

DIPLOMA IN ENGINEERING

Duration: 36 Months (3 Years) Eligibility: 12th Pass

COURSE STRUCTURE OF DIPLOMA IN CIVIL ENGINEERING SEMESTER Ist													
Course Details				External Assessment		Internal Assessment				Credit Distribution			Allotted Credits
Course Code	Course Type	Course Title	Total Marks	Major		Minor		Sessional ***		L	T	P	Subject wise Distribution
				Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks				
Theory Group													
2TDDE 101	Basic Science	Mathematics-I	100	50	17	20	07	30	15	2	1	0	3
2TDDE 102	Engineering Science Course	Applied Mechanics	100	50	17	20	07	30	15	2	1	0	3
2TDDE 103	Basic Science	Physics	100	50	17	20	07	30	15	2	1	0	3
2TDDE 104	Mandatory Course	Environment Engineering & safety	100	50	17	20	07	30	15	2	1	0	3
2TDDE 105	Humanities	Communication Skills-I	100	50	17	20	07	30	15	2	1	0	3
Practical Group				Term End Practical Exam				Sessional					
2TDDE 102	Engineering Science Course	Applied Mechanics	50	25	12	-	-	25	12	-	-	1	1
2TDDE 103	Basic Science	Physics	50	25	12	-	-	25	12	-	-	1	1
2TDDE 105	Humanities	Communication Skills-I	50	25	12	-	-	25	12	-	-	1	1
Grand total			650							10	5	3	18

Minimum Passing Marks are equivalent to Grade D

Major- Term End Theory / Practical Exam

Minor- Pre-University Test

Sessional weightage – Attendance 50%, Three Class Tests/ Lab Performance Assignment 50%

L- Lectures T- Tutorials P- Practical

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Course Code	Course Type	Course Title	Total Marks	Major		Minor		Sessional ***		L	T	P	Subject wise Distribution
				Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks				
Theory Group													
2TDDE 201	Basic Science	Mathematics-II	100	50	17	20	07	30	15	2	1	0	3
2TDDE 202	Engineering Science Course	Engineering Graphics	100	50	17	20	07	30	15	2	1	0	3
2TDDE 203	Basic Science	Chemistry	100	50	17	20	07	30	15	2	1	0	3
2TDDE 204	Engineering Science Course	Fundamentals Computer & IT	100	50	17	20	07	30	15	2	1	0	3
2TDDE 205	Humanities	Communication Skills-II	100	50	17	20	07	30	15	2	1	0	3
Practical Group				Term End Practical Exam				Sessional					
2TDDE 203	Basic Science	Chemistry	50	25	12	-	-	25	12	-	-	1	1
2TDDE 204	Engineering Science Course	Fundamentals Computer & IT	50	25	12	-	-	25	12	-	-	1	1
2TDDE 206	Engg. Sci. Course	Workshop Practice	50	25	12	-	-	25	12	-	-	1	1
Grand total			650							10	5	3	18

Minimum Passing Marks are equivalent to Grade D

Major- Term End Theory / Practical Exam

Minor- Pre-University Test

Sessional weightage – Attendance 50%, Three Class Tests/ Lab Performance Assignment 50%

L- Lectures T- Tutorials P- Practical

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COURSE STRUCTURE OF DIPLOMA IN CIVIL ENGINEERING SEMESTER IIIrd

Course Details				External Assessment		Internal Assessment				Credit Distribution			Allotted Credits
Course Code	Course Type	Course Title	Total Marks	Major		Minor		Sessional ***		L	T	P	Subject wise Distribution
				Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks				
Theory Group													
2TDCE 301	Professional Core	Surveying	100	50	17	20	07	30	15	2	1	0	3
2TDCE 302	Professional Core	Material technology	100	50	17	20	07	30	15	2	1	0	3
2TDCE 303	Professional Core	Transportation Engineering-I	100	50	17	20	07	30	15	2	1	0	3
2TDCE 304	Professional Core	Hydraulics	100	50	17	20	07	30	15	2	1	0	3
2TDCE 305	Professional Core	Building Drawing	100	50	17	20	07	30	15	2	1	0	3
Practical Group				Term End Practical Exam				Sessional					
2TDCE 301	Professional Core	Surveying	50	25	12	-	-	25	12	-	-	1	1
2TDCE 302	Professional Core	Material technology	50	25	12	-	-	25	12	-	-	1	1
2TDCE 304	Professional Core	Hydraulics	50	25	12	-	-	25	12	-	-	1	1
Grand total			650							10	5	3	18

Minimum Passing Marks are equivalent to Grade D

Major- Term End Theory / Practical Exam

Minor- Pre-University Test

Sessional weightage – Attendance 50%, Three Class Tests/ Lab Performance Assignment 50%

L- Lectures T- Tutorials P- Practical

DIPLOMA IN ENGINEERING

Duration: 36 Months (3 Years) Eligibility: 12th Pass

COURSE STRUCTURE OF DIPLOMA IN CIVIL ENGINEERING SEMESTER IVth

Course Details				External Assessment		Internal Assessment				Credit Distribution			Allotted Credits
Course Code	Course Type	Course Title	Total Marks	Major		Minor		Sessional ***		L	T	P	Subject wise Distribution
				Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks				
Theory Group													
2TDCE 401	Professional Core	Advance Surveying	100	50	17	20	07	30	15	2	1	0	3
2TDCE 402	Professional Core	Soil Mechanics	100	50	17	20	07	30	15	2	1	0	3
2TDCE 403	Professional Core	Mechanics of Structure	100	50	17	20	07	30	15	2	1	0	3
2TDCE 404	Professional Core	Computer Aided Drawing	100	50	17	20	07	30	15	2	1	0	3
2TDCE 405	Management Course	Entrepreneurship	100	50	17	20	07	30	15	2	1	0	3
Practical Group				Term End Practical Exam				Sessional					
2TDCE 401	Professional Core	Advance Surveying	50	25	12	-	-	25	12	-	-	1	1
2TDCE 402	Professional Core	Soil Mechanics	50	25	12	-	-	25	12	-	-	1	1
2TDCE 404	Professional Core	Computer Aided Drawing	50	25	12	-	-	25	12	-	-	1	1
Grand total			650							10	5	3	18

Minimum Passing Marks are equivalent to Grade D

Major- Term End Theory / Practical Exam

Minor- Pre-University Test

Sessional weightage – Attendance 50%, Three Class Tests/ Lab Performance Assignment 50%

L- Lectures T- Tutorials P- Practical

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COURSE STRUCTURE OF DIPLOMA IN CIVIL ENGINEERING SEMESTER Vth

Course Details				External Assessment		Internal Assessment				Credit Distribution			Allocated Credits
Course Code	Course Type	Course Title	Total Marks	Major		Minor		Sessional ***		L	T	P	Subject wise Distribution
				Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks				
Theory Group													
2TDCE 501	Professional Core	Irrigation Engineering	100	50	17	20	07	30	15	2	1	0	3
2TDCE 502	Professional Core	Quantity Surveying and Costing-I	100	50	17	20	07	30	15	2	1	0	3
2TDCE 503	Professional Core	Transportation Engineering-II	100	50	17	20	07	30	15	2	1	0	3
2TDCE 504	Professional Core	Structural Design and Drafting-I (RCC)	100	50	17	20	07	30	15	2	1	0	3
2TDCE 505	Management Course	Work Origination and Management	100	50	17	20	07	30	15	2	1	0	3
Practical Group				Term End Practical Exam		Lab Performance		Sessional					
2TDCE 502	Professional Core	Quantity Surveying and Costing-I	50	25	12	-	-	25	12	-	-	1	1
2TDCE 503	Professional Core	Transportation Engineering-II	50	25	12	-	-	25	12	-	-	1	1
2TDCE 504	Professional Core	Structural Design and Drafting-I (RCC)	50	25	12	-	-	25	12	-	-	1	1
Grand total			650							10	5	3	18

Minimum Passing Marks are equivalent to Grade D

Major- Term End Theory / Practical Exam

Minor- Pre-University Test

Sessional weightage – Attendance 50%, Three Class Tests/ Lab Performance Assignment 50%

L- Lectures T- Tutorials P- Practical

DIPLOMA IN ENGINEERING

Duration: 36 Months (3 Years) Eligibility: 12th Pass

COURSE STRUCTURE OF DIPLOMA IN CIVIL ENGINEERING SEMESTER VIth

Course Details				External Assessment		Internal Assessment				Credit Distribution			Allotted Credits
Course Code	Course Type	Course Title	Total Marks	Major		Minor		Sessional ***		L	T	P	Subject wise Distribution
				Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks				
Theory Group													
*	Professional Core	Professional Elective	100	50	17	20	07	30	15	2	1	0	3
2TDCE 602	Professional Core	Quantity Surveying and Costing-II	100	50	17	20	07	30	15	2	1	0	3
2TDCE 603	Professional Core	Structural Design and Drafting-II (Steel)	100	50	17	20	07	30	15	2	1	0	3
Practical Group				Term End Practical Exam				Sessional					
*	Professional Core	Professional Elective	50	25	12	-	-	25	12	-	-	1	1
2TDCE 602	Professional Core	Quantity Surveying and Costing-II	50	25	12	-	-	25	12	-	-	1	1
2TDCE 604	Project Work	Project	200	100	50	-	-	100	50	-	-	4	4
2TDCE 605	Professional Core	Professional activity	50	-	-	-	-	50	25	-	-	3	3
Grand total			650							6	3	9	18

*Elective subjects

List of Elective Subject

S.No.	Subject Code	Subject Name
1	2TDCE 601	(A) Public Health Engineering
2	2TDCE 601	(B) Green Building Technology

Minimum Passing Marks are equivalent to Grade D

Major- Term End Theory / Practical Exam

Minor- Pre-University Test

Sessional weightage – Attendance 50%, Three Class Tests/ Lab Performance Assignment 50%

L- Lectures T- Tutorials P- Practical

Mathematics-I

Course Code: 2TDDE 101

Course Objective:

Mathematics forms backbone for all technologies and hence occupies an important place in the curriculum of polytechnic education. The subject is equally important for the future self-development of Polytechnic students. In designing the curriculum for foundation course, the admission level to Polytechnics has been considered as 10th Board examination and mathematical needs of Technical subject have been given due consideration.

Syllabus:

UNIT-I:

1.1 Permutation

- Meaning of factorial n
- Permutation of ' n ' dissimilar thing taken ' r ' at a time,

1.2 Combination

- Combination of n dissimilar things taken ' r ' at a time

UNIT-II:

2.1 Binomial Theorem

- Statement of the theorem for positive integer
- General Term, Middle term, Constant term

2.2 Partial Fractions

- Define a proper-improper fraction
- Break a fraction into partial fraction whose denominator contains Linear, Repeated linear and Non repeated quadratic factors.

UNIT-III:

3.1 Determinant

- Concept & principles of determinants
- Properties of determinant
- Simple examples.

3.2 Complex Numbers

- Algebra of Complex Numbers
- Polar form

UNIT-IV:

TRIGONOMETRY :

- 4.1 Allied angles.
- 4.2 Trigonometrical ratios of sum and difference of angles, (Only statement)
- 4.3 Sum and difference of trigonometric ratios (C-D formula)
- 4.4 Multiple angles (Only double angle and half angle)
- 4.5 Properties of triangle (without proof)

UNIT-V:

MATRIX:

- 5.1 Definition of Matrix.
- 5.2 Types of Matrix.
Row, Column, Square, Unit, Upper and lower triangular, Symmetric & Skew Symmetric, Singular and non Singular Matrices.
- 5.3 ~~Adjoint~~ of a Matrix.
- 5.4 Inverse of a Matrix.

Course Outcome:

Through this syllabus the diploma student will learn the basic concepts of counting principle through permutation and combination , expansion of a binomial function , breaking up a complex fraction into simpler partial fractions, trigonometric ratio and concept of matrix

Text book:

Mathematics for Polytechnic - S. P. Deshpande- Pune Vidyarthi Griha Prakashan,

Basic Mathematics - B.M.Patel, J.M.Rawal and others - Nirali Prakashan

Applied mathematics., Dr. Sanjay Jain, Nitin Arya, Anil Maheshwari and Amp.

Reference book:

Advanced Engineering Mathematics” by Erwin Kreyszig.

Applied Mechanics

Course Code: 2TDDE 102

Course Objective:

- Ability to apply knowledge of mathematics, science, and engineering.
- Solve for the resultants of any force systems.
- Determine equivalent force systems.
- Determine the internal forces in plane frames, simple span trusses and beams.
- Solve the mechanics problems associated with friction forces.
- Obtain the centroid, first moment and second moment of an area.

Syllabus:

UNIT-1 COMPOSITION AND RESOLUTION OF FORCES

- 1.1 Definition, Effect, characteristics of force.
- 1.2 System of Forces.
- 1.3 Principle of Transmissibility of Forces.
- 1.4 Concept of Resultant Force.
- 1.5 Law of-
 - Parallelogram of Forces
 - Triangle of Forces
 - Polygon of Forces
- 1.6 Determination of Resultant of two or more concurrent forces (analytically and graphically).

PARALLEL FORCES AND COUPLES

- 2.1 Classification of Parallel Forces.
- 2.2 Methods of finding resultant Force of parallel forces- analytically & graphically.
- 2.3 Position of resultant force of parallel forces.
- 2.4 Definition, Classification and characteristics of a force Couple, moment of couple.

UNIT-2 MOMENTS AND THEIR APPLICATIONS

- 3.1 Definition, Types and law of moment.
- 3.2 Varignon's Principle of moment and its applications.
- 3.3 Lever and its Applications.
- 3.4 Types of supports and determination of support reactions of a simply supported beam subjected to point load and uniformly distributed load (UDL).

EQUILIBRIUM OF FORCES

- 4.1 Equilibrium of a system of concurrent forces.
- 4.2 Conditions and types of Equilibrium.
- 4.3 Lami's Theorem and its applications.

UNIT-3 CENTRE OF GRAVITY

- 5.1 Difference between Centroid and Center of Gravity (CG).
- 5.2 Centroid of standard plane figures and CG of simple solid bodies.
- 5.3 Method of finding out Centroid of composite plane laminas and cut sections.
- 5.4 Method of finding out CG of Composite solid bodies.

FRICTION

- 6.1 Concept and types of friction.
- 6.2 Limiting Friction, coefficient of friction, angle of friction, angle of repose.
- 6.3 Laws of friction (Static and Kinetic).
- 6.4 .Analysis of equilibrium of Bodies resting on Horizontal and inclined Plane.
- 6.5 Utility / Nuisance value of friction.

UNIT-4 SIMPLE LIFTING MACHINES

- 7.1 Concept of lifting Machines.
- 7.2 Definition of Mechanical Advantage, Velocity Ratio and Efficiency of Machines and their relation.
- 7.3 Reversibility of Machines and condition for self locking machine.
- 7.4 Law of Machines, Maximum mechanical advantage and maximum efficiency of machine.
- 7.5 Friction in machine (In terms of Load and effort).
- 7.6 Calculation of M. A, V.R. and efficiency of following machines
 - Simple wheel and axle
 - Differential wheel and axle
 - Single purchase crab
 - Double purchase crab
 - Simple screw jack
 - Different System of simple pulley blocks

MOTION OF A PARTICLE

- 8.1 Definition of speed, velocity, acceleration, uniform velocity, uniform acceleration and variable acceleration.
- 8.2 Motion under constant acceleration/ retardation (equations of motion).
- 8.3 Motion under force of gravity.
- 8.4 Concept of relative velocity.

- 8.5 Definition of projectile, velocity of projection, angle of projection, time of flight, maximum height, horizontal range and their determination.
- 8.6 Definition of angular velocity, angular acceleration and angular displacement.
- 8.7 Relation between linear and angular velocity of a particle moving in a circular path.
- 8.8 Motion of rotation under constant angular acceleration.

UNIT-5 LAWS OF MOTION

- 9.1 Newton's Laws of motion and their applications.

WORK, POWER AND ENERGY

- 10.1 Definition unit and graphical representation of work.
- 10.2 Definition and unit of power and types of engine power and efficiency of an engine.
- 10.3 Definition and concept of Impulse.
- 10.4 Definition, unit and types of energies.
- 10.5 Total energy of a body falling under gravity.

List of Experiments:

1. Verification of laws of parallelogram of forces.
2. Verification of laws of polygon of forces
3. Verification of laws of moments
4. Determination of forces in the members of Jib Crane
5. Determination of Centroid of plane lamina by graphical method
6. Determination of coefficient of friction for surfaces of different materials on horizontal plane
7. Determination of coefficient of friction for surfaces of different materials on an inclined plane
8. Determination of mechanical advantage, velocity ratio and efficiency of the following lifting machines
 - Simple wheel and axle
 - Differential wheel axle
 - Single purchase crab
 - Double purchase crab
 - Simple pulley block
 - Simple screw jack
9. Measurement of B.H.P. of an engine using rope break dynamometer

Course outcome:

At the end of the course, the student will be able to:

- Determine the resultant force and moment for a given system of forces
- Analyze planar and spatial systems to determine the forces in members of trusses, frames and problems related to friction
- Calculate the motion characteristics of a body subjected to a given force system.
- Determine the deformation of a shaft and understand the relationship between different material constants.

Text Books:

1. Engineering Mechanics - Shames
2. Mechanics for Engineers- B Johnson
3. Engineering Mechanics - Mchean
4. Applied mechanics Abdul Samad Kohri., Y.B. Mathur.

References Books:

Introduction to Solid Mechanics” by I H Shames

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Physics

Course Code: 2TDDE 103

Course Objective:

The development of various diploma engineering topics is primarily based on the fundamental principles. The different principles of physics have a wide range of applications in all the branches of engineering. A reasonably good level of knowledge of physics, therefore, forms sound base for engineering students. Physics can be considered as a basic tool in the hands of an engineer through which he can pursue his studies and research work in technical field. The foundation level of the subject acquired by the student is kept in mind for selection of the topics. To create interest in the students more stress is given on the applications, in engineering field

Syllabus:

Unit 1: UNITS & Measurement, Motion

Fundamental and derived units, Scalar and vector, Basic requirements to represent vector Symbols, abbreviation, and proclation Linear measurement by vernier calipers, screw gauge and spherometer Angular measurement by angular vernier Motion and its type Linear motion ,Circular motion ,Angular velocity and relation with linear velocity ,Centripetal acceleration, Centripetal and Centrifugal forces Rotatory motion Axis of rotation Moment of Inertia, Radius of gyration Kinetic energy of rotation Numerical problems and solution on the topic

Unit 2: Molecular Phenomenon Solids, Liquids And Properties Of Matter

Postulates Of Molecular Kinetic Brownian motion Kinetic and Potential energy of Kinetic theory of gases Postulates Calculation of pressure by Kinetic theory Prove of different gases law by Kinetic theory.Elasticity: Meaning, definition, stress, strain, Hook's law and elastic limit Surface Tension: Meaning, definition, molecular forces, cohesive and adhesive forces, Surface energy, capillary rise and capillary rise method. Viscosity : Meaning, definition, stream line and turbulent flow, critical velocity, Stock's law. Numerical problems and solution on the topic.

Unit 3: Heat Heating Effect Of Current And Thermoelectricity

Heat and temperature, concept of heat as molecular motion Transmission of heat, study state and variable state. Concept of heat capacity, specific heat and latent heat. Calorimeter and its uses Thermodynamics Relation between heat and work Mechanical equivalent of heat First law of thermodynamics and its application, Second law of thermodynamics and its application ,Carnot cycle Numerical problems and solution on the topic., Heating effect of electric current: Joule's law, work energy and power in electric circuit, calculation of electric energy. Thermo electricity See back effect and thermoelectric power., Neutral temperature, temperature of inversion and relation between them Thermo electric thermometer and thermo couples. Numerical problems and solution

Unit 4: Sound Optics And Optical Instruments

Reduction of sound waves(Longitudinal and transverse waves)Progressive and stationary waves Basic knowledge of refraction , reflection, interference and diffraction. Ultrasonic, Audible range, Production of ultrasonic, properties an due Refraction, critical angle and total internal reflection, refraction through lenses and problems Power of lenses Spherical and chromatic aberrations Simple and compound microscope, telescope and derivation for their magnifying power Numerical problems and solution on the topic.

Unit 5: Electrostatics and Electromagnetic Induction Modern Physics, Basic Electronics

Coulomb's law, Electric field intensity, potential. Capacity, principle of capacitor, types of capacitor, combination of capacitors Electromagnetic Induction: Faraday's law, Lenz's law Self and mutual inductance Transformer and electric motor, Induction coil Photoelectric effect, threshold frequency, Einstein- equation, Photo electric cells Radioactivity : decay constant, Half life, mean life Properties of nucleus, nuclear mass, mass defect Production of x-rays, properties and its uses Thermal emission, semiconductors, Types of semiconductors Explanation of conductor, semiconductor and insulators on the basis of band theory P-N junction, diode as rectifier

List of Experiments:

- Refractive index of prism (I-D) curve
- Refractive index of prism (spectrometer)
- Focal length of a convex lens by u-v method
- Focal length of a convex lens by displacement method
- Verification of Ohm's law
- To find out unknown resistance by meter brid
- To find out internal radius of hollow tube by vernier calipers.
- To find out volume of given cylinder by screw gauge.
- Surface tension by Capillary rise method. Coefficient of viscosity
- Coefficient of Thermal conductivity by searl's method.
- Verification of Newton's cooling law.

Course outcome:

- The course content should be taught and implemented with the aim to develop different types of skills leading to the achievement of the following competencies *Select proper measuring instrument on the basis of range, least count & precision required for measurement.
- Analyze properties of material & their use for the selection of material mostly applicable for engineering users.
- Identify good & bad conductors of heat and proper temperature scale for temperature measurement Identify.
- Analyze, discriminate and interpret logical sequence of field problems with the study of physics.
- Analyze variation of sound intensity with respect to distance and follow the principles used in the physical properties, its measurement and selections.

Text Book: -

Engineering Physics by Gaur R. K. and Gupta S. L., Dhanpat Rai Publications, New Delhi,

Fundamentals of Physics Extended, By Halliday D., Resnik R. and Walker, Wiley – India, New Delhi

Physics for scientists and Engineers by Serway R. A. and Jewett, Jr. J. W., Thomson Learning (Indian reprint)

Applied Physica Dr. Neelam Gupta Nishant Kumar DAdhich and Shweta Arora.

References Books:

Engineering Physics” by Dattuprasad Joshi

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Environmental Engineering & Safety

Course Code: 2TDDE 104

Course Objective:

- To improve the quality of life of the local community through management and conservation of natural resources.
- To ensure that the natural environment is used wisely as well as judiciously. The natural resources are continuously available for the benefit and enjoyment of future generations.
- To decrease vulnerability and improve adaptation capacity among poor local communities associated with Climate Change.

UNIT-1 Introduction to Environment

- 1.1 THE BIOSPHERE, biotic and abiotic
- 1.2 An aquatic ecosystem
- 1.3 Types of pollution
- 1.4 Impact of human being on environment.
- 1.5 Impact of environment on human being
- 1.6 Basic approach to improve environmental qualities
- 1.7 Roll of an environmental engineer

UNIT-2 Air Pollution Sources and Effects

- 2.1 Standard definition of air pollution
- 2.2 Composition of natural air
- 2.3 Names of air pollutants
- 2.4 Classification of air pollutants, primary and secondary pollutants
- 2.5 Classification of source of air pollutants on different bases
- 2.6 Definition of different types of aerosols.
- 2.7 Effect of air pollution on: human health, material properties, vegetation.
- 2.8 Major toxic metals and their effects
- 2.9 Major environmental phenomenon e.g., acid rain, global warming, green house effect, ozone layer depletion.
- 2.10 Air quality standards
- 2.11 Brief description of air pollution laws.

UNIT-3 Meteorological Aspects of Air Pollutant Dispersion

- 3.1 Meteorological parameters influencing air pollution
- 3.2 Environmental lapse rate, temperature inversion, atmospheric stability and adiabatic loss rate.
- 3.3 Turbulence, topographical effects,
- 3.4 Plume behavior, looping, coning, fanning fumigation, lofting , trapping.

Air Pollution Control Methods and Equipments

- 4.1 Natural purification processes of air
- 4.2 Artificial purification methods of air
- 4.3 Brief description of following control equipments along with sketch e.g, gravitation settling chamber, cyclone, scrubber, bag house filter, electrostatic precipitator.
- 4.4 Brief description of following processes for the control of gaseous pollutants e. g., absorption, adsorption, condensation, combustion etc.

UNIT-4 Water Pollution Sources and Classification

- 5.1 Water resources
- 5.2 Uses of water
- 5.3 Classification of water
- 5.4 Origin, composition and characteristics of domestic waste water as well as industrial waste water
- 5.5 Biochemical oxygen demand
- 5.6 Water pollution laws and standards
- 5.7 Uses of waste water
- 5.8 Classification of waste water
- 5.9 Chemical oxygen demand

Waste water treatment method

- 6.1 basic processes of water treatment
- 6.2 Meaning of primary, secondary and tertiary treatment
- 6.3 Flow chart of a simple effluent treatment plant
- 6.4 Theory of industrial waste treatment
- 6.5 Volume reduction, neutralization and proportionin

UNIT-5 Solid Waste Management

- 7.1 Sources and classification of solid waste
- 7.2 Public health aspects
- 7.3 Disposal methods - open dumping, sanitary, land fill

- 7.4 Incineration, compositing
- 7.5 Potential methods of disposal
- 7.6 Recovery and recycling of paper, glass, metal and plastic

Noise Pollution and Control

- 8.1 Sources of noise pollution
- 8.2 Units of Noise pollution measurement
- 8.3 Allowable limits for different areas
- 8.4 Problems of noise pollution and measures to control it
- 8.5 Noise pollution control devices brief discussion

Safety Practices

- 9.1 Responsibility of employees and employers regarding health and safety
- 9.2 Fire hazards prevention and precautions
- 9.3 Industrial hazards prevention and protection
- 9.4 Protection from air and noise pollution

Course Outcome:

- After successful completion of this course students will able to
- Enhance the use of recycled material for construction work and optimize the use of conventional energy sources.
- Take care of issues related to Conservation & Hazard Management while working as chemical engineer.
- Assess the effects of pollution on resources.
- Justify need of renewable energy for sustainable development.
- Identify concept of waste management and methods of recycling.
- Prepare list of use of do's and don'ts applicable during disasters.

Text Books:

AUDHYOGIK KANUN (SAFETY MANAGEMENT) HINDI BOOKS Dr. D.S.S. Ganguly, C. S. Changeriya., Chetan Prakashan
Safety, Health and Environment Handbook (English, Hardcover, Narayanan K T) [Narayanan K T](#)
Publisher: Mcgraw Hil

Reference Books:

“Geomorphology and Remote Sensing in Environmental Management” by SinghS

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Communication Skill-I

Course Code: 2TDDE 105

Course Objective:

The main aim of communicating is to pass information so that other people may know about what you are talking off. This can be through facts or even feelings.

Syllabus:

Unit1

Sentences –simple compound ,complex

- Articles –usage of ‘A’ , ‘AN’, ‘THE’
- Preposition—position of prepositions ,place Relations Time Relations
- Tenses – past perfect ,present perfect progressive ,past perfect
- Progressive,simple present andpresent progressive

Unit 2

Modals , Antonyms ,synonyms ,one word substitution ,jumbled sentences,Idioms and phrases ,correction of sentences with words likely to be confused word formation like prefix and suffix

Unit3

Comprehension of unseen passage short answer type questions to test understanding of the passage

Unit 4

précis –writing -Introductory Remarks

- Method of procedure
- Summing up

Unit 5

Essay-writing -- Introductory Remarks

- Characteristics of a good Essay
- Classifications of Essays
- Method of collecting materials

Course Outcome:

Through this syllabus the diploma students will learn the basic concept of English. Student should gain the ability to read understand, analyze, intercept and extrapolate from the complex texts that are at the heart of the diver's traditions of the English language.

Text Books:

Communication Skills I Compiled by Mrs. Thomas & Mrs. Krishnamurthy, H&M Dept , 2009

English and Communication skills by Vivek Saxena :

Reference Books:

1. Contemporary English grammar, structure and composition by David Green Publisher Macmillan First edition, 2000.
2. English grammar and composition, R. C. Jain, Macmillan, India, First edition, 2005

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Mathematics-II

Course Code: 2TDDE 201

Course Objective:

The main of teaching mathematics is to provide students with an adequate knowledge on the subject to serve as a tool in the learning of various engineering subjects and to solve technical problems encountered during the course of study . It can also serve as a foundation for their future work involving computation.

Syllabus:

UNIT-I: CO-ORDINATE GEOMETRY

- 1.1 Co-ordinate System: Cartesian and Polar.
- 1.2 Distance, Division, .Area of a triangle.
- 1.3 Locus of a point and its equation.
- 1.4 Slope of St. Line: Angle between two Straight lines, Parallel and perpendicular Straight lines.
- 1.5 Standard and general equation of Straight line. Point of intersection of two straight lines .

UNIT-II STATISTICS

- 2.1 Measures of Central tendency (Mean, Mode, Median)
- 2.2 Measures of Dispersion (Mean deviation, standard deviation)

UNIT-III DIFFERENTIAL CALCULUS

- 3.1 Define constant, variable, function.
- 3.2 Value of the function
- 3.3 Concept of limit of a function.
- 3.4 Definition and concept of differential coefficient as a limit.
- 3.5 Standard results.
- 3.6 Derivatives of sum, difference, product, quotient of two functions.
- 3.7 Differential co-efficient of function of a function.
- 3.8 Differential co-efficient of implicit function.
- 3.9 Logarithmic Differentiation.
- 3.10 Differential coefficient of Parametric function.

UNIT-IV INTEGRAL CALCULUS

- 4.1 Definition as a inverse process of differentiation
- 4.2 Standard Results (including inverse function)
- 4.3 Methods of Integration
 - Substitution
 - Integration by parts
 - Breaking up into partial fraction
- 4.4 Concept of Definite Integral

UNIT-V VECTOR ALGEBRA

- 5.1 Concept of Vector and Scalar Quantities.
- 5.2 Different types of vectors.
- 5.3 Addition and subtraction of vectors.
- 5.4 Components of a vector
- 5.5 Multiplication of two vectors
 - Scalar Product
 - Vector Product
 - Applications (Work done, power & reactive power)

Course Outcome:

Here in this syllabus student will learn some concept of co-ordinate geometry , some part of statistics viz. mean , median , mode , deviation etc. , and ofcourse a brand new concept of differential calculus and integral calculus which play an important role in technical subjects then concept of vector number , how they are added subtracted and multiplied etc.

Text Book:

Mathematics Dr. H. N. Sharma., Dr K.C. Sinha.

Reference Book:

Advance Engineering Mathematics” by Zill D G

Mathematics H.K. Dass., S Chand and Co.

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Engineering Graphics

Course Code: 2TDDE 202

Course Objective:

- To familiarize with the construction of geometrical figures.
- To familiarize with the projection of 1D, 2D and 3D elements .
- To familiarize with the sectioning of solids and development of surfaces.
- To familiarize with the Preparation and interpretation of building drawing .

COURSE CONTENT:

NOTE: Only First Angle Projection Method Is To Be Followed

Syllabus:

UNIT-1

Introduction to Drawing Instruments:

- Introduction of drawing instruments, materials and their uses
- Applications of mini-drafter
- Applications of compass and divider
- Applications of French curves and spline
- Pencils grades and their uses
- Designation and sizes of drawing sheet and drawing board

Planning and Layout of Drawing Sheet:

- Planning of drawing sheet as per I. S.: 696-1972 (SP 46: 1988)
- This should include
- Margin.
- Title Block.
- Zoning.
- Revision panel.
- Folding marks.
- Numbering of sheet.

UNIT-2

CONVENTIONAL REPRESENTATION:

Conventional representation of the following as per BIS practice

COMMON ENGINEERING MATERIALS ELECTRICAL INSTALLATIONS AND FITTINGS

Main switches, (lighting and power), socket outlets (3 pin 5AMP, 3pin5 AMP), bell, buzzer, loud speaker, Aerial, ceiling fan, exhaust fan, Bracket fan, fan regulator, battery and earth point.

ELECTRONICS COMPONENTS

Diode: Zener, varactor, Scotty, step recovery, light emitting diode (LED), PNP and NPN transistors, resistance, capacitor, Inductors (fixed and variable both), IC (8pin and 14pin) SCR, TRIAC, DIAC, UJT, FET, MOSFET, LOGIC GATES

SANITARY FITTINGS

showerhead, wall lavatory basin, comer Lavatory basin, urinal stall, kitchen sink, Indian type WC, Water closets (Asian pan, urissapan, Anglo-Indian, European)

BUILDING

Single and double swing doors and windows.

MECHANICAL COMPONENTS

Internal and external threads, slotted head, Square end and flat, radial arms and ribs, serrated shaft, splined shaft, Chain wheel, bearing, straight and diamond knurling, Compression and tension spring, leaf spring (with and without eye), Spur and helical gear

UNIT-3

LINES, LETTERING AND DIMENSIONING:

- Introduction of type of lines and their applications
- Single stroke vertical, inclined letters (capital and lowercase)
- And numerals.
- Dimensioning:
- Elements of dimensioning- dimension line, extension line, arrowhead Andleader line
- Dimensioning system - Aligned and unidirectional.
- Dimensioning of Arcs and Circles.
- Angular Dimensioning.
- Dimension of counter sunk and counter bore.

METRICAL CONSTRUCTIONS AND ENGINEERING CURVES:

- Divide a line into any number of equal parts by parallel line method bisecting of line and angle.
- Construction of triangles and polygons Introduction of conic sections (curves)
- Construction of Ellipse by Eccentricity and Concentric circles methods Construction of Parabola by Eccentricity and Rectangle methods Construction of Hyperbola by Eccentricity method Construction of Cycloid
- Construction of Involute of circle and polygon
- Construction of Archimedean Spiral of any number of convolutions

UNIT-4 SCALES:

- Introduction of scales and their applications
- Concept of reducing, enlarging and full size scale
- Classification of scales - plain, diagonal, vernier,
- Scale of chord and comparative scales
- Definition of R.F
- Construction of plain and diagonal scales

THEORY OF PROJECTION AND PROJECTION OF POINTS, LINES AND PLANES

- Definition of various term associated with theory of projection-
- Planes of projection, Quadrants, first & third angle projection method
- Projection of points in all the four quadrants.
- Projection of lines-
 1. Parallel to HP and VP both.
 2. Perpendicular to one plane and parallel to other.
 3. Inclined to one plane and parallel to other.
 4. Knowledge of projection of line inclined to both the planes

(No practice required)
- Projection of planes -
 1. Perpendicular to HP and VP both
 2. Perpendicular to one plane and parallel to other
 3. Inclined to one plane and perpendicular to other.
 4. Knowledge of projection of plane inclined to both the planes

PROJECTIONS OF SOLIDS:

Projection of cylinder, cone, prism and pyramid. Under the following conditions:

1. Axis parallel to HP and VP
2. Axis perpendicular to HP and parallel to VP
3. Axis perpendicular to VP and parallel to HP
4. Axis inclined to HP and parallel to VP.
5. Axis inclined to VP and parallel to HP.
6. Axis inclined to both HP and VP

UNIT-5

SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES:

Section of cone, cylinder, prism and pyramid (Solid resting on its base in the HP i.e. the Axis perpendicular to HP and parallel to VP) in the following cases:

1. Section plane parallel to HP and perpendicular to VP
2. Section plane parallel to VP and perpendicular to HP.
3. Section plane inclined to HP and perpendicular to VP.
4. Section plane inclined to VP and perpendicular to HP.

Drawing True shape of section.

Introduction to development of lateral surface of solids-

- Cone, Cylinder, Prism and Pyramids (Simple and truncated)
- Under the condition - solid resting on its base in the HP and axis
- Perpendicular to HP and parallel to VP
- Development of funnel and elbow

1. INTERSECTION OF SURFACES

- Intersection of following cases -
- Cylinder to cylinder and Prism to prism
- (With their axis intersecting and perpendicular to each other.)

2. ORTHOGRAPHIC PROJECTIONS & FREE HAND SKETCHING:

- Principles of orthographic projections
- Identification of necessary views and superfluous view
- Selection of front view
- Preparation of necessary orthographic views of simple objects
- From given pictorial views
- Dimensioning of orthographic views as per standard practice.
- Free hand sketches of simple objects (Using Pencil, Eraser & Paper only)

3. ISOMETRIC VIEWS

- Concept of isometric projection and isometric view (Isometric Drawing)
- Construction of isometric scale
- Construction of isometric view of polygon and circle
- Construction of isometric view of cone, cylinder, prism and pyramids
- Construction of isometric view of simple objects
- From given orthographic views

Course outcome:

- Introduction to engineering design and its place in society
- Exposure to the visual aspects of engineering design
- Exposure to engineering graphics standards
- Exposure to solid modelling
- Exposure to creating working drawings
- Ability to draw projections and analysing multiple views of object.

Text Books:-

Engineering Drawing –N.D.Bhatt - Charotar publishing House, 49 th Edition 2010

Reference Books:-

1. Engineering Drawing- D.A.Jolhe - TATA McGraw Hill, 2008
2. Engineering Graphics- K.R.Mohan – Dhanpatrai publishing co. 1st edition-2009

Chemistry

Course Code: 2TDDE 203

Course Objective:

- The objective of the Chemistry in polytechnique courses is to acquaint the students with the basic phenomenon/ concepts of chemistry, the student face during course of their studying the industry. The student with the knowledge of the basic chemistry will understand and explain scientifically the various chemistry related problems in the industry/engineering field. The student will able to understand the new developments and break through sufficient lying engineering and technology.
- To appreciate the need and importance of chemistry for industrial and domestic use.
- To gain the knowledge on existing and future upcoming materials used in device fabrication.
- To impart basic knowledge related to material selection and the techniques for material analysis.
- To impart knowledge of green chemical technology and its applications.
- Demonstrate knowledge of science behind common impurities in water and methods to treat them.
- Knowledge of methods to determine the calorific value of fuels.
- Apply the science for understanding corrosion and its prevention.

Syllabus:

UNIT-1 ATOMIC STRUCTURE AND RADIO ACTIVITY

Discovery of electron, proton ,neutron and nucleus. Rutherford's and Bohr's model of an atom. Bohr Burry scheme of filling the electrons in various orbits. Idea of s,p,d,f orbital .Alfa, Gamma and Beta rays, theory of radio activity, Group displacement law, half life period, numerical problems on half life period, fission and fusion.

SURFACE CHEMISTRY AND ITS APPLICATION

True solution, colloidal solution and suspension, lyophobic and lyophilic colloids, optical and electrical properties of colloids, coagulation, coagulants, idea about gels and emulsions.

ELECTROCHEMISTRY

Electrolysis, Faraday's laws of electrolysis, Numerical problems on Faradays Law, electroplating of copper and nickel.

UNIT-2 COLLIGATIVE PRPERTIES

Osmosis & osmotic pressure, Relative vapour pressure and Raoult's law. Internal energy (enthalpy) Entropy, Entropy fusion free energy, Effect of change in temperature catalysis.

CHEMICAL BONDING AND CATALYSIS

(A) Bonding: Nature of bonds- Electro valent, Co-valent, co-ordinate and hydrogen bond.

(B) Catalysis: Types, theory characteristic, positive, negative, auto and induced catalyst. Catalytic Promoter, and catalytic inhibitors. Industrial Application of catalysis.

WATER:

Sources of water, types of water, hardness of water, its causes, types and removal, Boiler feed water, harmful - effects of hard water in boiler. Municipal water supply. Numerical on soda lime process. Determination of hardness of water by O. Hener's, EDTA and soap solution method.

UNIT-3 METALS AND ALLOYS:

Physical and chemical properties of metals, copper, iron, aluminum, tin, nickel. General principle of metallurgy, minerals/ ores, ore dressing, roasting, smelting, base metalisation, fluxes, purification. Explanation of alloying purposes, methods of alloying, composition and uses of alloy like brass, bronze, duralium, German silver, gun metal, solder, stainless steel, casting and bearing alloy.

IONIZATION, PH VALUE CORROSION AND PROTECTION:

Arrhenius theory of ionization, factors affecting ionization. pH meaning (numerical), Buffer solutions and Buffer actions, choice of indication (acidimetry and alkalimetry). Explanation of corrosion, types of corrosion, factors effecting corrosion, corrosion control (protection against corrosion), metal and organic coating for corrosion control.

GLASS, CEMENT AND REFRACTORY:

Glass: Basic raw materials for glass, composition and manufacture of glass, varieties of glass and annealing of glass,.

Cement : Constituting compounds in cement, Composition of Portland Cement, its manufacture, setting and hardening of cement.

Refractories : Meaning, characteristics , use of common refractory materials.

UNIT-4 HIGH POLYMERS, RUBBER AND INSULATORS:

Polymerization and condensation, classification of plastics, Compounding and Moulding constituents of plastics. Preparation Properties and uses of PVC, polyethene, polystyrene, polyamides, polyesters , Bakelite. Synthetic fibers - nylon, rayon, decron, and polyesters.

Definition characteristics , classification and properties of insulators. Glass, wool and thermo cole.

Idea about rubber and vulcanization.

LUBRICANTS, PAINTS AND VARNISHES:

Lubricants: Meaning , type and theory of lubricants, properties of a good lubricants, Flash and fire point and cloud point, emulsification number, viscosity. Paints and Varnishes : Meaning, ingredients and characteristics of good paints and varnishes, their engineering applications.

UNIT-5 FUELS, FIRE EXTINGUISHERS AND EXPLOSIVES:

Classification of fuel, gross and net calorific value, Determination of a solid fuel by bomb calorimeter, octane and octane number. Proximate analysis of fuel, its utility, crude petroleum, products of fractional distillation .

Fire extinguishers - Description and use.

Explosives - Meaning, types, characteristic and use of explosives. Name Dynamite, lead azide, T.N.T., Picric acid, R.D.X.

POLLUTION AND CONTROL:

Introduction and chemical toxicology, air and water pollution, control of air and water pollution. Harmful effect of different gases like carbon mono-oxide, carbon dioxide, sulphur dioxide, nitric oxide, nitrous and lead.

List of Experiments:

- To identify one Anion and Cation in a given sample.
- Determination of flash point and fire point of a given sample of oil by Abel's apparatus.
- Determination of viscosity by Red Wood Viscometer no. 1 and no. 2.
- Redoximetry Titration :
 - a. Percentage of Iron in given sample of alloy.
 - b. Determination of strength of ferrous ammonium sulphate.
 - c. Determination of strength of anhydrous ferrous sulphate and ferrous sulphate.
- Determination of hardness of water by :
 - a. EDTA Method and Soap Solution Method
- Determination of solid content in the given sample of water.
- Determination of percentage of moisture in the given sample of coal by proximate analysis.

Course Outcome:

After the completion of the course, the learner will be able to:

- Analyze the need, design and perform a set of experiments.
- Differentiate hard and soft water, solve the related numerical problems on water purification and its significance in industry and daily life.
- Apply the principles of green chemistry in designing alternative reaction methodologies to minimize hazards and environmental degradation.
- Understand the causes of corrosion, its consequences and methods to minimize corrosion to improve industrial designs.
- Explain the properties, separation techniques of natural gas and crude oil along with potential applications and role of petrochemicals in national economy.
- Equipped with basic knowledge of polymers and its application.

Text Books: -

Applied Chemistry by Dr. Rekha Mittal., Dr Seema Kothari., Dr Karuna Mahahjan and amp.

Essentials of Physical chemistry, B. S. Bhal & G. D. Tuli, Edition: 18 th (2010) S Chand Group

Selected Topics in Inorganic Chemistry, Wahid U Malik, R.D.Madan, Tuli G. D., Edition: 17 th (2006), S Chand Group

Reference Books:

A Textbook of Organic Chemistry, Bahl,Arun, B.S. Bahl, Edition: 18th (2006) S Chand Group, New Delhi 110 055, India

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Fundamentals Computer & IT

Course Code: 2TDDE 204

Course Objectives:

- Learn basic principles of using Windows operation system.
- Learn and practice basic keyboarding and mouse use.
- Be able to access the Internet, Worldwide Web, as well as use Internet directories and search engines, and locate www addresses.
- Be able to find and evaluate information on the Web (learn how to be critical and evaluate what is valid and reliable).
- Learn basic computer and keyboarding related vocabulary in English.
- Learn the basics of e-mail, such as sending, forwarding and receiving mail, attaching documents, creating mailboxes, filters, and address books.
- Learn basic word processing skills with Microsoft Word, such as text input and formatting, editing, cut, copy and paste, spell check, margin and tab controls, keyboard shortcuts, printing, as well as how to include some graphics such as pictures and charts.
- In general, develop an intuitive sense of how computers work and how they can be used to make your academic work more efficient.

Syllabus:

Unit 1: Computer Organization, Evolution And Generation Of Computer Systems:

Block Diagram of computer system: Central Processing Unit, Memory unit ,ALU, Control unit Input & Output devices. Input Device Categorizing input hardware :Key Board, Card readers, Scanning Devices ,Bar Code Readers, OCR, OMR, MICR, Pointing Device, Mouse and its types ,light pen Touch Devices, Web camera ,microphone Joystick, Digitizing tablet. Output Device printers, Dot matrix, Printers, Plotters, and Monitors: CRT, TFT, Plasma, LCD Projector, DLP Projector, Speaker. Computer System Characteristics and capabilities Memory Capabilities, Repeatability Types of Computers & its Application Analog, Digital & Hybrid, General & Special Purpose Computer, Application of computer system Computer Generations & Classification of Computer Systems Minis, Mainframes & Super Computer Evolution of micro Comparative study w.r.t. speed, data bus, controllers, memory, peripheral interface of PC to Pentium computer systems.

Decimal, Binary, Octal, Hexadecimal number

Unit 2: Number System, Codes & Data Representation, Storage Devices

Systems Inter-Conversion from decimal to binary, octal, hexadecimal, conversion of binary number System to decimal, hexadecimal. Codes used for information exchange between computers–ASCII, Unicode, Data representation- Bit, Nibble, Byte, Kilo Byte, Mega Byte, Giga Byte, Tera Byte, Peta Byte etc Storage Fundamentals, Primary & Secondary Storage. RAM, dynamic and static ROM, PROM, EPROM, EEPROM, ape storage Devices, Characteristics & limitations, Floppy & their types.

Direct access Storage– Hard Disk, Disk Cartridges, Mass Storage Device Optical Disk , CD Rom, DVD, flash drive, ZIP drive

Unit 3:Computer Software's & Language

System Software V/s Application Software. Types of System Software, Operating System, Loader, Linker, Language Processor, Assembler, Compiler and Interpreter, Device Driver. CLASSIFICATION AND CHARACTERISTICS OF LANGUAGES Machine language, Assembly language, High-level language, Generations of Computer Language Application Software: working with MSOFFICE components, creating editing, formatting and printing documents using MSWORD, Data analysis and charting with MSEXCEL, Creating and presenting

slide show using MS POWERPOINT

Unit 4:Concept of Operating System, System security

Introduction, Functions of operating system, Types –batch, single user, multiuser, multiprogramming, multitasking, multi threading, real-time , embedded, Network, Distributed CLI(Command Line Interface) and GUI modes of O.S. Booting Process, BIOS, POST, Boot Strap Loader Introduction to viruses, worms, Trojans, Anti Viruses scanning & Removal of Viruses ,safety measures- Firewall, updates, Patches

Unit 5: Internet Applications:

Introduction to internet, different services of internet- www, E-Mail, Chat (Textual/Voice), website access and information search, Browsers And Search Engines

List of Experiments:

- 1 .Study the uses of input and output device
2. Study the uses of storage devices
3. Backup of data on tape, floppy & hard disk, CD, DVD and in PEN drive
4. Use of windows media player, recording, editing playing sound and video files
5. PRACTICE ON WINDOWS 2000/ XP/Vista

Starting Windows, Exploring the desktop, Arranging windows, my Creating Shortcuts, Practice on moving and Practice on Windows Explorer File organization: creating, copying, moving, renaming and deleting and Practice on Windows Accessories Creating editing, formatting, previewing and printing documents using Shutting down windows.

6. PRACTICE ON MS

Creating editing, formatting, saving, previewing and printing documents.

Auto Text, AutoComplete, AutoCorrect, grammar and spellchecker, Find

Insert, modify table.

Mail merge, Macro, Hyperlink

Header, footer, Watermark.

7. PRACTICE ON MICROSOFT EXCEL

Creating editing, formatting, saving, previewing and printing worksheet.

Use of formula and functions.

Split windows and freeze pans.

Create, edit, modify, print worksheet/charts.

Import & Export D

Pivot table- create, modify

Sorting & Filter data

Header, footer, Watermark.

8. PRACTICE ON POWERPOINT

Create, edit, insert, move, slides.

Open and save presentation.

Insert Object, picture, Diagram, chart, Table, Movie & Sound,

Slide design, layout, background.

slide show, setup, action button, animation scheme, custom animation,

Course Outcomes:

- Demonstrate a basic understanding of computer hardware and software.
- Demonstrate problem-solving skills.
- Apply logical skills to programming in a variety of languages.
- Utilize web technologies.
- Demonstrate basic understanding of network principles.
- Working effectively in teams.
- Apply the skills that are the focus of this program to business scenarios.

Text Books:

Computer fundamental books by Anita Goel

References Books:

Computer and information technology fundamentals

Narendra Jain and amp., B.L. Jeenekar

Communication Skills-II

Course Code: 2TDDE 205

Course Objective:

- The students, after completing the course ,will be able to use general purpose words of English to express himself in speaking reasonably clearly and correctly on routine matters .Develop a habit of reading with comprehension to achieve an optimum speed of 75 wpm Write reasonably and grammatically correct English

ENABLING OBJECTIVES:

The students, after completing the course, will be able to

- Understand slowly delivered spoken material in Indian English.
- Understand general purpose words of English.
- Use general purpose words of English to express himself in speaking reasonably clearly and correctly on routine matters.
- Write reasonably and grammatically correct English.
- Develop a habit of reading with comprehension to achieve an optimum speed of 75 WPM.

Communicate effectively in a professional environment through speaking and writing to achieve desired objectives.

Syllabus:

Unit I- Nature ,process and importance of communication

- Meaning of communication
- Definition of communication
- Functions and importance of communication
- Process of communication

Unit II- Detailed study of the stories from the prescribed book

- Writing summary, moral and characterization of any one story from the book prescribed

Unit III – Letter writing

- Importance of letter writing
- Lay out of business letter
- Format of business letter
- Letters of complaint /claim

Unit IV- Passages of comprehension

- Steps for effective Reading
- Meaning of comprehension

Unit V-Composition and Translation

- writing paragraphs of 150 words on topics of general interest
- Translation (Hindi to English and viceversa)

Course outcome:

- Seeks to develop the students' abilities in grammar, oral skills, reading, writing and study skills. students should improve their speaking ability in English both in terms of fluency and comprehensibility

TEXT BOOKS:

Communication skills compiled by Mrs. Thomas & Mrs. Krishnamurthy, H&M Dept, 2009

English and Communication Skills by Vivek Saxena

REFERENCE BOOKS:

1. Contemporary English Grammar, Structure and Composition by David Green, Publisher Macmillan, first edition, 2000.
2. English Grammar and Composition, R. C. Jain, Macmillan, India, first edition, 2005.

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Surveying

Course Code: 2TDCE 301

Course Objective:

To measure the land area, to prepare map and to find out the elevation of a point for constructional purpose.

Syllabus:

To initiate any Civil Engineering Project in Building Construction System, Irrigation Engineering System and Environmental Engineering System, the knowledge and skill of Surveying is a basic requirement for a Civil Engineer. With this knowledge and skill he will be able to choose appropriate survey and leveling methods, instruments and carry out survey work to prepare required maps. The plans /maps will be further used for designing, estimating and execution of Civil Engineering Works. One should acquire knowledge and develop the skills in surveying.

Unit 1: TYPES OF SURVEY:

Definition, objects of Surveying, Principles of Surveying, uses of survey, Classification of Surveying. Primary - Plain, Geodetic, Secondary - Based on Instruments, method, object, Nature of field.

CHAIN & CROSS STAFF SURVEY:

Principle of Chain Survey. Study and use of Instruments for linear measurements - chain, Tape, Ranging Rod, arrows, pegs, cross Staff, optical Square, line Ranger. Ranging -Direct and Indirect Ranging Chaining - Plain and sloping grounds. Chain Triangulation - Survey Station and their Selections, factors affecting selection of survey station. Survey lines, Check lines, Tie lines, base line. Taking offsets. long and short offset, degree of offset. Obstacles in chaining. Chain & cross staff Survey for finding area of a field (Numerical problems) Errors in chain Surveying & applying Corrections for chain & Tape (Numerical problems).Conventional signs related to survey

Unit 2: COMPASS SURVEY:

Principle of Compass Survey.Bearing of lines - Meridian -True, Magnetic, and Arbitrary. Bearing - fore bearing, Back bearing, Whole circle bearing, Quadrennial bearing system and Reduced bearing, Conversion of bearings, finding included angles from bearings. Prismatic Compass - Component, construction and use. Local attraction, Causes, precautions to be taken to avoid and correction of bearings affected due to local attraction, calculation of included angles. Traversing - traversing by chain and compass. open traverse, closed traverse, check on open and closed traverse. Graphical adjustment for closing error.Numerical problems on calculation of bearings, Angles and local attraction.

UNIT 3: LEVELLING:

Definitions, meaning of various terms used in levelling - Level surface, Level line, horizontal line, Vertical line, Datum surface, Reduced level, Bench mark and its types. Dumpy level -Components, Construction, Line of sight, Line of Collimation, Bubble tube axis, levelling Staff - Telescopic and folding type. Foresight, back sight, Intermediate sight, Change point, Height of collimation. Fundamental axes and their relationship Recording in level book. Temporary adjustments of dumpy level. Method of Reduction of levels - Height of instrument method and Rise and fall method. Arithmetical checks, Numerical problems, Computation of missing readings. Classifications of leveling - simple, differential, profile, cross sectional, fly and check levelling. Study and use of tilting level & Auto level. Sources and errors in levelling, precautions and difficulties faced in levelling.

UNIT 4: CONTOURING:

Definitions - Contour, contour interval, Horizontal equivalent. Characteristics of contours. Method of locating contours. Interpolation of contours. Establishing grade contours. Uses of Contour Maps. Calculation of reservoir capacity by contour map by trapezoidal and prismoidal formula. Interpretation of Typical Contour Sheets.

UNIT 5: AREA AND VOLUME MEASUREMENTS :

Construction and use of polar planimeter for measurement of area and simple numerical problems. Study and use of Digital Planimeter. Concept of computation of Volume by Trapezoidal and Prismoidal formulae. (No numerical problems)

Practical's:

- Measurement of distances with chain & tape on ground with direct or indirect ranging.
- Measurement of distances with chain & tape on ground with direct or indirect ranging.
- Construction and use of optical square and open cross staff for setting out perpendicular and running a survey line for locating details.
- Measurement of Area by Chain and cross staff survey.
- Use of prismatic compass and observing fore bearing and back bearing.
- Measuring Fore bearing and Back bearing of 5-6 side closed polygon. Identifying stations affected by local attraction and calculation of corrected F.B. & B.B.
- Measuring for bearing and back bearing for an open traverse (5 to 6 sided). Calculate direct angles between successive lines.
- Use of Dumpy level, temporary adjustments and taking reading on levelling staff.
- Recording readings in field book.
- Differential leveling practice, reduction of level by H.I. method.
- Differential leveling practice, reduction of level by rise & fall method.
- Carrying Bench mark from one point to another point about 200 m by fly leveling with tilting level.
- Use of auto level and taking observation.
- Measurement of Area of irregular figure by polar planimeter. Measuring area enclosed by closed contours on contour map prepared earlier, by simple digital planimeter.

Course Code: 2TDCE 301

Course Outcomes:

Students are expected to use basic surveying equipments like dumpy level, compass etc. perform chain survey, contour maps and carry out surveying works related to land and civil engineering projects.

Text Books:

Surveying by V.R. Sawant.,S.V. Gosavi., R.B. Narahari Nirali prakashan

Surveying I by Manisha

Reference Books:

“Introduction to Surveying” by James

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Material Technology

Course Code: 2TDCE 302

Course Objective:

To learn the manufacturing process, types, applications and testing procedures for materials.

Syllabus:

Construction Technology and Management Technician has to work as a supervisor in the field of Civil Engineering Construction works. He should therefore be in a position to select the proper material and use the same in the construction of a structure Hence, he should know the properties, Tests (wherever required) and skills in selection of the materials. The selection of materials and test should be according to I.S. specifications.

Unit 1: INTRODUCTION:

Importance of material Technology for Civil Engineer.name of common Engineering materials used in construction.

MASONARY MATERIALS:

- (a) Building stones- classification of rocks, requirement of good building stone, dressing of stones, quarrying of stones, artificial or cast stones.
- (b) Bricks - properties of good building bricks, conventional bricks , standard bricks, composition of clay brick, method of preparation of bricks, strength of bricks, proportions of burnt clay bricks , testing of bricks, special bricks, hollow blocks, fly ash bricks.

UNIT 2: BINDING MATERIALS:

Murrum, Properties of Murum for Road work. Lime - Types and properties of lime : Fat lime, Hydraulic Lime, Quick lime. Cement - Different ingredients used for manufacturing cement with their percentage. Physical properties of ordinary Portland cement (OPC), hydration of cement. Physical properties of cement - fineness, standard consistency, initial and final setting time, compressive strength and soundness, different grades of OPC, 33, 43, 53 and their specification of physical properties as per relevant IS codes, field test of cement, storing cement at site, effect of storage of cement on properties of cement, Types of cement and their functional uses..

UNIT 3: AGGREGATES:

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

MORTARS:

Classifications, lime mortar, cement mortar, special mortars. Functions of mortar, proportions, properties of mortar and tests for mortar.

UNIT 4: CONCRETE:

Introduction to concrete - Definition of concrete, necessity of supervision for concreting operation, different grades of concrete (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 (w/c) ratio, Definition of w/c ratio, 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. Range values of workability requirement for different types of concrete works, cohesiveness, segregation, bleeding, creep of concrete. Curing of concrete. Testing of concrete for strength and workability. Properties of hardened concrete

TIMBER:

Difference between wood and timber. Timber based material: use of timber, characteristics of good timber, defects in timber, plywood, particle board, veneer, sun mica for mica, nuwood, artificial timber, rubber wood.

PAINTS, VARNISHES & COLOURS:

Different in gradients used in manufacturing/ preparation of paints, Primers, their different types for steel and timber. Use of paint as protecting surface device for steel surface type of paint used and for wood surface types of paint used. VARNISH : Method of preparation of varnish, component materials used in varnish.

COLOURS : For decorative purpose and finished purpose use of colour as water base, colour as oil base, Distempers and cement paints.

UNIT 5: STEEL AND ALUMINIUM PRODUCTS:

Steel used as Engineering Material in different shapes. Like T- section , Angle section, Channel Section, I-Section steel sheets used in manufacturing of Doors. Aluminum : Used as construction materials.

MISCELLANEOUS:

Give the concepts about the other materials which can be used as Engineering Materials like Glass, Rubber, Tar, Emulsion, Bitumen, Glass wool, Use of J bolts, U hooks, Stoneware pipes, Galvanized iron pipes. Miscellaneous materials: glass, plastic- P.V.C. pipes used as materials in pipe laying for water supply purposes, Irrigation etc. Water tanks. fibers, aluminum, steel , galvanized iron, asphalt bitumen etc. micro silica, PVC, CPVC, PPF. Waterproofing and termite proofing materials, admixtures in concrete, bonding agents, epoxy resins, Polishing materials etc. readymade concrete cover. Readymade ornamental material (wall papers, carpets, radium prints, blocks etc.)

Practical's:

- | | | | |
|----|-------------------|-----|---|
| 1. | Test on Aggregate | (1) | Fineness Modulus of fine aggregate. |
| | | (2) | Fineness modulus of Coarse Aggregate. |
| | | (3) | Flakiness Index. |
| | | (4) | Aggregate crushing test (Demonstration) |
| | | (5) | Impact Test. |
| 2 | Test on Bricks | (1) | Water Absorption Test. |
| | | (2) | Compressive strength of bricks. |
| | | (3) | Effloresce Test. |
| 3. | Test for Cement | (1) | Fineness of cement. |
| | | (2) | Normal consistency of cement |
| | | (3) | Setting time test initial and final. |
| | | (4) | Tensile strength. |
| | | (5) | Specific gravity |
| 4 | Test for concrete | (1) | slump cone test |
| | | (2) | Compressive strength of cubes (7 days ,28 days) |
| | | (3) | Rebound hammer test |
| | | (4) | Compaction factor test |
| 5 | Test for mortar | (1) | bulking of sand |
| | | (2) | silt content |
| | | (3) | slaking of quick lime |
| 6 | Testing for Steel | (1) | Tensile strength of M.S. bar. |
| | | (2) | Shear strength on M.S. bar |

Course Outcomes:

- The student will be able to identify the use of different materials used in civil engineering.

Text Books:

Construction materials and equipments By Ghasiram Raigar
Concrete Technology By Manisha

Construction Materials M.N. Gangrade., N.K. Barwa Nirali prakashan

Reference Books:

Concrete technology by M L Gambhir
Concrete Technology and Good Construction Practices

Transportation Engineering-I

Course Code: 2TDCE 303

Course Objective:

- To impart the knowledge of planning, design, construction and maintenance of railway tracks, airports and harbours.

Syllabus:

This subject caters to the need of technician engaged in the investigation, planning, construction & maintenance of railway, bridges and tunnels. In Practical field each component of transportation is a specialized branch of engineering. This subject aims at basic knowledge about railway, bridges, and tunnels in respect of their various types, materials used, functions of component parts, methods of construction, planning principles, aspects of supervision and maintenance.

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 their relative merits and demerits. Necessity & importance of Cross drainage works for roads & railways.

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 broad gauge & metre gauge single & double line in cutting and embankment. permanent ways.

Unit-3 Ideal Requirement, Component Parts:

Rails - function & its types. Rail Joints - requirements, types, Creep of rail - causes & prevention of creep. Sleepers - functions & Requirement, types - wooden, metal, concrete sleepers & their suitability, sleeper density. Ballast - function & different types with their properties, relative merits & demerits. Rail fixtures & fastenings - fish plate, bearing plates, spikes, bolts, keys, anchors & anti creepers. Railway Track Geometrics. Coning of wheels, tilting of rails, Gradient & its types, Super elevation, limits of Super elevation on 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 and their function, organization, duties of permanent way inspector, gang mate, key man

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 & super structure. 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, Wing 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, pre-stressed 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.

Unit-5 Tunnel Engineering:

Definition, necessity, advantages, disadvantages. Classification of tunnels. shape and 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 tunnelling in hard rock - full face heading method, heading and bench method, drift method. Precautions in construction of tunnels. drilling equipments-drills and drills carrying equipments. Types of explosives used in tunnelling. Tunnel lining and ventilation.

Topics for Visits & Reports:

- Through packing
- Shovel packing
- Track maintenance
- Systematic overhauling
- Lifting of track
- Lowering of track
- Counteraction, measurement and adjustment of creep
- Organization, Tools and equipments for maintenance.
- Maintenance of points and crossings
- Maintenance of level crossing.

Course Outcomes:

- Student will be able to get knowledge on planning, design, construction and maintenance of highways as per IRC standards and other methods.

Text Books:

Transportation engineering By justo Khanna

Transportation engineering By V.K. Sonarkar., S.A. Rasal Nirali prakashan

Principles Of Transportation Engineering” by Partha Chakroborty

Reference Books:

Transportation Engineering” by C Venkatramaiah

Highway Engineering” by S K Khanna and C E G Justo

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Hydraulics

Course Code: 2TDCE 304

Course Objective:

To study the properties of a moving fluid like velocity and acceleration, and the forces on fluid through the continuity equation, Euler's and Bernoulli's equations.

Syllabus:

Hydraulics is a branch of engineering science deals with behavior of fluids at rest as well as in motion. Man encountered the problems in the field of water supply, irrigation, Navigation are resulted in the development of Hydraulics. Physical properties of water will play an important role in the through pipes, open channels. The empirical formulae developed in hydraulics have found useful application in several problems. The measurements of flow of water in pipes are useful in water supply system and assessment of water in irrigation field.

Unit 1 Properties of Fluid:

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

HYDROSTATIC PRESSURE :

Free liquid surface, Definition of pressure and its SI unit, Hydrostatic pressure at point, Pascal's law, Variation of pressure in horizontal and vertical direction in static liquid, Pressure diagram. Total hydrostatic pressure and center of pressure, Determination of total pressure & center of pressure on vertical & inclined faces of dams, sluice gates, sides and bottom of water tanks. Numerical Problems

UNIT 2 Measurement of Liquid Pressure In Pipes:

Concept of pressure head and its unit, Intensity of pressure, Variation of pressure with depth of liquid, Types of pressure- atmospheric gauge and absolute pressure. Conversion of pressure head of one liquid into 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. Simple Numerical Problems.

FUNDAMENTALS OF FLUID FLOW

Concept of flow, Gravity flow and pressure flow. Types of flow - steady and Unsteady, uniform and non-uniform, Laminar and turbulent. Various combinations of flow with practical examples, Reynolds number and its application, Stream line and equi-potential line. Flow net and its uses. Discharge and its units, Continuity equation for fluid flow. Various forms of energies present in fluid flow-potential, kinetic, & pressure energy. Datum head, pressure head, velocity head and total head, Bernoulli's theorem, its assumptions and limitations. Loss of head and modified Bernoulli's theorem. Application of Bernoulli's theorem. Simple Numerical Problems.

UNIT 3 Flow of Liquid Through Pipes:

Loss of head due to friction, Darcy-Weisbach Equation Friction factor, relative roughness. 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 pipes and 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. Simple Numericals on head loss.

FLOW THROUGH OPEN CHANNEL

Types of channels- artificial & natural, purposes of artificial channel, Different shapes of artificial channels. Geometrical properties of channel section - wetted area, wetted Perimeter, hydraulics radius. Prismatic channel sections, steady- uniform flow through prismatic channel section. Chezy's equation and Manning's equation for calculation of discharge through an open channel, common range of values of Chezy's constants and Manning's constant of different types of channel surfaces. Most economical channel section, conditions for most economical channel sections. Froude's number and its significance. Critical, sub-critical and supercritical flow in channel, Hydraulic jump its occurrence in field, uses of hydraulic jump.

UNIT 4 Flow Measuring Devices:

Velocity measuring devices for open channels. Float surface, sub-surface and float rod, Pitot tube - principle, expression for velocity, current meter - cup type & propeller type. Discharge measuring devices for channels - Notches, Types of notches, expression for discharge. Francis formula, End contraction and velocity of approach, Weirs - Broad crested weir, ogee spillway, and expression for discharge. Flumes - Venturi flume, standing wave flume, expression for discharge. Velocity area method for measurement of discharge through open channels. Discharge measuring devices for pipes. Venturimeter - Component parts, principle of working, Study and use of Water meter, Flow through orifice. Orifice- Definition and use, Types of orifice based on various criteria. Coefficient of contraction, coefficient of velocity and coefficient of discharge, Relationship between them. Discharge through small sharp-edged circular orifice. Determination of hydraulic coefficient of orifice. Simple Numerical.

Unit 5 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.

Practical's:

- Measurements of pressure and pressure head by Piezometer, U-tube manometer.
- Measurement of pressure difference by U-tube differential manometer. Study of bourdon's gauge.
- Verification of Bernoulli's theorem.
- Reynolds experiment to study types of flow.
- Determination of Darcy's friction factor for a given pipe.
- Determination of Minor losses in pipes (any two).
- Determination of Manning's constant or Chezy's constant for given rectangular channel section.
- Demonstration of Hydraulic jump.
- Determination of coefficient of discharge for given rectangular or triangular notch.
- Determination of coefficient of discharge for a given Venturimeter.
- Demonstration and use of Pitot tube and current meter.
- Determination of hydraulic coefficients for sharp edge orifice.
- Study & use of water meter.
- Study of a model of centrifugal and reciprocating pump.
- Use of characteristic curves/ charts / catalogs from manufactures for selection of pump for the designed discharge and head (Refer IS: 9694)

Course Outcomes:

The student will be able to get Knowledge of the basic concepts and principles of fluid mechanics.

Text Books:

Hydraulics by M N Gangrade.,R B Narahari

Fluid Mechanics by S.K. Saini

Reference Books:

Fluid Power Systems" by A B Goodwin

System-Specific Pi Control Theory for Fluid and Motion Systems" by I Krakow Kalman

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Building Drawing

Course Code: 2TDCE 305

Course Objective:

To understand the concept of building planning. To understand the various building codes to be followed while planning a building. To have the knowledge of various building components.

Syllabus:

Drawing is basically the language of an engineer. It is a means of communication between owner, architect, engineer and contractor. Civil Engineering Diploma holder has to supervise various construction processes and execute civil engineering structures such as buildings, roads, railways, dams, bridges; etc. Civil Engineer has to convert design parameters, process details into pictorial views. Therefore he is required to understand and prepare the drawings. He has to interpret the drawings, so that, he can execute the works. Civil engineer should be competent to convert his ideas into the drawing. This helps him to transfer his ideas, thoughts to his subordinates on the site. Drawing makes his job simple and effective. Drawing helps in detailing the structures processes with quality parameters. Drawings are essential for drafting specifications and tender documents. This subject is a core technology subject. The knowledge of this subject is useful for building construction, estimating and costing, design of structure, surveying, projects; etc.

UNIT 1 Convention

Conventions as per IS:962-1967 and other practices Types of Lines - Visible line, Centerline, Hidden line, Section line, Dimension line, Extension line, Pointers, Arrow heads or dots. Dimensioning systems. Symbols - Materials used in construction, building components. Reading of available ammonia prints of residential buildings.

UNIT 2 Planning of Building

Principles of planning of Residential and Public building. Space requirements and norms for various units of Residential and Public building. Rules and byelaws of local governing authorities for construction. Drawing of line plans for Residential and Public building.

UNIT 3: Building Drawing:

Development of plan from line plan of a residential building, Elevation, Section, Site plan, Location Plan, Foundation plan, Area statement and other details. Submission Drawing and Working Drawing.

UNIT 4: Detailed Drawing

Drawing of staircase, drawing of steel truss & lean to roof, drawing of layout plan of water supply line with accessories. Layout plan of sanitary line - position of inspection chamber, septic tank, sanitary fittings. Position of wash basin, sink etc.

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 storied building with flat roof etc.

Assignments/Activity:

- Drawing various types of lines, lettering and symbols of materials, doors and windows etc. Used in construction on Full Imperial size drawing sheet.
- Drawing the lines plans of following buildings on Full Imperial size graph paper.
Residential Building (Min. three rooms)
- Public Building - School building, Primary health center / Hospital building, Bank, Post Office, Hostel building etc. (At least four)
- Measured Drawing of an existing residential Building (Load bearing/ Framed structure Type) , showing Plan , Elevation, Sections, Construction notes, Schedule of openings, Site Plan, Area statement etc.
- Submission Drawing of two storied residential building (Framed structure type) showing Plans, Elevation, Sections, Foundation Plan, construction notes, Schedule of openings, Site Plan, Area statement etc.
- Working drawing of above drawing sheet preferably one plan, section through stair case to scale 1:50
- Two-point perspective view of a building drawn in submission drawing.
- Tracing of a submission drawing prepared at Sr. No.4 above.
- Ammonia print of submission drawing prepared at Sr. No.4 above.

Course Outcomes:

Understanding of building planning, orientation, drawing and architectural aspects.

Text Books:

Civil Engineering Drawing and Design” by D N Ghosh

Building Drawing M N Gangrade

Reference Books:

“A Course in Civil Engineering Drawing” by V B Sikka

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Advance Surveying

Course Code: 2TDCE 401

Course Objective:

To learn the different aspects of Geomatics surveying and the advancement in the different types of Surveying. The course will enable the engineers to the new frontiers of science like Hydrographic surveying, EDM, Global Positioning System and Photogrammetry and Remote Sensing.

Syllabus:

This is an applied technology Course Which is intended to teach Students application of facts, Concepts, Principles, and procedures in surveying and Levelling. It is also intended to teach students theodolite traversing and Modern Surveying equipment's. With this knowledge and skill, He will be able to choose appropriate survey and levelling methods depending on requirement to carry out survey works for various civil engineering activities.

Unit I Plane Table Survey:

Principles of plane table survey. Accessories required. Setting out of plane table, Levelling, Centering and orientation. Methods of plane table surveying - Radiation, Intersection, and Traversing. Merits and Demerits of plane table Surveying. situations where plane table survey is used. Use of Telescopic Alidade.

Unit II Theodolite Survey:

Components of Transit Theodolite and Their functions. Technical terms used. Temporary adjustments of Transit Theodolite. Swinging the telescope, Transiting, Changing the face. Measurement of Horizontal angle, method of Repetition, errors eliminated by method of repetition. Measurement of Deflection angle. Measurement of Vertical angle. Measurement of magnetic bearing of a line by Theodolite. Prolonging a Straight line. Sources of errors in Theodolite Surveying. Permanent adjustment of transit Theodolite (only relationship of 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 of a angular error, balancing the traverse by Bowditch rule and Transit Rule, Gale's traverse table. simple problems on above topic.

Unit III: Tacheometric Survey:

Principle of Tachometry. Essential requirements of Tacheorneter. Use of Theodolite as a Tachometer with staff held in vertical and fixed hair method (No derivation). Determination of tacheometric constants, simple numerical problems on above topics.

Unit IV: 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 offset from Long chord method and Rankine's method of deflection. angles. Simple Numerical problems on above topics..

ADVANCED SURVEY EQUIPMENTS:

Construction and use of one second Micro Optic Theodolite, Electronic Digital Theodolite. Features of Electronic Theodolite Principle of E.D.M, Components of E.D.M and their functions, use of E.D.M. Total station.

Unit V: Aerial Survey and Remote Sensing:

Aerial Survey Introductions, definition, Aerial photograph. Remote Sensing - Introduction, Electro-Magnetic Energy, Remote sensing system- Passive system , Active system. Applications - mineral, land use / Land cover, Natural Hazards and Environmental engineering system

Practicals:

- Using accessories carry out temporary adjustments of plane table. Locating details by method of Radiation.
- Locating details with plane table by method of intersection.
- Understanding the components of Theodolite and their functions, reading the vernier and temporary adjustments of theodolite.
- Measurement of Horizontal angle by transit theodolite.
- Measurement of Horizontal angle by method of Repetition.
- Measurement of vertical angles by theodolite.
- Measurement of Magnetic bearing of a line using theodolite.
- Measurement of deflection angle by taking open traverse of 4 -5 sides.
- To find Reduced levels and horizontal distances using theodolite as a Tacheometer.
- To find constants of a given Tacheometer.
- Study and use of 1 second Micro Optic Theodolite for measurement of Horizontal and Vertical angles.
- Study of E.D.M. for knowing its components.
- Use of EDM for finding horizontal and vertical distances and reduced levels.
- Determine the geographical parameters by total station.
- Use of Aerial survey (GPS, google earth, ISRO satellite etc.)

List of Projects:

- Plane table survey project for 5-6 sided traverse and locating details of buildings, Roads etc. by radiation and Intersection method , Sheet to be drawn by each student separately on A-1 size imperial drawing sheet.
- Theodolite traverse Survey for a closed traverse of 5-6 sides for a small area.03
- Computation by Gale's traverse table. Plotting the traverse with details on A1 size imperial drawing sheet.
- Setting out simple circular curve by Rankine's method of Deflection angles for a given problem and plotting the details of curve on A-1 size imperial drawing sheet.

Course Outcomes:

The student will be able to plan a survey for applications such as road alignment and height of the building.

Text Books:

“Surveying” by Punmia B C Advance Surveying by Vidya S Bhagwat., Late v S Gajare
ITI Surveyor theory Abhishek Arya

Reference Books:

Plane and Geodetic Surveying” by Clark D



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Soil Mechanics

Course Code: 2TDCE 402

Course Objective:

To provide the hands on training in determination of Engineering and index properties of soils, applied in field problems.

Syllabus:

Field of construction is an important area for pass out from polytechnic. Day to day supervision of construction work is an important function. Therein "Earth work" is an important item of the construction of Civil Engineering works e.g. Dams, embankments and cutting work in the construction of Roads and Railways, Pavement etc. for efficient supervision and proper execution of the earth work, the technicians must have knowledge of the basic principles of Soil Mechanics. Safe bearing capacity of soil is an important factor for the safety and design of a civil structure. Diploma pass outs have to work in the field, hence the knowledge of soil mechanics is necessary. Supervision of construction work rather than design of structure is considered more relevant to the job function of a technician and hence more emphasis is given to the practical aspect. However, necessary theoretical background has also been incorporated.

Unit 1: Physical Properties of Soil

Soil as a three-phase system. Water content, Determination of water content by oven drying method as per IS code. 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 weight by core cutter method and sand replacement method as per IS code. Specific gravity, determination of specific gravity by pycnometer.

CLASSIFICATION OF SOIL:

Field identification tests of fine-grained soil, IS. classification chart. 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. Classification of fine-grained soil by using plasticity chart. Seive analysis of soil and sedimentation of soil, log, scale of particle size. Stokes law, Consistency limit diagram. Particle size distribution, mechanical sieve analysis as per. IS code particle size distribution curve, effective diameter of soil, Uniformity coefficient and coefficient of curvature, well graded and uniformly graded soils. Particle size classification of soils & IS classification of soil

Unit 2: Permeability of Soil & Seepage Analysis

Definition of permeability. Laminar and turbulent flow. Importance of permeability. Darcy's law of permeability, coefficient of permeability, typical values of coefficient of permeability for different soil. Factors affecting permeability. Determination of coefficient of permeability by constant head and falling head permeability tests, simple problems to determine coefficient of permeability. Seepage through earthen structures, seepage velocity, seepage pressure, phreatic line, flow lines and equipotential lines. Flow net, characteristics of flow net, application of flow net (no numerical problems)

Unit 3: Shear Strength of Soil

Shear failure of soil, field situation of shear failure. Concept of shear strength of soil. Components of shearing resistance of soil - cohesion, internal friction. Mohr-coulomb failure theory (Coulomb's Law), Strength envelope, strength Equation. Purely cohesive and cohesion less soils. Laboratory determination of shear strength of soil - Direct shear test, Box shear test and tri-axial test Unconfined compression test & vane shear test, plotting strength envelope, determining shear strength parameters of soil

Unit 4: Bearing Capacity of Soils and Earth Pressure

Concept of bearing capacity, ultimate bearing capacity, safe bearing capacity and allowable bearing 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 Per IS:1888 & IS:2131. Typical values of bearing capacity from building code IS:1904. Definition of active earth pressure and passive earth pressure, structures subjected to earth pressure in the field. Earth pressure, effective pressure. Neutral pressure, and total pressure Magnitude of earth pressure. Rankine's theory, Assumptions made in the Rankine's theory. Earth retaining structures. Earth pressure on earth retaining structures. Bearing capacity of soil during earthquake.

Unit 5: 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. Modified proctor test. Factors affecting compaction. Field methods of compaction - rolling, ramming & vibration and Suitability of various compaction equipments. California bearing ratio, CBR test, significance of CBR value. Difference between compaction and consolidation. Concept of soil stabilization, necessity of soil stabilization. Different methods of soil stabilization - Mechanical soil stabilization, lime stabilization, cement stabilization, bitumen stabilization, fly-ash stabilization.

SITE INVESTIGATION AND SUB SOIL EXPLORATION :

Necessity of site investigation & sub-soil exploration. Types of exploration - general , detailed. Method of site exploration open excavation & boring. Criteria for deciding the location and number of test pits and bores. Trial pits types of Augers. Auger boring, wash boring and percussion drilling. Disturbed & undisturbed soil samples for lab testing. Field identification of soil - dry strength test, dilatancy test & toughness test. Empirical correlation between soil properties and SPT values. Record of boring Bore hole log.

Practical's:

- Determination of water content of given soil sample by oven drying method as per IS Code.
- Determination of bulk unit weight dry unit weight of soil in field by core cutter method as per IS Code.
- Determination of bulk unit weight dry unit weight of soil in field by sand replacement method as per IS Code.
- Determination of Liquid limit & Plastic limit of given soil sample as per IS Code.
- Determination of grain size distribution of given soil sample by mechanical sieve analysis as per IS Code.
- Determination of coefficient of permeability by constant head test.
- Determination of coefficient of permeability by falling head test Practical (Live demo or Prerecorded demo).
- Determination of shear strength of soil using direct shear test.
- Determination of shear strength of soil using Laboratory Vane shear test.
- Determination of MDD & OMC by standard proctor test on given soil sample as per IS Code.

Course Outcomes:

Students have the ability to determine Index properties and classify the soil. They can also know to determine engineering properties through standard tests and empirical correction with index properties

Text Books:

Environmental Studies V K Sonarkar., Dr Dinesh k Gupta

Soil and Foundation Engineering Manisha

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Mechanics of Structure

Course Code: 2TDCE 403

Course Objective:

To understand the stresses developed in bars, compounds bars, beams, shafts, cylinders and spheres.

Syllabus:

There are different types of structure depending upon type of materials like concrete steel, wood etc. They are subjected to various types of loading such as axial load, shear load, transverse load etc. This subject helps the student to analyze the internal behavior of structural members under different types of loading and to analyze trusses by using analytical and graphical method. The knowledge gained in this subject is helpful to study then subject Theory of Structure..

Unit 1: Stress & Strain

Definition of rigid body, plastic body, mechanical properties of metal such as elasticity & elastic limit .Definition of stress, strain, modulus of elasticity, S.I. Unit.Classification of stress, strain, Sign convention. Stress, strain curve for mild steel and HYSD bar , yield stress/ proof stress, Ultimate stress, breaking stress and percentage elongation. Deformation of body due to axial load. Deformation of a Body subjected to axial forces. Deformation of body of stepped c/s due to axial load, max. stress and min. stress induced. Stresses in bars of composite section & deformation. Shear stress, shear strain & modulus of rigidity, complementary shear stress, state of simple shear, punching shear.

Unit 2: Elastic Constants & Principal Stresses

Definition of lateral strain, Poisson's ratio, Change in lateral dimensions. Volumetric strain due to uni-axial force and change in volume. Biaxial and tri-axial stresses and volumetric strain & change in volume. Definition of bulk modulus, volumetric strain. Relation between modulus of elasticity, modulus of rigidity and bulk modulus. Definition of principal planes & principal stresses. Principal planes & stress due to bi-axial stress system & due to state of simple shear(Analytical method only). Strain Energy : Types of loading - gradual, suddenly applied load & Impact load. Definition of strain energy, modulus of resilience and proof resilience. Comparison of stresses due to gradual load, sudden load and impact load.

Unit 3: Shear Force and Bending Moment

Types of beams - cantilever, simply supported, fixed and continuous beams, types of loading- point load, uniformly distributed load, support reactions for determinate structures. Concept of shear force and bending moment, sign convention. Relation between bending moment, shear force and rate of loading. Shear force and bending moment diagrams for simply supported beams, overhanging beams and cantilever subjected to point loads, UDL and couples, point of contra flexure.

Unit 4: Moment of Inertia

Concept of moment of inertia, M.I of plane areas such as rectangle, triangle, circle, semicircle and quarter circle. Parallel axis and perpendicular axis theorem, M.I of composite sections, built up sections, symmetrical and unsymmetrical sections, radius of gyration & polar moment of inertia.

Stresses in Beams

Bending Stresses in Beams: Concept of pure bending, theory of simple bending, assumptions in theory of bending, neutral axis, bending stresses and their nature, bending stress distribution diagram, moment of resistance. Application of theory of bending to symmetrical and unsymmetrical sections. Shear stresses in beams, Shear stress equation, meaning of terms in equation, shear stress distribution for rectangular, hollow rectangular, circular sections and hollow circular sections, I sections and T sections. Relation between max.shear stress and average shear stress.

Unit 5: Analysis of Trusses

Definition frames, classification of frames, perfect, imperfect, redundant and deficient frame, relation between members and joints, assumption in analysis. Method of joint, method of section and graphical method to find nature of forces.

Columns:

End conditions, and equivalent length. Radius of gyration and slenderness ratio classification as per mode of failure. Euler's and Rankine's formulae. Use of Euler's and Rankine's formulae in solving various problems.

Course Outcomes:

- An ability to identify and compute various mechanical stresses in material and the material's response to each.

Text Books:

Strength of Materials Vol. I" by S P Timonshenko

Strength of Materials" by Bhavikatti Mechanics of structures Sunil S Deo.

Reference Books:

Mechanics of Structures" by Junarkar S B

Course Code: 2TDCE 404

Computer Aided Drawing

Course Code: 2TDCE 404

Course Objective:

To understand the concept of building drawing, various building codes to be followed while planning a building, various building components with the help of Auto-CAD

Syllabus:

It is the age of computer. Architect / Engineers prepares most accurate and descent presentation of plans to satisfy the clients. Use of computer software such as AutoCAD, Felix Cad, Auto Civil enables Civil Engineers to prepare quality drawings in shortest possible time. This helps in reduction in the laborious, tedious work of draftsman ship. Working drawings are also prepared with the help of computer. In view of this computer aided drawing has been included in the present curriculum.

Unit 1 Cad Software

Meaning, various CAD software available in the market AutoCAD, Felix Cad, Auto Civil, 3D Max ; etc.)Starting up of CAD, CAD Window, Tool bar, Drop down menu, Command window, Saving the drawing. Introduction of Graphic screen.

Unit 2 Cad Commands

WCS icon, UCS icon, co-ordinates, drawing limits, grid, snap, ortho features. Drawing commands, line, circle, polyline, multiline, ellipse, polygon etc. Editing commands - Copy, move, offset, fillet, chamfer, trim, lengthen, mirror, rotate, array etc. Working with hatches, fills, dimensioning, text etc.

Unit 3 Submission / Working Drawing

Generation of line plan, Detailed Plan, elevation, section, site plan, Area statement, Generation of 3D view and print commands, Introduction to Auto Civil , 3D Max.

Note: Above theoretical aspects should be covered in the practical periods.

Unit 4 Setting Up a Layout

Printing Concepts, Working in Layouts , Creating Layouts , Guidelines for Layouts ,File Management , Import & Export , DWG Files , IGES Files , Project Documentation Plotting & Printing , Printing Layouts , Print & Plot Settings , Projects Printing / Plotting

Unit 5 AutoCAD 3D

AutoCAD Civil 3D Interface ,AutoCAD Civil 3D GUI , AutoCAD Civil 3D Toolspace, AutoCAD Civil 3D Panorama, Workshops ,Project Management AutoCAD Civil 3D Projects , Sharing Data , Using Data Shortcuts for Project Management Chapter 3: Parcels , Lines and curves , Introduction to Parcels , Creating and Editing Parcels , Parcel Reports, Labels, Tables.

Practical's:

1. A: COMPUTER AIDED DRAFTING :

Following exercises shall be completed with CAD software and Print of all the drawings should be prepared on A3 / A4 size paper :

1. Preparation of line plan of a residential building.
2. Preparation of line plan of a Public building.
3. Preparation of detailed plan of a small residential building
4. Preparation of submission drawing of residential building - showing Plan, Elevation, Section, Schedule of openings, Site Plan and Area Statement.

2 B: COMPUTER AIDED DRAFTING :

Preparation of Drawings with CAD software for the following exercises (Any Three) and Print of all the drawings should be prepared on A3 /A4 size paper.

1. Plan, Cross Section and Longitudinal section of a Culvert (Pipe culvert/Box Culvert).
2. Section of an Earthen Dam.
3. Plan and Section of K. T. Weir.
4. Cross Section of Retaining wall.
5. Bonds in brickwork - Plan and Elevation for English bond and

Course Outcomes:

Students will be able to perform and design critical structures with ease.

Text Books:

Computer-Aided-Design-Sadhu-Singh Engineering Drawing by Hemraj Agarwal

Reference Books:

Learn Computer Basics and Its Application in Libraries” by Anil Kumar Dhiman and Yashoda Rani

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Entrepreneurship

Course Code: 2TDCE 405

Course Objective:

To help student understand the concept of self-employment, startups in the field of civil engineering.

Syllabus:

Since long entrepreneurship has been recognized as an essential ingredient of economic development. Concept of entrepreneurship has varied from time to time to suit the changing ethos of socio-economic reality. It was applied to business for the first time in 18th century, to designate a dealer who buys and sells goods at uncertain prices. Later on an entrepreneur was considered a dynamic agent of change, or the catalyst who transformed increasingly physical, natural and human resources, into corresponding production possibilities. In recent years, managerial aspects of entrepreneurship are being emphasized. It employs innovativeness, an urge to take risk in the face of uncertainties, and intuition, i.e. a capacity of seeing things in a way which afterwards proves to be true.

The course is kept in soft core under DCS, DME and DEE/ Videography/ Arch/CDDM/ Garment/ MOM/ Prod/ RAC/ MOM/CTM/ Auto/ Comp/ ETE/ IT/ Opto/ Print/ Texttile technology to bring to surface certain common characteristics such as perception of economic opportunity, technical and organizational skills, managerial competence, and motivation to achieve result.

Unit 1 Introduction to Entrepreneurship:

- Definition of Entrepreneur / Entrepreneur.
- Difference between Entrepreneurship / Entrepreneurship.
- Need for Entrepreneurship
- Qualities of successful entrepreneur
- Myths about Entrepreneurship
- Classification of entrepreneurs on the basis of different criteria
- Reasons for the failure of entrepreneurs.

Industries and Business Organizations

Concept of Industry or Enterprise

Classification of Industries

- (1) On the basis of capital investment
 1. Tiny (Micro) Industry
 2. Small Scale
 3. Medium Scale
 4. Large Scale
- (2) Others
 - Rural Industry
 - Cottage Industry

(3) Forms of Business Organization

1. Proprietorship
2. Board & Co-operative
3. Partnership
4. Public Ltd.
5. Private Ltd.
6. IT Sector
7. Government Co-operative / Undertakings

(4) Tiny small scale Industry

- Definition
- Its significance in National Development.
- Govt. policies for SSI promotions.
- Sector / Product for SSI.

Unit 2 Institutional Assistance

(a) Types of Institutional assistance

- Infra - structural assistance
- Technical Assistance
- Financial assistance
- Marketing Assistance

(b) Information / guidance & Training

- SISI - ASK
- MPCON - CSIR
- CED- MA - NRDC

(c) Infrastructure

- D/C - AVN/AKVN

(d) Marketing

- MP- AGRO
- NSIC
- PM.LUN
- EXPORT COPPORATION
- KVIP
- MPHSVN MPLDC

(e) Finance

- SIDBI - KVIB MPFC
- NABARD - MPWDC NSIC
- M.P.A.V.V.N.

- (f) Quality Control
- BIS - FPO - MPLUN F.D.A.
 - AG. MKT. Board

Unit 3 Incentives / Concession / Facilities Available

- Seed money
- Incentive / subsidies
- Others (Phones, Lands etc)

Unit 4 Planning of an Industrial Unit (SSI)

- Pre- Planning Stage
 - Scanning the environment
 - Market survey
 - Seeking information
 - product / project selection
- Implementation Stage
 - PPR Preparation
 - DIC registration
 - Arrangement of Land
 - Arrangement of Power
 - Obtaining NOC / Licenses from various departments
 - DPR Preparation
 - Seeking financial assistance
 - Commercial Production
- Post Implementation stage
 - Permanent registration from D.I.C.
 - Availing Subsidies
 - Diversification / Modification
 - Setting up of marketing channel / Distribution.

Unit 5 Achievement Motivation

- Historical perspective
- Concept of achievement motivation
- Significance of achievement motivation
- Development of achievement motivation

Financial Management of an Industrial Unit (SSI)

- Tools of financial analysis
- Ratio analysis
- Fund Flow / Cash flow analysis
- Working capital and concepts
- Financial accounting

Project Work/Assignment

1. To prepare chart to showing various factors affecting entrepreneurship.
2. To collect details related to various schemes run by the Govt. for Self-Employment and Entrepreneurship.
3. To identify and select a project and conduct Market-Survey thereof.
4. To collect various formats used in industries & departments/institutions working in the field of entrepreneurship.
5. Visit few small scale industries situated in city, nearby industrial area.
6. Discuss the problems related to SSI (Small Scale Industries) with an entrepreneur.
7. Collect information about market rates quality and quantity of goods for their choice.
8. Develop logical and analytical approach to purchase the raw material / finished goods.
9. To prepare case study of successful entrepreneurs.
10. Preparation of Project report for the industry/ Business they are willing to start.

Course Outcomes:

- Students will be able to learn the basic concepts of Entrepreneurship in the field of civil engineering and how to create new opportunities in construction industry.

Text Books

Entrepreneurship SBPD publications

Management and Entrepreneurship By Dr. Vinod Gupta

Reference Books:

Fundamentals of Entrepreneurship by H Nandan

Irrigation Engineering

Course Code: 2TDCE 501

Course Objective:

To impart the knowledge of planning, design, and construction of various irrigation system.

Syllabus:

India is an agricultural country where majority of persons live in villages. Agricultural Industry is the backbone of Indian economy. India being the tropical country, rainfall is available only for three to four months and is not uniform. To increase the yield of the farmers, assured uniform supply of water throughout the year is essential. This is possible only with enhancing the Irrigation facilities in the country. Irrigation is an age-old art. The aim of the subject is to present the science and practice of Irrigation engineering in a concise form comprising practically all the modern development. The input to the subject is the knowledge of survey for investigation, hydrology for calculation of yield from rainfall records and hydraulics for designing the storage, conveyance and outlet structures.

In current time the interlinking of river project is in the stage of implementation. The knowledge of irrigation is necessary

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. Analyze data for irrigation project, supervision of reservoir and canal structure, weir and barrages, lift irrigation scheme, its suitability, advantages and limitations Capacity of reservoir, Principle of Hydrology Relation between water and crop Rainfall, Crops, Dams Weir, Barrages, Area Capacity curve Capacity Canal Concept of runoff duty delta and base period.

Hydrology

Hydrological cycle, 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 off, factor affecting run off, calculation of run off by run off coefficient, English formula , Stranges and Binnie's tables and curves. Maximum flood discharge and methods of calculation. Unit hydrograph Yield and Dependable yield and methods calculation.

Unit 2 Water Requirement of Crops

Cropping seasons and crop in Madhya Pradesh. 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. Crop rotation. Problems on water requirement and capacity of canal. Assessment of irrigation water.

Investigation and Reservoir Planning

Survey for irrigation project data collected for irrigation project. Area capacity curve, silting of reservoir, rate of silting, factors affecting silting, methods to control levels and respective storage in reservoir. Fixing control levels

Unit 3 Dams and Spillways

Types of dams - Earthen dams and Gravity dams (masonry and concrete) Comparison of earthen and gravity dams with respect to foundation, seepage, construction and maintenance Earthen Dams - Components and their function , typical cross section seepage through embankment and foundation seepage control through embankment and foundation . Methods of constructions, types of failure of earthen dams and remedial measures. Gravity Dams Theoretical and practical profile, typical cross section, drainage gallery, joint in gravity dam, high dam and low dam Spillways-Definition, function, location and components. Emergency and services, ogee spillway and bar type spillway, discharge over spillway. Spillway with and with out gates.

Unit 4 Small Irrigation Structure, Bandhara, Percolation Tanks and Lift Irrigation

Advantages and disadvantages of Bandhara irrigation layout and component parts, solid and open Bandhara. Percolation Tanks - necessity and importance, selection of site. Layout of lift irrigation scheme. Irrigation department standard design and specification. Small irrigation structures, like Stop dam, stop dam cum cause way, ring bund , small ponds.

Diversion Head Works

Weirs - components parts, unction and types, layout of diversion head works wits its components and their function, canal head regular, silt excluders and silt ejectors. Barrages - components and their function. Difference between weir and barrage irrigation department standard design and specifications.

Unit 5 Canals

Classification of canals according to alignment and position in the canal network. Design of most economical canal section. Canal lining - Definition, purpose, types of canal 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.

Course Outcomes:

The student will gain knowledge on different methods of irrigation including canal irrigation.

Text Books:

Irrigation Engineering S K Garg
Irrigation Engineering B C Punmia

Reference Books: Irrigation Engineering by Gurcharan Singh

Quantity Surveying and Costing-I

Course Code: 2TDCE 502

Course Objective:

To provide hands-on experience on estimation, measurement and rate analysis of various building components and works.

Syllabus:

Preparation of quantity and cost estimates of the various items/ works is a major job function of a Diploma pass out in the field of Construction Technology and Management. This is a core technology subject, which will enable the students to learn core facts, concepts, principles & procedures in Estimating & Costing. With this knowledge and skill, he will be able to prepare estimate before start of construction and during execution. The course therefore, aims in developing in the student competency in preparing estimates of all types of Civil Engineering Structures i.e. Building Construction, Irrigation, Transportation and Environmental Engineering. The student is made familiar with the procedures and principles of measuring various works, estimating its cost and computing quantities of material needs. After learning the principles and procedures student applies them to prepare Estimate cost of various types of buildings, Earthwork and Road work estimates.

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 of Service unit method for selection of service unit for different types of civil Engineering Structures.

Types of detailed estimate Detailed estimate for new work. Revised estimate. Supplementary estimate. Revised & Supplementary estimate. Maintenance & Repair estimate. Uses of detailed estimate

Unit 2 Detailed Estimate

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.

Unit 3 Mode of Measurements.

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

Unit 4 Procedure for Preparing Detailed Estimate

Procedure for taking out quantities for various items of works by P.W.D & IS 1200 for. for Load bearing Structure -Long Wall and short wall method, Center line method. Framed Structure building. By using thumb rules for reinforcement quantity calculation By preparing bar bending Schedule Provisions in detailed estimate for contingencies, work charged establishment, Provisional items,

Provisional Sum, Provision for water Supply & Sanitary works, Electrical wiring & installations, centage charges, Tools & Plants, Prime cost, Day work.

Unit 5 Rate Analysis

Meaning of term Rate analysis -Factors affecting rate analysis, lead, lift, task work, 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. Estimate of Road of 1km. length for pavement surface, WBM, Bitumen, Cement concrete road, Use of software for estimation & for analysis of rates.

List of Practicals:

- 1) Prepare Check list of items of following type of Civil Engineering works.
 - a) Load Bearing type Building
 - b) Framed structure type building
 - c) W.B.M. Road
 - d) Septic Tank
 - e) Community well
- 2) Writing the rules of deduction's for below mentioned items of work as per IS 1200.
 - a) Brick / Stone masonry.
 - b) Plastering / Pointing
- 3) Taking out quantities of various items of work for load bearing building.
 - a) Earth work in excavation for foundation
 - b) Base Concrete of foundation
 - c) U.C.R. /BB Masonry work in foundation and plinth.
 - d) D.P.C.
 - e) Plinth Filling.
 - f) Brick work in masonry.
 - g) Flooring
 - h) Plastering.
 - i) Wood work in doors & windows
- 1) Taking out quantities of following items for small R.C.C. Hall
 - a) Concreting for footing, Column, Beam, slab.
 - b) Reinforcement for above items by preparing Schedule of bars.
 - c) Form work for all above items.
- 2) Preparing detailed estimate of a RCC single & two storied residential building for all items of work. (The quantity of reinforcement shall be calculated by percentage.)
- 3) Preparing Rate analysis of following items:
Building work - Brick work, P.C.C., R.C.C., Plastering, Flooring, Doors, Windows.
- 4) Taking out quantities of earth work for a Road profile prepared in surveying subject. Prepare the lead statement.
- 5) Taking out quantities of work for a Community well or Jack well or Septic Tank.

Course Code: 2TDCE 502

Course Outcomes:

Upon completion of the course, students will be able to have clear understanding of managerial functions like planning, organizing, staffing, leading & controlling and have same basic knowledge on international aspect of management.

Text Books:

Quantity Surveying and Costing-I by B N Dutta

Quantity Surveying And Valuation S.P.Mahajan, Sanjay Mahajan

Reference Books:

Estimating, Costing, Specification and Valuation In Civil Engineering” by M Chakraborti

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Transportation Engineering - II

Course Code: 2TDCE 503

Course Objective:

To introduce basic highway geometric element and familiarize with its design and to understand the available soil strata.

Syllabus:

Road is important, largest and basic mode of transportation in India. The transportation by road is the only one mode which could give maximum service to all. The road is also easy and effective mode of transportation. There is very much scope of road development work and its maintenance in our country. Students of Diploma in Civil Engineering have very much job opportunities in this field. He could work as a technician in P.W.D. and road construction organization. Also He could take the road construction works on contract basis. This subject gives the knowledge and skills required to carry investigation, planning, design, construction, maintenance works related to the roads.

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. different road yojana ,likepradhan mantra gram sadakyojana ,Mukhya mantra sadakyojna .

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 required for road project- Key map, Index map, Preliminary survey plan and detailed location survey plan, L section and C/S sections cross drainage work, land acquisition plan. Survey for availability of construction material, location plan of quarries.

Unit 2: 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. Super Elevation - definition, formula for calculating super elevation, minimum and maximum values of super elevation, and methods of providing super elevation. Sketching of standard C/S of national highway in embankment and cutting. Simple problems on geometric design of road.

Unit 3: 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, spoilbank, lead and lift, balancing of earthwork. Construction procedure. Soil stabilized roads - necessity, methods of soil stabilization, 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, tack coat, seal coat, Surface dressing - procedure of construction bituminous penetration macadam, and Bitumen/Tar carpets - procedure of construction. Cement concrete pavements- Construction procedure and equipments, Construction joints, joint filler, joint sealer.

Unit 4: 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 earth pressure, structures subjected to earth pressure in the field

Unit 5: Hill Roads

Parts and functions of hill road components, types of curves, Hill road formation. Land slides- causes and prevention. Structures- drainage structures.

Drainage of Roads

Surface drainage - side gutter, catch water drains, surface drainage. Sub-surface drainage - Longitudinal drains and cross drains.

Maintenance and Repairs of Roads

Necessity of maintenance of roads, Classification of maintenance operation - ordinary, routine and periodic maintenance. Maintenance of W.B.M., bituminous and cement concrete roads.

Arboriculture

Road side arboriculture, necessity, planning of plantation of trees selection of types of trees and development of nursery considering the environment aspects

List of Assignments/Practicals:

1. Road project for a road of minimum 0.5 km. length having at least one small cross drainage work.
 - Site selection.
 - Reconnaissance survey.
 - Fixing the alignment.
 - Detailed profile survey along the alignment and cross section of road and CD Work.
 - Prepare computer generated drawing of longitudinal section and typical cross sections of the road in cutting and filling.
 - Prepare computer generated drawing of proposed typical CD work/culvert. (Using CAD)

2. Visit to a road under construction/constructed to study the construction of
 - WBM road
 - flexible pavement
 - Rigid pavement roads for observing the type of construction and construction equipments.
3. Preparing drawings of detailed cross sections of major district road
 - state Highway
 - National highway
 - Express Highway in cutting and banking showing details and dimensions with proper scale. (Any two)
4. Traffic volume study and its representation of an important road intersection in your city.
5. Visit to a W.B.M. and Bituminous road for observing the different types of defects in roads.
6. Prepare a visit report. Which should consist of (a) List of various defects observed
Suggestions regarding the possible remedial measure.
7. 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.
8. Study of Different Highway software. Road SOR , MOST
1 - Geometrics 2- Pythagoras 3- C-Lx.

Course Outcomes:

Students will have adequate knowledge to design flexible and rigid pavements based on IRC guidelines. Further they know various techniques to evaluate performance of pavements.

Text Books:

Transportation and Planning : Highway Engineering: S.K. Khanna

Transportation Engineering by U S Patil., V K Sonarkar

Reference Books:

Highway Engineering” by P H Wright and K Dixon

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Structural Design & Drafting – I (RCC)

Course Code: 2TDCE 504

Course Objective:

To bring about an exposure to advanced topics in structural design comprising of RCC retaining walls, water tanks, design of bridges and prestressed concrete.

Syllabus:

The technician in construction Technology must have the concept of R.C.C. and should also be able to design simple R.C.C. structures, though he is not required to design complicated R.C.C. structures. Keeping this view in mind the course of R.C.C. is so designed that a technician in construction technology develop a concept of theory of R.C.C. gradually and finally will be able to design simple R.C.C. structures such as beam, slab, column footing, ductile detailing etc.

Unit 1: Introduction to RCC

SI. Units, Meaning of R.C.C. purpose of reinforcement. Materials of reinforcement steel as a reinforcing material. Types of steel used for reinforcement mild steel, Tor steel, permissible stresses in concrete and steel. Different mixes of concrete to be used for R.C.C. work use of I.S. code No. 456-2000 and I.S. 875-1984 for designing R.C.C. structures. Introduction to RCC design software like STRUUDS, resist.

Fixed & Continuous Beam

Concept of fixity, effect of fixity, advantages and disadvantages of fixed beam. Fixed end moments from first principle for beam subjected to UDL over 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. Clapeyron's theorem of three moment (no derivation). Application of theorem maximum up to three spans and two unknown support moment only, Support at same level, spans having same moment of inertia subjected to concentrated loads and uniformly distributed loads over entire span. Drawing SF and BM diagrams for continuous beams.

Unit 2: Working Stress Method & Prestressed Concrete

(Introduction to reinforced concrete, R.C. Sections their behaviour, grades of concrete steel. Permissible stresses, Assumptions in W.S.M. Equivalent bending stress distribution diagram for singly reinforced section.

Concept of under-reinforced, over-reinforced and balanced section, neutral axis co-efficient

Simple numerical problems on determining design constants, moment of resistance and area of steel for singly & doubly reinforced beam.

Concept of pre stressed concrete, externally and internally pre stressed member.

Advantages and disadvantages of pre stressed concrete.

Methods of pre stressing, pre tensioning and post tensioning. Losses in pre stressing.

(No numerical problems shall be asked in written examination on pre-stressed concrete).

Limit State Method

Definition, types of limit states, partial safety factors for materials strength, characteristics strength, characteristics load, design load. Loading on structure as per I.S. 875.

I.S. Specification regarding spacing of reinforcement in slab, cover to reinforcement in slab, beam column & footing, minimum reinforcement in slab, beam & column, lapping, anchoring effective span for beam & slab.

Analysis and Design of Singly Reinforced Sections (LSM)

Limit State of collapse (Flexure), Assumptions stress. Strain relationship for concrete and steel neutral axis, Stress block diagram and Strain diagram for singly reinforced section. Concept of under-reinforced, over-reinforced and balanced section, neutral axis co-efficient, limiting value of moment of resistance and limiting percentage of steel required for balanced singly R.C. Section. Simple numerical problems on determining design constants, moment of resistance and area of steel.

Unit 3: Analysis And Design Of Doubly Reinforced Sections (LSM)

General features, necessity of providing doubly reinforced section reinforcement limitations. Analysis of doubly reinforced section, strain diagram stress diagram, depth of neutral axis, moment of resistance of the section. Simple numerical problems on finding moment of resistance and design of beam sections.

Shear, Bond and Development Length (LSM)

Nominal Shear stress in R.C. Section, design shear strength of concrete, Maximum shear stress, Design of shear reinforcement, Minimum shear reinforcement, forms of shear reinforcement. Bond and types of bond, Bond Stress, check for bond stress, Development length in tension and compression, anchorage value of hooks 90° bend and 45° bend Standard Lapping of bars, check for development length. Simple numerical problems on deciding whether shear reinforcement is required or not, check for adequacy of the section in shear. Design of shear reinforcement; Minimum shear reinforcement in beams; Determination of Development length required for tension reinforcement of cantilevers beams and slab, check for development length

Unit 4: Analysis And Design Of T-Beam (LSM)

General features, advantages, effective width of flange as per IS:456-2000 code provisions. Analysis of singly reinforced T-Beam, strain diagram & stress diagram, depth of neutral axis, moment of resistance of T-beam Section with neutral axis lying within the flange. Design of T-beam for moment and shear for Neutral axis within or up to flange bottom. Simple numerical problems on deciding effective flange width. (Problems only on finding moment of resistance of T-beam section with N.A. lies within or upto the bottom of flange shall be asked in written examination.)

Design of slab (LSM) Design of simply supported one-way slabs for flexure check for deflection control, and shear. Design of one-way cantilever slabs and cantilevers chajjas for flexure check for deflection control and check for development length and shear. Design of two-way simply supported slab for flexure with corner free to lift. Design of dog-legged staircase. Simple numerical problems on design of one-way simply supported slabs cantilever slab & two -way simply supported slab. (No problem on design of dog-legged staircase shall asked in written examination.)

Unit 5: Design of Axially Loaded Column and Footing (LSM)

Assumptions in limit state of collapse- compression.

Definition and classification of columns, effective length of column. Specification for minimum reinforcement; cover, maximum reinforcement, number of bars in rectangular, square and circular sections, diameter and spacing of lateral ties.

Analysis and design of axially loaded short, square; rectangular and circular columns with lateral ties only, check for short column and check for minimum eccentricity may be applied.

Types of footing, Design of isolated square footing for flexure and shear. Simple numerical problems on the design of axially loaded short columns and isolated square footing. (Problems on design of footing shall be asked in written examination for moment and two way shear only.)

Principal of Earth Quake Engineering

Introduction ,RICHTER SCALE, Soft story effect, detailing of structural elements ,ductile detailing ,earthquake zone in India Different earthquake I S codes (IS 1893-1984) IS 4326-1976 .causes of failure of structure during earth quake ,principal of constructing earthquake resistant buildings .

List of Practicals:

Sketch book consists of approximately ten plates from R.C.C. Design shall include important information of clauses of IS 456-2000 code. Typical sketches of components members/stress distribution & strain distribution diagrams R.C.C. section / detailing of reinforcement in joints / members. Design of R.C.C. structural components by LSM.

Introduction to RCC design software STRUUDS

The students should make detailed simple design and drawing of reinforcement detailing on two full imperial size sheets finished in pencil on any five of the following R.C.C. components members of a two-storied building with detailing of reinforcement (G+1) at the joints as per requirements & IS 13920.

1. One-way simply supported slab.
2. Two-way simply supported slab.
3. Cantilever slab/chajja.
4. T-Beam
5. Column and column footing.
6. Dog-legged staircase.

Course Outcomes:

At the end of the course the student acquires hands on experience in design and preparation of structural drawings for concrete structures normally encountered in Civil Engineering practice

Text Books:

Design of RCC structural Elements by Bhavikatti

R.C.C. Designs Paperback – 2015

by B.C. Punmia (Author), Ashok Kumar Jain (Author), Arun Kumar Jain (Author)

Reference Books:

“Theory And Design Of R. C. C. Structures” by G Singh

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Work Origination and Management

Course Code: 2TDCE 505

Course Objective:

To know about the basics and importance of construction management and contracts related to tenders and construction industry

Syllabus:

A technician of Civil Engineering is required to execute civil work in various departments. The subject of included as a basic technology course so as to develop abilities of solving day to day problems arising during construction maintenance work. Handling live problems in the department such as issue of tender documents preparing T.A. Bills & CPM & charts, Handling to cash book, muster Rolls and settlement of imprest account problems etc. Understand labour laws and successfully dealing with labour and sub-ordinate staff.

In brief the subject works organization and management has been introduced to develop managerial skills in the students, so that he can successfully hurdle live situations at work.

Unit 1 Procedure of Execution of Work by P.W.D.

Organization of P.W.D. functions of their personnel. P.W.D. procedure of initiating the work administrative approval, technical sanction, budget provision. Method used in P.W.D. for carrying out works contract method and departmental method, Rate list method, piece work method, day's work method, department method.

(NMR and casual muster roll)

Contract

Definition of contract, objects of contract, requirements of valid contract. Types of engineering contract- Lump sum contract, item rate contract, percentage rate contract, cost plus percentage, cost plus fixed fee, cost plus variable percentage and cost plus variable fee contract, labor contract, demolition contract, fee contract, target contract, negotiated contract. Class of contractor, Registration of contractor. BOT Project.

Unit 2: Tender & Tender Documents:

Definition of Tender, necessity of Tender, Types of Local & Global. Tender Notice, points to be included while drafting Tender Notice, Drafting of Tender Notice. Meaning of terms: Earnest money, security deposit, validity period, right to reject one or all tenders, corrigendum to tender notice and its necessary.

Tender documents - List, scheduled A, Schedule B, Schedule C. Terms related to Tender documents - Contract conditions, time limit, time extension, penalty, defective material and workmanship, Termination of contract, Suspension of work, subletting of contract, extra item, escalation, arbitration, price variation clause, defect liability period, liquidated and un liquidated damages.

Filling the tender by contractor and points to be observed by him. Procedure of submitting filled in Tender document. Procedure of opening tender, comparative statement, scrutiny of tenders, award of contract, acceptance letter and work order. Unbalanced Tender, Ring Formation

Unit 3: Accounts of P.W.D.

Various Accounts Forms and their uses - measurement, Books, Nominal Muster Roll, Imprest Cash, indent, Invoice, Bills, Vouchers, Cash Book, Temporary advance.

Payment to Contractors

Mode of payment to the contractor : Interim payment and its necessity, Advance payment, secured advance, on account payment, Final payment, first and final payment, retention money, reduced rate payment, petty advance, mobilization advance.

Unit 4: Specifications

Necessity and importance of specifications of an items, points to be observed in framing specifications of an item, types of specification. Brief and detailed, standard and manufacturers specifications.

Preparing detailed specifications of items in Civil engineering works, standards specification book.

Legal aspects of specification.

Cash, Bills, Auction & T.A. Rules

Procedure to settle account of money received, modes of payment, permanent and temporary advance, comparison, checking of bills and vouchers, auction procedure, T.A. rules etc.

Unit 5: Time Schedule for Works

Importance of management of works Gantt bar chart, limitation of chart, CPM network, project chart.

Miscellaneous

Necessity of maintaining daily dairy, need for presence of sub engineer, A/R & S/R , charge to be handled to be cash transferred, inspection of rest houses. Measures to improve the efficiency of labour, causes of accident, trade unions, aims of labour legislation, labour courts, attitudes of sectional officers towards labour

Assignments:

1. Collecting old set of tender document and writing a report on it.
2. Collection of tender notices published in newspapers for various items of civil engineering works (At least 5) write salient features of them.
3. Drafting Tender Notice for construction of a Civil Engineering work (W.B.M. Road, Residential Building)
4. Preparation of Tender Document for the building. (Detailed Estimate prepared for R.C.C. building in estimating and costing shall be used)
5. Collection of various account forms from PWD & wiring report on in it.
6. Writing a report on store procedure and account producer of PWD. For it A
a) Guest Lecture of PWD Official may be arranged.

7. Writing detailed specifications for one item from each of following :
 - a) Building construction system.
 - b) Irrigation engineering system.
 - c) Transportation engineering system.
 - d) Environment engineering system.
8. Preparing muster rolls.
9. Preparing imprest account and temporary advance forms and developing skill for filling in forms.
10. Solving CPM and Net work problems
11. CPM PERT RELATED SOFTWARE
12. Preparation a ' E' Tendering of a particular project .

Visits:

1. Visit to public sector/Govt. Industry/ Organization. like PWD ,RES,
2. Visit to private sector Industry.

Course Outcomes:

Students will have the ability to select shortest activity to construct a structure.

Text Books:

Organization and Management by R D Agarwal

Management by Vijay D Navale

Reference Books:

Business Organisation & Management by V.S.P Rao

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Public Health Engineering

Course Code: 2TDCE 601 (A)

Course Objective:

The course is developed and designed to cover the emerging needs and challenges in the public health system in the country

Syllabus:

One of the basic needs of life is water. It must be supplied to all the people in required quantity and quality. A technician should be well aware and well trained to meet the water and sanitary requirement of the public, hence the course on PHE is included. For protection of environment, proper collection, conveyance and disposal of waste water and solid refuse are necessary. This again reinforces the necessity of study of water supply and sanitary engineering in the civil engineers in Diplomaprogramme . This course is aimed mainly at study of water supply and sanitary engineering. Without proper arrangement for house water supply and sanitation, the purpose of municipal water supply and drainage will be defeated. At present, entire cultural history, man is facing one of the most horrible ecological crises- the problem of pollution of his environment which some times in past was pure, virgin, undisturbed, uncontaminated and basically quite hospitable for him. Hence there is a need to study the problems related to environment in general and water pollution, land pollution, air pollution, solid waste management and noise pollution etc.; in particular.

Introduction

Duties of P.H. Engineer, Need and importance of P.H.E.

Unit 1: Hydrology

Hydrological cycle, 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 off, factor affecting run off, calculation of run off by run off coefficient, English formula , Stranges and Binnie's tables and curves. Maximum flood discharge and methods of calculation. Unit hydrograph Yield and Dependable yield and methods calculation.

Quantity of Water & Source of water :

Demands of water: Domestic, Industrial, Commercial & Institutional, Public use, 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, Types of water supply schemes Source of water : Surface and Subsurface sources of water ,Ground water, Open well, Tube-Well, infiltration well, infiltration gallery, infiltration pipes. Construction of dug well. Construction of tube well, Well Testing. Yield of well., Intake Structures-Definition and types, Factors governing the location of an intake structure, Water conservation, Ground water recharging – Necessity Importance and advantages.

Unit 2: Quality of Water & Purification of Water

Effect of different impurities on water, surface/ground water, Water borne disease. Need for analysis of water, Characteristics of water-Physical, Chemical and Biological, Testing of water for Total solids, hardness, chlorides, dissolved Oxygen, pH, Bacteriological tests, 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, 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, Flow diagram of water treatment plants

Unit 3: 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 a pipeline. 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

Building Sanitation

Importance and necessity of sanitation, Necessity to treat domestic sewage, Recycling and Reuse of domestic waste Definitions Sewage, sullage, types of sewage, 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, Systems of plumbing – one pipe, two pipe, single stack, layout plan for building sanitary fittings (drainage plan), inspection and junction chambers, their necessity, location.

Unit 4: Systems of Sewerage

Types of Sewers, Systems of Sewerage, Principle of Design of sewers, self cleansing velocity and non scouring velocity Laying, Testing and maintenance of sewers. Sewer Appurtenances, Manholes and Drop Manhole-component parts, location, spacing, Sewer Inlets, Street Inlets, Flushing Tanks – manual and automatic.

Analysis of Sewage

Characteristics of sewage, B.O.D./ C.O.D. and significance. , Aerobic and anaerobic process, Madhya Pradesh Pollution Control Board Norms for the discharge of treated sewage. Treatment of Sewage : 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. Common Complaints in the operation of septic tank and remedies.

Unit 5: Rural Sanitation

Environmental Sanitation Necessity and importance, Rural sanitation- Types of Privies – Aqua privy and Bore Hole Latrine construction and working Composting (NadeporVermiculture).

Practical's

- Turbidity test.
- Color test.
- Test for PH, Hardness, Chlorides, Iron & manganese.
- Test for B-Coil.
- Test for residual chlorine.
- Test for total, volatile, fixed suspended and settleable.
- Test for D.O., B.O.D., C.O.D. and stability.
- To determine suspended solids, dissolved solids and total solids of waste water sample.

VISITS

- Intake site and adjoining pumping station.
- Water treatment plant and testing lab.
- Sewage treatment plant.

Course Outcomes:

Student should be able to acquire theoretical knowledge and develop practical skills to apply a scientific approach to the management of public health services.

Reference Books:

Public health Engineering

By v. K. Sonarkar (author), dr. D. K. Gupta (author), s. A. Rasal (author),

Water-supply and Public health Engineering (studies in the history of civil engineering book 5)

By denis smith

Reference Books:

Public Health Engineering Sewerage Book by Ronald Ernest Bartlett

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Course Code: 2TDCE 601 (B)

Green Building Technology

Course Code: 2TDCE 601 (B)

Course Objective:

The course is developed and designed to cover the emerging needs and challenges in the development and efficient use of technology in green buildings, where buildings are developed keeping in mind less use of energy.

Unit 1: Introduction

Life Cycle impacts of materials and products – sustainable design concepts – strategies of Design for the Environment -The sun-earth relationship and the energy balance on the earth's surface, climate, wind – Solar radiation and solar temperature – Sun shading and solar radiation on surfaces – Energy impact on the shape and orientation of buildings – Thermal properties of building materials.

Unit 2: Energy Efficient Buildings

Passive cooling and day lighting – Active solar and photovoltaic- Building energy analysis methods- Building energy simulation- Building energy efficiency standards- Lighting system design- Lighting economics and aesthetics- Impacts of lighting efficiency – Energy audit and energy targeting- Technological options for energy management.

Unit 3: Indoor Environmental Quality Management

Psychrometry- Comfort conditions- Thermal comfort- Ventilation and air quality-Air conditioning requirement- Visual perception- Illumination requirement- Auditory requirement- Energy management options- -Air conditioning systems- Energy conservation in pumps- Fans and blowers- Refrigerating machines- Heat rejection equipment- Energy efficient motors- Insulation.

Unit 4: Green Building Concepts

Green building concept- Green building rating tools- Leeds and IGBC codes. – Material selection Embodied energy- Operating energy- Façade systems- Ventilation systems- Transportation- Water treatment systems- Water efficiency- Building economics

Unit 5: Green Building Design

Students to work through a controlled process of analysis and design to produce drawings and models of their own personal green building project. Topics include building form, orientation and site considerations; conservation measures; energy modeling; heating system and fuel choices; renewable energy systems; material choices; and construction budget-Students will research green construction and design in a particular -construction context and report their results to the class.

Practical's

As per the course coordinator

Course Code: 2TDCE 601 (B)

Course Outcomes:

The students completing the course will have ability to

- describe the concepts of sustainable design and green building techniques including energy efficiency and indoor environmental quality management
- create drawings and models of their own personal green building project

Text Books:

Green Building: Guidebook for Sustainable Architecture Book by Michael Bauer, Michael Schwarz, and Peter Mösle

Green Building Guidance Karthik Karuppu, NVICO

References Books:

Green Home Building: Money-Saving Strategies for an Affordable, Healthy, High-Performance Home” by Miki Cook and Doug Garrett

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Quantity Surveying & Costing - II

Course Code: 2TDCE 602

Course Objective:

To provide hands-on experience on estimation of RCC, steel, masonry buildings and roads and culverts and inculcate the fundamentals of valuation, contracts and tendering.

Syllabus:

One of the job specifications of a diploma holder is to prepare estimate of civil Engineering structures as for cost and quantity of various construction materials required. This is an essential and basic requirement for all projects. This is the first step towards efficient management of the project including proper estimation and utilization of human resources required for the project. This subject is in continuation of quantity surveying and costing-I. In this chapter, the timber structure, R.C.C. structures and steel structures Bridge and culverts, water supply and sanitary Engineering are included. The students will be able to calculate the quantity of works of the structures of the above - mentioned chapters. A chapter on valuation and rent fixation is also included so that the students will be familiar with the method for valuation work and fixing rent. Basic Introduction of software related to estimating & costing are also included which help students to work in the field with the software.

Unit 1: Estimate of R.C.C. Structure

Estimate of slab, beam, T-beam. Estimate of R.C.C. column with its footing. Preparation of Abstract of above items. Preparation of Bar bending schedule, and to calculate amount of steel.

Unit 2 Estimate of Steel / Timber Structures

Estimate of steel column (Stanchion) Estimate of steel Truss and Gusset Plate. Estimate of Roof covering materials.G.I. Roof, A.C. Roof. Estimate of steel frames for Doors & Windows. Estimate of Wooden Doors and Windows. Estimate of Roof Covering materials

Unit 3 Estimate of Culverts & Bridges

Estimate of Hume pipe culvert with splayed type of wing wall, Turn wall, face wall. Estimate of R.C.C. Slab Bridge, straight type wing walls.

Unit 4 Estimate of Water Supply and Sanitary Fittings

Detailed Estimate of Water Supply for building work. Detailed Estimate of Sanitary works for building work. Estimate of S.W. pipe line. Estimate of Septic Tank.

Unit 5 Valuation & Rent Fixation

Definition, Necessity of Valuation.Definition, Cost price, Value, Difference between them. Types of value, Book value, scrap value, salvage value, Market value, Depreciation, obsolescence, Sinking fund. Methods of calculation of depreciation, straight line method, sinking fund method constant percentage method, quantity survey method. Computation of capitalized value, Gross income,

outgoing, net income, Years purchase. Types of outgoing and their percentages. Valuation of Lands & Buildings, factors affecting their valuation, Fixation of Rent as per PWD practice.

Practical's

- Use of different Schedule of Rates like .PWD.C.P.W.D. D.S.R.,RES, HOUSING BOARD IRRIGATION & PHE
- Estimating & abstract and rate analysis with the help of different software eg. QE-PRO, ESTIMATOR, & Print out of report .
- Taking out quantities of following items for small R.C.C. Hall
 - i) Concreting for footing, Column, Beam, slab.
 - ii) Reinforcement for above items by preparing Schedule of bars.
 - iii) Form work for all above items.
- Preparing Rate analysis of following items: Building work – Brick work, P.C.C., R.C.C., Plastering, Flooring, Doors, Windows
- Taking out quantities of Steel work for given shed supported on steel trusses & having GI sheet/profile sheet roofing.
- Taking out quantities of work for pipe culvert. (Drawings shall be provided for the above exercises by subject teacher.)

Course Outcomes:

Upon completion of the course, Students will have the ability to economic planning, estimation and costing for construction of bridges, culverts, water supply systems, and other various RCC and steel structures.

Text Books:

Estimation and Costing textbook by B N Dutta

Quantity Surveying Contracts and Tenders 2019 Edition Paperback – 2018
by G. B. Deshpande (Author), J. P. Nayak (Author)

Reference Books:

Estimating, Costing, Specification and Valuation In Civil Engineering” by M Chakraborti

Structural Design & Drafting – II (Steel)

Course Code: 2TDCE 603

Course Objective:

To understand the basic concepts of steel construction industry.

Syllabus:

Design of steel structure is the subject placed at technology level. This subject requires prerequisite knowledge, skill and competencies acquired from the subject applied mechanics and mechanics of structure. Steel is extensively used as a construction material in the construction of civil engineering work such as high rise buildings, industrial building, transmission towers, railway bridges, overhead tanks, chimney, bunkers, silos etc. Construction in steel is to be supervised by Civil Engineering Technicians. For effective supervision and quality control Technicians must have good knowledge of design of steel structure. The design of steel structure involve the planning of structure for specific purpose, proportioning and selection of members to carry loads in most economic manner and erection of structure at site. This can be achieved by proper functional planning and providing adequate strength to withstand direct and induced forces which may acts on the structure during its life time. The knowledge of material properties and behaviors of structural member, methods of structural analysis, determining design loads and method of design by using latest IS codes and hand books and design aids.

Unit 1 Introduction

Types of sections used, Hollow Square section Rectangular section Tubular section, Z Section, Angle Section, T, I, C, L Section etc. Grades of steel and strength characteristics; advantages and disadvantages of steel as construction material; Use of steel table and relevant I. S. code; Types of loads on steel structure and its I. S. code specification.

Connections

Riveted connections, Types of rivets and their use, Nominal dia, Gross dia. Unwin's formula, Pitch of rivets, Edge distance, Tacking rivets, permissible stress in rivet riveted joint and its failure, Strength of riveted joint and efficiency of a riveted joint. Assumptions in theory of riveted joint, Design of riveted joint for axially loaded member. Eccentric riveted connection Welded connection Introduction, Permissible stress in weld, strength of weld, advantages and disadvantages of welded joint. Types of weld and their symbols. Design of fillet weld and butt weld subjected to axial load.

Unit 2: Tension member

Types of Sections used, Permissible Stresses in Axial Tension, gross and net cross sectional area of tension member, Analysis and design of tension member with welded and riveted connection.

Compression Member

Criteria of failure of short column and long column , end conditions effective length of a column, slenderness ratio and corresponding compressive stress : Angle struts Types of sections used, Analysis and Design of axially loaded angle struts with welded and riveted connection. Stanchion and Columns, types of sections used, simple and built up sections. Analysis and design of axially loaded column. Design of compound column. Design of lacing angles and Batten plates.

Unit 3: Column Bases

Types of column bases, design of slab base & concrete block. Cleat angles, their use, and introduction to gusseted base (no numerical problems on gusseted Base)

Unit 4: Steel 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, bending, bearing and deflection. Introduction to Plate Girder: Various components and their functions. (No numerical Problem on Plate Girder)

Unit 5: Roof Truss

Types of steel roof truss & its selection criteria. span and slope, Rise and pitch, loads acting on the Roof. Dead load; Live load and wind load as per I.S. 875-1987. Combination of loads for design of truss, Forces in the members (Graphical method). Design of members of truss, Design of Angle purlin as per I.S.06 16 .Arrangement of members.

Timber Structures

Grades of Timber – stress in timber. Factors affecting stress/ strength of timber. Design of Timber column & Timber Beam.

Assignments :

Term work shall consists of sketch book and design report of steel roof truss for an industrial building. Sketch book shall consists of any five plates out of the below mentioned

- Sketching of different types of riveted joints and welded joints. Typical sketches of sections of tension member, determination of net effective cross-sectional area of tension member for angle section.
- Typical sketches of sections of compression member, lacing and battening.
- Graphical solution of frames to find out the stress in the member. Type of trusses for different spans.
- Working drawing of steel truss with the details of joint
- Detailed drawing of slab base and gusseted base.
- Important information of clauses of IS800-1984 and IS875 (Part1,2& 3)

Course Outcomes:

- At the end of the course the student acquires hands on experience in design and preparation of structural drawings for steel structures normally encountered in Civil Engineering practice.

Text Books:

Steel Structures By Ramchandra

Steel Structures By Arya and Ajmani

Steel Structures By Malhotra M.M.

I.S. Code 800-1984

Steel Structures By R.K. Dhoble & D.S. Dharmadhikari

Steel Structures Negg.

Reference Books:

Steel structures By Ramanatham

Structural Engg. Vol.-IV (Steel) By Vazirani

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Project

Course Code: 2TDCE 604

Syllabus:

The project work is an important subject, which aims at closer co-ordination and integration between theory and practice. It gives access to the wider range of field techniques, helps to develop planning and decision making skills. It develops confidence in students to work independently, participating in group task, helps in comprehending knowledge of various subjects, in practical aspect apart from what is taught in classroom and also helps in tackling live problems. Major project is prescribed so that a student gets complete idea of planning and estimating a project and writing a project report. The minor project work will also help the student to be acquainted with modern materials, equipment's and the market cost analysis. The overall project work will help the student to become an entrepreneur than depending on govt. jobs and services.

Unit 1: Introduction

Importance of project work, guide line and general introduction

Unit 2: Selection of Project

The project can be selected from any four civil engineering system like Building construction system, transportation engineering system, irrigation engineering system. A topic for project can also be selected on recent development in civil engineering.

Unit 3: Planning of project

Planning of field work, line of action, work distribution, data to be collected by different batches. Projects to be undertaken by a group of 4 to 6 students.

Unit 4 The project report shall be in the following format

- Topic and objectives
- Collection of data, required survey work
- Management and construction procedure
- Resources scheduling and networking
- Design details □ Required drawing set
- Utility to society if any
- Conclusion.

List of Civil Engineering Projects:

- Design of Check Dam/Stop Dam.
- Study of G Dam (Earthen/Gravity)
- Micro Irrigation –Drip/Sprinkler Irrigation.
- Junction Planning For City Roads/Planning For Roads For Congested Area/Parking Studies Etc.
- Rain Water Harvesting For Domestic or Public Building
- Campus Development.
- Interior Decoration.
- Concrete Mix Design.
- Solid Waste Management.
- Hospital Waste Disposal.
- Recycling of Resources.

- Manufacturing of Pre Cast Concrete Products.
- Prestressed Concrete.
- Non Conventional Sources Of Energy.
- Concrete Pipe Manufacturing Unit.
- Planning Estimating And Design For Residential Apartments/Commercial Complex.
- Planning and Design of Water Treatment Plant For Given Data.
- Planning and Design of Water Supply Scheme For Given Lay Out.
- Planning and Design of Sewage Treatment Plant For Given Data.
- Planning and Design of Sanitary Scheme For Given Lay Out.
- Intelligent & Green Building Material.
- Low Cost Housing Project.
- Planning And Design Of Overhead Water Tank And Sump Well
- Study of Lay Out Of Small Railway Station.
- Planning & Design And Estimation of Roads (Pmgsy/Mgsx/Brts) Any Other Similar Project Can Be Selected.

Course Outcomes:

On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.

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Professional Activity

Course Code: 2TDCE 605

Syllabus:

Most of the diploma holders join industries. Due to globalization and competition in the industrial and service sectors the selection for the job is based on campus interviews or competitive tests. While selecting candidates a normal practice adopted is to see general confidence, attitude and ability to communicate and attitude, in addition to basic technological concepts. The purpose of introducing professional practices is to provide opportunity to students to undergo activities which will enable them to develop confidence. Industrial visits, expert lectures, seminars on technical topics and group discussion are planned in a semester so that there will be increased participation of students in learning process.

Unit 1

Structured industrial visits shall be arranged and report of the same should be submitted by the individual student, to form a part of the term work. (minimum 3 visits) Following are the suggested type of Industries/ Fields

- Visit to RCC framed structure building for details of reinforcement.
- Visit to water /sewage treatment plant.
- Visit to works carried out under watershed development/micro irrigation scheme.
- Visit to any structure undergoing rehabilitation/retrofitting.

Unit 2

The Guest Lecture/s from field/industry experts, professionals to be arranged (2 Hrs duration), minimum 2 nos. from the following or alike topics. The brief report to be submitted on the guest lecture by each student as a part of Term work.

- HRD and civil engineering projects.
- Project planning and execution of civil engineering projects.
- PWD system of accounts
- Contract Management
- RCC design and detailing.

Unit 3

Information SEARCH, DATA collection and writing a report on the topic

- Collection of data for valuation of old building
- Collection of details of BOT project under execution.
- Collection of Data and case study of failure of RCC structure.
- Collection of information on any topic from journal available in library

Unit 4

The students should discuss in group of six to eight students and write a brief report on the same as a part of term work. The topic of group discussions may be selected by the faculty members. Some of the suggested topics are

- Role of civil engineer in disaster management.
- Scope of out sourcing of civil engineering services.
- Pollution control

Unit 5

Seminar Presentation The students should select a topic for Seminar based on recent developments in civil engineering field, emerging technology etc.

**Chairperson
(Board of Studies)**

**Dean
(Academic Council)**

**(Registrar)
Seal**