Chhattisgarh Swami Vivekanand Technical University B.E./B.Tech MECH Sem 1 syllabus

Mathematics - I

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Credits: 4

UNIT I: Calculus
Evaluation of definite and improper integrals, reduction formulae, Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.
UNIT II : Calculus
Rolle’s Theorem, Mean value theorems, Taylor’s and Maclaurin theorems with remainders; indeterminate forms and L'Hospital's rule; Maxima and minima.

UNIT III : Sequences and series:
Convergence of sequence and series, tests for convergence; Power series, Taylor's series, series for exponential, trigonometric and logarithm functions; Fourier series: Half range sine and cosine series, Parseval’s theorem.

UNIT IV : Multivariable Calculus (Differentiation)
Limit, continuity and partial derivatives, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, curl and divergence directional derivatives.

UNIT V : Matrices
Rank of a matrix by elementary transformation, normal form of a matrix, System of linear equations; Symmetric, skewsymmetric and

orthogonal matrices; Eigen values and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem and Orthogonal transformation.

Text/Reference Books

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
4. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
5. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint, 2010.
6. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
7. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
8. V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra,Affiliated East–West press, Reprint 2005.

Basic Electrical and Electronics Engineering

Unit – I: D.C. Networks:

Introduction, Ohm's law, Kirchhoff's laws, Mesh and Nodal analysis, Superposition theorem,
(only independent sources). Definitions of MMF, Magnetic field strength, Reluctance, Leakage flux
and fringing, Core losses, Comparison of the Electric and Magnetic Circuits, Problems on Series
Magnetic Circuits.

Unit – II: A.C. Circuits:

Production of AC voltage, Basic Definitions of root mean square and average values, form factor
and peak factor, the j operator and Phasor Algebra, Analysis of ac series and Parallel Circuits,
Series- Parallel Circuits.

Unit – III: Single phase Transformers:

Introduction, Principles of operation, Constructional details, Ideal Transformer and Practical
Transformer, EMF equation, Rating, Phasor diagram at no load, Losses in Transformers.

Unit-IV: Diode:
Brief Review of Semiconductors, N-Type & P-Type Semiconductors, Formation of Depletion
Layer in a PN Junction, Forward & Reverse Biased, V-I Characteristic, Diode Current
Equation,Diode Applications.LED, Advantages & applications of LEDs., Seven-segment Displays,
Unit-V: Transistor:
BJT Construction, Junction Biasing of BJT, Operation of NPN & PNP BJT, Input and Output
Characteristics of Transistor in CE configuration; Transistor as an Amplifier& as a Switch.
Advantages of ICs & Scale of Integration.

Engineering Graphics and Design

Unit I: Introduction to Engineering Drawing
Principles of Engineering drawing and their significance, Lines, Lettering, Dimensioning, Scales,
Unit II: Projection
Principles of projection, Method of projection, First and third angle projections, Orthographic
projections, Isometric projection.
Unit III: Basic concept of drafting software
Introduction to CAD software, merits and demerits of CAD, Application of CAD, GUI, limits and
units, Basic co-ordinate system, setting of status bar option-snap, grid, O-snap, Dynamic input,
ortho, polar, and etc. concept of block, viewports and layer.
Unit IV: Drafting using CAD software
Drawing Tools: Circle, Arcs, Rectangle, Polygon, Ellipse, Spline, Poly-Line, and Multi-Line.
Editing Tools: Trim, Move, Copy, Rotate. Geometry Modifying Tools: Fillet, Chamfer, Scale,
Stretch. Copying Tools: Array, Mirror, and Offset. Dimensioning and Annotations.
Unit V: 3-D modeling using CAD software
Types of three dimensional model, basic primitives' tools: extrude, revolve, sweep, loft, wedge. Solid editing Tools: shell, round, taper faces, copy faces, chamfer edges, modifying tools: 3D-move, 3D- copy, rotate, scale, align. Copying tools: array and its type,

Text Books:

1. Bhatt, N.D., "Elementary Engineering Drawing", Charotar Book Stall, Anand
2. George Omura, " Mastering AutoCAD" B.P.B. Publication, New Delhi

Fundamentals of Computer

Unit I: Fundamentals of Computers

Generations of computer, block diagram of a computer, computer hardware and software
components: Central Processing Unit (CPU), VDU, Keyboard and Mouse, Other input/output
Devices, Computer Memory, Memory Hierarchy: Primary and Secondary Storage (Auxiliary
Storage), Secondary storage; magnetic disks vs optical disks (CD, CD-RW and DVD Memory),
data – numeric data, alpha numeric data, concept of data and information: storage, seeking,
processing and transmission.

Unit II: Hardware and Software

Computer Peripherals: Cables, Buses, Device drivers, installation of devices: keyboard, mouse,
scanner, printer, web-camera, speakers and many more; plug-and-play devices; expansion
slots.System software, Program Language Translators, application software, Programming
Language Paradigms: Imperative, Object-Oriented and Logic languages, Basics of Popular
Operating Systems (Windows and Linux); The User Interface, Using Mouse and Organizing
Desktop components, Running an Application, File, Folders and Directory management features,
Using Help; Creating Short cuts, Configuring Operating System: Windows and Ubuntu, BIOS,
System Utilities and Antivirus software.

Unit III: Basic Computer Literacy

Word Processing Basics (MS Word / LibreOffice Writer): Opening and Closing of documents; Text
creation and Manipulation; Formatting of text; Table handling; Spell

check, language setting and
thesaurus; Printing of word document; Using Spread Sheets (MS Excel / LibreOffice Calc) Basic
operations of Spreadsheets; Manipulation of cells; Formulas and Functions; Editing of Spread
Sheet, printing of Spread Sheet; Basics of presentation software (MS PowerPoint / LibreOffice
Impress) Preparation and Presentation of Slides; Slide Show; How to make an effective
presentation: Working with Presentation Tools (Create, Edit, Move, Delete, Resize, Format text
object), Working with Graphics tools (Creating Tables, Organization Charts, Hyperlinks), Saving,
editing and closing presentation; Taking printouts of presentation / handouts.

Unit IV: Computers and Communication
WWW and Web Browsers: Basic of Computer networks; LAN, WAN; Networking Devices,
Topologies, Cables and connectors, Connecting to internet; ISP; Basics of internet connectivity
related troubleshooting, Web Browsing software, Search Engines; URL; Domain Names; IP
Addressing, Wi-Fi and Bluetooth technology overview, Internet and Intranet: architecture, various
file formats, Applications of INTERNET: Electronic mailing systems (Google Mail features):
Creating and Managing mailing accounts, folders, Document collaboration, Instant Messaging,
Netiquettes; Skype calling and Messenger services;functioning and features of smart gadgets: Smart
phones, 4K smart television gadgets, kindle, gaming-gadgets, fitness gadgets and alike.

Unit V: Application Domains
Impact of computers in society: Computer applications in office automation, book publishing, data
analysis, accounting, investment, inventory control, graphics and multimedia, air and railway ticket
reservation sites, robotics, cyber security, Audio andVideo-conferencing, social networking,
surveillance, Case Studies: Computer Literacy for banking, KYC, Insurance and financial
transactions, operating mobile banking, Nine Pillars of Mission

Digital India (DI-Initiatives) and
their scheme highlights.

Text Books:
1. Computer Basics by IGNOU.
2. Suresh K Basendrea: Computers Today
3. Pradeep K. Sinha, Priti Sinha, “Computer Fundamentals”. BPB Publications.
4. Rajaraman, V., “Fundamental of Computers”. Prentice Hall India, New Delhi
5. Sanders Donald H Computers Today

Physics-I

Unit-1: Physical Quantities, Motion in Two or Three dimensions
Standards and Units, Unit consistency and conversions, Uncertainty and Significant figures, Estimates and
orders of magnitude, Position and velocity vectors, The Acceleration vector, Projectile motion, Motion in a
circle, Relative velocity, Free body diagrams, Conservative and Non-conservative Forces; Central forces,
Noninertial frames of reference.
Unit-2: Mechanics of Solids
Angular velocity and acceleration, Rotation with constant angular acceleration, Relating linear and angular
kinematics, Energy in rotational motion, Parallel axis theorem, Moment of Inertia calculations, Conditions
for equilibrium, Bending Stress, Shear stress, Concept of strain energy, Elastic Module, Concepts of
elasticity and plasticity.
Unit-3: Wave Optics

Superposition of waves and interference of light by wave front splitting and amplitude splitting, Fresnel bi-
prism; wedge shaped film, Newton’s rings, Farunhofer diffraction from a single slit, The Rayleigh criterion for limit of resolution and its application to vision, Diffraction gratings and their resolving power.
Unit-4: Electrostatics in vacuum and dielectric medium
Calculation of electric field and electrostatic potential for a charge distribution,Divergence and curl of
electrostatic field, Laplace’s and Poisson’s equations for electrostatic potential,Laws of electrostatics,

Polarisation, Permeability and dielectric constant, Polar and non-polar dielectrics, Solving simple
electrostatics problem in presence of dielectrics like Point charge at the centre of a dielectric sphere.

Unit-5: Magneto static in a linear magnetic medium
Bio-Savart law, Divergence and curl of static magnetic field,vector potential and calculating it for a given
magnetic field using Stokes' theorem, Magnetisation, Solving for magnetic field due to simple magnets like
a bar magnet, Permeability and Susceptibility, Classification of magnetic materials, Ferromagnetism,
Paramagnetic and diamagnetic materials, Magnetic domains and hysteresis.

Unit-6: Faraday's law and Electromagnetic waves
Faraday's law of electromagnetic induction, Continuity equation for current densities, displace current and
magnetic field arising from time dependent electric field, Maxwell's equation in vacuum, Energy in an
electromagnetic field, Flow of energy and Pointing vector, Plane electromagnetic waves in vacuum, Their
transverse nature and polarization, Relation between electric and magnetic fields of an electromagnetic wave.

Unit-7: Introduction to Quantum Mechanics
Wave nature of Particles, Time-dependent and time-independent Schrodinger equation for wave function,
Born interpretation, Expectation values (only basic), Free-particle wave function and wave-packets,
Uncertainty principle, Solution of stationary-state Schrodinger equation for one dimensional problem like
particle in a box.

Unit -8: Solid electronic materials
Electron in periodic potential, Kronig-Penny model (only basic to introduce origin of band gap), E-k
diagram, Electron conduction, Conductivity, Drift velocity, Energy bands in solids, Direct and indirect band
gaps, Types of electronic materials: metals, semiconductors, and insulators, Occupation probability, Fermi
level, Effective mass, Density of states and energy band diagrams.

Unit -9: Semiconductors
Intrinsic and extrinsic semiconductors, Electron and hole concentration, Concept of Fermi Level,

Dependence of Fermi level on carrier-concentration and temperature, Doping, impurity states, n and p type
semiconductors, Carrier generation and recombination, Law of mass action, Charge neutrality condition
,Carrier transport: diffusion and drift, p-n junction, Depletion region and potential barrier, Energy band
structure of PN junction in forward and reverse biasing ,Metal semiconductor junction (Ohmic and
Schottky).

Unit-10: Lasers & Fibre Optics

Einstein's theory of matter radiation interaction and A and B coefficients, amplification of light by
population inversion in optical resonator, different types of lasers: gas lasers (He-Ne,), solid-state lasers
(ruby, Neodymium), semiconductor laser, Properties of laser beams.
Fibre Optics: Introduction, Optical fibre as a dielectric wave guide, Total internal reflection, Numerical
aperture and various fibre parameters, Losses associated with optical fibres, Step and graded index fibres,
Application of optical fibres.

Text Books:

1. Introduction to Mechanics-Mahendra K. Verma,Universities Press, Hyderabad
2. David Griffiths, Introduction to Electrodynamics, Addison-Wesley Professional
3. H. J. Pain, The Physics of Oscillations and Waves, Wiley
4. J. Singh, Semiconductor Optoelectronics: Physics and Technology McGraw-Hill Inc
5. Quantum Mechanics, Ajay Ghatak S. Lokanathan, Trinity
6. Engineering Physics by Gaur & Gupta,DhanpatRai Publications

Reference Books:

1. Engineering Physics by PG Kshirsagar& M N Avadhanulu, S. Chand Publications
2. Modern Physics for Engineers, S.P. Taneja, R. Chand
3. Engineering Physics, Malik and Singh, Tata McGraw Hill
4. Sears and Zemansky's University Physics, Volume-1 Mechanics, Pearson
5. Mechanics, Mathur, S.Chand Publishing
6. Electromagnetic Theory, Prabir K. Basu&HrishikeshDhasmana, AneBooks
7. David Griffiths, Quantum Mechanics, Pearson Education
8. Quantum Mechanics: A Text Book for undergraduates, Mahesh C

Jain, TMH
9. A. Ghatak , Optics, McGraw Hill Education
10. O. Svelto, Principles of Lasers, Springer Science & Business Media
11. The Physics of waves and Oscillations, N.K. Bajaj, TMH
12. H. C. Verma, Concepts of Physics Vol – 1&2, Bharti Bhawan Publication
13. Halliday and Resnick, Physics.