Gondwana University, Maharashtra B.E./B.Tech CSE Sem 1 syllabus

Applied Mathematics - I

Course Code: 101
Title of the Course: Applied Mathematics - I

Credits 6

I Differential calculus
Successive differentiation, Leibnitz‟s theorem, Taylor‟s and Maclaurin‟s theorem, Indeterminate forms.

II Partial Differentiation -I
Partial Derivatives, Euler‟s theorem on homogeneous functions, Transformation of independent variables (Chain rule)

III Partial Differentiation - II
Jacobians, Taylor‟s and Maclaurin‟s series for functions of two variables, Maxima and Minima of functions of two variables, Lagrange‟s method of undetermined multipliers

IV Integral calculus
Beta and Gamma functions, R.M.S value, Differentiation of definite integrals, (Leibnitz‟s Rule) Tracing of Curves (Cartesian, Standard Parametric and Polar Curves)

V Statistics
Fitting of straight line, second degree parabola and exponential curve by the method of Least Squares, Coefficient of linear correlation, Regression lines, Rank correlation.

Text Book:
1. A text book of Engineering Mathematics, Volume I and II by D.T. Deshmukh

Reference Books:
1. A text book of Applied Mathematics Volume I and II by J.N. Wartikar and P.N. Wartikar
2. Higher Engineering Mathematics by Dr. B. S. Grewal
3. Advanced Engineering Mathematics by H. K. Dass
4. Advanced Engineering Mathematics by Erwins Kreyszig

Communication Skills

Course Code: 105
Title of the Course: Communication Skills

Credits 2

I Principles and Practice of letter writing: Business, Job and Bank Correspondence.

II Technical report writing.

III Grammer:
1. Correction of common Errors
2. Exercise on rewrite as directed
3. Correct use of words, idioms, phrases, prepositions, etc.

IV 1. Principles of Public Speaking
2. Reading Comprehension

V 1. Professional Communication Skills - Meaning, Significance, Types, Dimensions & Barriers
2. Group Discussion and Personal Interview - Importance of GD, Modules of GD, How to prepare for GD; Meaning, types & techniques of PI, How to prepare for PI

Text & Reference Books:
1. Public Speaking and Influencing Men in Business – Dale Carnegie
2. Professional Communication Skills – Bhatia and Sheikh
3. Business Communication – K.K.Sinha
4. Communication Skills – Dr. P. Prasad
5. Technical Communication – Raman and Sharma
6. High School Grammer and Composition – Wren and Martin
7. Modern English Grammer Usage and Composition – N. Krishnaswami

Basic Electrical Engineering

Course Code: 111
Title of the Course: Basic Electrical Engineering

I DC and AC Circuits

Concept of Electrical Circuit, Active & Passive elements, Voltage & Current Sources, Concept of Linearity & Linear network, Unilateral & Bilateral Elements, R,L and C as Linear Elements, Source Transformation, Kirchoff‟s Law, Superposition Theorem, Star- Delta Transformation.
AC Fundamentals, Sinusoidal & square waveforms , their average & effective values, Concept of Phasor, Phasor Diagram of RLC combinational Circuits with sinusoidal supply, Apparent, Active & Reactive Powers, Electrical Energy, Power Factor, Causes & disadvantages of Low power factor, Power factor improvement using capacitor.

II Magnetic Circuit & Single Phase Transformer

Concept of Magnetic Circuit, Analogy between Electric & magnetic Circuit, magnetic circuits with DC and Ac excitations, magnetic Leakage & Fringing, B-H Curve, Hysteresis & Eddy current losses, Series & Parallel Magnetic circuits, Mutual coupling, Laws of Electromagnetism.
Principle of operation & construction of Transformer, EMF Equation, Phasor Diagram under no load & loaded conditions, Equivalent Circuit, O.C. & S.C. Tests, Power Losses, Efficiency & Regulation, Introduction to Auto Transformer.

III Electrical Machines

Principles of Electromechanical energy conversion, Fleming‟s Right & Left Hand rule
DC Generator‟: Construction, working , types and applications
DC Motor‟: Construction, working , types and applications
EMF Equation, Methods of Excitation, Back EMF, Condition for maximum efficiency,
Torque equation of motor, Characteristics, Speed control of DC shunt Motor, Applications of DC motor
Types of Three Phase Induction Motors, Principle of Operation, Slip-Torque Characteristic, Applications
Construction, Principle of operation & working of Single phase Induction Motor, Methods of Starting , Applications

IV Measuring Instruments, Electrical safety & Introduction to Power System

Types of Instruments, Construction & working Principle of PMMC &

moving iron type Voltmeters & Ammeters, Single phase dynamometer wattmeter, Induction type Energy meter, Use of Shunts & multipliers. Overloads, short circuits & earth leakage, HRC Fuse, MCB, ELCB, Earth & Neutral wire, Factors influencing earth resistance, Pipe & plate earthing.
Three phase system : its necessity & advantages, Generation of three phase voltages, Phase sequence, Star & Delta Connections, Balance supply & balance load, Line & phase voltage/ current relations, Three phase power, General Lay out & single line diagram of Electrical Power System & functions of elements therein.

V Basic Electronics
Semiconductor Devices, PN Junction Diode, Half Wave & full wave Rectifiers, Filters, Zener Diode, Introduction to BJT & its CE characteristic, BJT as an amplifier & switch.
Introduction to number systems & Logic Gates, Boolean Algebra & its applications (POS and SOP form), K-maps.

Text Books:
1. V. Del Toro " Principles of Electrical Engineering", Prentice Hall
2. I.J. Nagrath " Basic Electrical Engineering", Tata McGraw Hill
3. D.F. Fitzgerald, A. Grabel Higginbotham " Basic Electrical Engineering", McGraw Hill
4. Mittal & Mittal " Basic Electrical Engineering", Tata McGraw Hill
5. B.L. Theraja and A.K. Theraja"A Text Book of Electrical Technology", Volume - I & II
6. J. Millman & Halkias " Electronic Devices & Circuits", Tata McGraw Hill
7. Herbert Taub " Digital Circuits & Microprocessors", McGraw Hill

Reference Books:
1. Edward Hughes " Electrical Technology", Pearson Education
2. T.K. Naagaskar & M.S. Sukhija " Basic Electrical Engineering", Oxford University Press
3. Joseph A. Edminister " Electrical Circuits : Schaums Outline Series", Tata McGraw Hill
4. S.K. Bhattacharya & S. Chatterjee " Industrial Electronics & Control", Tata McGraw Hill
5. P.S. Bhimra " Electrical Machines", Khanna Publishers
6. H. Cotton " Advanced Electrical Technology", Wheeler Publications
7. W.H. Hayt & J.E. Kennely " Engineering Circuit Analysis", McGraw Hill
8. Alan Motorshed " Electronic Devices & Circuits ", Tata McGraw Hill

9. R.P. Jain “ Modern Digital Electronics”, Tata McGraw Hill

Engineering Mechanics

Course Code: 104
Title of the Course: Engineering Mechanics

I Basic Concepts: System of forces, Moment of forces and its Application, Couples and Resultant of Force System

Equivalent Force System: Resultant of a 2 dimensional distributed loads and three- dimensional general force system

Equations of Equilibrium: Free body diagrams, Types of Supports, Equations of equilibrium, coplanar concurrent and non-concurrent systems, general spatial force system, Support reactions for determinate beams with different types of load – concentrated, uniformly distributed and uniformly varying load.

II Analysis of perfect Frames: Analysis of pin jointed simple and cantilever frames by method of joints and method of section.
Friction Forces: Law of Coulomb friction, problem involving Dry Friction, simple application like wedges, belt friction and band brakes.
Simple Machine – Differential wheel and axle, single and double purchase Crab, Velocity Ratio, Mechanical advantage, efficiency etc.

III Centroids and Moments of Inertia: Centroid location by first principle, centroid of composite areas, Second Moment and products of inertia of plane areas, Transfer theorems for moment of inertia and Product of inertia.
Introduction of Virtual work theorem: Principle of Virtual work applied to equilibrium of Mechanisms, simple beam, Pin jointed frames.

IV Kinematics & Kinetics of Particles: Rectilinear motion of a particle with variable acceleration, Motion curves, Projectile motion, normal and tangential components of acceleration, kinetics of particle and several interconnected particles.

V Collision of elastic bodies: Principle of conservation of momentum, Impulse momentum equation, work energy equation, coefficient of restitution, impact of elastic bodies.
D’Alemberts Principles, problems on connected system of particles.

Text & Reference Books:

1. Engineering Mechanics: F. L. Singer
2. Engineering Mechanics: Timoshenko & Young
3. Engineering Mechanics: Bear & Johnston
4. Engineering Mechanics: I. H. Shames
5. Engineering Mechanics: A. Nelson

Applied Physics

Course Code: 103
Title of the Course: Applied Physics

Credits 4

I Quantum Physics

Dual nature of matter, De-Broglies concept of matter waves , Davisson and Germer‟s experiment, Compton scattering (qualitative approach), Heisenberg‟s uncertainty principle and its experimental illustrations, wave packet concept, wave function interpretation, Schrodinger‟s wave equations, applications : Particle in infinite potential well, qualitative approach for finite potential well, tunneling.

II Semiconductor Physics

Formation of energy bands in solids, Classification of solids based on band theory, Energy band diagram of germanium & silicon, Probability distribution function Fermi energy-its dependence on temp and doping concentration, conductivity of solids. p-n junction diode, junction voltage equation, Hall effect-its derivation and application, transistors.

III Solid state physics

Introduction, Lattice, basis, space lattice, Unit cell, Bravais lattices, crystal system- SC, BCC & FCC, octahedral and tetrahedral voids. Crystal structure, Miller indices, Braggs law.

IV Wave optics & Electron ballistics

Interference due to thin films of uniform and non uniform thickness, Newton‟s ring, Antireflection coating applications, Motion of electron in uniform electric and magnetic fields, Concept of crossed fields. Electron refraction electric and magnetic focusing devices-CRT, CRO and its applications, Bainbridge Mass spectrograph.

V Lasers and fibre optics

Introduction, Principle of laser, laser characteristics, Spatial and temporal coherence of light waves,types of laser, and its application. Introduction to optical fibre structure, principle, modes of propogation, acceptance angle, Numerical aperture, fractional refractive index, types and classifications of optical fibre, V – number, attenuation & its different mechanisms, distortion, applications as sensors and detectors advantages of optical fibre in communication.

Text Books:

1. Engineering Physics by Avadhanulu & Kshirsagar S. Chand Prakashan.

Reference Books:

1. Concept of modern Physics by A. Beiser TMH Edition
2. Concept of modern Physics by S. L. Gupta &S. Gupta
3. Refresher Course in Physics by C.L. Arora S. Chand Publication
4. Fundamentals of Physics by David Halliday, Robert Resnik And Jerle Walker John Wiley & Sons 2002
5. Optics by Ajay Ghatak
6. Lasers and Non Linear Optics by B.B. Laud, New Age Publications
7. Lasers Theory & Application by Avadhanulu, S. Chand and Company
8. Electronic Engineering Material & Devices by John Allison (TMH)
9. Applied Physics by P.K. Mittal, I.K. International
10. Applied Physics by K. C. Nandi, Tech. Max. Pune

Applied Chemistry

Course Code: 110
Title of the Course: Applied Chemistry

Credits 4

I Water Conditioning

Industrial: Types units of hardness; Softening; (principle, reactions, advantage, limitation Comparison of) Lime-Soda (no methods), Zeolite, de-mineralization process; Numericals on lime-soda and Zeolite process; Boiler Troubles(causes, Effect on boiler operation & methods of prevention) Carry over-priming foaming; Scale sludge, caustic embrittlement, Boiler corrosion; Internal conditioning-(phosphate, carbonate, calgon).

Domestic: coagulation & sterilization using UV, ozone, chlorine, Break point chlorination.

II Corrosion and Battery Science

Introduction, Cause and Consequences of corrosion, Factors influencing corrosion Chemical & electrochemical corrosion. Mechanisms of electrochemical corrosion; Pilling-Bedworth rule; Differential aeration theory of corrosion.

Types of corrosion and Preventive Methods: Pitting; Inter granular, Stress, Waterline Corrosion; Corrosion prevention a) Design & material selection, b) Cathodic & anodic protection, c) protective surface coating- (only principle Methods not required)-tinning, galvanizing & powder coating, metal cladding and electroplating.

Battery: Secondary - Nickel-cadmium. Fuel cell applications, advantages and limitations eg Alkaline Fuel Cell.

III Materials and Green Chemistry

Cement: Portland cement: Raw material, manufacture, process parameters, role of microscopic constituents, Properties:-Setting & hardening; heat of hydration, soundness; Types (characteristics, application) High alumina, White, Rapid hardening, Ready Mix Concrete, flyash (properties, advantage, limitation, application) as cementing material.

Green Chemistry: Introduction, principles, concept of carbon credits.

IV Fuels and Energy

Fuels: Introduction: Calorific value, HCV & LCV; Determination of CV by Bomb & Boy‟s calorimeter; numericals; Solid fuels:- significance of proximate and Ultimate analysis; numericals (Dulongs formula).

Liquid and Gaseous fuels:- bubble tower fractional distillation of crude oil (boiling point wise separation only); Knocking in IC & Compression engine; Octane & Cetane number, Doping agents (Antiknocking, Anti oxidants, antiicing) Fisher-tropsch process of manufacture of synthetic gasoline; catalytic cracking (Only Principal, Definition, reactions and catalysts used, Advantage, Method of fixed bed & fluid bed not required) Bio-diesel, CNG (Composition, properties, advantages, limitations, applications, method of preparation not needed).

V Lubrication and Combustion Calculations

Lubricants: Introduction, mechanism; Hydrodynamic, boundary & extreme pressure lubrication; Classification-solid, semisolid & liquid lubricants; Biodegradable lubricants (properties, application, advantage limitation); Properties of greases:- Drop test & consistency test; Properties of liquid lubricants (definition, significance) flash &

fire point, viscosity & viscosity index, Cloud & Pour Point: Criteria for selection of lubricant- IC engine, refrigeration, gear, transformer, steam turbine, delicate mechanical system.
Numericals on Combustion estimations.

Text Books:

1. Text Book of Engineering Chemistry, S. S. Dara, S. Chand and Company Ltd., New Delhi.
2. Textbook of Engineering Chemistry, P. C. Jain and Monica Jain, Dhanpat Rai and Sons, New Delhi.
3. Text Book of Environmental Chemistry and Pollution Control, S. S. Dara; S. Chand and Company Ltd., New Delhi.
4. Textbook of Engineering Chemistry, S. N. Narkhede, R. T. Jadhav, A. B. Bhake, A. U. Zadgaonkar, Das Ganu Prakashan, Nagpur.
5. Applied Chemistry, A. V. Bharati and Walekar, Tech Max Publications, Pune.
6. Engineering Chemistry, Arty Dixit, Dr. Kirtiwardhan Dixit, Harivansh Prakashan, Chandrapur.

Reference Books:

1. A solid slate Chemistry and its Application by Anthony R. West, John Wiley & Sons(1989)
2. A Text book of Engineering Chemistry by Shashi Chawla; Dhanpat Rai & sons, New Delhi
3. A textbook of polymer science Fred. Billmeyer Jr. Wiley India Third edition
4. Applied chemistry by N. krishnamurthy . P.vallinavagam. and k. .Jeysubramanian TMH
5. Applied chemistry for engineers by T.S.Gyngell
6. Chemistry in Engineering by Lloyd A.Munro, Prentice-hall, Inc Nj
7. Chemistry of advanced materials – CNR Rao, Rsc Pbl.
8. Chemistry of Cement, J. D. Lee, Mcgraw Hill Publishing Company, New Delhi.
9. Chemistry of Engineering Materials, by Rober B Leigeou Mc Graw-Hill Book Company, Inc New York
10. Chemistry, Raymond Chang. (Tata McGraw Hill).
11. Corrosion Engineering by Mars G. Fontana and Norbert D. Green Mc Graw Hill Book Co. Tokyo
12. Electrochemistry, Philip H. Rieger (Chapman and Hail)
13. Engineering Chemistry (Vol. I and II) by Rajaram and Kuriakose.
14. Engineering Chemistry B.K.Sharma Krishna Prakashan media private LTD.
15. Engineering Chemistry by Gyngell, McGraw Hill Publishing Company, New Delhi.

16. Engineering chemistry by R.gopalan, and others, Vikas publications
17. Engineering Chemistry by R.V.Gadag, A.Nityananda Shetty ; I K International Publishing House, New
Delhi
18. Engineering Chemistry, B. S. Sivasankar, Tata Mcgraw Hill Publishing Company, New Delhi.
19. Engineering Chemistry, O. G. Palan, Tata Mcgraw Hill Publishing Company, New Delhi.
20. Engineering Chemistry, R. Shivakumar, Tata Mcgraw Hill Publishing Company, New Delhi.
21. Engineering Chemistry, Saraswat and Thakur, Vikas Publication, New Delhi.
22. Engineering materials. Venneth G Budinski (Prentice-- Hall of India).
23. Environmental chemistry, A. K. De (New Age International Publishers)
24. Fuels and Combustion by Amir Circar, Orient Longmans
25. Fundamentals of corrosion by Michael Henthorne, Chemical Engineering
26. Fundamentals of Engineering Chemistry (theory and Practice), S. K. Singh (New Age International
Publishers)
27. Materials science and engineering an introduction, William D. Callister, (Jr.,Wiley.publisher)
28. Polymer science and technology, Joel R Fried (Prentice -. Hall of India).
29. Polymer Science, V.R. Gowarikar (Wiley Eastern Ltd.).
30. Text book of engineering chemistry, R.N. Goyal and Harrmendra Goel, (Ane books India).
31. Tyre Technology, Tom French, Adam Hilger, New York
32. Water treatment by F.I. Bilane, Mir publisher
33. Water treatment for industrial and other use by Eskel Nordell, Rein hold Publishing Corporation,New York
34. Chemistry, Raymond Chang. (Tata McGraw Hill).
35. Principles of the solid state, H.V. Keer (New age international publishers).

Engineering Graphics

Course Code: 112
Title of the Course: Engineering Graphics

Credits 4

I Introduction to Engineering Drawing

Use of various drawing instruments, Conventions in Drawing, Lettering, BIS conventions. Layout of drawing sheet, sizes of drawing sheets. Different types of lines used in drawing practice, Dimensioning. Introduction to computer aided drafting package, Introduction to scales and representative factor (RF).

Curves used in Engineering Practice

Conic sections- Ellipse(excluding focus directrix method), Parabola, Hyperbola & involute, Cycloid curves- only Cycloid.

Basics of Orthographic Projections

Principle of projection, orthographic projection, reference planes, concepts of four quadrants, methods of orthographic projections, difference between first and third angle projection, first angle projections, conventions used to represent methods of orthographic projection.

Projections of Points and Lines

Projections of points in all possible positions w. r. to reference planes, projections of line parallel to both reference planes, perpendicular to one of the reference planes, inclined to one & parallel to other reference plane, inclined to both reference planes. (Lines in First Quadrant Only), simple problems on straight lines (excluding applications of straight lines)

II Projections of Planes

Projection of planes when it is parallel to one & perpendicular to other reference plane, lying in reference plane, inclined to one & perpendicular to other reference plane, inclined to both reference planes.

Auxiliary planes – Auxiliary Inclined Plane (AIP) and Auxiliary Vertical Plane (AVP), Use of Auxiliary Plane method for solving the problems.

Projections of Solids

Solids: cube, tetrahedron, prism, pyramid, cylinder and cone, projections of above solids when axis perpendicular to one of the reference planes, axis inclined to one & parallel to other reference plane, axis inclined to both the reference planes.

III Sections of Solids

Section planes, sectional views, to project sectional views of above solids cut by different section planes (when solid is in simple position, when axis is parallel to one & inclined to other reference plane).

Development of Surfaces of Solids
Applications of development of surfaces, methods of development, development of surfaces of above solids, development of surfaces of cut solids. (No reverse development)

IV Orthographic Projections
Conversion of pictorial view into orthographic views.

V Isometric Projection
Isometric view and projection, Isometric scale, conventions, isometric views of lines, plane figures, simple and compound figures, construction of Isometric view/projection from given orthographic views of blocks

Text Books:
1. N.D. Bhatt, Elementary Engineering Drawing, Charotar Publishing house, Anand, India.
2. D. N. Johle, Engineering Drawing, Tata Mcgraw-hill Publishing Co. Ltd.
3. M.B. Shah, B.C. Rana, Engineering Drawing, Pearson.
4. Pakhatkar, Engg. Drawing, Nirali Prakashan.
5. P J. Shah, Text Book of Engineering Drawing,S Chand & Publications

Reference Book:
1. P.S. Gill, Engineering Graphics.
2. Luzadder Warren J, Duff John, Fundamentals of Engineering Drawing, PHI Publications