Technical Communication

**Technical Communication
(KAS301/401)**

Unit -1 Fundamentals of Technical Communication:
Technical Communication: Features; Distinction between General and Technical
Communication; Language as a tool of Communication; Dimensions of Communication:
Reading & comprehension; Technical writing: sentences; Paragraph; Technical style: Definition,
types & Methods; The flow of Communication: Downward; upward, Lateral or Horizontal;
Barriers to Communication.

Unit - II Forms of Technical Communication:
Technical Report: Definition & importance; Thesis/Project writing: structure & importance;
synopsis writing: Methods; Technical research Paper writing: Methods & style; Seminar &
Conference paper writing; Expert Technical Lecture: Theme clarity; Analysis & Findings; 7 Cs
of effective business writing: concreteness, completeness, clarity, conciseness, courtesy,
correctness, consideration, C.V./Resume writing; Technical Proposal: Types, Structure & Draft.

Unit - III Technical Presentation: Strategies & Techniques
Presentation: Forms; interpersonal Communication; Class room presentation; style; method;
Individual conferencing: essentials: Public Speaking: method; Techniques: Clarity of substance;
emotion; Humour; Modes of Presentation; Overcoming Stage Fear; Audience Analysis &

retention of audience interest; Methods of Presentation: Interpersonal; Impersonal; Audience
Participation: Quizzes & Interjections.

Unit - IV Technical Communication Skills:
Interview skills; Group Discussion: Objective & Method; Seminar/Conferences Presentation
skills: Focus; Content; Style; Argumentation skills: Devices: Analysis; Cohesion & Emphasis;
Critical thinking; Nuances: Exposition narration & Description; effective business
communication competence: Grammatical; Discourse competence: combination of expression &
conclusion; Socio-linguistic competence: Strategic competence: Solution of communication
problems with verbal and non verbal means.

Unit - V Dimensions of Oral Communication & Voice Dynamics:
Code and Content; Stimulus & Response; Encoding process; Decoding process; Pronunciation
Etiquette; Syllables; Vowel sounds; Consonant sounds; Tone: Rising tone; Falling Tone; Flow in
Speaking; Speaking with a purpose; Speech & personality; Professional Personality Attributes:
Empathy; Considerateness; Leadership; Competence.

Reference Books
1. Technical Communication – Principles and Practices by Meenakshi Raman & Sangeeta
Sharma, Oxford Univ. Press, 2007, New Delhi.
2. Personality Development and Soft Skills by Barun K. Mitra, OUP, 2012, New Delhi.
3. Spoken English- A Manual of Speech and Phonetics by R.K.Bansal & J.B.Harrison,
Orient Blackswan, 2013, New Delhi.
4. Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan,
Tata McGraw Hill & Co. Ltd., 2001, New Delhi.
5. Practical Communication: Process and Practice by L.U.B. Pandey; A.I.T.B.S.
Publications India Ltd.; Krishan Nagar, 2014, Delhi.

6. Modern Technical Writing by Sherman, Theodore A (et.al); Apprentice Hall; New Jersey; U.S.

7. A Text Book of Scientific and Technical Writing by S.D. Sharma; Vikas Publication, Delhi.
8. Skills for Effective Business Communication by Michael Murphy, Harward University, U.S.
9. Business Communication for Managers by Payal Mehra, Pearson Publication, Delhi.

Mathematics-3

MODULE I

Laplace Transform
Laplace transform, Existence theorem, Laplace transforms of derivatives and integrals, Initial
and final value theorems, Unit step function, Dirac- delta function, Laplace transform of periodic
function, Inverse Laplace transform, Convolution theorem, Application to solve simple linear
and simultaneous differential equations.

MODULE II
Integral Transforms
Fourier integral, Fourier Transform , Complex Fourier transform, Inverse Transforms,
Convolution Theorems, Fourier sine and cosine transform, Applications of Fourier transform to simple one dimensional heat transfer equations, wave equations and Laplace equations, Z-Transform and its application to solve difference equations.

Module- III
Formal Logic ,Group, Ring and Field: Introduction to First order logic, Proposition, Algebra
of Proposition, Logical connectives, Tautologies, contradictions and contingency, Logical
implication, Argument, Normal form, Rules of inferences, semi group, Monoid Group, Group,
Cosets, Lagrange's theorem , Congruence relation , Cyclic and permutation groups, Properties
of groups, Rings and Fields (definition, examples and standard results only)

Module- IV

Set, Relation, function and Counting Techniques - Introduction of Sets, Relation and
Function, Methods of Proof, Mathematical Induction, Strong Mathematical Induction, Discrete
numeric function and Generating functions, recurrence relations and their solution , Pigeonhole
principle.

Module- V
Lattices and Boolean Algebra: Introduction, Partially ordered sets, Hasse Diagram, Maximal
and Minimal element, Upper and Lower bounds, Isomorphic ordered sets, Lattices, Bounded
Lattices and , Distributive Lattices.
Duality, Boolean Algebras as Lattices, Minimization of Boolean Expressions, prime Implicants,
Logic Gates and Circuits, Truth Table, Boolean Functions, Karnaugh Maps.

Text Books
1. E. Kreyszig: Advanced Engineering Mathematics; John Wiley & Sons.
2. R.K. Jain & S.R.K. Iyenger: Adnanced Engineering Mathematics, Narosa Publishing
House.
3. C.L.Liu: Elements of Discrete Mathematics; Tata McGraw- Hill Publishing Company
Limited, New Delhi.

4. S. Lipschutz, M.L. Lipson and Varsha H. Patil: Discrete Mathematics; Tata McGraw-
Hill Publishing Company Limited, New Delhi

5. B. Kolman , Robert C. Busby & S. C. Ross: Discrete Mathematical Structures' 5
th Edition, Perason Education (Singapore), Delhi, India.

Reference Books
1. B.S. Grewal: Higher Engineering Mathematics; Khanna Publishers, New Delhi.
2. B.V. Ramana: Higher Engineering Mathematics; Tata McGraw- Hill

Publishing
Company Limited, New Delhi.
3. Peter V.O' Neil. Advanced Engineering Mathematics, Thomas (Cengage) Learning.
4. Kenneth H. Rosem: Discrete Mathematics its Application, with Combinatorics and Graph
Theory; Tata McGraw- Hill Publishing Company Limited, New Delhi
5. K.D. Joshi: Foundation of Discrete Mathematics; New Age International (P) Limited,
Publisher, New Delhi.

Materials, Testing & Construction Practices

UNIT I Scope of Study of building Materials: building materials and their performance,
economics of the building materials.
Stones: Requirement of good building stone, characteristics of building stone sand their testing.
Common building stones.
Bricks: Manufacturing process of clay bricks, classification of clay bricks. Properties of clay
bricks, testing methods for clay bricks. Problems of efflorescence & lime bursting in bricks &
tiles. Different types of bricks.
Gypsum: properties of gypsum plaster, building products made of gypsum and their uses.
Cement: Raw materials used, Process of Manufacturing, Chemical composition, compounds
formed and their effect on strength, Types of cement, Testing of cement properties, Uses of
cement.
Cement Concrete: Constituent materials and their properties, Grades of concrete, Factors
affecting strength, Properties of concrete at fresh and hardened stage, Testing of concrete,
Methods of Curing of concrete.
Pozzolona: Chemical composition and requirements for uses, Natural and Artificial flyash,
Surkhi(burnt clay pozzolona), rice husk and ash pozzolona, properties and specifications for use
in construction. Timber: Classification and identification of timber, Fundamental Engineering
Properties of timber, Defects in timber, Factor affecting strength of

timber, Methods of seasoning
and preservation of timber. Wood based products.
Asphalt: Bitumen and Tar: Terminology, specifications and uses,
Bituminous materials.

UNIT II Plastics: classification, advantages of plastics, Mechanical properties and use of plastic
in construction. Paints, varnishes and distempers: Common constituents, types and desirable
properties, Cement paints. Ferrous metals: Desirable characteristics of reinforcing steel.
Principles of cold working. Strength ,Telemechanical, physical Properties and chemical
composition. Brief discussion on properties and uses of Aluminum and lead. Glass: Ingredients,
properties types and use in construction. Insulating Materials: Thermal and sound insulating
material, desirable properties and types.

UNIT III Building Construction: Components of building area considerations, Construction
Principle and Methods for layout, Damp proofing, anti termite treatment in buildings, Vertical
circulation: stair cases and their types and planning. Different types of floors, and flooring
materials .Bricks and stone masonry construction. Cavity wall & hollow block construction.

UNIT IV Doors and Windows: Construction details, types of doors and windows and their
relative advantages & disadvantages. Types of roof and roof treatments, Lintel sand Chhajja,
Principles of building Planning.

UNIT V Natural Ventilation, Water Supply and Sanitary fittings (Plumbing), Electric Fittings.
Heating Ventilation & Air conditioning (HVAC), Mechanical Lifts and Escalators, Fire Fighting
and Fire Protection of Buildings. Acoustics. Plastering and its types,

pointing, Distempering,
Colour washing, Painting etc. Principles & Methods of building maintenance.

Hydraulic Engineering and Machines

HYDRAULIC ENGINEERING & MACHINES

Credit – 4

UNIT I Introduction : Basic concepts of free surface flows, velocity and pressure distribution,

Mass, energy and momentum principle for prismatic and non-prismatic channels critical, sub-
critical and super-critical type of flows. Critical depth, concepts of specific energy and specific

force. Chezy's and Manning's equations for uniform flow in open channel, Velocity distribution,
most efficient channel section, compound sections. [8 Hours]

UNIT II Energy-Depth relationship: Application of specific energy principle for interpretation
of open channel phenomena, flow through vertical and horizontal contractions. Equation of
gradually varied flow and its limitations, flow classification and surface profiles, integration of
varied flow equation by analytical, graphical and numerical methods. Measurments of discharge
& velocity – Venturi flume, Standing wave flume, Parshall flume, Broad crested weir, Current
meter and Floats. [8 Hours]

UNIT III Rapidly varied flow: Hydraulic jump; Evaluation of the jump elements in rectangular
channels on horizontal and sloping beds, energy dissipater, open channel surge, celerity of the
gravity wave, deep and shallow water waves. [8 Hours]

UNIT IV Impulse momentum equation- Impact of Jets-plane and curved- stationary and moving
plates. Pumps: Positive displacement pumps - reciprocating pumps , centrifugal pumps,

operation, velocity triangles, performance curves, Cavitation, Multi staging, Selection of pumps.
[8 Hours]
UNIT V Rotodynamic Machines, Pelton Turbine, equations for jet and rotor size, efficiency,
spear valve, reaction turbines, Francis and Kaplan type, Head on reaction turbine, unit quantities,
similarity laws and specific speed, cavitation, characteristic curves. [8 Hours]

Sensor and Instrumentation

Unit- I:
Sensors & Transducer: Definition, Classification & selection of sensors, Measurement of displacement
using Potentiometer, LVDT & Optical Encoder, Measurement of force using strain gauge, Measurement
of pressure using LVDT based diaphragm & piezoelectric sensor.
Unit-II:
Measurement of temperature using Thermistor, Thermocouple & RTD, Concept of thermal imaging,
Measurement of position using Hall effect sensors, Proximity sensors: Inductive & Capacitive, Use of
proximity sensor as accelerometer and vibration sensor, Flow Sensors: Ultrasonic & Laser, Level
Sensors: Ultrasonic & Capacitive.
Unit -III:
Virtual Instrumentation: Graphical programming techniques, Data types, Advantage of Virtual
Instrumentation techniques, Concept of WHILE & FOR loops, Arrays, Clusters & graphs,
Structures: Case, Sequence & Formula nodes, Need of software based instruments for industrial
automation.
Unit-IV:
Data Acquisition Methods: Basic block diagram, Analog and Digital IO, Counters, Timers, Types of
ADC: successive approximation and sigma-delta, Types of DAC: Weighted Resistor and R-2R
Ladder type, Use of Data Sockets for Networked Communication.
Unit V:
Intelligent Sensors: General Structure of smart sensors & its components, Characteristic of smart sensors:

Self calibration, Self-testing & self-communicating, Application of smart sensors: Automatic robot
control & automobile engine control.

Universal Human Values

KVE401 Universal Human Values and Professional Ethics

UNIT-1 Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

Understanding the need, basic guidelines, content and process for Value Education, Self-Exploration–what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self exploration, Continuous Happiness and Prosperity- A look at basic Human Aspirations, Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority, Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario, Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

UNIT-2 Understanding Harmony in the Human Being - Harmony in Myself

Understanding human being as a co-existence of the sentient 'I' and the material 'Body', Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha, Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer), Understanding the characteristics and activities of 'I' and harmony in 'I', Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure Sanyam and Swasthya.

UNIT-3 Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

Understanding harmony in the Family- the basic unit of human interaction , Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship, Understanding the meaning of Vishwas; Difference between intention and competence, Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship, Understanding the harmony in the society (society being an extension of family): Samadhan,

Samridhi, Abhay, Sah-astitva as comprehensive Human Goals, Visualizing a universal harmonious order in society-Undivided Society (AkhandSamaj), Universal Order (SarvabhaumVyawastha)-from family to world family!.

UNIT-4 Understanding Harmony in the Nature and Existence - Whole existence as Co-existence

Understanding the harmony in the Nature, Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature, Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space, Holistic perception of harmony at all levels of existence.

UNIT-5 Implications of the above Holistic Understanding of Harmony on Professional Ethics

Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order, Competence in Professional Ethics: a) Ability to utilize the professional competence for augmenting universal human order, b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems, technologies and management models, Case studies of typical holistic technologies, management models and production systems, Strategy for transition from the present state to Universal Human Order: a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers, b) At the level of society: as mutually enriching institutions and organizations.

Text Books:

1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.

References:

1. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA
2. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
4. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report,

Universe Books.

5. A Nagraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak.
6. P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
7. A N Tripathy, 2003, Human Values, New Age International Publishers.
8. SubhasPalekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) KrishiTantraShodh, Amravati.
9. E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers , Oxford University Press
10. M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethics
(including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
11. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.
12. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal
Book Co., Lucknow. Reprinted 2008.

Introduction to Solid Mechanics

UNIT I Simple stress and strains:
Concept of stress and strain, types of stresses and strains, Hook's law, stress and strain diagram
for ductile and brittle metal. Lateral strain, Poisson ratio, volumetric strain, elastic moduli and
relation between them. Bar of varying cross-section, composite bar and temperature stress. Strain
energy for gradual, sudden, and impact loading.
Compound stress and strains:
Normal stress and strain, shear stress and strain, stresses on inclines sections, principal stress and
strain, maximum shear stress, Mohr's stress circle, three dimensional state of stress & strain,
equilibrium equations, generalized Hook's law-3D, Theories of failure and factor of safety.

UNIT II Shear force and bending moment diagrams
Shear force (SF) and Bending moment (BM) diagrams for simply supported, cantilevers,
overhanging and fixed beams. Calculation of maximum BM and SF

and the point of contra
flexure under concentrated loads, uniformly distributed loads over the whole span or part of
span, combination of concentrated loads (two or three) and uniformly distributed loads,
uniformly varying loads.

UNIT III Flexural Stresses

-Theory of simple bending – Assumptions – Derivation of bending
equation: $M/I = f/y = E/R$ - Neutral axis – Determination of bending stresses – Section modulus
of rectangular and circular sections (Solid and Hollow), I,T, Angle and Channel sections –
Design of simple beam sections.
Torsion- Derivation of torsion equation and its assumptions. Applications of the equation of the
hollow and solid circular shafts, torsional rigidity, Combined torsion and bending of circular
shafts, principal stress and maximum shear stresses under combined loading of bending and
torsion.
Shear Stresses- Derivation of formula – Shear stress distribution across various beam sections
like rectangular, circular, triangular, I, T angle sections.

UNIT IV Deflection of Beams:

Slope and deflection- Relationship between moment, slope and
deflection, Moment area method, Macaulay's method. Use of these methods to calculate slope
and deflection for determinant beams.
Short Columns and Struts: Buckling and stability, slenderness ratio, combined bending and direct
stress, middle third and middle quarter rules.

UNIT V Helical and Leaf Springs:

Deflection of springs by energy method, helical springs under
axial load and under axial twist (respectively for circular and square cross sections) axial load
and twisting moment acting simultaneously both for open and closed coiled springs.
Thin cylinders, Thick cylinders & Spheres: Introduction, difference between thin walled and

thick walled pressure vessels, thin walled spheres and cylinders, hoop and axial stresses and
strain, volumetric strain. Radial, axial and circumferential stresses in thick cylinders subjected to
internal or external pressures, compound cylinders.