Netaji Subhas University
The Diploma In Civil Engineering' Course Structure
(Effective from Session 2023-24)

First Year

SUBJECT CODE	SEMESTER 1	SUBJECT CODE	SEMESTER 2
DIP101	BASIC PHYSICS	DIP201	COMMUNICATION SKILLS-II
DIP102	BASICCHEMISTRY	DIP202	ENGG. MATHEMATICS-I
DIP103	BASIC MATHEMATICS	DIP203	APPLIED SCIENCE
DIP104	COMMUNICATION SKILL-I	DIP204	ENGG. MECHANICS
DIP105	ENGG. GRAPHICS	DIP205	ENGG. DRAWING
DIP106	COMPUTER FUNDAMENTALS	DIP206	BASIC WORKSHOP PRACTICE
DIP107L	PHY LAB	DIP207L	CHEM LAB
DIP108L	COMPUTER LAB	DIP208L	ED LAB

SECOND YEAR

SUBJECT CODE	SEMESTER 3	SUBJECT CODE	SEMESTER 4
DIP301	ENGG. MATHEMATICS II	DIP4CIV01	TRANSPORTATION ENGINEERING
DIP3CIV02	SURVEYING I	DIP4CIV02	CONCRETE TECHNOLOGY
DIP3CIV03	STRENGTH OF MATERIAL	DIP4CIV03	FLUID MECHANICS
DIP3CIV04	BUILDING DRAWING	DIP4CIV04	SURVEYING II
DIP3CIV05	BUILDING MATERIAL AND BUILDING CONSTRUCTION	DIP4CIV05	GEOTECHNICAL ENGINEERING
DIP3CIV06L	SURVEYING LAB	DIP4CIV06L	FLUID MECHANICS LAB
DIP3CIV07L	STRENGTH OF MATERIAL LAB	DIP4CIV07L	CONCRETE TECHNOLOGY LAB

THIRD YEAR

SUBJECT CODE	SEMESTER 5	SUBJECT CODE	SEMESTER 6
DIP5CIV01	THEORY OF STRUCTURE	DIP6CIV01	ESTIMATING AND COSTING
DIP5CIV02	DESIGN OF STEEL STRUCTURE	DIP6CIV02	ENVIRONMENTAL ENGINEERING
DIP5CIV03	ENVIRONMENTAL SICENCE	DIP603	INDUSTRIAL MANAGEMENT
DIP5CIV04	REINFORCED CEMENT CONCRETE	DIP6CIV04	ELECTIVE ANY ONE
DIP5CIV05	IRRIGATION ENGINEERING	DIP6CIV05	PROJECT & VIVA
DIP5CIV06L	TRANSPORTATION ENGINEERING LAB		
DIP5CIV07L	GEOTECHNICAL ENGINEERING LAB		

ELECTIVE– ADVANCED CONSTRUCTION TECHNIQUES & EQUIPMENTS

MAINTAINANCE AND REHABILITATION OF STRUCTURE

ARCHITECTURAL PRACTICES AND INTERIOR DESIGN

Program Outcome

After undergoing this programme, students will be able to:

PO1: Apply knowledge of mathematics, science and algorithm in solving complex Computer engineering problems.

PO2: Communicate effectively in English with others, Apply basic principles of mathematics and physics to solve engineering problems.

PO3: Use cutting tools, equipment and tools for fabrication of jobs by following safe practices at the workplace.

PO4: Work on different software for word processing, PowerPoint presentation, spreadsheets and communicate ideas electronically.

PO5: Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations.

PO6: Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.

PO7: Recognize the need, and have the ability, to engage in independent learning for continual development as a Computing professional.

PO8: Demonstrate knowledge and understanding of computing and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO9: Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.

PO10: Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice.

PROGRAMME SPECIFIC OUTCOMES

1. Understand the Opportunities and Challenges in Industry and to equip the students accordingly

2. Apply effectively the principles and methods of Computer

3. Technology to a wide range of applications.

4. Apply advanced algorithmic and mathematical concepts to the design and analysis of software.

5. Get proficiency of computing, and to prepare themselves for a continued professional development.

COURSE OUTCOME

1. Identify and analyze the computing requirements of a problem and to solve those using computing principles.

2. Understand and Apply mathematical foundation, computing and domain knowledge for the conceptualization of computing model of problems.

3. Use suitable architecture or platform on design and implementation with respect to performance.

4. Apply the management principles with computing knowledge to manage the projects in multidisciplinary environments.

5. Identify opportunities and use innovative ideas to create value and wealth for the betterment of the individual and society.

6. Expertise in developing application with required domain knowledge

DERIVING CURRICULUM AREAS FROM LEARNING OUTCOMES OF THEPROGRAMME

The following curriculum area subjects have been derived from learning outcomes:

Sr.No	Learning Outcomes	Curriculum Areas/Subjects
1.	Communicate effectively in English withothers	− Communication Skill − Student Centered Activities
2.	Apply basic principles of mathematics and science to solve engineering problems	− Applied Mathematics − Applied Physics
3.	Use cutting tools, equipment and tools for fabrication of jobs by following safe practices at the workplace	Workshop Practice
4.	Work on different software for word processing, powerpoint presentation, spreadsheets and communicate ideas electronically	Fundamentals of Computer and Information Technology
5.	Assemble, troubleshoot and maintain computer and peripherals and install various software	Computer Architecture and Hardware Maintenance
6.	Use appropriate procedures for energy conservation and for preventing environmental pollution	Environmental Studies
7.	Design page layouts for digital and electronic publications by combining different media elements	Internet and Web Technology
8.	Write, compile and debug programs using different programming constructs	Concept of Programming Using C
9.	Identify the software process model for specific software application and interpret different phases of software development life cycle	Software Engineering
10.	Create, manage and secure database	Database Management System
11.	Design, develop and host websites using internet technologies	Internet and Web Technology

12.	Plan and execute given task and project as a team member or a leader	Minor and Major Project Work
13.	Manage resources MIS/ERP effectively at theworkplace	Industrial Management and Entrepreneurship Development
14.	Implement OOPS concepts and data structure concepts.	Object Oriented Programming Using Java
15.	Use various functions and components of different operating systems	Operating Systems
16.	Set-up, diagnose problems, troubleshoot computer networks and maintain security of the networks	Data Communication and Computer Networks
17.	Write and debug simple as well as complex programs in Python	– Web Development using HTML/CSS/JS – Computer Programming using Python
18.	Apply the acquired knowledge and skills in	– Minor Project Work
19.	solving live problems in the Computer and I.T. industry	– Major Project Work

		PERIOD			Evaluation Scheme				
THEORY									
SUBJECT CODE	NAME OF THE PAPER	LECTURES	TUTORIALS	PRACTICALS	MSE	ESE	SUB-TOTAL	Credit	Hours
DIP101	Basic Physics	3	1	0	30	70	100	4	4
DIP102	Basic Chemistry	3	1	0	30	70	100	4	4
DIP103	Basic Mathematics	3	1	0	30	70	100	4	4
DIP104	Communication Skill-I	3	0	1	30	70	100	4	4
DIP105	Engg. Graphics	3	1	0	30	70	100	4	4
DIP106	Computer Fundamentals	3	0	1	30	70	100	4	4
DIP107L	COMPUTER LAB	0	0	2	15	35	50	2	2
DIP108L	PHY LAB	0	0	2	15	35	50	2	2
							Total Credits:	28	

SEMESTER - 1 (header appears above table)

Basic Physics (DIP101)

Programme Specific outcomes

1) After completion of program, students have deep knowledge of basic concepts in Physics.

2) Students are expected to acquire core knowledge in Physics, including the major premises of Mechanics and Properties of matter, Modern Physics, Classical and Quantum mechanics, Electricity and Magnetism, Digital Electronics, Optics, Relativity, Heat and Thermodynamic, Solid State Physics, Mathematical and Statistical physics, Atomic, Molecular and Nuclear Physics, Laser and nonconventional energy sources.

3) Students are also expected to develop written and oral communication skills in communicating physics-related topics.

4) Students should learn how to design and conduct an experiment and understand the basic physics behind it.

5) Students will develop the proficiency in the handling of laboratory instruments.

6) Students will realize and develop an understanding of the impact of Physics on society and apply conceptual understanding of the physics in real life.

Course Outcomes

1) The syllabi are framed in such a way that it bridges the gap between the plus two and 11th levels of Physics by providing a more complete and logical framework in almost all areas of basic Physics.

2) By the end of the first year (2nd semester), the students should have attained a common level in basic mechanics, Optics, Heat and Thermodynamics and Electricity and Magnetism. They were developed their experimental and data analysis skills through experiments at laboratories.

3) Students should have been introduced to powerful tools for tackling a wide range of topics in, Modern Physics, General Electronics, Mathematical and Statistical Physics and Solid State Physics They develop their experimental and data analysis skills through a wide range of experiments through practical at laboratories.

4) Students should have developed their understanding of core Physics by covering a range of topics in almost all areas of physics including Classical and Quantum Mechanics, Electrodynamics, Laser, Fiber optics, semiconductor devices and Non-conventional Energy

Contents (Theory)

Unit -1   **Hrs/week**

UNITS AND MEASUREMENTS   **06**
Need of Measurement in engineering and science, unit of a Physical quantity, requirements of standard unit, systems of units-CGS, MKS and SI,classification of physical quantities- Fundamental and Derived with their units. Accuracy, Precision of instruments, Errors in measurement, Estimation of errors - Absolute error, Relative error and percentage error, significant figures. (Simple Problems). Basic Measuring instruments –Vernier Calliper, Micrometre screw gauge, inner & outer calliper thermometer, speedometer, ammeter, voltmeter with their least count, range, accuracy and precision. Standard reference surfaces used in engineering measurements- surface plate, angle plate, V- block, Engineer's square.

Unit -2   **08**
Elasticity : Deforming force, Restoring force, Elastic and plastic body, Stress and strainwith their types, Hooke's law, Stress strain diagram, Young's modulus, Bulk modulus, Modulus of rigidity and relation between them(no derivation), (simple problems). (Simple problems). Stress strain diagrams of H.T. Steel, Cast iron, Aluminium and Concrete,Ultimate and breaking stress, Factor of safety.
Surface Tension: Forces—cohesive and adhesive, angle of contact, shape of liquid
surface in a capillary tube, capillary action
GENERAL PROPERTIES OF MATTER
with examples, relation between surface tension, capillary rise and radius of capillary (no derivation), (simple problem), effect of impurity and temperature on surface tension.
2.3 Viscosity : Velocity gradient, Newton's law of viscosity, coefficient of viscosity, streamline and turbulent flow, critical velocity, Reynolds's number, (simple problems),Stokes law and terminal velocity (no derivation), buoyant (up thrust) force, effect of temperature & adulteration on viscosity of liquid.

Unit – 3   **06**
HEAT
Transmission of heat and expansion of solids: Three modes of transmission of heat - conduction, convection and radiation, good and bad conductor of heat with examples, law ofthermal conductivity, coefficient of thermal conductivity (simple problems), expansion of solids-linear, aerial and cubical and relation between them.
Gas laws and specific heats of gases: Boyle's law, Charles's law, Gay Lussac's law, absolute temperature, Kelvin scale of temperature, general gas equation(no derivation) (simple problems), molar or universal gas constant, universal gas equation, standard or normal temperature and pressure (N.T.P.), specific heat of gases, relation between twospecific heat (simple problems), thermodynamic variables, first law of thermodynamics (statement & equation only), isothermal, isobaric, isochoric & adiabatic processes (difference among these processes and equations of state) (simple problems).

Unit – 4   **08**
LIGHT
Properties of light: Reflection and refraction, Snell's law, physical significance of refractive index (simple problems), Total internal reflection, dispersion, diffraction andpolarization of light (only introduction).
Wave theory of light & Interference: Newton's corpuscles theory of light, Huygens'swave theory, wave front, Types of wave front-spherical, cylindrical and plane Huygens's principle of propagation of wave front, Principle of superposition of waves, Interference of light, constructive and destructive interference, Young's experiment. Analytical treatment of interference, conditions for stationary interference pattern.
Laser: Light amplification by stimulated emission of radiation, properties of laser, spontaneous and stimulated emission, population inversion, pumping methods, He-Ne laser-construction & working, recording and reconstructing of hologram by using He-Ne laser.

Unit – 5   **05**

MODERNPHYSICS

Photo electricity : Plank's hypothesis, properties of photons, photo electric effect, lawsand characteristics of photoelectric effect, Einstein's photoelectric equation,(simple problems), construction and working of photoelectric cell, applications of photoelectric cell.

X-rays: Production of X-rays, types of X-ray spectra-continuous and characteristics, X- ray wavelength (simple problems), properties of X-rays, applications of X-rays-engineering,medicine and scientific research work.

Total -   **33**

Text/Reference Books :-

Titles of the Book	Name of Authors.	Name of the Publisher
Physics –I	V. Rajendran	Tata McGraw- Hill raw- Hill publication, New Delhi
Applied Physics	Arthur Beiser.	Tata McGraw- Hill raw- Hill publication, New Delhi
Engineering. Physics	R.K. Gaur & S.L. Gupta.	Dhanpat Rai Publication, New Delhi.
Physics	Resnick and Halliday	-

Basic Chemistry (DIP102)

Programme Specific Outcome

- ✓ Inorganic Chemistry
- ✓ Methodology and Perspectives of Sciences and General Informatics
- ✓ Organic Chemistry
- ✓ Physical Chemistry
- ✓ Practical papers– Inorganic, Volumetric, Organic, Physical and Gravimetric experiments

Programme outcome:

Chemistry introduces basic concepts, experimental techniques and applications of chemical sciences and introduces cheminformatics, Green chemistry and micro analytical techniques.

CONTENTS &THEORY

	Hrs/week
Unit -1	**05**

Atomic Structure : Definition of Atom, Fundamental Particles of Atom – their Mass, Charge,Location, Definition of Atomic no, Atomic Mass no., Isotopes & Isobars, & their distinction with suitable examples, Bohr's Theory, Definition, Shape & Distinction between Orbits & Orbitals, Hund's Rule, Filling Up of the Orbitals by Aufbau's Principles (till Atomic no.30), Pauli's exclusion principle, Valency – Definition, types (Electrovalency & Covalency),Distinction, Octet Rule, Duplet Rule, Formation of Electrovalent & Covalent Compounds e.g. Nacl, $CaCl_2$, MgO, $AlCl_3$, CO_2, H_2O, Cl_2, NH_3, C_2H_4, N_2,C_2H_2.

Unit -2   **06**

Electrochemistry : Definition Ionisation & Electrolytic Dissociation, Arrhenius Theory of Ionisation, Significance of the Terms Involved in Electrolysis. Such as Conductors, Insulators or Dielectrics, Electrolyte, Non Electrolyte, Electrolysis, Electrolytic Cell, Electrodes, Current Density, Temperature, Mechanism of Electrolysis – Primary & Secondary Reactions at Cathode & Anode, Electrochemical Series for Cations& Anions, Electrolysis of $CuSO_4$ Solution by using Cu Electrode & Platinum Electrode, Electrolysis of NaOH solution & fused NaCl, Faraday's first & second law of Electrolysis & Numericals, Electrochemical Cells & Batteries, Definition, Types (Primary & Secondary Cells), e.g. Construction, Working & Applications of Dry Cell / Laclanche Cell & Lead – Acid Storage Cell, Applications of Electrolysis such as Electroplating & Electro refining, Electrometallurgy & electrotyping Conductivity of Electrolyte – Ohms Law, Definition & Units of Specific Conductivity, Equivalent Conductivity, specific resistance.

Unit -3   **08**

Metals & Alloys Metals : Occurrence of Metals, Definition Metallurgy, Mineral, Ore, Gangue, Flux & Slag, Mechanical Properties, Processing of Ore, Stages ofExtraction of Metals from its Ores in Detail i.e. Concentration, Reduction, refining. Physical Properties & Applications of some commonly used metals such as Fe, Cu, Al, Cr, Ni,Sn, Pb, Zn, Co, Ag, W.

Alloys: Definition of Alloy, Purposes of Making alloy Preparation Methods, Classification ofAlloys such as Ferrous & Non Ferrous, examples. Composition, Properties & Applications of Alnico, Duralumin, Dutch Metal, German Silver / Nickel Silver, Gun Metal, Monel metal, Wood'sMetal, Babbitt Metal.

Unit -4   **04**

Non Metallic Materials Plastics : Definition of Plastic, Formation ofPlastic by Addition & Condensation Polymerisation by giving e.g. of Polyethylene & Backelite plastic Respectively, Types of Plastic, Thermo softening& Thermosetting Plastic, with Definition, Distinction &e.g.

Compounding ofPlastics – Resins, Fillers, Plasticizers, Accelerators, Pigments, Engineering Applications of Plastic based on their Properties.

Rubber: Natural Rubber: Its Processing, Drawbacks of Natural Rubber, Vulcanisation ofRubber with Chemical Reaction. Synthetic Rubber: Definition, & e.g., Distinction Between Natural & Synthetic Rubber.

Thermal Insulating Materials: Definition, Characteristics & Applications of Glass, Wool,Thermocole, Asbestos, Cork.

Unit –5   **09**

Environmental Effects (Awareness Level): Introduction, Definition, Causes of Pollution,Types of Pollution, Such as Air & Water Pollution.

Air Pollution : Definition, Types of Air Pollutions their Sources & Effects, Such as Gases, Particulates, Deforestation, Radio Active Gases, Control of Air Pollution, Air Pollution Due toInternal Combustion Engine & Its Control Methods, Causes & Effects of Ozone Depletion & Green House Effects**.**

Water Pollution : Definition, Causes & Methods of Preventing Water Pollution, Types ofWaste such as Domestic Waste, Industrial Waste, their Physical & Biological Characteristics, BOD, COD, Biomedical Waste & E–Waste, their Origin, Effects & Control Measures. PreventiveEnvironmental Management (PEM) Activities.

Total   **32**

Text/Reference Books:-

Titles of the Book	Name of Authors.	Name of the Publisher
Engineering Chemistry	Jain & Jain	DhanpatRai and Sons
Engineering Chemistry	S.S. Dara	S. Chand Publication
Industrial Chemistry	B.K. Sharma	Goel Publication
Environmental Chemistry Pollution Control.	S.S. Dara	S. Chand Publication

Basic Mathematics (DIP103)

PROGRAMME OUTCOME

Formulate and develop mathematical arguments in a logical manner. Also when there is a need for information, the student will be able to identify, locate, evaluate, and effectively use that information for handling issues or solving problems at hand. Acquire good knowledge and understanding in advanced areas of mathematics and its applications.

PROGRAMME SPECIFIC OUTCOME

Will be able to apply critical thinking skills to solve problems that can be modelled mathematically, to critically interpret numerical and graphical data, to read and construct mathematical arguments and proofs, to use computer technology appropriately to solve problems and to promote understanding, to apply mathematical knowledge to a career related to mathematical sciences thus cultivating a proper attitude for higher learning in mathematics.

Contents (Name of Topics)

Hrs/week

Unit -1   **14**
ALGEBRA REVISION:
Laws of Indices
Formula of factorization and expansion ((a^2-b^2), $(a+b)^2$ etc.)
Laws of logarithm with definition of Natural and Common logarithm.

1.2 PARTIAL FRACTION :
1.21 Definition of polynomial fraction proper & improper fractions and definition of partial fractions.
To Resolve proper fraction into partial fraction with denominator containing non repeated linear factors,
repeated linear   factors and irreducible non repeated quadratic factors.
To resolve improper fraction into partial fraction.

DETERMINANT AND MATRICES:
Determinant-- 4Marks
Definition and expansion of determinants of order 2 and3. Cramer's rule to solve simultaneous equations in 2 and 3 unknowns.
Matrices--------------------------------------11Marks
Definition of a matrix of order m x n types of matrices.
Algebra of matrices such as equality, addition, Subtraction, scalar multiplication andmultiplication. Transpose of a matrix. Minor, cofactor of an element of a matrix, adjoint of matrix and inverse ofmatrix by adjoint method.
 Solution of simultaneous equations containing 2 and 3unknowns by matrix inversion method.
BINOMIAL THEOREM:
Definition of factorial notation, definition of permutation and combinations withformula. Binomial theorem for positive index. General term. Binomial theorem for negative index. Approximate value (only formula)

Unit -2   **14**
TRIGONOMETRY.
REVISION:
Measurement of an angle (degree and radian). Relation Between degree and radian.
2.1.2 Trigonometric ratios of 0^0 , 30^0 , 45^0 etc.

2.1.3 Fundamental identities.

2.2 TRIGONOMETRIC RATIOS OF ALLIED, COMPOUND, MULTIPLE & SUBMULTIPLEANGLES
(Questions based on numerical computations, which can also be done by calculators, neednot be asked particularly for allied angles).
2.3   FACTORIZATION AND DEFACTORIZATION FORMULAE: INVERSE TRIGONOMETRIC RATIOS:
Definition of inverse trigonometric ratios, Principal values of Inversetrigonometric ratios. Relation between inverse trigonometric ratios.

PROPERTIES OF TRIANGLE
Sine, Cosine, Projection and tangent rules (without proof) Simple problems.

Unit -3   **14**
COORDINATE GEOMETRY
POINT AND DISTANCES:
 Distance formula, Section formula, midpoint, centroid of triangle. Area of triangle and condition of collinearity.

STRAIGHT LINE:
 Slope and intercept of straight line. Equation of straight line in slope point form, slope-intercept form, two-point form,two- intercept form, normal form. General equation of line. Angle between two straight lines condition of parallel and perpendicularlines. Intersection of two lines. Length of perpendicular from a point on the line and perpendicular distancebetween parallel lines.

CIRCLE:

Equation of circle in standard form, Centre – radius form, diameter form, two –intercept form. General equation of circle, its Centre and radius.

Unit-4   **08**

VECTORS

4.1 Definition of vector, position vector, Algebra of vectors (Equality, addition, subtraction and scalar multiplication) 4.2 Dot (Scalar) product with properties.

4.3 Vector (Cross) product with properties.

Applications

Work done and moment of force about a point &line

Total-   **50**

Text/Reference Books:-

Titles of the Book	Name of Authors.	Name of the Publisher
Mathematics for Polytechnic	S.P. Deshpande	Pune Vidyarthi Griha
Trigonometry	S.L. Lonely	S. Chand Publication
Higher Algebra	H.S. Hall & S.R. Knight	Metric edition, Book Palace, New Delhi
College Algebra	Frc. G. Valles	Charotar Publication

Communication Skill-I (DIP104)

Course Objectives:
1. To make the students confident of speaking in English impeccably and with utmost enthusiasm.
2. To familiarize the students with different styles of communication.
3. To enlighten the students with the seven concepts of communication.
4. To make the students understand the nuances of communication.
5. To train the students and make them comprehend various aspects of Interview skills.

Course Outcomes:
At the end of the course, the students would be able to:
1. Develop knowledge, skills, and judgment around human communication that facilitate their ability to work collaboratively with others.
2. Understand and practice different techniques of communication.
3. Practice and adhere to the 7Cs of Communication.
4. Familiarize with different types of Communication.
5. Understand and practice Interview Etiquettes.

Contents : Theory

	Hrs/week
Unit -1	**08**

Introduction: Definition, Objectives, Stages of Communication, Essentials of Good/Effective Communication, Benefits of Good Communication, Gaps in Communication, Communication and Information Technology. Business Correspondence: Structure of a Letter, Inquiry Letter, Sales Letter, Order Letter, Complaints, Complaint Handling, Telemarketing.

Unit -2	**08**

Government Correspondence: Noting, Routine Letter, Demi-Official Letter Memorandum, Circular, Telegrams, Newsletter. Writing Skills: Report Writing, Scientific Paper Writing, Writing SmallParagraphs & Essays.

Unit -3	**05**

2-3classic short stories, 2-3 great short stories by Indian writers. Preparation for Job: Writing Applications for Jobs, Preparing Curriculum Vitae, Preparing for Interviews, Preparing for Group Discussions.

Unit -4	**07**

Grammar:
Sentence Structure, Idiomatic Usage of Language, Tenses, Direct & Indirect Parts of Speech, Active & Passive Voice, Vocabulary

Unit -5	**08**

Preparation for Job:
Writing Applications for Jobs, Preparing Curriculum Vitae, Preparing for Interviews, Preparing for Group Discussions.

Total-	**36**

Text Books and Reference Book:

Titles of the books	Name of the Author	Name of the Publisher
Organizations - Structures,Processes and Outcomes	Richard h Hall	Prentice Hall India
English for the Secretary	Yvonne Hoban	Tata McGraw Hill
Technical Communication	M. Raman & S. Sharma	Oxford University Press
Business Communication Process and Product	M.E. Guffey	Thomson Learning

Engg. Graphics (DIP105)

COURSE OBJECTIVES:
1. To improve imagination skills.
2. Increase ability to communicate with people.
3. Learn to sketch and take field dimensions.
4. Learn to take data and transform it into graphic drawings.
5. Learn basic engineering drawing formats.
6. Prepare the student for future Engineering positions.

COURSE OUTCOMES:
At the end of course the student will be able to:
1. Get acquainted with the knowledge of various lines, geometrical constructions and construction of various kinds of scales, and Ellipse.
2. Improve their imagination skills by gaining knowledge about points, lines and planes.
3. Become proficient in drawing the projections of various solids.
4. Gain knowledge about orthographic and isometric projections.

CONTENTS & THEORY

Hrs/week

Unit -1   05
Drawing Instruments and their uses :
Letters and numbers (single stroke vertical)
   Convention of lines and their applications.
   Scale (reduced, enlarged & full size) plain scale and diagonal scale.
   Sheet layout.
Introduction to CAD (Basic draw and modify Command).
Geometrical constructions.

Unit -2   09
Engineering
2.1 **curves & Loci of Point: To drawan ellipse by :**

2.1.10 Directrix and focus method

2.1.2 Arcs of circle method.

2.1.3 Concentric circles method.

2.2 **To draw a parabola by :**

2.2.1 Directrix and focus method

2.2.2 Rectangle method

2.3 **To draw a hyperbola by :**

2.3.1 Directrix and focus method

    2.3.2 passing through given points with reference toasymptotes.
    2.3.3 Transverse Axis and focus method.
    2.4 **To draw involutes of circle & polygon (up to hexagon)**
    2.5**:** To draw a cycloid, 21 picycloids, hypocycloid To draw Helix&spiral.
    2.6 Loci of Points:
    2.7 Loci of points with given conditions and examples related to simplemechanisms.
    2.7.1

Unit – 3   06
Orthographic projections :
Introduction to Orthographic projections.
Conversion of pictorial view into Orthographic Views (First Angle Projection MethodOnly).
Dimensioning technique as perSP-46.

Unit – 4   05
Isometric projection :
Isometric scale.
Conversion of orthographic views into isometric View/projection (Simple objects)
Projection of Straight Lines and Planes (First Angle Projection Method only).

Unit – 5   07
Lines inclined to one reference plane only and limited to both ends in one quadrant.
Projection of simple planes of circular, square, rectangular, rhombus, pentagonal, and hexagonal,
inclined to one reference plane and perpendicular tothe other.

Total-   32

Text/Reference Books:-

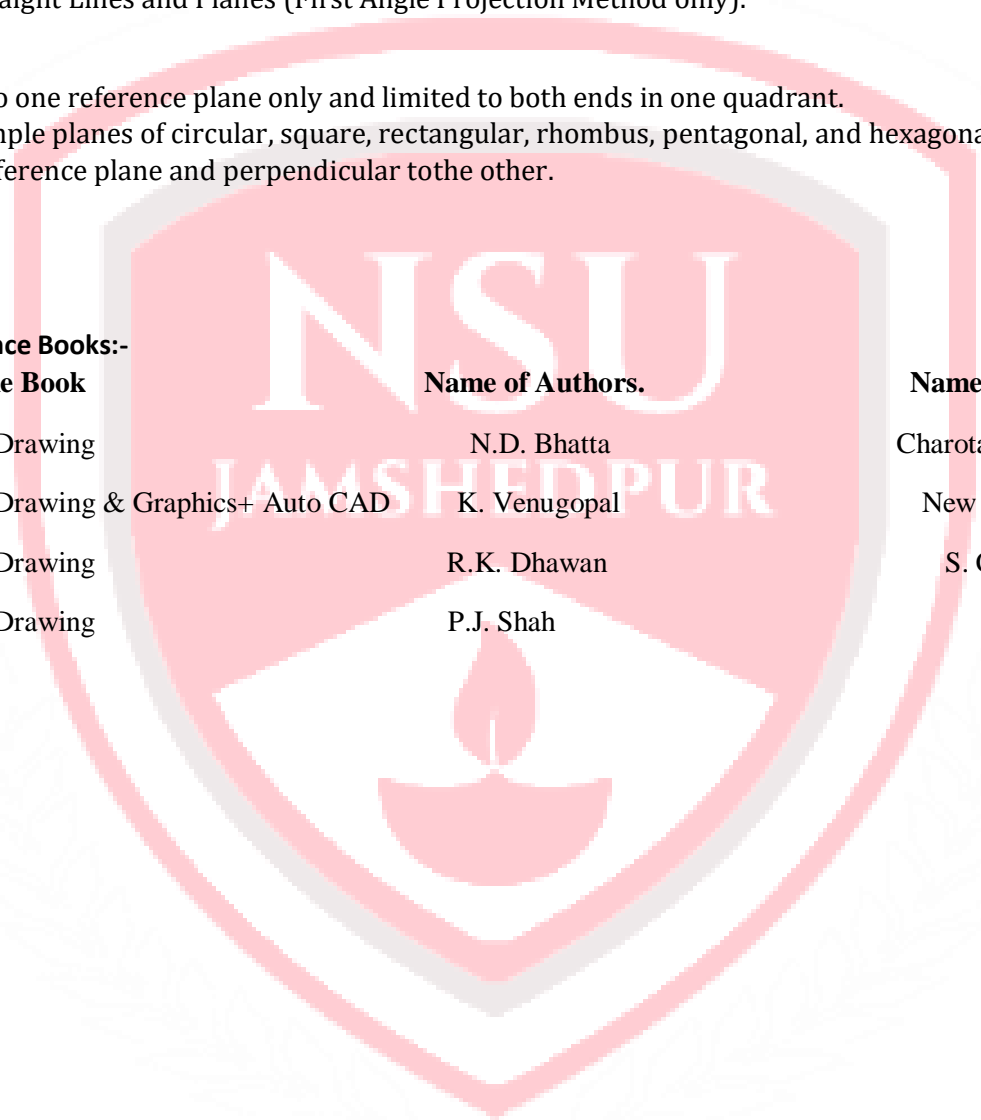| Titles of the Book	Name of Authors.	Name of the Publisher
Engineering Drawing	N.D. Bhatta	Charotar Publishing House
Engineering Drawing & Graphics+ Auto CAD	K. Venugopal	New Age Publication
Engineering Drawing	R.K. Dhawan	S. Chand Co.
Engineering Drawing	P.J. Shah	

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Computer Fundamentals (DIP106)

Objectives:
- To understand basics of computer and working with OS
- To develop working skills with productivity tools, graphics designing and Internet.
- To acquire basic programming skills.
- To apply computing in problem solving.

Course Outcomes
- After successfully completing this course, a student will be able to:
- Converse in basic computer terminology
- Formulate opinions about the impact of computers on society
- Possess the knowledge of basic hardware peripherals
- Know and use different number systems and the basics of programming

CONTENTS & THEORY

Hrs/week

Unit -1   **08**

Evolution of computer, Data and Information, Characteristics of computers, Various fields of application of computers, various fields of computer   (Hardware, Software, Human ware and Firmware), Advantages and Limitations of computer, Block diagram of computer, Function of different units of computer, Classification of computers Types of software (System and Application), Compiler and Interpreter, Generation of language (Machine Level, Assembly, High Level,4GL).

Unit -2   **08**

Computer Memory: & **Number System (Logic gates)** Primary Memory (ROM and it's type– PROM, EPROM, EEPROM, RAM) Secondary memory- SASD, DASD Concept, Magnetic Disks– Floppy disks, Hard disks, Magnetic Tape, Optical disks – CD ROM and it's type (CD ROM,CD ROM-R, DVD, Flash Memory. Introduction to Number System, Conversion of Number System, Signed and Unsigned Numbers, Binary Coding, Logic gates, Boolean algebra, Combination of Logic Gates.

Unit -3   **05**

Operating System Concept: Introduction to operating system; Function of OS, Types of operating systems, Booting Procedure,   Start-up sequence, Dos – History, Files and Directories, Internal and External Commands, Batch Files

Unit -4   **07**

Editors and Word Processors 5 Basic Concepts: MS-Word, Introduction to desktop publishing **Spreadsheets and Database packages:** Purpose, usage, commands - MS-Excel Creation of files in MS-Access, MS –PowerPoint

Unit -5   **08**

Concept of Data Communication and Networking: Networking Concepts, Types of networking (LAN, MAN AND WAN), Communication Media, Mode of Transmission (Simplex, Half Duplex, Full Duplex), Analog and Digital Transmission. Synchronous and Asynchronous Transmission,
Different Topologie

Total-   **36**

Text Books:

Titles of book	Name of Author	Name of Publisher
Microsoft Office-2000 Complete		BPB Publication
Foundations of Computing,	Sinha, Kr. Pradeep and Preeti Sinha	BPB Publication
Computers and Beginners	Jain, V.K	

SEMESTER -2									
THEORY		**PERIOD**			**Evaluation Scheme**				
SUBJECT CODE	**NAME OF THE PAPER**	**LECTURES**	**TUTORIALS**	**PRACTICALS**	**MSE**	**ESE**	**SUB-TOTAL**	**Credit**	**Hours**
DIP201	**Communication Skills-II**	3	1	0	30	70	100	4	4
DIP202	**Engg. Mathematics-I**	3	1	0	30	70	100	4	4
DIP203	**Applied Science**	4	0	0	30	70	100	4	4
DIP204	**Engg. Mechanics**	4	0	0	30	70	100	4	4
DIP205	**Engg. Drawing**	2	0	2	30	70	100	4	4
DIP206	**Basic Workshop Practice**	0	0	4	30	70	100	4	4
DIP207L	**ED LAB**	0	0	2	15	35	50	2	2
DIP208L	**CHEM LAB**	0	0	2	15	35	50	2	2
							Total Credits:	**28**	

COMMUNICATION SKILLS-II (DIP201)

COURSE OBJECTIVES:

1. Ability to be comfortable with English in use while reading or listening.
2. Ability to use receptive skills through reading and listening to acquire good exposure to language and literature.
3. Ability to write and speak good English in all situations.
4. Students should develop style in speech and writing and manipulate the tools of language for effective communication.
5. The course should provide exposure to the learners in Good Prose texts and Poems and expose the learners to value based ideas.

COURSE OUTCOMES:

1. Students can read and understand any text in English listening to the inputs given by the teacher in the classroom.
2. Students imbibe the rules of language unconsciously and tune to deduce language structure and usage.
3. Students write paragraphs, essays, and letters.
4. Students decipher the mechanism of language and use it for success in competitive examinations and job related speaking and writing tasks.

CONTENTS & THEORY

Name of the Topic   Hrs/Week

Unit -1   08
Introduction to communication :
Definition , Communication Cycle/Process,
The elements of communication: sender-message-channel- Receiver -Feedback & Context.Definition of
Communication   Process. Stages in the process: defining the context, knowing the audience, designing them message,
encoding, selecting proper channels, transmitting, receiving, decoding and giving feedback.

Unit -2   04
Types of communication :
2.1 Formal- Informal, Verbal- Nonverbal, Vertical- Horizontal- Diagonal.

Unit -3   **06**

Principals of effective communication :

Definition of Effective Communication. Communication Barriers & how to overcome them. Developing effective messages: Thinking about purpose, knowing the audience, structuring themessage, selecting proper channels, minimizing barriers & facilitating feedback.

Unit -4   **06**

Non verbal- graphic communication:

 4.1Noun-verbal codes: A-Kinesics, B-Proxemics, C-Haptics D-Vocalics ,E-Physicalappearance. F-Chronemics, G-Artifacts Aspects of Body Language Interpreting Visuals & illustrating with Visuals like Tables, Charts & graphs.

Unit -5   **06**

Formal written skills :

Office Drafting: Circular, Notice, and Memo. Job Application with resume.

Business correspondence: Enquiry, Order letter, Complaint letter, and Adjustment letter.

Report writing: Accident report, fall in production, Progress/ Investigative. Defining &describing objects & giving   Instructions.

Total-   **30**

Text/Reference Books :-

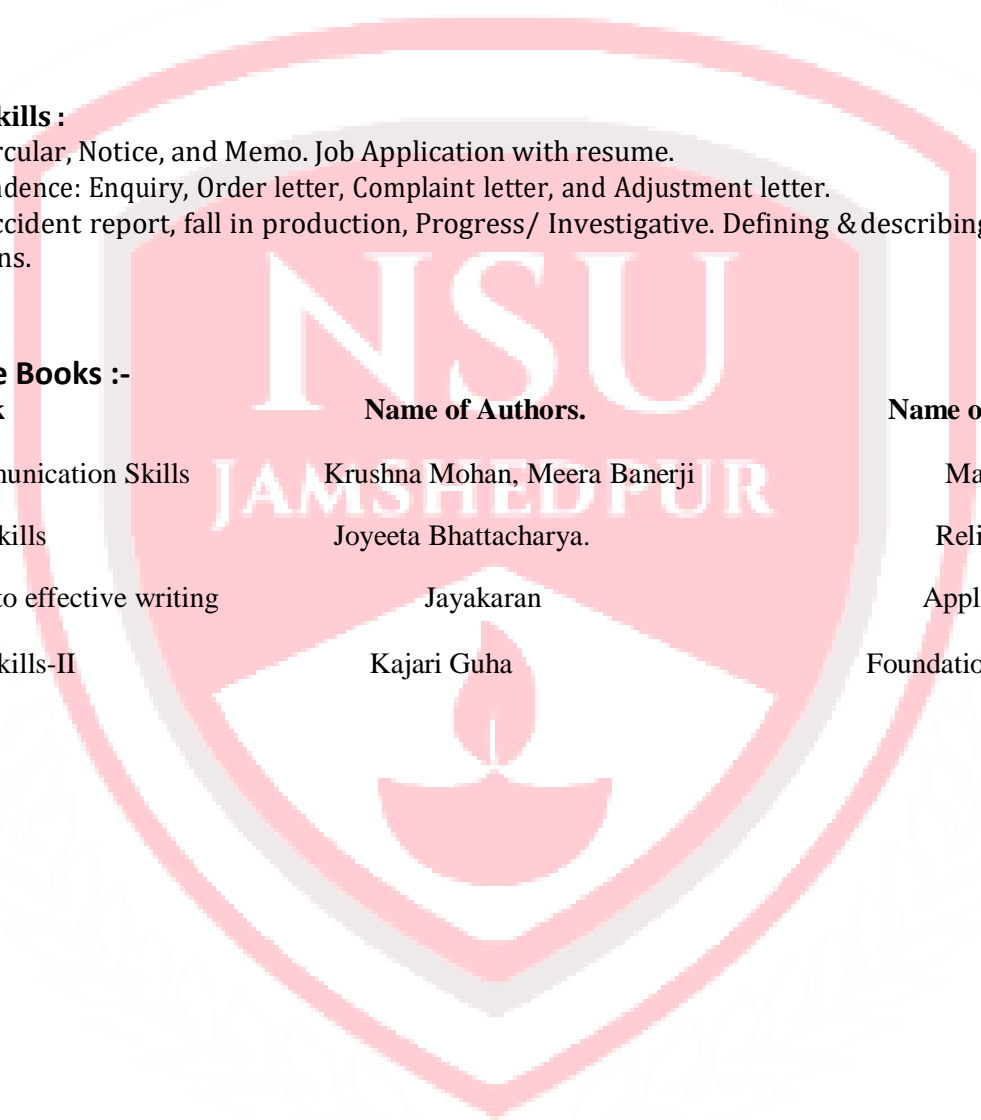| Titles of the Book	Name of Authors.	Name of the Publisher
Developing Communication Skills	Krushna Mohan, Meera Banerji	Macmillan
Communication Skills	Joyeeta Bhattacharya.	Reliable Series
Every ones guide to effective writing	Jayakaran	ApplePublishing
Communication Skills-II	Kajari Guha	Foundation Publishing House

Engg. Mathematics-I (DIP202)

Course Objectives:

• To recall and remember basics of matrices, complex numbers, and differential calculus.

• To understand the concepts of basic mathematical methods for matrices, complex numbers and differential calculus.

• To apply methods to solve engineering problems.

• To analyze engineering problems and evaluate.

• To solve and evaluate the problems using matrices, complex numbers, and differential calculus. Course

Outcomes:

• Students will be able to remember terminologies and formulae in matrices, complex numbers, and differential calculus.

• Students will be able to understand and interpret the concepts of matrices, complex numbers, and differential calculus.

• Students will be able to compare and analyze the methods in matrices, complex numbers, and differential calculus.

• Students will be able to predict and evaluate the problems in matrices, complex numbers, and differential calculus.

Contents theory

Hrs/week

Unit -1   06

Function and Limit :

Function

Definitions of variable, constant, intervals such as open, closed, semi-open etc.
Definition of Function, value of a function and types of functions, Simple Examples.

Limits

Definition of neighborhood, concept and definition limit.
Limits of algebraic, trigonometric, exponential and logarithmic functions with simple examples.

Unit -2   12

Derivatives :

Definition of Derivatives, notations. Derivatives of Standard Functions

Rules of Differentiation. (Without proof). Such as Derivatives of Sum or difference, scalarmultiplication, Product and quotient. Derivatives of composite function(Chain rule) Derivatives of inverse and inverse trigonometric functions. Derivatives of Implicit Function Logarithmic differentiation Derivatives of parametric Functions. Derivatives of one function w.r.t another function Second order Differentiation.

Unit - 3   12

Statistics And Probability :

Statistics

Measures of Central tendency (mean, median, mode) for ungrouped andgrouped frequency distribution. Graphical representation (Histogram and Ogive Curves) to find mode and median. Measures of Dispersion such as range, mean deviation, Standard Deviation,Variance and coefficient of variation. Comparison of two sets of observations.

Probability

Definition of random experiment, sample space, event, Occurrence of event andtypes of events (impossible, mutually   exclusive, exhaustive, equally likely).

Definition of Probability, addition and multiplication theorems of Probability

Unit - 4   **09**

Applications Of Derivative

Geometrical meaning of Derivative, Equation of tangent and Normal.
Rates and Motion Maxima and minima Radius of Curvature

Complex number

Definition of Complex number. Cartesian, polar, Exponential forms of Complexnumber.
Algebra of Complex number(Equality, addition, Subtraction, Multiplication andDivision)
De-Moivre's theorem (without proof) and simple problems. Euler's form of
Circular functions, hyperbolic functions and relations between circular & hyperbolicfunctions

Unit - 5   **06**

Numerical Solution of Algebraic Equation

Bisection method, Regula-Falsi method and Newton- Raphson method.

5.2 Numerical Solution of Simultaneous Equations

5.3 Gauss elimination method Iterative methods-Gauss Seidal and Jacobi's method

Total-   **45**

Text/Reference Books :-

Titles of the Book	Name of Authors.	Name of the Publisher
Mathematics for Polytechnic	S.P. Desh Pande	Pune Vidyarthi Griha Prakashan Pune.
Calculus single Variable	Robert T Smith	Tata McGraw Hill
Advanced Engineering Mathematics	Dass H.K.	S. Chand Publication, New Delhi
Fundamentals of Mathematical Statistics	S.C. Gupta and Kapoor	S. Chand Publication New Delhi

Applied Science (DIP203)

PHYSICS

Programme Specific outcomes

1) After completion of program, students have deep knowledge of basic concepts in Physics.

2) Students are expected to acquire core knowledge in Physics, including the major premises of Mechanics and Properties of matter, Modern Physics, Classical and Quantum mechanics, Electricity and Magnetism, Digital Electronics, Optics, Relativity, Heat and Thermodynamic, Solid State Physics, Mathematical and Statistical physics, Atomic, Molecular and Nuclear Physics, Laser and nonconventional energy sources.

3) Students are also expected to develop written and oral communication skills in communicating physics-related topics.

4) Students should learn how to design and conduct an experiment and understand the basic physics behind it.

5) Students will develop the proficiency in the handling of laboratory instruments.

Course Outcomes

1) The syllabi are framed in such a way that it bridges the gap between the plus two and 11th levels of Physics by providing a more complete and logical framework in almost all areas of basic Physics.

2) By the end of the first year (2nd semester), the students should have attained a common level in basic mechanics, Optics, Heat and Thermodynamics and Electricity and Magnetism. They were developed their experimental and data analysis skills through experiments at laboratories.

3) Students should have been introduced to powerful tools for tackling a wide range of topics in, Modern Physics, General Electronics, Mathematical and Statistical Physics and Solid State Physics They develop their experimental and data analysis skills through a wide range of experiments through practical at laboratories.

Contents

	Hrs/week

Unit-1   07

Kinematics

Rectilinear Motion

Equations of Motions- $v = u+at$, $S = ut+1/2at^2$, $V^2 = u^2+2as$ (only equation), Distance traveled by particle in n^{th} second, Velocity Time Diagrams-uniform velocity, uniform acceleration and uniform retardation, equations of motion for motion under gravity.

Angular Motion

Definition of angular displacement, angular velocity, angular acceleration, Relation between angular velocity and linear   velocity, Three equations of circular motion (no derivation) angular distance traveled by particle in n^{th}second(only equation),Definition of S.H.M. and S.H.M. as projection of uniform circular motion on any one diameter, Equation of S.H.M. and Graphical representation of displacement, velocity, acceleration of particle in S.H.M. for S.H.M. starting from mean position and from extreme position.

Kinetics

Definitions of momentum, impulse, impulsive force, and Statements of Newton's laws of motion and with equations, Applications of laws of motion—Recoil of gun, Motion of two connected bodies by light inextensible string passing over smooth pulley, Motion of lift.

Unit-2   07

Work, Power, Energy

Definition of work, power and energy, equations for P.E. K.E., Work energy principle, Representation of work by using graph,   Work done by a torque (no derivation).

Unit -3   05

Non-destructive testing of Materials.

Testing methods of materials -Destructive and Nondestructive, Advantages and Limitations of N.D.T., Names of N.D.T.   Methods used in industries, Factors on Which selection of N.D.T. dependents, Study of Principle, Setup, Procedure. Working, Advantages, limitations, Applications and Application code of following N.D.T. methods -Penetrant method, Magnetic particle method, Radiography, Ultrasonic, Thermography.

Unit -4   05

Acoustics and Indoor Lighting of Buildings
Acoustics
Weber and Fetcher's law, limit of intensity and loudness, echo, Reverberation and reverberation time (Sabine's formula) ,Timbre (quality of sound), Pitch or Frequency of sound. Factors affecting Acoustical planning of auditorium-- echo, reverberation, creep, focusing,standing wave, coefficient of absorption, sound insulation, noise pollution and the different ways of controlling these factors.

Indoor lighting
Definition of luminous intensity, intensity of illumination with their SI units, Inverse squarelaw and Photometric equation, Bunsen's photometer—ray diagram, working and applications, Need of indoor lighting, Indoor lighting schemes and Factors Affecting Indoor Lighting.
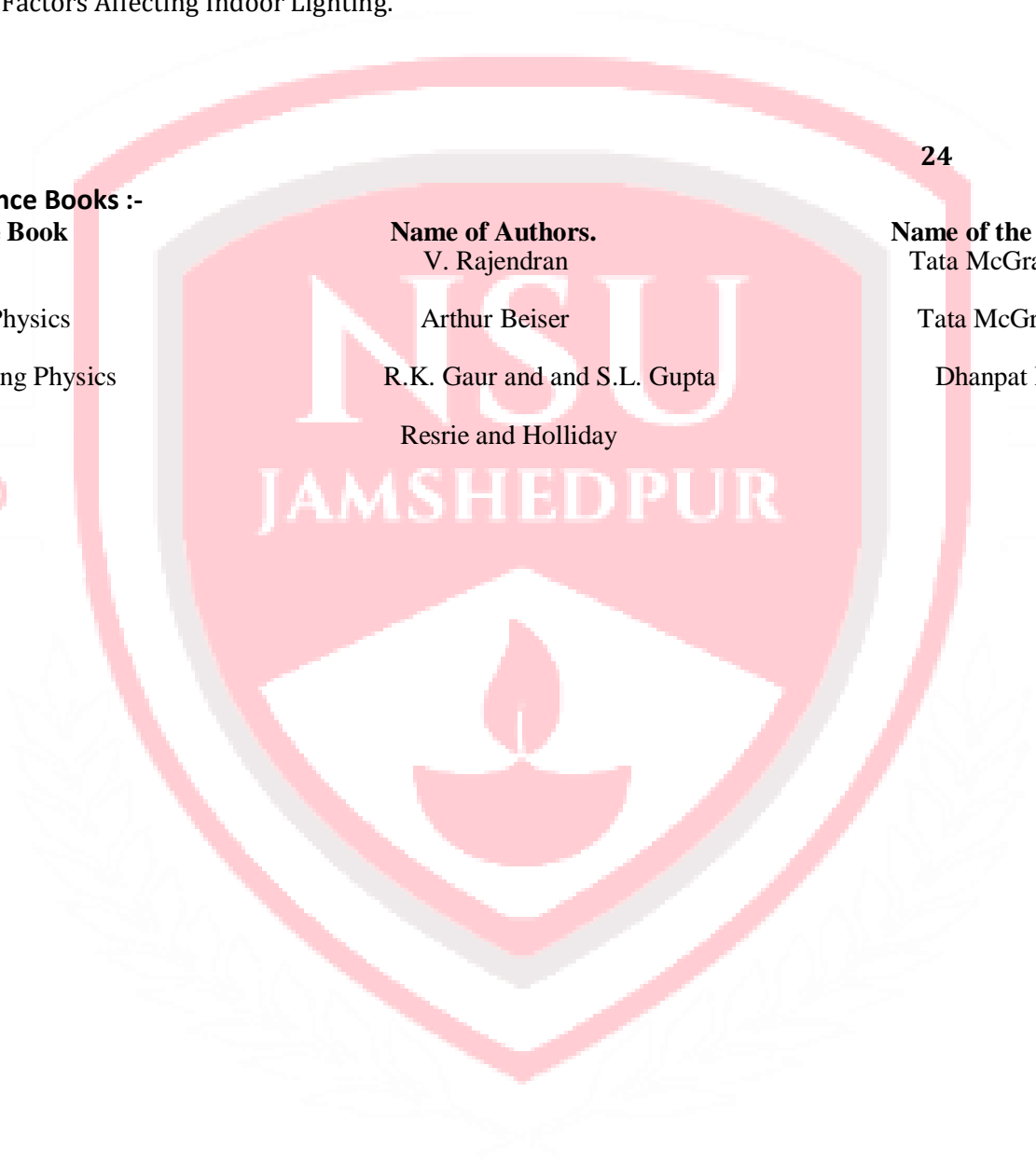
Total-   **24**

Text/Reference Books :-

Titles of the Book	Name of Authors.	Name of the Publisher
(i) Physics –I	V. Rajendran	Tata McGraw – Hill
(ii) Applied Physics	Arthur Beiser	Tata McGraw – Hill
(iii) Engineering Physics	R.K. Gaur and and S.L. Gupta	Dhanpat Rai
(iv) Phyiscs	Resrie and Holliday	

CHEMISTRY

Programme Specific Outcome

- Inorganic Chemistry

- Methodology and Perspectives of Sciences and General Informatics

- Organic Chemistry

- Physical Chemistry

- Practical papers– Inorganic, Volumetric, Organic, Physical and Gravimetric experiments

Programme outcome:
Chemistry introduces basic concepts, experimental techniques and applications of chemical sciences and introduces cheminformatics, Green chemistry and micro analytical techniques.

CONTENT & THEORY

	Hrs/Week

Unit -1   05

Electrochemistry

Definition of Electrolyte & Conductor, Difference between Metallic& Electrolytic Conduction, Ionisation, Degree of Ionisation& Factors Affecting Degree of Ionisation, Conductivity of Electrolytes. Definition of Electrochemical Cell, Battery, Charge, Discharge, Closed Circuit Voltage, Open Circuit Voltage, EMF, Internal Resistance, Separator, Classification of Batteries such as Primary, Secondary & Reserve with Examples.
Industrial Application of Electrolysis-Metallic or Protective Factors for Selection of Method of Coating, Process of Electroplating, Electro refining, Electrometallurgy (Applications of Electroplating), Impregnated Coating or Cementation on Base Metal Steel - Coating Metal Zn(Sheradizing), Cr(Chomozing), Al (Colorizing), Applications,
Advantages & Disadvantages.

Unit -2   05

Non Metallic Engineering Materials

(Plastic, Rubber, Insulators, Refractories, Composite Material, Ceramics)

Engineering Plastic:

Special Characteristics & Engineering Applications of Polyamides or Nylons,

Polycarbonates(Like Lexan, Merlan),Polyurethanes

(Like Perlon- U), Silicons, Polyacetals, Teflon, Laminated Plastic, Thermocole,Reinforced Plastic.

Ceramics:

Definition, Properties & Engineering Applications, Types-Structural Ceramics, Facing Material, Refractories, Fine Ceramics, Special Ceramics.

Refractories:

Definition, Properties, Applications & Uses of Fire Clay, Bricks, Silica Bricks.

Composite Materials:

Definition, Properties, Advantages, Applications & Examples.

Unit -3   08

Metals & Alloys Metals - Metallurgy of Iron, Terms Involved in Metallurgy, Indian Resourcesof Fe, Imp Ores, Extraction, Smelting in Blast Furnace, Chemical Reactions in Blast Furnace, Products of Blast Furnace, their Composition, Application, Commercial Forms of Iron, (Pig Iron/ Cast Iron, Wrought or Malleable Steel), their Composition, Properties & Applications, Types of Casting (Chilled Casting, CentrifugalCasting & Malleable Casting), Heat Treatment, Heat Treatment of Cast Iron &Steel.

Alloys - Definition, Types, Ferrous Alloys - Steel, Composition, Properties & Applications of

Plain Carbon Steel (Low Carbon, Medium Carbon, High Carbon & Very Hard Steel) & Alloy Steels, (Heat Resisting, Shock   Resisting, Magnetic, Stainless, Tool Steel & HSS), Effect of Various Alloying Elements (Cr, W, V, Ni, Mn, Mo, Si)etc. on Steel.

Non-Ferrous Alloys-Copper Alloy-Brass, Bronze, Nickel Silver or German Silver, their Composition, Properties & Applications, Aluminium Alloy-Duralumin, Bearing Alloy-Babbitt Metal, Solders- Soft Solder, Brazing Alloy, Tinamann's Solder, Nickel Alloy-Monel Metal, Low Melting Alloys-Woods Metal.

Unit -4   **06**
Corrosion Definition, Types, Atmospheric or Chemical Corrosion, Mechanism, Factors Affecting Atmospheric, Corrosion &   Immersed Corrosion or Electrochemical Corrosion, Mechanism, Protection of Metals by Purification of Metals, Alloy Formation, Cathode Protection, Controlling the External Conditions & Application of Protective Coatings i.e. Galvanising, Tinning,Metal Spraying, Sherardizing, Electroplating, Metal Clodding, Cementation or Diffusion Method, their Definition, Procedure, Uses, Advantages & Disadvantages, Examples of Non Corrosive Materials, Protection of Corrosion by the Use of Organic Coating Like Paint, Lacquer, Enamels, Emulsion Paints, Special Paints, their Properties &Uses. Special Paints - Heat Resistant, Cellulose Paint, Coaltar Paint, Antifouling Paint their constituents & applications.

Unit -5   **03**
Lubricant Lubricant, Types, Lubrication Mechanism by Fluid Film, Boundary, Extreme Pressure, Physical Characteristics of Lubricants Such as Viscosity,ViscosityIndex,Oilness,Volatility,Flash&FirePoint,Cloud& PourPoint,ChemicalCharacteristicssuchasAcidValueorNeutralization Number, Emulsification, Saponification Value, Selection of Lubricantsfor Various Types
of Machineries.

Total-   **27**
Text/Reference Books :-

Titles of the Book	Name of Authors.	Name of the Publisher
(i) Engineering Chemistry	Jain & Jain	Dhanpat Rai and Sons
(ii) Engineering Chemistry	S.S. Dara	S. Chand Publication
(iii) Industrial Chemistry	B.K. Sharma	Goel Publication

Engg. Mechanics (DIP204)

Course Objectives:

1. Understand the scalar representation of forces and moments.
2. Describe static equilibrium of particles and rigid bodies in two dimensions including the effect of friction.
3. Analyse the properties of surfaces and solids in relation to moment of inertia.
4. Illustrate the laws of motion, kinematics of motion and their relationship.
5. Study the mechanical vibration without and with damping of SODF and MDOF.

Course Outcomes:

After successful completion of this course, the students should be able to:

CO1: Construct free body diagram and calculate the reactions necessary to ensure static equilibrium.

CO2: Study the effect of friction in static and dynamic conditions.

CO3: Understand the different properties of surfaces in relation to moment of inertia.

CO4: Analyse and solve different problems of kinematics and kinetics.

Contents &Theory

	Hrs/week
Unit -1	**12**

Force Fundamentals:-Definitions of mechanics, statics, dynamics. Engineering Mechanics, body,rigid body, mass, weight, length, time, scalar and vector, fundamental units, derived units, S.I. units.

Force: - Definition of a force, unit force, Newton, S.I. unit of a force, representation of a force by vector and by Bow's notation method. Characteristics of a force, effects of a force, principle of transmissibility.

Resolution of a force: Definition, Method of resolution, Types of component forces, Perpendicular components and Non- perpendicular components.

Moment of a force:-Definition, measurement of moment of a force, S. I. unit, geometricalmeaning of moment of a force, classification of moments according to direction of rotation, sign convention, law of moments Varignon's theorem of moment and it's use, couple-definition, S.I. unit, measurement of a couple, properties of couple.

Force system: - Definition, classification of force system according to plane and lien of action**Composition of Forces**: - Definition, Resultant force, methods of composition of forces, I-Analytical method:-(i)Trigonometric method(law of parallelogram of forces) (ii) Algebraicmethod(method of resolution), II - Graphical method: - Introduction, space diagram, vector diagram, polar diagram, and funicular polygon. Resultant of concurrent, non-concurrent and parallel force system byanalytical and graphical method.

Unit -2	**10**

Equilibrium:

Definition, conditions of equilibrium, analytical and graphical conditions of equilibrium for concurrent, non-concurrent and parallel force system, free body and free body diagram.

Lami's Theorem–statement and explanation, Application of Lami's theorem for solving various engineering problems. Equilibrant – Definition, relation between resultant and equilibrant, equilibrant of concurrent and non-concurrent force system. Beams – Definition, Types of beams (cantilever, simply supported, overhanging, fixed, and continuous), Types of end supports (simple support, hinged, roller), classification of loads, point load, uniformly distributed load. Reactions of a simply supported and over hanging beam by analytical and graphical method.

Unit -3	**08**

Friction:

Definition of friction, force of friction, limiting frictional force, coefficient of friction, angle of friction, angle of repose, relation between angle of friction angle of repose and coeff. Of friction. Cone of friction, types of friction, laws of friction, advantages and disadvantages of friction.

Equilibrium of bodies on level plane–external force applied horizontal andinclined up and down.

Equilibrium of bodies on inclined plane–external forces is applied parallel to the plane,horizontal and to inclined plane. Ladder friction, Wedge and block.

Unit -4   **08**
Centroid and Centre Of Gravity:
Centroid: Definition of centroid. Moment of an area about an axis. Centroid of basic geometrical figures such as square, rectangle, triangle, circle, semi-circle and quarter circle. Centroid of composite figure.
Center of gravity: Definition, center of gravity. Of simple solids Such as cylinder, sphere, hemisphere, cone, cube, and rectangular block. Centre of gravity of composite solids.

Unit -5   **10**
Simple Machines:
Definitions of simple machine, compound machine, load, effort, mechanical advantage, velocity ratio, input on a machine, output of a machine ,efficiency of a machine , expression for mechanical advantage , velocity ratio and efficiency of a machine. Ideal machine, ideal effort and ideal load, friction in machines, effort lost in friction and frictional load. Law of machine, maximum mechanical advantage and maximum efficiency of a machine, reversibility of a machine, condition for reversibility of a machine, self- locking machine.
Study of simple machines : Simple axle and wheel, differential axle and wheel, Weston's differential pulley block, single purchase crab, double purchase crab, worm and worm wheel, geared pulley block, screw jack, pulleys: First, second and third system of pulleys, gear train, hoist mechanism.

Total-   **48**
Text/Reference Books :-

Titles of the Book	Name of Authors.	Name of the Publisher
(i) Engineering Mechanics	Beer-Johnson	Tata McGraw Hill, Delhi
(ii) Engineering Mechanics	Basu	Tata McGraw Hill, Delhi
(iii) Vector Mechanics for Engineers Vol. - I & II	Joslph F. Shelley	Tata McGraw Hill, Delhi
(iv) Engg. Mechanics	Ram Manohar Pandey	Foundation Publishing House
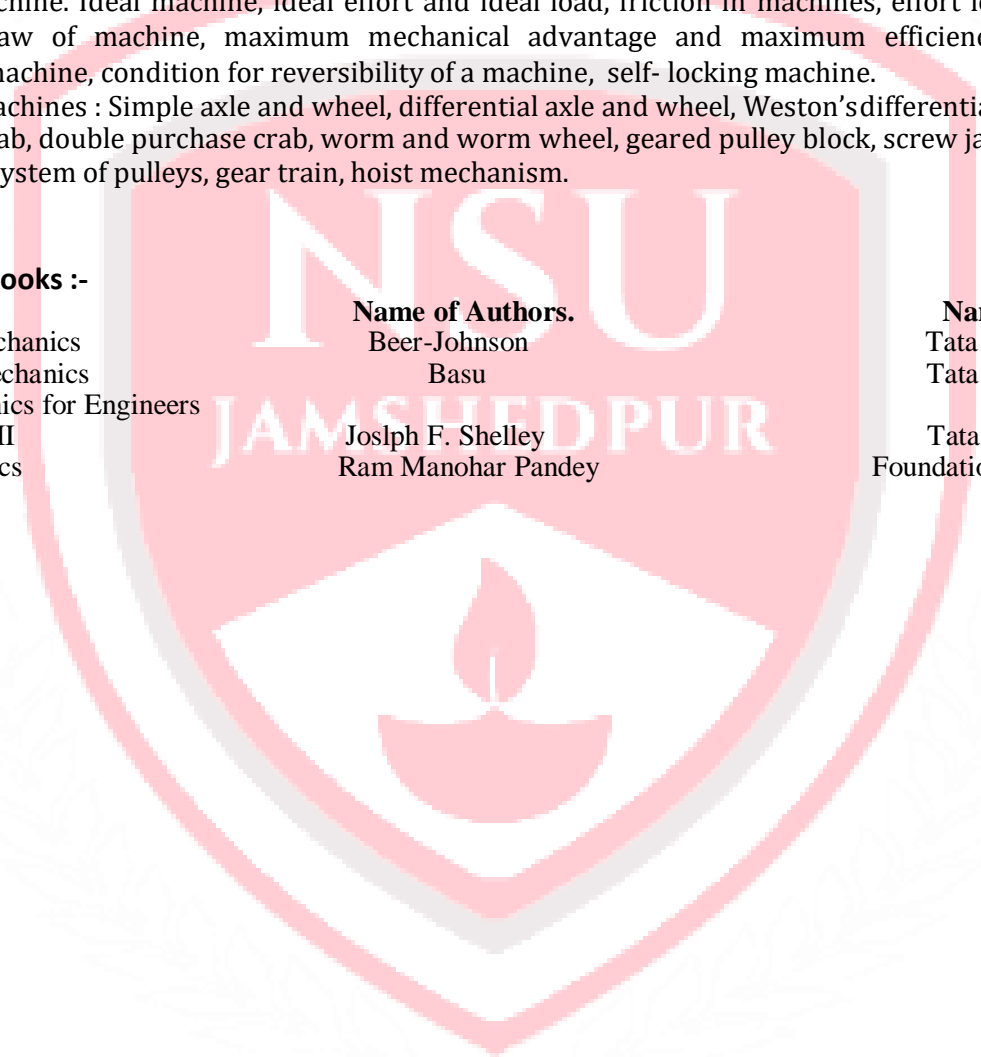
Engg. Drawing (DIP205)

Course Objectives: To understand techniques of drawings in various fields of engineering

Course Outcomes (COs)

CO1: To know about different types of lines & use of different types of pencils in an engg. Drawing

CO2: To know how to represents letters & numbers in drawing sheet

CO3: To know about different types of projection

CO4: To know projection of points, straight lines, solids etc.

CO5: To know development of different types of surfaces.

CO6: To know about isometric projection.

Contents (Theory)
Hrs/week

Unit -1   **03**
Sectional Views.
Types of sections
Conversion of pictorial view into sectional orthographic views (First Angle ProjectionMethod only)

Unit -2   **01**
Missing Views.
2.1Draw missing view from the given Orthographic views-simple components (First AngleProjection Method only)

Unit -3   **03**
Isometric Projection
3.1Conversion of Orthographic Views into Isometric view/projection (Including rectangular,cylindrical objects, representation of slots on sloping as well as plane surfaces).

Unit - 4   **02**
Projections of Solids.
4.1 Projections of Prism, Pyramid, Cone, Cylinder, Tetrahedron, Cube with their axes inclined to one reference plane and parallel to other.

Unit - 5   **03**
Sections of Solids.
Solids:-Prism, Pyramid, Cone, Cylinder, Tetrahedron, Cube.
Cone, Pyramid and Tetrahedron resting on their base on Horizontal Plane.
Prism, Cylinder:-a)Axis parallel to both the reference plane b) Resting on their base on HP.
Section plane inclined to one reference plane and perpendicular to other.

Unit - 6   **02**
Developments of Surfaces.
Developments of Lateral surfaces of cube, prisms, cylinder, pyramids, cone and their applicationssuch as tray, funnel, Chimney, pipe bends etc.

Unit -7   **02**
Free Hand Sketches
7.1Free hand sketches of nuts, bolts, rivets, threads, split pin, foundation bolts,

Total-   **16**

Text/Reference Books :-

Titles of the Book	Name of Authors.	Name of the Publisher
(i) Engineering Drawing	N.D. Bhatta	Charotkar Publishing House

(ii) Engineering Drawing	R.K. Dhawan	S. Chand Co.
(iii) Engineering Drawing	P.J. Shah	-
(iv) Machine Drawing	N.D. Bhatta	Charotkar Publishing House

Introduction to Software Package (DIP206)

COURSE OUTCOMES (CO)
COURSE 1.1- Microsoft Word
CO1. Performing basic editing functions, formatting text, copy and moving objects and text.
CO2. Leaning the formatting skills on paragraphs, tables, lists, and pages.
CO3. Knowledge on navigating the Word Ribbon Interface.
CO4. Understanding the process of inserting graphics, pictures, and table of contents, Drop Cap.
CO5. Learning the utilities of Auto text, AutoCorrect, Footnotes and Bookmark

COURSE 1.2- Microsoft Excel
CO1. Demonstrating the basic mechanics and navigation of an Excel spreadsheet.
CO2. Formatting techniques and presentation styles.
CO3. Learning the use and utility of functions and formulas on excel spreadsheet.
CO4. Working knowledge of organizing and displaying large amounts and complex data.
CO5. Using clip art to enhance ideas and information in Excel worksheets.

COURSE 1.3- Microsoft PowerPoint
CO1. Learning to modify presentation themes.
CO2. Analyzing formatting techniques and presentation styles
CO3. Integrating information from other Microsoft programs into a PowerPoint presentation.
CO4. Working with text, themes, and styles.
CO5. Creating charts, grants, and tables.
CO6. Inserting media clips and animation

Contents: Theory

Unit -1
WORD PROCESSING PACKAGE (MS-WORD):
Features of Word Processing Package MS-Word, Menu Options-File, Edit, View, Insert, Format, Tools-spelling and grammar, language, mail- merge, options; table. Creating, editing and saving a document, Opening a document, password protection for file. Setting page margins, tab setting, ruler and indenting.
Formatting a document- using different fonts; changing font size and colour; changing the appearance through bold/italic/underline; highlighting text; change case; use of sub script and superscript. Alignment of text in a document and justification, use of bullets and numbering. Paragraph formatting, inserting page breaks and column breaks. Use of headers, footers, footnote and end note. Use of Comments, inserting date, time, and special symbols, importing graphical images and use of drawing tools. Creating table, formatting cells, using different border styles, shading in tables, merging of cells, and partition of cells, inserting and deleting a row/column in a table. Print preview, zoom, page setup, print options.
01.10 Use of tools such as spell checker, help, mail-merge, and use of macros.

Unit -2
SPREADSHEET PACKAGE (MS-EXCEL):
Features of Spreadsheet package such as MS Excel, Menu Options-File; edit; view; insert; format; tools-spelling, auto correct, protection, options; data. Concepts of cell and cell-addressing. Creating, operating and

saving worksheet. Entering text, numeric information and formula Formatting numbers and text, protection cells, printing worksheet. Using data management functions-mathematical, statistical and financial functions. Creating different types of charts, graphs and balance worksheet and displaying 3-D Charts, printing and resizing charts. Importing files and graphics.

Unit -3
PRESENTATION PACKAGE (MS-POWER POINT):
Features of Presentation Package MS-Power Point, Menu options-File; edit, view; insert; format; tools-spelling, language, auto clipart, slide show Status bar, tool bar, customized tool bar, slide view, outline view, slide sorter view, notes page view, slide show view Creating and saving slides, opening and editing slides, changing layout of a slide, deleting of slide, changing layouts of a slide, deleting of slide, changing the order of slides, animation. Working with objects: selecting, grouping, ungrouping and regrouping of objects, moving, aligning, cutting, copying, pasting, and duplicating objects. Putting text on slides: selecting and editing text, finding and replacing text. Creating graphs and importing files. Creating tables. Use of data sheet view and design view.

Unit -4
ANTI VIRUS PACKAGES:
Introduction to Virus.
Virus Protection, Deletion & Removal Utilities Anti-Virus Packages to prevent, detect & delete Viruses.

Books Recommended:-

1.	MS office 2000 for Everyone, Vikash Publications, New Delhi	-	Sanjay Saxena
2.	MS office 2000, Addison Wesley(Singapore) Pvt. Ltd., New Delhi	-	Sagman
3.	MS office 2000 8-in-1, Prentice Hall of India, New Delhi	-	Habraken

SEMESTER – 3								
THEORY		**PERIOD**			**Evaluation Scheme**		**Credit**	**Hours**
SUBJECT CODE	**NAME OF THE PAPER**	**LECTURES**	**TUTORIALS**	**PRACTICALS**	**MSE**	**ESE**	**SUB-TOTAL**		
DIP301	**ENGG. MATHEMATICS II**	3	1	0	30	70	100	4	4
DIP3CIV02	SURVEYING –I	3	1	0	30	70	100	4	4
DIP3CIV03	**STRENGTH OF MATERIAL**	3	1	0	30	70	100	4	4
DIP3CIV04	**BUILDING DRAWING**	3	0	1	30	70	100	4	4
DIP3CIV05	**BUILDING MATERIAL AND BUILDING CONSTRUCTION**	3	1	0	30	70	100	4	4
DIP3CIV06L	SURVEYING LAB	2	0	2	15	35	50	2	2
DIP3CIV07L	STRENGTH OF MATERIAL LAB	2	0	2	15	35	50	2	2
							Total Credit-	24	

ENGG. MATHEMATICS II (DIP301)

Course-1

Course Code   **DIP301**
Course Title   **ENGG. MATHEMATICS II**
Theory / Lab   Theory
L-T-P-C   3-1-0-3

Course Outcomes: On completion of the course, a student will be able to:
  CO-1   Problems.
  CO-2   Transforms
  CO-3   Apply the concepts of Maxima and Minima for finding extreme values
  CO-4   Formulate and solve P.D.E

CONTENT AND THEORY
Hrs/Week

Unit 1   **10**
INTEGRATION:
Definition of integration as anti-derivative. Integration of standard function. Rules of integration (Integrals of sum, difference, scalar multiplication). Methods of Integration. Integration by trigonometrical transformation. Integration by substitution. Integration byparts. Integration of rational and irrational functions. Integration by Partial fractions. Definite Integration. Concept of definite integrations with examples. Properties of definite integral with simple problems. Applications of definite integrals. Area under the curve. Area bounded by two curves.

Unit 2   **08**
DIFFERENTIAL EQUATION.
Definition of differential equation, order and degree of differential equation. Formation of differential equation. Solution of differential equations of first order and first Degree such as variable separable form, reducible to Variable separable, Homogeneous and Linear Differential Equation. Applications of Differential equations

Unit 3   **10**
NUMERICAL METHODS:
Solution of algebraic equations Bisection method, Regula-falsi method and Newton– Raphson method. Solution of simultaneous equations containing 3 unknowns .Gauss elimination method. Jacobi's Iterative method. Gauss Seidal method. Interpolation. Concept of interpolation and extrapolation. Different operators (Δ, ∇&amp),relation between them, some problems based on operators, formation of Difference Table. Newton's Forward and Backward difference interpolation formulae. Lagrange's interpolation formula. Problems based on above. Numerical Differentiation & amp; Integration. Newto n's forward and backward difference formulae for first and second order differentiation at any point. Numerical integration Trapezoidal rule and Simpson's 1/3rd rule

Unit 4   **06**
PROBABILITY:
Definition of random experiment, sample space, event occurrence of event and types of events (impossible, mutually exclusive, exhaustive, equally likely). Definition of probability, addition and multiplication theorems of probability. Probability Distribution. Binomial distribution. Poisson's distribution. Normal distribution. Simple examples based on above

Unit 5   **08**
LAPLACE TRANSFORM :
Definition of Laplace transforms Laplace transform of standard functions. Properties of Laplace transform such as Linearity, first shifting, second shifting, multiplication by tn, division by t. Inverse Laplace transforms. Properties-linearly first shifting, second shifting.Method of partial fractions, Fourier Series. Definition of Fourier series (Euler's formula). Series expansion of continuous functions in the intervals $(0,2l),(−l,l),(0,2\pi),(−\pi,\pi)$ Linear Programming. Introduction. Solution of Linear Programming problem (LPP) by Graphical

 Total-   **42**
Reference Books:

Title of the book	Name of the Author	Name of the Publisher
Engineering Mathematics	H.K.Das	S.Chand & Company LTD, New Delhi
Higher Engineering Mathematics	B.V Ramana	McGraw Hill Education (India) PVT. LTD, New Delhi
Introductory Method of NumericalAnalysis	S.S. Shastri	P.H.I
A text book for class 12, Part- I & II		NCERT, Delhi

SURVEYING I (DIP3CIV02)

Course Code: DIP3CIV02
Course Title: SURVEYING I
Theory / Lab: Theory
L-T-P-C: 3-1-0-4

Course Outcomes: On completion of the course, a student will be able to:
CO-1 Recognize various surveying instruments used for measurement of distances, directions and elevations
CO-2 Calculate distances, areas and volumes using various surveying methods and instruments.
CO-3 Identify and sketch suitable curve for the given data.
CO-4 Know the working principles of Total Station and GPS and list their application.

CONTENT AND THEORY
Hrs/Week

Unit 1   10
LINEAR MEASUREMENT:
Method of measuring distance, their merits and demerits. Instruments for measuring distance: Tape and Chains .Equipment and accessories for chaining-description only .Use ofchain- unfolding & folding, use of arrows, reading a chain, testing and adjusting of chain.
Ranging – purpose, signaling, direct and indirect ranging, line ranger-featuring and use, error due to incorrect ranging. Method of chaining- Role of leader and follower, Chaining onflat ground, chaining on sloping ground-stepping method.
Chaining around obstacle possible:
a) Vision fee but chaining obstructed both vision and chaining obstructed. b) Chaining around obstacle not possible: Vision free but chaining obstructed, chaining free but vision obstructed. Numerical problem on chaining across obstacles. Error and mistakes in linear measurement-classification, sources of error and remedies. Correction to measured length due to-incorrect length, temperature variation, pull, sag, numerical problem applying corrections. Precaution during chaining. Principle of chain surveying-well conditioned and illconditioned triangles. Selection of survey station, base line, Tie line, Check lines. Offsets-necessity, perpendicular and Oblique offsets, Setting offsets with chain & tape, Instrumentsfor setting offset- Cross staff, optical Square, feature, use & handling , suitability, sources of error & remedies. Error in chain surveying- causes & remedies, Precautions during chainsurveying.

Unit 2   08
COMPASS SURVEYING: Compass- types- surveyor's compass, Prismatic compass, feature, parts,merits & demerits, suitability of different types. Concept of meridians-magnetic, true, arbitrary. Concept of bearings-whole circle bearing, Quadrantal bearing / Reduced bearing, numerical problems on conversion of bearings. Use of compass- setting in field- centering, levelling, taking readings, concept of fore-bearing, Back bearing, Numerical problems on computation of interior & exterior angles from bearings. Effect of earth's magnetism- dip of needle, magnetic declination, variation in declination, numerical problems on application ofcorrection for declination. Local attraction- causes, detection, error, corrections, numerical problems on application on application of correction due to local attraction. Principle of traversing- open & closed traverse, advantage & disadvantages over chain surveying.
Method of traversing- locating objects, field book entry. Plotting of traverse- check of closingerror in closed & open traverse. Computations of area from plotted survey, planimeter, feature, use of menstruation techniques- average ordinate rule. Trapezoidal rule, Simpson's rule.

Unit 3   **08**
LEVELLING:
Purpose of levelling Definition of terms used in levelling- concept of level surface, Horizontalsurface, vertical surface, datum, RL, Bench mark, Concept of line of collimation, axis of bubble tube, axis of telescope, vertical axis, BS,FS. Types of levels and Levelling staff, auto level. Temporary adjustment of level, taking reading with level. Principle of levelling- simple levelling, Different types of levelling, use and method.

Unit 4   **10**
THEODOLITE SURVEY:
Types of theodolite and terminologies in theodolite survey. Temporary and permanent adjustment of theodolite. Relation between fundamental lines of theodolite. Measurementof horizontal and vertical angles, base line, extension of base line. Features and use of TotalStation and modern survey equipments. Tachometry survey for determination of horizontaldistance of plane and slope ground. (numerical problems)Latitude, departure and computation of length and bearing of closed traverse. Bowditch and transit rule.

Unit 5   **04**
PLANE TABLE SURVEY:
Different instruments used. Different Methods
 Total- 40

REFERENCE BOOKS:

Titles of book	Name of the Author	Name of the Publisher
Surveying & leveling	T.P. Kanetkar& S.V. Kuljarni	Griha Prakash , Pune
A text book of surveying and leveling	R. Agor	Khanna Publishers, Delhi-6
Surveying and leveling	Hussain and Nagraj	S. Chand & co, Delhi
Surveying & leveling	S.C Rangawal	Charotar Book Stall, Pune
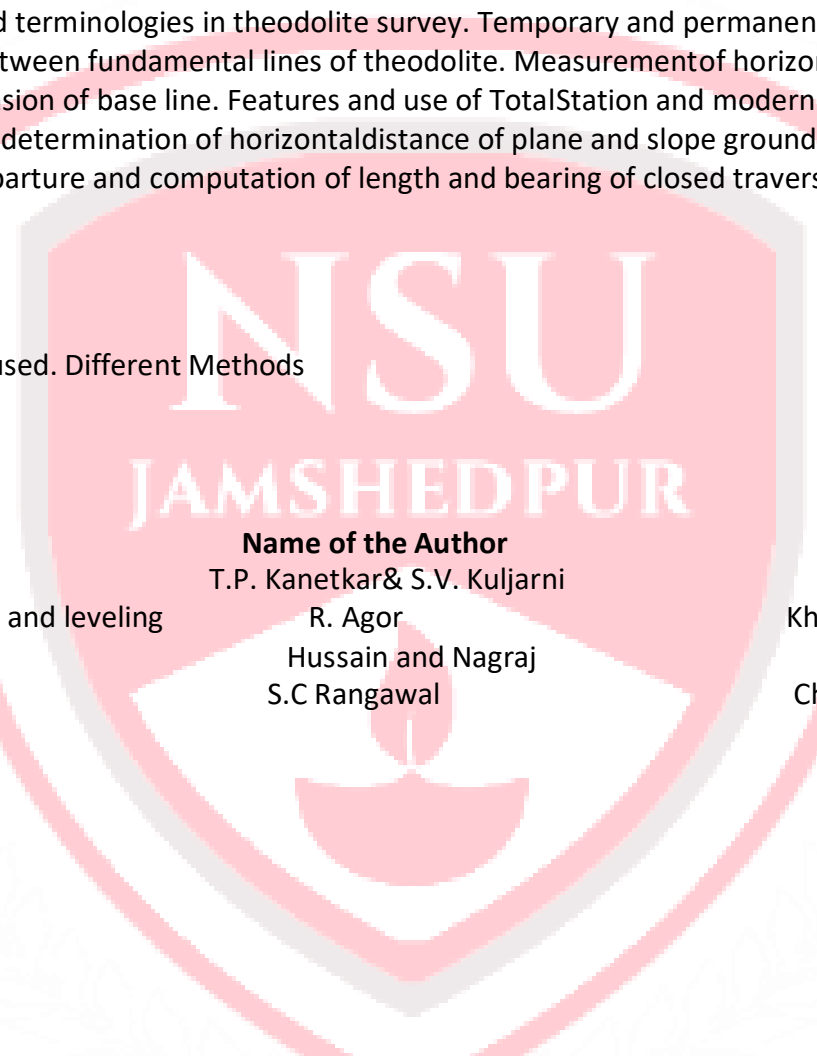
STRENGTH OF MATERIAL (DIP3CIV03)

Course Code: DIP3CIV03
Course Title: STRENGTH OF MATERIAL
Theory / Lab: Theory
L-T-P-C: 3-1-0-4

Course Outcomes: On completion of the course, a student will be able to:
CO-1 Compute the stresses due to axial, shear and bending moment
CO-2 Determine and draw Shear force and bending moment diagrams for beams
CO-3 Calculate the deflections and slope in statically determinate beams
CO-4 Compute the stresses developed in thin cylinders

CONTENT AND THEORY
Hrs/Week

Unit 1 10
STRESS AND STRAIN :
Stress & strain and their types, complimentary shear stress. Tensile test of ductile & brittlematerial.
Feature point on the curve. Factor of safety. Hooke's law, Poisson's ratio, Generalized Hooke's law,
relation among the elastic constants for an isotropic material.Volumetric strain & their calculation for some
common solid shapes. Thin cylindrical & spherical shell. Hoop stress & strain. Change in dimension due to
rise in pressure.

Unit-2 06
Deformations of Axially Loaded Members: Bars of varying section, tapering rod, bars of composite section,
Deformation due to self-weight, Thermal stress. (Simple problems on determination of stresses and
shortening).

Unit-3 06
CENTROID & MOMENT OF INERTIA:
Difference between C.G & Centroid, Axis of symmetry. Centroid of simple common Figureby 1st principle,
Calculation of Centroid of composite section M.I. & their Calculation for simple plane shape by 1st principle
perpendicular axis theorem. Polar Moment of Inertia. Parallel axis theorem and their use for calculation
M.I. of composite section Radius of Gyration

Unit -4 08
ANALYSIS OF BEAMS :
Forces, Types, Resolution of forces, Equilibrium of forces Types of support, load and beam. Shear force and
bending moment. Relation between Shear force, bending moment & uniformly distributed load. Shear force
diagram and bending moment diagram of simply supported & cantilever beam with concentrated, UDL or
combination of them. Introduction of singularity function for calculation SFD & BMD.

Unit -5 10
STRESSES IN BEAMS: Assumptions in the theory of pure bending, derivation of bending stress formula, concept of
neutral axis, section modulus,, calculation of bending stresses for different types of loading and sections (in SS
and Cantilever beam). Shear stresses in beams– Formula for shear stress in rectangular cross section. Calculate
shear stresses at different layers of a given Beam; draw the distribution of shear stress for different structural
sections (only application of formula)
Total-40

REFEFENCE BOOKS :

Title of the book	Name of the Author	Name of the Publisher
Elements of Strength of materials	S.P. Timoshenko,D.H. Young	Affiliated East – West Press Pvt Ltd
Engineering Mechanics and Strength of materials of materials	R.K. Bansal	Laxmi Publication, New Delhi.
Strength of Materials	Surendra Singh	Vikas Publication House Pvt. Ltd.
Strength of Materials	Ferdinand L.Singer	Harper and Row and John Weather bill.

BUILDING DRAWING (DIP3CIV04)

Course Code: DIP3CIV04
Course Title: BUILDING DRAWING
Theory / Lab: Theory
L-T-P-C : 3-1-0-4

Course Outcomes: On completion of the course, a student will be able to:
CO-1 State building Bye-laws, Principles and General Building Requirements as per NBC
CO-2 Describe different conventional signs in drawing plans of structures
CO-3 Plan and drawn Residential buildings and Industrial structures
CO-4 Interpret drawings of RC buildings, Industrial structures and Pipe line drawings

CONTENTS (THEORY)
Hrs/Week

UNIT I   04
CONVENTIONS:
Conventions as per IS:962-1967 and other practices Types of lines –Visible lines, Centrelines, Hidden line, Extension line ,Section line, DimensionLine ,Pointers ,Arrowheads or Dots ,Symbols –Materials used in construction, building components .Reading of available ammonia prints of residential buildings

UNIT 2   06
PLANNING OF BUILDING:
Principles of planning of residential building and public building. Space requirements andnorms for various units of Residential and Public building, Rules and Byelaws of local governing authorities for construction. Drawing of line plans for Residential and Public building.

UNIT 3   15
TYPES OF DRAWING:
Development of line Plan
Elevation Plan
Section Site Plan
Location Plan Foundation Plan

Unit-4
Area statement and other details:
Measured Drawings and its Significance Submission drawing
and Working Drawing

UNIT-5   **10**
PERSPECTIVE DRAWING:
Definition, Necessity, Principles of Perspective Drawing , Terms used in Perspective Drawing Two point
perspective view of a small object like pedestal ,step block ,small single storeyed
with flat roof

   Total-   **35**

Text/ Reference books

Titles of the Books	Name of Authors	Name of the Publishers
Text book of Building Drawing	Shah, Kale Patki	
Elements of Building Drawing	D M Mahajan	Pune Vidyarthi Griha Prakashan
Civil Engineering Drawing	Malik and Mayo	New Asian Publishers New Delhi
Civil Engineering Drawing and		
House Planning	B. P Verma	Khanna Publishers Delhi
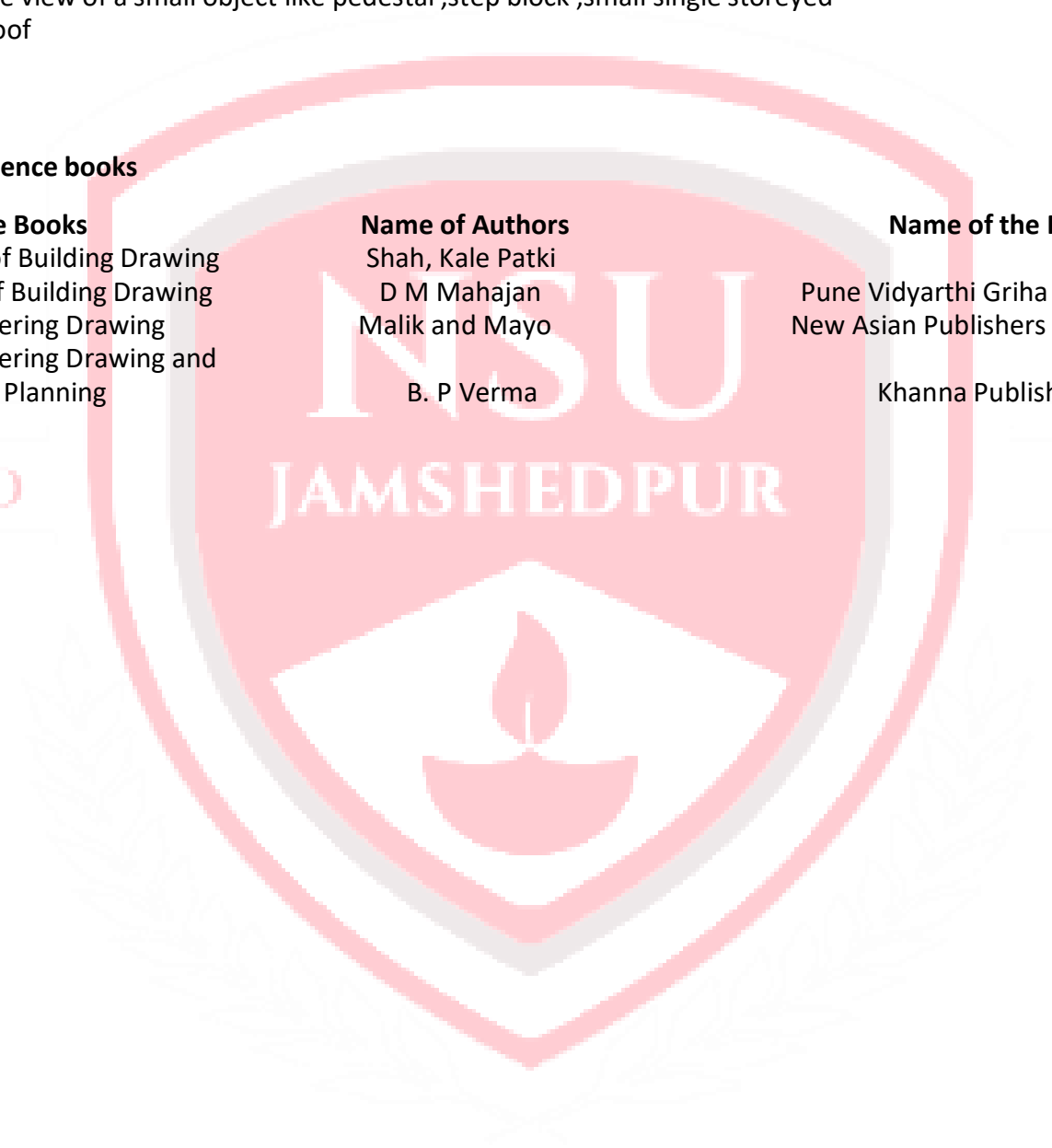
BUILDING MATERIAL AND BUILDING CONSTRUCTION (DIP3CIV05)

Course Code-: DIP3CIV05
Course Title-: BUILDING MATERIAL AND BUILDING CONSTRUCTION
Theory / Lab- : Theory
L-T-P-C-: 3-1-0-4

Course Outcomes: On completion of the course, a student will be able to:
CO-1 Know various engineering properties of building construction materials and suggest their suitability.
CO-2 Identify the functional role of ingredients of concrete and apply this knowledge to concrete mix design.
CO-3 Acquire and apply fundamental knowledge in the fresh and hardened properties of concrete.
CO-4 Design mix proportions for different grades of concrete as per Indian Standards

CONTENT AND THEORY
Hrs/Week

Unit 1   09
BRICKS:
Bricks earth – its composition & selection. Brick making – preparation of brick moulding, drying, burning in kiln. Classification of bricks, size of traditional and modular bricks, qualitiesof good building bricks. Uses of brick bats and surkhi, uses of hollow bricks.
Lime: Type of lime. Uses of lime. Cement: Type of cements. Properties of cements. Testing ofquality of cement.

Unit 2   05
SAND:
Sources and classification of sand. Bulking factor and finesses of sand. Qualities and gradingof sand for plaster and for masonry Work as per BIS specification (IS:1542,2116,383)
Stone:
Classification of rock, uses of stone, natural bed of stone, Qualities of good building stone.
Stone quarrying- tools for blasting, process of blasting, Precautions in blasting, machines forquarrying, dressing of stone. Characteristics of different type of stone and their uses.

Unit 3   13
REFRACTORY MATERIAL AND CLAY PRODUCTS:
Definition, classification of refractory Properties and uses of refractory like terracotta,porcelain glazing. Different types of Tile and similar products.
Mortar and concrete:
Composition and properties of ingredients in both cement & lime mortar and concrete. Properties and uses of cement & lime mortar and concrete. Grading of aggregates in concrete. Water- cement ratio. Concreting- mechanical properties of aggregate, mixing ofingredients, placing, compacting and curing of concrete. Introduction to Ready Mixed Concrete. Factors responsible for deterioration of concrete.

Unit 4   08
TIMBER:
Classification and structure of timber .Defects in timber. Disease and decay of timber. Seasoning and preservation of timber. Manufacturing and uses of plywood .Special characteristics of Assam type timber. Substitute building materials of timber. Paint, Varnishand Distemper: Purpose of painting a surface Characteristics of ideal paint and varnish. Ingredients of paint and varnish. Process of painting and varnishing. Repainting of old surface. Purpose of applying distemper, properties, ingredients, process of distempering. Application of white washing and colour washing.

Unit 5 06

IRON AND STEEL:
Uses of cast iron, wrought iron, mild steel and tor steel Classification and uses of steel. Bituminous material: Distinction among tar, bitumen and asphalt. Different types of asphaltand tor and their uses. Introduction to Nano Materials

Total- 41
REFERENCE OF BOOKS :

Title of the book	Name of the Author	Name of the Publisher
Building Materials	Shri S.K. Basu and Shri A.K. Ray	S.K. Lahiri& Co. (P) ltd
Civil engineering materials	T.T.T.I	Chandigarh, Tata McGrew Hills
Building Materials	Duggal	
Building Materials	J Jha & S K Sinha	

SEMESTER – 4									
THEORY		**PERIOD**			**Evaluation Scheme**			**Credit**	**Hours**
SUBJECT CODE	NAME OF THE PAPER	LECTURES	TUTORIALS	PRACTICALS	MSE	ESE	SUB-TOTAL		
DIP4CIV01	TRANSPORTATION ENGINEERING	3	1	0	30	70	100	4	4
DIP4CIV02	CONCRETE TECHNOLOGY	3	1	0	30	70	100	4	4
DIP4CIV03	FLUID MECHANICS	3	1	0	30	70	100	4	4
DIP4CIV04	SURVEYING –II	3	0	0	30	70	100	4	4
DIP4CIV05	GEOTECHNICAL ENGINEERING	3	1	0	30	70	100	4	4
DIP4CIV06L	FLUID MECHANICS LAB	2	0	2	15	35	50	2	2
DIP4CIV07L	CONCRETE TECHNOLOGY LAB	2	0	2	15	35	50	2	2
								Total Credit =24	

TRANSPORTATION ENGINEERING (DIP4CIV01)

Course Code: DIP4CIV01
Course Title: TRANSPORTATION ENGINEERING
Theory / Lab: Theory
L-T-P-C: 3-0-0-3

Course Outcomes: On completion of the course, a student will be able to:
CO-1 Know different factors influencing pavement design.
CO-2 Calculate stresses developed in flexible and rigid pavements.
CO-3 Know the maintenance requirements of flexible and rigid pavements.
CO-4 Compare different pavement management systems.

CONTENT & THEORY
Hrs/week

Unit -1   **03**
ROAD ENGINEERING: Importance of road in India. Classification of roads according to Nagpur plan(Location and function), and third road development plan. Traffic and Tonnage, Classification of urban roads.
INVESTIGATION FOR ROAD PROJECT: Reconnaissance survey, Preliminary survey and Location survey for a road project. Detailed survey for cross drainage- L-section and C/S sections. Fixing the alignment of road, factors affecting alignment of road. Drawings requiredfor road project- Key map, Index map, Preliminary survey plan and detailed location survey plan, L- section and C/S sections cross drainage work, land acquisition plan. Survey for availability of construction material, location plan of quarries.

Unit -2   **12**
GEOMETRIC DESIGN OF HIGHWAYS: Camber- definition, purpose, types, IRC – specifications. Kerbs, road margin, road formation, right of way. Design speed- IRC specifications Gradient – definition, types, IRC specification. Sight distances– definition, types, IRC specification. Curves–Necessity, types– horizontal, vertical and transition curves. Widening of roads on curves. SuperElevation – definition, formula for calculating super elevation, minimum and maximum values of super elevation, and methods of providing super elevation.

Unit – 3   **14**

CONSTRUCTION OF ROADS PAVEMENTS AND MATERIALS: Types of road materials and Tests – soil, aggregates, bitumen, Cement Concrete. Test on soil sub grade- C.B.R. test, Test on Aggregate –Los Angeles abrasion, impact, and shape test. Tests on bitumen- Penetration, Ductility and Softening point test. Pavement – objective of pavement, structure of pavement, function of pavement components, types of pavement. Construction of earthen road – general terms used- borrows pits, spoil bank, lead and lift, balancing of earthwork. Construction procedure. Soil stabilized roads – necessity, methods of soil stabilization, and brief details of mechanical soil stabilization. Water bound macadam roads – materials used, size and grading of aggregates and screening, construction procedure including precautions in rolling.
Construction of bituminous roads. Terms used–bitumen, asphalt, emulsion, cutback, tar, common grades adopted for construction. Types of bituminous surface – prime coat, tackcoat, seal coat, Surface Dressing.
TRAFFIC ENGINEERING: Traffic volume study, Traffic control devices-road signs, marking, Signals,Traffic island. Road intersections- intersections at grade and grade separator intersections. Road accident.

UNIT -4
RAILWAY ENGINEERING: Alignment and Gauges, Classification of Indian Railways, zones of Indian Railway. Alignment-Factors governing rail alignment. Rail Gauges – type, factors affecting selection of gauge. Rail track cross sections- standard cross section of BG & MG Single & double line in cutting and embankment. Permanent ways, Ideal requirement, component parts.
Rails-function & its types. Rail Joints–requirements, types, creep of rail, causes & prevention of creep. Sleepers – functions & Requirement, types - wooden, metal, concrete sleepers & their suitability, sleeper density. Ballast-function & different types with their properties, relative merits & demerits. Rail fixtures & fastenings – fish plates, bearing plates, spikes, bolts, keys, anchors & anti creepers.

UNIT -5
RAILWAY TRACKS: Geometrics. Coning of wheels, tilting of rails, Gradient & its types, Super elevation, limits of super elevation, curves, cant deficiency negative cant, grade compensation on curves. Branching of tracks, Definition of point & crossing, a simple split switch turnout, consisting of points and crossing lines. Sketch showing different components, their functions & working. Types of station yard, track maintenance.

 Total-   **40**

Text/ Reference Books:-

Titles of the Book	Name of Authors	Name of the Publisher
Highway Engineering	Khanna& Justo	Khanna Publication
Traffic Engineering	L.R. Kadiyali	--
Transportation Engineering	N.L. Arora, S.P. Luthara	I.P.H. New Delhi

CONCRETE TECHNOLOGY (DIP4CIV02)

Course Code: DIP4CIV02
Course Title: CONCRETE TECHNOLOGY
Theory / Lab: Theory
L-T-P-C: 3-1-0-4

Course Outcomes: On completion of the course, a student will be able to:
CO-1 Apply the design philosophies of working stress method and limit state method for determining design parameters of RC beams
CO-2 Design and detail the reinforced concrete beams using IS code
CO-3 Design and detail the reinforced slabs, columns and footings using IS Code.
CO-4 Determine the anchorage and development length of RC element.

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CONTENTS: THEORY
3Hrs/week

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Unit -1   **06**
PROPERTIES OF CEMENT:-
Physical properties of Ordinary Portland cement (OPC), determination and test on OPC
,Hydration of cement, physical properties of cement – fineness, standard consistency, initial & final setting times, compressive strength & soundness, different grades of OPC 33, 43 , 53 & their specification of physical properties as per relevant I. S. codes. Adulteration of cement(field test), storing cement at site, effect of storage of cement on properties of cement / concrete. Types of Cement: Physical properties, specifications as per relevant IS codes & field application of the following types of cement Rapid hardening cement, Low heat cement, Pozzolana Portland cement, Sulphate resisting cement, Blast furnace slag cement, White cement

Unit -2   **08**
PROPERTIES OF AGGREGATES :-
Properties of fine aggregates:-
Concept of size, shape, surface texture, strength, specific gravity, bulk density, water absorption, surface moisture, soundness, bulking impurities, Determination of fineness modulus & grading zone of sand by sieve analysis, determination of silt content in sand &their specification as per IS 383, Bulking of sand, phenomenon of bulking, its effect on concrete mix proportion.
Properties of coarse aggregates:-Concept of size, shape, surface texture, water absorption, soundness, specific gravity & bulk density. Determination of fineness modulus of coarse aggregate by sieve analysis, grading of Coarse Aggregates Determination of crushing value, impact value & abrasion value of coarse aggregate, flakiness index & elongation index of coarse aggregate and their specification.

Unit – 3   **12**
PROPERTIES OF CONCRETE:-
Introduction to concrete:-
Definition of concrete, necessity of supervision for concreting operation, different grades of concrete (ordinary concrete, standard concrete & high strengthconcrete as per provisions of IS 456- 2000), minimum grade of concrete for different exposure conditions, minimum grade of concrete for R.C.C., water retaining structure & in sea water construction, durability of concrete.
Water cement ratio Definition of w/c ratio, Duff Abraham w/c law, significance of w/c ratio,maximum w/c ratio for different grades of concrete for different exposure conditions.
Properties of fresh concrete:-
Definition of workability, factors affecting workability of concrete. Determination of workability of concrete by slump cone test, compaction factor test, Vee bee consistometer & flow table tests. Range values of workability requirement for different types of concrete works, cohesiveness, segregation, harshness, bleeding.

Properties of hardened concrete Definition of compressive strength, durability, impermeability, elastic properties of concrete, modulus of elasticity of concrete.Creep, factors affecting creep, shrinkage, factors affecting shrinkage

Unit -4   **10**
QUALITY CONTROL OF CONCRETE:-
Batching, Different Types of Mixers & Vibrators
Volume & weight batching, volume batching for nominal mixes & weight batching for design mix concrete, types of mixers (tilting & non-tilting type) Different types of vibrators
- needle vibrator, surface vibrator, table vibrator, principle & application of each type ofvibrator.
Formwork : formwork for concreting, different types of formworks for different works such as beams, slabs, columns, well foundation, materials used for formwork, requirement of good formwork, stripping time for the removal of formwork as per I.S. 456- 2000 provisionsfor different structural members.
Transportation, placing, compaction & finishing of concrete: Modes of transportation of concrete , precautions to be taken during transportation and placing of concrete in formworkcompaction of concrete, methods of compaction, care to be taken during compaction

Unit-5   **08**
EXTREME WEATHER CONCRETING & CHEMICAL ADMIXTURE IN CONCRETE :-
Extreme weather concreting Effect of cold weather on concrete, effect of hot weather onconcrete, precautions to be taken while concreting in hot & cold weather condition.
Chemical admixture in concrete. Properties & application for different types of admixturesuch as accelerating admixtures, retarding admixtures, water reducing admixture, air entraining admixture & super plasticizers.

PROPERTIES OF SPECIAL CONCRETE:-
Properties, Advantages & Limitation of the following types of Special concrete, Ready mix Concrete, Reinforced Concrete, Pre stressed Concrete, Fiber Reinforced Concrete, PrecastConcrete, High performance Concrete

 Total-   **44**

Text /Reference Books:-
Titles of the Book	Name of Authors	Name of the Publisher
Concrete Technology	M. L. Gambhir	Tata McGraw.Hill Publishing Co. Ltd. New Delhi
Concrete technology	A. M. Neyille& J J Brooks	Pearson Education (Singapore) Pvt. Ltd. NewDelhi
Concrete technology	M. S. Shetty	S. Chand Publication
Text book of Concrete technology	P. D. Kulkarni	M. H. Ghosh and Phull publication

FLUID MECHANICS (DIP4CIV03)

Course Code: DIP4CIV03
Course Title: FLUID MECHANICS
Theory / Lab: Theory
L-T-P-C: 3-1-0-4

Course Outcomes: On completion of the course, a student will be able to:
CO-1 1 Solve uniform and non-uniform flow problems
CO-2 2 Apply dimensional analysis and similitude for various applications.
CO-3 3 Differentiate various types of dams based on its functions.
CO-4 4 Design turbines and pumps to meet the field requirements

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CONTENT & THEORY
Hrs/Week

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Unit -1   06
PROPERTIES OF FLUID:-
Definition of fluid, Difference in behavior of fluid with respect to solids. Introduction to fluid mechanics and hydraulics, Branches of hydraulics- Hydrostatics and hydrodynamics, Importance of Hydraulics with respect to Irrigation and Environmental engineering.
Physical properties of fluid Mass density, Weight density, Specific volume, Specific gravity, Surface tension and capillarity, Compressibility, Viscosity, Newton's law of viscosity – Dynamic and kinematics viscosity. Ideal and Real liquids

Unit -2   08
HYDROSTATIC PRESSURE:-
Free liquid surface, Definition of pressure and its SI unit Hydrostatic pressure at point, Pascal's law Variation of pressure in horizontal and vertical direction in static liquid Pressure diagram.
Total hydrostatic pressure and center of pressure, Determination of total pressure & center of pressure on vertical & inclined faces of dams, sluice gates, sides and bottom of water tanks, Determination of total hydrostatics pressure & center of pressure on sides and bottomof tank containing two liquids. Determination of net hydrostatic pressure and center of
pressure on vertical surface in contact with liquid on either side. Numerical Problems.

Unit -3   04
MEASUREMENT OF LIQUID PRESSURE IN PIPES:-
Concept of pressure head and its unit, Conversion of pressure head of one liquid in to other devices for pressure measurements in pipes– Piezometer, U-tube manometer, Bourdon's pressure gauge. Principle of working and limitations. Measurement of pressure difference using differential manometer
–U-tube differential manometer and inverted U-tube differential manometer. NumericalProblems.

Unit -4   06
FUNDAMENTALS OF FLUID FLOW:-
Concept of flow, Gravity flow and pressure flow. Typesof flow – steady and Unsteady, uniform and non-uniform, Laminar and turbulent. Various combinations of flow with practical examples, Reynolds number and its application, Streamline and equi-potential line. Flow net and its uses
Discharge and its units Continuity equation for fluid flow. Datum head, pressure head, velocity head and total head, Bernoulli's theorem, Loss of head and modified Bernoulli'stheorem, Impulse momentum theorem Numerical Problems.

Unit -5   07
FLOW OF LIQUID THROUGH PIPES:-

Loss of head due to friction, Darcy-Weisbach EquationFriction factor, relative roughness. Moody's diagram and its use. Common range of friction factor for different types of pipe material.Minor loss of head in pipe flow- loss

Hydraulic gradient line and Energy gradient line, Siphon pipe. Water hammer in pipes –cause effects and remedial measures Use of Nomograms for design of water distribution

of head due to sudden Contraction, sudden expansion,gradual contraction & expansion, at entrance and exit of pipe in various pipe fittings. Pipes in series and parallel Equivalent pipe – Dupuit's equation system. Numerical.

Total- **31**

Text/Reference Books:-

Titles of the Book	Name of Authors	Name of the Publisher
Hydraulics & Fluids Mechanics	Dr. P.N.Modi & Dr. S.M.Seth	Standard Book House, Dehli
Hydraulics & Fluids Mechanics	S. Ramamrutham	DhanpatRai& Sons, Delhi
A Text Book of Hydraulics, Fluids Mechanics Hydraulics Machines	R.S.Khurmi	S.Chand & Company Ltd. New Delhi
A Text Book of Fluids Mechanics Hydraulics Machines	R.K.Rajput	S.Chand& Company Ltd. New Delhi

SURVEYING II (DIP4CIV04)

Course Code: DIP4CIV04
Course Title: SURVEYING II
Theory / Lab: Theory
L-T-P-C: 3-1-0-4

Course Outcomes: On completion of the course, a student will be able to:
CO-1 Set out horizontal curves.
CO-2 Carry out a geodetic survey, taking accurate measurements using instruments and apply mathematical adjustment of errors involved in surveying measurements.
CO-3 Plan a survey for applications such as road alignment and height of the building.
CO-4 Invoke advanced surveying techniques over conventional methods in the field of civil engineering.
CO-5 Provide a basic understanding on geospatial acquisition and its process.

CONTENTS: THEORY
Hrs/Week

Unit-1 **06**
PLANE TABLE SURVEY:
Principles of plane table survey. Accessories required, Setting out of plane table, Levelling,Centering and orientation. Methods of plane table surveying–Radiation, Intersection, and Traversing. Merits and Demerits of plane table Surveying. Situations where plane table survey is used. Use of Telescopic Alidade.

Unit-2 **09**
THEODOLITE SURVEY:
Components of Transit Theodolite and Their functions. Technical terms used. Temporary adjustments of Transit Theodolite. Swinging the telescope, Transiting, Changing the face. Measurement of Horizontal angle, method of Repetition, errors eliminated by method of repetition. Measurement of Deflection angle. Measurement of Vertical angle. Measurement of magnetic bearing of a line by Theodolite. Prolonging a Straight line. Sources of errors in Theodolite Surveying. Permanent adjustment of transit Theodolite (only relationshipof different axes of Theodolite.).

Unit-3 **06**
Traversing with Theodolite – Method of included angles, locating details, checks in closed traverse, Calculation of bearings from angles. Traverse Computation-Latitude, Departure Consecutive, Co-ordinates error of Closure, Distribution ofan angular error, balancing the traverse by Bowditch rule and Transit Rule, Gale's traverse table simple problems on above topic.

Unit -4 **06**
TACHEOMETRIC SURVEY:
Principle of Tacheometry.
Essential requirements of Tachometer. Use of Theodolite as a Tacheometer with staff held in vertical and fixed hair method (No derivation). Determination of Tacheometric constants, simple numerical problems on above topics.

Unit -5 **06**
CURVES:
Types of curves used in road and railway alignments. Notations of simple circular curve. Designation of curve by radius and degree of curves. Method of Setting out curve by offsetfrom Long chord, method and Rankine's method of deflection angles. Simple Numerical problems on above topics.

TOTAL- **33**

Text /Reference Books

Titles of the Book	Name of Authors	Name of the Publisher
Surveying and Levelling	N NBasak	Tata McGraw-Hill
Surveying and Levelling Part I and II GRIHA Prakashan	T .P. Kanetkar& S. V, Kulkarni	PUNE VIDHYARTHI
Surveying and Levelling Vol. I and II	Dr. B. C. Punmiya	Laxmi Publication
Text book of Surveying company	S.K.Husain, M.S. Nagaraj	S. Chand and

GEOTECHNICAL ENGINEERING (DIP4CIV05)

Course Code: DIP4CIV05
Course Title: GEOTECHNICAL ENGINEERING
Theory / Lab: Theory
L-T-P-C: 3-1-0-4

Course Outcomes: On completion of the course, a student will be able to:
CO-1 Categorize soils based on their physical properties
CO-2 Calculate seepage discharge using a flow net
CO-3 Determine the stresses in soils, settlement and rate of settlement consequent to construction activity
CO-4 Estimate the shear strength using the cohesion and internal friction of soils under different drainage conditions.

CONTENTS: THEORY
Hrs/week

Unit -1   04
OVERVIEW GEOTECHNICAL ENGINEERING
Definition of soil Importance of soil in Civil Engineering as construction material in CivilEngineering Structures, as foundation bed for structures. Field application of geotechnicalengineering foundation design, pavement design, design of earth retaining structures, design of earthen dams (brief ideas only)

Unit -2   12
PHYSICAL PROPERTIES OF SOIL:
Soil as a three phase system, Water content, Determination of water content by oven dryingmethod as per I2Scode, Void ratio, porosity and degree of saturation, density index, Unit weight of soil mass – bulk unit weight, dry unit weight, unit weight of solids, saturated unit weight, submerged unit weight, Determination of bulk unit weight and dry unit weightby core cutter method and sand replacement method as per IS code, Specific gravity, determination of specific gravity by Pycnometer.
Consistency of soil, stages of consistency, Atterberg's limits of consistency viz. Liquid limit,plastic limit and shrinkage limit, plasticity index. Determination of liquid limit, plastic limit and shrinkage limit as per IS code. Particle size distribution, mechanical sieve analysis as per IS code particle size distribution curve, effective diameter of soil, Uniformity, coefficient and coefficient of curvature, well graded and uniformly graded soils. Particle size classification of soils & IS classification of soil.

Unit -3   04
PERMEABILITY OF SOIL & SEEPAGE ANALYSIS
Definition of permeability, Darcy's law of permeability, coefficient of permeability, typicalvalues of coefficient of permeability for different soil, Factors affecting permeability, Determination of coefficient of permeability by constant head and falling head permeabilitytests, simple problems to determine coefficient of permeability. Seepage through earthen structures, seepage velocity, seepage pressure, phreatic line, flow line sand equipotential lines. Flow net, characteristics of flow net, application of flow net(no numerical problems)

Unit -4   04
SHEAR STRENGTH OF SOIL:
Shear failure of soil, field situation of shear failure, Concept of shear strength of soil, Components of shearing

resistance of soil–cohesion, internal friction, Mohr-coulomb failure theory, Strength envelope, strength equation, Purely cohesive and cohesion less soils, Laboratory determination of shear strength of soil – Direct shear test, Unconfined compression test & vane shear test, plotting strength envelope, determining shear strength parameters of soil.

Unit -5   **06**
BEARING CAPACITY OF SOILS:
Concept of bearing capacity, ultimate bearing capacity, safe bearing capacity and allowablebearing pressure. Terzaghi's analysis and assumptions made. Effect of water table on bearing capacity, Field methods for determination of bearing capacity – Plate load test and standard penetration test. Test procedures as PerIS:1888&IS:2131.
TypicalvaluesofbearingcapacityfrombuildingcodeIS:1904
Definition of active earth pressure and passive earth pressure, structures subjected to earthpressure in the field.

COMPACTION OF SOIL & STABILIZATION
Concept of compaction, purpose of compaction field situations where compaction is required. Standard proctor test – test procedure as per IS code, Compaction curve, optimum
moisture content, maximum dry density, Zero air voids line.

Total-   **34**

Text/Reference Books:-

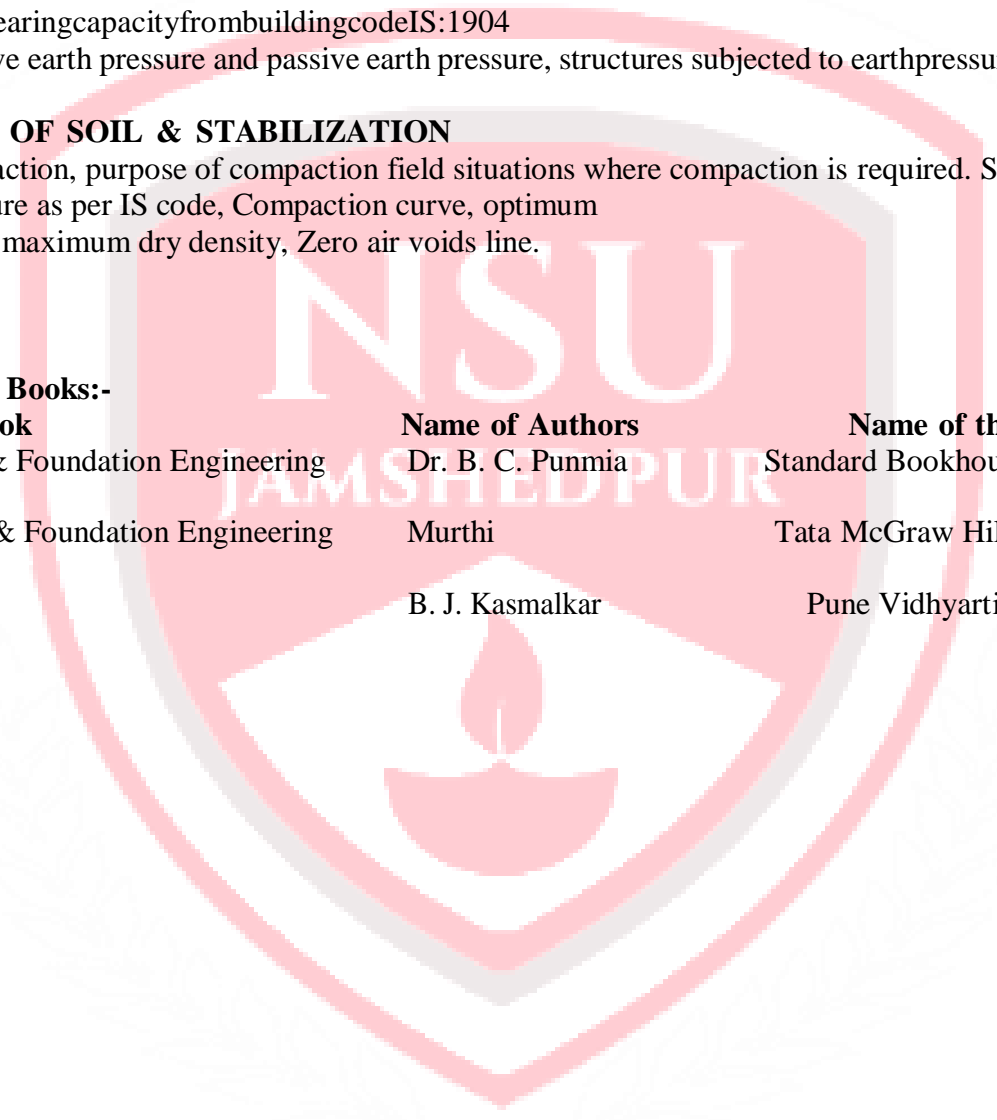| Titles of the Book	Name of Authors	Name of the Publisher
Soil Mechanics& Foundation Engineering	Dr. B. C. Punmia	Standard Bookhouse, NewDelhi
Soil Mechanics & Foundation Engineering	Murthi	Tata McGraw Hill , New Delhi
Soil Mechanics	B. J. Kasmalkar	Pune Vidhyarti Griha, Pune

SEMESTER 5

THEORY		PERIOD			Evaluation Scheme				Hours
SUBJECT CODE	NAME OF THE PAPER	LECTURES	TUTORIALS	PRACTICALS	MSE	ESE	SUB-TOTAL	Credit	
DIP5CIV01	THOERY OF STRUCTURES	3	1	0	30	70	100	4	4
DIP5CIV02	DESIGN OF STEEL STRUCTURE	3	1	0	30	70	100	4	4
DIP503	ENVIRONMENTAL SICENCE	3	1	0	30	70	100	4	4
DIP5CIV04	REINFORCED CEMENT CONCRETE	3	1	0	30	70	100	4	4
DIP5CIV05	IRRIGATION ENGINEERING	3	1	0	30	70	100	4	4
DIP5CIV06L	TRANSPORTATION ENGINEERING LAB	2	0	2	15	35	50	2	2
DIP5CIV07L	GEOTECHNICAL ENGINEERING LAB	2	0	2	15	35	50	2	2
							Total Credit	=24	

THEORY OF STRUCTURES (DIP5CIV01)

Course Code: DIP5CIV01
Course Title: THEORY OF STRUCTURE
Theory / Lab: Theory
L-T-P-C: 3-1-0-4

Course Outcomes: On completion of the course, a student will be able to:
CO-1 Apply the design philosophies of working stress method and limit state method for determining design parameters of RC beams
CO-2 Design and detail the reinforced concrete beams using IS code
CO-3 Design and detail the reinforced slabs, columns and footings using IS Code.
CO-4 Determine the anchorage and development length of RC element.

CONTENT & THEORY
Hrs/week

Unit -1   **06**

DIRECT AND BENDING STRESSES. Concept of direct and eccentric loads, eccentricity about oneprincipal axis, nature of stresses, maximum and minimum stresses, resultant stress distributiondiagram. Condition for no tension or zero stress at extreme fibre, Limit of eccentricity, core of section for rectangular and circular cross sections. Columns, pillars and chimneys of uniform section subject to lateral wind pressure, coefficient of wind resistance, stress distribution at bases

Unit -2   **06**

SLOPE AND DEFLECTION CONCEPT OF SLOPE Deflection, stiffness of beam Relation between slope, deflection and radius of curvature, differential equation (no derivation), double integration method to find slope and

deflection of simply supported and cantilever beam. Macaulay's method for slope and deflection, application to simply supported and CANTILEVERbeam subjected to concentrated and uniformly distributed load**.**

Unit – 3   06
Fixed Beam: Concept of fixity, effect of fixity, advantages and disadvantages of fixed beam. Principle of superposition. Fixed end moments from first principle for beam subjected to UDLover entire span, central point load, Point load other than mid span. Application of standard formulae in finding moments and drawing S.F. and B.M. diagrams for a fixed beam (Derivation need not be asked in the examination)

Unit – 4   08
CONTINUOUS BEAM. Definition, effect of continuity practical example, nature of moments induced due to continuity, concept of deflected shape. Clapeyron's theorem of three moments(no derivation). Application of theorem maximum up to three spans and two unknown supportmoment only, Support at same level, spans having same moment of inertia subjected to concentrated loads and uniformly distributed loads over entire span. Drawing SF and BM diagrams for continuous beams.

Unit – 5   14
MOMENT DISTRIBUTION METHOD: Introduction, sign convention Carry over factor, stiffness factor, distribution factor. Application of moment distribution method for various types of continuous beams subjected to concentrated loads and uniformly distributed load over entire span having same or different moment of inertia up to three spans and two unknown support moment only, SF and BM diagrams (Supports at same level) Application of moment distributionmethod to single storey single bay symmetrical portal frames, SF and BM diagrams
COLUMNS: Definition, Classification of Column Buckling of axially loaded compression member,Types of end conditions for column, effective length, radius of gyration, slenderness ratio assumptions in the theory of long column Euler's theory, buckling load and Rankin's theory,
crippling load , factor of safety, safe load. Application of Rankin's and Euler theory, designingsolid circular or hollow circular sections

 Total-   **40**
Text/Reference Books:-

Titles of the Book	Name of Authors	Name of the Publisher
Mechanics of structures	S. B. Junnarkar	Charotar Publishing House, Anand
Theory of structures	S. Ramanrutham	DhanpatRai& Sons, Delhi
Analysis of Structures	V.N. Vazirani& M.M. Ratwani	Khanna Publishers Delhi

DESIGN OF STEEL STRUCTURES (DIP5CIV02)

Course Code: DIP5CIV02
Course Title: DESIGN OF STEEL STRUCTURES
Theory / Lab: Theory
L-T-P-C 3-0-1-4

Course Outcomes: On completion of the course, a student will be able to:
CO-1 Design the connections of steel components as per Indian standards.
CO-2 Perform plastic analysis of Steel Structures
CO-3 Design and detailing rolled steels sections for axial and flexural members.
CO-4 Design and detailing of built up sections for axial and flexural members.

CONTENT AND THEORY
Hrs/week

Unit -1 **06**
INTRODUCTION: Types of sections used, Grades of steel and strength characteristics; advantages and disadvantages of steel as construction material; Use of steel table andrelevant IS code; Types of loads on steel structure and its I. S. code specification.

Unit -2 **06**
CONNECTIONS: Riveted connections, Types of rivets and their use, Types of riveted joint andits failure, Strength of riveted joint and efficiency of a riveted joint. Assumptions in theory ofriveted joint Design of riveted joint for axially loaded member. Welded connection Introduction, Permissible stress in weld, strength of weld, advantages and disadvantages of welded joint. Types of weld and their symbols. Design of fillet weld and butt weld subjected to axial load.

Unit -3 **05**
DESIGN OF TENSION MEMBER: Types of sections used, permissible stresses in axial Tension and gross and net cross- sectional area of tension member Analysis and Design oftension member with welded and riveted connection. Introduction to Lug Angle and Tension splice.

Unit – 4 **08**
DESIGN OF COMPRESSION MEMBER, Angle struts Types of Sections used, Effective length, Radius of gyration, slenderness ration and its limit, Permissible compressive stresses. Analysisand Design of axially loaded angle struts with welded and riveted connection. Stanchion and Columns types of sections used; simple and built up sections, effective length, Analysis and design of axially loaded column introduction to lacing and battening (No numerical problem on Lacing and Battening

Unit -5 **09**
STEEL ROOF TRUSS: Types of steel roof truss & its selection criteria. Calculation of panel pointload for Dead load; Live load and wind load as per I.S. 875-1987 Analysis and Design of steel roof truss. Design of Angle purlin as per I. S. Arrangement of members at supports

BEAMS: Different steel sections used; Simple and built-up sections Permissible bending stresses. Design of simple beams, check for shear only. Design of built-up beams(Symmetrical I Section with cover plates only), check for shear only. Introduction to PlateGirder: Various components and their functions. (No numerical Problem on Plate Girder)

Total - **34**

Text/ Reference Books:-

Titles of the Book	Name of Authors	Name of the Publisher
Design of steel structure	S. K. Duggal	Tata Macgraw Hill Publication Company ltd.

New Delhi

Design of steel structure   M. Raghupati   Tata Macgraw Hill publication Company ltd.

New Delhi

Design of steel structureL.   S. NegeTata   Macgraw Hill publication Company ltd.

New Delhi

ENVIRONMENTAL SICENCE (DIP503)

Course Code: DIP503
Course Title: ENVIRONMENTAL SCIENCE
Theory / Lab: Theory
L-T-P-C: 3-1-0-4

Course Outcomes: On completion of the course, a student will be able to:
CO-1 Estimate quantity of water requirement for a town/city.
CO-2 Identify the water source and select proper intake structure.
CO-3 Design the components of treatment plants
CO-4 Plan and design the water distribution networks.

CONTENT & THEORY
Hrs/Week

Unit -1   **02**
ENVIRONMENTAL POLLUTION AND CONTROL:-
1.1 Introduction:-
Environment, Ecosystem, Environmental Pollution and its
types, Causes of Pollution, Effects of Pollution, Control of Pollution, Existing laws related toEnvironmental Pollution.

Unit -2   **16**
PUBLIC WATER SUPPLY:-
Quantity of Water Demands of water: Domestic, Industrial, Commercial & Institutional, Publicuse, Losses and wastes, Fire demand ; Factors affecting rate of Demand, Variations of water demands, Forecasting of population, Methods of forecasting of population, Design period for water supply scheme. Estimation of quantity of water supply required for a town or city, Typesof water supply schemes. Sources of Water
Surface and Subsurface sources of water, Intake Structures- Definition and types, Factors governing the location of an intake structure, Water conservation, Ground water recharging –
Necessity Importance and advantages. Quality of Water Need for analysis of water, Characteristics of water-Physical, Chemical and Biological, Testing of water for Total solids, hardness, chlorides, dissolved Oxygen, pH, Fluoride, Nitrogen and its compounds, Bacteriological tests, E coli index, MPN, Sampling of water, Water quality standards as per I.S.Purification of Water:-
Screening- Types of screens, Aeration- objects and methods of aeration, Plain sedimentation, Sedimentation with coagulation, principles of coagulation, types of coagulants, Jar Test, processof coagulation, types of sedimentation tanks, Filtration-theory of filtration, classification of filters : slow sand filter, rapid sand filter, pressure filter, domestic filter, filter media, construction and working of slow sand filter and rapid sand filter, Disinfection: Objects, methods of disinfection, Chlorination- Application of chlorine, forms of chlorination, types of chlorination practices, residual chlorine and its importance, orthotolidinetest, Miscellaneous water Treatments (Water softening, Defluoridation techniques), AdvancedWater Treatments (Electrolysis, Reverse Osmosis) , Flow diagram of water treatment plants, Low cost water Treatments: Necessity and importance in rural areas, Prevention of pollution ofbores and borewells.
2.5 Conveyance and Distribution of Water: Types of Pipes used for conveyance of water, choice of pipe material, Types of joints & Types of valves-their use, location and function on apipeline. Methods of distribution of water- Gravity, pumping, and combined system Service reservoirs – functions and types ,

Layouts of distribution of water- Dead end system, grid iron system, circular system, radial system; their suitability, advantages and disadvantages.

Unit-3   **14**
DOMESTIC SEWAGE:-
Introduction Importance and necessity of sanitation, Necessity to treat domestic sewage, Recycling and Reuse of domestic waste Definitions- Sewage, sullage, types of sewage Building Sanitation Definitions of the terms related to Building Sanitation- Water pipe, Rain water pipe, Soil pipe , Sullage pipe, Vent pipe, Building Sanitary fittings- Water closet – Indian and European type, flushing cistern, wash basin, sinks, Urinals, Traps-types, qualities of good trap, Systems of plumbing – one pipe, two pipe, single stack, choice of systemPrinciples regarding design of building drainage, layout plan for building sanitary fittings (drainage plan) , inspection and junction chambers, their necessity, location , size and shape.
Maintenance of sanitary units. Systems of Sewerage Types of Sewers, Systems of Sewerage, Design of sewers, self-cleansing velocity and non-scouring velocity Laying, Sewer Appurtenances Manholes and Drop Manhole-component parts, ,location, spacing, construction details, Sewer Inlets , Street Inlets, Flushing Tanks – manual and automatic Analysis of Sewage Characteristics of sewage, B.O.D./C.O.D. and significance. Aerobic and anaerobic process Objects of sewage treatment, General layout and flow diagram, Screening, Grit removal, Skimming, Sedimentation of sewage, Sludge digestion, Trickling filters, Activated sludge process, Disposal of sewage, Septic tank, Oxidation pond, Oxidation ditch.

Unit-4   **04**
INDUSTRIAL WASTE:-
4.1 Industrial Waste Water Characteristics of Industrial waste water from sugar, Dairy, Distillery, Textile, Paper and Pulp and Oil industry; and their suggestive treatments
ENVI RONMENTAL POLLUTION:-
5.1AirPollutionandNoisePollutionSources,EffectsandControlofAir Pollution, Sources , Effectsand Control of Noise Pollution (only brief idea) Global warming, Acid Rain

Unit-5   **08**
SOLID WASTES FROM THE SOCIETY:-
Solid Waste Management Definitions–Refuse, Rubbish, Garbage, Ashes, Constituents of solid wastes Sources of solid wastes, Collection of Solid Wastes. Methods of collection of solid wastes Methods of treatment and disposal of solid waste. Hazardous Wastes Introduction, Types of hazardous wastes. Characteristics of hazardouswastes. Treatment and disposal of hazardous wastes.
ENVIRONMENTAL SANITATION:-
Environmental Sanitation Necessity and importance, Rural sanitation- Types of Privies – Aquaprivy and Bore Hole Latrine- construction and working Composting (Nadep or Vermiculture),
Emerging Trends(only brief idea) Ant Gadge Baba Swachhatha Abhiyan Low cost atrines Jalswarajya Scheme.
PLUMBING:-
8.1 Sanitary Plumbing, Layout, Details of water supply arrangement for residential and publicbuilding Rainwater and sewage collection systems.

Total-   **44**

Text / Reference Books:-

Titles of the Book	Name of Authors	Name of the Publisher
Environmental Engineering (Volume I & II)	Santosh Kr. Garg	Khanna Publishers,
Environmental Engineering	Kamla A. &KanthRao D. L.	Tata McGraw Hill,
Water Supply and Sanitary Engineering	Birdie G. S. Birdie J. S.	Dhanpat Rai& Sons

Plumbing – Design and Practice   Deolalikar S. G.   Tata McGraw Hill,

REINFORCED CEMENT CONCRETE (DIP5CIV04)

Course Code: DIP5CIV04
Course Title: REINFORCED CEMENT CONCRETE
Theory / Lab: Theory
L-T-P-C: 3-1-0-4

Course Outcomes: On completion of the course, a student will be able to:
CO-1 Recall history of road development in India.
CO-2 Design road geometric elements based on highway surveys.
CO-3 Design elements of flexible and rigid pavements based on highway material properties
CO-4 Conduct traffic surveys and use the data in solving traffic engineering problems

CONTENTS & THEORY

Hrs/week

UNIT 1   **8**

Introduction: Concept of reinforced concrete structures, Different grades of concrete and steel used in RCC Load and loading standards as per IS:875. Differentiate between ultimate load method, working stress method and limit state method of design.

Design Based on Limit State Method:-Fundamentals of Limit State Method, types of limit state, Introduction to stress block parameters, Assumptions in the theory of simple bending for RCC beams, Neutral Axis, Moment of resistance, critical neutral axis, actual neutral axis, concept of balanced, under reinforced and over-reinforced sections.

Partial safety factors, characteristic strength of materials and loads, Flexural strength, Shear Strength, Development Length of bars, Concept of Deflection and cracking , Design requirements, Side face reinforcement, Nominal Cover to reinforcement.

Analysis of Beams: Analysis of the following beam as per IS:456- 2000(Simply supported and cantilever beams)
 (i)   Singly reinforced Beams
 (ii)   Doubly reinforced Beams and its necessity.
 (iii)   T-beams: Structural behaviour of a beam and slab floor laid monolithically, Rules for the design of T-Beams, Economical depth of TBeams, Strength of T-Beams, concept of L-beam.

UNIT 2   **8**

Design of singly reinforced concrete beams as per IS: 456 from the given data such as span load and properties of materials used. (Design for shear Two legged vertical stirrups only and check for deflection)

Design of doubly reinforced concrete beams as per IS: 456 from the given data such as span, load and properties of materials used. (Design only for shear), Problems on simply supported and cantilever beams.

UNIT 3   **8**

Design of RCC Slabs: Structural behaviour of one way and two way slabs under uniformly distributed load (UDL), Types of end supports, Check for DEFLECTION is not necessary.
   (i)   Design and reinforcement detailing of one way slab (simply supported) and Concept of design of balcony slab.
   (ii)   One way continuous slab (Two span only) using moment co-efficient as per IS: 456 Table 12.
   (iii)   Design and reinforcement detailing of Two-way slab :

   a) Corners are not held down

   b) Corners are held down : All the Four edges discontinuous case only.

UNIT 4   **8**

Design of Columns: Concept of long and short columns, Specifications for main and lateral reinforcement, interaction

diagram in column design, Behaviour of RCC column under axial load.
  (i)   Design and detailing of Axially loaded short columns (circular, square and rectangular as per IS specifications),
  (ii)   Design of column subjected to uniaxial bending for reinforcement distributed equally on TWO sides only using SP-16 chart (Square and Rectangular).

Design of Column Footings: Concept of column footing, Design criteria, Design of square, rectangular isolated column footings, Detailing of reinforcement.

UNIT 5   **8**

Design of Staircase: Introduction to stair cases, design and detailing of dog-legged stair, Single flight stairs. **Lintel** : Design and Detailing of a Lintel

Pre-Stressed Concrete : Concept of prestressing, Difference between RCC & PSC, Situations where prestressed concrete is used, and Materials used in prestressed concrete and their specifications as per IS. Pre-tensioning and Post-tensioning, Mention the systems of prestresses, Mention the Losses in Prestresses. (Excluding numerical problems)

Total-   **40**

Text /Reference Books:-

Titles of the Book	Name of Authors	Name of the Publisher
Design Of RCC Structural Elements Vol.-I	S. S. Bhavikatti	New Age International Private Limited
Advanced RCC Design - (R C C Vol. – II)	S. S. Bhavikatti	New Age International Private Limited
Advanced Reinforced Concrete Design 3ed	N. Krishna Raju	C8S Publication And Distributors

IRRIGATION ENGINEERING (DIP5CIV05)

Course Code: DIP5CIV05
Course Title: IRRIGATION ENGINEERING
Theory / Lab: Theory
L-T-P-C: 3-1-0-4

Course Outcomes: On completion of the course, a student will be able to:
CO-1 Determine various hydrological parameters
CO-2 Apply various methods for estimating and routing of flood runoff.
CO-3 Solve well hydraulics problems
CO-4 Determine crop water requirements.

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CONTENT & THEORY
Hrs/week

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Unit-1   12
INTRODUCTION:-
Definition – Irrigation and irrigation engineering, advantages of irrigation, ill effects of over irrigation, and types of irrigation project- purpose wise and administrative wise,Methods of irrigation.
HYDROLOGY:-
Definition of rainfall , rain gauge and rain gauge station , types of rain gauges (names only average annual rain fall and its calculation , definition of run of , factor affecting run off, calculation of run off by run of coefficient, inglis' formula, Stranges and Binnie's tablesand curves. Maximum flood discharge and methods of calculation. Yield and Dependable yieldand methods of calculation.

Unit-2   08
WATER REQUIREMENT OF CROPS:-
Cropping seasons and crop in Maharashtra. Definition – Crop period, base period Duty & Delta , factors affecting Duty , relation between Duty Delta and base period Definition – CCA , GCA, IA, intensity of irrigation time factor capacity factor. Problems on water requirement and capacity of canal. Modified Penman method. Assessmentof irrigation water.

Unit-3   06
INVESTIGATION AND RESERVOIR PLANNING:-
Survey for irrigation project data collected forirrigation project. Area capacity curve, silting of reservoir, rate of silting, factors affecting silting, methods to control levels and respective storage in reservoir. Fixing control levels.

Unit-4   10
DAMS AND SPILLWAYS:-
Types of dams – Earthen dams and Gravity dams (masonry and concrete) Comparison of earthen and gravity dams with respect to foundation, seepage, construction and maintenance Earthen Dams – Components and their function , typical cross section seepage through embankment and foundation seepage control through embankment and foundation . Methods of constructions, types of failure of earthen dams and remedial measures. Gravity Dams Theoretical and practical profile, typical cross section, drainage gallery, joint in gravity dam, high dam and low dam Spillways-Definition, function, location and components. Emergency and services, ogee spillway and bar type spillway, discharge over spillway. Spillway with and without gates.

Unit-5   06
CANALS:-
CANALS – Classification of canals according to alignment and position in the canal network. Design of most economical

canal section. Canal lining – Definition, purpose, types ofcanal lining advantages of canal lining properties of good canal lining material.CD. Works- different C.D. works, canal falls, escapes, cross regulators and canal outlets.

Total- **42**

Text/ Reference Books:-

Titles of the Book	Name of Authors	Name of the Publisher
Irrigation and hydraulic structure	S. K. Garg	Khanna publisher, New Delhi
Irrigation Engineering	B.C. Punmia	Laxmi Publication, Delhi

SEMESTER-6								
THEORY		**PERIOD**			**Evaluation Scheme**			
SUBJECT CODE	**NAME OF THE PAPER**	**LECTURES**	**TUTORIALS**	**PRACTICALS**	**MSE**	**ESE**	**SUB-TOTAL**	**Credit**	**Hours**
DIP6CIV01	ESTIMATING AND COSTING	3	1	0	30	70	100	4	4
DIP6CIV02	ENVIRONMENTAL ENGG	3	1	0	30	70	100	4	4
DIP603	INDUSTRIAL MANAGEMENT	3	1	0	30	70	100	4	4
DIP6CIV04	ELECTIVE ANY ONE	3	0	1	30	70	100	4	4
DIP6CIV05	PROJECT & VIVA				100	100	200	8	8
							Total credit	=24	

ESTIMATING & COSTING (DIP6CIV01)

Course code: DIP6CIV01
Course Title: ESTIMATION AND COSTING
Theory / Lab: Theory
L-T-P-C: 3-1-0-4

Course Outcomes: On completion of the course, a student will be able to:
CO-1 Calculate Earthwork quantities for roads and canals.
CO-2 Prepare bar bending schedule.
CO-3 Prepare specifications and contract documents for a project
CO-4 Prepare a detailed estimate of a building using long wall short wall method and centerline method.

CONTENT & THEORY

Hrs/week

Unit-1   **06**

OVERVIEW OF ESTIMATING & COSTING:-

Meaning of the terms estimating, costing. Purpose of estimating and costing. Types of estimate - Approximate and Detailed. Approximate estimate, Types- Plinth area rate method, Cubic Content method, Service Unit method, Typical bay method, Approximate Quantity method, Problems on Plinth area rate method & application ofService unit method for selection of service unit for different types of civil Engineering Structures.Types of detailed estimate. Detailed estimate for new work. Revised estimate. Supplementary estimate. Revised & Supplementary estimate. Maintenance & Repair estimate. Uses of detailed estimate

Unit-2   **06**

DETAILED ESTIMATE:-

Unit quantity method, Total quantity method, Data required for detailed estimate. Factors to be considered during preparation of detailed estimate, Specification, Quantity availability of material, Location of site, Labour Component. Steps in preparing detailedestimate. Taking out quantities, squaring, abstracting. Preparing check list – by adoption of Sequence of execution. Drafting Brief Specification of items, contents of measurement Sheet , Abstract sheet, face sheet.

Unit-3   **04**

MODE OF MEASUREMENTS:-

General Rules for fixing units of Measurements for different – items ofwork as per IS 1200 & As per PWD Hand Book Desired accuracy in taking measurements of various items of work & rules for deductions as per IS 1200 & P.W.D.

handbook.

Unit-4   10
PROCEDURE FOR PREPARING DETAILED ESTIMATE:-
Procedure for taking out quantities for various items of works by P.W.D & IS 1200 for:- Load bearing Structure –Long Wall and short wall method ,Center line method. Framed Structure building. By using thumb rules for reinforcement quantity calculation By preparing bar bending Schedule Provisions in detailed estimate for contingencies, work charged establishment, Provisional items, Provisional Sum, Provision for water Supply & Sanitary works, Electrical wiring & installations, centage charges, Tools & Plants, Prime cost, Day
work.

Unit-5   12
RATE ANALYSIS MEANING OF TERM RATE ANALYSIS:-
Factors affecting rate analysis, lead, lift, taskwork, materials and labour component, Market Rate and labour rate. Transportation of Materials,load factor for different materials. Standard lead , extra lead, Transportation Charges , Labour - Categories of labours, labour rates, overheads , contractor's profit, water charges, taking out quantities of materials for different items of works. Preparing rate analysis of different items of work Standard Schedule of rates, full rates & labour rates. Taking out quantities of work for different Civil Engineering Works Roads, Dam , Canals ,Railway embankments, methods of mean area , mid sectional area, trapezoidal, Prismoidal formula. Calculation of quantity of earth work.

Total-   **38**

Text / Reference Books:-

Titles of the Book	Name of Authors	Name of the Publisher
Estimating & costing in Civil Engineering	B.N. Datta	UBS Publishers Distributors Pvt Ltd New Delhi
Estimating & costing, Specification and Valuationin Civil Engineering	M.Chakraborti	M. Chakraborti , Calcutta
Estimating & costing	S.C. Rangwala	Charotar Publication, Anand

ENVIRONMENTAL ENGINEERING (DIP6CIV02)

Course Code: DIP6CIV02
Course Title: ENVIRONMENTAL ENGINEERING
Theory / Lab: Theory
L-T-P-C: 3-1-0-4

Course Outcomes: On completion of the course, a student will be able to:
CO-1 Plan and design the sewerage systems
CO-2 Analyze the characteristics of the waste water
CO-3 Select suitable method for sewage treatment
CO-4 Identify suitable method of disposal of sewage

Hrs/Week

Unit-1   **07**

POPULATION FORECASTING AND WATER DEMAND

Population forecasting methods- Arithmatic increase method, Geometric increase method, Incremental increase method, Decrease growth rate method,

Quantity of Water Demands: Domestic, Industrial, Commercial & Institutional, Public use, Losses and wastes, Fire demand ; Factors affecting rate of Demand, Variations of water demands, Coincidental draft, Total demand, Components of water supply scheme.

Unit-2   **08**

WATER QUALITY

Sources of Water-Surface and Subsurface sources of water, Characteristics of water-Physical, Chemical and Biological, Testing of water for Total solids, hardness, chlorides, dissolved Oxygen, pH, Fluoride, Nitrogen and its compounds, Bacteriological tests, Ecoli index, MPN, Sampling of water, Water quality standards as per I.S.Purification of Water. Water borne diseases, Toxic and non toxic metals.

Unit-3   **07**

PLAIN SEDIMENTATION, COAGULATION, FILTRATION AND DISINFECTION

Stoke's law for settling velocity, Surface loading rate, Detention time, Flow through velocity, Particle removal efficiency, Mechanism of coagulants, Commonly used coagulants. Classification of filters: slow sand filter, rapid sand filter. Disinfection: Objects, methods of disinfection, Chlorination- Application of chlorine, types of chlorination practices, residual chlorine and its importance.

Unit-4   **06**

INTRODUCTION OF WASTE WATER ENGINEERING AND QUALITY CHARACTERISTICS OF SEWAGE

Estimation of dry weather flow, Wet weather flow

BOD, Classification of waste based on BOD/COD value, BOD loading rate, Efficiency of BOD removal, Sludge volume index, permissible value of parameters in waste water, Sewage sickness, Pyrolosis and Incineration

Unit-5   **07**

AIR POLLUTION & CONTROL AND NOISE POLLUTION

Sources of Air Pollution, Classification of air pollutants and their permissible values as per NAAQS, Lapse rate, Effects and Control of Air Pollution.

Noise Pollution Sources, Sound pressure level, Effects and Control of Noise Pollution.

Total -   **35**

Text/ReferenceBooks:-

TitlesoftheBook	Name ofAuthors	NameofthePublisher
Environmental Engineering (Volume I & II)	Santosh Kr. Garg	Khanna Publish
Environmental Engineering Water Supply and	KamlaA.& Kanth Rao D.L.	Tata McGraw Hill,
Sanitary Engineering	Birdie G.S.Birdie J.S.	Dhanpat Rai&Sons
Plumbing–Design and Practice	DeolalikarS.G.	Tata McGraw Hill,

INDUSTRIAL MANAGEMENT (**DIP603**) (COMMON)

Course code: DIP603
Course Title: INDUSTRIAL MANAGEMENT
Theory / Lab: Theory
L-T-P-C: 3-0-0-3

Course Outcomes: On completion of the course, a student will be able to:
CO-1 Know the concepts of project planning and management.
CO-2 Construct networks using PERT and CPM techniques.
CO-3 Update networks using resource allocation and resource smoothening
CO-4 List different management information systems.

CONTENT & THEORY

Hrs/Week

Unit-1   **04**
OVERVIEW OF BUSINESS:-
Types of Business, Service, Manufacturing, Trade, Industrial   Sectors
Introduction to Engineering Industry, Process Industry, Textile IndustryChemical Industry, Agro
Industry, Globalization Introduction Advantages & Disadvantages w.r.t .India Intellectual Property
Rights(I.P.R.)

Unit-2   **06**
MANAGEMENT PROCESS:-
What is Management? Evolution, Various definitions, Concept of management, Levels of management, Administration
&management, Scientific management by F.W.Taylor, Principles of Management (14 principles of Henry Fayol),
Functions of Management, Planning, Organizing, Directing, Controlling

Unit-3   **06**
ORGANIZATIONAL MANAGEMENT:-
Organization:- Definition, Steps in organization, Types of organization, Line, Line &staff, Functional, Project,
Departmentation, Centralized & Decentralized, Authority & Responsibility,Span of Control, Forms of ownership,
Propriotership, Partnership, Joint stock, Co-operative Society Govt. Sector

Unit-4   **08**
HUMAN RESOURCE MANAGEMENT, PERSONNELMANAGEMENT:-
Introduction, Definition Functions, Staffing, Introduction to HR Planning, Recruitment Procedure, Personnel– Training
&Development, Types of training, Induction, Skill, Enhancement, Leadership &Motivation, Maslow's Theory of
Motivation Safety Management, Causes of accident, Safety precaution
Introduction to– Factory Act, ESI Act, Workmen Compensation Act, Industrial Dispute Act

Unit-5   **06**
FINANCIAL MANAGEMENT, FINANCIAL MANAGEMENT OBJECTIVES & FUNCTIONS:-
Capital Generation &Management, Types of Capitals, Sources of raising Capital, Budgets andaccounts, Types of
Budgets, Production Budget (including Variance Report), Labour Budget Introduction to Profit & Loss Account (only
concepts); Balance Sheet Introduction to– Excise Tax, ServiceTax, Income Tax, VAT, Custom Duty

TOTAL -   **30**

Text/ Reference Books:-

Titles of the Book	Name of Authors	Name of the Publisher
Industrial Engg & Management	Dr. O.P. Khanna	Dhanpat Rai & sons
New Business Administration		

| & Management | Dr. S.C. Saksena | Sahitya Bhavan Agra |
| The Process of Management | W.H.Newman E.Kir by Warren Andrew | R.McGill Prentice- Hall |

ELECTIVE (DIP6CIV04)
i) ADVANCED CONSTRUCTION TECHNIQUES & EQUIPMENTS

CONTENT & THEORY

Hrs/week

Unit-1   06
ADVANCED CONSTRUCTION MATERIALS:-
FIBERS ANDPLASTICS.
Types of fibers – Steel, Carbon, Glass fibers. Use of fibers as construction materials. Properties offibers. Types of Plastics – PVC, RPVC, HDPE, FRP, GRP etc. Colored plastic sheets. Use of plastic as construction Material. Artificial Timber Properties and uses of artificial timber. Types of artificial timber available in market, strength of artificial timber. Miscellaneous materials Properties and uses of acoustics materials, wall claddings, plaster boards, Micro-silica, artificial sand, bonding agents, adhesives etc.

Unit-2   10
ADVANCED CONCRETING
Methods Prestressed Concrete Grades of Concrete and prestressing cables for prestressed concrete.Methods of pre-tensioning and post tensioning. Equipments and accessories for perrstressing. Precautions during prestressing of members. Under Water Concreting Underwater concreting for bridge piers and bored pile construction. Tremy method of underwater concreting. Procedure and equipments required for tremy method. Properties, workability and water cement ratio of the concrete required. Ready Mix concrete Necessity and use of Ready Mix Concrete. Production and equipments for RMC. Ready Mix Concrete plant. Conveying of RMC. Transit mixers-working and time of transportation. Workabilityand water cement ratio for RMC. Strength of RMC. Tremix Concreting method Definition, application of vacuum dewatering concreting. Equipments used intermix concreting. Procedure of vacuum dewatering concreting (Tremix). Special Concretes Properties, uses and procedure of Roller compacted concrete. Properties and uses of High Impact Resisting concrete. Properties, uses and constituents of Steelfiber reinforced concrete. Percentage of steel fibers in SFRC. Effect of size, aspect, ratio and percentage of steel fibers on strength of concrete.

Unit- 3   08
ADVANCED CONSTRUCTION METHODS:-
Formwork Steel Formwork, H frames, Steel plates, Steel props, Telescopic props, Girders or trestles. Tubular formwork. Slip formwork- meaning, use of slip formwork. Process of concretingwith slip forms. Construction of Multistoried Buildings Use of lifts, belt conveyors, Pumped concrete, Equipments and machinery required for construction of Multistoried Buildings. Precautions and safety measures. Prefabricated Construction
Meaning of prefabrication and precast. Methods of prefabrication- plant prefabrication and siteprefabrication. Linear members, rigid frames, roofing and flooring members, R.C. Doors and windows, wall panels, Jointing of structural members. Soil Reinforcing techniques Necessity of soil reinforcing, Use of wire mesh and geo-synthetics. Strengthening of embankments,slope stabilization in cutting and Embankments by soil reinforcing techniques.

Unit -4   08
HOISTING AND CONVEYING EQUIPMENTSHOISTING EQUIPMENTS:-
Principle and working of Tower cranes, Crawler cranes, Truck mounted cranes, gantry cranes, Mastcranes, Derricks. Conveying Equipments Working of belt conveyors. Types of belts and conveying mechanism. Capacity and use of dumpers, tractors and trucks.
EARTH MOVING MACHINERY EXCAVATION EQUIPMENTS:-
Use, Working and output of bulldozers, scrapers, graders, and power shovels, JCB, draglines. Compacting Equipments Use of rollers, Roller types- Plain rollers , Sheep footed rollers, Vibratoryrollers, pneumatic rollers. Rammers- use and working.

Unit-5   **08**
CONCRETING EQUIPMENTS CONCRETE MIXERS:-
Types of concrete mixers. Weigh batching equipments, Equipments for transportation of concrete-trollies, lifts. Transit mixers, Concrete vibrator- Needle vibrators, Screed vibrators. Automatic concrete plants – layout, process and working. Stone Crushers Types of stone crushers, capacities and working. Equipments for production ofartificial san

MISCELLANEOUS EQUIPMENTS AND EQUIPMENT MANAGEMENT:-
Miscellaneous Equipments Pile driving equipment, Pile hammers, and selection of hammers. Workingof hot mix bitumen plant, Bitumen paver. Grouting equipments, Floor polishing machine. Equipment Management Standard equipment, Special equipment, Selection of equipment, Owningand operating cost of construction equipment. Economic life of construction equipment. Preventive maintenance of equipment, Break down maintenance of Equipments.

Total -   **40**

Text Books:-

Titles of the Book	Name of Authors	Name of the Publisher
Construction Technology Vol. I to IV	R. Chudly	ELBS- Longman Group
Construction Planning equipment and methods	R.L. Peurifoy	McGraw-Hill Co. Ltd.
Construction Engineering and management	S. Seetharaman	Umesh Publication, New Delhi.
Construction management and Planning	B. Sengupta and Guha	Tata McGraw Hill

(ii) MAINTENANCE & REHABILITATION OF STRUCTURES

Name of the Topic

                                                                                                         Hrs/week
Unit-1   **05**
INTRODUCTION:-
Necessity, operation, maintenance & repairs of structures Classification of maintenance,Rehabilitation (restoration),strengthening, retrofitting. Methodical approach to repairs, inspection-annual, emergency, special, repairs- minor, special and renovation. Causes & detection of damages: Causes of damages, damages due to earthquakes, firehazards, flood, hazards, dilapidation, List of basic equipments for investigation.

Unit-2   **05**
MATERIALS FOR REPAIRS:-
Epoxy resin, epoxy mortar, gypsum cement mortar, quick setting, cement mortar, Shot-creting Mechanical anchors. Masonry walls: Damp walls, causes effects, remedies, eradication of efflorescence Cracks in walls, remedial & preventive measures bond between old & new brick work, reinforced brickwork.

Unit-3   **05**
REPAIRS TO FOUNDATION:-
Remedies, types & processes of settlement, foundations in king Examination of existingfoundation, strengthening of foundation. Water proofing: Leaking Basements & roofs

Unit-4   **07**
CONCEPT OF REPAIRS & STRENGTHENING OF RCC STRUCTURES:-
Concept of repairs of RCC structures Physical examination of common defects,
Structural repairs & strengthening repairs by new developments. Damage due to fire: Fireresistance, effects of temp. of RCC, Repairs to RCC structures damaged due to fire Advanced Damage detection techniques: Advanced damage

detection techniques, non-destructive testing.

Unit-5   **12**
STRENGTHENING METHODS:-
Cantilevers, beams, slabs, walls, columns, foundation. Evaluation of strength, economic & age of building: Determination of approx. age of a building. Determination of strength of structural member of old building. Finding cost in use of an existing building. Maintenance of life lines: Maintenance of electric supply, water supply leaking pipe joints and sewerage systems, closed drains, sewers. Maintenance of roads, road berms, side drain maintenance of bridges, culvertscauseways

ESTIMATES AND TENDERING:-
Estimates of annual repairs, special repairs and maintenance work. Preparation of tender

Total -   **34**

Text /Reference Books:-

Titles of the Book	Name of Authors	Name of the Publisher
Maintenance and Repairs of Buildings	P.K. Guha	New Central book Agencies
Maintenance Engineering For Civil Engineers	Nayak B. S.	Khanna Publication
Maintenance and Repairs of Buildings	Hutchin Son, BD	Newnes –Butterworth.
Building Failures – Diagnosis and Avoidance	Ransom W. H.E and F. N. Span.	

iii) ARCHITECTURAL PRACTICES AND INTERIOR DESIGN

ARCHITECTURAL PRACTICE

           Hrs/week
Unit-1   **02**
ARCHITECTURAL DESIGN:-
Review of principles of Architecture. Site selection, Climatic conditions, sun control, orientation of building &site. Building by laws & its applications.

Unit-2   **02**

BUILDING AESTHETICS:-
Feeling for aesthetics and utility, composition, unity, mass composition, order, expression, proportion, scale, accentuation & rhythm, contrast,balance, pattern. Character of Building.

Unit-3   **08**
DESIGN OF PROJECTS:-
A case study of residential building. A case study of public/commercial building.

Unit-4
Aspect of working drawing plan,elevation section

Unit-5   **04**
LANDSCAPING:-
Soft and Hard landscaping. Basic Principle of landscaping. Assessmentof land. Design procedure. A case study of landscape for public/commercial building campus.

Total -   **16**

INTERIOR DESIGN

Hrs/week

Unit-1   **03**
ELEMENTS AND PRINCIPLES OF DESIGN:-
Elements such as form, texture, light, colour, effect of light on colour and texture, spaceorganization of space in design, space pattern. Importance of colour as art element. Various colour schemes.

Unit-2   **01**
ANTHROPOMETRICS DATA:-
Relation of human measurement to furniture andmovement and to circulation patterns.

Unit-3   **02**
INTERIOR MATERIALS:-
Different interior materials, paneling, partitions, finishing materials, furniture. Falseceiling, flooring, paints.

INTERIOR OF RESIDENTIAL BUILDING:-

Unit -4   **07**
Use of space, circulation, standard size of furniture.
Plans and elevation of interior with furniture for living space, dining space, kitchen,bedroom, guest room etc.

Unit -5   **03**
INTERIOR OF SMALL COMMERCIAL BUILDING:
Planning of interior for small commercial units such as offices, consulting chambers,shops etc. Furniture details such as executive table, architectures Table etc. used in commercial units.

Total-   **16**

Text/Reference Books:-

Titles of the Book	Name of Authors	Name of the Publisher
Building construction	M. G. Shah, C.M. Kale / S.Y. Patiki	Tata McGraw Hill
Times as per standard for interior design & space planning	Joseph DeChiara, Julins Panch, martin Zelnik	MC Graw Hill
The use of colours in Interiors	Albert O. Halse	McGraw Hill
Nwtert – Architects	Bousmaha Baiche & Nicholes Walliman	Black Well Science