First Semester

APPLIED MATHEMATICS – I (DAS-103)

Basic Science (BS) Core: Credit 4(3-1-0)

Objective: Applied Mathematics forms the backbone of engineering students. The curriculum of mathematics has undergone changes from time to time in accordance with the growth of the subject. Diploma in Engineering is a launching stage where the students learn the basics of engineering. The revised syllabus has been designed keeping in view the emerging needs of all categories of students. Great emphasis has been laid on application of various contents like algebra, complex numbers, trigonometry and coordinate geometry.

COURSE OUTLINE:

1. Algebra
    1. Series: A.P. and G.P., nth term of AP and GP, , sum to nth term, Value of npr and ncr.
    2. Binomial theorem (without proof) for positive integral index (expansion and general form); binomial theorem for any index (expansion without proof)
    3. Partial fractions (linear factors, repeated linear factors, non-reducible quadratic factors only)
    4. Determinants and Matrices – expansion of determinants (upto third order), properties of determinants, solution of equations (up to 3 unknowns) by Cramer's rule. Definition of matrix, addition, subtraction, multiplication of matrices (up to third order), minors and cofactors, inverse of a matrix by adjoint method (up to second order)
    5. Scalar and vector product of two /three vectors

2. Trigonometry

    Review of ratios of some standard angles (0,30,45,60,90 degrees), T-Ratios of Allied angles (without proof), Sum, difference formulae and their applications (without proof). Product formulae (Transformation of product to sum, difference and vice versa). T-Ratios of multiple angles, sub-multiple angles (2A, 3A, A/2).

3. Complex numbers

    Definition of complex numbers, real and imaginary parts of a complex number, polar and Cartesian form and their interconversion, conjugate of a complex number, modulus and argument of a complex number, addition, subtraction, multiplication and division of a complex number. De-Moivre's Theorem (simple problems)

4. Coordinate Geometry

Equation of straight line in various standard forms (without proof), intersection of two straight lines, angle between two lines, perpendicular distance formula (without proof)

1. General equation of a circle and its characteristics. To find the equation of a circle, given:
    - Centre and radius
    - Three points lying on it
    - Coordinates of endpoints of a diameter
2. Equations of conics (ellipse, parabola and hyperbola), simple problems related to engineering (standards forms only)

RECOMMENDED BOOKS

1. Applied Mathematics by Dr. RD Sharma, Dhanpat Rai Publications, Delhi
2. Elementary Engineering Mathematics by BS Grewal, Khanna Publishers, New Delhi

APPLIED PHYSICS – I (DAS-105)

Basic Science (BS) Core: Credit 4(3-0-2)

Objective: Applied physics includes the study of a large number of diverse topics all related to things that go on in the world around us. It aims to give an understanding of this world both by observation and by prediction of the way in which objects will behave. Concrete use of physical principles and analysis in various fields of engineering and technology are given prominence in the course content.

COURSE OUTLINE:

1. Units and Dimensions

    1. Physical quantities
    2. Units - fundamental and derived units, systems of units (FPS, CGS, MKS and SI units)
    3. Dimensions and dimensional formulae of physical quantities
    4. Dimensional equations and principle of homogeneity, applications to conversion from one system of units to another, checking the correctness of physical relations and derivation of simple physical relations, limitations of dimensional analysis

5. Error in measurement, random and systematic errors, types of errors,

propagation of errors, significant figures

2. Force and Motion

1. Concept of Scalar and Vector quantities – examples, types of vectors.

2. Resolution and Composition of vectors, Vector multiplication (scalar product and vector product of vectors), addition of vectors (Parallelogram law)

3. Force: Newton's laws of motion, linear momentum and conservation of linear momentum, impulse and its application, simple numerical problem in brake system of vehicles and trains etc.

Friction: Types of friction and its application.

5. Circular motion: Angular displacement, angular velocity and angular acceleration
6. Relation between linear and angular variables (velocity and acceleration)

7. Centripetal force (derivation) and centrifugal force with application such as banking of roads and bending of cyclists

8. Application of various forces in lifts

3 Rotational Motion

1. Concept of translatory and rotational motion with examples

2. Definitions of torque, angular momentum and their relationship

3. Conservation of angular momentum (qualitative) and its examples

4. Moment of inertia and its physical significance, radius of gyration, Theorems of parallel and perpendicular axes (statements), Moment of inertia of rod, disc, ring and sphere (Formulae only).

5. Application of rotational motions in transport vehicles, trains and aeroplane turbine/engine.

4 Work, Power and Energy

1. Work: definition and its SI units

2. Work done in moving an object on horizontal and inclined plane (incorporating frictional forces) with its application

3. Power: definition and its SI units, calculation of power with numerical problems

4. Energy: Definition and its SI units: Kinetic energy and Potential energy with examples and their derivation

5. Principle of conservation of mechanical energy (for freely falling bodies), transformation of energy from one form to another with its application

5 Properties of Matter

1. Elasticity: definition of stress and strain, different types of modulus of elasticity, stress – strain diagram, Hooke's law with its applications

2. Pressure: definition, its units, atmospheric pressure, gauge pressure, absolute pressure, Fortin's Barometer and its applications

3. Surface tension: concept, its units, angle of contact, measurement of surface tension by capillary tube method, applications of surface tension, effect of temperature and impurity on surface tension

4. Viscosity and coefficient of viscosity: Stoke's Law and derivation of terminal velocity, effect of temperature on viscosity.

6 Thermometry

6.1 Difference between heat and temperature

6.2 Principles of measurement of temperature and different scales of temperature and their relationship

6.3 Types of thermometers (Concept only)

6.4 Expansion of solids, liquids and gases, coefficient of linear, surface and cubical expansions and relation amongst them

6.5 Modes of transfer of heat (Conduction, convection and radiation with examples)

6.6 Coefficient of thermal conductivity

6.7 Engineering Application of conduction, convection and radiations

7. Waves and Vibrations (10 Periods)

7.1 Simple Harmonic Motion(SHM): definition, expression for displacement, velocity, acceleration, time period, frequency in S.H.M. Equation of simple harmonic progressive wave

7.2 Wave motion: transverse and longitudinal wave motion with examples, sound and light waves, velocity, frequency and wavelength of a wave (relationship v = nλ) and their applications

7.3 Free, forced and resonant vibrations with examples

7.4 Acoustics of buildings – reverberation, reverberation time, echo, noise, coefficient of absorption of sound, methods to control reverberation time and their applications

7.5Ultrasonics – production (magnetostriction and piezoelectric methods) and their engineering and medical applications

LIST OF PRACTICALS (to perform minimum ten experiments)

1. To find the diameter of wire using a screw gauge

2. To find volume of solid cylinder and hollow cylinder using a vernier calipers

3. To determine the thickness of glass strip and radius of curvature using a spherometer

4. To verify parallelogram law of forces

5. To find the time period of a simple pendulum and determine the length of a second's pendulum. 6. To find the velocity of sound by using resonance apparatus at room temperature.

7. To determine the viscosity of glycerin by Stoke’s method

8. To determine the coefficient of friction on the horizontal plane.

9. To determine the Young’;s Modulus by Searle's apparatus

10. To determine force Constant of spring using Hooke’s Law

RECOMMENDED BOOKS

1. Text Book of Physics for Class XI (Part-I, Part-II) N.C.E.R.T

2. Text Book of Physics for Class XII (Part-I, Part-II) N.C.E.R.T

APPLIED CHEMISTRY – I (DAS-104)

Basic Science (BS) Core: Credit 4(3-0-2)

Objective: The role of Chemistry and chemical products in every branch of engineering is expanding greatly. Nowadays various products of chemical industries are playing an important role in the field of engineering with an increasing number of such products each successive year. The strength of materials, the chemical composition of substances, their behaviour when subjected to different treatment and environment, and the laws of heat and dynamic energy have entered in almost every activity of modern life. Chemistry is considered as one of the core subjects for diploma students in engineering and technology for developing in them scientific temper and appreciation of chemical properties of materials, which they have to handle in their professional career.

COURSE OUTLINE:

1.Basics Concepts

1. Definition of chemistry and its importance

2. Definition of matter, element, compound and mixtures, atom, molecule, ion, symbol, formula, valency and chemical equation.

3. Writing of the chemical formula of a simple chemical compound. Calculation of percentage composition of a chemical compound and form the empirical and molecular formula of the compound

4. Essentials of a chemical equation, balancing of a chemical equation by hit and trial method

2. Atomic Structure and Chemical Bonding

Fundamental particles i.e. electron, proton and neutron, their characteristics (discovery is not included)

1. Electronic concept of valency

2. Elementary account of electrovalent, covalent and coordinate bond formation on the basis of the electronic concept of valency giving suitable examples to each

3. Hydrogen bonding and its effect on physical properties of the compounds

Electronic configuration of elements (up to Z = 30) with special reference to Aufbau principle

3. Water

1. Hard and soft water, types of hardness and its causes, disadvantages of hardness of water

    1. in industrial use (ii) in boilers for steam generation with special reference to sludge and scale formation; foaming and priming in boilers

2. Methods to remove hardness of water (i) Clark's Process (ii) Permutit Process (iii) Soda Lime process (iv) Ion-Exchange resin process. Simple numerical problems related to soda lime process.
3. Definition of degree of hardness of water and the systems to express the degree of hardness of water. Simple numerical problems related to finding the degree of hardness on different scales. Estimation of hardness of water sample by O'Hehner's Method and E.D.T.A. Method
4. Qualities of water used for drinking purposes, treatment of river water to make it fit for town supply
5. Disinfection of water by chlorination process

4. Solutions

Concept of homogenous solution, brief introduction of the terms (i) Ionization (ii) Acidity (iii) Basicity (iv) equivalent weight and gram equivalent weight with suitable examples

1. Strength of a solution (i) Normality (ii) Molarity (iii) Molality as applied in relation to a solution with simple numerical problems related to these terms
2. Definition of pH, and different industrial applications of pH, determination of pH of a solution with the help of pH meter including simple numerical problems.

5. Electrolysis

1. Definition of the terms: Electrolytes, Non-electrolytes conductors and non-conductors with suitable examples
2. Faraday's Laws of Electrolysis with simple numerical problems
3. Different industrial applications of 'Electrolysis' with special reference to electroplating and electrorefining of metals
4. Basic concept of Buffer solutions, indicators and solubility product

6 Environmental Chemistry

6.1 General concept of pollution and pollutants

6.2 Types and control of pollution like air, water, noise and soil pollution

6.3 General idea of ozone depletion, global warming

LIST OF PRACTICALS

1. Volumetric analysis and study of apparatus used therein. Simple problems on volumetric analysis equation
2. Preparation of standard solution of oxalic acid or potassium dichromate
3. To analyse the inorganic mixture for two acidic and two basic radicals from the following radicals a) Acidic Radicals CO_3^{--}, SO_4^{--}, NO_3^-, CH_3COO^-, Cl^-, Br^-, I^- b) Basic Radicals NH_4^{++}, Pb^+, Cu^{++}, Cd^{++}, As^{+++}, Sb^{+++}, Sn^{++}, Al^{+++}, Fe^{+++}, Cr^{+++}, Mn^{++}, Ni^{++}, Co^{++}, Zn^{++}, Ba^{++}, Sn^{++}, Ca^{++} and Mg^{++},
4. Determine the degree of temporary hardness of water by O'Heher's method
5. Estimation of total alkalinity of water volumetrically
6. Determine pH of a given sample by using pH meter
7. Determination of solubility of a solid at room temperature

8. Demonstration – Application of FeCl3 in etching process for designing circuits on PCB (Printed Circuit Board)

RECOMMENDED BOOKS

1. Chemistry in Engineering by J.C. Kuriacose and J. Rajaram; Tata McGraw-Hill Publishing Company Limited, New Delhi
2. Engineering Chemistry by Dr. S. Rabindra and Prof. B.K. Mishra ; Kumar and Kumar Publishers (P) Ltd. Bangalore-40

Programming in C (DBIT-102)
Basic Engineering and Science (BES): Credit 4(3-0-2)

RATIONALE

In today's information technology era, computer technology plays an important role. Computer applications are all pervasive in day to day life of human beings. It becomes compulsory for all employees to have sound knowledge of how computers work and process data and information.

'C' is the most widely used computer language, which is being taught as a core subject. C is a general-purpose structural language that is powerful, efficient and compact, which combines features of high-level language and low-level language. It is closer to Man and Machine both. Due to this inherent flexibility and tolerance it is suitable for different development environments. C is still considered as the first priority programming language.

This subject covers from the basic concept of C to pointers in C. This subject will act as "programming concept developer" for students. It will also act as "Backbone" for subjects like OOPS, VB, Windows Programming, JAVA, OOMD, etc.

DETAILED CONTENTS

Unit 1 INTRODUCTION TO PROGRAMMING

Concept of programming---different programming languages and programming logic—algorithms and flow charts overview of C programming

Introduction of c language-history of C-importance of C demerits of C-basic structure of C-working steps of c compiler-source code—object code—executable code, data types and sizes-declaration of variables—different operators and expressions type conversions.

Unit 2 MANAGING INPUT AND OUTPUT OPERATIONS & CONTROL FLOW (DECISION MAKING)

Decision making and branching ,simple and nested IF statements, IF-ELSE statements CASE-SWITCH statements ,looping concept, GOTO statement, Looping: FOR, WHILE, and DO-WHILE statements, comparative study among them, BREAK and CONTINUE statements.

Unit 3 Introduction to arrays, function, pointer, structure etc.

LIST OF PRACTICALS

1 Basic of C Programming Introduction of C language , Merit & Demerits of C , Working steps of C Compiler

1.1To execute a sample C program to study the basic structure of a C program.

1.2To be familiar with keywords and identifiers through some program.

1.3To apply constant variables and different types of data types.

2. Operators & Expressions

2.1To write a program using Arithmetic, Relational, Logical and Assignment operators.

2.2To write a program to implement increment & decrement operators and to find the greatest between two numbers using conditional operators.

2.3To evaluate an expression to study operator precedence and associativity and to write a program using casting a value.

3. Decision Making

3.1To use formatted scanf( ) and printf( ) functions for different types of data.

3.2To find the roots of a quadratic equation. Find the greatest of three numbers using IF –ELSE and IF -ELSE IF statements.

3.3To test whether the given character is vowel or not, using nested if –else statement and Switch-case statement.

3.4To find sum of first n natural number using 'GOTO' statement

3.5To find the sum of all Fibonacci numbers in between 1 to n using 'for' loop.

3.6To find G.C.D and L.C.M of two numbers using 'WHILE' loop.

3.7To find the sum of the digits of an integer using DO –WHILE loop structure.

3.8To solve other problems for the implementation of different loop structures.

4. Arrays

4.1To write a program to accept 10 numbers, store them in a single dimensional array and to make the average of the numbers.

4.2To make an array of n elements and sort them and to write a program to check whether an input number is palindrome or not.

4.3To write a program to accept a string and to count the number of vowels present in this string.

4.4To write programs on matrix operation (addition, subtraction & multiplication).

4.5To write some programs to utilize different string handling functions and to create an array to store the names of 10 students arranging them alphabetically.

5. User Defined Functions

5.1To write a program to find the sum of the digits of a given number using a function.

5.2To write a program using functions: —(a) with no argument and no return value;(b) with argument and no return value;(c) with argument and return value.

5.3To find out the factorial of a given number using a recursive function.

5.4To write a program that uses a function to sort an array of integers.

5.5To write programs to illustrate auto variable, external variable, static variable and register variable.

6. Pointers

6.1 To write a program to access variables using a pointer.

6.2 To write a program to assign the address of an integer array to a pointer variable 'p' and add all the array elements through 'p'.

6.3 To write programs to explain parameter passing 'by reference 'and 'by value'.

7. Structure
7.1To write a program to define and assign values to structure members
7.2To write a program to explain structure with arrays.
7.3To define and assign values to 'Union' members.
8. File Handling
8.1To write to and read from a sequential access file (use character type data).
8.2To create an integer data file, to read this file and to write all odd numbers to a new file.
8.3To write a program to use different functions used in file handling.
8.4To make a random access to a file.

Reference books

1. Programming with c / byron gotteried/tata mcgraw hill
2. Programming in ansi c /e.balaguruswami/ tatamcgraw hill
3. Let us c /y.kanetkar/ bpb

ENGINEERING DRAWING – I (DED-101)

Basic Engineering and Science (BES) Core: Credit 2(0-0-4)

Objective: Drawing is said to be the language of engineers and technicians. Reading and interpreting engineering drawings is their day-to-day responsibility. The course is aimed at developing basic graphic skills so as to enable them to use these skills in preparation of engineering drawings, their reading and interpretation.

COURSE OUTLINE:

1. Drawing Office Practice, Lines & Lettering (2 Sheets)

    1. Drawing instruments
    2. Sizes and layout of standard drawing sheets and drawing boards
    3. Different types of lines in engineering drawing as per BIS specifications
    4. Free hand lettering (alphabet and numerals) lowercase and uppercase, single stroke vertical and inclined at 75 degree in different standard series of 2.5, 3, 5, 7, 10, and 15 mm heights in the ratio of 7:4

2. Dimensioning (2 Sheets)

1. Necessity of dimensioning, Types of dimensioning (chain, parallel and progressive dimensioning, size and location dimensioning)

   Methods of placing dimensioning (Aligned and unidirectional system), use of leader lines. General principles of dimensioning.

2. Dimensioning of overall sizes, circles, thread holes, chamfered surfaces, angles, tapered surface holes equally spaced on PCD, countersunk hole counterbored holes, cylindrical parts, narrow space and gaps, radii, curves and arches.

3. Simple Geometrical Constructions used in Engineering Practice (2 Sheets)

1. Construction of regular polygons (triangle, square, pentagon, hexagon) and circles
2. Ellipses (concentric circle method and Intersecting Arcs method)

4. Parabola (rectangle and tangent method), cycloid Scale (2 sheets)

1. Scale – their need and importance, Definition of representative fraction (R.F), find RF of given scale
2. Construction of plain and diagonal scales

5. Principle of Projections (7 sheets)

1. Principle of orthographic projection and introduction to first angle projection and third angle projection
2. Projection of points situated in different quadrants (1 Sheet)

3. Projection of lines, Lines inclined to one plane and parallel to the other and vice versa (1st&3rd quadrants); Line inclined to both reference planes (HP and VP)) (1 Sheet)

4. Projection of Planes: Planes perpendicular and parallel to either of the planes; planes perpendicular to one plane and inclined to the other or vice versa (1st& 3rd quadrants) (1 Sheet)

5. Projection of solids, such as Prism, Cube, Cylinder and Cones with axis perpendicular to horizontal plane or parallel to horizontal plane/vertical plane or both

6. Drawing 3 orthographic views of given objects (3 sheets, at least one sheet in 3rd

Angle Projection)

5.7 Identification of surfaces on drawn orthographic views from isometric object drawn (1Sheet)

6. Sectional Views (1 sheet)

    1. Need for sectional views –Drawing of different conventions for materials in sections, conventional breaks for shafts, pipes, rectangular, square, angle, channel and rolled sections

7. Isometric Views (2 sheets)

    1. Fundamentals of isometric projections (theoretical instructions) and isometric scales
    2. Isometric views of combination of regular solids like cylinder, cone, cube, prism and pyramid

8. Symbols and Conventions (2 sheets)

    1. Civil engineering sanitary fitting symbols

    2. Electrical fitting symbols for domestic interior installations and electronics symbols

Building plan drawing with electrical and civil engineering symbols

RECOMMENDED BOOKS

- Engineering Drawing by C M Verma, Takniki Parkashak, Roorkee.
2. Elementary Engineering Drawing (in First Angle Projection) by ND Bhatt, Charotar Publishing House

GENERAL WORKSHOP PRACTICE – I (DAS-107)

Basic Engineering and Science (BES) Core: Credit 2(0-0-4)

Objective: In order to have a balanced overall development of diploma engineers, it is necessary to integrate theory with practice. General workshop practices are included in the curriculum in order to provide hands- on experience about use of different tools and basic manufacturing practices. This course aims at developing general manual and machining skills in the students. Besides above, the development of dignity of labour, precision, safety at work place, team working and development of right attitude are the other objectives.

COURSE OUTLINE:

The following shops are included in the syllabus:

1. Carpentry and Painting Shop-1
2. Fitting Shop
3. Welding Shop-I
4. Electric Shop –I
5. Smithy Shop or Electronic Shop-I
6. Sheet Metal Shop

RECOMMENDED BOOKS

1. Workshop Technology I,II,III, by S K Hajra, Choudhary and A K Chaoudhary. Media Promoters and Publishers Pvt. Ltd., Bombay
2. Workshop Technology by Manchanda Vol. I,II,III India Publishing House, Jalandhar.

Manual on Workshop Practice by K Venkata Reddy, KL Narayana et al; MacMillan India Ltd. New Delhi

ENGLISH AND COMMUNICATION SKILLS – I (DAS-106)

Humanities and Social Sciences (HU): Credit 3(3-0-0)

Objective: Interpersonal communication is a natural and necessary part of organizational life. Yet, communicating effectively can be challenging because of our inherent nature to assume, overreact to and misperceive what actually is happening. Poor communication or lack of communication is often cited as the cause of conflict and poor teamwork. In today's team-oriented workplace, managing communication and developing strategies for creating shared meaning are crucial to achieve results and create successful organizations. The goal of the Communicating Skills course is to produce civic-minded, competent communicators. To that end, students must demonstrate oral as well as written communication proficiency.

COURSE OUTLINE:

1. COMMUNICATION SKILLS

    1. Introduction and Process of Communication
    2. Objectives of Communication
    3. Verbal and Non-verbal Communication
    4. Process of Communication
    5. Barriers to Communication; Overcoming Strategies
    6. Listening and Speaking Skills and Sub-Skills (All topics should be in detail)

2. GRAMMAR AND USAGE

    1. Syntax (Parts of speech)

3. WRITING SKILLS

    1. Writing Paragraphs

2. Picture Composition

3. Developing writing skills based on some audio-visual stimulus

4. READING COMPREHENSION SKILLS

Unseen comprehension passages (at least 3 passages of literary, scientific, data interpretation).

5. FACETS OF LITERATURE

5.1 Fiction

5.1.1 Homecoming – R.N. Tagore

5.1.2 The Selfish Giant - Oscar Wilde

5.1.3 The Missing Mail – R K Laxman

2. Prose

1. Of Studies – Francis Bacon

2. Art of Conversation – Richard Steel

3. Democracy – Dr. Radhakrishnan

3. Poems

1. Ozymandias – P.B. Shelley

2. Daffodils – William Wordsworth

3. Stopping by Woods on a Snowy Evening – Robert Frost

LIST OF PRACTICALS

(Note: The following contents are only for practice. They should not be included in the final theory examination)

DEVELOPING ORAL COMMUNICATION SKILLS

1. Greeting, Starting a Conversation
2. Introducing Oneself
3. Introducing Others x Leave Taking
4. Thanking, Wishing Well
5. Talking about Oneself
6. Talking about Likes and Dislikes
7. Mock Interview

LIST OF REFERENCE BOOKS

1. Communicating Effectively in English, Book-I by Revathi Srinivas; Abhishek Publications, Chandigarh.
2. High School English Grammar and Composition by Wren and Martin; S. Chand & Company Ltd., Delhi