Netaji Subhas University
The Diploma Civil Engineering' Course Structure
(Effective from Session 2021-24)

First Year

SUBJECT CODE	SEMESTER 1	SUBJECT CODE	SEMESTER 2
DIP101	BASIC PHYSICS	DIP201	COMMUNICATION SKILL-II
DIP102	BASIC CHEMISTRY	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	BASIC PHYSICS LAB	DIP207L	ENGINEERING DRAWING LAB
DIP108L	COMPUTER FUNDAMENTALS LAB	DIP208L	CHEMISTRY LAB

SECOND YEAR

SUBJECT CODE	SEMESTER 3	SUBJECT CODE	SEMESTER 4
DIP301	ENGG. MATHEMATICS-II	DIP4CIV01	TRANSPORTATION ENGINEERING I
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 I LAB	DIP4CIV06L	HYDRAULICS LAB
DIP3CIV07L	STRENGTH OF MATERIAL LAB	DIP4CIV07L	SURVEYING II 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
DIP503	ENVIRONMENTAL SCIENCE	DIP603	INDUSTRIAL MANAGEMENT
DIP5CIV04	TRANSPORTATION ENGINEERING II	DIP6CIV04	ELECTIVE ANY ONE
DIP5CIV05	IRRIGATION ENGINEERING	DIP6CIV05	PROJECT & VIVA
DIP5CIV06L	IRRIGATION ENGINEERING LAB		
DIP5CIV07L	DSS LAB		

ELECTIVE– ADVANCED CONSTRUCTION TECHNIQUES & EQUIPMENTS

MAINTAINANCE AND REHABILITATION OF STRUCTURE

ARCHITECTURAL PRACTICES AND INTERIOR DESIGN

SEMESTER 1

SEMESTER – 1									
THEORY		PERIOD			Evaluation Scheme			Credit	Hours
SUBJECT CODE	NAME OF THE PAPER	LECTURES	TUTORIALS	PRACTICALS	MSE	ESE	SUB-TOTAL		
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	BASIC PHYSICS LAB	0	0	2	15	35	50	2	2
DIP108L	COMPUTER FUNDAMENTALS LAB	0	0	2	15	35	50	2	2
							Total Credits:	28	

BASIC PHYSICS (DIP101)

Course Outcome:

I: Learn about the measurements used in science and units of all physical quantities .
II: Learn about the elasticity, Surface tension and Viscosity properties of any material.
III: Learn about the heat and its transmission and different types of laws its follows.
IV: Learn about the Light , Properties of light , Wavelength of Light and Laser.
V: Learn about Photo Electricity and X Rays and their Properties.

	Contents (Theory)	Hrs/ week
Unit -1	**UNITS AND MEASUREMENTS** 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 accuracy and precision. Standard reference surfaces used in engineering measurements- surface plate, angle plate, V- block, Engineer's square.	**06**
Unit -2	**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 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.	**08**

Unit -3	**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).	**06**
Unit -4	**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.	**08**
Unit -5	**MODERN PHYSICS :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.	**05**
Total		**33**

Text/Reference Books :-

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

BASIC CHEMISTRY (DIP102)

Course Outcome:

I: Learn about the Atomic Structure, Isotopes and Isobars, Valency, Electrovalent and Covalent Bond.

II: Learn about the Electrolysis and Electrolytic Solutions and their applications.

III: Learn about the Metals and Alloys and their occurrence and preparation of different type of alloys.

IV: Learn about the Non Metallic Materials Plastics, Rubber and Thermal Insulating Materials.

V: Learn about the environmental effects affects, Air Pollution and Water Pollution.

	CONTENTS &THEORY	Hrs/ week
Unit -1	**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.	**05**
Unit -2	**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.	**06**
Unit -3	**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.	**08**
Unit -4	**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.	**04**

Unit –5	**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.	**09**
TOTAL		**32**

Text/Reference Books:-

	Titles of the Book	**Name of Authors.**	**Name of the Publisher**
(i)	Engineering Chemistry	Jain & Jain	DhanpatRai and Sons
(ii)	Engineering Chemistry	S.S. Dara	S. Chand Publication
(iii)	Industrial Chemistry	B.K. Sharma	Goel Publication
(iv)	Environmental Chemistry Pollution Control.	S.S. Dara	S. Chand Publication

BASIC MATHEMATICS (DIP103)

Course Outcome:

I: Learn about the Algebra, Partial fraction, Determinant and Matrices.
II: Learn about the Binomial Theorem and Trigonometry functions.
III: Learn about the Inverse Trigonometric Ratios & Properties of triangles.
IV: Learn about the Straight line and Circle, their slope, equations and angles.
V: Learn about Vectors, types of vectors and their applications.

Contents (Name of Topics)		**Hrs/ week**
Unit -1	**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** Definition and expansion of determinants of order 2 and3. Cramer's rule to solve simultaneous equations in 2 and 3unknowns. **Matrices** 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.	**10**

Unit -2	**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) **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**	**08**
Unit -3	**INVERSE TRIGONOMETRIC RATIOS:** Definition of inverse trigonometric ratios, Principal values of Inversetrigonometric ratios. Relation between inverse trigonometric ratios. **PROPERTIES OFTRIANGLE** Sine, Cosine, Projection and tangent rules (without proof) Simple problems. **COORDINATE GEOMETRY** **POINT AND DISTANCES:** Distance formula, Section formula, midpoint, centroid of triangle. Area of triangle and condition of collinearity.	**08**
Unit-4	**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 distance between 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.	**08**
Unit-5	**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	**06**
TOTAL		**40**

Text/Reference Books:-

S no	Titles of the Book	Name of Authors.	Name of the Publisher
(i)	Mathematics for Polytechnic	S.P. Deshpande	Pune Vidyarthi Griha
(ii)	Trigonometry	S.L. Lonely	S. Chand Publication
(iii)	Higher Algebra	H.S. Hall & S.R. Knight	Metric edition, Book Palace, New Delhi
(iv)	College Algebra	Frc. G. Valles	Charotar Publication

COMMUNICATION SKILL-I (DIP104)

Course Outcome:

- **I: Know about the Communications, and the benefits of communication and its application in daily life.**
- **II: Know how to write a letter, like Government letter, Formal letter ,writing essays and small paragraphs**
- **III: Know about Preparation for Job and Writing Applications for Jobs and Interviews.**
- **IV: Know about the Grammar, use of different types of speech direct and indirect speech, active and passive voice.**
- **V: Know about the Preparing for Group Discussions.**

Contents : Theory		Hrs/ week
Unit -1	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.	**08**
Unit -2	Government Correspondence: Noting, Routine Letter, Demi-Official Letter Memorandum, Circular, Telegrams, Newsletter. Writing Skills: Report Writing, Scientific Paper Writing, Writing SmallParagraphs & Essays.	**08**
Unit -3	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.	**05**
Unit -4	**Grammar:** Sentence Structure, Idiomatic Usage of Language, Tenses, Direct & Indirect Parts of Speech, Active & Passive Voice, Vocabulary	**07**
Unit -5	**Preparation for Job:** Writing Applications for Jobs, Preparing Curriculum Vitae, Preparing for Interviews, Preparing for Group Discussions.	**08**
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 Outcome:

- **I: Know about the Drawing Instruments and their uses.**
- **II: Learn to draw curves & Loci of Point, ellipse, parabola, hyperbola, polygon and hexagon.**
- **III: Know how to draw Orthographic projections.**
- **IV: Know how to draw Isometric projection.**
- **V: Know how to draw projections of circle, square, rectangle and rhombus.**

CONTENTS & THEORY		Hrs/week
Unit -1	**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.	**05**
Unit -2	**Engineering** 2.1**curves & Loci of Point: To drawan ellipse by :** 2.1.1Directrix and focus method 2.1.2Arcs of circle method. 2.1.3Concentric circles method. 2.2**To draw a parabola by :** 2.2.1Directrix and focus method 2.2.2Rectangle method 2.3**To draw a hyperbola by :** 2.3.1Directrix 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.	**09**
Unit – 3	**Orthographic projections :** Introduction to Orthographic projections. Conversion of pictorial view into Orthographic Views (First Angle Projection MethodOnly). Dimensioning technique as perSP-46.	**06**
Unit – 4	**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).	**05**
Unit – 5	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.	**07**
TOTAL		**32**

Text/Reference Books:-

S.No	Titles of the Book	Name of Authors.	Name of the Publisher
(i)	Engineering Drawing	N.D. Bhatta	Charotar Publishing House
(ii)	Engineering Drawing & Graphics+ Auto CAD	K. Venugopal	New Age Publication
(iii)	Engineering Drawing	R.K. Dhawan	S. Chand Co.
(iv)	Engineering Drawing	P.J. Shah	-

COMPUTER FUNDAMENTALS (DIP106)

Course Outcome:

- **I: Know about the Computer origination, about its hardware and software and its applications.**
- **II: Know about the Computer memory and Number system .**
- **III: Know about the Operating System in computer and its commands.**
- **IV: Know about word processors, Spreadsheet and database package.**
- **V: Know concept of data communication and networking, communication and transmission.**

	CONTENTS & THEORY	Hrs/week
Unit -1	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).	**08**
Unit -2	**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.	**08**
Unit -3	**Operating System Concept:** Introduction to operating system; Function of OS, Types ofoperating systems, Booting Procedure, Start-up sequence, Dos – History, Files and Directories, Internal and External Commands, Batch Files	**05**
Unit -4	**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 inMS-Access, MS –PowerPoint	**07**
Unit -5	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	**08**
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

SEMESTER – 2									
THEORY		PERIOD			Evaluation Scheme			Credit	Hours
SUBJECT CODE	NAME OF THE PAPER	LECTURES	TUTORIALS	PRACTICALS	MSE	ESE	SUB-TOTAL		
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
DIP206L	BASIC WORKSHOP PRACTICE	0	0	4	30	70	100	4	4
DIP207L	ENGINEERING DRAWING LAB	0	0	2	15	35	50	2	2
DIP208L	CHEMISTRY LAB	0	0	2	15	35	50	2	2
							Total Credits:	28	

COMMUNICATION SKILLS-II (DIP201)

Course Outcome:

- **I : Know about the elements of communication: sender-message-channel- Receiver - Feedback & Context**
- **II: Know about the types of communication.**
- **III: Know about the Effective Communications like knowing the audience and their feedbacks.**
- **IV: Know about the Non-verbal graphic communications.**
- **V: Learn to write letters like complaint letter, order letter, accident and Investigation letter writing.**

CONTENTS & THEORY		
	Name of the Topic	Hrs/Week
Unit -1	**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.	**08**
Unit -2	**Types of communication :** **2.1** Formal- Informal, Verbal- Nonverbal, Vertical- Horizontal- Diagonal.	**04**
Unit - 3	**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.	**06**

Unit - 4	**Non verbal- graphic communication**: 4.1Noun-verbal codes: A-Kinesics, B-Proxemics, C-Haptics D-Vocalics ,E-Physical appearance. F-Chronemics, G-Artifacts Aspects of Body Language Interpreting Visuals & illustrating with Visuals like Tables, Charts & graphs.	**06**
Unit - 5	**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.	**06**
	Total	**30**

Text/Reference Books :-

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

Engg. Mathematics-I (DIP202)

Course Outcome:

- **I: Know about the functions and limits and their uses.**
- **II: Know about the different types of derivative functions.**
- **III: Know about the Statistics And Probability.**
- **IV: Know about the Applications Of Derivative and complex number.**
- **V: Learn to Numerical Solution of Algebraic Equations**

Contents theory		**Hrs/week**
Unit -1	**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.	**06**
Unit -2	**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.	**1** **2**

Unit - 3	**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	**12**
Unit - 4	**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	**09**
Unit - 5	**Numerical Solution of Algebraic Equations** Bisection method, Regula-Falsi method and Newton- Raphson method. **5.2 Numerical Solution of Simultaneous Equations** Gauss elimination method Iterative methods-Gauss Seidal and Jacobi's method	**06**
TOTAL		**45**

Text/Reference Books :-

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

APPLIED SCIENCE (DIP203)

Course Outcome:

- **I: Know about the Rectilinear motion and angular motion and their velocity time graphs.**
- **II: Know about Kinetics and work, power and energy.**
- **III: Know about the Nondestructive testing of materials and their different methods used.**
- **IV: Know about the the factors affecting planning of auditorium, sound insulation and noise pollution.**
- **V: Know about the acoustics and indoor lighting of buildings**

(A) PHYSICS

	Contents	Hrs/week
Unit-1	**Kinematics** **Rectilinear Motion** Equations of Motions- v = u+at, S = ut+1/2at^2, V^2 = u^2+2as (only equation), Distance traveled byparticle in nth 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) angulardistance traveled by particle in nthsecond(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.	**08**
Unit-2	**Kinetics** Definitions of momentum, impulse, impulsive force, and Statements of Newton's laws ofmotion 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. **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).	**04**
Unit -3	**Non-destructive testing of Materials.** **T**esting 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.	**04**
Unit -4	**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.	**05**
Unit -5	**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.	**03**
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	-

(B) CHEMISTRY

Course Outcome:

- **I: Know about the Electrochemistry, electrolysis and conductor, metallic and electrolytic conduction.**
- **II: Know about the non-metallic engineering materials.**
- **III: Know about the metals and different types of alloys.**
- **IV: Know about the corrosion, galvanization and electroplating of metals**
- **V: Know about the lubricants and viscosity.**

	CONTENT & THEORY	Hrs/Week
Unit -1	**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.	**05**
Unit -2	**Non Metallic Engineering Materials** (Plastic, Rubber, Insulators, Refractories, Composite Material, Ceramics) **1. 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. **2. Ceramics:** Definition, Properties & Engineering Applications, Types-Structural Ceramics, FacingMaterial, Refractories, Fine Ceramics, Special Ceramics. **3. Refractories:** Definition, Properties, Applications & Uses of Fire Clay, Bricks, Silica Bricks. **4. Composite Materials:** Definition, Properties, Advantages, Applications & Examples.	**05**

Unit -3	**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.	**08**
Unit -4	**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.	**06**
Unit -5	**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.	**03**
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 Outcome:

- **I: Know about the force and its units and types, moment of force and resolution of force.**
- **II: Know about the equilibrium of concurrent and non-concurrent and parallel forces?**
- **III: Know about the friction and its types and their applications.**
- **IV: Know about the Centroid and Centre of gravity.**
- **V: Know about the uses of simple machines in our daily life and their mechanism.**

	Contents &Theory	Hrs/ week
Unit -1	**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.	**12**
Unit -2	**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.	**10**
Unit -3	**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.	**08**
Unit -4	**Centroid and Centre Of Gravity:** Centroid: Definition of centroid. Moment of an area about an axis. Centroid of basicgeometrical 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.	**08**

Unit -5	**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'sdifferential 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.	**10**
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 Outcome:

- **I: Know about the Conversion of pictorial view into sectional orthographic views.**
- **II: Know about the Orthographic views-simple components First AngleProjection Method only.**
- **III: Know about the isometric projections on plane surfaces.**
- **IV: Know about the projections of solids and sections of solids.**
- **V: Know about the the development of surfaces and free hand sketches.**

Contents (Theory)		**Hrs/week**
Unit -1	**Sectional Views.** Types of sections Conversion of pictorial view into sectional orthographic views (First Angle Projection Method only)	**03**
Unit -2	**Missing Views.** 2.1Draw missing view from the given Orthographic views-simple components (First Angle Projection Method only)	**01**
Unit - 3	**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).	**03**
Unit - 4	**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. **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.	**05**

Unit - 5	**Developments of Surfaces.** Developments of Lateral surfaces of cube, prisms, cylinder, pyramids, cone and their applicationssuch as tray, funnel, Chimney, pipe bends etc. **Free Hand Sketches** 7.1Free hand sketches of nuts, bolts, rivets, threads, split pin, foundation bolts,	**04**
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

SEMESTER 3

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-I LAB	0	0	2	15	35	50	2	2
DIP3CIV07L	STRENGTH OF MATERIAL LAB	0	0	2	15	35	50	2	2
							Total Credit-	24	

ENGG. MATHEMATICS-II (DIP301)

Course Outcome:

- **I: Will know about the Concept and Definition of Integration and Partial Fractions**
- **II: Learn about the concept of Differential Equations using variable separation method**
- **III: Learn about Algebraic equations using Bisection Method, Regula-Falsi Method and Newton Raphson Method**
- **IV: Learn about the concept of probability using the Binomial Distribution, Poisson's Distribution & Normal Distribution**
- **V: About Laplace Transform and their functions, Fourier series.**

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	CONTENT AND THEORY	Hrs/Week
Unit 1	**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.	10
Unit 2	**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 asvariable separable form, reducible to Variable separable, Homogeneous and Linear Differential Equation. Applications of Differential equations.	08
Unit 3	**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 interpolationformula. 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	10

Unit 4	**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	06
Unit 5	**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	08
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) Private limited , New Delhi
Introductory Method of Numerical Analysis	S.S. Shastri	P.H.I
A text book for class 12, Part- I & II		NCERT, Delhi

SURVEYING I (DIP3CIV02)

Course Outcome:

- **I: Methods of measuring the distance and surveying of land, Using different types of instruments and methods, Knowing about the obstructions while surveying works and how to overcome them.**
- **II: How to use the compass and take readings while survey works.**
- **III: Concept of Levelling and how to make the land level using Levelling instruments.**
- **IV: About Theodolite Surveying its adjustment and taking Vertical and horizontal angles from it.**
- **V: Plane table Surveying and their instruments knowledge.**

	CONTENT AND THEORY	Hrs/Week
UNIT-1	**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, signalling, 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 liner 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 ill conditioned 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	12

	error & remedies. Error in chain surveying- causes & remedies, Precautions during chainsurveying.	
Unit 2	**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.	10
Unit 3	**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.	04
Unit 4	**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.	08
Unit 5	**PLANE TABLE SURVEY:** Different instruments used. Different Methods	04
TOTAL		38

REFERENCE BOOKS:

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

STRENGTH OF MATERIAL (DIP3CIV03)

Course Outcome:

- **I: Concept of stress and strain and different laws related to them.**
- **II: Concept of centroid and moment of inertia, radius of gyration.**
- **III: Analysis of beams and different types of beams, and their SFDs and BMDs.**
- **IV: Analysis of forces, resolution of forces, equilibrium of forces, types of support and loads on beam.**
- **V: Derivation of stress formula and concept of neutral axis and calculations of shear stress.**

	CONTENT AND THEORY	Hrs/ Week
Unit 1	**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. 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).	16
Unit 2	**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	06
Unit 3	**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. Introductionof singularity function for calculation SFD & BMD.	08
Unit 4	**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)	10
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 Private Limited
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 Outcome:

- **I: Concept of Types of lines used in making a plan of building.**
- **II: Concept of planning a building plan, knowing the principles like space requirements and local governing bodies' byelaws.**
- **III: Different types of drawings for making a building.**
- **IV: Perspective drawing concept and its application.**

	CONTENTS (THEORY)	Hrs/ Week
UNIT I	**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.	04
UNIT 2	**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,	06
UNIT 3	**TYPES OF DRAWING:** Development of line planElevation Section Site plan Location plan Foundation plan Area statement and other details Measured Drawings and its Significance Submission drawing and Working Drawing	15
UNIT 4	**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	10
TOTAL		35

Text/ Reference books

S no	Titles of the Books	Name of Authors	Name of the Publishers
1	Text book of Building Drawing	Shah, Kale Patki	
2	Elements of Building Drawing	D M Mahajan	Pune Vidyarthi Griha Prakashan
3	Civil Engineering Drawing	Malik and Mayo	New Asian Publishers New Delhi
4	Civil Engineering Drawing and House Planning	B. P Verma	Khanna Publishers Delhi

BUILDING MATERIAL AND BUILDING CONSTRUCTION (DIP3CIV05)

Course Outcome:

- **I: Knowing about the bricks and its types and its applications.**
- **II: Sand and its uses for different construction works.**
- **III: Refractory materials and products of clays and their applications while construction.**
- **IV: Concept of timber and its types and storage at different weather conditions.**
- **V: Knowing about the cast iron and steel and their grades for construction purpose.**

	CONTENT AND THEORY	Hrs/ Week
Unit 1	**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.	06
Unit 2	**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.	05
Unit 3	**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.	10
Unit 4	**TIMBER:** Classification and structure of timber .Defects in timber 8.3 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.	08
Unit 5	**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	06
Total		35

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

SEMESTER – 4									
THEORY		PERIOD			Evaluation Scheme			Credit	Hours
SUBJECT CODE	NAME OF THE PAPER	LECTURES	TUTORIALS	PRACTICALS	MSE	ESE	SUB- TOTAL		
DIP4CIV01	TRANSPORTATION ENGINEERING I	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	HYDRAULICS LAB	0	0	2	15	35	50	2	2
DIP4CIV07L	SURVEYING-II LAB	0	0	2	15	35	50	2	2
							Total Credit	=24	

TRANSPORTATION ENGINEERING I (DIP4CIV01)

	CONTENT & THEORY	Hrs/ week
Unit -1	**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.	03
Unit -2	**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.	03
Unit -3	**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.	12
Unit - 4	**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 .	14
Unit -5	**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. Building code IS:1904 Definition of active earth pressure and passive earthpressure, structures subjected to earth pressure in the field	08
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)

	CONTENTS: THEORY	Hrs/ week
Unit -1	**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 resistingcement, Blast furnace slag cement, White cement	06
Unit -2	**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 coarseaggregate, flakiness index & elongation index of coarse aggregate and their specification.	08
Unit – 3	**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	12
Unit -4	**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	08

	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	**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	06
TOTAL		40

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) Pyt. Ltd. New Delhi
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)

	CONTENT & THEORY	Hrs/ Week
Unit -1	**PROPERTIES OF FLUID:-** Definition of fluid, Difference in behavior of fluid with respectto 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	06
Unit -2	**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 verticaldirection 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.	08
Unit -3	**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.	04
Unit -4	**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.	06

Unit -5	**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 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 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 system. Numerical **HYDRAULIC MACHINES:-** Pumps - Definition and types. Suction head, delivery head, static head and manometric head. Centrifugal pump - component parts and their functions, principle of working, priming. Reciprocating pump - component parts and working. Submersible pump and Jet pump. Selection and choice of pump. Computation of power required for pumps. Turbines -Definition and types.	11
TOTAL		35

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	Dhanpat Rai& 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)

	CONTENTS: THEORY	Hrs/Week
Unit-1	**PLANE TABLE SURVEY:** Principles of plane table survey. Accessories required, Setting out of plane table, Levellin0g,Centering and orientation. Methods of plane table surveying–Radiation, Intersection, and Traversing. Merits and Demerits of plane table Surveying. Situations where plane table survey issued. Use of Telescopic Alidade.	06
Unit-2	**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. MeasurementofmagneticbearingofalinebyTheodolite.ProlongingaStraightline. Sources of errors in Theodolite Surveying. Permanent adjustment of transit Theodolite (only relationshipof different axes of Theodolite.). 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.	15
Unit -3	**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 abovetopics.	06
Unit -4	**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.	06

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	T .P. Kanetkar& S. V, Kulkarni	PUNE VIDHYARTHI GRIHA Prakashan
Surveying and Levelling Vol. I and II	Dr. B. C. Punmiya	Laxmi Publication
Text book of Surveying	S.K.Husain, M.S. Nagaraj	S. Chand and company

GEO-TECHNICAL ENGINEERING (DIP4CIV05)

	CONTENTS: THEORY	Hrs/ week
Unit -1	**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)	04
Unit -2	**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.	12
Unit -3	**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)	04
Unit -4	**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 failuretheory, 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	04
Unit -5	**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.	10

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

SEMESTER -5									
THEORY		PERIOD			Evaluation Scheme			Credit	Hours
SUBJECT CODE	NAME OF THE PAPER	LECTURES	TUTORIALS	PRACTICALS	MSE	ESE	SUB-TOTAL		
DIP5CIV01	THOERY OF STRUCTURE	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	TRANSPORTATION ENGINEERING II	3	1	0	30	70	100	4	4
DIP5CIV05	IRRIGATION ENGINEERING	3	1	0	30	70	100	4	4
DIP5CIV06L	IRRIGATION ENGINEERING LAB	0	0	2	15	35	50	2	2
DIP5CIV07L	DSS LAB	0	0	2	15	35	50	2	2
							Total Credit	=24	

THEORY OF STRUCTURES (DIP5CIV01)

	CONTENT & THEORY	Hrs/week
Unit -1	**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	06
Unit -2	**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.	06
Unit - 3	**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)	06
Unit - 4	**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.	08
Unit - 5	**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	14
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)

CONTENT AND THEORY		Hrs/week
Unit -1	**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.	06
Unit -2	**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.	06
Unit -3	**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.	05
Unit - 4	**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)	08
Unit -5	**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)	09
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 structure	L. S. Nege	Tata Macgraw Hill publication Company ltd. New Delhi

ENVIRONMENTAL SICENCE (DIP503)

	CONTENT & THEORY	Hrs/Week
Unit -1	**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.	02
Unit -2	**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.	18
Unit-3	**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-cleansingvelocity 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 diagram, Screening,Grit removal, Skimming, Sedimentation of sewage, Sludge digestion, Trickling filters, Activated sludge process, Disposal of sewage, Septic tank, Oxidation pond, Oxidation ditch.sewage, B.O.D./C.O.D. and significance. Aerobic andanaerobic process Objects of sewage treatment, General layout and flow	16

Unit-4	**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	02
Unit-5	**SOLID WASTES FROM THE SOCIETY:-** Solid Waste Management Definitions–Refuse, Rubbish, Garbage, Ashes, Constituents of solidwastes 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 public building Rainwater and sewage collection systems.	06
Total		48

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

TRANSPORTATION ENGINEERING II (DIP5CIV04)

	CONTENTS & THEORY	Hrs /week
Unit-1	**OVERVIEW OF TRANSPORTATION ENGINEERING:-** Role of transportation in the development of nation. Modes of transportation system–roads, railway, airways, waterways, Importance of each mode, comparison and the irrelative merits anddemerits. Necessity & importance of Cross drainage works for roads & railways.	04
Unit-2	**RAILWAY ENGINEERING:-** Alignment and Gauges, Classification of Indian Railways, zones of Indian Railway. Alignment-Factors governing rail alignment. Rail Gauges – types, factors affecting selection of gauge. Rail track cross sections – standard cross section of BG & M.G Single & double line in cuttingand embankment. Permanent ways, Ideal requirement, component parts. Rails–function & its types. Rail Joints–requirements, types, Creep of rail, causes & prevention ofcreep. 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 plate, bearing plates, spikes, bolts, keys, anchors & anti creepers.	09
Unit-3	**Railway Track Geometrics.** Coning of wheels, tilting of rails, Gradient & its types, Super elevation limits of Super elevationon 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. Line sketches of track junctions-crossovers, scissor cross over, diamond crossing, triangle. Inspection of points and crossings Station and Yards: Site selection for railway stations, Requirements of railway station, Types of stations (way side, crossing, junction & terminal) Station yards, types of station yard, Passenger yards, Goods yard Locomotive yard–its requirements, water column, Marshalling yard – its types. Track Maintenance- Necessity, types,Tools required Q and their function, organization, duties of permanent way inspector, gang mate, key man	09
Unit-4	**BRIDGE ENGINEERING:-** Site selection and investigation, Factors affecting selection of site of a bridge. Bridge alignment Collection of design data, Classification of bridges according to function, material, span, size, alignment, position of HFL. Component parts of bridge. Plan & sectional elevation of bridge showing component parts of, substructure & superstructure. Different terminology such as effective span, clear span, economical span, waterway, afflux, scour, HFL, freeboard, etc. Foundation – function, types, Piers-function, requirements, types. Abutment – function, types ofWing walls – functions and types. Bearing–functions, types of bearing for RCC & steel bridges. Approaches –in cutting and embankment. Bridge flooring- open and solid floors Permanent and Temporary Bridges-Permanent Bridges - Sketches & description in brief of culverts, causeways, masonry, arch, steel, movable steel bridges, RCC girder bridge, prestressed, girder bridge, cantilever, suspension bridge. Temporary Bridges- timber, flying, floating bridges Inspection & Maintenance of Bridge. Inspection of bridges Maintenance of bridges & types–routine & special maintenance.	10
Unit-5	**TUNNEL ENGINEERING:-** Definition, necessity, advantages, disadvantages, Classification of tunnels. Shapeand Size of tunnels, Tunnel Cross sections for highway and railways, Tunnel investigations and surveying –Tunnel surveying locating center line on ground, transferring center line inside the tunnel. Shaft - its purpose &construction. Methods of tunneling in Soft rock- needle beam method, fore-poling method. Line plate method, shield method. Methods of tunneling in Hard Rock-Full-face headingmethod, Heading and bench method, drift method. Precautions in construction of tunnels, drilling equipment's-drills and drills carrying equipment's, Types ofexplosives used in tunneling. Tunnel lining and ventilation.	08
TOTAL		40

Text /Reference Books:-

Titles of the Book	Name of Authors	Name of the Publisher
Railway Engineering	S.C. Saxena	Dhanpatrai& sons
Railway Track	K.R. Antia	The New Book Co. Pvt. Ltd Mumbai

Principles of Railway Engineering	S.C. Rangwala	Charotar Publication
Principles and Practice of Bridge Engineering	S.P. Bindra	Dhanpatrai& sons

IRRIGATION ENGINEERING (DIP5CIV05)

	CONTENT & THEORY	Hrs/ week
Unit-1	**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.	04
Unit-2	**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.	08
Unit-3	**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.	08
Unit-4	**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. **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.	10
Unit-5	**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 though 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 andcomponents. Emergency and services, ogee spillway and bar type spillway, discharge over spillway. Spillway with and without gates.	10
Total		40

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

SEMESTER-6									
THEORY		PERIOD			Evaluation Scheme			Credit	Hours
SUBJECT CODE	NAME OF THE PAPER	LECTURES	TUTORIALS	PRACTICALS	MSE	ESE	SUB-TOTAL		
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	4	0	4	100	100	200	8	8
							Total credit	=24	

ESTIMATING & COSTING (DIP6CIV01)

	CONTENT & THEORY	Hrs/week
Unit-1	**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	06
Unit-2	**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 detailed estimate. 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.	06
Unit-3	**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.	04
Unit-4	**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.	10
Unit-5	**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.	12
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)

	CONTENT & THEORY	Hrs/ Week
Unit-1	**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.	02
Unit-2	**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, process of coagulation, types of sedimentation tanks, Filtration-theory of filtration, classification of filters : slow sand filter, rapid sand filter, pressure filter, domestic filter, filtermedia, 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 of bores 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.	18

Unit- 3	**DOMESTIC SEWAGE:-** Introduction Importance and necessity of sanitation, Necessity to treat domestic sewage, Recycling and Reuse of domestic waste Definitions- Sewage, sullage, typesof 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 system Principles 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-cleansingvelocity 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 andanaerobic 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.	16
Unit-4	**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	02
Unit-5	**ENVI RONMENTAL POLLUTION:-** 5.1AirPollutionandNoisePollutionSources,EffectsandControlofAir Pollution, Sources , Effectsand Control of Noise Pollution (only brief idea) Global warming, Acid Rain **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 wastesMethods of treatment and disposal of solid waste. Hazardous Wastes Introduction, Types of hazardous wastes. Characteristics of hazardous wastes. Treatment anddisposal of hazardous wastes.	02
TOTAL		**40**

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

INDUSTRIAL MANAGEMENT (DIP603) (COMMON)

Chapter	CONTENT & THEORY	Hrs/Week
Unit-1	**OVERVIEW OF BUSINESS:-** Types of Business, Service, Manufacturing, Trade, IndustrialSectors 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.)	02
Unit-2	**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	07
Unit-3	**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	07

Unit-4	**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 precautions Introduction to– Factory Act, ESI Act, Workmen Compensation Act, Industrial Dispute Act	08
Unit-5	**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	08
TOTAL		48

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. Kirby Warren Andrew R. McGill	Prentice- Hall

ELECTIVE (DIP6CIV04)

i) ADVANCED CONSTRUCTION TECHNIQUES & EQUIPMENTS

CONTENT & THEORY		**Hrs/week**
Unit-1	**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 ofartificial timber. Miscellaneous materials Properties and uses of acoustics materials, wall claddings, plaster boards, Micro-silica, artificial sand, bonding agents, adhesives etc.	06
Unit-2	**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 prerstressing. 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 watercement 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.	10

Unit- 3	**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.	08
Unit -4	**HOISTING AND CONVEYING EQUIPMENTS HOISTING 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.	08
Unit -5	**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 sand. **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, Owning andoperatingcostofconstructionequipment.Economiclifeofconstruction equipment. Preventive maintenance of equipment, Break down maintenance of Equipments.	08
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	**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.	05
Unit-2	**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.	05
Unit-3	**REPAIRS TO FOUNDATION:-** Remedies, types & processes of settlement, foundations in king Examination of existingfoundation, strengthening of foundation. Water proofing: Leaking Basements & roofs	05
Unit-4	**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.	07
Unit-5	**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, culverts causeways **ESTIMATES AND TENDERING:-** Estimates of annual repairs, special repairs and maintenance work. Preparation of tender	12
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.

iii) ARCHITECTURAL PRACTICES AND INTERIOR DESIGN

SECTION A – ARCHITECTURAL PRACTICE		Hrs/week
Unit-1	**ARCHITECTURAL DESIGN**:- Review of principles of Architecture. Site selection, Climatic conditions, sun control, orientation of building &site. Building by laws & its applications.	02
Unit-2	**BUILDING AESTHETICS**:- Feeling for aesthetics and utility, composition, unity, mass composition, order, expression, proportion, scale, accentuation & rhythm, contrast,balance, pattern. Character of Building.	02
Unit-3	**DESIGN OF PROJECTS**:- A case study of residential building. A case study of public/commercial building. Aspect of working drawing–plan, elevation section	08
Unit-4	**LANDSCAPING**:- Soft and Hard landscaping. Basic Principle of landscaping. Assessmentof land. Design procedure. A case study of landscape for public/commercial building campus.	04
Total		16
SECTION – B: INTERIOR DESIGN		**Hrs/week**
Unit-1	**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.	03
Unit-2	**ANTHROPOMETRICS DATA**:- Relation of human measurement to furniture andmovement and to circulation patterns.	01
Unit-3	**INTERIOR MATERIALS:-** Different interior materials, paneling, partitions, finishing materials, furniture. Falseceiling, flooring, paints.	02
	INTERIOR OF RESIDENTIAL BUILDING:-	
Unit -4	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.	07
Unit -5	**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.	03
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 interiordesign & space planning	Joseph DeChiara, Julins Panch, martin Zelnik	MC Graw Hill