# BS-1201 ENGINEERING MATHEMATICS – II

**Teaching Scheme:** **Examination Scheme:**

Lectures: 3 Hrs/Week In-Semester: **50** Marks

Tutorial: 1 Hr/Week End-Semester: **50** Marks

**Credits: 4**

**Course Objectives:**

1. To recall and remember basics of differential equations, integration, integral calculus.
2. To understand the concepts of basic mathematical methods for solving differential equations, multiple integration, integral calculus.
3. To apply these methods to solve mathematical problems and its applications.
4. To analyze problems and evaluate.
5. To solve and evaluate the problems using differential equations, multiple integration, integral calculus..

**Course Outcomes:**

1. Students will be able to remember terminologies and formulae in differential equations, multiple integration, integral calculus.
2. Students will be able to understand and interpret the concepts of differential equations, multiple integration, integral calculus.
3. Students will be able to compare and analyze the methods in differential equations, multiple integration, integral calculus.
4. Students will be able to predict and evaluate the problems in differential equations, multiple integration, integral calculus.

**Unit – I: Integral Calculus** **(08)**

Differentiation Under integral sign, Curve tracing of Cartesian form, polar form and parametric form of equations.
**Special Functions:-**Gamma Function, Beta Functions, Error function.

**Unit – II: First order first degree Differential Equation and Application** **(07)**

Definition, Order and degree of Differential Equation, Formation of differential equation, solutions of differential equation, Exact differential equation, Linear differential equation and equation reducible to these types.

**Unit – III: Applications of Differential Equations** **(05)**

Applications of differential equations to engineering problems: simple electrical circuits, applications of chemical engineering, applications of mechanical engineering and applications of physics.

**Unit – IV: Multiple Integrals** **(07)**

Transformation of Co-Ordinate systems Spherical, Polar and Cylindrical ,
Double and Triple integrals with limit, Double and Triple integrals without limits.

**Unit – V: Applications of Multiple Integrals** **(06)**

Area, Volume, Centre of gravity, Mass, Moment of inertia, Root mean square value.

**Unit – VI:Fourier Series and Harmonic Analysis** **(09)**

Definition of Fourier series, Dirichlet's conditions, full range Fourier series, half range Fourier sine Series, half range Fourier cosine Series, Practical Harmonic analysis, applications to problems in Engineering.

**Text Books:**


1. B.S. Grewal, 'Higher engineering Mathematics', *Khanna publishers, Delhi(*40th edition*),*2008
2. B. V. Ramana,**'Higher Engineering Mathematics ',** *Tata McGraw Hill Publications,* (2007)


**Reference Books:**

1. C.R.Wylie, L.C. Barrette, **'Advanced Engineering Mathematics',** *McGraw Hill Publications, New Delhi.(*6th edition),(2003*)*
2. Peter V. O'neil,**'Advanced Engineering Mathematics'** ,*Thomson Brooks / Cole,Singapore (*5th edition ), (2007*).*
3. Erwin Kreyszig ,**'Advanced Engineering Mathematics'** *Wiley Eastern Ltd.*(8th Student Edition), (2004).

# BS1202 Physics - II

**Teaching Scheme:**

Lectures: 2 Hrs / Week

Tutorial: 1 Hr / Week

**Examination Scheme:**

In - Semester: **25** Marks

End - Semester: **50** Marks

**Credits: 3**

**Course Objectives:**

To facilitate the learners -

1. To become acquainted with the terminologies of Quantum Physics
2. For interpreting the notions of Quantum Physics
3. For classifying and comparing these notions with respect to their domains of validity
4. In executing procedures toward solving problems in Quantum Physics
5. In differentiating and organising basic ideas and mathematical relations of Quantum Physics
6. For checking, judging and critiquing the applications of Quantum Physics

**Course Outcomes:**

By taking this course, the learner will be able to -

1. Recall and recognise the terminologies of Quantum Physics
2. Interpret the notions of Quantum Physics
3. Classify and compare these notions with respect to their domains of validity
4. Execute procedures toward solving problems in Quantum Physics
5. Differentiate and organise basic ideas and mathematical relations of Quantum Physics
6. Check, judge and critique the applications of Quantum Physics

**Unit - I: Probability Amplitudes: (3)**

The laws for combining amplitudes; The two-slit interference pattern; Scattering from a crystal

**Unit - II: Identical Particles: (4)**

Bose particles and Fermi particles; The blackbody spectrum; The exclusion principle

**Unit - III: The Dependence of Amplitudes on Time: (4)**

Stationary states; Potential energy and energy conservation; Forces, the classical limit; The precession of a spin one-half particle

**Unit - IV: The Hamiltonian Matrix: (3)**

Amplitudes and vectors; Resolving state vectors; How states change with time; The Hamiltonian Matrix

**Unit - V: Two-state Systems: (3)**

The ammonia molecule; Spin-half particles in magnetic field; The Pauli spin matrices; The polarisation states of the photon

**Unit - VI: Band Theory of Solids, Semiconductor Physics: (4)**

States for an electron in a lattice; Time-dependent states; Electrons and holes in semiconductors; Impure semiconductors; The Hall effect; Semiconductor junctions; Rectification at a semiconductor junction; The transistor

**Text Book:**

R. P. Feynman, R. B. Leighton and M. Sands, **'The Feynman Lectures on Physics - Volume 3'**, *Pearson Education* (2006)

**Reference Books:**

1. J. Walker, D. Halliday, R. Resnick, **'Principles of Physics'**, *Wiley Student Edition* (10th Edition)
2. H. Young and Roger Freedman, **'University Physics'**, Pearson Addison Wesley (12th Edition)

# BS-1203 Chemistry II

**Teaching Scheme:**

Lectures: 2 Hrs/Week

Tutorial: 1 Hr/Week

**Examination Scheme:**

In-Semester: 25 Marks

End-Semester: 50 Marks

**Credits: 3**

**Course Objectives:**

1. To learn about properties and applications of different molecules based upon their chemical bonding and structure.
2. To understand different synthesis routes for preparation of variety of compounds.
3. To study qualitative and quantitative analytical techniques for engg. materials.
4. To apply specific mechanisms and models involved in synthesis /analysis of materials.
5. To inculcate creativity, reasoning and problem solving skills using principles of chemistry.

**Course Outcomes:**

1. To understand nature of chemical bonding in materials and predict their properties.
2. To comprehend various analytical techniques for qualitative and quantitative analysis.
3. To outline the synthesis procedures and separation techniques of engineering substances.
4. To apply specific models for understanding material properties and applications.
5. The students would be able to apply basic chemical concepts and principles in understanding simple real life problems.

**Unit – I: Instrumental methods of Analysis II** **(04)**

Basic principles, theory, instrumentation and applications of Uv-Vis Spectrophotometry; Flamephotometry.

**Unit – II: Polymer Chemistry** **(06)**

Basic terms, molecular weight determination, types of polymerization and its mechanism (free radical and ionic), compounding of plastics, Speciality polymers, Recycling of polymers

**Unit – III: Chemistry of fuels** **(08)**

Calorific value, Bomb & Boys' calorimeter, Proximate and Ultimate analysis of coal, Crude oil: refining, knocking, alternate fuels, rocket propellants, Combustion: calculation of air required for combustion.

**Unit – IV: Corrosion** **(04)**

Dry and wet corrosion mechanism, types, factors affecting corrosion, Protection against corrosion: Cathodic and anodic protection, powder coating and metallic coatings.

**Unit – V: Phase Rule** **(04)**

Gibbs Phase Rule, one Component system- Water system, Sulphur system, Two component system- (Pb-silver alloy). Applications and limitations of phase rule.

**Unit – VI: Nanomaterials** **(04)**

Introduction to nanomaterials, synthesis by top down and bottom up methods, properties and typical applications of nanomaterials.

**Text Books:**


1. Arun Bahl and G.D. Tuli, **'Essentials of Physical Chemistry'**, (2014/2016)
2. S.S. Dara **'Engineering Chemistry'** *S.Chand Publications* (2010)
3. B.S. Chauhan **'Engineering Chemistry'** *Univ Sc Press.*(2015)
4. Shashi Chawla **'A Text Book Of Engineering Chemistry'** *Dhanpat Rai & Co.* (2015)
5. S.K. Kulkarni **'Nanotechnology: principles and practices'** (2014)
6. Gurdeep Chatwal **'Instrumental methods of Chemical Analysis'** *Himalaya publishing*
7. *house* (1996)
8. Jain and Jain **'Engineering Chemistry'** *Dhanpat Rai Publishing Co.* (2016)
9. **'Engineering Chemistry'** Wiley India (2012)
10. O.G. Palanna **'Engineering Chemistry'** McGraw-Hill Education


**Reference Books:**


1. Ram D. Gupta,**'Hydrogen as a fuel'** *C.R.C.Publication* (2009)
2. Puri, Sharma, Pathania **'Principles of Physical Chemistry'** *Vishal Publishing Co.* (2015-16)
3. Robert D. Braun **'Instrumental methods of analysis'** *Pharmamed press* (2010)

# ES 1201 Basic Electrical and Electronics Engineering – II

**Teaching Scheme:**
Lectures: 3 Hrs/Week

**Examination Scheme:**
In-Semester: **25** Marks
End-Semester: **50** Marks
**Credits: 3**

**Course Objectives:**

1. To make students familiar with the fundamental concepts of AC circuits
2. To make students familiar with three phase supply.
3. To make students familiar with single phase and three phase transformers.
4. To understand basics of combinational logic , Boolean algebra and flip-flops.
5. To understand basics operational amplifier (IC 741) and its applications.

**Course Outcomes:**

After completion of all the modules ,students will be able to

1. Analyze and solve single phase AC circuit
2. Develop a clear understanding of operation and use of single phase transformer.
3. Understand applications of logic gates for building combinational and sequential circuits.
4. Understand applications of operational amplifier.

**Unit – I: AC Circuits** **(08)**

Behavior of pure R,L,C in ac circuits, Series and parallel RL, RC and RLC circuits, concept of Impedance and admittance, power triangle and power factor. Resonance in series and parallel RLC circuit, Three phase voltage generation and waveform, star and delta balanced systems. Relationship between phase and line quantities, phasor diagram, power in a three phase circuit.

**Unit – II: Single Phase Transformers** **(07)**

1 Φ transformer: concept, types, working, ideal transformer, practical transformer, equivalent circuit, phasor diagram, efficiency and regulation calculations. Introduction to three phase transformer.

**Unit – III: Digital Electronics** **(07)**

Binary number systems and binary arithmetic, basic gates, implementation of basic gates using universal gates, Boolean algebra, standard representation of logic functions (SOP and POS forms), Introduction of Combinational logic circuits like multiplexer, de-multiplexer, half adder and full adder, Introduction of Sequential logic circuits like flip- flops (SR, D), counters and shift registers.

**Unit – IV: OPAMP** **(07)**

Introduction to operational amplifiers, opamp configurations, modes and parameters, Negative feedback concept and applications like comparators, summing amplifiers, integrators and differentiators.

**Unit – V: Power Devices** **(07)**

Construction, characteristics and turn on mechanism of SCR, two transistor analogy of SCR, concept of line and forced commutation. Introduction to phase control concept. Construction, characteristics of IGBT and MOSFET.

**Unit – VI: Transducers** **(06)**

Introduction to Transducers, selection of transducers, classification of transducers. Types of transducers such as LVDT, RTD, Thermistor and strain gauge.

**Text Books:**

1. Hughes,' **Electrical & Electronic Technology**', *Pearson Education,* (9th Edition),(2009)

**Reference Books:**

1. AP Malvino & Donald Leach, '**Digital Principles and Applications**', *McGraw Hill Education*,( 6 th edition), (2009)
2. Floyd ,'**Electronic Devices and Circuits'**, *Pearson Education India,* (7 th edition), (2008)
3. H.S. Kalsi , **'Electronic Instrumentation'**, *TMH publication,*( 2 nd edition), (2008)
4. Jacob Millman & C C Halkais, Chetan parikh, '**Integrated Electronics : Analog and Digital Circuits and Systems'**, *TMH, (* 2 nd edition), (2013)
5. D.P. Kothari and I.J. Nagrath, **'Basic Electrical Engineering'**, *Tata McGraw-Hill,*(3 rd Edition), (2010)

# ES 1202 Fundamentals of Programming Languages- II

**Teaching Scheme:**
Lectures: 1Hr/Week

**Examination Scheme:**
In-Semester: **25** Marks

**Credits: 1**

**Course Objectives:**

1. Understand role of functions and it's utility in programming.
2. Understand the use of pointers in memory management.
3. Understand the utility of need and utility of user defined data types.
4. Learn and explore mobile application development environment.

**Course Outcomes:**

1. Students will be able to write functions and use them by calling.
2. Students will be able to use pointers for effective memory management.
3. Students will be able to use appropriate user defined data types for various applications.
4. Students will be able to design a mobile application using development environment.

**Unit – I: Functions in C** **(03)**

Concept of Function, Function declaration, Function definition, Function Call, Return statement, Passing parameters: Call by value, Recursion

**Unit – II: Strings** **(02)**

Introduction, Reading Strings, Writing Strings, Strings Operations: Counting characters in String, Converting into upper case and lower case, Concatenation, Appending, Comparing, Reverse

**Unit – III: Introduction to Pointers in C** **(03)**

Understanding Computer memory, Introduction to Pointers, Declaring pointer variable, Function Call by reference, Pointer and Arrays, Role of Pointers in Passing an Array to a Function, Pointers and Strings

**Unit – IV: Structures** **(02)**

Introduction to Structures: Declaring Structure and Structure Variables, Initializing Structure, Accessing members of Structure

**Unit – V: Unions, Enumeration Data types** **(02)**

Declaring Union and its members, Accessing members of Union, Enumeration Types

**Unit – VI: Mobile application Development** **(02)**

Introduction, Web apps vs Native apps, Introduction to mobile operating System like Android / IOS / Windows, Features and architecture of Mobile Operating System, Generating GUI and Views, Layouts and Application Components, Creating simple mobile application

**Text Books:**


1. ReemaThareja, **'Introduction to C programming',** *Oxford University Press* (2nd edition), (2015)
2. Pradeep Day, **'Computer Fundamentals and programming in C'**, *Oxford University Press*, (2nd edition) (2013)


**Reference Books:**


1. B Kernighan, D Ritchie, '**C programming Language'**, *Prentice Hall Software Series*, (2nd edition) (1988)

# ES 1103 Basic Mechanical Engineering

**Teaching Scheme:**
Lectures: 3Hrs/Week

**Examination Scheme:**
In-Semester: **25** Marks
End-Semester: **50** Marks

**Credits: 3**

**Course Objectives:**

1. To provide an overview of mechanical engineering systems (Power plant, Manufacturing plant, Maintenance systems, transmission systems).
2. To enable students to understand terminology used in Mechanical engineering with its significance.
3. To make student understand concept of Mechatronics System.

**Course Outcomes:**

1. The student will be able to differentiate between major areas like Design, Manufacturing and Thermal in mechanical industries while addressing a problem.
2. The student will be able to select an appropriate sector while finding solution to a problem.
3. The student will be aware of avenues available while choosing career opportunities in mechanical engineering Industry.
4. Understand the underlying principle of energy conversion systems and power plants, power producing and Power absorbing devices.
5. Students will be able to identify Mechatronics System and its components.

**Unit – I: Introduction to basic mechanical engineering (06)hours**

Industry overview-Comparison between process, product and service industry. Work environment for Mechanical industries, role of a mechanical engineer, ethics, professional hazards and safety concerns in mechanical industry. Typical manufacturing method of a product.

**Unit – II: Introduction to thermal engineering (08)hours**

Thermodynamic system, properties, states, process, cycle, first law of thermodynamics, application of first law to open and closed systems, second law of thermodynamics, conceptual difference between heat engine, heat pump and refrigerator, significance of efficiency and co-efficient of performance. Numerical on appropriate topics.

**Unit – III: Power producing devices and power absorbing devices (08)hours**

Power producing devices-Internal combustion engines and turbines, power plants.

Power absorbing devices-Centrifugal pumps, reciprocating units, vapour compression refrigeration, air conditioning systems.

Energy management system-fluctuations in demand-supply of energy, need of power grid, concept of energy audit.

**Unit – IV: Introduction to design engineering (08)hours**

Introduction to engineering materials, elements and principles of engineering design, basic procedure, Basic requirement, standards in design, aesthetic and ergonomic considerations in design.

Basic machine elements, shaft, key, coupling, bearing, clutch and brake.

Mechanical drives, belt, chain and gear.

**Unit – V: Introduction to manufacturing (08)hours**

Operation on different machine tools, lathe, Milling, Drilling.

Joining of metals, welding-gas and arc, TIG, MIG, Soldering, brazing.

Hot and cold working-Forging, rolling, extrusion.

**Unit – VI: Introduction to Mechatronics (06)hours**

Definition(S) of Mechatronics, Mechatronics system Components, Levels of Mechatronics system, Examples of Mechatronics (products and systems in manufacturing), Advantages of Mechatronics with Traditional Systems.

**Text Books:**


1. C.P. Aurora, '**Thermodynamics'**, *Tata McGraw Hill education*, (2001).
2. Basant Agarwal, C.M Agarwal, '**Basic Mechanical Engineering'**, *Wiley Ind. Pvt. Ltd*.
3. V B Bhandari, **'Design of Machine Elements'**, *Tata McGraw Hill*, (2nd edition), (2007).
4. S. K.Hajra Choudhury, S.K.Bose, A.K.Hajra Choudhury, **'Elements of workshop technology, volume I and II',** *Media promoters and publishers pvt. Ltd* ($7^{th}$ edition).
5. W.Bolton, '**Mechatronic-a multidisciplinary approach',** *Prentice Hall,* ($4^{th}$ edition), (2009).
6. Class room notes.

**Reference Books:**


1. Moran, Shapiro, Boettner, Bailey, '**Principles of engineering thermodynamics'**, *Wiley*, ($7^{th}$ edition).
2. Rayner Joel, '**Basic engineering thermodynamics'**, *Addison-Wesley*, ($5^{th}$ edition).
3. Y. A. Cengel and M. A. Boles, '**Thermodynamics, an Engineering Approach**', (4th edition).
4. S.S. Rattan, '**Theory of Machine'**, *McGraw Hill*, ($4^{th}$ edition).
5. B.S. Raghuwanshi, '**A course in workshop technology'**, *Dhanpat Rai & co*.
6. Kalpakjian, Schmid, **'Manufacturing engineering and technology**', *Pearson*, ($4^{th}$ edition).
7. Nptel course112105127/1, 112105127/2

# ES 1204 Engineering Mechanics

**Teaching Scheme:**
Lectures: 2Hrs/Week
Tutorial: 1Hr/Week

**Examination Scheme:**
In-Semester: **25** Marks
End-Semester: **50** Marks
**Credits: 3**

**Course Objectives:**

1. To develop the ability of students to analyze any problem in a simple and logical manner.
2. To make the students understand the fundamental principles of mechanics which are the foundation of much of today's engineering.
3. To develop logical thinking of the students for application in engineering.
4. To provide an introduction to the basic quantities of mechanics.

**Course Outcomes:**

A student should be able to obtain/develop:

1. An ability to apply knowledge of mathematics, science and engineering
2. A recognition of the need for, and an ability to engage in, life-long learning.
3. Application of Newton's laws of motion
4. Knowledge of kinematic & kinetic analysis.

**Unit – I: Introduction to Statics** **(06)**

a) Fundamental concepts and principle (The parallelogram law of addition of forces, the principle of transmissibility, Newton's laws of motion**,** Newton's law of gravitation).
Introduction to a force in a plane, Types of force system, resolution & composition of forces, Methods of composition to find resultant, moment of force, Varignon's theorem, couple, equivalent force couple system.

b) Introduction to force in a space, problems on resultant of concurrent force system

c) Equilibrium- Introduction to concept of equilibrium, Conditions of equilibrium, Free body diagram, equilibrium under different forces, equilibrium of concurrent parallel & general forces in a plane.

**Unit – II: Introduction to type of Supports and Beam (05)**

a) Types of supports (Fixed, roller, hinged support)
   Types of loads on a beam (point load, uniformly distributed load, uniformly varying load)
   Types of beams (simple beam, cantilever beam, compound beam)
b) Problems on Reactions & analysis of beams
c) Centroid- Definitions (Center of gravity of two dimensional body, center of mass, centroid), procedure to find centroid of regular plane lamina.

**Unit – III: Introduction to Friction (03)**

Definition and classification of friction, coefficient of static and kinetic friction ,angle of friction, angle of repose, problems on block friction and ladder friction

**Unit – IV: Rectilinear Motion (05)**

a) Variables in Rectilinear motion- Time, Position, Displacement, Distance travelled, Velocity, Acceleration
   Equations of motion for constant acceleration & motion under gravity, variable acceleration, relative motion based on kinematic equations.
b) Application of Newton's second law of motion for rectangular co-ordinate system(D' Alembert's principle)

**Unit – V: Curvilinear Motion (05)**

a) Equation of motion in rectangular components, Normal & Tangential components, Radial & Transverse components.
b) Projectile motion- Definition and derivation (time of flight, horizontal range, angle of projection, maximum height, trajectory), Projectile on horizontal plane only

**Unit – VI: Work Energy Principle (04)**

a) Introduction and definition of Work, power, energy, conservative & non- conservative forces, Conservation of energy, work-energy principle.
b) Problems on Work done by different forces (External force, Frictional force, Gravitational force, Spring force).

**Text books:**

1) A Nelson, '**Engineering Mechanics Statics and Dynamics'**, *Mc Graw Hill Education.*
2) R.S. Khurmi, **'A Textbook of Engineering Mechanics'**, *S. Chand & Company Ltd*.

**Reference books:**


1) Beer & Johnson, '**Vector mechanics for engineers**', *Mc Graw hill publication.*
2) I. H. Shames & G.K.M. Rao, '**Engg. Mechanics'**, *Pearson.*
3) R. C. Hibbler, '**Engg. Mechanics statics & dynamics**', *Pearson publication*
4) S. Timosenko, DPT.young & J.V.Rao, '**Engineering mechanics**', *Tata Mc Graw hill education pvt. Ltd. New delhi.*

# ES 1205 Basic Electrical and Electronics Engineering Lab - II

**Teaching Scheme:**

Practical: 2 Hrs/Week

**Examination Scheme:**

Practical Exam: 25 marks

Credits: 1

**List of Practicals:-**

1. Performance analysis of L-C-R series circuit .
2. Load test on single phase transformer
3. Performance analysis of 3 phase AC circuit.
4. Performance analysis of LCR parallel circuit.
5. Analysis of Summing amplifier and difference amplifier using OPAMP.
6. Design and implementation of half adder & full adder circuits.
7. Plot and analyze characteristics of LVDT.
8. Verification of static characteristics of SCR
9. Build and test BCD counter with seven segments LED Display.
10. Soldering Techniques (any small circuit like clippers, clamper, circuits using basic gates).

## ES 1206: FUNDAMENTALS OF PROGRAMMING LANGUAGE LAB -II

**Teaching Scheme** **Examination Scheme**
**Practical: 2 Hrs/week** **Practical: 25 Marks**

**Prerequisites:** Basic knowledge of C programming.

**Course Objectives:**

1. Learn and acquire art of computer programming
2. Learn basics of C programming
3. Learn to write C program for a given logical solution.
4. Learn to apply programming concepts to solve simple problems using arrays, functions and structures.

**Course Outcomes:**

1. Students will familiar with programming environment.
2. Students will be able able to write C program using different constructs of C programing.
3. Students will be able to develop C program to find solution of a given problem.
4. Students will be able to apply programming concepts to solve simple problem using arrays, functions and structures.

**Prerequisite (compulsory) - (4 hrs)**

1. Learning of basic commands of Linux OS
2. Understanding of IDE to execute a C program.
3. Understanding of basic C programming.

**Section I – (any 8 assignments) - ( 2 hrs per assignment)**

1. Write a C program to swap 2 integers using user defined functions (call by value, call by reference).
2. Write a C program to compute the factorial of the given positive integer using recursive function.
3. Write a menu driven program to perform following operations using array of integers like (accept, display, print alternate number, sum of all numbers, search a number).
4. 
5. Write a program in C to sort n integers using bubble sort.
6. Write a menu driven program in C to perform string operations using library functions
7. Write a menu driven program to perform string operations using user defined functions
8. Write a program in C to compute addition, subtraction, multiplication of two matrices. Use functions to read, display and add, subtract, multiply the matrices.
9. For a class an examination is conducted and the results for the students of all the 5 subjects is recorded. Write C program to display the record of students. On the basis of the record compute:
    I. The average score of class
    ii. Highest score and lowest score of class
    iii. Marks scored by most of the students
    iv. List of students who were absent for the test
10. Write a C program to create an employee database using structure and perform operations such as accept, display, search by name, search by number, update a record.

**Section II– (any 3 assignments) - ( 2 hrs per assignment)**

1. A string is provided from the user. Calculate and display the total number of characters in the string and the total number of vowels with the number of occurrences in the string.

2. College library has n number of books. Write C program to store the cost of books in an array in ascending order. Books are to be arranged in descending order of their cost.

3. Write a recursive function to obtain the first 25 numbers of a Fibonacci sequence. In a Fibonacci sequence the sum of two successive terms gives the third term. Following are the first few terms of the Fibonacci sequence:
1 1 2 3 5 8 13 21 34 55 89...

4. A factory has 3 division and stocks 4 categories of products. An inventory table is updated for each division and for each product as they are received. There are three independent suppliers of products to the factory:
(a) Design a data format to represent each transaction.
(b) Write a program to take a transaction and update the inventory .
(c) If the cost per item is also given write a program to calculate the total inventory values.

5. Write a program that compares two given dates. To store date use structure say date that contains three members namely date, month and year. If the dates are equal then display message as "Equal" otherwise "Unequal".

6. Create a structure to specify data of customers in a bank. The data to be stored is: Account number, Name, Balance in account. Assume maximum of 200 customers in the bank.
(a) Write a function to print the Account number and name of each customer with balance below Rs. 100.
(b) If a customer request for withdrawal or deposit, it is given in the form:
*Acct. no, amount, code (1 for deposit, 0 for withdrawal)*
Write a program to give a message, “The balance is insufficient for the specified withdrawal”.

7. An automobile company has serial number for engine parts starting from AA0 to FF9. The other characteristics of parts to be specified in a structure are: Year of manufacture, material and quantity manufactured.
(a) Specify a structure to store information corresponding to a part.
(b) Write a program to retrieve information on parts with serial numbers between BB1 and CC6.

**Section III (8 hrs)**

Students should design and develop a small Android application for mobile.

## ES1207: ENGINEERING MECHANICS LAB

**Teaching Scheme:** **Examination Scheme:**

**Practical: 2Hr/Week** **Practical/Oral:-25 Marks**

**Credit: 1**

**Course objective:**

1. To co-relate the theoretical concepts with practical applications.
2. To develop logical thinking of the students for applications in engineering.

**Course outcome:** A student should be able to obtain/develop:

1. An ability to apply knowledge of mathematics, science and engineering
2. An ability to analyze and interpret data for related experiment.

## List of practicals :-

**Experiments**

1. Verification of law of polygon of forces.
2. Verification of Varignon's theorem.
3. Verification of Lami's theorem.
4. Support reactions of simple beam.
5. To determine forces in space force system.
6. Study of Curvilinear motion.
7. Determination of coefficient of restitution.
8. To compare coefficient of friction of various pair of surfaces in contact.

**Graphical analysis**

9. To find resultant of concurrent force system
10. To find resultant of non-concurrent force system
11. To find reactions of simple beam
12. To find centroid of plane lamina

# ES 1208 Workshop Practice I

**Teaching Scheme:** **Examination Scheme:**

Practical: 2 Hr/Week Practical/Oral Examination: 25 marks

**Credit: 1**

**Course Objectives:**

1. To provide knowledge and skill to use tools, machines, equipment, and measuring instruments, which are used in manufacturing industries.
2. To educate students for Safe handling of machines and tools in manufacturing environment

**Course Outcomes:**

1. The student will be able to apply concept related to workshop safety & use of measuring instruments during process of manufacturing.
2. The student will be able suitably select basic manufacturing practices for making of component.
3. The students will be able to manufacture/produce given product from raw material using different manufacturing methods.

**Unit – I: Introduction to Workshop Safety and Measuring Instruments: (05)**

- Safety precautions while working in shop, safety equipment's and their use.
- Brief introduction to instruments like – Steel rule, Calipers, VernierCaliper, Micrometer, etc. Least counts, common errors and care while using them, use of marking gauge, 'V'block and surface plate.
- Introduction & working of different tools used in workshop.

**Unit – II: Manufacturing Practice:(Any Two Trades) (13)**

- Fitting: Preparation of joints, markings, cutting and filling for making joints like V or T for making part of any component.
- Carpentry: Wood working consists of planning, marking, sawing, chiseling and grooving to make joint like lap, T, dovetail.
- Tin smithy: Making of small parts using sheet metal such as Tray, Funnel.
- Welding Joints: Introduction to use of MIG/ TIG, arc welding for making joints like Lap, Butt joint.

**Unit – III: Information technology: (06)**

- Identify the peripherals of computer components in a CPU and its functions
- Disassemble and assemble the PC back to working condition
- Loading of operating system.

**Unit – IV: Plumbing (06)**

- Hands on practice on Cutting, bending and external threading of GI pipes using Die
- Plumbing on PVC pipes.
- Different Joint preparation on GI & PVC Pipes

**Text Books:**


1. Choudhary, Hajara**'Elements of Workshop Technology**', Media Promotors& Publishers, (1997).
2. Raghuvanshi B.S. "Workshop Technology" Vol. I &II,DhanpatRai& Sons, (1998).
3. H.S. Bawa'Workshop Technology' Vol.-I by, TMH Publications, New Delhi, (2009).
4. Gupta and Kaushik "Workshop Technology: Vol. – I by, New Heights,(1999).


**Reference Books:**


1. Chapman W.A. J and Arnold E. '**Workshop Technology-part I**' Viva low priced Student,(1998).