Faculty of Engineering & Technology

Study and Evaluation Scheme

Of

Bachelor of Technology (I Year)
(CBCS)

B.Tech. (All Branches)
(Applicable w.e.f Academic Session 2016-20, till revised)

AKS UNIVERSITY, SATNA

Study and Evaluation Scheme

** The University Authorities reserve all the rights to make any additions/ deletions or changes/ modifications to this syllabus as deemed necessary.
### Group A
(Mechanical, Civil, Cement)

<table>
<thead>
<tr>
<th>S.NO.</th>
<th>Paper Code</th>
<th>Subject</th>
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### Group B
(Electrical, Computer & Mining)

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### B.TECH. (CBCS)

#### SCHEME

(W.E.F. SESSION 2016-17)

#### SEMESTER-II

<table>
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### GROUP-B

(Mechanical, Civil, Cement)

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</table>
## UNIT-1 Differential Calculus
Successive differentiation: Maclaurin’s series and Taylor’s series for one variable function. Partial differentiation, Homogeneous function, Euler’s theorem, Maxima and minima of function of one and two variables. Radius of curvature,

## UNIT-2 Matrices

## UNIT- 3 Multiple Integrals

## UNIT- 4 Vector Calculus
Scalar and vector: Definition and terminology, Vector and scalar point functions, Gradient of scalar function, Divergence of a vector point function, Curl of a vector point function Directional derivatives. Vector integrations: Line integral, surface integral and volume integrals, Green’s Theorem (statement and related problems), Stoke’s Theorem (statement and related problems), Gauss’s divergence theorem (statement and related problems)

## UNIT- 5 Differential Equations:
Solution of Ordinary differential equation of first order and first degree: Separation of variables, Homogeneous equation, linear differential equations, Bernoulli’s equation, Exact differential equation, NASC for Exactness of ODE , Rules for finding integrating factor. Solution of Linear differential equations of nth order with constant coefficients: Complementary functions and particular integrals, Cauchy’s Homogeneous linear differential equation, Simultaneous linear differential equations.

### Text Books :
4. D.C. Agrawal, Engineering Mathematics-I,Sai prakasan

### Reference Books:-
Objective: The role of chemistry and chemical production in every branch of engineering is expanding greatly now a day’s various chemical products of chemical industries are playing important role in the field of engineering with increasing number of such products each successive years. The strength of materials the composition of substances, their behaviors when subjected to different treatment and environment and the laws of heat and dynamic energy have entered in almost every activity of modern life.

UNIT-I: Atomic Structure and chemical bonding
Chemical bonding: - Ionic, covalent and co-ordinate bond. Hydrogen bond and its type. Hybridization (sp, sp^2, sp^3, sp^d^2 and sp^d^3). VSEPER theory, MOT and Molecular energy level diagram for, N_2, O_2 and F_2 molecules.

UNIT-II: Polymer and metallic corrosion

UNIT-III: Fuels, Cement and Lubricants

UNIT-IV: Water and its treatment

UNIT-V: Spectroscopy and chromatography:-
### Text Book:

<table>
<thead>
<tr>
<th>Author</th>
<th>Name of the book</th>
<th>Publisher</th>
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<tbody>
<tr>
<td>Jain &amp; Jain</td>
<td>Engineering Chemistry</td>
<td>Dhanpat Rai &amp; sons</td>
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<tr>
<td>Jain &amp; Jain</td>
<td>Engineering Chemistry</td>
<td>Wiley India Edition</td>
</tr>
<tr>
<td>B.K. Sharma</td>
<td>Industrial Chemistry</td>
<td>Goel Publication</td>
</tr>
<tr>
<td>B.K. Sharma</td>
<td>Engineering Chemistry</td>
<td>Krishna Publication</td>
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<tr>
<td>S.S. Dara</td>
<td>Engineering Chemistry</td>
<td>S. Chand Publication</td>
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<tr>
<td>Shashi Chawla</td>
<td>Engineering Chemistry</td>
<td>Dhanpat Rai &amp; sons</td>
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### Reference Books:

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<tr>
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<tbody>
<tr>
<td>Ghosh</td>
<td>Polymer Science</td>
<td>Tata McGraw Hill</td>
</tr>
<tr>
<td>S.S. Kumar</td>
<td>Applied Chemistry</td>
<td>Tata</td>
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</tbody>
</table>
Unit I - Languages and skills of communication
Linguistic techniques, Modern usages, Reading comprehension, English phonetic symbols/sings, Oral presentation, Audition Communication, Processes of Communication, Verbal and Non Verbal Communication, Barriers to Communication.

Unit II - Application of linguistic ability
Writing of definitions of Engineering terms, Objects, Processes and Principles (Listening) Topics of General Interest, Reproduction from business, daily life, travel, health, buying and selling, company structure, systems etc.

Unit III - Letter Writing:
Applications, Enquiry, Calling quotations, Tenders, Order and Complaint.

Unit IV
Precise Writing, Noting and drafting, Technical Description of simple engineering objects and processes (writing), Report writing, precise writing, Note writing, Slogan writing comment, Speech advertising.

Unit V

Additional Topics to be covered in the session:
1. Basic Grammar & Vocabulary (Synonyms /Antonyms, Analogies, sentence completion, correctly spelt words, idioms, proverbs, common errors).
2. phonetic symbols and pronunciation.
3. Listening skills (Including Listening Comprehension )
4. Reading Skills (Including Reading Comprehension )
5. Writing Skills (Including structuring resume and cover letter )
6. Speaking Skills
7. Body Language
8. Oral Presentation :

Reference Books :-
1. Business Correspondence and Report Writing - By Sharma; TMH.
2. Living English Structure – By W.S. Allen; Longmans.
3. English Grammar – Ehrlich, Schaum Series; TMH.
4. Spoken English for India – By R.K. Bansal and IB Harrison Orient
5. Longman. New International Business English – by Joans and Alexander; OUP.
6. Effective Technical Communication – Rizvi; TMH.
Unit-I
Coplanar Concurrent Forces:

Unit-II
Resolution and Composition of Forces:

Unit-III
Coplanar Non Concurrent Forces:

Unit-IV

Unit-V
Centroid and Centre of Gravity: Centroid, Centre of Gravity, Determination of Centroid of Simple Figures, Centroid of Composite Sections. Centre of Gravity of Solid Bodies. Area Moment of Inertia: Basic Concept of Inertia, Definition of Moment of Inertia, Theorems of Moment of Inertia, Radius of Gyration, Polar Moment of Inertia of Standard Sections, Moment of Inertia of Composite Section, Principal Moment of Inertia, Mass Moment of Inertia.
Introduction to Dynamics: Overview of Dynamics, Basic Concepts and Terms Used in Dynamics, Motion, Types of Motion, Newton’s Laws of Motion, Newton’s Law of Gravitation.

REFERENCES
KL Kumar, Engineering Mechanics, Tata McGraw- Hill Education
Unit I
*Suggested Jobs : Forging of chisel , forging of Screw Driver*

Unit II
*Suggested Jobs : Name Plate ,Any of the Carpentry joint like mortise or tennon joint*

Unit III
Fitting Shop: Study and use of Measuring instruments, Engineer steel rule, Surface gauges caliper, Height gauges, feeler gauges, micro meter. Different types of files, File cuts, File grades, Use of surface plate, Surface gauges drilling tapping Fitting operations: Chipping filling, Drilling and tapping.
*Suggested Jobs :Preparation of job piece by making use of filling, sawing and chipping , drilling and tapping operations.*

Unit IV
Moulding : Properties of good mould & Core sand, Composition of Green , Dry and Loam sand. Methods used to prepare simple green and bench and pit mould dry sand bench mould using single piece and split patterns.

Unit V

Reference Books:
1. Bawa HS; Workshop Practice, TMH
2. Rao PN; Manufacturing Technology- Vol. I & 2, TMH
3. John KC; Mechanical workshop practice; PHI
5 Jain. R.K. Production Technology -
<table>
<thead>
<tr>
<th>Unit 1 :</th>
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<tbody>
<tr>
<td>Definition, scope and importance, need for public awareness. Natural resources and associated problems. Forest resources: Use and over-exploitation, deforestation, mining, dams and their effects on forest. Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. Land resources: Land as a resource, land degradation, soil erosion and desertification.</td>
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<th>Unit 2 :</th>
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<tr>
<td>Food resources: World food problems, effects of modern agriculture, fertilizer-pesticide problems, Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.</td>
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<th>Unit 4 :</th>
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<tr>
<td>Definition: Cause, effects and control measures of :- Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards, Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies, Disaster management: floods, earthquake, cyclone and landslides.</td>
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**Field work**

- Visit to a local area to document environmental assets, river/ forest/grassland/hill/mountain
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural
- Study of common plants, insects, birds.
- Study of simple ecosystems-pond, river, hill slopes, etc

**Suggested Books:**

- A text book of Environmental Studies, Erach Bharucha, UGC Publication Delhi
- A text book of Environmental science: Purohit Shami & Agrawal, Agrobios Student edition Jaipur
- A text book of Environmental Studies: Kaushi & Kaushik New age International Publication
- Paryavaran Addhyan : MP Hindi Granth Academy
- Paryavaran Addhyan : KL Tiwari and Jadhav Publication
Unit-I

Unit-II
POWER GENERATION: External and internal combustion engines Auto diesel & dualcycles, comparative study - Hydro, thermal and nuclear power plants (layouts, element/component description, advantages, disadvantages, applications). Simple Problems. Introduction to Steam water and gas turbines, basics of Rankine & Joule cycle, centrifugal pumps.

Unit-III

Unit-IV
THERMAL ENGINEERING: Basic concepts of thermodynamics, Concept of system, Introduction to Zeroth, first & second law of thermodynamics, salient features of steamboilers, accessories & mountings, High pressure boilers Basic modes of heat transfer Fourier’s law, Stefan Boltzmann’s law, Newton’s law. Concept of refrigeration & air conditioning, ton of refrigeration, COP. working of domestic refrigerator & air conditioner.

Unit-V

REFERENCES
Unit-1 Wave Mechanics

**Interference:** coherent sources, principle of superposition, definition and types of interference, Interference from parallel thin films, wedge shaped films, Newton’s rings, Michelson’s Interferometer, experiments and their applications.

**Diffraction:** Fresnel diffraction, diffraction at a straight edge, single slit, double slit and n-Slit Diffraction grating, dispersive power of grating, resolving power of prism and grating. **Polarization:** Introduction, production of plane polarized light by different method, Brewster’s law and Malu’s law, double refraction, Nicol prism, Quarter and half wave plate, polarimeter.

Unit-2 Laser & Fiber Optics

**LASER:** Absorption, Stimulated and Spontaneous emission, coherence, pumping, population Inversion, Principle of laser beam, Einstein’s coefficients, principle and working of He-Ne laser & Ruby Laser with energy level diagram, applications and uses of laser.

**Fibre optics:** fundamental idea about optical fibre, types of optical fibre, mechanism of optical fibre (qualitative only), optical communication, applications and uses of optical fibre.

Unit-3 Quantum Mechanics

Phase & Group velocities and their relationship, Uncertainty principle with elementary proof and applications, Debroglie’s concept of matter waves, Schrodinger’s wave equation, (Time dependent and time independent), interpretation of wave function, eigen values and eigen functions, Compton’s effect.

Unit-4 Solid State Physics & Superconductivity

**Solid State Physics:** Formation of energy bands in solids, classification of conductors, semiconductors and insulators on the basis of energy band theory, semiconductors and it’s classification, intrinsic & extrinsic semiconductor, Zener diode, tunnel diode, P-N junction and it’s applications, Hall effect.

**Superconductivity:** Introduction, types of superconductor, Meissner effect, Type-I and Type-II Superconductors, properties of superconductors, and it’s applications.

Unit-5 Nano Technology

Introduction, nanoscale, quantum dot, quantum wire and quantum well, concept of nano materials, Nano particles, carbon nano tubes, nano clays, nano mud, nano fibres and their properties, preparation technique of nano materials and nano fibres, characterisations of nano materials by using X-ray diffraction and scanning electron microscopy measurements, applications and future of nano technology in the field of electronics, nanorobots, quantum computing, space energy, DNA, Biomedical, Polymers, Textiles and nano co
TEXT BOOKS
2. “ENGINEERING PHYSICS” BY – Kshir Sagar

REFERENCE BOOKS
1. Verma H.C. “CONCEPT IN PHYSICS”, Bharti Bhawan Ltd., New Delhi
2. Optics by- Ghatak
4. Solid state physics By- Kittel

List of Experiments (Any-10)
1. To determine the refractive index of prism by Spectrometer.
2. To find wave length of diffraction grating with the help of mercury lamp.
3. To find wave length of sodium light with the help of Newton’s ring.
4. To study diffraction of light with the help of single slit experiment by using laser beam.
5. To find the specific rotation of angle of a sugarcane solution by using polarimeter.
6. To find the value of Plank’s constant.
7. To study the characteristics curve of P-N junction diode & Zener diode.
8. To study the characteristics curve of P-N-P transistor.
9. To study the characteristics curve of N-P-N transistor.
10. Calibration of ammeter with the help of a potentiometer.
11. Determination of value of unknown resistance by using wheatstone bridge.
13. To determine the energy band gap in a semiconductor using a P-N Junction diode.
Unit 1
Introduction to Computers, Characteristics of Computers, Memory. Types of Programming Languages: Machine Languages, Assembly Languages, High Level Languages; Basic DOS commands.

UNIT 2
What is C: Historical development of C, where C stands, Getting Started with C: The C Character set, Types of C Constants, Types of C Variables, C keywords, identifiers, and literals.
Basic input & output function – printf and scanf.
Operator: arithmetic operators, relational operators, assignment operators, logical operators, increment and decrement operators, conditional operator.

UNIT 3
Decision control structure: control instructions in C, if, if-else, if-else if, nested if. Loops control structure: while loop, for loop, do – while loop, odd loop, nested loop, Break, continue, case control structure, go to, and exit statement

UNIT 4
Array what are arrays, array initialization, 2D array, initialization of 1D and 2D array.
Function: Need of function, declaring function, defining, calling function, types of function, passing parameter in function.

UNIT 5
Networking: Definition, types of Network, protocol, E-mail, creating an email account, Cyber law and Security, hacking and Cracking Overview.

Text Book

Reference Books
Unit 1 : INTRODUCTION TO ELECTRICAL ENGINEERING-
Importance of electrical engineering in day to day life electrical elements and their classification
Electrical circuit analysis- concept of networks, active & passive elements, Voltage and current sources,
dependent and independent sources, source conversion, DC circuits analysis using mesh & nodal method,
Thevenin’s & superposition theorem, star-delta transformation.

UNIT 2 : AC circuits
1-phase AC circuits under sinusoidal steady state, active, reactive and apparent power, physical meaning
of reactive power, power factor, 3-phase balanced and unbalanced supply, star and delta connections.

Unit 3 : Transformers
Review of laws of electromagnetism, mmf, flux, and their relation, analysis of magnetic circuits. Single-
phase transformer, basic concepts and construction features, voltage, current and impedance
transformation, equivalent circuits, phasor diagram, voltage regulation, losses and efficiency, OC and SC
test.

Unit 4 : Digital Electronics
Number systems used in digital electronics, decimal, binary, octal, hexadecimal, their complements,
operation and conversion, floating point and signed numbers, Demorgan’s theorem, AND, OR, NOT,
NOR, NAND, EX-NOR, EX-OR gates and their representation, truth table, half and full adder circuits, R-
S flip flop, J-K flip flop.

Unit 5 : ELECTRONIC COMPONENTS AND CIRCUITS
Passive components-resistors, inductors and capacitors and their types. Introduction to Semiconductors,
Diodes, V-I characteristics, Bipolar junction transistors (BJT) and their working, introduction to CC, CB
& CE transistor configurations, different configurations and modes of operation of BJT, DC biasing of
BJT.

TEXT BOOKS-
1. Basic electrical & electronics engg. J.B GUPTA
2. Basic electrical & electronics engg. R.K RAJPUT
3. Electrical technology Volume-I B.L THAREJA

References:
1. Vincent Del Toro, Electrical Engineering Fundamentals, PHI Learning, II Edition
List of Experiments

1. Verification of Truth Table for Various Gates.
2. Verification of Superposition Theorems.
3. Verification Thevenin Theorems.
4. Identification of Different electronics components.
5. Study of Transformer Nameplate Ratting, Determination of Ratio Polarity.
8. Observing input &output Waveform of rectifiers.
Transister Application as Amplifier & Switch.
Unit -1
Overview of Civil Engineering, types of infrastructures, Effect of infrastructure facilities on economy and environment, Role of Civil Engineers in the infrastructural Development, Introduction to sub domains of Civil Engineering Industry Size of Infrastructure, emerging trends in infra spending through public and public-private partnership (PPP), talent shortage and global trends in workshop mobility and skill demands.

Unit -2
Stages in the life of construction- Design, construction, Maintenance, Repair, Demolition/Recycling; an overview of Indian standards, unit and conversion factors for lengths, areas, volumes and weights; Opportunities and challenge of India’s Infrastructure, Interdisciplinary nature of civil engineering projects.

Unit – 3
Roads: Types of Roads, road plan, components of road and their function; Bridges: important parts of bridges, classification of bridges: types of dams

Unit – 4
Properties and classification of common building materials- Stones, Bricks, Sand, Limes, Cement, Mortar, Concrete, and Steel

Unit – 5
Overview of Indian Road Congress, National Highway Authority of India (NHAI) and Society of Civil Engineers (ASCE), Emerging areas and new technologies in the field of civil engineering

References:
1. Elements of civil engineering by MD Saika, B. Mohan Das, MM Das, PHI Learning Private Limited
2. Prakash M.N. Mehata, Ganesh b., A textbook on elements of civil engineering, PHI Learning Private Limited
<table>
<thead>
<tr>
<th>B.TECH.</th>
<th>ENGINEERING DRAWING &amp; GRAPHICS</th>
<th>SEMESTER-I OR II</th>
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**Unit - 1**

Scales: Representative factor, plain scales, diagonal scales, scale of chords.

Conic sections: Construction of ellipse, parabola, hyperbola by different methods; Normal and Tangent.

Special Curves: Cycloid, Epi-cycloid, Hypo-cycloid, Involute, Archimedean Spiral

**Unit - 2**

Projection: Types of projection, orthographic projection, first and third angle projection,

Projection of points and lines: Line inclined to one plane, inclined with both the plane, True Length and True Inclination, Traces of straight lines.

**Unit - 3**

Projection of planes and solids: Projection of Planes like circle and polygons in different positions; Projection of polyhedrons like prisms, pyramids and solids of revolutions like cylinder, cones in different positions.

**Unit - 4**

Section of Solids: Section of right solids by normal and inclined planes; Intersection of cylinders.

Development of Surfaces: Parallel line and radial - line method for right solids.

**Unit - 5**

Isometric Projections: Isometric scale, Isometric axes, Isometric Projection from orthographic drawing.

Computer Aided Drafting (CAD): Introduction, benefit, software’s basic commands of drafting entities like line, circle, polygon, polyhedron, cylinders; transformations and editing commands like move, rotate, mirror, array; solution of projection problems on CAD.

References:
1. Visvesvaraya Tech. University; A Premier on Computer Aided Engg drawing; VTU Belgaum
2. Venugopal K.; Engineering Graphics; New Age
3. John KC; Engg. Graphics for Degree; PHI.
4. Gill P.S.; Engineering Drawing; kataria
5. Jeyopoovan T.; Engineering drawing & Graphics Using AutoCAD; Vikas
6. Agrawal and Agrawal; Engineering Drawing; TMH

**TEXT BOOKS**

1. Bhatt N.D.; Engineering Drawing, Charotar
2. Engineering Drawing R. K. Dhawan

Unit II: Mining administration-Mines-Safety-DGMS (Role of DGMS)-IBM-CIMFR-Exploration agencies-Coal India and its subsidiary companies-Neyveli Lignite Corporation Ltd, NMDC Ltd-Acts and Rules related to Mining in India (Mines Act, CMR, MMR, MVTR, etc)-Mine Planning

Unit III: Mining Terms – Opencast (OC) terms – Under Ground (UG) Mining terms Opencast vs UG Mining, How to select UG & OC Mining. – UG Mining – entry (Shaft & Incline – Shaft fittings-Winders-Pit Top, Pit Bottom), Different types of UG Mining of Coal & Metal;

What do we see/observe in UG Mine Pit-Top – Haulage-or Winder-Ventilation Fan-Lamp Room-First Aid Room-Unloading & Loading of men & material (into Incline or Shaft system)-Man riding system(in some Inclines) – Entrance to walking way-Conveyor or Rope haulage system(in Inclines) – Road ways, Method of Work (Bord & Pillar-Longwall etc)-Face, Roof & Floor-Support system-Track & Tubs, Locomotives-Drilling & Blasting Face-Development & Depillaring face-Ventilation Duct-Ventilating Doors-Lighting system-Transformer room-Priming station-First Aid Room/chamber-Rope Haulage system –Sump etc.

Unit IV: Opencast Mining – Stripping ratio-Box cut-Dump for OB and Coal/Ore-Main haul road-Benches-Bench dimensions-Production Face-Drilling & Blasting-Loading-Dumper transport-Ramp-Sump etc. Quarry operations-Shovel/Excavator Mining system-Dragline system – Unit Operations (Drilling-Blasting-Loading & Hauling)-Lighting-OB removal-Dumping of OB – HEMM selection and where to adopt?

Unit V: Role of Mining in economic development of India-MMDR Act 2015-National Mineral Policy-Mineral/Coal statistics etc.- Environmental impact of Mining (Land-Water-Air) etc

References:

1) Elements of Mining Technology, (Vol. I) by D.J. Deshmukh
2) Introduction to Mining by G.K. Pradhan
3) Training Aid (Mining) Published by AKS University
References
1. Indian Bureau of Mines, Minerals Year Book & other publications
2. Dr C.M.Kole, Khuli Khan Ka Ayojan (Hindi), CMPDIL, Ranchi
3. Dr. Calvin Konya; “Rock Blasting and Overbreak Control” Precision Blasting Services, Montville, Ohio
6. Web sites : mines.nic.in, GSI, CMPDI, Coal India, NMDC etc.

Reference Journals
1. Journal of Institution of Engineers(India)-Mining
3. Indian Mining & Engineering Journal, Bhubaneswar
4. Journal of Mining Engineers, MEAI, Hyderabad
5. Minetech, CMPDIL(Quarterly)
6. CMTM(Coal Mining Technology) Journal, IIMC Publication, Ranchi
7. Minerals & Metals Review, Bombay
UNIT- 1 FOURIER SERIES AND FOURIER TRANSFORMATION
Periodic functions, Trigonometric series, Fourier series of period \(2\pi\), Euler’s formulae, Functions having arbitrary period, Change of interval, Parseval’s identity for Fourier series, Fourier series for Even and odd functions, Half range sine series and Half range cosine series. Fourier transformation, Fourier sine transformation, Fourier cosine transformation (elementary).

UNIT- 2 LAPLACE TRANSFORMATIONS
Laplace transform, Existence theorem (statement only), Laplace transform of elementary function, First Shifting theorem, Change of scale property, Division property, Multiplication property, Integral property, Laplace transform of Derivatives of \(F(t)\), Laplace transform of periodic functions, Application to solve simple linear and simultaneous differential equations. Inverse Laplace transformation and its properties, Convolution theorem.

UNIT-3 Algebra of Logic and Graph Theory
Algebra of Logic: Boolean Algebra, Principal of Duality, Basic Theorems, Boolean expressions and minimal Boolean function: CNF and DNF, Switching circuit Diagram.
Graph: Definition, Sub graph simple graph ,Weight Graph ,Connected and disconnected Graph , complete Graph ,Regular Graph, Walks, Paths, Circuits, Euler's Graph, degree of vertices, Length of edges, Matrix representation of a Graph, Adjacency and incidence matrices of a Graph, Isomorphic and Homomorphism Graph ,Tree: Definition, types of tree .

UNIT-4 LINEAR AND NON- LINEAR PARTIAL DIFFERENTIAL EQUATION

UNIT-5 SERIES SOLUTION OF ODE AND SPECIAL FUNCTION

Text Books:

Reference Books:-