

## Civil Engineering

Scheme and Syllabus ( With effect from 2020-21 admitted batch)

### B.Tech I Year - I Semester

Course code	Category	Course Title	Hours per week			Internal Marks	External Marks	Total Marks	Credits C
			L	T	P				
CV-1101	BS	Mathematics – I	3	0	0	30	70	100	3
CV-1102	BS	Chemistry	3	0	0	30	70	100	3
CV-1103	HSS	English	3	0	0	30	70	100	3
CV-1104	ES	CPNM	3	0	3	30	70	100	3
CV-1105	ES	Civil Engineering Materials	3	0	0	30	70	100	3
CV-1106	HSS	English Language Lab	0	0	2	50	50	100	1.5
CV-1107	BS	Chemistry Lab	0	0	3	50	50	100	1.5
CV-1108	ES	CPNM Lab	0	0	3	50	50	100	1.5
<b>Total Credits</b>									<b>19.5</b>

### B.Tech I Year - II Semester

Course code	Category	Course Title	Hours per week			Internal Marks	External Marks	Total Marks	Credits C
			L	T	P				
CV-1201	BS	Mathematics – II	3	0	0	30	70	100	3
CV-1202	BS	Physics	3	0	0	30	70	100	3
CV-1203	ES	Engineering Graphics	1	0	4	30	70	100	3
CV-1204	ES	Surveying and Geomatics	3	0	0	30	70	100	3
CV-1205	ES	Engineering Mechanics	3	0	0	30	70	100	3
CV-1206	ES	Workshop Lab	0	0	3	50	50	100	1.5
CV-1207	BS	Physics Lab	0	0	3	50	50	100	1.5
CV-1208	ES	Engineering Geology Lab	0	2	2	50	50	100	1.5
<b>Total Credits</b>									<b>19.5</b>

**CV-1101  
MATHEMATICS-I**

**Course Objectives:**

- To transmit the knowledge of Partial differentiation.
- To know of getting maxima and minima of function of two variables and finding errors and approximations.
- To evaluate double and triple integrals, volumes of solids and area of curved surfaces.
- To expand a periodical function as Fourier series and half-range Fourier series.

**Course Outcomes:**

- Find the partial derivatives of functions of two or more variables.
- Evaluate maxima and minima, errors and approximations.
- Evaluate double and triple integrals, volumes of solids and area of curved surfaces.
- To expand a periodical function as Fourier series and half-range Fourier series.
- Have a fundamental understanding of Fourier series and be able to give Fourier expansions of a given function.

**SYLLABUS**

**(Partial Differentiation)**

Introduction - Functions of two or more variables - Partial derivatives - Homogeneous functions – Euler’s theorem - Total derivative - Change of variables – Jacobins. Mean value Theorems (without proofs)

**(Applications of Partial Differentiation)**

Geometrical interpretation -Tangent plane and Normal to a surface -Taylor’s theorem for functions of two variables - Errors and approximations -Total differential. Maxima and Minima of functions of two variables - Lagrange’s method of undetermined multipliers - Differentiation under the integral Sign - Leibnitz’s rule.

**(Multiple Integrals)**

Introduction - Double Integrals - Change of Order of Integration - Double Integrals in Polar Coordinates - Triple Integrals - Change of Variables.

**(Multiple Integrals-Applications)**

Area enclosed by plane curves - Volumes of solids - Area of a curved surface - Calculation of Mass - Center of gravity - Moment of inertia - product of inertia – principal axes- Beta Function - Gamma Function - Relation between Beta and Gamma Functions. Error Function or Probability Integral.

**(Fourier Series)**

Introduction - Euler’s Formulae - Conditions for a Fourier Expansion - Functions having points of discontinuity - Change of Interval - Odd and Even Functions - Expansions of Odd or Even Periodic Functions, Half-Range Series - Parseval’s Formula. Practical Harmonic analysis.

**TEXT BOOK:**

**Scope and Treatment as in “Higher Engineering Mathematics”, by Dr. B.S. Grewal, 43<sup>rd</sup> Edition, Khanna publishers.**

**REFERENCE BOOKS:**

1. Graduate Engineering Mathematics by V B Kumar Vatti., I.K.International publishing house Pvt. Ltd.
2. Advanced Engineering Mathematics by Erwin Kreyszig.
3. A text book of Engineering Mathematics, by N.P. Bali and Dr. Manish Goyal, Lakshmi Publications.
4. Advanced Engineering Mathematics by H.K. Dass. S. Chand Company.
5. Higher Engineering Mathematics by B.V. Ramana, Tata Mc Graw Hill Company.
6. Higher Engineering Mathematics by Dr. M.K.Venkataraman.

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## **CV-1102 CHEMISTRY**

### **Course Objectives:**

- To apply the basic knowledge of Chemistry to the Engineering Discipline.
- To develop knowledge about water and its treatment for industrial and potable purposes.
- To develop understanding in the areas of Polymers, Mechanism of Corrosion of Metals and Corrosion Control Methods, Fuels, Lubricants and Nanomaterials for of conducting polymers, bio-degradable polymers and fiber reinforced plastics and apply the knowledge for solving existing challenges faced in various engineering and societal areas.

### **Course outcome:**

- This course applies the basic concepts and principles studied in Chemistry to Engineering.
- It provides an application of chemistry to different branches of engineering
- The students will be able acquire knowledge in the areas of Water Chemistry, Polymers, Corrosion, Fuels and Lubricants and nanomaterials and suggest innovative solutions for existing challenges in these areas.

## **SYLLABUS**

### **Water Chemistry**

Sources of Water – Impurities and their influence of living systems – WHO Limits – Hardness and its Determination – Boiler Troubles and their removal – Water Softening Methods – Lime-Soda, Zeolite and Ion Exchange - Municipal Water Treatment-Break Point Chlorination – Desalination of Sea Water – Reverse Osmosis Method, Electro-dialysis.

### **Polymers and Plastics**

**Polymers:** Definition – Types of Polymerization (Addition & Condensation) – Mechanisms of Addition Polymerization – Radical and Ionic – Thermodynamics of Polymerization Process.

**Plastics:** Thermosetting and Thermoplastics – Effect of Polymer Structure on Properties of Cellulose Derivatives – Vinyl Resins – Nylon (6,6), Reinforced Plastics – Conducting Polymers.

### **Corrosion**

**Corrosion:** Origin and Theory – Types of Corrosion: Chemical and Electrochemical; Pitting, Inter granular, Waterline, Stress – Galvanic Series – Factors Effecting Corrosion.

**Corrosion Controlling Methods:** Protective Coatings: Metallic Coatings, Electroplating and Electroless Plating – Chemical conversion Coatings – Phosphate, Chromate, Anodized, Organic Coatings – Paints and Special Paints.

## **Fuels and Lubricants**

**Solid Fuels:** Wood and Coal, Ranking of Coal – Analysis (Proximate and Ultimate) Coke Manufacture – Otto Hoffmann’s Process – Applications; **Liquid Fuels:** Petroleum Refining – Motor Fuels – Petrol and Diesel Oil – Knocking – Octane number – Cetane Number; **Gaseous Fuels:** Biogas, LPG and CNG – Characteristics – Applications; **Rocket Fuels:** Propellants – Classification – Characteristics

**Lubricants:** Classification – Mechanism – Properties of Lubricating Oils – Selection of Lubricants for Engineering Applications.

## **Nanomaterials**

Nanomaterials, Properties and application of fullerenes, fullerenols, Carbon nanotubes and nanowires. Synthesis - Top-down and Bottom-up approaches - Nanocomposites - Nanoelectronics- Applications of nanomaterials in catalysis, telecommunication and medicine.

## **Text Books:**

1. Engineering Chemistry – PC Jain and M. Jain – Dhanpath Rai and Sons, New Delhi.
2. A Text book of Engineering Chemistry – S. S. Dara – S. Chand & Co. New Delhi.

## **Reference Books:**

1. Engineering Chemistry – B. K. Sharma – Krishna Prakashan – Meerut.
2. Introduction to Nanoscience - S. M. Lindsay - Oxford University Press
3. Engineering Chemistry - B. L. Tembe, Kamaluddin and M. S. Krishnan, (NPTEL).

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**CV-1103  
ENGLISH**

**Course Objectives:**

- To make students understand the explicit and implicit meanings of a text/topic;
- To give exposure to new words and phrases, and aid to use them in different contexts;
- To apply relevant writing formats to draft essays, letters, emails and presentations; and
- To adapt oneself to a given situation and develop a functional approach to finding solutions: adaptability and problem solving.

**Course Outcomes:**

- Students will be able to analyse a given text and discover the various aspects related to language and literature;
- Learn the various language structures, parts of speech and figures of speech;
- Develop one's reading and writing abilities for enhanced communication; and
- Learn to apply the topics in real-life situations for creative and critical use.

**SYLLABUS**

*On the conduct of life:* William Hazlitt

**Life skills: Values and Ethics**

*If:* Rudyard Kipling

*The Brook:* Alfred Tennyson

**Life skills: Self-Improvement**

*How I Became a Public Speaker:* George Bernard Shaw

*The Death Trap:* Saki

**Life skills: Time Management**

*On saving Time:* Seneca

*Chindu Yellama*

**Life skills: Innovation**

*Muhammad Yunus*

*Politics and the English Language:* George Orwell

**Life skills: Motivation**

*Dancer with a White Parasol:* Ranjana Dave

**Grammar:**

Prepositions – Articles – Noun-Pronoun Agreement, Subject-Verb Agreement –  
Misplaced Modifiers – Clichés, Redundancies.

**Vocabulary:**

Introduction to Word Formation – Root Words from other Languages – Prefixes and Suffixes – Synonyms, Antonyms – Common Abbreviations

**Writing:**

Clauses and Sentences – Punctuation – Principles of Good Writing – Essay Writing – Writing a Summary

**Writing:** Essay Writing

**Life skills: Innovation**

*Muhammad Yunus*

**Textbook:** *Language and Life: A Skills Approach* Board of Editors, Orient Blackswan Publishers, India. 2018.

**References :**

1. *Practical English Usage*, Michael Swan. OUP. 1995.
2. *Remedial English Grammar*, F.T. Wood. Macmillan.2007
3. *On Writing Well*, William Zinsser. Harper Resource Book. 2001
4. *Study Writing*, Liz Hamp-Lyons and Ben Heasley. Cambridge University Press. 2006.
5. *Communication Skills*, Sanjay Kumar and PushpLata. Oxford University Press. 2011.
6. *Exercises in Spoken English*, Parts. I-III. CIEFL, Hyderabad. Oxford University Press.

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**CV-1104**  
**CPNM**

**Course Objectives:**

- The course is designed to provide complete knowledge of C language.
- To provide students with understanding of code organization and functional hierarchical decomposition with using complex data types.
- To provide knowledge to the Students to develop logics which will help them to create programs, applications in C.
- This course aims to identify tasks in which the numerical techniques learned are applicable and apply them to write programs, and hence use computers effectively to solve the task.
- This course provides the fundamental knowledge which is useful in understanding the other programming languages.

**Course Outcomes:**

- **Identify** basic elements of C programming structures like data types, expressions, control statements, various simple functions and **Apply** them in problem solving.
- **Apply** various operations on derived data types like arrays and strings in problem **solving**.
- **Design** and Implement of modular Programming and memory management using Functions, pointers.
- **Apply** Structure, Unions and File handling techniques to **Design** and **Solve** different engineering programs with minimal complexity.
- **Apply** Numerical methods to **Solve** the complex Engineering problems.

**SYLLABUS**

**1. Introduction to C:** Basic structure of C program, Constants, Variables and data types, Operators and Expressions, Arithmetic Precedence and associativity, Type Conversions. Managing Input and Output Operations Formatted Input, Formatted Output.

**2. Decision Making, Branching, Looping, Arrays & Strings:** Decision making with if statement, Simple if statement, The if...else statement, Nesting of if...else statement, the else..if ladder, switch statement, the (?:) operator, the GOTO statement., The while statement, the do statement, The for statement, Jumps in Loops ,One, Two-dimensional Arrays, Character Arrays. Declaration and initialization of Strings, reading and writing of strings, String handling functions, Table of strings.

**3. Functions:** Definition of Functions, Return Values and their Types, Function Calls, Function Declaration, Category of Functions: No Arguments and no Return Values, Arguments but no Return Values, Arguments with Return Values, No Argument but Returns a Value, Functions that Return Multiple Values. Nesting of functions, recursion, passing arrays to functions, passing strings to functions, the scope, visibility and lifetime of variables.

**4. Pointers:** Accessing the address of a variable, declaring pointer variables, initializing of pointer variables, accessing variables using pointers, chain of pointers, pointer expressions, pointers and arrays, pointers and character strings, array of pointers, pointers as function arguments, functions returning pointers, pointers to functions, pointers to structures-Program Applications

**5. Structure and Unions:** Defining a structure, declaring structure variables, accessing structure members, structure initialization, copying and comparing structure variables, arrays of structures, arrays within structures, structures within structures, structures and functions and unions, size of structures and bit-fields- Program applications.

**6. File handling:** Defining and opening a file, closing a file, Input/ Output operations on files, Error handling during I/O operations, random access to files and Command Line Arguments-Program Applications

**7. Numerical Methods:** Solutions of Algebraic and Transcendental Equations, Bisection Method, Newton Raphson Method. Newton's forward and backward Interpolation, Lagrange's Interpolation in unequal intervals. Numerical Integration: Trapezoidal rule, Simpson's 1/3 rules. Solutions of Ordinary First Order Differential Equations: Euler's Method, Modified Euler's Method and Runge-Kutta Method.

**Text Book:**

1. Programming in ANSI C, E Balagurusamy, 6th Edition. McGraw Hill Education (India) Private Limited.
2. Introduction to Numerical Methods, SS Sastry, Prentice Hall

**Reference Books:**

1. Let Us C ,YashwantKanetkar, BPB Publications, 5th Edition.
2. Computer Science, A structured programming approach using C", B.A.Forouzan and R.F.Gilberg, " 3rd Edition, Thomson, 2007.
3. The C –Programming Language' B.W. Kernighan, Dennis M. Ritchie, PHI.
4. Scientific Programming: C-Language, Algorithms and Models in Science, Luciano M. Barone (Author), Enzo Marinari (Author), Giovanni Organtini, World Scientific.

**CV1105-Department  
CIVIL ENGINEERING MATERIALS**

**Course Objectives:**

- Student can enlisting the various materials of different types of stones, cement, bricks, timber, lime products, tar, bitumen, metal, sand, paints, admixtures, etc...used in building construction
- Student will have the capability of understanding the different processes of brick and cement manufacturing, and their types and uses.

**Course Outcomes:**

- Student will have the capability of testing of building construction materials like cement, bricks, aggregate, etc.... to find various properties of them.
- Student will have the capability of preservation of building construction materials like cement, bricks, aggregate, etc.... from the external agencies. weather, etc
- Students will understand the design concepts of different types of windows, Doors and stair cases etc

**SYLLABUS**

Masonry: Different Types of Stone Masonry – Plan, Elevation, Sections of Stone Masonry Works – Brick Masonry – Different Types of Bonds – Plan, Elevation and Section of Brick Bonds up to Two-Brick Wall Thickness – Partition walls – Different Types of Block Masonry – Hollow Concrete Blocks – FAL-G Blocks, Hollow Clay Blocks.

Paints, Varnishes: Paints and Varnishes: Constituents and Characteristics of Paints, Types of Paint, their uses and preparation on Different Surfaces, Painting Defects, Causes and Remedies. Constituents of Varnishes, Uses of Varnishes, Different Kinds of Varnishes, Polishes. Painting of Interior Walls, Exterior Walls, Wooden Doors and Windows – Steel Windows – Various Types of Paints (Chemistry of Paints not included) Including Distempers; Emulsion Paints etc., Varnishes Wood Work Finishing Types.

Asbestos, Asphalt Bitumen and Tar: Availability and uses of Asbestos, Properties of Asbestos, Various Types of Asbestos, Difference Between Asphalt and Bitumen, Types, Uses and Properties of Asphalt and Bitumen, Composition of Coal Tar, Wood Tar, Mineral Tar and Naphtha.

Roofing: Mangalore Tiled Roof, RCC Roof, Madras Terrace, Hollow Tiled Roof, Asbestos Cement, Fibre Glass, Aluminium, G.I. Sheet Roofings.

Trusses: King Post and Queen Post Trusses – Steel Roof Truss for 12 m Span with details.

Wooden Doors and Windows: Parallel – Glazed – Flush Shutters, Plywood, Particle Board Shutters – Aluminum, PVC, Steel Doors, Windows and Ventilators, various types of Windows, Glazing – Different Varieties.

Stair Cases: Stair Cases or Stairway Design (Architectural Design or Planning only) various types such as, Straight Flight, Dog-legged, Quarter Landing, Open Spiral, Spiral Stairs etc.

#### *Text Books*

1. *Engineering Materials [Material Science] by Rangwala, Charotar Publications.*
2. *Building Construction by B.C. Punmia, Laxmi Publications.*
3. *Civil Engineering Construction Materials, S.K. Sharma, KBP House.*

#### *Reference Books*

1. *Concrete: Microstructure, Properties & Materials, PK Mehta, Tata McGra-Hill Publications.*
2. *Building Construction, Vol.II & III By W.B. Mckay, E.L.B.S. and Longman, UK.*
3. *Building Materials by S.K. Duggal, New Age International Publishers.*

**CV-1106**  
**ENGLISH LANGUAGE LAB**

**Course Objectives:**

- To make students recognize the sounds of English through Audio-Visual aids;
- To help students build their confidence and help them to overcome their inhibitions and self-consciousness while speaking in English;
- To familiarize the students with stress and intonation and enable them to speak English effectively; and
- To give learners exposure to and practice in speaking in both formal and informal contexts.

**Course Outcomes:**

- Students will be sensitized towards recognition of English sound patterns and the fluency in their speech will be enhanced;
- A study of the communicative items in the laboratory will help students become successful in the competitive world;
- Students will be able to participate in group activities like roleplays, group discussions and debates; and
- Students will be able to express themselves fluently and accurately in social as well professional context.

**SYLLABUS**

**Introduction to Phonetics:** The Sounds of English (Speech sound – vowels and consonants) - Stress and Intonation - Accent and Rhythm.

**Listening Skills:** Listening for gist and specific information - listening for Note taking, summarizing and for opinions - Listening to the speeches of eminent personalities.

**Speaking Skills:** Self-introduction - Conversation Skills (Introducing and taking leave) - Giving and asking for information - Role Play - Just A Minute (JAM) session - Telephone etiquette.

**Reading and Writing skills:** Reading Comprehension – Précis Writing - E-Mail writing - Punctuation.

**Presentation skills:** Verbal and non-verbal communication - Body Language - Making a Presentation.

**Reference Books:**

1. Ashraf Rizvi. *Effective Technical Communication*. Tata McGraw Hill Education Private Limited, New Delhi.
2. *Speak Well*. Orient Blackswan Publishers, Hyderabad.
3. Allan Pease. *Body Language*. Manjul Publishing House, New Delhi.

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**CV-1107**  
**CHEMISTRY LAB**

**Course Objectives:**

- To develop the fine skills of quantitative determination of various chemical components through titrimetric analysis
- To prepare and use ionexchange/ zeolite columns for the removal of hardness of water
- To develop the skill of organic synthesis through the preparation of a polymer/ drug

**Course Outcomes:**

- The course provides quantitative determine the amount of various chemical species in solutions by titrations and conduct the quantitative determinations with accuracy
- The course provides to develop novel materials to be used as zeolite and prepare columns for removal of hardness of water
- The course provides to synthesise a polymer or a drug

**SYLLABUS**

1. Determination of Sodium Hydroxide with HCl ( $\text{Na}_2\text{CO}_3$  Primary Standard)
2. Determination of Alkalinity (Carbonate and Hydroxide) of water sample
3. Determination of Fe(II)/Mohr's Salt by Permanganometry
4. Determination of Oxalic Acid by Permanganometry
5. Determination of Chromium (VI) by Mohr's Salt Solution
6. Determination of Zinc by EDTA method
7. Determination of Hardness of Water sample by EDTA method
8. Determination of Chlorine in water by Iodometric Titration
9. Ionexchange/ Zeolite column for removal of hardness of water
10. Synthesis of Polymer/ drug

**Reference Books:**

1. Vogel's Quantitative Chemical Analysis – V – Edition – Longman.
2. Experiments in Applied Chemistry (For Engineering Students) – Sinita Rattan – S. K. Kataria & Sons, New Delhi

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**CV-1108  
CPNM LAB**

**Course Objectives:**

- To impart writing skill of C programming to the students and solving problems.
- To write and execute programs in C to solve problems such as Modularize the problems into small modules and then convert them into programs.,
- To write and execute programs in C to solve problems such as arrays, files, strings, structures and different numerical methods.
- This reference has been prepared for the beginners to help them understand the basic to advanced concepts related to Objective-C Programming languages.

**Course Outcomes:**

- Understand various computer components, Installation of software. C programming development environment, compiling, debugging, and linking and executing a program using the development environment.
- Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs.
- Construct programs that demonstrate effective use of C features including arrays, strings, structures, pointers and files.
- Apply and practice logical ability to solve the real world problems.
- Apply Numerical methods to Solve the complex Engineering problems.

**SYLLABUS**

1. Write a program to read x, y coordinates of 3 points and then calculate the area of a triangle formed by them and print the coordinates of the three points and the area of the triangle. What will be the output from your program if the three given points are in a straight line?
2. Write a program, which generates 100 random integers in the range of 1 to 100. Store them in an array and then print the arrays. Write 3 versions of the program using different loop constructs. (e.g. for, while, and do while).
3. Write a set of string manipulation functions e.g. for getting a sub-string from a given position, Copying one string to another, Reversing a string, adding one string to another.
4. Write a program which determines the largest and the smallest number that can be stored in different data types like short, int, long, float, and double. What happens when you add 1 to the largest possible integer number that can be stored?
5. Write a program, which generates 100 random real numbers in the range of 10.0 to 20.0, and sort them in descending order.
6. Write a function for transposing a square matrix in place (in place means that you are not allowed to have full temporary matrix).
7. First use an editor to create a file with some integer numbers. Now write a program, which reads these numbers and determines their mean and standard deviation.
8. Given two points on the surface of the sphere, write a program to determine the smallest arc length between them.

9. Implement bisection method to find the square root of a given number to a given accuracy.
10. Implement Newton Raphson method to det. a root of polynomial equation.
11. Given table of  $x$  and corresponding  $f(x)$  values, Write a program which will determine  $f(x)$  value at an intermediate  $x$  value by using Lagrange's interpolation/
12. Write a function which will invert a matrix.
13. Implement Simpson's rule for numerical integration.
14. Write a program to solve a set of linear algebraic equations.

**CV-1201**  
**MATHEMATICS – II**

**Course Objectives:**

- The way of obtaining rank, eigen values and eigen vectors of a matrix.
- To know the importance of Cayley-Hamilton theorem and getting canonical form from a given quadratic form.
- To solve the system of equations by using direct and indirect methods.
- To solve first order and higher order differential equations by various methods.
- To obtain the Laplace transforms and inverse Laplace transforms for a given functions and their applications.

**Course Outcomes:**

- Find rank, eigen values and eigen vectors of a matrix and understand the importance of Cayley-Hamilton theorem.
- Reduce quadratic form to canonical forms and solving linear systems by direct and indirect methods.
- Demonstrate solutions to first order differential equations by various methods and solve basic applications problems related to electrical circuits, orthogonal trajectories and Newton's law of cooling
- Discriminate among the structure and procedure of solving higher order differential equations with constant and variable coefficients.
- Understand Laplace transforms and its properties and finding the solution of ordinary differential equations.

**SYLLABUS**

**(Linear Algebra)**

Rank of a matrix- Echelon form, Normal Form - Solution of Linear System of Equations - Consistency of Linear System of Equations - Direct & Indirect Methods: Gauss elimination method, LU Factorization method, Gauss Seidal Method. Complex Matrices: Hermitian, Skew-Hermitian and Unitary Matrices and their Properties.

**(Eigen Values and Eigen Vectors)**

Eigen Values and Eigen Vectors of a Matrix - Cayley-Hamilton theorem - Inverse and Powers of a Matrix using Cayley-Hamilton's theorem and its applications. Diagonalization of a Matrix - Quadratic Forms - Reduction of Quadratic Form to Canonical Form - Nature of a Quadratic Form.

**(Ordinary Differential Equations of First Order and its Applications)**

Formation of ordinary differential equations (ODEs) - Solution of an ordinary differential equation - Equations of the first order and first degree - Linear differential equation - Bernoulli's equation - Exact differential equations - Equations reducible to exact equations - Orthogonal

Trajectories - Simple Electric (LR & CR) Circuits - Newton's Law of Cooling - Law of Natural growth and decay.

### **(Differential Equations of Higher Order)**

Solutions of Linear Ordinary Differential Equations with Constant Coefficients - Rules for finding the complimentary function - Rules for finding the particular integral - Method of variation of parameters - Cauchy's linear equation - Legendre's linear equation - Simultaneous linear differential equations.

### **(Laplace Transforms)**

Introduction - Existence Conditions - Transforms of Elementary Functions - Properties of Laplace Transforms - Transforms of Derivatives - Transforms of Integrals - Multiplication by  $t^n$  - Division by  $t$  - Evaluation of integrals by Laplace Transforms - Inverse Laplace Transform - Applications of Laplace Transforms to Ordinary Differential Equations - Simultaneous Linear Differential Equations with Constant Coefficients - Second Shifting Theorem - Laplace Transforms of Unit Step Function, Unit Impulse Function and Laplace Transforms of Periodic Functions.

### **TEXT BOOK:**

Scope and Treatment as in "Higher Engineering Mathematics", by Dr. B.S. Grewal, 43<sup>r</sup>d edition, Khanna publishers.

### **REFERENCE BOOKS:**

7. Graduate Engineering Mathematics by V B Kumar Vatti., I.K. International publishing house Pvt. Ltd.
1. Advanced Engineering Mathematics by Erwin Kreyszig.
2. A text book of Engineering Mathematics, by N.P. Bali and Dr. Manish Goyal. Lakshmi Publications.
3. Advanced Engineering Mathematics by H.K. Dass. S. Chand Company.
4. Higher Engineering Mathematics by B.V. Ramana, Tata Mc Graw Hill Company.

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## CV-1202 PHYSICS

### Course Objectives:

- To impart knowledge in basic concept of physics of Thermodynamics relevant to engineering applications.
- To grasp the concepts of physics for electromagnetism and its application to engineering. Learn production of Ultrasonics and their applications in engineering.
- To Develop understanding of interference, diffraction and polarization: connect it to a few engineering applications.
- To Learn basics of lasers and optical fibers and their use in some applications.
- To Understand concepts and principles in quantum mechanics and Nanophase Materials. Relate them to some applications.
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### Course Outcomes:

- Understand the fundamentals of Thermodynamics and Laws of thermodynamics. Understand the working of Carnot cycle and concept of entropy.
- Gain Knowledge on the basic concepts of electric and magnetic fields. Understand the concept of the nature of magnetic materials. Gain knowledge on electromagnetic induction and its applications .
- Understand the Theory of Superposition of waves. Understand the formation of Newton's rings and the working of Michelson's interferometer. Remember the basics of diffraction, Evaluate the path difference. Analysis of Fraunhofer Diffraction due to a single slit
- Understand the interaction of matter with radiation, Characteristics of Lasers, Principle, working schemes of Laser and Principle of Optical Fiber. Realize their role in optical fiber communication.
- Understand the intuitive ideas of the Quantum physics and understand dual nature of matter. Compute Eigen values, Eigen functions, momentum of Atomic and subatomic particles using Time independent one Dimensional Schrodinger's wave equation. Understand the fundamentals and synthesis processes of Nanophase materials.

## SYLLABUS

### THERMODYNAMICS

Introduction, Heat and Work, First law of thermodynamics and applications, Reversible and Irreversible process, Carnot cycle and Efficiency, Second law of thermodynamics, Carnot's Theorem, Entropy, Second law in terms of entropy, Entropy and disorder, Third law of thermodynamics (statement only).

### ELECTROMAGNETISM

Concept of electric flux, Gauss's law - some applications, Magnetic field - Magnetic force on current, torque on current loop, The Biot-Savart's Law, B near a long wire, B for a

circular Current loop, Ampere's law, B for a solenoid, Hall effect, Faraday's law of induction, Lenz's law, Induced magnetic fields, Displacement current, Maxwell's equations (no derivation), Magnetic materials: Classification of magnetic materials and properties.

**Ultrasonics :** Introduction, Production of Ultrasonics – Piezoelectric and Magnetostriction methods, acoustic grating, applications of ultrasonics.

## **OPTICS**

**Interference:** Principles of superposition – Young's Experiment – Coherence - Interference in thin films (reflected light), Newton's Rings, Michelson Interferometer and its applications.

**Diffraction:** Introduction, Differences between interference and diffraction, Fresnel and Fraunhofer diffraction, Fraunhofer diffraction at a single slit (Qualitative and quantitative treatment).

**Polarisation:** Polarisation by reflection, refraction and double refraction in uniaxial crystals, Nicol prism, Quarter and Half wave plate, circular and elliptical polarization.

## **LASERS and FIBRE OPTICS**

Introduction, characteristics of a laser beam, spontaneous and stimulated emission of radiation, population inversion, Ruby laser, He-Ne laser, Semiconductor laser, applications of lasers

Introduction to optical fibers, principle of propagation of light in optical fibers, Acceptance Angle and cone of a fibre, Numerical aperture, Modes of propagations, classification of fibers, Fibre optics in communications, Application of optical fibers.

## **MODERN PHYSICS**

Introduction, De Broglie concept of matter waves, Heisenberg uncertainty principle, Schrodinger time independent wave equation, application to a particle in a box. Free electron theory of metals, Kronig - Penney model (qualitative treatment), Origin of energy band formation in solids, Classification of materials into conductors, semi conductors and insulators.

### **Nanophase Materials**

Introduction, properties, Top-down and bottom up approaches, Synthesis - Ball milling, Chemical vapour deposition method , sol-gel methods, Applications of nano materials.

## **TEXT BOOKS :**

1. Physics by David Halliday and Robert Resnick – Part I and Part II - Wiley.
2. A textbook of Engineering Physics, Dr. M. N. Avadhanulu, Dr. P.G. Kshirsagar - S. Chand
3. Engineering Physics by R.K. Gaur and S.L. Gupta –Dhanpat Rai

## **Reference Books:**

1. Modern Engineering Physics by A.S. Vadudeva
2. University Physics by Young and Freedman

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**CV-1203**  
**ENGINEERING GRAPHICS**

**Course Objectives:**

- Understand the basics of Engineering Graphics and BIS conventions.
- Develop the graphical skills for communication of concepts, ideas and design of engineering products through technical drawings
- Demonstrate and practice the various profiles/curves used in engineering practice through standard procedures.
- Demonstrate and practice the orthographic projections of points, lines, planes, solids and section of solids
- Demonstrate and practice the development of surfaces of simple solids
- Familiarize the basic concept of isometric views clearly.

**Course Outcomes:**

- Develop simple engineering drawings by considering BIS standards.
- Able to draw different engineering curves with standard Procedures
- Comprehend the basics of orthographic projections and deduce orthographic projections of points, lines, planes and solids at different orientations in real life environment.
- Visualize clearly the sections of solids.
- Apply the concepts of development of surfaces while designing/analyzing any product.
- Recognize the significance of isometric drawing to relate 2D environment with 3D environment.

**SYLLABUS**

**Introduction:** Lines, Lettering and Dimensioning, Geometrical Constructions, and Scales.

**Curves:** Conic sections: General construction of ellipse, parabola and hyperbola. Construction of involutes of circle and polygons only. Normal and tangent to curves.

**Projections of Points:** Principal or Reference Planes, Projections of a point situated in any one of the four quadrants.

**Projections of Straight Lines:** Projections of straight lines parallel to both reference planes, perpendicular to one reference plane and parallel to other reference plane, inclined to one reference plane and parallel to the other reference plane.

**Projections of Straight Line Inclined to Both the Reference Planes:** Projections of Planes: Projection of Perpendicular planes: Perpendicular to both reference planes, perpendicular to one reference plane and parallel to other reference plane and perpendicular to one reference plane and inclined to other reference plane. Projection of Oblique planes. Introduction to Auxiliary Planes.

**Projections of Solids:** Types of solids: Polyhedra and Solids of revolution. Projections of solids in simple positions: Axis perpendicular to horizontal plane, Axis perpendicular to vertical plane and Axis parallel to both the reference planes, Projection of Solids with axis inclined to one reference plane and parallel to other and axes inclined to both the reference planes.

**Sections of Solids:** Perpendicular and inclined section planes, Sectional views and True shape of section, Sections of solids (Prism, Pyramid, Cylinder and Cone) in simple position only.

**Development of Surfaces:** Methods of Development: Parallel line development and radial line development. Development of a cube, prism, cylinder, pyramid and cone.

**Isometric Views:** Isometric projection, Isometric scale and Isometric view. Isometric view of Prisms, Pyramids, cylinder, cone, and their combinations.

**Text Book:**

Elementary Engineering Drawing by N.D.Bhatt, Charotar Publishing House.

**Reference:**

Engineering Graphics by K.L. Narayana and P. Kannaiah, Tata Mc-Graw Hill

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**CV-1204**  
**SURVEYING AND GEOMATICS**

**Course Objectives:**

- To enable the student to understand the basic steps to be conducted in the field before any construction activity.
- To enhance the students ability to use different survey instruments like Compass, Levels, Theodolite, Electronic Theodolite, Total Station etc.
- To train the students in the survey of Global Positioning System and its applications.

**Course Outcomes:**

- The student will be in a position to use different survey instruments for identification of precise position of points on or above the Earth's surface.
- The student can conduct any extent of field survey using Total Station.
- The student will be in a position to fix the alignment of routes for highways and railways.

**SYLLABUS**

Introduction: Classification and Principles of Surveying, Triangulation and Trilateration – Earth as Spheroid, Datum, Geoid, Azimuth, Latitude, Longitude, Map Projections, Scales, Plans and Maps. Chain Surveying: Instrumentation for Chaining – Errors due to Incorrect Chain–Chaining on uneven and sloping Ground – Errors in Chaining –Tape Corrections – Problems: Base Line Measurement – Chain Triangulation – Check Lines, Tie Lines, Offsets. Basic Problems in Chaining – Obstacles in Chaining – Problems – Conventional Signs.

Compass Survey: (a) Introduction to Compass Survey Definitions of Bearing. True bearing, True meridian, Magnetic Meridian, Magnetic Bearing. Plane Table Surveying: Introduction – Advantages, Accessories. Theodolite – Types of Theodolites – Temporary Adjustments, Measurements of Horizontal Angle – Method of Repetition, Method of Reiteration – Uses of Theodolites. Curves – Sample Curves – Elements of Simple Curves – Methods of Setting Simple Curves – Rankine's Method – Two Theodolite Method.

Levelling: Definitions of Terms – Methods of Levelling – Uses and Adjustments of Dumpy Level – Temporary and Permanent Adjustments of Dumpy Level Levelling Staves – Differential Levelling, Profile Levelling – Cross Sections – Reciprocal levelling. Precise Levelling – Definition of BS, IS, FS, HI, TP – Booking and Reduction of Levels, H.I. Methods – Rise and

Fall Method – Checks – Related Problems – Curvature and Refraction Related Problems – Correction – Reciprocal Levelling – Related Problems – L.S & C.S Leveling – Problems in Levelling – Errors in Levelling. Contouring: Definitions – Contour Intervals, Characteristics of Contours

Total Station Surveying: Electronic Theodolite, Electronic Distance Measurements, Total Station, Errors in Measurements, Advantages, Disadvantages, Applications; Contour Mapping, Determination of Height of Remote Point, Position of Hidden Point, Free Station, Area Measurement, Volume Measurement.

Modern Surveying and Mapping: GPS Survey – Introduction, Errors in GPS, Positioning Methods, Classification of GPS Surveying, Applications, Advantages and Disadvantages, Photogrammetric Surveying; Sensors and Platforms, Aerial Photogrammetry, Satellite Images Resolution, Concept of Stereo Models, Photogrammetric Products, Rectified Images, Orthophotography, Topographic Map, Digital Maps, DEM, GIS, Advantages and Disadvantages of Photogrammetric Surveying.

#### *Text Books*

1. *Surveying Vol. I, II and III by B.C.Punmia, Standard Book House.*
2. *Advanced Surveying by Satheesh Gopi, Sathikumar and Madhu, Pearson India.*
3. *Geomatics Engineering by M.K.Arora and R.C.Badjatia, Nemchand & Bros.*

#### *Reference Books*

1. *Surveying Vol. I and II by S.K. Duggal, Tata McGraw-Hill Publishing Co. Ltd.*
2. *Surveying: Theory & Practices by James M. Anderson and Edward M. Mikhail, Tata McGraw-Hill Publishing Co. Ltd.*

**CV-1205**  
**ENGINEERING MECHANICS**

**Course Objectives:**

- Represent and calculate force and moment vectors and their resultants
- Understand properties of areas and volumes.
- Analyse and interpret dynamic systems.
- Understand work-energy and impulse-momentum application to dynamic systems.

**Course Outcomes:**

- The student will be in a position to understand the Effect of forces and its components, the principle of Moments on wide variety of practical situations that are encountered by Engineers.
- The student will develop the logical orderly processes of thinking that characterized an Engineer.

**SYLLABUS**

Basic Concepts: Introduction to Engineering Mechanics – Scalar and Vector quantities – Forces – Characteristics of a Force – Definitions and Examples of Various Types of Force Systems – Definition of Resultant – Composition and Resolution of Forces – Moment of a Force – Principles of Moments of Force – Couples – Characteristics of a Couple – Transformations of a Couple – Resolution of a Force into a Force and Couple.

Resultants of Force Systems, Possible Resultants of Different Types of Force Systems – Resultant of a Concurrent, Coplanar Force System – Resultant of a Non-concurrent Coplanar Force System – Resultant of a Concurrent Non-coplanar Force System – Resultant of a Parallel, Non-coplanar Force System – Resultant of a System of Couples in Space – Resultant of Non-concurrent, Non-coplanar, Non-parallel Force System – Screw of Wrench.

Equilibrium: Free Body Diagrams – Equations of Equilibrium for a Concurrent Coplanar Force System – Equilibrium of Bodies Acted on by Two or Three Forces – Equilibrium of Bodies Acted on by Non-concurrent Coplanar Force System – Equilibrium of Bodies Acted on by Parallel, Non-coplanar Force System – Equilibrium of Non-concurrent, Non-coplanar Non-Parallel Force System.

Analysis of Statically Determinate Trusses by (a) Method of Joints and (b) Method of Sections.

Centroids and Centres of Gravity: Centre of Gravity of Parallel Forces in a Plane – Centre of Gravity of Parallel Forces in Space – Centroid and Centre of Gravity of Composite Bodies – Theorems of Pappus – Distributed Loads on Beams.

Moments of Inertia, Definition – Parallel Axis Theorem for Areas – Second Moments of Areas by Integration – Radius of Gyration of Areas – Moments of Inertia of Composite Areas – Parallel Axis and Parallel Plane Theorems for Masses – Moments of Inertia of Masses by Integration – Radius of Gyration of Mass – Moments of Inertia of Composite Masses.

Friction: Nature of Friction – Laws of Friction – Coefficient of Friction – Angle of Friction – Cone of Friction – Problems Involving Frictional Forces

Method of Virtual Work: Principle of Virtual Work – Equilibrium of Ideal System – Stability of Equilibrium.

Kinematics: Absolute Motion: Introduction – Recapitulation of Basic Terminology of Mechanics – Newton's Laws – Introduction to Kinematics of Absolute Motion – Rectilinear Motion of a Particle – Angular Motion – Curvilinear Motion of a Particle using Rectangular Components – Motion of Projectiles – Curvilinear Motion using Radial and Transverse Components – (Simple Problems only) – Basics of Simple Harmonic Motion (Simple Problems) – Motion of Rigid Bodies.

Kinematics: Relative Motion: Introduction to Kinematics of Relative Motion – Relative Displacement – Relative Velocity – Instantaneous Centre – Relative Acceleration.

Kinetics: Introduction to Kinetics – Newton's Laws of Motion – Equation of Motion for a Particle. Motion of the Mass Centre of a System of Particles – D'Alembert's Principle – Rectilinear Translation of a Rigid Body – Curvilinear Translation of a Rigid Body – Rotation of a Rigid Body – Plane Motion of a Rigid Body.

Kinetics: Work and Energy Approach – Work Done by a Force – Work Done by a Couple – Work Done by a Force System – Energy: Potential Energy – Kinetic Energy of a Particle – Kinetic Energy of a Rigid Body – Principle of Work – Energy and Application to Particle and Rigid Body in Planar Motion – Conservation of Energy

Impulse – Momentum Approach – Linear Impulse – Linear Momentum – Principle of Linear Impulse and Linear Momentum – Conservation of Linear Momentum – Elastic Impact - Principle of Angular Momentum.

*Text Books*

1. *Engineering Mechanics by Fredinand Leon Singer, B.S.Publications.*
2. *Applied Mechanics by I.B. Prasad, Khanna Publishers.*

*Reference Books*

1. *Engineering Mechanics by S.Timoshenko and D.H. Young, Tata McGraw-Hill Publishing Co. Ltd. India.*
2. *Engineering Mechanics Vol. I and Vol. II by J.L.Meriam and L.G.Kraige, Wiley Publications.*
3. *Mechanics for Engineers Statics and Dynamics by F.B. Beer and E.R. Johnston.*
4. *Engineering Mechanics by R.S.Kurmi, S.Chand Publishing.*

## **CV-1206 WORKSHOP LAB**

### **Course Objectives:**

- Get hands on experience with the working skills in Carpentry trade.
- Know how to work with Sheet Metal tools.
- Get familiar with the working skills of Metal Fitting operations.
- Get hands on experience with house hold electrical wiring.

### **Course Outcomes:**

- Can be able to work with Wood Materials in real time applications.
- Can be able to build various parts with Sheet Metal in day-to-day life.
- Can be able to apply Metal Fitting skills in various applications.
- Can be able to apply this knowledge to basic house electrical wiring and repairs.

## **SYLLABUS**

**Carpentry:** Any three jobs from – Half lap joint, Mortise and Tenon joint, Half – lap Dovetail joint, Corner Dovetail joint, Central Bridle joint.

**Sheet Metal:** Any three jobs from – Square tray, Taper tray(sides), Funnel, Elbow pipe joint.

**Fitting:** Any three jobs from – Square, Hexagon, Rectangular fit, Circular fit and Triangular fit.

**House wiring:** Any three jobs from – Tube light wiring, Ceiling fan wiring, Stair-case wiring, Corridor wiring.

### **References:**

1. Elements of workshop technology, Vol.1 by S. K. and H. K. Choudary.
2. Work shop Manual / P.Kannaiah/ K.L.Narayana/ SciTech Publishers.
3. Engineering Practices Lab Manual, Jeyapooan, Saravana Pandian, 4/e Vikas.

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**CV-1207**  
**PHYSICS LAB**

**Course Objectives:**

- To enable the students to acquire skill, technique and utilization of the Instruments
- Draw the relevance between the theoretical knowledge and to imply it in a practical manner with respect to analyze various electronic circuits and its components.
- To impart the practical knowledge in basic concepts of Wave optics, Lasers and Fiber optics.
- To familiarize the handling of basic physical apparatus like Vernier callipers, screw gauge, spectrometers, travelling microscope, laser device, optical fibre, etc.

**Course Outcomes:**

- Ability to design and conduct experiments as well as to analyze and interpret
- Ability to apply experimental skills to determine the physical quantities related to Heat, Electromagnetism and Optics
- The student will learn to draw the relevance between theoretical knowledge and the means to imply it in a practical manner by performing various relative experiments.

**SYLLABUS**

1. Determination of Radius of Curvature of a given Convex Lens By forming Newton's Rings.
2. Determination of Wavelength of Spectral Lines in the Mercury Spectrum by Normal Incidence method.
3. Study the Intensity Variation of the Magnetic Field along axis of Current Carrying Circular Coil.
4. Determination of Cauchy's Constants of a Given Material of the Prism using Spectrometer.
5. Determination of Refractive Index of Ordinary ray  $\mu_o$  and Extraordinary  $\mu_e$  ray.
6. Determination of Thickness Given Paper Strip by Wedge Method.
7. Calibration of Low Range Voltmeter.
8. Calibration of Low Range Ammeter.
9. Determination of Magnetic Moment and Horizontal Component of Earth's Magnetic Field.
10. Lees Method - Coefficient of thermal Conductivity of a Bad Conductor.
11. Carey Foster's Bridge – Verification of laws of Resistance and Determination Of Specific Resistance.
12. Melde's Apparatus – Frequency of electrically maintained Tuning Fork.
13. Photoelectric cell-Characteristics.
14. Planks Constants.
15. Laser- Diffraction.

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**CV-1208**  
**ENGINEERING GEOLOGY LAB**

**Course Objectives:**

- To enable the students to know different types of soils.
- To enable the students to know different properties of different soils.
- To enable the students to know the application of Remote Sensing and Geo Physical Methods.
- Understand weathering process and mass movement

**Course Outcomes:**

- Students will understand the suitable foundation for different structures in different types of soils.
- Identify subsurface information and groundwater potential sites through geophysical investigations
- Apply geological principles for mitigation of natural hazards and select sites for dams and tunnels.

**SYLLABUS**

General geology:

Importance of geology from Civil Engineering point of view. Weathering and soils: soil profile, erosion, and soil formation, types of Indian soils.

Landforms produced by running water, glaciers, wind, sea waves and currents.

Ground water: Origin and Occurrence of ground water. Porosity and permeability. Aquifers and ground water moment and water bearing properties of rocks.

Petrology & Mineralogy:

Petrology: Definitions of rock. Rock classification, structure, texture and mineralogical composition. Types of rocks– igneous rocks and structures-dykes and sills: granite, dolerite, basalt.

Sedimentary rocks: conglomerate, sandstone, shale, limestone.

Metamorphic rocks: gneiss, khondalite, schist, marble, charnokite, engineering properties of rocks.

Mineralogy: Physical properties: form, colour, lustre, cleavage, fracture, hardness and specific gravity. Study of important rock forming minerals: feldspar, micas and clays

Stratigraphy and Structural Geology:

Stratigraphy: major geological formations of India. Archaeans. Cuddapahs, vindyana, gondwanas and deccan traps.

Mineral resources of Andhra Pradesh. Structural geology: elements of structural geology–strike and dip, plunge. Clinometers compass and Brunton compass. Classification of folds, faults and joints. Geological methods of investigation: geological formations, preparations of geological maps, structural features and groundwater parameters.

Natural hazards: earthquake origin and distribution. Volcanoes, landslides and mass moment. Tsunamis.

Remote Sensing and Geo Physical Methods:

Remote sensing: Introduction, electromagnetic spectrum, aerial photo, types of aerial photos and flight planning aerial mosaics. Elements of photo interpretation. Satellite, remote sensing, Satellite, sensors and data products, principles of GIS. RS and GIS applications to Civil Engineering–town planning, dams and reservoirs,

Geophysical Methods:

Principles of geophysical methods, electrical methods, seismic methods. Principles of resistivity method and configurations. Applications of resistivity method in prediction of soil profile, hard rock and ground water table. Principles of seismic refraction and reflections methods and their applications to Civil Engineering problems.

Geological applications to Civil Engineering structures: Role of engineering geologists in planning, design and construction stages in Civil Engineering works. Geological investigations for dams and reservoir; geological investigations for bridges and multi-storied structures. Geological investigation for highways. Geological investigations for tunnels and coastal structures. (sea walls. groins and bulkheads). Environmental geology.

#### LIST OF EXPERIMENTS

1. General study of toposheet
2. Physical properties of minerals
3. Physical properties of 3 types of rocks
4. Study of folds, faults and joints (Models)
5. Study of tunnels (models)
6. General observation of satellite data for abstraction of data

## 7. Integrated approach of Terrain evaluation

### *Text Books*

1. *Principles of Engineering Geology by K.V.G.K.Gokhale. B.S. Publications-2005*
2. *Engineering Geology by N.Chennakesavalu, Mc-Millan, Indian Ltd-2005*
3. *A Text Book of Geology by P.K.Mukherjee, World Press*
4. *Engineering and General Geology by Parbin Singh, Katson Publishing House*
5. *Fundamentals of Remote Sensing by George Jospheh, University Press (India) Private Ltd.*