Punyashlok Ahilyadevi Holkar Solapur University, Maharashtra B.E./B.Tech CSE Sem 1 syllabus

Communication Skills

C116 COMMUNICATION SKILLS

Theory–1 Credit

Laboratory–1 Credit

Unit No 01: English Grammar

1.1 Articles, nouns, pronouns, verbs, modal verbs, auxiliary verbs & tenses

1.2 Adjectives, adverbs, prepositions, conjunctions

1.3 i. Idioms& phrases
ii.Clichés
iii. Redundancies

Unit No 02: Vocabulary

2.1 Synonyms & antonyms

2.2 Prefixes & suffixes

Unit No 03:Oral Communication

3.1 Situational conversation

3.2 Impromptu speaking –extempore

Unit No 04: Reading Comprehension

4.0 Reading comprehension

Unit No 05:Writing Practices-1

5.1 Writing business letters

5.2 E-mail communication

5.3 Paragraph writing&Essay writing

Text Books:

1. English Grammar Just for You. RajeevanKaral. Oxford University Press
2. Technical English.Dr. M. Hemamalini. Wiley India Pvt.
3. English for Practical Purposes, Z. N. Patil, B.S. Valke, A.R. Thorat, Zeenath Merchant
4. Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press.2006.
5. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad.Oxford University Press.
6. Communication Skills, Sanjay Kumar and PushpaLata. Oxford University Press. 2011

References Books:

1. English Grammar & Composition , Wrenn& Martin, S. Chand
2. Practical English Usage . Michael Swan.OUP.1995.
3. Remedial English Grammar.F.T.Wood.Macmillan.2007.
4. On Writing Well. William Zinsser. Harper Resource Book.2001.
5. Business Communication, ShaliniKalia, ShailjaAgarwal, Wiley
6. Communication Skills for Technical Students, T. M. Farhathullah, Orient BlackSwan
7. Longman Dictionary of Contemporary English
8. Essential Activator, Longman
9. Word Power Made Easy, Norman Lewis

Basic Mechanical Engineering

C115 BASIC MECHANICAL ENGINEERING

Theory–3 Credits

Laboratory–1 Credit

Unit No 01: Thermodynamics

1.1 Definition of thermodynamics, thermodynamic Systems,

surrounding, universe, types ofsystems, state of system, properties-intensive and extensive, thermodynamic equilibrium, process and cycle, Zeroth Law of thermodynamics

1.2 Work and forms of work, heat, first law of thermodynamics, first law applied to flow processes, steady flow process, steady flow energy equation (SFEE), (numerical on first law of thermodynamics, cyclic and non cyclic processes, SFEE)

1.3 Limitations of first law, Kelvin Plank and Clausius statements of second law ofthermodynamics.

Unit No 02: Gas Laws & Gas Processes

2.1 Ideal gas, Boyle's law, Charle's law, characteristic gas equation, universal gas constant, Avogadro's law

2.2 First law applied to constant volume, constant pressure, constant temperature, reversible adiabatic process and polytropic process (work done, heat transfer, P-V-T relation) (Numerical treatment)

2.3 Refrigeration: definition of refrigeration, Vapour compression refrigeration cycle (VCRS), domestic refrigerator, air conditioning: window air conditioner, split air conditioner.

Unit No 03: Pumps, Compressors & Turbines

3.1 Power absorbing devices
Pumps: definition, classification, construction, working and applications of reciprocating pump, centrifugal pump.
compressors: construction, working and applications of reciprocating compressor, rotary compressors (vane blower)

3.2 Power producing devices
Turbines: construction, working and applications of Pelton wheel, Francis and Kaplan turbines

Unit No 04: Power Plants

4.1 Thermal power plant, site selection criteria, advantages, disadvantages

4.2 Hydroelectric power plant, site selection criteria, advantages, disadvantages

4.3 Nuclear power plant, BWR, PWR, site selection criteria, advantages, disadvantages

Section-II

Unit No 05: Internal Combustion Engines

5.1 Definition, classification, components of IC engine

5.2 Two stroke, four stroke engines, SI and CI engines

5.3 Otto and diesel cycles, thermal efficiency of Otto, diesel air standard cycle (numerical treatment)

Unit No 06: Power Transmission Systems

6.1 Belt drives: open and cross belt drives, materials of belt, types of belts, length of belt for open and cross drive, velocity ratio of simple and compound belt drive, centrifugal tension, maximum power transmitted (numerical on simple belt drive only)

6.2 Other Transmission Systems: chain drive, gear, types of gears (excluding gear terminology), gear trains-simple and compound, epicyclical gear train.

Unit No 07: Mechanical Engineering Design

7.1 Introduction, design considerations, design process, types of stresses & strains, stress- strain diagrams, modes of failure, factor of safety, engineering materials properties

7.2 Aesthetic considerations, ergonomic considerations (no numerical treatment)

Unit No 08: Manufacturing Technology

8.1 Machine tools: Centre lathe - basic elements, construction, working, operations on lathe, turning, facing.
Drilling machine - basic elements of pillar drilling machine, Construction and working of Horizontal Milling machine (no numerical treatment)

8.2 Joining Processes:

Welding process: definition, types, manual metal arc welding, spot welding, oxy acetylene welding

Brazing: procedure, filler metals, advantages, disadvantages, applications
Soldering: filler metals used, procedure, riveting and its Types (no numerical treatment)

Text Books :
1. Thermal Engineering, P.L. Ballaney, Khanna Publishers
2. Thermal Engineering, Domkundwar, Kothandaraman, Domkundwar, Dhanpat Rai & Co.
3. Elements of Workshop Technology, Vol-I & II, S.K. HajraChoudhury , A K HajraChoudhury, Nirjhar Roy , Media Promoters & Publishers Pvt. Ltd.
4. Design of Machine Elements, V.B. Bhandari, Tata McGraw Hill Publications

Reference Books:
1. Engineering Thermodynamics, P K Nag, The Tata McGraw-Hill Companies

2. Mechanical Engineering Design, Joseph E Shigley, Charles R Mischke, The Tata McGraw- Hill Companies

3. Production Technology Vol. I & II, O.P. Khanna, Dhanpat Ray Publications

Basic Electrical & Electronics Engineering

C113 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

Theory–4 Credits

Laboratory–1 Credit

Section I

Unit No 01: DC Circuits

1.1 Ohm's law, Resistance, specific resistance, energy sources, concepts of open circuit and short circuit

1.2 Kirchhoff’s Voltage and Current law& it’s applications for circuit solutions

1.3 Simplifications of circuits using series, parallel combinations

1.4 Star-delta, delta-star conversions

Unit No 02: Magnetic Circuit and Single Phase Transformer

2.1 Basic definitions related to magnetic circuit (flux, mmf, reluctance, flux density, magnetic field strength, permeability) Comparison between electric and magnetic circuit.

2.2 Series magnetic circuits with air gap, magnetic leakage and fringing

2.3 Faraday's law of electromagnetic induction, Lenz’s law, concept of self and mutual inductance

2.4 Working principle and construction of Single Phase transformer

2.5 EMF-equation of Single phasetransformer

Unit No 03: Single Phase AC Circuits

3.1 Introduction to AC, Generation of alternating voltage and current, concept of cycle, period, frequency, phase difference, Instantaneous value, Peak value

3.2 RMS value of an alternating quantity, average value of an alternating quantity, form factor, peak factor.

3.3 AC through pure resistance, pure inductance and pure capacitance, Phasor diagram

3.4 Series AC circuit (RL, RC and RLC): impedance , complex power, power factor

Unit No 04: Poly-Phase Circuits

4.1 Generation of three phase voltages

4.2 Relations of voltage and current in star and delta connections for alanced systems.

Section II

Unit No 05: Semiconductor Diodes

5.1 Semiconductors and p-n junction diode -Doping, depletion layer, barrier potential, construction, working, biasing, V-I characteristics,

ratings.

5.2 Diode applications-Circuit diagram & working of half wave rectifier, full wave rectifier, bridge rectifier.
Analysis of above rectifiers- average & RMS value of voltage & current, ripple factor and efficiency, capacitor filter using full wave rectifier- circuit diagram, working and formula of ripple factor.

5.3 Special Purpose Diodes- photo diode, LED- application of LED as 7- segment display , Zener diode- Working principle, V-I characteristics, ratings, application of Zener as voltage regulator

Unit No 06: Bipolar Junction Transistor

6.1 Bipolar Junction Transistor-construction, biasing, configuration with I/O characteristics for -CB,CE,CC, comparison between CB,CE,CC configurations, ratings of transistor

6.2 Application of transistor-BJT as switch and amplifier

Unit No 07: Electrical Transducers

7.1 Introduction, parameters for selection of transducers, wire type strain gauge , load cell , LVDT

7.2 Temperature & other transducers- thermocouple , thermistor, reluctance pulse pickup, photoelectric pickup, LDR , solar cell

Unit No 08: Introduction to Digital Electronics

8.1 Number system- decimal, binary, octal, hexadecimal & their inter-conversion , BCD code

8.2 Binary Arithmetic- addition, subtraction, subtraction using 2’s complement

8.3 Logic Gates- AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR Gates - symbol, output equation, truth table, realization of basic gates using universal gates

8.4 Boolean Algebra- laws & rules, De- Morgan theorem, simplification of logical expressions using Boolean algebra

Text-Books :
1. Electrical Technology (Volume I & 2), B L Thereja, 22nd edition, S

Chand & Company Ltd
2. Basic Electrical Engineering, V K Mehta, Revised edition, S Chand & Company Ltd
3. Basic Electronics Solid State, B L Thereja, Revised edition, S Chand & Company Ltd
4. Digital Principles and Applications, Albert Malvino , Donald Leach, Tata McGraw Hills Publication
5. Principles of Electronic Devices and Circuits (Analog and Digital), B. L. Theraja , R. S. Sedha , S. Chand publication

Reference-Books :

1. Basic Electrical Engineering, Dr.Debashisha Jena, Revised Edition, Wiley Engineering Press
2. Electrical Engineering Fundamentals, V Del Toro, 2nd edition, Prentice-Hall
3. Electrical Technology, E Hughes, 10th edition, ELBS, Longman
4. Laboratory courses in Electrical Engineering, S G Tarnekar, P K Kharbanda, S B Bodhe and S
D Naik, S Chand & Company Ltd 5. Basic Electronics Engineering, V. Baru , R. Kaduskar, S.Gaikwad , Dreamtech Publication
6. Electronic Devices and Circuits , David A. Bell ,Oxford University, Press India, Fifth edition
7. Electronic Devices, Floyd, Pearson Education publication
8. Electronic Device & Circuits, Millman Halkias ,Tata McGraw Hill, Third edition
9. Electronic Components and Materials, M. A. Joshi (Wheeler publication)

Engineering Mechanics

C114 ENGINEERING MECHANICS

Theory –3 Credits

Laboratory–1 Credit

Section I

Unit No 01: Resultant of coplanar forces

1.1 Basic units, SI units, body, rigid body, particle, scalar quantities, vector quantities, Idealization of engineering problems, force, law of transmissibility of force, moment of a force, couple, moment of a couple, resultant, parallelogram law of forces, triangle law of forces,

polygon law of forces. Varignon's theorem

1.2 Composition of co-planar concurrent and non concurrent forces: analytical method, graphical method, Bow's notation.

Unit No 02: Equilibrium of Rigid Bodies

2.1 Equilibrium of co-planar forces, analytical and graphical conditions of equilibrium, different type of supports, free body diagrams, Lami's theorem

2.2 Friction, types of friction, limiting friction, laws of Friction, Static and Dynamic friction, inclined planes, ladders, support reactions of statically determinate beams with point loads, inclined loads, uniformly distributed load, uniformly varying loads and couples.

2.3 Principle of virtual work (concept only), introduction to forces in space.

Unit No 03: Analysis of Pin-Jointed Plane Frames

3.1 Pin-jointed statically determinate plane trusses-perfect frames, assumptions, determination of nature and magnitude of a force in a member, simple trusses; zero force members.

3.2 Analysis of trusses by method of joints, method of sections and graphical method.

Unit No 04: Center of Gravity and Moment of Inertia

4.1 Centre of gravity, centroid of a composite area, Centroid of simple figures from first principle, Centroid of composite sections; Centre of Gravity and its implication

4.2 Moment of inertia- Definition, moment of inertia of plane, sections from first principles, Theorems of moment of inertia, perpendicular axis theorem, parallel axis theorem, moment of inertia of symmetrical and unsymmetrical sections, radius of gyration, polar moment of inertia.

SECTION II

Unit No 05: Kinematics of particles

5.1 Rectilinear motion, equations of motion, motion curves and their

applications, relative velocity- simple problems.

5.2 Curvilinear motion, angular motion, relation between angular motion and linear motion, equation of angular motion, tangential and radial acceleration, motion of a projectile.

Unit No 06: Kinetics of Particles

6.1 Newton's laws of motion for linear motion and angular motion, D'Alembert's principle, rectilinear motion on a rough inclined plane, motion of a lift,motion of connected bodies.

6.2 Circular motion, kinetics of rotation-torque, mass moment of inertia, problems on centroidal rotation

Unit No 07: Work Energy Methods

7.1 Potential energy, kinetic energy of linear motion and rotation, principle of conservation of energy, work energy equation.

7.2 Impulse momentum method, collision, Impact- central, eccentric, direct, oblique, elastic, plastic, coefficient of restitution, Loss of kinetic energy due to impact

Unit No 08: Mechanical Vibrations

8.1 Mechanical Vibrations: - Basic terminology, free and forced vibrations, resonance and its effects, Degree of freedom.

Text Books:

1. Engineering Mechanics, Bhavikatti S. S., New Age International Pvt. Ltd.
2. Engineering Mechanics, K. L. Kumar, Tata McGraw Hill Publications
3. Engineering Mechanics, Basudeb Bhattacharyya, Oxford University Press.
4. Engineering Mechanics - Statics and Dynamics, A. Nelson, McGraw Hill Education (India) Pvt. Ltd.
5. Engineering Mechanics Statics and Dynamics ,A.K. Dhiman, P.Dhiman & D.C. Kelshreshtha, McGraw Hill Education (India) Pvt. Ltd
6. A Text book of Engineering Mechanics, R.S. Khurmi, S. Chand Publications

Reference Books:

1. Vector Mechanics for Engineers: Statics and Dynamics by Beer and Johnson, Tata McGraw Hill Education (India) Pvt. Ltd.
2. Engineering Mechanics by Irving H. Shames, Prentice Hall of India, New Delhi.
3. Engineering Mechanics Statics and Dynamics by Ferdinand Singer, Harper& Row Publications.
4. Engineering Mechanics Statics, Vol.1, SI Version, 7th Edition – J. L. Meriam, L. G. Kraige, Wiley India Pvt. Ltd., New Delhi.
5. Engineering Mechanics Dynamics, SI Version, 7th Edition – J. L. Meriam, L. G. Kraige, Wiley India Pvt. Ltd., and New Delhi.

Engineering Physics

C011 ENGINERING PHYSICS

Theory–3 Credits

Laboratory–1Credit

Section I

Unit No 01: Semiconductor Physics

1.1 Classification of solids, Fermi level (definition), Fermi-Dirac probability distribution function (introduction only)

1.2 Fermi level in intrinsic and extrinsic semiconductors, effect of impurity concentration on Fermi level, derivation for EFin

1.3 Hall effect and its applications, numericals on this chapter

Unit No 02: Crystallography

2.1 Introduction to crystal systems, characteristics of cubic unit cell: number of atoms per unit cell, atomic radius, co-ordination number

2.2 Atomic packing factor, void space, density of crystal, symmetry elements (axis, center and plane),Bragg’s Law

2.3 Miller indices, inter planner distance (by using Miller indices), numericals on this chapter

Unit No 03: Sound Engineering

3.1 Acoustics: Introduction, reverberation, reverberation time,

absorption coefficient (definition only), Sabine's formula, basic requirements for acoustically good hall

3.2 Factors affecting acoustics of auditorium and their remedies, numericals on this chapter

3.3 Ultrasonic :Introduction, piezoelectric effect and magnetostriction effect (introduction), properties of ultrasonic waves, detection methods of ultrasonic waves and applications.

Unit No 04: Relativistic Mechanics

4.1 Introduction, postulates of special theory of relativity, Lorentz transformation of space and time,numericals on this chapter

4.2 Length contraction, time dilation,

4.3 Equivalence of mass and energy

Section II

Unit No 05: Wave Optics

5.1 Diffraction:Introduction, resolving power, Rayleigh criterion, theory of diffraction grating and its resolving power.

5.2 Polarization: concept, optic axis, Malus law, positive and negative crystals

5.3 Optical activity, specific rotation, Laurent's half shade polarimeter, Numericals on this chapter

Unit No 06: LASER

6.1 Interaction of radiation with matter- Stimulated absorption, spontaneous and stimulated emission, population inversion, pumping, metastable state, properties of laser

6.2 He-Ne gas laser

6.3 Holography (construction and reconstruction), applications of laser (science, engineering and medical),

Unit No 07: Optical Fibers

7.1 Introduction, structure of optical fiber, basic principle of optical

fiber (total internal reflection)

7.2 Derivation for acceptance angle, acceptance cone and numerical aperture, fractional refractive index change, numericals on this chapter

7.3 Classification of optical fibers- single mode and multi-mode fiber,step index and graded index fibers,advatntages of optical fibers over conducting wires

Unit No 08: Introduction to Quantum Mechanics and Nanotechnology

8.1 De Broglie hypothesis, De Broglie wavelength of matter waves: in terms of kinetic energy and associated with particle in thermal equilibrium, properties of matter waves

8.2 Davisson-Germer experiment (apparatus, investigations and analysis), numericals on this chapter

8.3 Nanotechnology: introduction,carbon nano tubes and its classification, applications of nanotechnology- electronics, energy, automobiles, space and defense, medical, environmental, textile, cosmetics

Engineering Chemistry

C012 ENGINEERING CHEMISTRY

Theory–3 Credits

Laboratory–1 Credit

Section I

Unit No 01: Water Chemistry

1.1 Introduction, water quality parameters like pH, acidity, alkalinity, total solids, Dissolved oxygen, chlorides (definitions & permissible limits as per BIS), BOD, COD, (Definition, Determination & Significance).

1.2 Hardness: types of hardness (temporary/ permanent), Calcium carbonate equivalent hardness and its calculations. (Numerical problems on hardness),

1.3 Scale and sludge in boilers: Formation, disadvantages and prevention.
Softening of water by Ion exchange process and reverse osmosis process.

1.4 Treatment of water for domestic purpose by aeration, sedimentation with coagulation process. Disinfection of water by chloramine, bleaching powder, chlorine and ozone.

Unit No 02: Organic reactions and Synthesis of Drug Molecules

2.1 Introduction to organic reactions: Addition, substitution, elimination and rearrangement (no mechanism)

2.2 Synthesis and uses of commonly used drug molecules: Paracetamol, Aspirin and Ibuprofen.

Unit No 03: Lubricants

3.1 Lubricants & lubrication, functions, classification of lubricants: Solid, semisolid and liquid.

3.2 Characteristic properties of lubricants (only definition) such as viscosity, viscosity index, flash point & fire point, cloud point & pour point, aniline point, oiliness, saponification value & acid value (numerical problems on saponification & acid value)

3.3 Types of lubrication such as fluid film, boundary (thin film) and extreme pressure. Selection of lubricants for cutting tools, I.C. engine, gears, transformers, delicate instruments & refrigeration system.

Unit No 04: Corrosion

4.1 Corrosion: definition, classification
Dry corrosion: oxidation corrosion: nature of oxide film.
Wet corrosion – electrochemical corrosion: Hydrogen evolution mechanism, oxygen absorption mechanism.

4.2 Factors influencing corrosion, testing and measurement of corrosion by weight loss method and electrical resistance method

4.3 Prevention of corrosion by: cathodic protection, anodic protection by anodizing and potentiostat.
Protective coatings: methods of application of metal coatings such as

hot dipping (galvanization & tinning), metal cladding.

Section II

Unit No 05: : Metals, Alloys & Ceramics

5.1 Metallic Materials: types of iron: cast iron, steel and wrought iron: composition, properties and applications.
Alloys: definition, purposes of making alloys.

5.2 Ceramics: definition, classification, properties.
Glass: general properties, general method of manufacture of glass, types of glasses: soft, hard, borosilicate, optical, laminated and safety glass.

Unit No 06: Fuels

6.1 Introduction, classification, characteristics of good fuel, comparison between solid, liquid and gaseous fuel, calorific value (gross and net),

6.2 Determination of calorific value by bomb calorimeter and Boy's calorimeter. Dulong's formula for calorific value. (numerical problems on calorific value.)

6.3 Petroleum: introduction, composition, classification, origin, refining of crude oil.
Biodiesel:introduction, preparation, advantages and disadvantages.

Unit No 07: Polymers

7.1 Polymerization, types of polymerization (no mechanism), degree of polymerization (DP), numerical problems on degree of polymerization, number average molecular weight (definitions and numerical problems)

7.2 Plastics: definition, properties, types of plastics (thermo softening and thermosetting), properties and applications of PVC and PET, molding of plastic into articles: compression, extrusion and injection.

7.3 Rubber:Classification, isolation of natural rubber, vulcanization, properties and applications of Buna-S and Thiokol rubbers.
Biodegradable Polymers: Introduction, examples with applications.

Unit No 08: Modern Analytical Techniques

8.1 Concentration of solution-: molarity, normality, mole fraction (definition and numerical problems),

8.2 Chromatography: definition, types.
GLC: definition, instrumentation and application of GLC.
Thermal analysis: definition of TGA, instrumentation and application of TGA.

Text Books:
1. A text book of Engineering Chemistry, S.S. Dara, S S Umare, S Chand
2. A text book of Engineering Chemistry, Shashi Chawala, Dhanpat Rai & Co
3. A text book of Experiments and Calculations in Engineering Chemistry, S.S. Dara. S Chand

Reference Books:
1. Engineering Chemistry, Jain and Jain, Dhanpat Rai & Co
2. Engineering Chemistry, M. Subha Ramesh, Dr. S. Vairan-Ed.-IInd Wiley
3. Instrumental Methods of chemical analysis, Chatwal and Anand,Himalaya Pub House
4. Industrial Chemistry, B.K.Sharma,Goyal
5. Chemistry for Engineers, Rajesh Agnihotri, Wiley
6. Fundamentals of Engineering Chemistry, S.K.Singh, New Age Int.
7. Engineering Chemistry (NPTEL Web book), B. L. Tembe, Kamaluddin & M. S. Krishnan.

Engineering Mathematics I

C112 ENGINEERING MATHEMATICS- I

Theory –3 Credits

Tutorial–1 Credit

Section I

Unit No 01: Successive Differentiation and Mean Value Theorems

1.1 Definition & symbol, nth derivatives of standard functions

1.2 nth derivatives of algebraic functions, nth derivatives of functions

belongs to polar form

1.3 Statement of Leibnitz's Theorem (without proof), nth derivative of product of two functions by Leibnitz theorem, formation of higher order differential equations for the given functions,

1.4 Mean Value Theorem(MVT) (Without Proof) : Rolles MVT, Lagranges MVT, Cauchys MVT

Unit No 02: Expansion of Functions and Indeterminate forms

2.1 Statement of Maclaurin's series (without proof), expansion of standard functions and examples using Maclaurin's series. Expansion of functions by standard series method, differentiation and integration, method of substitution.

2.2 Statement of Taylor's series (without proof), expansion of functions f(x) about any point

2.3 Indeterminate forms of the type, L Hospital's rule.

Unit No 03: Matrices

3.1 Definition of Symmetric, Skew- Symmetric and orthogonal Matrices, Rank of matrix, canonical form or normal form of matrix

3.2 System of Simultaneous Linear Equations - homogeneous and non-homogeneous

3.3 Linear dependence and independence of vectors, Cayley - Hamilton Theorem (without proof) Inverse by Cayley Hamilton Theorem

3.4 Eigen values , Eigen vectors and their properties

Section II

Unit No 04: Multivariable Differential Calculus

4.1 Partial(Multivariable) derivatives of first and higher order , variable to be treated as constant

4.2 Total derivative, Partial(Multivariable) differentiation of composite function

4.3 Homogeneous functions and Euler's Theorem (without proof)

Unit No 05 : Applications of Multivariable Differential Calculus

5.1 Jacobians , properties of Jacobians i.e. J. J *=1 , Jacobians of composite functions

5.2 Errors and approximations

5.3 Maxima & minima of functions of two variables

5.4 Lagrange's method of Undetermined multipliers (one condition)

Unit No 06: Vector Differential Calculus

6.1 Velocity vector, acceleration vector, tangential and normal component of acceleration

6.2 Vector differential operator, gradient, directional derivatives, angle between surfaces,

6.3 Divergence and curl, solenoidal and irrotational field

Text Books:

1. A Text Book of Applied Mathematics, P.N. and J.N. Wartikar, Vol.1, Pune Vidyarthi Griha
Prakashan.
2. Advanced Engineering Mathematics, H. K. Dass, S. Chand Publications, Delhi.
3. Engineering Mathematics (Volume I), ITL Education, Cengage Learning.
4. Engineering Mathematics, Ravish R Sing and Mukul Bhatt, McGraw Hill.
5. Applied Mathematics-I,II, Kreyzig's, Wiley.
6. A text book of Engineering Mathematics, N.P. Bali and Manish Goyal, Laxmi
Publications, 2008

Reference Books:

1. Higher Engineering Mathematics (42nd Edition), B.S. Grewal Khanna Publications, Delhi.
2. Engineering Mathematics, Srimanta Pal and Subodh C. Bhunia, Oxford Higher Education.
3. Mathematics for Engineering Applications, Kuldip S. Rattan and Naathan W. Klingbeil Wiley.
(Modeling and Core Engineering Application)
4. Higher Engineering Mathematics, Ramana B.V., Tata McGraw Hill

New Delhi, 2010.