SEMESTER I

Course Code	**MATHS101**
Course Title	**Calculus**
Type of Course	Core
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz)	 50 50
Course Prerequisites	
Course Objectives (CO)	1. To understand the behaviour of infinite series and its use. 2. To learn the concepts of functions of two and more than two variables and their applications. 3. To learn the methods to evaluate multiple integrals and their applications to various problems. 4. To understand the concepts of Vector calculus and their use in engineering problems.
Course Outcome	1. The students are able to test the behaviour of infinite series. 2. Ability to analyze functions of more than two variables and their applications. 3. Ability to evaluate multiple integrals and apply them to practical problems. 4. Ability to apply vector calculus to engineering problems

SYLLABUS

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SECTION-A

FUNCTIONS OF ONE VARIABLE

Sequences and Series: Sequences, Limits of sequences, Infinite series, series of positive terms, Integral test, Comparison test, Ratio test, Root test. Alternating series, Absolute and Conditional Convergence, Leibnitz test. Power series: radius of convergence of power series, Taylor's and Maclaurin's Series. (Scope as in Chapter 10, Sections 10.1 – 10.9 of Reference 1).

Integral Calculus: Length of curves, Volume (disk and washer method) and surface areas of revolution (Scope as in Chapter 6, 6.1, 6.3, 6.4 of Reference 1).

(11 hours)

DIFFERENTIAL CALCULUS OF FUNCTIONS OF TWO AND THREE VARIABLES

Concept of limit and continuity of a function of two and three variables, Partial derivatives, total derivative, composite function, differentiation of an implicit function, chain rule, change of variables, Jacobian, Taylor's theorem (statement only), Maxima and minima of a function of two and three variables, Lagrange's method of multipliers (Scope as in Chapter 14, Sections 14.1-14.4, 14.6-14.10 of Reference 1).

(10 hours)

SECTION-B

INTEGRAL CALCULUS OF FUNCTIONS OF TWO AND THREE VARIABLES

Double and triple integrals, Change of order of integration, Change of Variables, Applications to area, volume and surface area. (Scope as in Chapter 15 of Reference 1).

(9 hours)

VECTOR DIFFERENTIAL CALCULUS

Vector-valued functions and space curves and their tangents, integration, arc lengths, unit tangent vector, Curvature and torsion of a curve, Gradient of a Scalar field, Directional Derivative (Scope as in Chapter 13, Sections 13.1-13.5 Chapter 14, Section 14.5 of Reference 1).

(8 hours)

VECTOR INTEGRAL CALCULUS

Line integrals, Vector fields, Work, Circulation and Flux, Path Independence, Potential functions and Conservative fields, Green's theorem in the plane, Surface Areas and Surface Integrals, Stoke's Theorem, Gauss Divergence Theorem (Statements only) (Scope as in Chapter 16 of Reference 1).

(7 hours)

RECOMMENDED BOOKS

S. No.	**NAME**	**AUTHORS**	**PUBLISHER**
1.	Calculus	Maurice D. Weir, Joel Hass, Frank R. Giordano, Thomas	12th edition, Pearson Education.
2.	Advanced Engineering Mathematics	E. Kreyszig.	8th edition , John Wiley.
3.	Advanced Engineering Mathematics	Michael D. Greenberg	2nd edition, Pearson Education.
4.	Advanced Engineering Mathematics	Wylie and Barrett	Tata McGraw Hill
5.	Higher Engineering Mathematics	B.V.Ramana	Tata McGraw Hill.
6.	Advanced Engineering Mathematics	R. K. Jain, S. R. K. Iyenger	Narosa Publications

Course Code	**CS102**
Course Title	**Introduction to Computer Science and Engineering**
Type of Course	Core
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz)	50 50
Course Prerequisites	
Course Objectives (CO)	1. To appraise students about various disciplines in Computer Science and Engineering. 2. To make students aware of emerging trends of Computer Science and Engineering.
Course Outcome	The student will have knowledge about various fields of Computer Science and Engineering.

SYLLABUS

Note for the examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

SECTION – A

Introduction
What is computer science?, Differentiating computer science from engineering, Classification of computers, History, Types of Computers, Block Diagram of a Computer System, Introduction to various units, CPU, Memory, Input and Output devices, Auxiliary storage devices. Turing model, Von-Newmann model, social and ethical issues in computer science and engineering.
(8 hours)

Computer Hardware and Software
Introduction to computer hardware, components of mother boards & its types-ports, slots, connectors, add on cards, Basics of Number System. Application software, system software, interpreter, compliers, editor, computer viruses, worms, trozen. (6 hours)

Computer Organization
Central processing unit, computer storage: memory hierarchy, basics of RAM ,ROM , PROM, EPROM, Floppy, CD Rom, CDRW, DVD, Virtual memory, Cache memory, Physical memory
(5 hours)

SECTION - B

Logic Development and Algorithm
Various techniques to solve a problem, Ways to specify an algorithm, Flow charts. (6 hours)

Area of Computer Science and Engineering
Theory of computation, algorithms and data structures, Database, Artificial Intelligence, Computer Networks, Software Engineering, Computer Vision, Web and Internet. (16 hours)

Trends in Computing
Social and ethical issues related to computing technology, Professional development opportunities. (4 hours)

TEXT BOOK			
S.No.	**NAME**	**AUTHOR**	**PUBLISHER**
1.	Computing Fundamentals	Peter Nortan	Tata McGraw Hill
REFERENCE BOOK			
1.	Compter Science Handbook	Allen B. Tucker	CRC Press

Course Code	**CS101 / CS201**
Course Title	**Programming Fundamentals**
Type of Course	Core
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz) Practical (Continuous and end semester evaluation)	 50 50 50
Course Prerequisites	
Course Objectives (CO)	To get basic knowledge of computers, its components and Operating systems and Linux. Shell Commands.
Course Outcome	Upon successful completion of this course, the student should be able 1. To document, implement, test and debug C programs. 2. To program with Operators, Conditions Statements, Function, Pointers, Arrays, Structures, Files and Preprocessor directives 3. To understand concepts of object oriented programming and Shell programming.

SYLLABUS

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SECTION - A

Introduction
Introduction to Programming Languages, Flowcharts, Algorithms, System Software (Assembler, Compiler, Translator, Debugger), Program Structure. (5 hours)

Basic Constructs of C
Keywords, Identifiers, Variables, Symbolic Constants, Data Types and their storage, Operands, Arithmetic Operators, Relational Operators, Logical Operators, Bitwise Operators, Increment & Decrement Operators, Expressions, Conditional Expressions, Assignment Operators and Expressions, Type Conversions, Precedence and Order of Evaluation, External Variables and Scope of Variables. Basic Input Output, Formatted I/O. (7 hours)

Program Control Flow

Statements and Blocks, Conditional Statements, IF, ELSE-IF, Switch Case statements, Control Loops, For, While and Do-While, Go to and Labels. (7 hours)

Arrays & Functions
Arrays, Multi dimensional arrays, strings, pointer arrays, Functions, Function Prototyping, Scope of functions, Arguments, Call by value and call by references, static variables, recursion.
(7 hours)

SECTION - B

Structures
Structures, Array of Structures, Typedef, Unions, Bit fields, passing structures as an argument to functions , C-Pre-processor and Macros, Command line arguments. (6 hours)

Pointers
Pointer declaration, initialization, Pointer arithmetic, Pointer to array and Pointer to structure.
(6 hours)

Input and Output
Standard and Formatted Input and Output, File Access & its types, Line Input and Output, Types of Files, Binary & ASCII Files, Error handling, stderr and exit functions. (7 hours)

RECOMMENDED BOOKS

S.No.	NAME	AUTHORS	PUBLISHER
1.	The C Programming language	Brian Kernighan and Dennis M. Ritchie	Prentice Hall, 2nd editon, 2007
2.	Fundamentals of Information Technology and Computer Programming	V. K. Jain	PHI. Latest edition
3.	C Programming: A Modern Approach	K. N. King	W. W. Norton Company 2nd editon (2008)
4.	C : The Complete Reference	Herbert Schildt	Tata McGraw Hill Publications, 4th editon
5.	Let us C++	Yashwant Kanetkar	BPB Publications
6.	Programming in ANSI C++	E. Balagurusamy	TMH publications, 4th edtion, Reprint(2008)
7.	Programming in ANSI C	Gottfired	Schaum Series, TMH publications, 2nd edtion(1996)

List of Experiments

Instruction for Students: The candidate will be attending a laboratory session of 2 hours weekly and students have to perform the practical related to the following list.

1. Introduction to basic structure of C program, utility of header and library files.
2. Implementation of program related to the basic constructs in C
3. Program using different data types in C
4. Programs using Loops and Conditional Statements in C

5. Programs using arrays single dimension and multi dimensions in C.
6. Implementation of Matrices and their basic functions such as addition, subtraction, multiplication, inverse.
7. Programs using functions by passing values using call by value and call by reference method
8. Programs related to structures and unions
9. Program to implement array using pointers
10. Programs related to string handling in C
11. Program to manage I/O files and Pointers

Physics Course 1

Any one of the following three papers to be chosen by institute

Course Code	**APH 101 / APH 201**
Course Title	**Oscillations and Optics**
Type of Course	Core
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz) Practical (Continuous and end semester evaluation)	 50 50 50
Course Prerequisites	
Course Objectives (CO)	
Course Outcome	

SYLLABUS

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SECTION - A

Ultrasonics

Production and detection of ultrasonics (2 hours)

Simple Harmonic Motion

Review of SHM, superposition of two SHM in one dimension, charge oscillations in LC circuits (3 hours)

Damped Oscillations

Concept and cause of damping, differential equation of a damped oscillator and different kinds of damping, Methods of describing damping of an oscillator - logarithmic decrement, relaxation time, quality factor, band width. Series LCR circuit as a damped oscillator. (3 hours)

Forced Oscillations

States of forced oscillations, differential equation of forced oscillator – its displacement, velocity and impedance, behaviour of displacement and velocity with driver's frequency, Power, bandwidth, Quality factor and amplification of forced oscillator, resonance in forced oscillators, forced oscillations in series LCR circuit (4 hours)

Wave Motion

Wave equation and its solution, characteristic impedance of a string, reflection and transmission of waves on a string at a boundary, reflection and transmission of energy, the matching of impedances (3 hours)

SECTION - B

Interference

Division of wave front and amplitude; Fresnel's biprism, Newton's rings, Michelson interferometer and its applications for determination of λ and $d\lambda$. (4 hours)

Diffraction

Fresnel and Fraunhofer diffraction, qualitative changes in diffraction pattern on moving from single slit to double slit, plane transmission grating, dispersive power & resolving power of a grating. (5 hours)

Polarization

Methods of polarization, analysis of polarized light, quarter and half wave plates, double refraction. (4 hours)

Lasers

Elementary idea of LASER production, spontaneous emission, stimulated emission, Einstein's coefficients, Helium-Neon, Ruby and semiconductor lasers, applications of lasers. (4 hours)

Fibre Optics

Basics of optical fibre - its numerical aperture, coherent bundle, step index and graded index fibre, material dispersion, fibre Optics sensors, applications of optical fibre in communication systems. (3 hours)

Holography

Basic principle, theory and requirements, applications (2 hours)

RECOMMENDED BOOKS

S.No.	NAME	AUTHORS	PUBLISHER
1.	Physics for Engineers	N. K. Verma	Prentice Hall India
2.	Physics of Vibrations and Waves	H. J. Pain	5th edition, John Wiley & Sons
3.	Vibrations and Waves	A. P. French	CBS Publishers
4.	Optics	Ajoy Ghatak	McGraw Hill Publications

LIST OF EXPERIMENTS

1. To study Lissajous figures obtained by superposition of oscillations with different frequencies and phases.
2. To find the wavelength of sodium light using Fresnel's biprism.
3. To determine the wavelength of He-Ne laser using transmission grating.

To determine the slit width using the diffraction pattern.

4. To determine the wave length of sodium light by Newton's rings method.
5. To determine the wave length of sodium light using a diffraction grating.
6. To find the specific rotation of sugar solution using a Bi-quartz Polarimeter.
7. To design a hollow prism and used it find the refractive index of a given liquid.
8. To determine the wavelength of laser using Michelson interferometer.

Course Code	**APH 103 / APH 203**
Course Title	**Quantum and Statistical Physics**
Type of Course	Core
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz) Practical (Continuous and end semester evaluation)	 50 50 50
Course Prerequisites	
Course Objectives (CO)	
Course Outcome	

SYLLABUS

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SECTION – A

Special theory of Relativity
Inertial and non-inertial frames of reference, Galilean transformation, Michelson Morley Experiment, postulates of special theory of relativity, Lorentz transformation, Simultaneity, Length contraction, Time dilation, Doppler effect, Addition of velocities, variation of mass with velocity, mass-energy relation (7 hours)

Origin and Postulates of Quantum Mechanics
Quantum theory of light, X-rays production, spectrum & diffraction (Bragg's law), photoelectric effect, Compton effect, pair production, photons & gravity, black holes, de-Broglie hypothesis, particle diffraction, uncertainty principle and applications (7 hours)

Postulates of quantum mechanics, Schrodinger theory, time-dependent and time-independent Schrodinger equation, wave function, Born interpretation and normalization, expectation values (3 hours)

SECTION - B

Applications of Quantum Mechanics
Particle in a box (infinite potential well), finite potential step and barrier problems, tunneling, linear harmonic oscillator (one-dimensional) (4 hours)

Hydrogen atom (qualitative), radiative transitions and selection rules, Zeeman effect, Spin-orbit coupling, electron spin, Stern-Gerlach experiment, exclusion principle, symmetric and antisymmetric wavefunctions (5 hours)

Statistical Physics

Maxwell-Boltzmann statistics, molecular energies in an ideal gas, Bose-Einstein and Fermi-Dirac statistics, black body radiation, Rayleigh-Jeans and Planck's radiation laws, free electrons in a metal, electron-energy distribution, Fermi energy, electronic specific heat, conduction in metals, thermionic emission. (10 hours)

RECOMMENDED BOOKS

S.No.	NAME	AUTHORS	PUBLISHER
1.	Concepts of Modern Physics	Arthur Beiser	McGraw Hill Publications
2.	Solid State Physics	C. Kittel	Wiley Eastern Publications
3.	Solid State Physics	S. O. Pillai	New Age International
4.	Statistical Physics Thermodynamics	V. S. Bhatia	

List Of Experiments

1. To study the quantized energy level of the first excited state in the Argon using the Frank-Hertz setup.
2. To find the value of Planck's constant and evaluate the work function of cathode material by used of photoelectric cell.
3. To study various characteristics of photo-voltaic cell: (a) Voltage-current characteristics, (b) loading characteristics, (c) power-resistance characteristics and (d) inverse square law behavior of the photo-current with distance of source of light from photo-voltaic cell
4. To study the response of a photo-resistor to varying intensity of light falling on it and deduce spectral sensitivity of its semiconductor material.
5. To study the Balmer Series of Mercury and Hydrogen spectrum using diffraction grating and calculate Rydberg constant.
6. To evaluate charge on an oil drop using Millikan's oil drop method.
7. To verify Rutherford's alpha scattering formula using a mechanical model.

Course Code	**APH 107 / APH 207**
Course Title	**Physics of Materials**
Type of Course	Core
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz) Practical (Continuous and end semester evaluation)	 50 50 50
Course Prerequisites	
Course Objectives (CO)	
Course Outcome	

SYLLABUS

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SECTION - A

Crystal structure

Bonding forces and energies, Primary and Secondary bonds, Space Lattices, Symmetries in a cubic lattice, Crystal Structures (cubic and hexagonal cells), Assignment of coordinates, directions and planes in crystals, Linear, Planar and Space densities in crystals, close packed morphology (Hexagonal and cubic close packing), single and polycrystalline structures, interstitial spaces (trigonal, tetrahedral and octahedral voids)

Structure of ceramics (NaCl, Zinc blende, silica and silicates, diamond crystal, Graphite, Fullerenes and carbon nanotubes), Structure of polymers, crystallinity of long chain polymers

Crystal Structure analysis, X-ray diffraction and Bragg's law, Powder method for study of X-ray diffraction pattern, Crystal Defects (Point, line, surface and volume imperfections)

(14 hours)

Diffusion

Diffusion mechanisms, steady state diffusion, non-steady state diffusion, factors affecting diffusion, applications based on diffusion (corrosion resistance of Duralumin, carburization of steel, decarburization of steel, doping of semiconductors) (3 hours)

Elastic, Anelastic and Viscoelastic Behaviour

Elastic behaviour and its atomic model, rubber like elasticity, anelastic behaviour, relaxation processes, viscoelastic behaviour, spring-dashpot model (3 hours)

SECTION – B

Plastic Deformations and strengthening mechanisms

Tensile properties (Yield strength, Tensile Strength, Ductility, Resilience, Toughness), Dislocations and plastic deformation, characteristics of dislocations, slip systems, slip in single crystals, plastic deformation of polycrystalline materials, mechanisms of strengthening in metals (grain size reduction, solid-solution strengthening, strain hardening), recovery, recrystallization and grain growth

(5 hours)

Fracture, Fatigue and Creep

Fracture (Ductile and brittle fractures), principles of fracture mechanics, fracture toughness, ductile to brittle transitions Cyclic stresses, S-N curve, crack initiation and propagation, factors that affect fatigue life, environmental effects, generalized creep behavior, stress and temperature effects.

(5 hours)

Phase Diagrams

One-Component (or Unary) Phase Diagrams, Binary Isomorphous Systems, Interpretation of Phase Diagrams, Development of Microstructure in Isomorphous Alloys, Mechanical Properties of Isomorphous Alloys ,Binary Eutectic Systems, Development of Microstructure in Eutectic Alloy, Equilibrium Diagrams Having Intermediate Phases or Compounds, Eutectic and Peritectic Reactions, the Iron-Carbon system. (6 hours)

Phase Transformations

Kinetics of phase transformation, kinetics of solid state reactions, Isothermal transformation diagrams, continuous cooling transformation, temper embrittlement (4 hours)

RECOMMENDED BOOKS

S.No.	NAME	AUTHORS	PUBLISHER
1.	Material science and engineering – An Introduction	William D Callister	6Th edition, John Willey and Sons.
2.	Material Science and Engineering – A First Course	V. Raghvan	4th edition, Eastern economy edition
3.	Solid State Physics	S. O. Pillai	New Age International
4.	Introduction to Solids	Leonid V Azaroff	Tata McGraw Hill, 3rd edition.

List of Experiments

1. To find the energy band gap of the given semiconductor by four probe method.
2. To study the Hall Effect of a given semiconductor.
3. To determine the dielectric constant of the given materials.
4. To study the B-H curve of the ferromagnetic materials.
5. To determine the value of e/m for electron by long solenoid (helical) method.
6. To study the variation of magnetic field with distance along the axis of a circular coil carrying current by plotting a graph.
7. To find the Curie temperature of a Ferroelectric material by measuring Capacitance as a function of temperature.
8. To determine the thermal conductivity of an insulator material using guarded plate method (Lee's disc method).
9. To study (a) Voltage-current characteristics (b) loading characteristics (c) Power-Resistance characteristics and (d) intensity response of photo-voltaic cell.

Course Code	**HSS 101 / HSS 201**
Course Title	**Ethics and Self Awareness**
Type of Course	Core
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz)	 50 50
Course Prerequisites	
Course Objectives (CO)	
Course Outcome	

SYLLABUS

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SECTION - A

Introduction to Ethics

Concept of Ethics – Nature, Scope, Sources, Types, Functions and Factors influencing Ethics, Approaches to Ethics – Psychological, Philosophical and Social, Broader Ethical Issues in Society. (6 hours)

Values, Norms, Standards and Morality

Concept and Role, Relation with Ethics, Psycho-Social Theories of Moral Development – Kohlberg and Carol Gilligan (4 hours)

Ethics and Business

Concept of Business Ethics – Nature, Objectives and Factors influencing Business Ethics, 3 C's of Business Ethics, Ethics in Business Activities, Ethical Dilemmas in Business, Managing Ethics (5 hours)

SECTION – B

Self-Awareness

Concept of Self Awareness – Need, Elements, Self Assessment – SWOT Analysis, Self Concepts – Self-Knowledge, Assertiveness and Self-Confidence, Self-Esteem (4 hours)

Self-Development

Concept of Self-Development, Social Intelligence, Emotional Intelligence, Managing Time and Stress, Positive Human Qualities (Self-Efficacy, Empathy, Gratitude, Compassion, Forgiveness and Motivation), Personality Development Models – Johari Window, Transactional Analysis, Myers Briggs Type Indicator, Self-Awareness and Self-Development Exercises (11 hours)

RECOMMENDED BOOKS			
S.No.	**NAME**	**AUTHOR(S)**	**PUBLISHER**
1.	Business Ethics – Text and Cases	C.S.V. Murthy	Himalaya Publishing House
2.	Business Ethics	Hartman, Laura P. And Chatterjee, Abha	Tata McGraw Hill
3.	Business Ethics and Professional Values	A. B. Rao	Excel Books
4.	Business Ethics – Concepts and cases	Manuel G. Velasquez	Prentice Hall
5.	Issues and Ethics in the Helping Professions	G. Corey, M. Schneider Corey, P. Callanan	Brooks/Cole
6.	Theories of Personality	S. Calvin Hall, Dardner Lindzey and John B. Cambell	Hamilton Printing Company
7.	The Curse of Self-awareness, Egotism and the Quality of Human Life	M. R. Leary	Oxford University Press
8.	Self – Awareness	Allan Twain	

Course Code	**GS 101 / GS 201**
Course Title	**Introduction to Environment Science**
Type of Course	Core
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz)	 50 50
Course Prerequisites	
Course Objectives (CO)	
Course Outcome	

SYLLABUS

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SECTION - A

General
Introduction, components of the environment, environmental degradation. (4 hours)

Ecology
Elements of ecology: Ecological balance and consequences of change, principles of environmental impact assessment. (4 hours)

Air pollution and control
Atmospheric composition, energy balance, climate, weather, dispersion, sources and effects of pollutants, primary and secondary pollutants, green house effect, depletion of ozone layer, standards and control measures. (6 hours)

PART B

Water pollution and control
Hydrosphere, natural water, pollutants their origin and effects, river/lake/ground water pollution, standards and control. (6 hours)

Land Pollution
Lithosphere, pollutants (municipal, industrial, commercial, agricultural, hazardous solid wastes): their origin and effects, collection and disposal of solid waste, recovery and conversion methods. (6 hours)

Noise Pollution
Sources, effects, standards and control. (6 hours)

RECOMMENDED BOOKS			
S.No.	**NAME**	**AUTHORS**	**PUBLISHER**
1.	Introduction to Environmental Engineering and Science	C. M. Masters	Prentice Hall of India Pvt. Ltd., 1991
2.	Environmental Science	B. J. Nebel	Prentice Hall Inc., 1987