6th Edn., New York
2. Physical Metallurgy – Clark & Varney, East West Edn., New Delhi
3. Engineering Physical Metallurgy – Lakhtin – CBS Publishers & Distributors
4. Materials Science – Narang – CBS Publishers & Distributors
5. Engineering Materials – Woulf Series.
6. Physical Metallurgy Principles – Robert E Re3ed Hill – Affiliated East-West Press Pvt. Ltd., New Delhi, 2004

Course Outcome:

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

1. Demonstrate the knowledge of nucleation, Crystal growth, Solid solution and Phase diagrams.
2. Appreciate the necessity of engineering materials, Smart material and its applications in various fields.
3. Demonstrate creativeness in designing new systems components and processes in the field of Engineering.
4. Appreciate the significance and applications of various heat treatment processes.

Chhattisgarh Swami Vivekananda Technical University, Bhilai

Name of Program: Bachelor of Technology
Branch: Mechatronics Engineering **Semester: III**
Subject: Material Testing Lab. **Code:B067321(067)**
Total Periods: 02
Maximum Marks: 40 **Minimum Marks: 20**

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

1. To study the Universal Testing Machine.
2. To perform the Tensile Test of Mild Steel on Universal Testing Machine and to draw the Stress–Strain Curve.
3. To determine the strength of wood on Universal Testing Machine (i) Along the Grain (ii) Across the Grain.
4. To determine shear strength of Mild Steel on Universal Testing Machine
5. To observe Flexural Behavior of Timber specimen and to determine it's strength under transverse loading on Universal Testing Machine
6. To study the Impact Testing Machine and the test specimen of Izod and Charpy.
7. To determine Izod and Charpy Value of the given mild steel specimen.
8. To study the Fatigue Testing Machine and to discuss the procedure to find out endurance limit of given material.
9. To study the Spring Testing Machine.
10. To determine modulus of rigidity for the material of open and closed Coiled Helical Spring Subjected to Axial Load by spring testing machine.
11. To study the Torsion Testing Machine
12. To determine ultimate shear stress and modulus of rigidity under Torsion.
13. To study the Cupping Test Machine and to determine Erichsen value of Mild Steel sheet.
14. To study the Rockwell Hardness Testing Machine and to determine the Rockwell Hardness of the given material.
15. To study the Brinell Hardness Machine and to determine the Brinell hardness of the given material.
16. To study the Vickers Hardness Machine and to conduct a hardness test on the machine.
17. To study Column testing machine and to conduct Buckling Test of column.

Equipment/Machines/Instruments/Tools/Software Required:

 Universal Testing Machine Impact Testing Machine Fatigue Testing Machine Spring Testing Machine Torsion Testing Machine Cupping Testing Machine Rockwell Hardness Testing Machine Brinell Hardness Testing Machine Vickers Hardness Testing Machine Column Testing Machine

Chhattisgarh Swami Vivekananda Technical University, Bhilai

Name of Program: Bachelor of Technology
Branch: Mechatronics Engineering **Semester: III**
Subject: Electronic Devices and Digital Circuits Lab. **Code:B067322(067)**
Total Periods: 02
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 design a- full wave rectifier and determine the ripple factor and efficiency with filter.
3. To draw the characteristics of FET.
4. To draw the characteristics of CE configuration of a transistor amplifier.
5. To draw the characteristics of CB configuration of a transistor amplifier.
6. To draw the characteristics of CC configuration of a transistor amplifier.
7. To design a Zener regulator circuit and to find the regulation characteristics.
8. To Verify The Properties of NOR & NAND Gates As Universal Building Block. Realization of Boolean Expression Using NAND Or NOR Gates.
9. To Construct X- OR Gate Using Only NAND Or NOR Gates Only.
10. To Construct A Half Adder Circuit. And Logic Gates And Verify its Truth table.
11. To Construct A Full Adder Circuit. And Verify its truth table (Using Two X-OR And 3 NAND Gates).
12. To Construct A Full Subtractor Circuit by Using Basic Gates And Verify its truth table.
13. To Construct A RS Flip Flop Using Basic & Universal Gates (NOT,NOR & NAND)
14. To Construct A J.K.Flip Flop Using Basic & Universal Gates
15. To Verify The Operation of A Synchronous Decade Counter
16. To perform the operation of Asynchronous counter

List of Equipments/Machine Required:

Circuit components, Breadboard, Power supply, CRO, Function generator, 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 Vivekananda Technical University, Bhilai

Name of program: **Bachelor of Technology**
Branch: **Mechatronics Engineering** Semester: **III**
Subject: **Metrology and Instrumentation Lab.** Code:**B067323(067)**
Total Periods: **02**
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 Thermistor
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 Thermocouple.
12. To perform the following experiments using Data Acquisition System
    a) Measurement of Temperature by Themocouple
    b) Measurement of Temperature by Thermistor
    c) Measurement of Temperature by RTD.
    d) Measurement of 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. Determination of the accuracy of Electrical and Optical Comparator.
4. Determination of the Surface Flatness and Contour using Interferometer.
5. Determination of the Effective Diameter of screw threads by using two wire and 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 2. Software compatible with DAS 3. Displacement Measurement Tutor Using (LVDT) 4. Pressure Measurement Tutor Using Pressure Transducer 5. Strain Measurement Tutor Using Strain Cantilever Beam 6. Torque Measurement Tutor Using Torque Transducer 7. Temperature Measurement Tutor Using RTD Sensor 8. Temperature Measurement Tutor Using Thermocouple 9. Temperature Measurement Tutor Using Thermistor 10. Angular Measurement Tutor Using Angular Sensor 11. Rotameter Trainer Module 12. Dead Weight Pressure Gauge Tester 13. Bourdon Gauge Trainer 14. Image Analyzer	1. Vernier Calipers 2. Vernier Height Gauge 3. Depth Micrometers 4. Set of Slip Gauges 5. Interferometer 6. Tool Makers Microscope 7. Profile Projector 8. Bevel Protector 9. Sine Bar 10. Combination Set 11. Optical & Electrical Comparator 12. Optical Flats 13. Surface Plates 14. Dial Indicators 15. Snap and Ring Gauges (GO and NO-GO type)

Chhattisgarh Swami Vivekananda Technical University, Bhilai

Name of Program: Bachelor of Technology
Branch: Mechatronics Engineering **Semester: III**
Subject: Software Lab. (Programming in C++) **Code:B067324(067)**
Total Periods: 02
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 check whether the number is prime or not.

2. Write a Program to read number and to display the largest value between: (a) Two number, (b)Three Numbers, (c) Four numbers by using switch-case statements.

3. Write a Program to find sum of first natural numbers: sum= 1+2+3+4+……. 100 by using(a) for loop, (b)while loop, (c) dowhile loop

4. Write a Program to find sum of the following series using function declaration: Sum= x-(x)3 /3!+(x)5 /5!-……..(x)n /n!

5. Write a Program to read the element of the given two matrixes & to perform the matrix multiplication.

6. Write a Program to exchange the contents of two variables by using (a)Call by value, (b)Call by reference.

7. Write a Program to perform the following arithmetic operations of a complex number using astructure: (a) Addition of two complex numbers, (b) Subtraction of two complex numbers, (c) Multiplication of two complex numbers, (d) Division of two complex numbers.

8. Write an object oriented program (OOP) using C++ to exchange the private data members of two different functions using friend functions.

9. Write an OOP using C++ to count how many times a particular member function of a class is called by: (a) A particular object, (b) Any objects

10.Write an OOP using C++ to define a constructor for a “Date” class that initializes the Date objects with initial values. In case initial values are not provided, it should initialize the objects with default values.

11.Write an OOP using C++ to overload = = operator to compare two strings.

12.Write an OOP using C++ to perform simple arithmetic operations of two complex numbers using operator overloading.

13.Write a C++ program to demonstrate how ambiguity is avoided using scope resolution operator in the following inheritance: (a) Single inheritance, (b) Multiple inheritance

14.Write a C++ Program to perform the swapping of two data items of integer, floating point number and character type with the help of function overloading.

15.Write a C++ program to generate a Fibonacci series by overloading: (a) Prefix Operator, (b) Postfix Operator.

16.Write a C++ program to access the private data of a class by non-member function through friend function where the friend function is declared: (a) in the location of public category, (b) in the location of private category, (c) within the scope of a class definition itself, (d) defined with inline code subtraction.

17.Write a C++ program to demonstrate how a pure virtual function is defined, declared and invoked from the object of derived class through the pointer of the base class.

18.Write a C++ program to open a file and count the number of characters, number of vowels and number of newline characters present in the file.

19.Write a program to copy the contents of one text file to another and display both the files using a text Menu.

20.Create a database of 10 students. The database should contain the Name, Marks of 5 subjects, Aggregate Marks, Aggregate percentage and Division according to the following conditions: (a) Percentage above or equal to 60 – First division, (b) Percentage between 50 and less than 60 – Second division, (c) Percentage between 40 and less than 50 – Third division, (d) Percentage below 40 – Improvement required Display the above database of every student in a tabulated form. Implement the above program using Structures, Text-Menu and File I/O operations.

21.Write an OOP using a class template to read any five parameterized data type such as float and integer, and print the average.

22.Write a C++ program to Bubble Sort using template function.

23.Write a C++ program to read two numbers and find the division of these two numbers using exception handling.

24.Write a C++ program to create a function which take a parameter, if the value of parameter is > 0 then throw integer type, if parameter is = 0, then throw character type, if parameter is < 0 then throws float type exception but for all design use only one catch block.

25.Write a C++ program for invoking, for that generate & handle exception.

List of Equipment/Machine Required:

Pentium IV machine, Turbo C++ compiler / gcc, windows / Linux environment

Recommended Books:

1. Programming with C++ - By D Ravichandran, Tata McGraw-Hill Education
2. OOP's with C++ By E. Balaguruswamy , Tata McGraw-Hill Education
3. Programming with C++ -By Venugopal , McGraw-Hill Education
4. Object Oriented Programming in C++- By Bjarne Stroustrup, Addison-Wesley Professional
5. C++: The Complete Reference, 4th Edition - By Herbert Schildt , Tata McGraw-Hill Education
6. Let us C++ - By Yashavant P. Kanetkar, BPB Publications