YBN UNIVERSITY,RANCHI

School Of Engineering and Technology

Semester - I   Common for All Branch

Subject Code	COURSE TITLE	Hrs. Per Week	TERM WORK QUIZ, ASSIGNMENT	MID TERM TEST (TWO)		SEMESTER EVALUATION THEORY PAPER MARKS	LAB WORK QUIZ, ASSIGNMENT	SEMESTER EVALUATION PRACTICAL / ORALEXAMINATION (VIVA) MARKS	CREDIT	GRAND TOTAL OF MARKS
				I	II					
YDE101	MATHEMATICS-I	03	10	10	10	70	---	---	03	100
YDE102	APPLIED PHYSICS-I	03	10	10	10	70	---	---	03	100
YDE103	APPLIED CHEMISTRY	03	10	10	10	70	---	---	03	100
YDE104	COMMUNICATION SKILLS IN ENGLISH	03	10	10	10	70	---	---	03	100
YDE102P	APPLIED PHYSICS-I LAB	02	---	---	---	---	20	30	02	50
YDE103P	APPLIED CHEMISTRY LAB	02	---	---	---	---	20	30	02	50
YDE104P	COMMUNICATION SKILLS IN ENGLISH LAB	02	---	---	---	---	20	30	02	50
YDE105P	ENGINEERING GRAPHICS LAB	03	---	---	---	---	20	30	02	50
YDE106P	WORKSHOP PRATICAL LAB	03	---	---	---	---	20	30	02	50
	TOTAL	24	40	40	40	280	100	150	22	650

MATHEMATICS-I(YDE101)

Objectives:
This course is designed to give a comprehensive coverage at an introductory level to the subject of Trigonometry, Differential Calculus and Basic elements of algebra.

Content:

UNIT - I: Trigonometry
Concept of angles, measurement of angles in degrees, grades and radians and their conversions, T-Ratios of Allied angles (without proof), Sum, difference formulae and their applications (without proof). Product formulae (Transformation of product to sum, difference and vice versa). T- Ratios of multiple angles, sub-multiple angles (2A, 3A, A/2). Graphs of sin x, cos x, tan x and e^x**.**

UNIT - II: Differential Calculus

Definition of function; Concept of limits. Four standard limits $\lim_{x \to a} \frac{x^n - a^n}{x - a}$, $\lim_{x \to 0} \frac{\sin x}{x}$, $\lim_{x \to a} \left(\frac{a^x - 1}{x}\right)$ and $\lim_{x \to a} (1 + x)^{\frac{1}{x}}$.

Differentiation by definition of X^n, sinx,cosx,tanx, ex and$\log_a x$. Differentiation of sum, product and quotient of functions. Differentiation of function of a function. Differentiation of trigonometric and inverse trigonometric functions, Logarithmic differentiation, Exponential functions.

UNIT - III: Algebra
Complex Numbers: Definition, real and imaginary parts of a Complex number, polar and Cartesian, representation of a complex number and its conversion from one form to other, conjugate of a complex number, modulus and amplitude of a complex number Addition, Subtraction, Multiplication and Division of a complex number.De-movier's theorem, its application.

UNIT – IV: Partial fractions:
Definition of polynomial fraction proper & improper fractions and definition of partial fractions. To resolve proper fraction into partial fraction with denominator containing non-repeated linear factors, repeated linear factors and irreducible non-repeated quadratic factors. To resolve improper fraction into partial fraction.

UNIT – V: Permutations and Combinations:
Value of ^nP_r and ^nC_r.
Binomial theorem: Binomial theorem (without proof) for positive integral index (expansion and general form); binomial theorem for any index (expansion without proof) first and second binomial approximation with applications to engineering problems

References:
1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi, 40th Edition, 2007.
2. G. B. Thomas, R. L. Finney, Calculus and Analytic Geometry, Addison Wesley, 9th Edition, 1995.
3. ReenaGarg, Engineering Mathematics, Khanna Publishing House, New Delhi (Revised Ed. 2018)
4. V. Sundaram, R. Balasubramanian, K.A. Lakshminarayanan, Engineering Mathematics, 6/e., ViFirst Year Curriculum Structure Common to All Branches 14 kas Publishing House.
5. ReenaGarg&Chandrika Prasad, Advanced Engineering Mathematics, Khanna Publishing House,

APPLIED PHYSICS-I(YDE102)

Objectives:

Applied Physics includes the study of a large number of diverse topics all related to materials/things that exist in the world around us. It aims to give an understanding of this world both by observation and by prediction of the way in which such objects behave. Concrete use of physical principles and analysis in various fields of engineering and technology are given prominence in the course content. The course will help the diploma engineers to apply the basic concepts and principles to solve broad based engineering problems and to understand different technology based applications.

Content:

Unit 1: **Physical world, Units and Measurements**

Physical quantities; fundamental and derived, Units and systems of units (FPS, CGS and SI units), Dimensions and dimensional formulae of physical quantities, Principle of homogeneity of dimensions, Dimensional equations and their applications (conversion from one system of units to other, checking of dimensional equations and derivation of simple equations), Limitations of dimensional analysis.

Measurements: Need, measuring instruments, least count, types of measurement (direct, indirect), Errors in measurements (systematic and random), absolute error, relative error, error propagation, error estimation and significant figures.

Unit 2: Force and Motion

Scalar and Vector quantities – examples, representation of vector, types of vectors.Addition and Subtraction of Vectors, Triangle and Parallelogram law (Statement only), Scalar and Vector Product, Resolution of a Vector and its application to inclined plane and lawn roller.Force, Momentum, Statement and derivation of conservation of linear momentum, its applications such as recoil of gun, rockets, Impulse and its applications. Circular motion, definition of angular displacement, angular velocity, angular acceleration, frequency, time period, Relation between linear and angular velocity, linear acceleration and angular acceleration (related numerical), Centripetal and Centrifugal forces with live examples, Expression and applications such as banking of roads and bending of cyclist.

Unit 3: Work, Power and Energy

Work: Concept and units, examples of zero work, positive work and negative work Friction: concept, types, laws of limiting friction, coefficient of friction, reducing friction and its engineering applications, Work done in moving an object on horizontal and inclined plane for rough and plane surfaces and related applications. Energy and its units, kinetic energy, gravitational potential energy with examples and derivations, mechanical energy, conservation of mechanical energy for freely falling bodies, transformation of energy (examples). Power and its units, power and work relationship, calculation of power (numerical problems).

Unit 4: **Rotational Motion**

Translational and rotational motions with examples, Definition of torque and angular momentum and their examples, Conservation of angular momentum (quantitative) and its applications. Moment of inertia and its physical significance, radius of gyration for rigid body, Theorems of parallel and perpendicular axes (statements only), Moment of inertia of rod, disc, ring and sphere (hollow and solid); (Formulae only).

Unit 5: **Properties of Matter**

Elasticity: definition of stress and strain, moduli of elasticity, Hooke's law, significance of stress-strain curve. Pressure: definition, units, atmospheric pressure, gauge pressure, absolute pressure, Fortin's Barometer and its applications.Surface tension: concept, units, cohesive and adhesive forces, angle of contact, Ascent Formula (No derivation), applications of surface tension, effect of temperature and impurity on surface tension. Viscosity and coefficient of viscosity: Terminal velocity, Stoke's law and effect of temperature on viscosity, application in hydraulic systems. Hydrodynamics: Fluid motion, stream line and turbulent flow, Reynold's number Equation of continuity, Bernoulli's Theorem (only formula and numericals) and its applications.

Unit 6: Heat and Thermometry Concept of heat and temperature, modes of heat transfer (conduction, convection and radiationwith examples), specific heats, scales of temperature and their relationship, Typesof Thermometer (Mercury thermometer, Bimetallic thermometer, Platinum resistance thermometer,Pyrometer) and their uses.Expansion of solids, liquids and gases, coefficient of linear, surface and cubical expansionsand relation amongst them, Co-efficient of thermal conductivity, engineering applications.

References:

1. Text Book of Physics for Class XI& XII (Part-I, Part-II); N.C.E.R.T., Delhi
2. Applied Physics, Vol. I and Vol. II, TTTI Publications, Tata McGraw Hill, Delhi.
3. Concepts in Physics by HC Verma, Vol. I & II, BhartiBhawan Ltd. New Delhi
4. Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi
5. Engineering Physics by DK Bhhatacharya&PoonamTandan; Oxford University Press, New Delhi.
6. Comprehensive Practical Physics, Vol, I & II, JN Jaiswal, Laxmi Publications (P) Ltd., New Delhi
7. Practical Physics by C. L. Arora, S. Chand Publication.
8. e-books/e-tools/ learning physics software/websites etc.

APPLIED CHEMISTRY(YDE103)

Objectives:

There are numerous number materials are used in fabricating and manufacturing devices for the comfort of life. The selection, characterization and suitability assessment of natural raw materials essentiallyrequires principles and concepts of Applied Chemistry for technicians. On successful completionof this course content will enable technicians to understand, ascertain and analyse and propertiesof natural raw materials require for producing economical and eco-friendly finished products.

• Solve various engineering problems applying the basic knowledge of atomic structure andchemical bonding.

• Use relevant water treatment method to solve domestic and industrial problems.

• Solve the engineering problems using knowledge of engineering materials and properties.

• Use relevant fuel and lubricants for domestic and industrial applications

• Solve the engineering problems using concept of Electrochemistry and corrosion.

Content:

• Unit 1: Atomic Structure, Chemical Bonding and Solutions

Rutherford model of atom, Bohr's theory (expression of energy and radius to be omitted), and hydrogen spectrum explanation based on Bohr's model of atom, Heisenberg uncertaintyprinciple, Quantum numbers – orbital concept. Shapes of s,p and d orbitals, Pauli's exclusion principle, Hund's rule of maximum multiplicity Aufbau rule, electronic configuration. Concept of chemical bonding – cause of chemical bonding, types of bonds: ionic bonding(NaCl example), covalent bond (H2, F2, HF hybridization in BeCl2, BF3, CH4, NH3, H2O), coordination bond in NH4+, and anomalous properties of NH3, H2O due to hydrogen bonding, andmetallic bonding.Solution – idea of solute, solvent and solution, methods to express the concentration of solution-molarity (*M* = mole per liter), ppm, mass percentage, volume percentage and mole fraction

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• Unit 2: Water

Graphical presentation of water distribution on Earth (pie or bar diagram). Classification ofsoft and hard water based on soap test, salts causing water hardness, unit of hardness andsimple numerical on water hardness.Cause of poor lathering of soap in hard water, problems caused by the use of hard water in boiler (scale and sludge, foaming and priming, corrosion etc), and quantitative measurementof water hardness by ETDA method, total dissolved solids (TDS) alkalinity estimation.

i). Water softening techniques – soda lime process, zeolite process and ion exchange process.

ii). Municipal water treatment (in brief only) – sedimentation, coagulation, filtration, sterilization. Water for human consumption for drinking and cooking purposes from any water sourcesand enlist Indian standard specification of drinking water (collect data and understand standards).

• Unit 3: Engineering Materials

Natural occurrence of metals – minerals, ores of iron, aluminium and copper, gangue (matrix),flux, slag, metallurgy – brief account of general principles of metallurgy. Extraction of - iron from haematite ore using blast furnace, aluminium from bauxite along with reactions. Alloys – definition, purposes of alloying, ferrous alloys and non-ferrous with suitable examples, properties and applications.General chemical composition, composition based applications (elementary idea only detailsomitted):Port land cement and hardening, Glasses Refractory and Composite materials. Polymers – monomer, homo and co polymers, degree of polymerization, simple reactions involved in preparation and their application of

thermoplastics and thermosetting plastics(using PVC, PS, PTFE, nylon – 6, nylon-6,6 and Bakelite), rubber and vulcanization of rubber.

• **Unit 4: Chemistry of Fuels and Lubricants**

Definition of fuel and combustion of fuel, classification of fuels, calorific values (HCV and LCV), calculation of HCV and LCV using Dulong's formula. Proximate analysis of coal solid fuel petrol and diesel - fuel rating (octane and cetane numbers),Chemical composition, calorific values and applications of LPG, CNG, water gas, coal gas, producer gas and biogas. Lubrication – function and characteristic properties of good lubricant, classification with examples, lubrication mechanism – hydrodynamic and boundary lubrication, physical properties(viscosity and viscosity index, oiliness, flash and fire point, could and pour point only)and chemical properties (coke number, total acid number saponification value) of lubricants.

• **Unit 5: Electro Chemistry**

Electronic concept of oxidation, reduction and redox reactions. Definition of terms: electrolytes, non-electrolytes with suitable examples, Faradays laws of electrolysis and simple numerical problems. Industrial Application of Electrolysis –

• Electrometallurgy

• Electroplating

• Electrolytic refining.

Application of redox reactions in electrochemical cells –

• Primary cells – dry cell,

• Secondary cell - commercially used lead storage battery, fuel and Solar cells.

Introduction to Corrosion of metals –

• definition, types of corrosion (chemical and electrochemical), H2 liberation andO2 absorption mechanism of electrochemical corrosion, factors affecting rate of corrosion. Internal corrosion preventive measures –

• Purification, alloying and heat treatment andExternal corrosion preventive measures: a) metal (anodic, cathodic) coatings, b) organicinhibitors.

References/Suggested Learning Resources:

(a) Books :

1) Text Book of Chemistry for Class XI& XII (Part-I, Part-II); N.C.E.R.T., Delhi, 2017-18.
2) Agarwal, &Shikha, Engineering Chemistry, Cambridge University Press; New Delhi, 2015.
3) C.N. R. Rao, Understanding Chemistry, Universities Press (India) Pvt. Ltd., 2011.
4) Dara, S. S. &Dr.S.S.Umare, Engineering Chemistry, S.Chand. Publication, New Delhi, New Delhi,2015.
5) Jain & Jain, Engineering Chemistry, DhanpatRai and Sons; New Delhi, 2015.
6) Dr. Vairam, S., Engineering Chemistry, Wiley India Pvt.Ltd., New Delhi, 2013.
7) Dr. G. H. Hugar & Prof A. N. Pathak, Applied Chemistry Laboratory Practices, Vol. I and Vol. II, NITTTR, Chandigarh, Publications, 2013-14.
8) Agnihotri, Rajesh, Chemistry for Engineers, Wiley India Pvt.Ltd., 2014.

(b) Open source software and website address:

1 www.chemguide.co.uk/atommenu.html (Atomic structure and chemical bonding)

2 www.visionlearning.com (Atomic structure and chemical bonding)

3 www.chem1.com (Atomic structure and chemical bonding)

4 https://www.wastewaterelearning.com/elearning/ (Water Treatment)

5 www.capital-refractories.com (Metals, Alloys, Cement, and Refractory Materials)

7 www.chemcollective.org (Metals, Alloys)

COMMUNICATION SKILLS IN ENGLISH(YDE103)

Objectives:

Communication skills play an important role in career development. This course aims at introducing basic concepts of communication skills with an emphasis on developing personality of the students. Thus, the main objectives of this course are:21 First Year Curriculum Structure Common to All Branches To develop confidence in speaking English with correct pronunciation.To develop communication skills of the students i.e. listening, speaking, reading and writing skills.To introduce the need for personality development- Focus will be on developing certain qualitieswhich will aid students in handling personal and career challenges, leadership skills etc.

Content

Unit-1 Communication: Theory and Practice

• Basics of communication: Introduction, meaning and definition, process of communicationetc.

• Types of communication: formal and informal, verbal, non-verbal and written Barriers toeffective communication.

• **7** Cs for effective communication (considerate, concrete, concise, clear, complete, correct,courteous).

• Art of Effective communication,

o Choosing words

o Voice

o Modulation

o Clarity

o Time

o Simplification of words

• Technical Communication.

Unit-2 Soft Skills for Professional Excellence

• Introduction: Soft Skills and Hard Skills.

• Importance of soft skills.

• Life skills: Self-awareness and Self-analysis, adaptability, resilience, emotional intelligenceand empathy etc.

• Applying soft skills across cultures.

• Case Studies.

Unit-3: Reading Comprehension

Comprehension, vocabulary enhancement and grammar exercises based on reading of the followingtexts:

Section-1

Malgudi Days: R.K. Narayan

The Room on Roof: Ruskin Bond

"The Gift of the Magi" by O. Henry

"Uncle Podger Hangs a Picture" Jerome K. Jerome

Section-2

Night of the Scorpion by Nissim Ezekiel,

Stopping by Woods on a Snowy Evening by Robert Frost,

Where the Mind is Without Fear by Rabindranath Tagore,
Ode to Tomatoes by Pablo Neruda,

Unit-4: Professional Writing
The art of précis writing,
Letters: business and personnel,
Drafting e-mail, notices, minutes of a meeting etc.
Filling-up different forms such as banks and on-line forms for placement etc.

Unit-5: Vocabulary and Grammar
Vocabulary of commonly used words
Glossary of administrative terms (English and Hindi)
One-word substitution, Idioms and phrases etc.
Parts of speech, active and passive voice, tenses etc., Punctuation

References:
1. J.D.O'Connor. *Better English Pronunciation.* Cambridge: Cambridge University Press, 1980.
2. Lindley Murray. *An English Grammar: Comprehending Principles and Rules.* London: Wilson and Sons, 1908.
3. Kulbhushan Kumar, Effective Communication Skills, Khanna Publishing House, New Delhi (Revised Edition 2018)
4. Margaret M. Maison. *Examine your English.* Orient Longman: New Delhi, 1964.
5. M. Ashraf Rizvi. *Effective Technical Communication*.Mc-Graw Hill: Delhi, 2002.
6. John Nielson. *Effective Communication Skills.*Xlibris, 2008.
7. *Oxford Dictionary*
8. *Roget's Thesaurus of English Words and Phrases*
9. *Collin's English Dictionary*

ENGINEERING GRAPHICS(YDE103)

Course Objectives:
• To understand the language of graphics which is used to express ideas, convey instructions while carrying out engineering jobs.
• To develop drafting and sketching skills, to know the applications of drawing equipments, and Nget familiarize with Indian Standards related to engineering drawings.
• To develop skills to visualize actual object or a part of it, on the basis of drawings.
• To develop skills to translate ideas into sketches and to draw and read various engineering curves, projections and dimensioning styles.
• To understand the basic commands and develop basic skills related to computer aided drafting, of how to draw, modify, and edit basic shapes (2D), using AUTOCAD. 23 First Year Curriculum Structure Common to All Branches

Course Content
Unit – I Basic elements of Drawing
Drawing Instruments and supporting materials: method to use them with applications. Convention of lines and their applications.Representative Fractions – reduced, enlarged and full size scales; Engineering Scales such as plain and diagonal scale. Dimensioning techniques as per SP-46:2003 – types and applications of chain, parallel and coordinate dimensioning. Geometrical and Tangency constructions. (Redraw the figure)

Unit – II Orthographic projections
Introduction of projections-orthographic, perspective, isometric and oblique: concept and applications. (No question to be asked in examination). Introduction to orthographic projection, First angle and Third angle method, their symbols.Conversion of pictorial view into Orthographic Views – object containing plain surfaces, slanting surfaces, slots, ribs, cylindrical surfaces. (use First Angle Projection method only)

Unit – III Isometric Projections
Introduction to isometric projections.Isometric scale and Natural scale.Isometric view and isometric projection.Illustrative problems related to objects containing lines, circles and arcs shape only. Conversion of orthographic views into isometric view/projection.

Unit – IV Free Hand Sketches of engineering elements
Free hand sketches of machine elements: Thread profiles, nuts, bolts, studs, set screws, washer, Locking arrangements. (For branches other than mechanical Engineering, the teacher should select branch specific elements for free hand sketching) Free hand sketches of orthographic view (on squared graph paper) and isometric view (on isometric grid paper)

Unit – V Computer aided drafting interface
Computer Aided Drafting: concept. Hardware and various CAD software available. System requirements and Understanding the interface. Components of AutoCAD software window: Title bar, standard tool bar, menu bar, object properties tool bar, draw tool bar, modify tool bar, cursor cross hair. Command window, status bar, drawing area, UCS icon. File features: New file, Saving the file, Opening an existing drawing file, Creating templates, Quit. Setting up new drawing: Units, Limits, Grid, Snap. Undoing and redoing action.

Unit – VI Computer aided drafting

Draw basic entities like Line, Circle, Arc, Polygon, Ellipse, Rectangle, Multiline, PolyLine.Method of Specifying points: Absolute coordinates, Relative Cartesian and Polar coordinates. Modify and edit commands like trim, extend, delete, copy, offset, array, block, layers. Dimensioning: Linear, Horizontal Vertical, Aligned, Rotated, Baseline, Continuous, Diameter, Radius, Angular Dimensions. Dim scale variable. Editing dimensions.Text: Single line Text, Multiline text. Standard sizes of sheet. Selecting Various plotting parameters such as Paper size, paper units, Drawing orientation, plot scale, plot offset, plot area, print preview.

S.No.	Practical Exercises	Unit No.	Approx. Hrs
1	Draw horizontal, Vertical, 30 degree, 45 degree, 60 and 75 degrees lines, differ- ent types of lines, dimensioning styles using Tee and Set squares/ drafter. (do this exercise in sketch book)	I	02
2	Write alphabets and numerical (Vertical only) (do this exercise in sketch book)	I	02
3	Draw regular geometric constructions and redraw the given figure (do this exer-cise in sketch book) Part I	II	02
4	Draw regular geometric construction and redraw the given figure (do this exer-cise in sketch book) Part II	II	02
5	Draw a problem on orthographic projections using first angle method of projec-tion having plain surfaces and slanting. Part I	III	02
6	Draw another problem on orthographic projections using first angle method of projection having slanting surfaces with slots. Part II	III	02
7	Draw two problems on orthographic projections using first angle method of pro-jection having cylindrical surfaces, ribs. Part I	III	02
8	Draw two problems on Isometric view of simple objects having plain and slant-ing surface by using natural scale. Part I	IV	02
9	Draw some problems on Isometric projection of simple objects having cylindri-cal surface by using isometric scale. Part I	IV	02
10	Draw free hand sketches/ conventional representation of machine elements in sketch book such as thread profiles, nuts, bolts, studs, set screws, washers, Locking arrangements. Part I	V	02
11	Problem based Learning: Given the orthographic views of at least three objects with few missing lines, the student will try to imagine the corresponding ob- jects, complete the views and draw these views in sketch book. Part I	III, II, V	02
12	Draw basic 2D entities like: Rectangle, Rhombus, Polygon using AutoCAD(Print out should be a part of progressive assessment). Part I	V	02
13	Draw basic 2D entities like: Circles, Arcs, circular using AutoCAD (Printoutshould be a part of progressive assessment). Part II	V	02
14	Draw basic 2D entities like: Circular and rectangular array using AutoCAD(Printout should be a part of progressive assessment). Part III	V	02

15	Draw blocks of 2D entities comprises of Rectangle, Rhombus, Polygon, Circles, Arcs, circular and rectangular array, blocks using AutoCAD (Print out should be a part of progressive assessment). Part IV	V	02
16	Draw basic branch specific components in 2D using AutoCAD (Print out should be a part of term work). Part I	VI	02
17	Draw complex branch specific components in 2D using AutoCAD (Print should be a part of progressive assessment). Part I	VI	02
	Total		**34**

SUGGESTED LEARNING RESOURCES

1. Bureau of Indian Standards. *Engineering Drawing Practice for Schools and Colleges IS: Sp-46.* BIS. Government of India, Third Reprint, October 1998; ISBN: 81-7061-091-2.

2. Bhatt, N. D. *Engineering Drawing*. Charotar Publishing House, Anand, Gujrat 2010; ISBN: 978-93-80358-17-8.

3. Jain &Gautam, Engineering Graphics & Design, Khanna Publishing House, New Delhi (ISBN: 978-93-86173-478)

4. Jolhe, D. A. *Engineering Drawing*. Tata McGraw Hill Edu. New Delhi, 2010; ISBN: 978-0-07-064837-1

5. Dhawan, R. K. *Engineering Drawing*. S. Chand and Company, New Delhi; ISBN: 81-219-1431-0.

6. Shah, P. J. *Engineering Drawing*. S. Chand and Company, New Delhi, 2008, ISBN:81-219-2964-4.

7. Kulkarni, D. M.; Rastogi, A. P.; Sarkar, A. K. *Engineering Graphics with AutoCAD*. PHI Learning Private Limited-New Delhi (2010); ISBN: 978-8120337831.

8. Jeyapoovan, T. *Essentials of Engineering Drawing and Graphics using AutoCAD*. Vikas Publishing HousePvt. Ltd, Noida, 2011; ISBN: 978-8125953005.

9. Autodesk. *AutoCAD User Guide*. Autodesk Press, USA, 2015.

Software/Learning Websites
1. https://www.youtube.com/watch?v=TJ4jGyD-WCw
2. https://www.youtube.com/watch?v=dmt6_n7Sgcg
3. https://www.youtube.com/watch?v=_MQScnLXL0M
4. https://www.youtube.com/watch?v=3WXPanCq9LI
5. https://www.youtube.com/watch?v=fvjk7PlxAuo
6. http://www.me.umn.edu/coursesme2011/handouts/engg%20graphics.pdf
7. https://www.machinedesignonline.com

Course Outcomes
Following outcomes will be achieved:
1) Select and construct appropriate drawing scales, use drawing equipment's, and understand Indian Standards of engineering drawing
2) Draw views of given object and components 3) Sketch orthographic projections into isometric projections and vice versa.
3) Apply computer aided drafting tools to create 2D engineering draw

WORKSHOP PRATICAL(YDE103)

Course Objectives:

☐ To understand basic engineering processes for manufacturing and assembly.

☐ To understand, identify, select and use various marking, measuring, and holding, striking and cutting tools and equipment's

☐ To understand and interpret job drawings, produce jobs, and inspect the job for specified dimensions

☐ To understand the various types of wiring systems and acquire skills in house wiring

☐ To understand, operate, control different machines and equipment's adopting safety practices

Course Content:

S.No.	Details Of Practical Content
I	**Carpentry:** i) Demonstration of different wood working tools / machines. ii) Demonstration of different wood working processes, like plaining, marking, chiseling, grooving, turning of wood etc. iii) One simple job involving any one joint like mortise and tenon dovetail, bridle, half lap etc.
II	**Fitting:** i) Demonstration of different fitting tools and drilling machines and power tools ii) Demonstration of different operations like chipping, filing, drilling, tapping, sawing, cutting etc. iii) One simple fitting job involving practice of chipping, filing, drilling, tapping, cutting etc
III	**Welding:** i) Demonstration of different welding tools / machines. ii) Demonstration on Arc Welding, Gas Welding, MIG, MAG welding, gas cutting and rebuilding of broken parts with welding. iii) One simple job involving butt and lap joint
IV	**Sheet Metal Working:** i) Demonstration of different sheet metal tools / machines. ii) Demonstration of different sheet metal operations like sheet cutting, bending, edging, end curling, lancing, soldering, brazing, and riveting. iii) One simple job involving sheet metal operations and soldering and riveting.
V	**Electrical House Wiring:** Practice on simple lamp circuits (i) one lamp controlled by one switch by surface conduit wiring, (ii) Lamp circuits- connection of lamp and socket by sep- arate switches, (iii) Connection of Fluorescent lamp/tube light, (iv) simple lamp circuits-in-stall bedroom lighting. And (v) Simple lamp circuits- install stair case wiring.
VI	**Demonstration:** i) Demonstration of measurement of Current, Voltage, Power and Energy. ii) Demonstration of advance power tools, pneumatic tools, electrical wiring tools and acces-sories. iii) Tools for Cutting and drilling

References:

1. S.K. HajaraChaudhary, Workshop Technology, Media Promoters and Publishers, New Delhi, 2015
2. B.S. Raghuwanshi, Workshop Technology, DhanpatRai and sons, New Delhi 2014
3. K. Venkat Reddy, Workshop Practice Manual, BS Publications, Hyderabad 2014
4. Kents Mechanical Engineering Hand book, John Wiley and Sons, New York

APPLIED PHYSICS-I(YDE102P)

Course Objectives

Study of Applied Physics aims to give an understanding of physical world by observations and predictions. Concrete use of physical principles and analysis in various fields of engineering and technologyis very prominence. The course aims to supplement the factual knowledge gained in the lecture by first hand manipulation of apparatus. This will develop scientific temper and help to apply the basic concepts and principles in solving engineering and technology based problems. In addition, students get necessary confidence in handling equipment and thus learn various skills in measurement.

List of Practical's/Activities (To perform minimum 10 practical's).

1. To measure length, radius of a given cylinder, a test tube and a beaker using a Verniercaliper and find volume of each object.
2. To determine diameter of a wire, a solid ball and thickness of cardboard using a screw gauge.
3. To determine radius of curvature of a convex and a concave mirror/surface using a spherometer.
4. To verify triangle and parallelogram law of forces.
5. To find the co-efficient of friction between wood and glass using a horizontal board.
6. To determine force constant of a spring using Hook's Law.
7. To verify law of conservation of mechanical energy (PE to KE).
8. To find the moment of inertia of a flywheel.
9. To find the viscosity of a given liquid (Glycerin) by Stoke's law.
10. To find the coefficient of linear expansion of the material of a rod.
11. To determine atmospheric pressure at a place using Fortin's barometer.
12. To measure room temperature and temperature of a hot bath using mercury thermometer and convert it into different scales.

Learning Outcome:

After undergoing this lab work, the student will be able to:

☐ Select right kind of measuring tools (Meter scale, Vernier caliper, Screw gauge, Spherometeretc.) for determining dimensions of physical quantities and make measurements with accuracy and precision.

☐ Differentiate various shapes and determine dimensions of plane, curved and regular surfaces/ bodies.

☐ Apply and Verify laws of forces and determine resultant force acting on a body.

☐ Appreciate role of friction and measure co-efficient of friction between different surfaces.

☐ Describe and verify Hook's law and determine force constant of spring body.

☐ Identify various forms of energy, energy transformations and verify law of conservation of energy.

☐ Understand rotational motion and determine M.I. of a rotating body (flywheel)

☐ Understand Stoke's law for viscous liquids and determine viscosity of a given liquid.

☐ Understand how materials expand on heating and determine linear expansion coefficient for a given material rod.

☐ Understand working and use Fortin's barometers for determining pressure at a place.

☐ Understand use of thermometers to measure temperature under different conditions and different scales of temperature measurements.

References:
1. Text Book of Physics for Class XI& XII (Part-I, Part-II); N.C.E.R.T., Delhi
2. Comprehensive Practical Physics, Vol, I & II, JN Jaiswal, Laxmi Publications (P)Ltd.,
3. Practical Physics by C. L. Arora, S. Chand Publication.
4. e-books/e-tools/ learning physics software/YouTube videos/websites etc.

APPLIED CHEMISTRY(YDE103P)

Course Objectives:

There are numerous number of materials used in fabricating and manufacturing devices for the comfort of life. The selection, characterization and suitability assessment of natural raw materials essentially requires principles and concepts of Applied Chemistry for technicians. The course aims to supplement the factual knowledge gained in the lectures by first hand manipulation of processes and apparatus. This will develop scientific temper and help to apply the basic concepts and principles in solving engineering problems.

LIST OF PRACTICALS:

Perform any 12 (twelve) Laboratory Practicals.

Volumetric and Gravimetric analysis:

1 Preparation of standard solution of oxalic acid or potassium permanganate.

2 To determine strength of given sodium hydroxide solution by titrating against standard oxalic acid solution using phenolphthalein indicator.

3 Standardization of $KMnO_4$ solution using standard oxalic acid and Determine the percentage of iron present in given Hematite ore by $KMnO_4$ solution.

4 Iodometric estimation of copper in the copper pyrite ore.

5 Volumetric estimation of total acid number (TAN) of given oil.

6 Volumetric estimation of

a) Total hardness of given water sample using standard EDTA solution.

b) Alkalinity of given water sample using 0.01M sulphuric acid

7 Proximate analysis of coal

a) Gravimetric estimation moisture in given coal sample

b) Gravimetric estimation ash in given coal sample

Instrumental analysis

8. Determine the conductivity of given water sample.

9. Determination of the Iron content in given cement sample using colorimeter.

10. Determination of calorific value of solid or liquid fuel using bomb calorimeter.

11. Determination of viscosity of lubricating oil using Redwood viscometer.

12. Determination of flash and fire point of lubricating oil using Able's flash point apparatus.

13. To verify the first law of electrolysis of copper sulfate using copper electrode.

14. Construction and measurement of emf of elector chemical cell (Daniel cell).

15. To study the effect of dissimilar metal combination.

Teachers should use the following strategies to achieve the various outcomes of the course.

☐ Different methods of teaching and media to be used to attain classroom attention.

☐ Massive open online courses (MOOCs) may be used to teach various topics/sub topics.

☐ 15-20% of the topics which are relatively simpler of descriptive in nature should be given to the students for self-learning and assess the development of competency through classroom presentations.

☐ Micro-projects may be given to group of students for hand-on experiences

☐ Encouraging students to visit to sites such as Railway station and research establishment around the institution.

Learning Outcomes:

At the end of the course student will be able to

☐ To express quantitative measurements accurately.

☐ To practice and adapt good measuring techniques.

☐ To use various apparatus for precise measurements.

☐ To understand and differentiate different methods of quantitative analysis.

☐ To know and understand principles of quantitative analysis using instruments.

☐ To construct different electrochemical cells used in developing batteries.

☐ To understand and appreciate methods of corrosion abetments.

Reference Books:

1. Text Book of Chemistry for Class XI & XII (Part-I, Part-II); N.C.E.R.T., Delhi, 2017-18.

2. Dr. G. H. Hugar and Prof A. N. Pathak, Applied Chemistry Laboratory Practices, Vol. I and Vol. II, NITTTR, Chandigarh, Publications, 2013-14.

3. Agnihotri, Rajesh, Chemistry for Engineers, Wiley India Pvt.Ltd., 2014.

4. Jain & Jain, Engineering Chemistry, DhanpatRai and Sons; New Delhi, 2015.
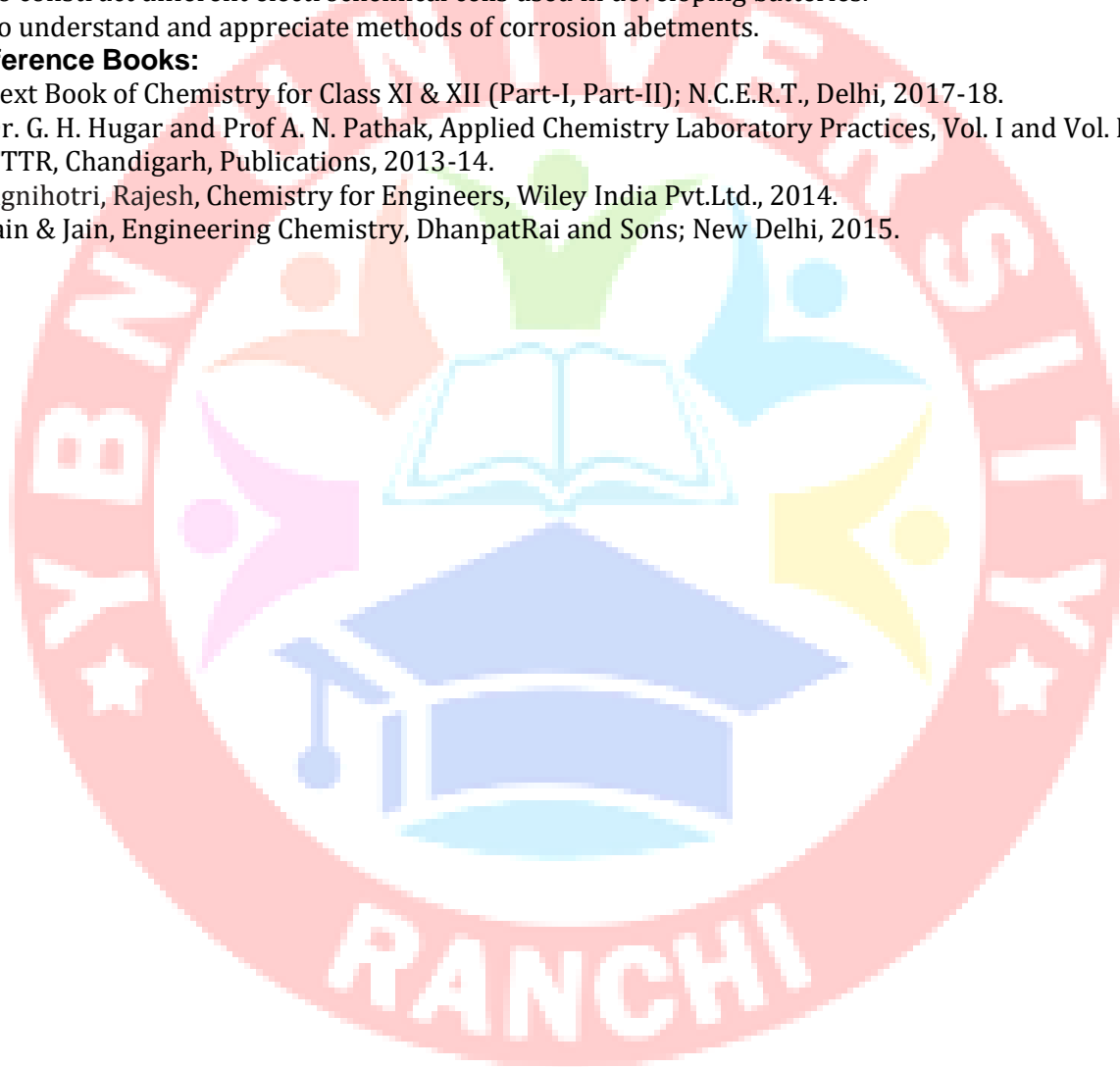
COMMUNICATION SKILLS IN ENGLISH LAB(YDE104P)

Objectives:

Communication skills play an important role in career development. This lab course aims at actively involving students in various activities to improve their communication skills with an emphasis on developing personality of the students. Thus, the objectives of this course are:

1. To develop listening skills for enhancing communication.
2. To develop speaking skills with a focus on correct pronunciation and fluency.
3. To introduce the need for Personality development- Focus will be on developing certain qualities which will aid students in handling personal and career challenges, leadership skills etc. for that purpose group discussion, extempore and other activities should be conducted during lab classes.

Content:

Unit 1 Listening Skills

Listening Process and Practice: Introduction to recorded lectures, poems, interviews and speeches, listening tests.

Unit II Introduction to Phonetics

Sounds: consonant, vowel, diphthongs, etc. transcription of words (IPA), weak forms, syllable division, word stress, intonation, voice etc.

Unit III Speaking Skills

Standard and formal speech: Group discussion, oral presentations, public speaking, business presentations etc. Conversation practice and role playing, mock interviews etc.

Unit IV Building vocabulary

Etymological study of words and construction of words, phrasal verbs, foreign phrases, idioms and phrases. Jargon/ Register related to organizational set up, word exercises and word games to enhance self-expression and vocabulary of participants.

Recommended Readings:

1. Daniel Jones. *The Pronunciation of English.*Cambridge: Cambridge University Press, 1956.
2. James Hartman& et al. Ed. *English Pronouncing Dictionary.*Cambridge: Cambridge University Press, 2006.
3. Kulbhushan Kumar, Effective Communication Skills, Khanna Publishing House, New Delhi (Revised Ed. 2018)
4. J.D.O'Connor. *Better English Pronunciation.* Cambridge: Cambridge University Press, 1980.
5. Lindley Murray. *An English Grammar: Comprehending Principles and Rules.* London: Wilson and Sons, 1908.
6. Margaret M. Maison. *Examine your English.* Orient Longman: New Delhi, 1964.
7. J.Sethi& et al. *A Practice Course in English Pronunciation*. New Delhi: Prentice Hall, 2004.
8. Pfeiffer, William Sanborn and T.V.S Padmaja. *Technical Communication: A Practical Approach*. 6th ed. Delhi: Pearson, 2007.

YBN UNIVERSITY,RANCHI

School Of Engineering and Technology

Semester - II   **Common for All Branch**

Subject Code	COURSE TITLE	Hrs. Per Week	TERM WORK QUIZ, ASSIGNMENT	MID TERM TEST (TWO)		SEMESTER EVALUATION THEORY PAPER MARKS	LAB WORK QUIZ, ASSIGNMENT	SEMESTER EVALUATION PRACTICAL / ORALEXAMINATION (VIVA) MARKS	CREDIT	GRAND TOTAL OF MARKS
				I	II					
YDE201	MATHEMATICS-II	04	10	10	10	70	---	---	04	100
YDE202	APPLIED PHYSICS-II	03	10	10	10	70	---	---	03	100
YDE203	INTRODUCTION TO IT SYSTEMS	03	10	10	10	70	---	---	03	100
YDE204	FUNDAMENTAL OF ELECTRICAL & ELECTRONICS ENGINEERING	03	10	10	10	70	---	---	03	100
YDE205	ENGINEERING MECHANICS	03	10	10	10	70			03	100
YDE202P	APPLIED PHYSICS-II LAB	02	---	---	---	---	20	30	02	50
YDE203P	INTRODUCTION TO IT SYSTEMS LAB	02	---	---	---	---	20	30	02	50
YDE204P	FUNDAMENTAL OF ELECTRICAL & ELECTRONICS ENGINEERING LAB	02	---	---	---	---	20	30	02	50
YDE205P	ENGINEERING MECHANICS LAB	02	---	---	---	---	20	30	02	50
	TOTAL	24	40	40	40	280	100	150	24	700

MATHEMATICS-II(YDE201)

Course Objectives:
This course is designed to give a comprehensive coverage at an introductory level to the subject of matrices, Integral Calculus coordinate geometry, Basic elements of vector algebra and First Order Differential Equations.

Course Content:

UNIT - I: Determinants and Matrices

Elementary properties of determinants up to 3rd order, consistency of equations, Crammer's rule. Algebra of matrices, Inverse of a matrix, matrix inverse method to solve a system of linear equations in 3 variables.

UNIT - II: Integral Calculus

Integration as inverse operation of differentiation. Simple integration by substitution, by parts and by partial fractions (for linear factors only). Use of formulas $\int_0^{\frac{\pi}{2}} \sin^n x \, dx, \int_0^{\frac{\pi}{2}} \cos^n x \, dx$ and $\int_0^{\frac{\pi}{2}} \sin^m x \cos^n x \, dx$ for solving problems Where m and n are positive integers.

Applications of integration for i. Simple problem on evaluation of area bounded by a curve and axes. ii. Calculation of Volume of a solid formed by revolution of an area about axes. (Simple problems).

UNIT - III: Co-Ordinate Geometry

Equation of straight line in various standard forms (without proof), inter section of two straight lines, angle between two lines. Parallel and perpendicular lines, perpendicular distance formula. General equation of a circle and its characteristics. To find the equation of a circle, given:

i. Centre and radius,

ii. Three points lying on it and

iii. Coordinates of end points of a diameter;

Definition of conics (Parabola, Ellipse, Hyperbola) their standard equations without proof. Problems on conics when their foci, directories or vertices are given.

UNIT - IV: Vector Algebra

Definition notation and rectangular resolution of a vector.Addition and subtraction of vectors. Scalar and vector products of 2 vectors. Simple problems related to work, moment and angular velocity.

UNIT-V: Differential Equations

Solution of first order and first degree differential equation by variable separation method (simple problems). MATLAB – Simple Introduction.

References:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi, 40th Edition, 2007.
2. G. B. Thomas, R. L. Finney, Calculus and Analytic Geometry, Addison Wesley, 9th Edition, 1995.
3. S.S. Sabharwal, Sunita Jain, Eagle Parkashan, Applied Mathematics, Vol. I & II, Jalandhar.
4. Comprehensive Mathematics, Vol. I & II by Laxmi Publications, Delhi.
5. ReenaGarg&Chandrika Prasad, Advanced Engineering Mathematics, Khanna Publishing House, New Delhi

APPLIED PHYSICS-II(YDE202)

Course Objectives

Applied Physics aims to give an understanding of this world both by observation and by prediction of the way in which objects behave. Concrete use of physical principles and analysis in various fields of engineering and technology are given prominence in the course content. The course will help the diploma engineers to apply the basic concepts and principles to solve broad-based engineering problems and to understand different technology based applications.

Teaching Approach

Teachers should give examples from daily routine as well as, engineering/technology applications on various concepts and principles in each topic so that students are able to understand and grasp these concepts and principles. In all contents, SI units should be followed. Use of demonstration can make the subject interesting and develop scientific temper in the students. Student activities should be planned on all the topics.

Activity- Theory - Demonstrate/practice approach may be followed throughout the course so that learning may be outcome and employability based.

Course Content

UNIT - 1: Wave motion and its applications

Wave motion, transverse and longitudinal waves with examples, definitions of wave velocity, frequency and wave length and their relationship, Sound and light waves and their properties, wave equation $(y = r \sin \omega t)$ amplitude, phase, phase difference, principle of superposition of waves and beat formation. Simple Harmonic Motion (SHM): definition, expression for displacement, velocity, acceleration, time period, frequency etc. Simple harmonic progressive wave and energy transfer, study of vibration of cantilever and determination of its time period, Free, forced and resonant vibrations with examples. Acoustics of buildings – reverberation, reverberation time, echo, noise, coefficient of absorption of sound, methods to control reverberation time and their applications, Ultrasonic waves – Introduction and properties, engineering and medical applications of ultrasonic.

UNIT - 2: Optics

Basic optical laws; reflection and refraction, refractive index, Images and image formation by mirrors, lens and thin lenses, lens formula, power of lens, magnification and defects. Total internal reflection, Critical angle and conditions for total internal reflection, applications of total internal reflection in optical fiber.

Optical Instruments; simple and compound microscope, astronomical telescope in normal adjustment, magnifying power, resolving power, uses of microscope and telescope, optical projection systems.

UNIT - 3: Electrostatics

Coulombs law, unit of charge, Electric field, Electric lines of force and their properties, Electric flux, Electric potential and potential difference, Gauss law: Application of Gauss law to find electric field intensity of straight charged conductor, plane charged sheet and charged sphere.

Capacitor and its working, Types of capacitors, Capacitance and its units. Capacitance of a parallel plate capacitor, Series and parallel combination of capacitors (related numerical), dielectric and its effect on capacitance, dielectric break down.

UNIT - 4: Current Electricity

Electric Current and its units, Direct and alternating current, Resistance and its units, Specific resistance, Conductance, Specific conductance, Series and parallel combination of resistances. Factors affecting resistance of a wire, carbon resistances and colour coding.Ohm's law and its verification, Kirchhoff's laws, Wheatstone bridge and its applications (slide wire bridge only), Concept of terminal potential difference and Electro motive force (EMF) Heating effect of current, Electric power, Electric energy and its units (related numerical problems),
Advantages of Electric Energy over other forms of energy.

UNIT - 5: Electromagnetism

Types of magnetic materials; dia, para and ferromagnetic with their properties, Magnetic field and its units, magnetic intensity, magnetic lines of force, magnetic flux and units, magnetization.
Concept of electromagnetic induction, Faraday's Laws, Lorentz force (force on moving charge in magnetic field). Force on current carrying conductor, force on rectangular coil placed in magnetic field. Moving coil galvanometer; principle, construction and working, Conversion of a galvanometer into ammeter and voltmeter.

UNIT - 6: Semiconductor Physics

Energy bands in solids, Types of materials (insulator, semi-conductor, conductor), intrinsic and extrinsic semiconductors, p-n junction, junction diode and V-I characteristics, types of junction diodes.Diode as rectifier – half wave and full wave rectifier (centre taped). Transistor; description and three terminals, Types- pnp and npn, some electronic applications (list only). Photocells, Solar cells; working principle and engineering applications.

UNIT - 7: Modern Physics

Lasers: Energy levels, ionization and excitation potentials; spontaneous and stimulated emission; population inversion, pumping methods, optical feedback, Types of lasers; Ruby, He-Ne and semiconductor, laser characteristics, engineering and medical applications of lasers.
Fiber Optics: Introduction to optical fibers, light propagation, acceptance angle and numerical aperture, fiber types, applications in; telecommunication, medical and sensors. Nanoscience and Nanotechnology: Introduction, nanoparticles and nanomaterials, properties at nanoscale, nanotechnology, nanotechnology based devices and applications.

References:
1. Text Book of Physics for Class XI& XII (Part-I, Part-II); N.C.E.R.T., Delhi
2. Applied Physics, Vol. I and Vol. II, TTTI Publications, Tata McGraw Hill, Delhi
3. Concepts in Physics by HC Verma, Vol. I & II, BhartiBhawan Ltd. New Delhi
4. Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi.
5. Modern approach to Applied Physics-I and II, AS Vasudeva, Modern Publishers.
6. A Textbook of Optics, N Subramanyam, BrijLal, MN Avahanulu, S Chand and Company Ltd.
7. Introduction to Fiber Optics, AjoyGhatak and K Thyagarajan, Cambridge University Press India Pvt. Ltd, New Delhi.
8. Nanoscience and Nanotechnology, KK Choudhary, Narosa Publishing House, Pvt. Ltd. New Delhi.
9. Nanotechnology: Importance and Applications, M.H. Fulekar, IK International Publishing House Pvt. Ltd, New Delhi.
10. e-books/e-tools/ learning physics software/websites etc.

INTRODUCTION TO IT SYSTEMS (YDE203)

Course Objectives::

This course is intended to make new students comfortable with computing environment - Learning basic computer skills, Learning basic application software tools, Understanding Computer Hardware, Cyber security awareness

Content:

UNIT 1:

Basic Internet skills: Understanding browser, efficient use of search engines, awareness about Digital India portals (state and national portals) and college portals. General understanding of various computer hardware components – CPU, Memory, Display, Keyboard, Mouse, HDD and other Peripheral Devices.

UNIT 2:

OS Installation (Linux and MS Windows), Unix Shell and Commands, vi editor.

UNIT 3:

HTML4, CSS, making basic personal webpage.

UNIT 4:

Office Tools: OpenOffice Writer, OpenOffice Spreadsheet (Calc), OpenOffice Impress.

UNIT 5:

Information security best practices. Class lectures will only introduce the topic or demonstrate the tool, actual learning will take place in the Lab by practicing regularly.

Suggested Lab Work:

This is a skill course. Topics/concepts taught in the class should be practiced in the Lab same week and practiced regularly during the semester till student becomes confident about it. This course is all about some theory and a lot of practice.

References:

☐ R.S. Salaria, Computer Fundamentals, Khanna Publishing House

☐ Ramesh Bangia, PC Software Made Easy – The PC Course Kit, Khanna Publishing House

☐ Online Resources, Linux man pages, Wikipedia

☐ Mastering Linux Shell Scripting: A practical guide to Linux command-line, Bash scripting, and Shell programming, by MokhtarEbrahim, Andrew Mallett

Course outcomes:

At the end of the course student will be able to comfortably work on computer, install and configure OS, assemble a PC and connect it to external devices, write documents, create worksheets, prepare presentations, protect information and computers from basic abuses/ attacks

FUNDAMENTAL OF ELECTRICAL & ELECTRONICS ENGINEERING(YDE204)

Course Objectives:
To provide basic knowledge of the different elements and concepts of electrical engineering field and to learn basic concepts of various active and passive electronic components, Signals, Op-Amp and their applications, Digital Electronics and their applications to help students deal with electrical and electronics engineering principles and applications in industrial processes of different fields.

Course Content:
UNIT I Overview of Electronic Components & Signals:
Passive Active Components: Resistances, Capacitors, Inductors, Diodes, Transistors, FET, MOS and CMOS and their Applications. Signals: DC/AC, voltage/current, periodic/non-periodic signals, average, rms, peak values, different types of signal waveforms, Ideal/non-ideal voltage/current sources, independent/dependent voltage current sources.

UNIT II Overview of Analog Circuits: Operational Amplifiers-Ideal Op-Amp, Practical op amp, Open loop and closed loop configurations, Application of Op-Amp as amplifier, adder, differentiator and integrator.

UNIT III Overview of Digital Electronics: Introduction to Boolean Algebra, Electronic Implementation of Boolean Operations, Gates-Functional Block Approach, Storage elements-Flip Flops-A Functional block approach, Counters: Ripple, Up/down and decade, Introduction to digital IC Gates (of TTL Type).

Unit IV Electric and Magnetic Circuits:
EMF, Current, Potential Difference, Power and Energy; M.M.F, magnetic force, permeability, hysteresis loop, reluctance, leakage factor and BH curve; Electromagnetic induction, Faraday's laws of electromagnetic induction, Lenz's law; Dynamically induced emf; Statically inducedemf; Equations of self and mutual inductance; Analogy between electric and magnetic circuits.

Unit V A.C. Circuits: Cycle, Frequency, Periodic time, Amplitude, Angular velocity, RMS value, Average value, Form Factor Peak Factor, impedance, phase angle, and power factor; Mathematical and phasor representation of alternating emf and current; Voltage and Current relationship in Star and Delta connections; A.C in resistors, inductors and capacitors; A.C in R-L series, R-C series, R-L-C series and parallel circuits;Power in A. C. Circuits, power triangle.

Unit VI Transformer and Machines: General construction and principle of different type of transformers; Emf equation and transformation ratio of transformers; Auto transformers; Construction and Working principle of motors; Basic equations and characteristic of motors.

References:
1. RituSahdev, Basic Electrical Engineering, Khanna Publishing House
2. Mittle and Mittal, Basic Electrical Engineering, McGraw Education, New Delhi, 2015, ISBN : 978-0-07-0088572-5
3. Saxena, S. B. Lal, Fundamentals of Electrical Engineering, Cambridge University Press, latest

edition ISBN : 9781107464353

4. Theraja, B. L., Electrical Technology Vol – I, S. Chand Publications, New Delhi, 2015, ISBN: 9788121924405

5. Theraja, B. L., Electrical Technology Vol – II, S. Chand Publications, New Delhi, 2015, ISBN: 9788121924375
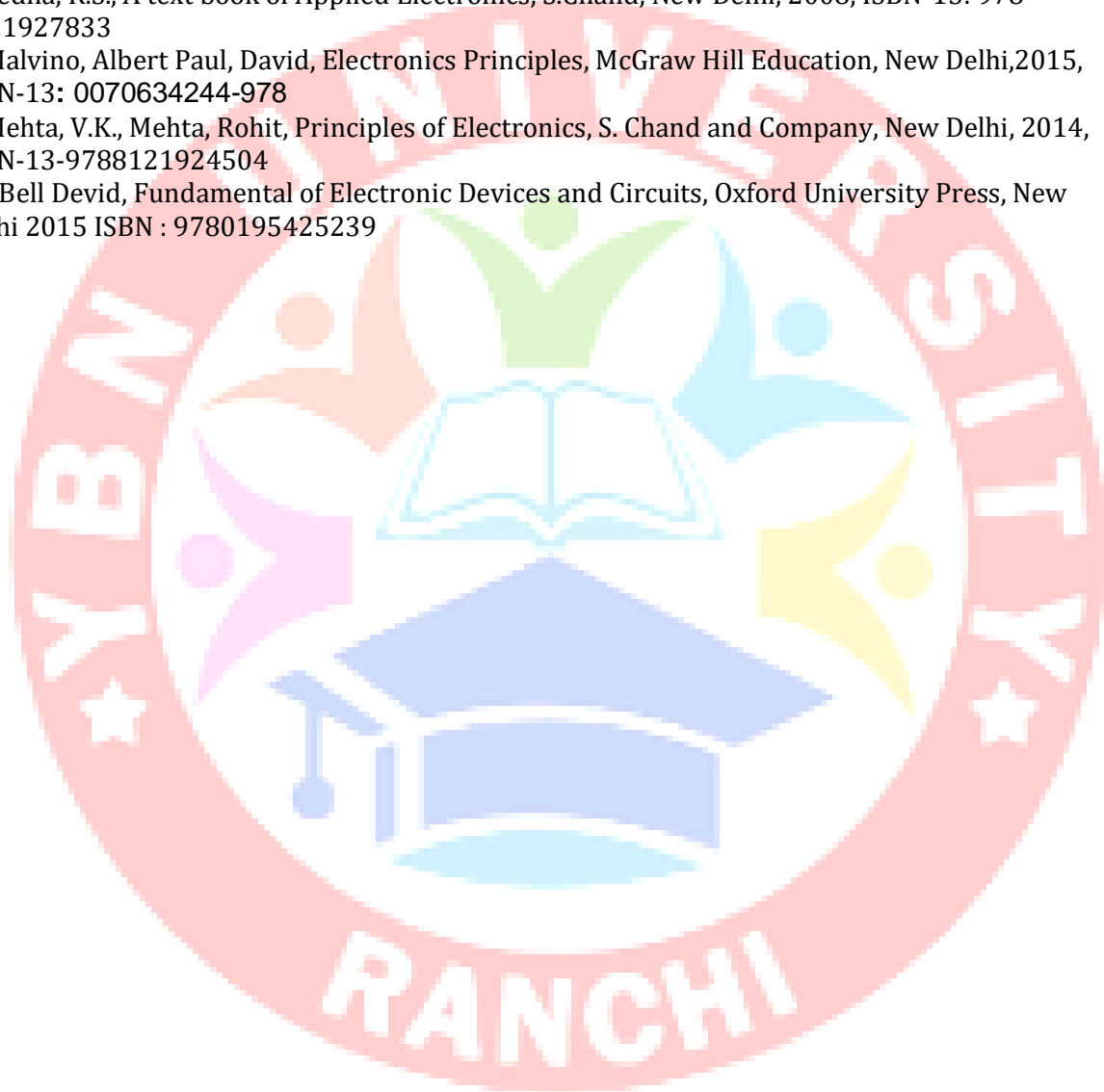
6. Jegathesan, V., Basic Electrical and Electronics Engineering, Wiley India, New Delhi, 2015, ISBN : 97881236529513

7. Sedha, R.S., A text book of Applied Electronics, S.Chand, New Delhi, 2008, ISBN-13: 978-8121927833

8. Malvino, Albert Paul, David, Electronics Principles, McGraw Hill Education, New Delhi,2015, ISBN-13**:** 0070634244-978

9. Mehta, V.K., Mehta, Rohit, Principles of Electronics, S. Chand and Company, New Delhi, 2014, ISBN-13-9788121924504

10. Bell Devid, Fundamental of Electronic Devices and Circuits, Oxford University Press, New Delhi 2015 ISBN : 9780195425239

ENGINEERING MECHANICS(YDE204)

Course Contents:

Unit – I Basics of mechanics and force system

Significance and relevance of Mechanics, Applied mechanics, Statics, Dynamics. Space, time, mass, particle, flexible body and rigid body.Scalar and vector quantity, Units of measurement (SI units) - Fundamental units and derived units.Force – unit, representation as a vector and by Bow's notation, characteristics and effects of a force, Principle of transmissibility of force, Force system and its classification. Resolution of a force - Orthogonal components of a force, moment of a force, Varignon's Theorem.Composition of forces – Resultant, analytical method for determination of resultant for concurrent, non-concurrent and parallel co-planar force systems – Law of triangle, parallelogram and polygon of forces.

Unit– II Equilibrium

Equilibrium and Equilibrant, Free body and Free body diagram, Analytical and graphical methods ofanalysing equilibriumLami's Theorem – statement and explanation, Application for various engineering problems. Types of beam, supports (simple, hinged, roller and fixed) and loads acting on beam (vertical and inclined point load, uniformly distributed load, couple), Beam reaction for cantilever, simply supported beam with or without overhang – subjected to combination of Point load and uniformly distributed load. Beam reaction graphically for simply supported beam subjected to vertical point loads only.

Unit– III Friction

Friction and its relevance in engineering, types and laws of friction, limiting equilibrium, limiting friction, co-efficient of friction, angle of friction, angle of repose, relation between co-efficient of friction and angle of friction. Equilibrium of bodies on level surface subjected to force parallel and inclined to plane. Equilibrium of bodies on inclined plane subjected to force parallel to the plane only.

Unit– IV Centroid and centre of gravity

Centroid of geometrical plane figures (square, rectangle, triangle, circle, semi-circle, quarter circle) Centroid of composite figures composed of not more than three geometrical figures Centre of Gravity of simple solids (Cube, cuboid, cone, cylinder, sphere, hemisphere) Centre of Gravity of composite solids composed of not more than two simple solids.

Unit – V Simple lifting machine

Simple lifting machine, load, effort, mechanical advantage, applications and advantages. Velocity ratio, efficiency of machines, law of machine. Ideal machine, friction in machine, maximum Mechanical advantage and efficiency, reversible and non-reversible machines, conditions for reversibility Velocity ratios of Simple axle and wheel, Differential axle and wheel, Worm and worm wheel,Single purchase and double purchase crab winch, Simple screw jack, Weston's differential pulley block, geared pulley block.

Suggested Learning Resources:

1. D.S. Bedi, Engineering Mechanics, Khanna Publications, New Delhi (2008)
2. Khurmi, R.S., Applied Mechanics, S. Chand & Co. New Delhi.

3. Bansal R K, A text book of Engineering Mechanics, Laxmi Publications.
4. Ramamrutham, Engineering Mechanics, S. Chand & Co. New Delhi.
5. Dhade, Jamadar&Walawelkar, Fundamental of Applied Mechanics, Pune Vidhyarthi Gruh.
6. Ram, H. D.; Chauhan, A. K., Foundations and Applications of Applied Mechanics, Cambridge University Press.
7. Meriam, J. L., Kraige, L.G., Engineering Mechanics- Statics, Vol. I, Wiley Publication, New Delhi.

APPLIED PHYSICS-II LAB(YDE202P)

Course Objectives:

Concrete use of physical principles and analysis in various fields of engineering and technology is very prominence. The course aims to supplement the factual knowledge gained in the lecture by first hand manipulation of apparatus. This will develop scientific temper and help to apply the basic concepts and principles in solving engineering and technology based problems. In addition, students get necessary confidence in handling equipment and thus learn various skills in measurement.

List of Practicals/Activities: (To perform minimum 12 Practicals)

1. To determine and verify the time period of a cantilever.
2. To determine velocity of ultrasonic in different liquids using ultrasonic interferometer.
3. To verify laws of reflection from a plane mirror/ interface.
4. To verify laws of refraction (Snell's law) using a glass slab.
5. To determine focal length and magnifying power of a convex lens.
6. To verify Ohm's law by plotting graph between current and potential difference.
7. To verify laws of resistances in series and parallel combination.
8. To find the frequency of AC main using electrical vibrator.
9. To verify Kirchhoff's law using electric circuits.
10. To study the dependence of capacitance of a parallel plate capacitor on various factors and determines permittivity of air at a place.
11. To find resistance of a galvanometer by half deflection method.
12. To convert a galvanometer into an ammeter.
13. To convert a galvanometer into a voltmeter.
14. To draw V-I characteristics of a semiconductor diode (Ge, Si) and determine its knee voltage.
15. To verify inverse square law of radiations using a photo-electric cell.
16. To measure wavelength of a He-Ne/diode laser using a diffraction grating.
17. To measure numerical aperture (NA) of an optical fiber.
18. Study of an optical projection system (OHP/LCD) - project report.

Suggested Student Activities & Strategies

Apart from classroom and laboratory learning following are the suggested student related activities which can be undertaken to accelerate the attainment of various outcomes of the course.

a. Make survey of different physical products and compare the following points

☐ Measurements of dimensions

☐ Properties

☐ Applications

b. Library survey regarding engineering materials/products used in different industries

c. Seminar on any relevant topic.

Teachers should use the following strategies to achieve the various outcomes of the course.

☐ Different methods of teaching and media to be used to attain classroom attention.

☐ Massive open online courses (MOOCs) may be used to teach various topics/sub topics.

☐ 15-20% of the topics which are relatively simpler or descriptive in nature should be given to the students for self-learning and assess the development of competency through classroom presentations/projects.

☐ Micro-projects on relevant may be given to group of students for hand-on experiences.

Learning Outcome:

After undergoing this subject, the student will be able to;

a) Apply concept of vibrations and determine the time period of vibrating objects.

b) Use of equipment for determining velocity of ultrasonics in different liquids.

c) Verify optical laws; reflection, refraction from plane interfaces and surfaces.

d) Apply knowledge of optics to determine focal length and magnifying power of optical lenses.

e) Understand uses of electrical components and meters and verify Ohm's law for flow of current.

f) Quantify resistances and verify laws of series and parallel combination of resistances.

g) Apply concept of electrical vibrations in determine frequency of AC main.

h) Analyse electrical circuits and verify Kirchhoff's law governing electrical circuits.

i) Measure resistance of a galvanometer and how it is converted into an ammeter and voltmeter.

j) Investigate characteristics of semiconductor diodes, photoelectric cells and determine operational parameters associated with their performance.

k) Work with laboratory lasers and understand method to measure the wavelength of the light emitted from a laser.

l) Handle optical fibers and determine numerical aperture of given optical fiber.

m) Understand construction and working of an optical projection system.

Recommended Books:

1. Text Book of Physics for Class XI& XII (Part-I, Part-II); N.C.E.R.T., Delhi

2. Comprehensive Practical Physics, Vol, I & II, JN Jaiswal, Laxmi Publications (P) Ltd., New Delhi

3. Practical Physics by C. L. Arora, S. Chand & Company Ltd.

4. e-books/e-tools/ learning physics software/you Tube videos/ websites etc.

INTRODUCTION TO IT SYSTEMS LAB(YDE203P)

Course Objectives:
This Lab course is intended to practice whatever is taught in theory class of 'Introduction of IT Systems' and become proficient in using computing environment - basic computer skills, basic application software tools, Computer Hardware, cyber security features, etc.

Course Content:

S.No.	Topics for Practice
1	Browser features, browsing, using various search engines, writing search queries
2	Visit various e-governance/Digital India portals, understand their features, services offered
3	Read Wikipedia pages on computer hardware components, look at those components in lab, identify them, recognise various ports/interfaces and related cables, etc.
4	Install Linux and Windows operating system on identified lab machines, explore various options, do it multiple times
5	Connect various peripherals (printer, scanner, etc.) to computer, explore various features of peripheral and their device driver software.
6	Practice HTML commands, try them with various values, make your own Webpage
7	Explore features of Open Office tools, create documents using these features, do it multi-ple times
8	Explore security features of Operating Systems and Tools, try using them and see what happens.

This is a skill course. More you practice, better it will be.

References:
1. Online resources, Linux man pages, Wikipedia.
2. R.S. Salaria, Computer Fundamentals, Khanna Publishing House.
3. Ramesh Bangia, PC Software Made Easy – The PC Course Kit, Khanna Publishing House.
4. Mastering Linux Shell Scripting: A practical guide to Linux command-line, Bash scripting, and Shell programming, by MokhtarEbrahim, Andrew Mallett.
5. IT Essentials PC Hardware and Software Companion Guide, Davis Anfinson and Ken Quamme, CISC Press, Pearson Education.
6. PC Hardware and A+ Handbook, Kate J. Chase PHI (Microsoft).

Course outcomes:
At the end of the course student will be able to comfortably work on computer, install and configure OS, assemble a PC and connect it to external devices, write documents, create worksheets, prepare presentations, protect information and computers from basic abuses/attacks.

FUNDAMENTAL OF ELECTRICAL & ELECTRONICS ENGINEERING LAB(YDE204P)

Suggested Practicals/Exercises:

The practical in this section are PrOs (i.e. sub-components of the COs) to be developed and assessed in the student for the attainment of the competency.

S. No.	Practical Outcomes (PrOs)	Approx. Hrs.
1.	Determine the permeability of magnetic material by plotting its B-H curve.	02*
2.	Measure voltage, current and power in 1-phase circuit with resistive load.	02*
3.	Measure voltage, current and power in R-L series circuit.	02*
4.	Determine the transformation ratio (K) of 1-phase transformer.	02
5.	Connect single phase transformer and measure input and output quantities.	02
6.	Make Star and Delta connection in induction motor starters and measure the line and phase values.	02
7.	Identify various passive electronic components in the given circuit	02
8.	Connect resistors in series and parallel combination on bread board and measure its value using digital multimeter.	02
9.	Connect capacitors in series and parallel combination on bread board and measure its value using multimeter.	02*
10.	Identify various active electronic components in the given circuit.	02
11.	Use multimeter to measure the value of given resistor.	02
12.	Use LCR-Q tester to measure the value of given capacitor and inductor.	02
13.	Determine the value of given resistor using digital multimeter to confirm with colour code.	02*
14.	Test the PN-junction diodes using digital multimeter.	02*
15.	Test the performance of PN-junction diode.	02
16.	Test the performance of Zener diode.	02
17.	Test the performance of LED.	02
18.	Identify three terminals of a transistor using digital multimeter.	02
19.	Test the performance of NPN transistor.	02*
20.	Determine the current gain of CE transistor configuration.	02
21.	Test the performance of transistor switch circuit.	02
22.	Test the performance of transistor amplifier circuit.	02
23.	Test Op-Amp as amplifier and Integrator	02
	Total	**46**

References:

1. RituSahdev, Basic Electrical Engineering, Khanna Publishing House, 2018
2. Mittle and Mittal, Basic Electrical Engineering, McGraw Education, New Delhi, 2015, ISBN : 978-0-07-0088572-5
3. Saxena, S. B. Lal, Fundamentals of Electrical Engineering, Cambridge University Press, latest edition ISBN : 9781107464353
4. Theraja, B. L., Electrical Technology Vol – I, S. Chand publications, New Delhi, 2015, ISBN: 9788121924405
5. Theraja, B. L., Electrical Technology Vol – II, S. Chand publications, New Delhi, 2015, ISBN: 9788121924375
6. Jegathesan, V., Basic Electrical and Electronics Engineering, Wiley India, New Delhi, 2015, ISBN : 97881236529513
7. Sedha, R.S., A text book of Applied Electronics, S.Chand ,New Delhi, 2008, ISBN-13: 978-8121927833
8. Malvino, Albert Paul, David, Electronics Principles, McGraw Hill Eduction, New Delhi,2015, ISBN-13**:** 0070634244-978
9. Mehta, V.K., Mehta, Rohit, Principles of Electronics, S. Chand and Company, New Delhi, 2014, ISBN-13-9788121924504
10. Bell Devid, Fundamental of Electronic Devices and Circuits, Oxford University Press, New Delhi 2015 ISBN : 9780195425239

Suggested Softwares/Learning Websites:

a. en.wikipedia.org/wiki/Transformer

b. www.animations.physics.unsw.edu.au//jw/AC.html

c. www.alpharubicon.com/altenergy/understandingAC.htm

d. www.electronics-tutorials

e. learn.sparkfun.com/tutorials/transistors

f. www.pitt.edu/~qiw4/Academic/ME2082/Transistor%20Basics.pdf

g. www.technologystudent.com/elec1/transis1.htm

h. www.learningaboutelectronics.com

i. www.electrical4u.com

Course Outcomes:

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

1. Understand basic principle and operation of electric circuits and machines.

2. Solve basic problems related to electrical circuits and machines. Explain the operation of different electrical technologies.

3. Demonstrate an understanding of the control systems.

4. Understand the basic circuit elements

5. Understand different types of signal waveforms.

6. Understand logic gates and apply them in various electronic circuits.

7. Understand the basic concepts of op-amps, and their applications.

8. Use relevant electric/electronic protective devices safely.

ENGINEERING MECHANICS LAB(YDE205P)

Course Objectives::
Following are the objectives of this course:
1) To obtain resultant of various forces
2) To calculate support reactions through conditions of equilibrium for various structures
3) To understand role of friction in equilibrium problems
4) To know fundamental laws of machines and their applications to various engineering problems

List of Practical to be performed:
1. To study various equipments related to Engineering Mechanics.
2. To find the M.A., V.R., Efficiency and law of machine for Differential Axle and Wheel.
3. To find the M.A., V.R., Efficiency and law of machine for Simple Screw Jack.
4. Derive Law of machine using Worm and worm wheel.
5. Derive Law of machine using Single purchase crab.
6. Derive Law of machine using double purchase crab.
7. Derive Law of machine using Weston's differential or wormed geared pulley block.
8. Determine resultant of concurrent force system applying Law of Polygon of forces using force table.
9. Determine resultant of concurrent force system graphically.
10. Determine resultant of parallel force system graphically.
11. Verify Lami's theorem.
12. Study forces in various members of Jib crane.
13. Determine support reactions for simply supported beam.
14. Obtain support reactions of beam using graphical method.
15. Determine coefficient of friction for motion on horizontal and inclined plane.
16. Determine centroid of geometrical plane figures.

Suggested Learning Resources:
1. Bedi D.S., Engineering Mechanics, Khanna Publishing House
2. Khurmi, R.S., Applied Mechanics, S.Chand& Co. New Delhi.
3. Bansal R K, A text book of Engineering Mechanics, Laxmi Publications.
4. Ramamrutham, Engineering Mechanics, S.,S Chand & Co. New Delhi.
5. Dhade, Jamadar&Walawelkar, Fundamental of Applied Mechanics, Pune Vidhyarthi Gruh.
6. Ram, H. D.; Chauhan, A. K. Foundations and Applications of Applied Mechanics, Cambridge University Press.
7. Meriam, J. L., Kraige, L.G. , Engineering Mechanics- Statics, Vol. I, Wiley Publication, New Delhi.

Course outcomes:
After completing this course, student will be able to
1. Identify the force systems for given conditions by applying the basics of mechanics.
2. Determine unknown force(s) of different engineering systems.
3. Apply the principles of friction in various conditions for useful purposes.
4. Find the centroid and centre of gravity of various components in engineering systems.
5. Select the relevant simple lifting machine(s) for given purposes.

YBN UNIVERSITY,RANCHI

School Of Engineering and Technology

Semester - III   **CIVIL ENG.**

Subject Code	COURSE TITLE	Hrs. Per Week	TERM WORK QUIZ, ASSIGNMENT	MID TERM TEST (TWO)		SEMESTER EVALUATION THEORY PAPER MARKS	LAB WORK QUIZ, ASSIGNMENT	SEMESTER EVALUATION PRACTICAL / ORALEXAMINATION (VIVA) MARKS	CREDIT	GRAND TOTAL OF MARKS
				I	II					
YDCE301	Construction Material	03	10	10	10	70	---	---	03	100
YDCE302	Basic Surveying	03	10	10	10	70	---	---	03	100
YDCE303	Building Construction	03	10	10	10	70	---	---	03	100
YDCE304	Concrete Technology	03	10	10	10	70	---	---	03	100
YDCE305	Geotechnical Engineering	03	10	10	10	70	---	---	03	100
YDCE301P	Construction Material Lab	02	---	---	---	---	20	30	02	50
YDCE302P	Basic Surveying Lab	02	---	---	---	---	20	30	02	50
YDCE304P	Concrete Technology Lab	02	---	---	---	---	20	30	02	50
YDCE305P	Geotechnical Engineering Lab	02	---	---	---	---	20	30	02	50
	TOTAL	23	50	50	50	350	80	120	23	700

Construction Material(YDCE301)

Objectives:

Following are the objectives of this course:

☐ To learn about various construction materials, and understand their relevant characteristics.

☐ To be able to identify suitability of various materials for different construction purposes.

☐ To know about natural, artificial, and processed materials available for various purposes of construction

Content:

Unit – I: Overview of Construction Materials

• Scope of construction materials in Building Construction, Transportation Engineering, Environmental Engineering, Irrigation Engineering (applications only).

• Selection of materials for different civil engineering structures on the basis of strength, durability, Eco friendly and economy.

• Broad classification of materials –, Natural, Artificial, special, finishing and recycled.

Unit – II: Natural Construction Materials

☐ Requirements of good building stone; general characteristics of stone; quarrying and dressing methods and tools for stone.

☐ Structure of timber, general properties and uses of good timber, different methods of seasoning for preservation of timber, defects in timber, use of bamboo in construction.

☐ Asphalt, bitumen and tar used in construction, properties and uses.

☐ Properties of lime, its types and uses.

☐ Types of soil and its suitability in construction.

☐ Properties of sand and uses

☐ Classification of coarse aggregate according to size

Unit- III: Artificial Construction Materials

☐ Constituents of brick earth, Conventional / Traditional bricks, Modular and Standard bricks, Special bricks –fly ash bricks, Characteristics of good brick, Field tests on Bricks, Classification of burnt clay bricks and their suitability, Manufacturing process of burnt clay brick, fly ash bricks, Aerated concrete blocks.

☐ Flooring tiles – Types, uses

☐ Manufacturing process of Cement - dry and wet (only flow chart), types of cement and its uses. field tests on cement.

☐ Pre-cast concrete blocks- hollow, solid, pavement blocks, and their uses.

☐ Plywood, particle board, Veneers, laminated board and their uses.

☐ Types of glass: soda lime glass, lead glass and borosilicate glass and their uses.

☐ Ferrous and non-ferrous metals and their uses.

Unit– IV: Special Construction Materials

☐ Types of material and suitability in construction works of following materials: Water proofing, Termite proofing; Thermal and sound insulating materials.

☐ Fibers – Types –Jute, Glass, Plastic Asbestos Fibers, (only uses).

☐ Geopolymer cement: Geo-cement: properties, uses.

Unit– V: Processed Construction Materials
☐ Constituents and uses of POP (Plaster of Paris), POP finishing boards, sizes and uses.
☐ Paints- whitewash, cement paint, Distempers, Oil Paints and Varnishes with their uses.
(Situations where used).
☐ Industrial waste materials- Fly ash, Blast furnace slag, Granite and marble polishing
waste and their uses.
☐ Agro waste materials - Rice husk, Bagasse, coir fibres and their uses.
☐ Special processed construction materials; Geosynthetic, Ferro Crete, Artificial timber, Artificial
sand and their uses.

References:
1. Ghose, D. N., Construction Materials, Tata McGraw Hill, New Delhi.
2. S.K. Sharma, Civil Engineering Construction Materials, Khanna Publishing House, Delhi
3. Varghese, P.C. , Building Materials, PHI learning, New Delhi.
4. Rangwala, S.C., Engineering Materials, Charator publisher, Ahemdabad.
5. Somayaji, Shan, Civil Engineering Materials, Pearson education, New Delhi.
6. Rajput, R.K, Engineering Materials, S. Chand and Co., New Delhi.
7. Sood H., Laboratory Manual on Testing of Engineering Materials, New Age Publishers, New
Delhi.
8. Sharma C. P., Engineering Materials, PHI Learning, New Delhi.
9. Duggal, S. K, Building Materials, New International, New Delhi.

Basic Surveying(YDCE302)

Course Objectives:

Following are the objectives of this course:

☐ To understand types of surveying works required.

☐ To know the types of method and equipments to be used for different surveys.

☐ To know the use and operational details of various surveying equipments.

Course Content:

Unit – I Overview and Classification of Survey

☐ Survey- Purpose and Use.

☐ Types of surveying- Primary and Secondary, Classification: Plane, Geodetic, Cadastral, Hydrographic, Photogrammetry and Aerial.

☐ Principles of Surveying.

☐ Scales: Engineer's scale, Representative Fraction (RF) and diagonal scale.]

Unit– II Chain Surveying

☐ Instruments used in chain survey: Metric Chain, Tapes, Arrow, Ranging rod, Line ranger, Offset rod, Open cross staff, Optical square.

☐ Chain survey Station, Base line, Check line, Tie line, Offset, Tie station.

☐ Ranging: Direct and Indirect Ranging.

☐ Methods of Chaining, obstacles in chaining.

☐ Errors in length: Instrumental error, personal error, error due to natural cause, random error.

☐ Principles of triangulation.

☐ Types of offsets: Perpendicular and Oblique.

☐ Conventional Signs, Recording of measurements in a field book.

Unit– III Compass Traverse Survey

☐ Compass Traversing- open, closed.

☐ Technical Terms: Geographic/ True Magnetic Meridians and Bearings, Whole Circle Bearing system and Reduced Bearing system and examples on conversion of given bearing to another bearing (from one form to another), Fore Bearing and Back Bearing, Calculation of internal and external angles from bearings at a station, Dip of Magnetic needle, Magnetic Declination.

☐ Components of Prismatic Compass and their Functions, Methods of using Prismatic Compass-Temporary adjustments and observing bearings.

☐ Local attraction, Methods of correction of observed bearings - Correction at station and correction to included angles.

☐ Methods of plotting a traverse and closing error, Graphical adjustment of closing error.

Unit– IV Levelling and Contouring

☐ Basic terminologies: Level surfaces, Horizontal and vertical surfaces, Datum, Bench Marks- GTS, Permanent, Arbitrary and Temporary, Reduced Level, Rise, Fall, Line of collimation, Station, Back sight, Fore sight, Intermediate sight, Change point, Height of instruments.

☐ Types of levels: Dumpy, Tilting, Auto level, Digital level, Components of Dumpy Level and its fundamental axes, Temporary adjustments of Level.

☐ Types of Leveling Staff: Self-reading staff and Target staff.

☐ Reduction of level by Line of collimation and Rise and Fall Method.
☐ Leveling Types: Simple, Differential, Fly, Profile and Reciprocal Leveling.
☐ Contour, contour intervals, horizontal equivalent.
☐ Uses of contour maps, Characteristics of contours, Methods of Contouring: Direct and indirect.

Unit– V Measurement of Area and Volume

☐ Components and use of Digital planimeter.
☐ Measurement of area using digital planimeter.
☐ Measurement of volume of reservoir from contour map.

Suggested learning resources

1. Punmia, B.C,; Jain, Ashok Kumar; Jain, Arun Kumar, Surveying I, Laxmi Publications, New Delhi.
2. Basak, N. N., Surveying and Levelling, McGraw Hill Education, New Delhi.
3. Kanetkar, T. P.; Kulkarni, S. V., Surveying and Levelling volume I, Pune Vidyarthi Gruh Prakashan.
4. Duggal, S. K., Survey I, McGraw Hill Education, New Delhi.
5. Saikia, M D.; Das. B.M.; Das. M.M., Surveying, PHI Learning, New Delhi.
6. Subramanian, R., Fundamentals of Surveying and Levelling, Oxford University Press. New Delhi.
7. Rao, P. Venugopala Akella, Vijayalakshmi, Textbook of Surveying, PHI Learning New Delhi.
8. Bhavikatti, S. S., Surveying and Levelling, Volume 1, I. K. International, New Delhi.
9. Arora K R , Surveying Vol. I, Standard Book House.
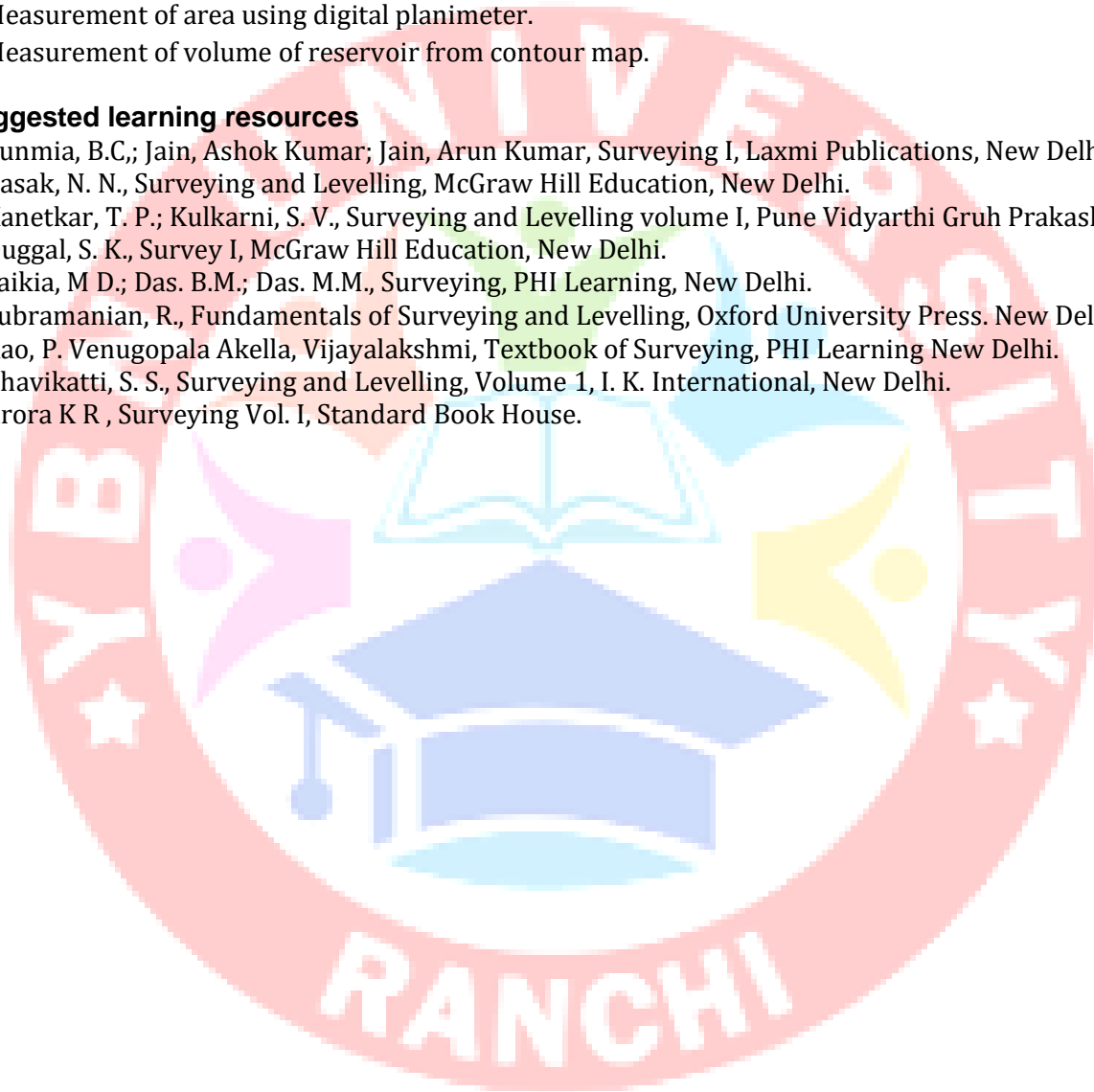
Building Construction(YDCE303)

Course Objectives:
Following are the objectives of this course:
- [] To identify different components of building.
- [] To understand different types of foundation and their significance.
- [] To know different types of masonry and their construction.
- [] To highlight the importance of communications in building planning.

Course Content
Unit – I: Overview of Building Components
Civil Engineering Curriculum Structure 66

[] Classification of Buildings as per National Building Code Group A to I, As per Types of Constructions- Load Bearing Structure, Framed Structure, Composite Structure.

[] Building Components - Functions of Building Components, Substructure – Foundation, Plinth.

[] Superstructure – Walls, Partition wall, Cavity wall, Sill, Lintel, Doors and Windows, Floor, Mezzanine floor, Roof, Columns, Beams, Parapet.

Unit – II: Construction of Substructure
[] Job Layout: Site Clearance, Layout for Load Bearing Structure and Framed Structure by Center Line and Face Line Method, Precautions.

[] Earthwork: Excavation for Foundation, Timbering and Strutting, Earthwork for embankment, Material for plinth Filling, Tools and plants used for earthwork.

[] Foundation: Functions of foundation, Types of foundation – Shallow Foundation, Stepped Footing, Wall Footing, Column Footing, Isolated and Combined Column Footing, Raft Foundation, Grillage Foundation. Deep Foundation - Pile Foundation, Well foundation and Caissons, Pumping Methods of Dewatering, Deep wells, Well points, Cofferdams (Introduction only).

Unit- III: Construction of Superstructure
[] **Stone Masonry:** Terms used in stone masonry- facing, backing, hearting, Through stone, corner stone, cornice. Types of stone masonry: Rubble masonry, Ashlar Masonry and their types. Joints in stone masonry and their purpose. Selection of Stone Masonry, Precautions to be taken in Stone Masonry Construction.

[] **Brick masonry:** Terms used in brick masonry- header, stretcher, closer, quoins, course, face, back, hearting, bat bond, joints, lap, frog line, level and plumb. Bonds in brick masonry- header bond, stretcher bond, English bond and Flemish bond. Requirements of good brick masonry. Junctions in brick masonry and their purpose and procedure. Precautions to be observed in Brick Masonry Construction. Comparison between stone and Brick Masonry. Tools and plants required for construction of stone and brick masonry. Hollow concrete block masonry and composite masonry.

[] **Scaffolding and Shoring:** Purpose, Types of Scaffolding, Process of Erection and Dismantling. Purpose and Types of Shoring, Underpinning. Formwork: Definition of Formwork, Requirements of Formwork, Materials used in Formwork, Types of Formwork, Removal of formwork.

Unit– IV: Building Communication and Ventilation

• **Horizontal Communication: Doors** –Components of Doors, Full Paneled Doors, Partly Paneled and Glazed Doors, Flush Doors, Collapsible Doors, Rolling Shutters, Revolving Doors, Glazed Doors. Sizes of Door recommended by BIS.

• **Windows:** Component of windows, Types of Windows - Full Paneled, Partly Paneled and Glazed, wooden, Steel, Aluminum windows, Sliding Windows, Louvered Window, Bay window, Corner window, clear-storey window, Gable and Dormer window, Skylight. Sizes of Windows recommended by BIS. Ventilators.

• Fixtures and fastenings for doors and windows- Material used and functions of Window Sill and Lintels, Shed / Chajja.

• **Vertical Communication:** Means of Vertical Communication- Stair Case, Ramps, Lift, Elevators and Escalators. Terms used in staircase-steps, tread, riser, nosing, soffit, waist slab, uster, balustrade, scotia, hand rails, newel post, landing, headroom, winder. Types of staircase (On the basis of shape): Straight, dog-legged, open well, Spiral, quarter turn, bifurcated, Three quarter turn and Half turn, (On the basis of Material): Stone, Brick, R.C.C., wooden and Metal.

Unit– V: Building Finishes

☐ **Floors and Roofs**: Types of Floor Finishes and its suitability- Kota, Marble, Granite, Ceramic Tiles, Vitrified, Chequered Tiles, Paver Blocks, Concrete Floors, wooden Flooring, Skirting and Dado. Process of Laying and Construction, Finishing and Polishing of Floors, Roofing Materials- RCC, Mangalore Tiles, AC Sheets, G.I. sheets, Corrugated G.I. Sheets, Plastic and Fibre Sheets. Types of Roof: Flat roof, Pitched Roof-King Post truss, Queen Post Truss, terms used in roofs.

☐ **Wall Finishes:** Plastering – Necessity of Plastering, Procedure of Plastering, Single Coat Plaster, Double Coat Plaster, Rough finish, Neeru Finishing and Plaster of Paris (POP). Special Plasters- Stucco plaster, sponge finish, pebble finish. Plaster Board and Wall Claddings. Precautions to be taken in plastering, defects in plastering. Pointing – Necessity, Types of pointing and procedure of Pointing. Painting –Necessity, Surface Preparation for painting, Methods of Application.

Suggested learning resources:

1. S. P. Arora and Bindra., Building Construction, Dhanpat Rai Publication, Delhi.
2. Sushil Kumar., Building Construction, Standard Publication.
3. Rangawala, S. C., Building Construction, Charotar Publication, Anand.
4. Punmia B. C., and Jain A. K., Building Construction ,Firewall Media.
5. Sharma S. K., Building Construction, S. Chand and Co. Pvt. Ltd., New Delhi.
6. Janardan Zha , Building Construction, Khanna Publication.
7. Bhavikatti S. S., Building Construction, Vikas Publication House Pvt. Ltd., Delhi.
8. Mantri S., A to Z Building Construction, Satya Prakashan, New Delhi.

Concrete Technology(YDCE304)

Course Objectives:

Following are the objectives of this course:

• To know properties of cement, aggregate and water used in concrete.

• To understand different characteristics of concrete.

• To learn about role of admixtures in concrete.

Course Content:

Unit – I Cement, Aggregates and Water

• Physical properties of OPC and PPC: fineness, standard consistency, setting time, soundness, compressive strength. Different grades of OPC and relevant BIS codes

• Testing of cement: Laboratory tests-fineness, standard consistency, setting time, soundness, compressive strength. Storage of cement and effect of storage on properties of cement.

• BIS Specifications and field applications of different types of cements: Rapid hardening, Low heat, Portland pozzolana, Sulphate resisting, Blast furnace slag, High Alumina and White cement.

• Aggregates: Requirements of good aggregate, Classification according to size and shape.

• Fine aggregates: Properties, size, specific gravity, bulk density, water absorption and bulking, fineness modulus and grading zone of sand, silt content and their specification as per IS 383. Concept of crushed Sand.

• Coarse aggregates: Properties, size, shape, surface texture, water absorption, soundness, specific gravity and bulk density, fineness modulus of coarse aggregate, grading of coarse aggregates, crushing value, impact value and abrasion value of coarse aggregates with specifications.

• Water: Quality of water, impurities in mixing water and permissible limits for solids as per IS: 456.

Unit– II Concrete

• Concrete: Different grades of concrete, provisions of IS 456.

• Duff Abraham water cement (w/c) ratio law, significance of w/c ratio, selection of w/c ratio for different grades, maximum w/c ratio for different grades of concrete for different exposure conditions as per IS 456.

• Properties of fresh concrete: Workability: Factors affecting workability of concrete. Determination of workability of concrete by slump cone, compaction factor, Vee-Bee Consistometer. Value of workability requirement for different types of concrete works. Segregation, bleeding and preventive measures.

• Properties of Hardened concrete: Strength, Durability, Impermeability.

Unit– III Concrete Mix Design and Testing of Concrete

• Concrete mix design: Objectives, methods of mix design, study of mix design as per IS 10262 (only procedural steps).

• Testing of concrete, determination of compressive strength of concrete cubes at different ages, interpretation and co-relation of test results.

• Non- destructive testing of concrete: Rebound hammer test, working principle of rebound hammer and factor affecting the rebound index, Ultrasonic pulse velocity test as per IS13311 (part 1 and 2), Importance of NDT tests.

Unit– IV Quality Control of Concrete

• Concreting Operations: Batching, Mixing, Transportation, Placing, Compaction, Curing and Finishing of concrete.

• Forms for concreting: Different types of form works for beams, slabs, columns, materials used for form work, requirement of good form work. Stripping time for removal of form works per IS 456.

• Waterproofing: Importance and need of waterproofing, methods of waterproofing and materials used for waterproofing.

• Joints in concrete construction: Types of joints, methods for joining old and new concrete, materials used for filling joints
.

Unit– V Chemical Admixture, Special Concrete and Extreme Weather concreting

• Admixtures in concrete: Purpose, properties and application for different types of admixture such as accelerating admixtures, retarding admixtures, water reducing admixtures, air entraining admixtures and super plasticizers.

• Special Concrete: Properties, advantages and limitation of following types of Special concrete: Ready mix Concrete, Fiber Reinforced Concrete, High performance Concrete Self-compacting concrete and light weight concrete.

• Cold weather concreting: effect of cold weather on concrete, precautions to be taken while concreting in cold weather condition.

• Hot weather concreting: effect of hot weather on concrete, precautions to be taken while concreting in hot weather condition.

Suggested learning resources:

1. Gambhir, M.L., Concrete Technology, Tata McGraw Hill Publishing Co. Ltd., Delhi.
2. Shetty, M.S., Concrete Technology, S. Chand and Co. Pvt. Ltd., Ram Nagar, Delhi.
3. Santhakumar, A. R., Concrete Technology, Oxford University Press, New Delhi.
4. Neville, A. M. and Brooks, J.J., Concrete Technology, Pearson Education Pvt. Ltd.
5. Neville, A. M., Concrete Technology, Pearson Education Pvt. Ltd., New Delhi.
6. Sood, H., Kulkarni P. D., Mittal L. N., Laboratory Manual in Concrete Technology, CBS Publishers, New Delhi.

Geotechnical Engineering(YDCE305)

Course Objectives:

Following are the objectives of this course:

☐ To understand and determine physical and index properties and classification of soil

☐ To estimate permeability and shear strength of soil

☐ To know the load bearing capacity of soil

☐ To learn various soil stabilization and compaction methods

Content:

Unit – I Overview of Geology and Geotechnical Engineering

☐ Introduction of Geology, Branches of Geology, Importance of Geology for civil engineering structure and composition of earth, Definition of a rock: Classification based on their genesis (mode of origin), formation. Classification and engineering uses of igneous, sedimentary and metamorphic rocks.

☐ Importance of soil as construction material in Civil engineering structures and as foundation bed for structures.

☐ Field application of geotechnical engineering for foundation design, pavement design, design of earth retaining structures, design of earthen dam.

Unit– II Physical and Index Properties of Soil

☐ Soil as a three phase system, water content, determination of water content by oven drying method as per BIS 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 and sand replacement method, Determination of specific gravity by pycnometer.

☐ Consistency of soil, Atterberg limits of consistency: Liquid limit, plastic limit and shrinkage limit. Plasticity index.

☐ Particle size distribution test and plotting of curve, Determination of effective diameter of soil, well graded and uniformly graded soils, BIS classification of soil.

Unit– III Permeability and Shear Strength of Soil

☐ Definition of permeability, Darcy's law of permeability, coefficient of permeability, factors affecting permeability, determination of coefficient of permeability by constant head and falling head tests, simple problems to determine coefficient of permeability. Seepage through earthen structures, seepage velocity, seepage pressure, phreatic line, flow lines, application of flow net, (No numerical problems).

☐ Shear failure of soil, concept of shear strength of soil. Components of shearing resistance of soil – cohesion, internal friction. Mohr-Coulomb failure theory, Strength envelope, strength equation for purely cohesive and cohesion less soils. Direct shear and vane shear test –laboratory methods.

Unit– IV Bearing Capacity of Soil

☐ Bearing capacity and theory of earth pressure. Concept of bearing capacity, ultimate bearing capacity, safe bearing capacity and allowable bearing pressure. Introduction to Terzaghi's analysis and assumptions, effect of water table on bearing capacity.

Field methods for determination of bearing capacity – Plate load and Standard Penetration Test. Test procedures as per IS:1888& IS:2131.

 Definition of earth pressure, Active and Passive earth pressure for no surcharge condition, coefficient of earth pressure, Rankine's theory and assumptions made for non-cohesive Soils.

Unit– V Compaction and stabilization of soil

 Concept of compaction, Standard and Modified proctor test as per IS code, Plotting of Compaction curve for determining: Optimum moisture content(OMC), maximum dry density(MDD), Zero air voids line. Factors affecting compaction, field methods of compaction – rolling, ramming and vibration. Suitability of various compaction equipments-smooth wheel roller, sheep foot roller, pneumatic tyred roller, Rammer and Vibrator, Difference between compaction and consolidation.

 Concept of soil stabilization, necessity of soil stabilization, different methods of soil stabilization. California bearing ratio (CBR) test - Meaning and Utilization in Pavement Construction

 Necessity of site investigation and soil exploration: Types of exploration, criteria for deciding the location and number of test pits and bores. Field identification of soil – dry strength test, dilatancy test and toughness test.

Suggested learning resources:

1. Punmia, B.C., Soil Mechanics and Foundation Engineering, Laxmi Publication, Delhi.
2. Murthy, V.N.S., A text book of soil mechanics and foundation Engineering, CBS Publishers & Distributors Pvt. Ltd., New Delhi.
3. Ramamurthy, T.N. & Sitharam,T.G., Geotechnical Engineering(Soil Mechanics), S Chand and Company LTD., New Delhi.
4. Raj, P. Purushothama, Soil Mechanics and Foundation Engineering, Pearson India, New Delhi.
5. Kasamalkar, B. J., Geotechnical Engineering, Pune Vidyarthi Griha Prakashan, Pune.
6. Arora K R, Soil Mechanics and Foundation Engineering, Standard Publisher.

Construction Material Lab(YDCE301P)

Course Objectives:

Following are the objectives of this course:

☐ To learn about various construction materials, and understand their relevant characteristics.

☐ To be able to identify suitability of various materials for different construction purposes.

☐ To know about natural, artificial, and processed materials available for various purposes of construction activities.

List of practical to be performed:

☐ Identify various sizes of available coarse aggregates from sample of 10 kg in laboratory and prepare report (60,40, 20,10 mm)

☐ Identify the available construction materials in the laboratory on the basis of their sources.

☐ Identify the grain distribution pattern in given sample of teak wood in the laboratory and draw the various patterns. (along and perpendicular to the grains)

☐ Prepare the lime putty by mixing lime (1 kg) with water in appropriate proportion and prepare report on slaking of lime.

☐ Identify various layers and types of soil in foundation pit by visiting at least 3 construction sites in different locations of city and prepare report consisting photographs and samples. Part I

☐ Identify various layers and types of soil in foundation pit by visiting at least 3 construction sites in different locations of city and prepare report consisting photographs and samples. Part II

☐ Select first class, second class and third-class bricks from the stake of bricks and prepare report on the basis of its properties.

☐ Measure dimensions of 10 bricks and find average dimension and weight. Perform field tests - dropping, striking and scratching by nail and correlate the results obtained.

☐ Identify different types of flooring tiles such as vitrified tiles, ceramic tiles, glazed tiles, mosaic tiles, anti- skid tiles, chequered tiles, paving blocks and prepare report about the specifications.

☐ Apply the relevant termite chemical on given damaged sample of timber.

☐ Identify the type of glasses from the given samples.

☐ Apply two or more coats of selected paint on the prepared base of a given wall surface for the area of 1m x 1m using suitable brush/rollers adopting safe practices. Part I

☐ Apply two or more coats of selected paint on the prepared base of a given wall surface for the area of 1m x 1m using suitable brush/rollers adopting safe practices. Part II

☐ Prepare the cement mortar of proportion 1:3 or 1:6 using artificial sand as a special processed construction material.

☐ Prepare mortar using cement and Fly ash or Granite/marble polishing waste in the proportion 1:6 or 1:3.

Suggested learning resources:

1. Ghose, D. N., Construction Materials , Tata McGraw Hill, New Delhi.
2. S.K. Sharma, Civil Engineering Construction Materials, Khanna Publishing House, New Delhi
3. Varghese, P.C. , Building Materials, PHI learning, New Delhi.
4. Rangwala, S.C., Engineering Materials, Charator publisher, Ahemdabad.

5. Somayaji, Shan, Civil Engineering Materials, Pearson education, New Delhi.

6. Rajput, R.K, Engineering Materials, S. Chand and Co., New Delhi.

7. Sood H., Laboratory Manual on Testing of Engineering Materials, New Age Publishers, New Delhi.

8. Sharma C. P., Engineering Materials, PHI Learning, New Delhi.

9. Duggal, S. K, Building Materials, New International, New Delhi.

73 Civil Engineering Curriculum Structure

Basic Surveying Lab(YDCE302P)

Course Objectives:

Following are the objectives of this course:

☐ To understand types of surveying works required

☐ To know the type of method and equipments to be used for different surveys

☐ To know the use and operational details of various surveying equipments.

List of Practicals to be performed

☐ Measure distance between two survey stations using chain, tape and ranging rods when two stations are inter visible.

☐ Undertake reciprocal ranging and measure the distance between two stations.

☐ Determine area of open field using chain and cross staff survey.

☐ Measure Fore Bearing and Back Bearing of survey lines of open traverse using Prismatic Compass.

☐ Measure Fore Bearing and back bearing of a closed traverse of 5 or 6 sides and correct the bearings and included angles for the local attraction.

☐ Undertake Survey Project with chain and compass for closed traverse for minimum 5 sides around a building**.**

☐ Plot the traverse on A1 size imperial drawing sheet for data collected in Survey Project mentioned at practical **No.6.**

☐ Undertake simple leveling using dumpy level/ Auto level and leveling staff.

☐ Undertake differential leveling and determine Reduced Levels by Height of instrument method and Rise and fall method using dumpy level/Auto Level and leveling staff.

☐ Undertake fly leveling with double check using dumpy level/ Auto level and leveling staff.

☐ Undertake Survey Project with Leveling instrument for Profile leveling and cross-sectioning for a road length of 500 m with cross-section at 30 m interval.

☐ Plot the L-section with minimum 3 cross-sections on A1 size imperial sheet for data collected in Survey Project mentioned at practical **No.11.**

☐ Undertake Survey Project for plotting contour map using block contouring method for a block of 150m x 150m with grid of 10m x 10m.

☐ Plot the contours on A1 size imperial drawing sheet for data collected in Survey Project mentioned at practical **No.13.**

☐ Measure area of irregular figure using Digital planimeter.

Suggested learning resources:

1. Punmia, B.C,; Jain, Ashok Kumar; Jain, Arun Kumar, Surveying I, Laxmi Publications., New Delhi.
2. Basak, N. N., Surveying and Levelling, McGraw Hill Education, New Delhi.
3. Kanetkar, T. P.; Kulkarni, S. V., Surveying and Levelling volume I, Pune Vidyarthi Gruh Prakashan.
4. Duggal, S. K., Survey I, McGraw Hill Education, New Delhi.
5. Saikia, M D.; Das. B.M.; Das. M.M., Surveying, PHI Learning, New Delhi.
6. Subramanian, R., Fundamentals of Surveying and Levelling, Oxford University Press. New Delhi.
7. Rao, P. Venugopala Akella, Vijayalakshmi, Textbook of Surveying, PHI Learning
8. Bhavikatti, S. S., Surveying and Levelling, Volume 1, I. K. International, New Delhi.

Concrete Technology Lab (YDCE304P)

Course Objectives:

Following are the objectives of this course:

☐ To know properties of cement, aggregate and water used in concrete.

☐ To understand different characteristics of concrete.

☐ To learn about role of admixtures in concrete.

List of Practical to be performed:

1	Determine fineness of cement by Blaine's air permeability apparatus Or by sieving.
2	Determine specific gravity, standard consistency, initial and final setting times of cement.
3	Determine compressive strength of cement.
4	Determine silt content in sand.
5	Determine bulking of sand.
6	Determine bulk density of fine and coarse aggregates.
7	Determine water absorption of fine and coarse aggregates.
8	Determine Fineness modulus of fine aggregate by sieve analysis.
9	Determine impact value of aggregate
10	Determine crushing value of aggregate.
11	Determine abrasion value of aggregate.
12	Determine elongation and flakiness index of coarse aggregates
13	Determine workability of concrete by slump cone test.
14	Determine workability of concrete by compaction factor test.
15	To prepare concrete mix of a particular grade and determine compressive strength of concrete for 7 and 28 days.
16	Demonstration of NDT equipments .

Suggested learning resources:

1. Gambhir, M.L., Concrete Technology, Tata McGraw Hill Publishing Co. Ltd., Delhi.
2. Shetty, M.S., Concrete Technology, S. Chand and Co. Pvt. Ltd., Ram Nagar, Delhi.
3. Santhakumar, A. R., Concrete Technology, Oxford University Press, New Delhi.
4. Neville, A. M. and Brooks, J.J., Concrete Technology, Pearson Education Pvt. Ltd.
5. Neville, A. M., Concrete Technology, Pearson Education Pvt. Ltd., New Delhi.
6. Sood, H., Kulkarni P. D., Mittal L. N., Laboratory Manual in Concrete Technology, CBS Publishers, New Delhi.

Geotechnical Engineering(YDCE305)

Course Objectives:

Following are the objectives of this course:

☐ To understand and determine physical and index properties of soil.

☐ To estimate the permeability and shear strength of soil.

☐ To know the procedure for performing C.B.R test.

☐ To learn various compaction methods for soil stabilization.

List of Practicals to be performed:

1. Identification of rocks from the given specimen.
2. Determine water content of given soil sample by oven drying method as per IS: 2720 (Part- II).
3. Determine specific gravity of soil by pycnometer method as per IS 2720 (Part- III).
4. Determine dry unit weight of soil in field by core cutter method as per IS 2720 (Part- XXIX).
5. Determine dry unit weight of soil in field by sand replacement method as per IS 2720 (Part- XXVIII).
6. Determine Plastic and Liquid Limit along with Plasticity Index of given soil sample as per IS 2720 (Part- V).
7. Determine Shrinkage limit of given soil sample as per IS 2720 (Part- V).
8. Determine grain size distribution of given soil sample by mechanical sieve analysis as per IS 2720 (Part- IV).
9. Use different types of soil to identify and classify soil by conducting field tests-Through Visual inspection, Dry strength test, Dilatancy test and Toughness test.
10. Determine coefficient of permeability by constant head test as per IS 2720 (Part- XVII).
11. Determine coefficient of permeability by falling head test as per IS 2720 (Part- XVII).
12. Determine shear strength of soil by direct shear test as per IS 2720 (Part-XIII).
13. Determine shear strength of soil by vane shear test as per IS 2720 (Part-XXX).
14. Determine MDD and OMC by standard proctor test of given soil sample as per IS 2720 (Part- VII).
15. Determination of CBR value on the field as per IS2720 (Part - XVI).

Suggested learning resources:

1. Punmia, B.C., Soil Mechanics and Foundation Engineering, Laxmi Publication
2. Murthy, V.N.S., A text book of soil mechanics and foundation Engineering, CBS Publishers & Distributors Pvt. Ltd., New Delhi.
3. Ramamurthy, T.N. & Sitharam,T.G., Geotechnical Engineering(Soil Mechanics), S Chand and Company LTD., New Delhi.
4. Raj, P. Purushothama, Soil Mechanics and Foundation Engineering, Pearson India
5. Kasamalkar, B. J., Geotechnical Engineering, Pune Vidyarthi Griha Prakashan, Pune.
6. Arora K R, Soil Mechanics and Foundation Engineering, Standard Publisher.

YBN UNIVERSITY,RANCHI

School Of Engineering and Technology

Semester - IV   **CIVIL ENG.**

Subject Code	COURSE TITLE	Hrs. Per Week	TERM WORK QUIZ, ASSIGNMENT	MID TERM TEST (TWO)		SEMESTER EVALUATION THEORY PAPER MARKS	LAB WORK QUIZ, ASSIGNMENT	SEMESTER EVALUATION PRACTICAL / ORALEXAMINATION (VIVA) MARKS	CREDIT	GRAND TOTAL OF MARKS
				I	II					
YDCE401	Hydraulics	03	10	10	10	70	---	---	03	100
YDCE402	Advanced Surveying	03	10	10	10	70	---	---	03	100
YDCE403	Theory of Structure	03	10	10	10	70	---	---	03	100
YDCE404	Transportation Engineering	03	10	10	10	70	---	---	03	100
YDCEP**	Elective-1	03	10	10	10	70	---	---	03	100
YDCE401P	Hydraulics Lab	02	---	---	---	---	20	30	02	50
YDCE402P	Advanced Surveying Lab	02	---	---	---	---	20	30	02	50
YDCE404P	Transportation Engineering Lab	02	---	---	---	---	20	30	02	50
YDPR402	Minor Project	---	---	---	---	---	20	30	02	50
YDAU402	Essence of Indian Knowledge and Tradition	02	---	---	---	---	---	---	---	---
	TOTAL	23	50	50	50	350	80	120	23	700

Hydraulics(YDCE401)

Objectives:

Following are the objectives of this course:

☐ To understand parameters associated with fluid flow and hydrostatic pressure.

☐ To know head loss and water hammer in fluid flowing through pipes.

☐ To learn different types of pumps and their uses.

Course Content

Unit – I Pressure measurement and Hydrostatic pressure

☐ Technical terms used in Hydraulics –fluid, fluid mechanics, hydraulics, hydrostatics and hydrodynamics - ideal and real fluid, application of hydraulics.

☐ Physical properties of fluid – density-specific volume, specific gravity, surface tension, capillarity, viscosity-Newton's law of viscosity.

☐ Various types of pressure – Atmospheric Pressure, Gauge Pressure, Absolute Pressure, Vacuum Pressure. Concept of Pressure head and its unit, Pascal's law of fluid pressure and its uses.

☐ Measurement of differential Pressure by different methods.

☐ Variation of pressure with depth, Pressure diagram, hydrostatic pressure and center of pressure on immersed surfaces and on tank walls.

☐ Determination of total pressure and center of pressure on sides and bottom of water tanks, sides and bottom of tanks containing two liquids, vertical surface in contact with liquid on either side

Unit– II Fluid Flow Parameters

☐ Types of flow – Gravity and pressure flow, Laminar, Turbulent, Uniform, Non-uniform, Steady, Unsteady flow. Reynolds number.

☐ Discharge and its unit, continuity equation of flow.

☐ Energy of flowing liquid: potential, kinetic and pressure energy.

☐ Bernoulli's theorem : statement, assumptions, equation.

Unit– III Flow through pipes

☐ Major head loss in pipe: Frictional loss and its computation by Darcy's Weisbach equation, Use of Moody's Diagram and Nomograms.

☐ Minor losses in pipe: loss at entrance, exit, sudden contraction, sudden enlargement and fittings.

☐ Flow through pipes in series, pipes in parallel and Dupuit's equation for equivalent pipe.

☐ Hydraulic gradient line and total energy line.

☐ Water hammer in pipes: Causes and Remedial measures.

☐ Discharge measuring device for pipe flow: Venturi meter - construction and working.

☐ Discharge measurement using Orifice, Hydraulic Coefficients of Orifice.

Unit– IV Flow through Open Channel

☐ Geometrical properties of channel section: Wetted area, wetted perimeter, hydraulic radius for rectangular and trapezoidal channel section.

☐ Determination of discharge by Chezy's equation and Manning's equation.

☐ Conditions for most economical rectangular and trapezoidal channel section.

☐ Discharge measuring devices: Triangular and rectangular Notches.

☐ Velocity measurement devices: current meter, floats and Pitot's tube.

☐ Specific energy diagram, Froudes' Number

Unit– V Hydraulic Pumps

 Concept of pump, Types of pump - centrifugal, reciprocating, submersible.

 Centrifugal pump: components and working

 Reciprocating pump: single acting and double acting, components and working.

 Suction head, delivery head, static head, Manometric head

 Power of centrifugal pump.

 Selection and choice of pump.

Suggested learning resources:

1. Modi, P. N.and Seth, S.M., Hydraulics and Fluid Mechanics, Standard book house, Delhi.
2. S.S. Rattan, Fluid Mechanics & Hydraulic Machines, Khanna Book Publishing Co., New Delhi
3. Ramamrutham, and Narayan, R., Hydraulics, Fluid Mechanics and Fluid Machines, Dhanpat Rai Publishing Company, New Delhi.
4. Khurmi R S, Hydraulics, Fluid Mechanics, Hydraulic machines, S. Chand Publishers
5. Rajput, R K, Fluid Mechanics, S Chand, New Delhi.
6. Ojha, C S P, Berndtsson, R, and Chandramoulli P. N., Fluid Mechanics and Machinery, Oxford University
Press, New Delhi.

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Advanced Surveying(YDCE402)

Course Objectives:

Following are the objectives of this course:

• To know methods of plane surveying and Theodolite surveying and their uses

• To learn tacheometric surveying and curve setting

• To understand the principles of Electronic Distance Measurement equipment and Total station and their use.

• To know the concept of remote sensing, GPS and GIS

Course Content

Unit – I Plane Table Surveying

• Principles of plane table survey.

• Accessories of plane table and their use, Telescopic alidade.

• Setting of plane table; Orientation of plane table - Back sighting and Magnetic meridian method, True Meridian Method.

• Methods of plane table surveys- Radiation, Intersection and Traversing.

• Merits and demerits of plane table survey.

Unit– II Theodolite Surveying

• Types and uses of Theodolite, Components of transit Theodolite and their functions, Reading the Vernier of transit Theodolite.

• Technical terms- Swinging, Transiting, Face left, Face right.

• Fundamental axes of transit Theodolite and their relationship

• Temporary adjustment of transit Theodolite.

• Measurement of horizontal angle- Direct and Repetition method, Errors eliminated by method of repetition.

• Measurement of magnetic bearing of a line, Prolonging and ranging a line, deflection angle.

• Measurement of vertical Angle.

• Theodolite traversing by Included angle method and Deflection angle method.

• Checks for open and closed traverse, Calculations of bearing from angles.

• Traverse computation-Latitude, Departure, Consecutive coordinates, Independent coordinates, balancing the traverse by Bowditch's rule and Transit rule, Gale's Traverse table computation.

Unit– III Tacheometric surveying and Curve setting

• Principles of Tacheometry, Tacheometer and its component parts, Anallatic lens.

• Tacheometric formula for horizontal distance with telescope horizontal and staff vertical.

• Field method for determining constants of tacheometer, Determining horizontal and vertical distances with tacheometer by fixed hair method and staff held vertical, Limitations of tacheometry.

• Types of curves used in roads and railway alignments. Designation of curves.

• Setting simple circular curve by offsets from long chord and Rankine's method of deflection angles.

Unit– IV Advanced surveying equipments

• Principle of Electronic Distance Meter (EDM), its component parts and their Functions, use of EDM.

• Use of micro optic Theodolite and Electronic Digital Theodolite.
• Use of Total Station, Use of function keys.
• Measurements of Horizontal angles, vertical angles, distances and coordinates using Total Station, Traversing, Profile Survey and Contouring with Total Station.

Unit– V Remote sensing, GPS and GIS
• Remote Sensing – Overview, Remote sensing system, Applications of remote sensing in Civil engineering, land use / Land cover, mapping, disaster management.
• Use of Global Positioning System (G.P.S.) instruments.
• Geographic Information System (GIS): Over view, Components, Applications, Software for GIS.
• Introduction to Drone Surveying.

Suggested learning resources:
1. Kanetkar, T. P.; Kulkarni, S. V., Surveying and Levelling Part I and II, Pune Vidyarthi Gruh Prakashan, Pune.
2. Basak, N. N.,Surveying and Levelling, McGraw Hill Education (India) Pvt. Ltd.,Noida.
3. Duggal, S. K., Survey I and Survey II, Tata McGraw Hill Education Pvt. Ltd., Noida.
4. Saikia, M D.; Das. B.M.; Das. M.M., Surveying PHI Learning Pvt. Ltd., New Delhi.
5. Subramanian, R., Surveying and Levelling, Oxford University Press. New Delhi.
6. Punmia, B.C,; Jain, Ashok Kumar; Jain, Arun Kumar, Surveying Vol. I and Surveying Vol. II, Laxmi Publications Pvt. Ltd., New Delhi.
7. Rao, P. Venugopala Akella, Vijayalakshmi, Textbook of Surveying, PHI Learning Pvt. Ltd., New Delhi.
8. Venkatramaiah, C, Textbook of Surveying, Universities Press, Hyderabad.
9. Anderson, James M and Mikhail, Edward M, Surveying theory and practice, Mc Graw Hill Education,
Noida.
10. De, Alak, Plane Surveying, S.Chand Publications, New Delhi.

Theory of Structure(YDCE403)

Course Objectives:

Following are the objectives of this course:

☐ To learn concept of eccentric loading and stresses in vertical members like column, chimneys, dam

☐ To analyze beams using various methods like slope deflection, three moment, and moment distribution

☐ To understand different methods of finding axial forces in trusses.

Course Content

Unit – I Direct and Bending Stresses in vertical members

☐ Introduction to axial and eccentric loads, eccentricity about one principal axis only, nature of stresses, Maximum and minimum stresses, resultant stresses and distribution diagram.

☐ Condition for no tension or zero stress at extreme fiber, Limit of eccentricity, core of section for rectangular and circular cross sections, Middle third rule.

☐ Chimneys of circular cross section subjected to wind pressure, Maximum and minimum stresses, resultant stresses and distribution diagram at base.

☐ Analysis of dams subjected to horizontal water pressure, conditions of stability, Maximum and minimum stresses, resultant stresses and distribution diagram at base.

Unit – II Slope and Deflection

☐ Concept of slope and deflection, stiffness of beams, Relation among bending moment, slope, deflection and radius of curvature, (no derivation).

☐ Double integration method to find slope and deflection of cantilever and simply supported beams subjected to concentrated load and uniformly distributed load on entire span.

☐ Macaulay's method for slope and deflection, application to cantilever and simply supported beam subjected to concentrated and uniformly distributed load on entire span.

Unit- III Fixed and Continuous Beam

☐ Concept of fixity, effect of fixity, advantages and disadvantages of fixed beam over simply supported beam.

☐ Principle of superposition, Fixed end moments from first principle for beam subjected to point load, UDL over entire span.

☐ Application of standard formulae in finding end moments, end reactions and drawing S.F. and B.M. diagrams for a fixed beam.

☐ Definition, effect of continuity, nature of moments induced due to continuity, concept of deflected shape, practical examples.

☐ Clapeyron's theorem of three moment (no derivation), Application of Clapeyron's theorem maximum up to three spans and two unknown support moment only, Support at same level spans having same and uniform moment of inertia subjected to concentrated loads and uniformly distributed loads over entire span.

☐ Drawing SF diagrams showing point of contraflexure, shear and BM diagrams showing net BM and point of contraflexure for continuous beams.

Unit– IV Moment distribution method

◻ Introduction to moment distribution method, sign convention, Carry over factor, stiffness factor, distribution factor.

◻ Application of moment distribution method to various types of continuous beams subjected to concentrated loads and uniformly distributed load over entire span having same or different moment of inertia, supports at same level, up to three spans and two unknown support moments only.

◻ Introduction to portal frames – Symmetrical and unsymmetrical portal frames with the concept of Bays and stories.

Unit– V Simple trusses

◻ Types of trusses (Simple, Fink, compound fink, French truss, pratt truss, Howe truss, North light truss, King post and Queen post truss)

◻ Calculate support reactions for trusses subjected to point loads at joints

◻ Calculate forces in members of truss using Method of joints and Method of sections.

Suggested learning resources:

1. Ramamrutham.S, Theory of structures, Dhanpatrai & Sons.
2. Khurmi, R. S. , Theory of Structures S. Chand and Co., New Delhi.
3. Bhavikatti, S S , Structural Analysis Vol-1, ,Vikas Publishing House Pvt Ltd.New Delhi.
4. Junnarkar, S. B. , Mechanics of structures, Volume-I and II Charotar Publishing House, Anand.
5. Pandit, G.S. and Gupta, S.P., Theory of Structures, Tata McGraw Hill, New Delhi.
6. Agor R, Structural Analysis, Khanna Publishing House, Delhi.

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Transportation Engineering(YDCE404)

Course Objectives::

Following are the objectives of this course:

☐ To identify the types of roads as per IRC recommendations.

☐ To understand the geometrical design features of different highways.

☐ To perform different tests on road materials.

☐ To identify the components of railway tracks.

Course Content:

Unit – I Overview of Highway Engineering

• Role of transportation in the development of nation, Scope and Importance of roads in India and its' Characteristics.

• Different modes of transportation – land way, waterway, airway. Merits and demerits of roadway and railway;

• General classification of roads.

• Selection and factors affecting road alignment.

Unit– II Geometric Design of Highway

• Camber: Definition, purpose, types as per IRC – recommendations.

• Kerbs: Road margin, road formation, right of way.

• Design speed and various factors affecting design speed as per IRC – recommendations.

• Gradient: Definition, types as per IRC – Recommendations.

• Sight distance (SSD): Definition, types IRC – recommendations, simple numerical.

• Curves: Necessity, types: Horizontal, vertical curves.

• Extra widening of roads: numerical examples.

• Super elevation: Definition, formula for calculating minimum and maximum Super elevation and method of providing super-elevation.

• Standards cross-sections of national highway in embankment and cutting.

Unit– III Construction of Road Pavements

• Types of road materials and their Tests – Test on aggregates-Flakiness and Elongation Index tests, Angularity Number test, test on Bitumen- penetration, Ductility, Flash and Fire point test and Softening point test.

• Pavement – Definition, Types, Structural Components of pavement and their functions

• Construction of WBM road. Merits and demerits of WBM & WMM road.

• Construction of Flexible pavement / Bituminous Road, Types of Bitumen and its properties, Emulsion, Cutback, Tar, Terms used in BR-prime coat, tack coat, seal coat, Merits and Demerits of BR.

• Cement concrete road -methods of construction, Alternate and Continuous Bay Method, Construction joints, filler and sealers, merits and demerits of concrete roads. Types of joints.

Unit– IV Basics of Railway Engineering

• Classification of Indian Railways, zones of Indian Railways

• Permanent way: Ideal requirement, Components; Rail Gauge, types, factors affecting selection of a gauge.

• Rail, Rail Joints - requirements, types.

• Creep of rail: causes and prevention.
• Sleepers - functions and Requirement, types - concrete sleepers and their density
• Ballast - function and types, suitability.
• Rail fixtures and fastenings – fish plate, spikes, bolts, keys, bearing plates, chairs-types of anchors and anti-creepers.

Unit– V Track geometrics, Construction and Maintenance
• Alignment- Factors governing rail alignment.
• Track Cross sections – standard cross section of single and double line in cutting and embankment. Important terms-permanent land, formation width, side drains,
• Railway Track Geometrics: Gradient, curves- types and factors affecting, grade compensation, super elevation, limits of Super elevation on curves, cant deficiency, negative cant, coning of wheel, tilting of rail.
• Branching of Tracks, Points and crossings, Turn out- types, components, functions and inspection. Track junctions: crossovers, scissor cross over, diamond crossing, track triangle.
• Station -Purpose, requirement of railway station, important technical terms, types of railway station, factors affecting site selection for railway station.
• Station yard: Classification- Passenger, goods, locomotive and marshalling yards. Function & drawbacks of marshalling yards.
• Track Maintenance- Necessity, Classification, Tools required for track maintenance with their functions, Organisation of track maintenance, Duties of permanent way inspector, gang mate and key man.

Suggested learning resources:
1. L.R. Kadiyali, Transportation Engineering, Khanna Book Publishing Co., Delhi (ISBN: 978-93-82609-858) Edition 2018
2. Khanna S.K., Justo, C E G and Veeraragavan, A., Highway Engineering, Nem Chand and Brothers, Roorkee.
3. Arora, N. L., Transportation Engineering, Khanna Publishers, Delhi.
4. Saxena S C and Arora S P, A Textbook of Railway Engineering, Dhanpat Rai Publication.
5. Birdi, Ahuja, Road, Railways, Bridge and Tunnel Engg , Standard Book House, New Delhi.
6. Sharma, S.K., Principles, Practice and Design of Highway Engineering,, S. Chand Publication, New Delhi.
7. Duggal, Ajay K. and Puri, V. P., Laboratory Manual in Highway Engineering, New Age International (P) Limited, Publishers, New Delhi.
8. Subramanian, K.P., Highway, Railway, Airport and Harbour Engineering, Scitech Publications, Hyderabad.

Hydraulics Lab (YDCE401P)

Course Objectives:

Following are the objectives of this course:

☐ To understand parameters associated with fluid flow and hydrostatic pressure.

☐ To know head loss and water hammer in fluid flowing through pipes.

☐ To learn different types of pumps and their uses.

List of Practicals to be performed:

1	Use piezometer to measure pressure at a given point.
2	Use Bourdon's Gauge to measure pressure at a given point.
3	Use U tube differential manometer to measure pressure difference between two given points.
4	Find the resultant pressure and its position for given situation of liquid in a tank.
5	Use Reynold's apparatus to determine type of flow.
6	Use Bernoulli's apparatus to apply Bernoulli's theorem to get total energy line for a flow in a closed conduit of varying cross sections.
7	Use Friction factor Apparatus to determine friction factor for a given pipe.
8	Determine minor losses in pipe fittings due to sudden contraction and sudden enlargement.
9	Determine minor losses in pipe fitting due to Bend and Elbow.
10	Calibrate Venturi meter to find out the discharge in a pipe.
11	Calibrate the Orifice to find out the discharge through a tank
12	Use Current meter to measure the velocity of flow of water in open channel.
13	Use Pitot tube to measure the velocity of flow of water in open channel.
14	Use triangular notch to measure the discharge through open channel.
15	Use Rectangular notch to measure the discharge through open channel.
16	Determine the efficiency of centrifugal pump.

Suggested learning resources:

1. Modi,P. N.and Seth, S.M., Hydraulics and Fluid Mechanics, Standard book house, Delhi.
2. S.S. Rattan, Fluid Mechanics and Hydraulic Machines, Khanna Publishing House, Delhi
3. Ramamrutham, and Narayan, R., Hydraulics, Fluid Mechanics and Fluid Machines, Dhanpat Rai Publishing Company, New Delhi.
4. Khurmi,R S, Hydraulics, Fluid Mechanics, Hydraulic machines, S Chand Publishers, New Delhi.
5. Rajput, R K, Fluid Mechanics, S Chand, New Delhi.
6. Ojha, C S P, Berndtsson, R, and Chandramoulli P. N., Fluid Mechanics and Machinery, Oxford University Press, New Delhi.

Advanced Surveying Lab(YDCE402P)

Course Objectives:
Following are the objectives of this course:
☐ To know methods of plane surveying, Theodolite surveying and their uses.
☐ To learn tacheometric surveying and curve setting.
☐ To understand the principles of Electronic Distance Measurement and Total station and their uses.
☐ To know the concept of Remote Sensing, GPS and GIS.

List of Practicals to be performed

1	Use plane table survey to prepare plans of a plot of seven sided closed traverse by Radiation Method.
2	Use plane table survey to prepare plans, locate details by Intersection Method.
3	Use plane table survey to prepare plans, locate details by Traversing Method.
4	Use plane table survey to carry out Survey Project for closed traverse for minimum five sides around a building.
5	Use transit theodolite to measure Horizontal and Vertical angle by Direct Method.
6	Plot the traverse on A1 size imperial drawing sheet for the collected data from preceding Theodolite Survey Project.
7	Use Thedolite as a Tacheometer to compute reduced levels and horizontal distances.
8	Set out a circular curve by Rankine's Method of Deflection Angles.
9	Use micro optic Theodolite to Measure Horizontal angle by Direct Method.
10	Use EDM to measure horizontal distance.
11	Use Total station instrument to measure horizontal distances.
12	Use Total station instrument to measure vertical angle.
13	Use Total station instrument to carry out Survey Project for closed traverse for minimum five sides.
14	Plot the traverse on A1 size imperial drawing sheet for the collected data from preceding Total Station Survey Project.
15	Use GPS to locate the coordinates of a station.

Suggested learning resources

1. Kanetkar, T. P.; Kulkarni, S. V., Surveying and Levelling Part I and II, Pune Vidyarthi Gruh Prakashan, Pune.
2. Basak, N. N.,Surveying and Levelling, McGraw Hill Education (India) Pvt. Ltd.,Noida.
3. Duggal, S. K., Survey I and Survey II, Tata McGraw Hill Education Pvt. Ltd., Noida.
4. Saikia, M D.; Das. B.M.; Das. M.M., Surveying PHI Learning Pvt. Ltd., New Delhi.
5. Subramanian, R., Surveying and Levelling, Oxford University Press. New Delhi.
6. Punmia, B.C,; Jain, Ashok Kumar; Jain, Arun Kumar, Surveying Vol. I and Surveying Vol. II, Laxmi Publications Pvt. Ltd., New Delhi.
7. Rao, P. Venugopala Akella, Vijayalakshmi, Textbook of Surveying, PHI Learning Pvt. Ltd., New Delhi.
8. Venkatramaiah, C, Textbook of Surveying, Universities Press, Hyderabad.
9. Anderson, James M and Mikhail, Edward M, Surveying theory and practice, Mc Graw Hill Education,

Transportation Engineering Lab (YDCE404P)

Objectives:

Following are the objectives of this course:

☐ To identify the types of roads as per IRC recommendations.

☐ To understand the geometrical design features of different highways.

☐ To perform different tests on road materials.

☐ To identify the components of railway tracks.

List of Practicals to be performed:

1	Draw the sketches showing standard cross sections of Expressways, Freeways, NH/SH, MDR/ODR
2	Flakiness and Elongation Index of aggregates.
3	Angularity Number of aggregates.
4	Aggregate impact test
5	Los Angeles Abrasion test
6	Aggregate crushing test
7	Softening point test of bitumen.
8	Penetration test of bitumen.
9	Flash and Fire Point test of bitumen.
10	Ductility test of Bitumen.
11	Visit the constructed road for visual inspection to identify defects and suggest remedial measures.
12	Prepare the photographic report containing details for experiment No. 11.
13	Visit the hill road constructed site to understand its components.
14	Prepare the photographic report containing details for experiment No. 13
15	Visit the road of any one type (flexible or rigid) to know the drainage condition.
16	Prepare the photographic report suggesting possible repairs and maintenance for experiment No. 15.
17	Visit to railway track for visual inspection of fixtures, fasteners and yards.
18	Prepare the photographic report containing details for experiment No. 17.

Suggested learning resources:

1. L.R. Kadiyali, Transportation Engineering, Khanna Book Publishing Co., New Delhi (ISBN: 978-93-82609-858) Edition 2018

2. Khanna S.K., Justo, C E G and Veeraragavan, A., Highway Engineering, Nem Chand and Brothers, Roorkee.

3. Arora, N. L., Transportation Engineering, Khanna Publishers, Delhi.

4. Saxena S C and Arora S P, A Textbook of Railway Engineering, Dhanpat Rai Publication.

5. Birdi, Ahuja, Road, Railways, Bridge and Tunnel Engg , Standard Book House, Delhi.

6. Sharma, S.K., Principles, Practice and Design of Highway Engineering,, S. Chand

7. Duggal, Ajay K. and Puri, V. P., Laboratory Manual in Highway Engineering, New Age International (P) Limited, Publishers, New Delhi.

8. Subramanian, K.P., Highway, Railway, Airport and Harbour Engineering, Scitech Publications, Hyderabad.

YBN UNIVERSITY,RANCHI

School Of Engineering and Technology

Subject Code	COURSE TITLE	Hrs. Per Week	TERM WORK QUIZ, ASSIGNMENT	MID TERM TEST (TWO)		SEMESTER EVALUATION THEORY PAPER MARKS	LAB WORK QUIZ, ASSIGNMENT	SEMESTER EVALUATION PRACTICAL / ORALEXAMINATION (VIVA) MARKS	CREDIT	GRAND TOTAL OF MARKS
				I	II					
YDCE501	Design of steel and RCC structure	03	10	10	10	70	---	---	03	100
YDCE502	Estimating, costing and valuation	03	10	10	10	70	---	---	03	100
YDCEP**	Elective-II	03	10	10	10	70	---	---	03	100
YDCEP**	Elective-III	03	10	10	10	70	---	---	03	100
YDOE**	Open Elective-I	03	10	10	10	70	---	---	03	100
YDCE501P	Design of steel and RCC Structure Lab	02	---	---	---	---	20	30	02	50
YDCE502P	Estimating, costing and valuation Lab	02	---	---	---	---	20	30	02	50
YDSI02	Summer Internship(6 Week)	---	---	---	---	---	20	30	02	50
YDPR502	Major Project	02	---	---	---	---	40	60	03	100
	TOTAL	21	50	50	50	350	100	150	24	750

Design of steel and RCC structure(YDCE501)

Objectives:

Following are the objectives of this course:

☐ To learn the concept of limit state design for tension and compression steel members.

☐ To learn the concept of limit state design of steel beams.

☐ To understand design of RCC elements.

☐ To know the design of short and long RCC columns.

Content:

Unit – I Design of Steel Tension and Compression Members (Limit State Method)

• Types of sections used for Tension members.

• Strength of tension member by- yielding of section, rupture of net cross-section and block shear.

• Design of axially loaded single angle and double angle tension members with bolted and welded connections.

• Types of sections used as compression member, Calculation of effective length, Radius of gyration and slenderness ratio, Permissible values of slenderness ratio as per IS 800, Design compressive stress.

• Introduction to built up sections, lacing and battening (Meaning and purpose), Diagrams of single and double lacing and battening system. (No numerical problems).

• Design of axially loaded single and double angle struts connected by bolted and welded connections with gusset plate.

Unit– II Design of Steel beams (Limit State Method)

• Standard beam sections, Bending stress calculations.

• Design of simple I and channel section.

• Check for shear as per IS 800.

Unit– III Design of Reinforced Concrete Beams by Limit State Method

• Concept of Limit state, Stress block diagram, Introduction to singly and doubly reinforced sections, IS 456

• Design of singly reinforced beam, concept of under reinforced, over reinforced and balanced section, Simple numerical problem on ultimate moment of resistance and design of beam section

• Design of doubly reinforced sections, stress and strain diagrams, depth of neutral axis, simple numerical problems on ultimate moment of resistance of reinforced beam, Calculation of A_{st} and A_{sc}.

Unit– IV Shear, Bond and Development length in Design of RCC member

• Nominal shear stress in RCC section, Design shear strength of concrete, Design of shear reinforcement, Minimum Shear Reinforcement, Provisions of IS 456, forms of shear reinforcement

• Types of bond, Bond stress, check for bond stress, Determination of Development length in tension and compression members and check as per codal provisions, Anchorage value of 90_0 hook, Lapping of bars.

• Simple numericals on: Shear reinforcement, Adequacy of section for shear.

• Introduction to serviceability limit state check

Unit– V Design of axially loaded RCC Column

• Definition and classification of column, Limit state of compression members, Effective length of column.

• Provisions of IS 456 for minimum steel, cover, maximum steel, spacing of ties etc.
• Design of axially loaded short column - Square, Rectangular, and Circular only.

Suggested learning resources:

• Shah, V. L., and Gore, V., Limit State Design of Steel Structures, Structures Publications, Pune.
• Dayarathnam P., Design of Steel Structures, S. Chand and Company, Delhi.
• Subramanian N., Design of Steel Structures, Oxford University Press.
• Sairam, K.S., Design of Steel Structures, Pearson Publication, Chennai, Delhi.
• Shah, V. L., and Karve, S.R., Limit State Theory and Design of Reinforced Concrete Structures, Structures Publications, Pune,2014.
• Sinha N.C., and Roy S.K., Fundamentals of Reinforced Concrete, S. Chand & Co., New Delhi.
• Krishna Raju, and N. Pranesh, R.N., Reinforced Concrete Design Principles and Practice, New Age International, Mumbai.
• Pillai, S.U., and Menon, Devdas, Reinforced concrete Design, McGraw Hill Publications, New Delhi.
• Varghese, P. C., Limit State Design of Reinforced Concrete, Prentice Hall India Learning Private Limited, Delhi.
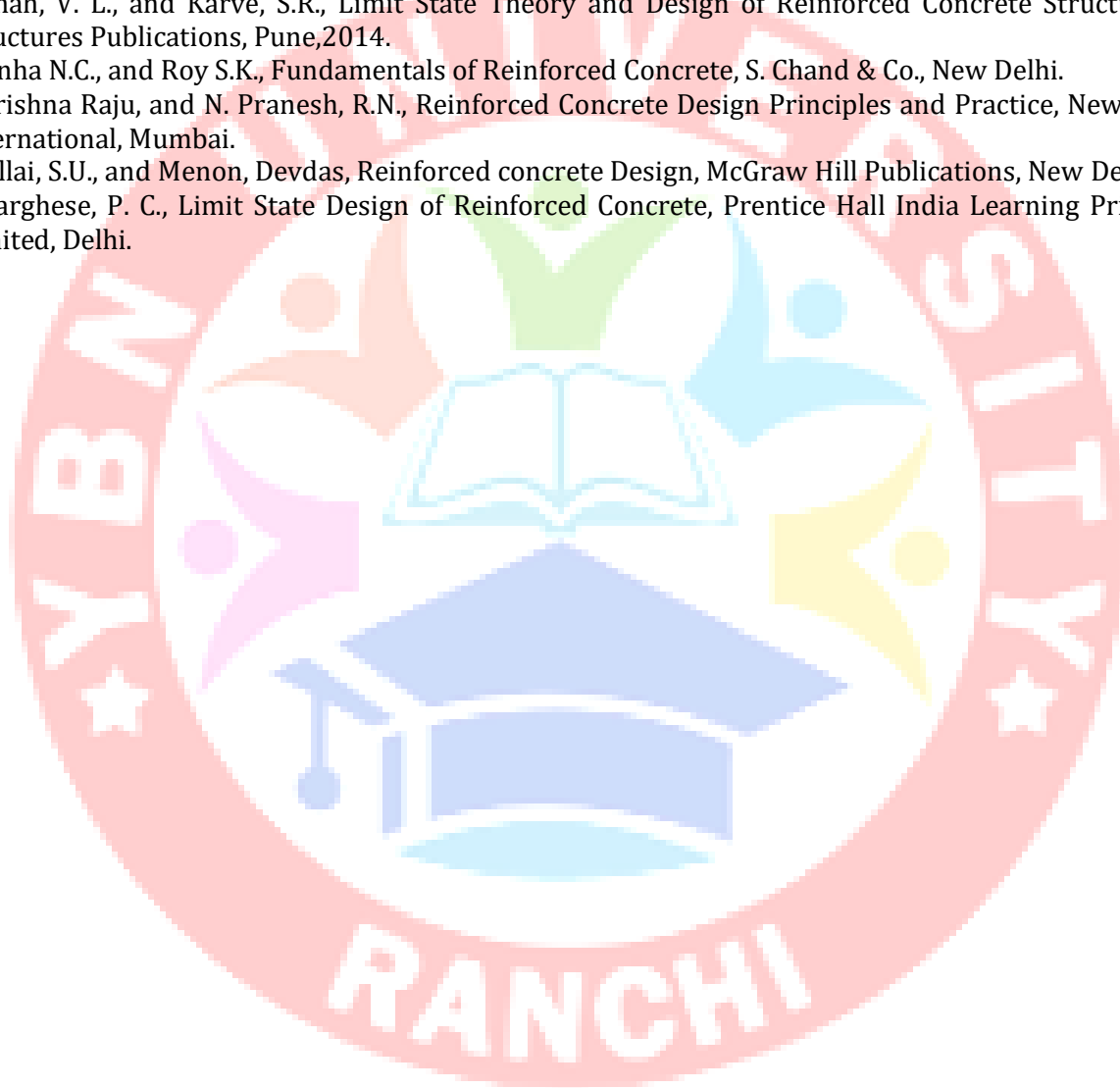
Estimating, costing and valuation(YDCE502)

Objectives:

Following are the objectives of this course:

☐ To learn the procedure for estimating and costing of Civil Engineering works.

☐ To perform rate analysis for different items associated with construction projects.

☐ To use software for detailed estimate related to civil infrastructural projects.

Content

Unit – I Fundamentals of Estimating and Costing

☐ Estimating and Costing – Meaning, purpose, Administrative approval, Technical Sanction and Budget provision.

☐ Types of estimates – Approximate and Detailed estimate.

☐ Types and Uses of Estimates: Revised estimate, Supplementary estimate, Repair and maintenance estimate, renovation estimate.

☐ Roles and responsibility of Estimator.

☐ Checklist of items in load bearing and framed structure.

☐ Standard formats of Measurement sheet, Abstract sheet, Face sheet.

☐ Modes of measurement and desired accuracy in measurements for different items of work as per IS:1200.

☐ Rules for deduction in different category of work as per IS:1200.

☐ Description / specification of items of building work as per PWD /DSR.

Unit– II Approximate Estimates

☐ Approximate estimate- Definition, Purpose.

☐ Methods of approximate estimate - Service unit method, Plinth area rate method, Cubical content method, Typical bay method, Approximate quantity method (with simple numericals)

☐ Approximate estimate for roads, Railways, bridges/culvert, irrigation projects and water supply projects.

Unit– III Detailed Estimate

☐ Detailed Estimate- Definition and Purpose, Data required for detailed estimate - Civil cost, GST, Contingencies, Supervision charges, Agency charges, Procedure for preparation of detailed estimate- Taking out quantities and Abstracting.

☐ Methods of Detailed Estimate- Unit quantity method and total quantity method (with simple numericals)

☐ Long wall and Short wall method, Centre line method.

☐ Bar bending schedule for footing, column, beam, Lintel, chajja and slab elements

☐ Provisions in detailed estimate: contingencies, work charged establishment, percentage charges, water supply and sanitary Charges and electrification charges etc.

☐ Prime cost, Provisional sum, Provisional quantities, Bill of quantities, Spot items or Site items.

Unit– IV Estimate for Civil Engineering Works

☐ Earthwork - Quantities for roads, Embankment and canal by – Mid sectional area method, mean sectional area method, Prismoidal and trapezoidal formula method.

☐ Detailed estimate for septic tank, Community well.

☐ Use of computer /softwares / programmes for detailed estimate Preparation of Civil Engineering Works.

Unit– V Rate Analysis

☐ Rate Analysis: Definition, purpose and importance.
☐ Lead (Standard and Extra), lift, overhead charges, water charges and contractors' profit,
☐ Procedure for rate analysis.
☐ Task work- Definition, types. Task work of different skilled labour for different items.
☐ Categories of labours, their daily wages, types and number of labours for different items of work.
☐ Transportation charges of materials - Lead and Lift, Hire charges of machineries and equipments.
☐ Preparing rate analysis of different items of work pertaining to buildings and roads.

Suggested learning resources

1. Datta, B.N., Estimating and Costing in Civil engineering, UBS Publishers Distributors Pvt. Ltd. New Delhi.
2. Peurifoy,Robert L. Oberlender,Garold, Estimating construction cost (fifth edition), McGraw Hill Education, New Delhi.
3. Rangwala,S.C., Estimating and Costing, Charotar Publishing House PVT. LTD., Anand.
4. Birdie,G.S., Estimating and Costing, Dhanpat Rai Publishing Company(P) Ltd. New Delhi.
5. Patil,B.S., Civil Engineering Contracts and Estimates, Orient Longman, Mumbai.
6. Chakraborti,M., Estimating and costing, specification and valuation in civil engineering, Monojit Chakraborti, Kolkata.
7. PWD Schedule of Rates.
8. Ministry of Road Transport and Highways (MORT&H) Specifications and Analysis of Schedule of Rates.
9. Manual of Specifications and Standards for DBFOT projects, EPC works.

Design of steel and RCC structure Lab(YDCE501P)

Objectives:

Following are the objectives of this course:

• To learn the concept of limit state design of tension and compression steel members.
• To understand design of steel beams.
• To learn the concept of limit state design of RCC beams.
• To know the limit state design of RCC columns.

List of Practical to be performed:

1	Draw any five commonly used rolled steel sections and five built up sections.
2	Summarize the provisions of IS 800 required for the design of tension member in report form.
3	Compile relevant clauses from IS 800 required for the design of a compression member and submit it in report form.
4	Draw sketches for single & double lacing of given built up columns.
5	Draw sketches for battening of given built up columns.
6	Prepare a report on the IS 800 provisions pertaining to design of lacing & battening along with its significance.
7	Draw cross section, strain diagram & stress diagram for singly reinforced section.
8	Draw cross section, strain diagram & stress diagram for doubly reinforced section.
9	Design simply supported I section steel beam for udl.
10	Design beams section for shear as per IS 800 provisions.
11	Draw sketches of different types of column footings.
12	Interpret the actual RCC Structural Drawings used on site with reference to reinforcement details of various structural elements.
13	Prepare a checklist for reinforcement provided from actual drawings used on site for various structural elements.
14	Prepare a detailed report of site visit for reinforcement detailing of structural elements like beams, columns, staircase & footing.
15	Prepare a detailed report of site visit for study of rolled steel tension & compression members used in various structures.

Suggested learning resources:

1. Shah, V. L., and Gore, V., Limit State Design of Steel Structures, Structures Publications, Pune.
2. Dayarathnam, P., Design of Steel Structures, S. Chand and Company, Delhi.
3. Subramanian N., Design of Steel Structures, Oxford University Press.
4. Sairam, K.S., Design of Steel Structures, Pearson Publication, Chennai, Delhi.
5. Shah, V. L., and Karve, S.R., Limit State Theory and Design of Reinforced Concrete Structures, Structures Publications, Pune,2014.
6. Sinha N.C., and Roy S.K., Fundamentals of Reinforced Concrete, S. Chand & Co., New Delhi.
7. Krishna Raju, and N.Pranesh, R.N., Reinforced Concrete Design Principles and Practice, New Age International, Mumbai.
8. Pillai, S.U., and Menon, Devdas, Reinforced concrete Design, McGraw Hill Publications, New Delhi.
9. Varghese, P. C., Limit State Design of Reinforced Concrete, Prentice Hall India Learning Private Limited, Delhi.

Estimating, costing and valuation Lab(YDCE502P)

Objectives:

Following are the objectives of this course:

☐ To learn the procedure for estimating and costing of Civil Engineering works.

☐ To perform rate analysis for different items associated with construction projects.

☐ To use software for detailed estimate related to civil infrastructural projects.

List of Practical to be performed:

1	Prepare the list of items to be executed with units for detailed estimate of a given structure from the given drawing.
2	Prepare a report on market rates for given material, labour wages, hire charges of tools & equipments required to construct the given structure as mentioned in at Serial number 1 above.
3	Study of items with specification given in the DSR (for any ten item)
4	Recording in Measurement Book (MB) for any four items
5	Prepare bill of quantities of given item from actual measurements. (any four items).
6	Prepare approximate estimate for the given civil engineering works.
7	Calculate the quantity of items of work from the given set of drawings using standard measurement sheet for load bearing residential structure using description of item from DSR (1BHK Building with staircase).
8	Prepare detailed estimate from the given set of drawings using "standard measurement and abstract format" for RCC framed structure using description of item from DSR along with face sheet and prepare quarry chart, lead statement (G+1 Building) .
9	Calculate the reinforcement quantities from the given set of drawings for a room size of 3 m X 4 m with bar bending schedule (footing, column, beam, lintel with chajja, slab)
10	Prepare rate analysis for the given five item of works.
11	Prepare detailed estimate of road of one kilometre length from the given drawing.
12	Prepare detailed estimate of small Septic tank from the given set of drawings.
13	Prepare detailed estimate of well from the given set of drawing.
14	Use the relevant software to prepare detailed estimate of a Road.
15	Use the relevant software to prepare detailed estimate of a residential building.

Suggested learning resources:

1. Datta, B.N., Estimating and Costing in Civil engineering, UBS Publishers Distributors
2. Peurifoy, Robert L. Oberlender,Garold, Estimating construction cost (fifth edition), McGraw Hill Education, New Delhi.
3. Rangwala,S.C., Estimating and Costing, Charotar Publishing House, Anand.
4. Birdie,G.S., Estimating and Costing, Dhanpat Rai Publishing Company(P) Ltd. Delhi.
5. Patil,B.S., Civil Engineering Contracts and Estimates, Orient Longman, Mumbai.
6. Chakraborti,M., Estimating and costing, specification and valuation in civil engineering, Monojit Chakraborti, Kolkata.
7. PWD Schedule of Rates.
8. Ministry of Road Transport and Highways (MORT&H) Specifications and Analysis of Schedule of Rates.
9. Manual of Specifications and Standards for DBFOT projects, EPC works.

YBN UNIVERSITY,RANCHI

School Of Engineering and Technology

Semester - VI   **CIVIL ENG.**

Subject Code	COURSE TITLE	Hrs. Per Week	TERM WORK QUIZ, ASSIGNMENT	MID TERM TEST (TWO)		SEMESTER EVALUATION THEORY PAPER MARKS	LAB WORK QUIZ, ASSIGNMENT	SEMESTER EVALUATION PRACTICAL / ORALEXAMINATION (VIVA) MARKS	CREDIT	GRAND TOTAL OF MARKS
				I	II					
YDCE601	Public Health Engg.	03	10	10	10	70	---	---	03	100
YDCE602	Entrepreneurship and Start-Ups	03	10	10	10	70	---	---	03	100
YDCEP**	Elective-IV	03	10	10	10	70	---	---	03	100
YDOE**	Open Elective-II	03	10	10	10	70	---	---	03	100
YDOE**	Open Elective-III	03	10	10	10	70	---	---	03	100
YDCE601P	Public Health Engg. Lab	02	---	---	---	---	20	30	02	50
YDAU601	Indian Constitution	02	---	---	---	---	20	30	---	0
YDCE03	Seminar	02	---	---	---	---	20	30	02	50
YDPR601	Major Project	04	---	---	---	---	40	60	04	100
	TOTAL	25	50	50	50	350	100	150	23	700

Public Health Engg.(YDCE601)

Objectives:

Following are the objectives of this course:

• To learn the principles for identification of sources of surface and subsurface water

• To learn calculation of population and requirement of drinking water

• To understand the plotting of water supply scheme highlighting different features

• To know evaluation of characteristics and treatment of sewage.

Content

Unit – I Sources, Demand and Quality of water

• Water supply schemes - Objectives, components,

• Sources of water: Surface and Subsurface sources of water, Intake Structures, Definition andtypes, Factors governing the location of an intake structure, Types of intakes.

• Demand of water: Factors affecting rate of demand, Variations of water demands, Forecasting of population, Methods of forecasting of population, (Simple problems on forecasting of population), Design period, Estimating of quantity of water supply required for city or town.

• Quality of water**:** Need for analysis of water, Characteristics of water- Physical, Chemical and Biological, Testing of water for Total solids, hardness, chlorides, dissolved Oxygen, pH, Fluoride, Nitrogen and its compounds, Bacteriological tests, E coli, B coli index, MPN, Sampling of water, Water quality standards as per IS 10500.

UNIT II Purification of water

• Purification of Water: Objectives of water treatment, 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, Clariflocculator.

• Filtration - mechanisation of filtration, classification of filters: slow sand filter, rapid sand filter, pressure filter. Construction and working of slow sand filter and rapid sand filter, operational problems in filtration. 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.

• Miscellaneous water Treatments: Introduction to water softening, Defluoridation techniques.

UNIT III Conveyance and Distribution of water

• Conveyance: 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.

• Distribution of water: Methods of distribution of water- Gravity, pumping, and combined system, Service reservoirs - functions and types, Layouts of distribution of Water-Dead end system, grid iron system, circular system, radial system; their suitability, advantages and disadvantages.

UNIT IV Domestic sewage and System of Sewerages

• Building Sanitation: **N**ecessity of sanitation, Necessity to treat domestic sewage, Definitions - Sewage, sullage, types of sewage. Definition 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. Trapstypes, qualities of good trap. Systems of plumbing - one pipe, two pipe, single stack, choice of system. Principles regarding design of building drainage, inspection and junction chambers, their necessity, location, size and shape.

• Systems of Sewerage and Sewer Appurtenances: Types of Sewers, Systems of sewerage,

self-cleansing velocity and non-scouring velocity, Laying, Testing and maintenance of sewers, Manholes and Drop Manhole-component parts, location, spacing, construction details, Sewer Inlets, Street Inlets.

UNIT V Characteristics and treatment of Sewage
• Analysis of sewage: Characteristics of sewage, B.O.D., C.O.D. and its significance., Central Pollution Control Board Norms for discharge of treated sewage, Objects of sewage treatment and flow diagram of conventional sewage treatment plant.
• Treatment of Sewage: Screening, Types of screens, Grit removal, Skimming, Sedimentation of sewage, Aerobic and anaerobic process, Sludge digestion, trickling filters, Activated sludge process, Disposal of sewage, Oxidation pond, Oxidation ditch. Septic tank, Recycling and Reuse of domestic waste.

Suggested learning resources
1. Sharma S.C, Environmental Engineering, Khanna Publishing House, New Delhi
2. Garg, S.K., Environmental Engineering Vol. I and Vol. II, Khanna Publishers
3. Birdie, G. S. and Birdie, J. S.Water Supply and Sanitary Engineering, Dhanpat Rai
4. Gupta, O.P., Elements of Environmental Pollution Control, Khanna Publishing House, Delhi
5. Rao, C.S., Environmental Pollution Control Engineering, New Age International
6. Punmia, B C, Environmental Engineering, vol. I and II, Laxmi Publishers
7. Peavy H S, Rowe D R, and Tchobanoglous G, Environmental Engineering, McGraw
8. Basak N N, Environmental Engineering, McGraw Hill Publishers.

Public Health Engg. Lab(YDCE601P)

Objectives:

Following are the objectives of this course:

• To learn the tests for measuring quality of drinking water.

• To learn determination of BOD and COD requirement in sewage.

• To understand the plotting of water supply scheme highlighting different features.

List of Practical to be performed:

1	Determine pH value of given sample of water.
2	Determine the turbidity of the given sample of water.
3	Determine residual chlorine in a given sample of water.
4	Determine suspended, dissolved solids and total solids of given sample of water.
5	Determine the dissolved oxygen in a sample of water.
6	Undertake a field visit to water treatment plant and prepare a report.
7	Determine the optimum dose of coagulant in a given raw water sample by jar test.
8	Draw sketches of various valves used in water supply pipe line
9	Draw a sketch of one pipe and two pipe system of plumbing
10	Determine B.O.D. of given sample of sewage.
11	Determine pH value of given sample of sewage.
12	Determine suspended solids dissolved and total solids for sample of sewage.
13	Determine the dissolved oxygen in the given sample of sewage.
14	Determine C.O.D. of given sample of sewage.
15	Prepare a report of a field visit to sewage treatment plant

Suggested learning resources:

1. Sharma S.C, Environmental Engineering, Khanna Publishing House, New Delhi
2. Garg, S.K., Environmental Engineering Vol. I and Vol. II, Khanna Publishers
3. Birdie, G. S. and Birdie, J. S.Water Supply and Sanitary Engineering, Dhanpat Rai
4. Gupta, O.P., Elements of Environmental Pollution Control, Khanna Publishing House, Delhi
5. Rao, C.S., Environmental Pollution Control Engineering, New Age International
6. Punmia, B C, Environmental Engineering, vol. I and II, Laxmi Publishers
7. Peavy H S, Rowe D R, and Tchobanoglous G, Environmental Engineering, McGraw
8. Basak N N, Environmental Engineering, McGraw Hill Publishers.

Repairs and Maintenance of Structures(YDCEP01)

Course Objectives:

Following are the objectives of this course:

• To learn about types of maintenance techniques

• To understand causes of various types of damages.

Civil Engineering Curriculum Structure 124

• To know about relevant materials for repair.

• To learn methods of retrofitting for different structures.

Course Content:

Unit – I Basics of maintenance

• Types of Maintenances - repair, retrofitting, re-strengthening, rehabilitation and restoration.

• Necessity, objectives and importance of maintenance.

• Approach of effective management for maintenance.

• Periodical maintenance: check list, maintenance manual containing building plan, reinforcement details, material sources, maintenance frequency, corrective maintenance procedures and sources. Pre- and post- monsoon maintenance.

Unit– II Causes and detection of damages

• Causes of damages due to distress, earthquake, wind, flood, dampness, corrosion, fire, deterioration, termites, pollution and foundation settlement.

• Various aspects of visual observations for detection of damages.

• Load test and non-destructive tests (brief description). NDT tests on damaged structure such as rebound hammer, ultrasonic pulse velocity, rebar locator, crack detection microscope, digital crack measuring gauge.

• Chemical test - Chloride test, sulphate attack, carbonation test, pH measurement, resistivity method, Half-cell potential meter (Introduction and demonstration only).

Unit– III Materials for maintenance and repairs

• Types of repair material, material selection.

• Essential parameters for maintenance and repair materials such - bond with substrate, durability.

• Waterproofing materials based on polymer modified cement slurry, UV resistant acrylic polymer, ferro-cement.

• Repairing materials for masonry: plastic/aluminum nipples, non-shrink cement, polyester putty or 1:3 cement sand mortar, galvanized steel wire fabrics and clamping rods, wire nails, ferro-cement plates.

• Repairing materials for RCC: epoxy resins, epoxy mortar, cement mortar impregnated with polypropylene, silicon, polymer concrete composites, sealants, fiber reinforcement concrete, emulsions and paints.

Unit– IV Maintenance and repair methods for masonry Construction

• Causes of cracks in walls - bulging of wall, shrinkage, bonding, shear, tensile, vegetation.

• Probable crack location: junction of main and cross wall, junction of slab and wall, cracks in masonry joints.

• Repair methods based on crack type - For minor & medium cracks (width 0.5 mm to 5mm): grouting and for major cracks (width more than 5mm): fixing mesh across cracks, RCC band, installing ferro-cement plates at corners, dowel bars, propping of load bearing.

• Remedial measures for dampness & efflorescence in wall.

Unit– V Maintenance and repair methods for RCC Construction

• Repair stages such as concrete removal and surface preparation, fixing suitable formwork, bonding/passive coat and repair application, various methods of surface preparation.

• Repair options such as grouting, patch repairs, carbonated concrete, cleaning the corroded steel, concrete overlays, latex concrete, epoxy bonded mortar and concrete, polymer concrete, corrosion protection such as jacketing.

• Building cracks and its prevention, common methods for dormant crack repairs such as Epoxy injection, grooving and sealing, stitching, grouting and guniting/ shotcreting.

• Strengthening methods for live cracks such as addition of reinforcements, Jacketing, brackets, collars, supplementary members i.e. shoring, underpinning and propping of framed structure.

Suggested learning resources:

1. Gahlot, P. S., Sharma, S., Building Repair and Maintenance Management, CBS Publishers & Distributors Pvt. Ltd., New Delhi

2. Guha, P. K., Maintenance and Repairs of Buildings, New Central Book Agencies

3. Hutchin Son, B. D., Maintenance and Repairs of Buildings, Newnes-Butterworth

4. Relevant BIS codes
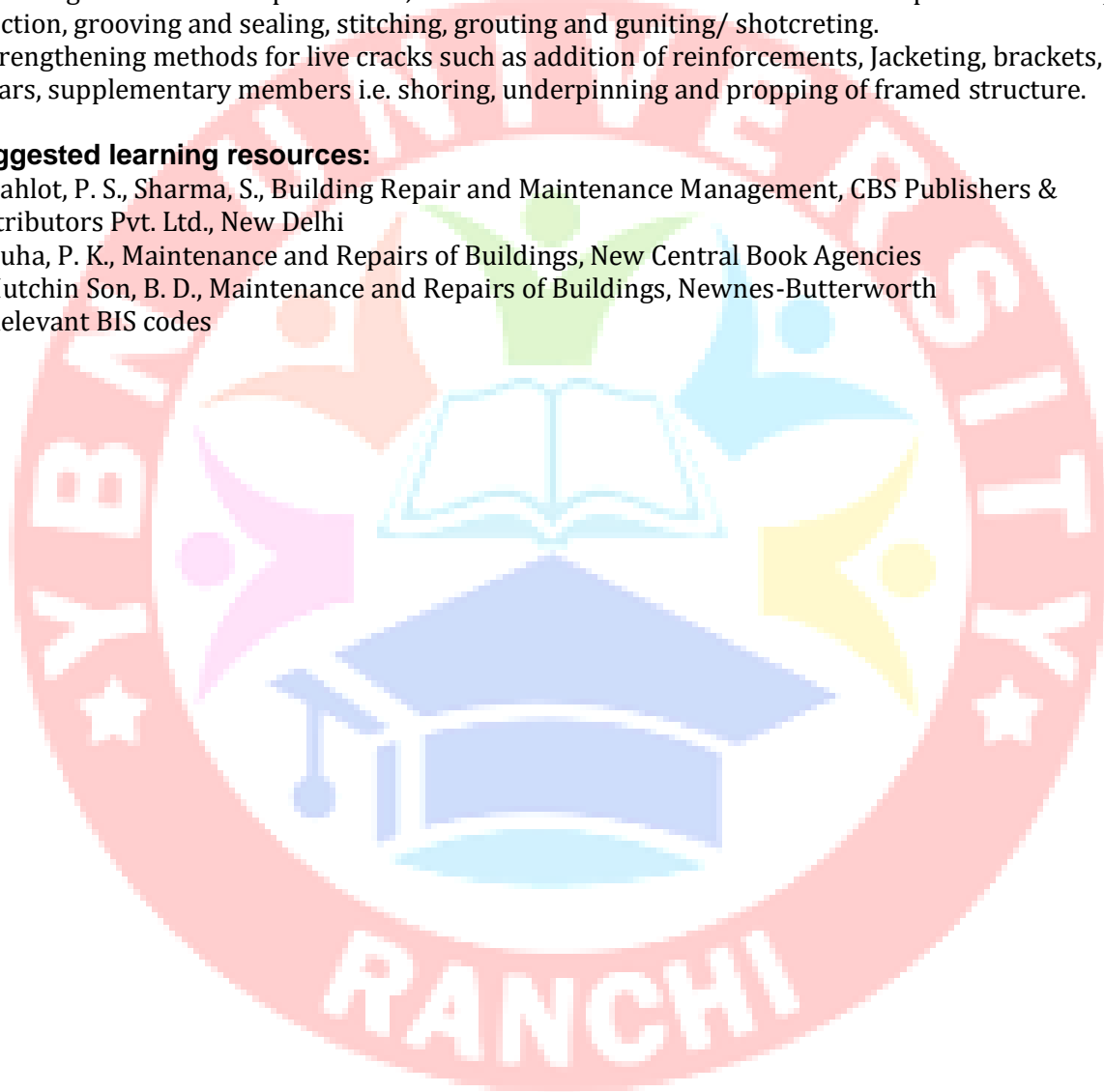
Advanced Design Of Structures(YDCEP02)

Course Objectives:

Following are the objectives of this course:

• To understand the concepts involved in the design of riveted and welded connections.

• To know the provisions of BIS code for design of built up sections.

• To analyze T and L shaped beam sections.

• To understand the concept for design of one way and two way slabs.

• To identify short and long columns and their design provisions.

Course Content:

Unit – I Design of connections in steel structures

• Types of rivets, Riveted connections, Strength of riveted joints, Design of riveted joints for axially loaded members.

• Types of weld, welded connections, Permissible stresses in weld, Strength of weld. Advantages and disadvantages of weld, Design of fillet weld and butt weld for axial load.

• Design of column bases for axially loaded columns only.

Unit– II Steel Beams

• Different steel sections, Simple and built up sections, Permissible bending stresses,

• Design of built up sections (symmetrical I section with cover plates only), check for shear and deflection

• Introduction to plate girder: Components and functions (no numericals)

Unit– III Design of RC flanged beam

☐ General features of T and L beams, Advantages, Effective width as per BIS 456

☐ Design of singly reinforcement T beam, Stress and Strain diagram, Depth of neutral axis, Moment of resistance, T and L beams with neutral axis in flange only.

☐ Simple numericals on location of neutral axis, Effective width of flange.

Unit– IV Design of slab

☐ Design of simply supported one-way slab for flexure, shear and deflection and checks, as per the provisions of BIS 456

☐ Design of one-way cantilever slab, Chajjas, Flexure including checks for Development length and Shear stress.

☐ Design of two-way simply supported slab,

☐ Introduction to design of dog-legged staircases.

Unit– V Design of RCC Column and Footing design: Uni-axial bending

☐ IS 456 provisions, Column with uni-axial moment, Effective length calculations, Minimum eccentricity

☐ Design of footing for axially loaded column only.

Suggested learning resources:

1. Shah, V. L., and Gore, V., Limit State Design of Steel Structures, Structures Publications, Pune.

2. Dayarathnam, P., Design of Steel Structures, S. Chand and Company, New Delhi.

3. Subramanian N., Design of Steel Structures, Oxford University Press.

4. Sairam, K.S., Design of Steel Structures, Pearson Publication, Chennai, Delhi.

5. Shah, V. L., and Karve, S.R., Limit State Theory and Design of Reinforced Concrete Structures, Structures Publications, Pune.

6. Sinha N.C., and Roy S.K., Fundamentals of Reinforced Concrete, S. Chand & Co.,

7. Krishna Raju, and N.Pranesh, R.N., Reinforced Concrete Design Principles and Practice, New Age International, Mumbai.

8. Pillai, S.U., and Menon, Devdas, Reinforced concrete Design, McGraw Hill

Tendering and Accounts(YDCEP03)

Objectives:

Following are the objectives of this course:
- To understand terminologies in contract and tender document and their significance.
- To know different types of contracts and their uses.
- To learn preparation of typical Tender documents for civil engineering work.
- To get acquainted with rent fixation and valuation of civil structures.

Course Content:

Unit – I Procedure to execute the work

Administrative approval, Technical sanction, budget provision, expenditure sanction. Methods for carrying out works- contract method, departmental method -rate list method, piece work method, day's work method, employing labours on daily wages basis.

Unit– II Contracts

- Definition of contract, objects of contract, requirements of contract, overview of Indian Contract Act.
- Types of engineering contract with advantages, disadvantages and their suitability – 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, labour contract, demolition contract, target contract, negotiated contract, Engineering Procurement Construction Contract (EPC), Annuity Contract.
- Introduction of FIDIC Conditions of contract.
- Classification of contractor on basis of financial limits, Requirement of documents for registration of contractor.
- Build Operate Transfer (BOT) Project, BOT Toll contract, BOT (Annuity) contract, Design, Build, Finance, Operate and Transfer (DBFOT) contract, Hybrid Annuity contract, Operate Maintain and Transfer (OMT) contract, Operation & Maintenance contract (Introduction only).

Unit– III Tender and Tender Documents

- Definition of tender, necessity of tender, types of tender- Local, Global, Limited.
- E -Tendering System – Online procedure of submission and opening of bids (Technical and Financial).
- Notice to invite tender (NIT)- Points to be included while drafting tender notice, Drafting of tender notice.
- Procedure of submitting filled tender Documents (Two envelope system), procedure of opening tender, comparative statement, scrutiny of tenders, award of contract, letter of award.
- Meaning of terms - Earnest Money Deposit (EMD), Performance Security Deposit, Validity period, corrigendum to tender notice and its necessity, Unbalanced bid.
- Tender documents – Index, tender notice, general instructions, special instructions, Schedule A, Schedule B, Schedule C etc.

• 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 items, price variation clause(escalation), defect liability Period, liquidated Damages.
• Arbitration- Meaning, Qualification of an arbitrator, Appointment, Dispute and Settlement
of disputes, Arbitration and Conciliation Act, Arbitration award.

Unit– IV Accounts

• Various account forms and their uses – Measurement Books, E- Measurement book (E-MB), Nominal Muster Roll(NMR), Imprest Cash, Indent, Invoice, Bill, Vouchers, Hand receipt Cash Book, Temporary Advance.Heads of Accounts.
• Mode of Payment to the contractor and its necessity -Interim Payment, Advance Payment Secured Advance, Petty advance, Mobilization advance, Running account bill, Final bill, Retention money, E - payment.

Unit– V Introduction to Valuation

• Definition and purpose of Valuation, role of valuer. Definition - Cost, Price and Value, Characteristicsm of Value, Factors Affecting Value.
• Types of Value - Book Value, Scrap Value, Salvage Value, Speculative Value, Distress Value, Market Value, monopoly Value, Sentimental Value.Factors affecting value.
• Depreciation, Obsolescence, Sinking Fund, Methods of Calculation of Depreciation – Straight Line Method, Sinking Fund Method, Constant Percentage Method.
• Fixation of rent, Lease – types of lease, lease hold property and free hold property. Mortgage – Mortgage deed, precautions to be taken while making mortgage.

Suggested learning resources:

1. Datta, B. N., Estimating and Costing in Civil engineering, UBS Publishers Pvt. Ltd., New Delhi
2. Raina, V. K., Construction Management and Contract Practices, Shroff Publishers & Distributers Pvt. Ltd.
3. Rangawala, S. C., Estimating and Costing, Charotar Publishing House PVT. LTD., Gujrat
4. Birdie, G. S., Estimating and Costing, Dhanpat Rai Publishing Company(P) Ltd., New Delhi
5. Patil, B. S., Civil Engineering Contracts and Estimates, Orient Longman, Mumbai
6. Chakraborti, M., Estimating and Costing, Specification and Valuation in Civil Engineering, Monojit Chakraborti, Kolkata.

Course outcomes:

After completing this course, student will be able to:
• Understand various types of contract and when they are used
• Suggest the relevant type of contract for the given civil engineering work.
• Prepare the typical Tender document for the given civil engineering work.
• Decide type of payment for the executed work.
• Justify the rent fixation and valuation of given civil structure.

Trafic Engineering(YDCEP04)

Objectives:

Following are the objectives of this course:
• To understand the issues involved in traffic flow.
• To know and understand the tools for traffic studies.
• To delineate various traffic control measures.
• To understand measures for preventing accidents.

Content:

Unit – I Fundamentals of Traffic Engineering.
• Traffic engineering- Definition, objects, scope
• Relationship between speed, volume and density of traffic
• Road user's characteristics-physical, mental, emotional factors.
• Vehicular characteristics-width, length, height, weight, speed, efficiency of breaks.
• Road characteristics - gradient, curve of a road, design speed, friction between road and tyre surface.
• Reaction time - factors affecting reaction time. PIEV Theory.

Unit– II Traffic Studies
• Traffic volume count data- representation and analysis of data.
• Necessity of Origin and Destination study and its methods.
• Speed studies - Spot speed studies, and its presentation.
• Need and method of parking study.

Unit– III Road Signs and Traffic Markings
• Traffic control devices –definition, necessity, types.
• Road signs - definition, objects of road signs.
• Classification as per IRC: 67-Mandatory or Regulatory, Cautionary or warning, informatory signs, Location of cautionary or warning sign in urban and non-urban areas, Points to be considered while designing and erecting road signs.
• Traffic markings- definition, classification, carriage way, kerb, object marking and reflector markers.

Unit– IV Traffic Signals and Traffic Islands
• Traffic signals- Definition, Types, Traffic control signals, pedestrian signals.
• Types of traffic control signals - Fixed time, manually operated, traffic actuated signals and location of signals.
• Compute signal time by fix time cycle, Webster's and IRC method and sketch timing diagram for each phase.
• Traffic islands –Definition, advantages and disadvantages of providing islands.
• Types of traffic islands - rotary or central, channelizing or Refuge Island.
• Road intersections or junctions - Definition, Types of road intersection.
• Intersection at grade- Types, basic requirements of good intersection at grade.
• Grade separated intersection- advantages and disadvantages, types - flyovers-partial and full Cloverleaf pattern, Diamond intersection, Trumpet type, underpass.

Unit– V Road Accident Studies and Arboriculture
• Road Accidents-Definition, types and causes for collision and non-collision accidents.
• Measures to prevent road accidents.
• Collision and condition diagram.
• Street lighting –definition, necessity, types-luminaire, foot candle, lumen, factors affecting their utilization and maintenance.
• Arboriculture- definition, objectives, factors affecting selection of type of trees.
• Maintenance of trees-protection and care of road side trees.

Suggested learning resources:
1. Khanna S.K., Justo, C E G and Veeraragavan, A., Highway Engineering, Nem Chand and Brothers, Roorkee.
2. Kadiyali L.R., Transportation Engineering, Khanna Book Publishing Co., Delhi
3. Vazirani, V N , Chaondola, S P, Transportation Engineering Vol. I & II, Khanna Publishers. Delhi.
4. Saxena, S C, Traffic planning and design, Dhanpat Rai & Sons Delhi.
5. Kumar R S, Introduction to Traffic Engineering, University Press (India), Pvt. Ltd.
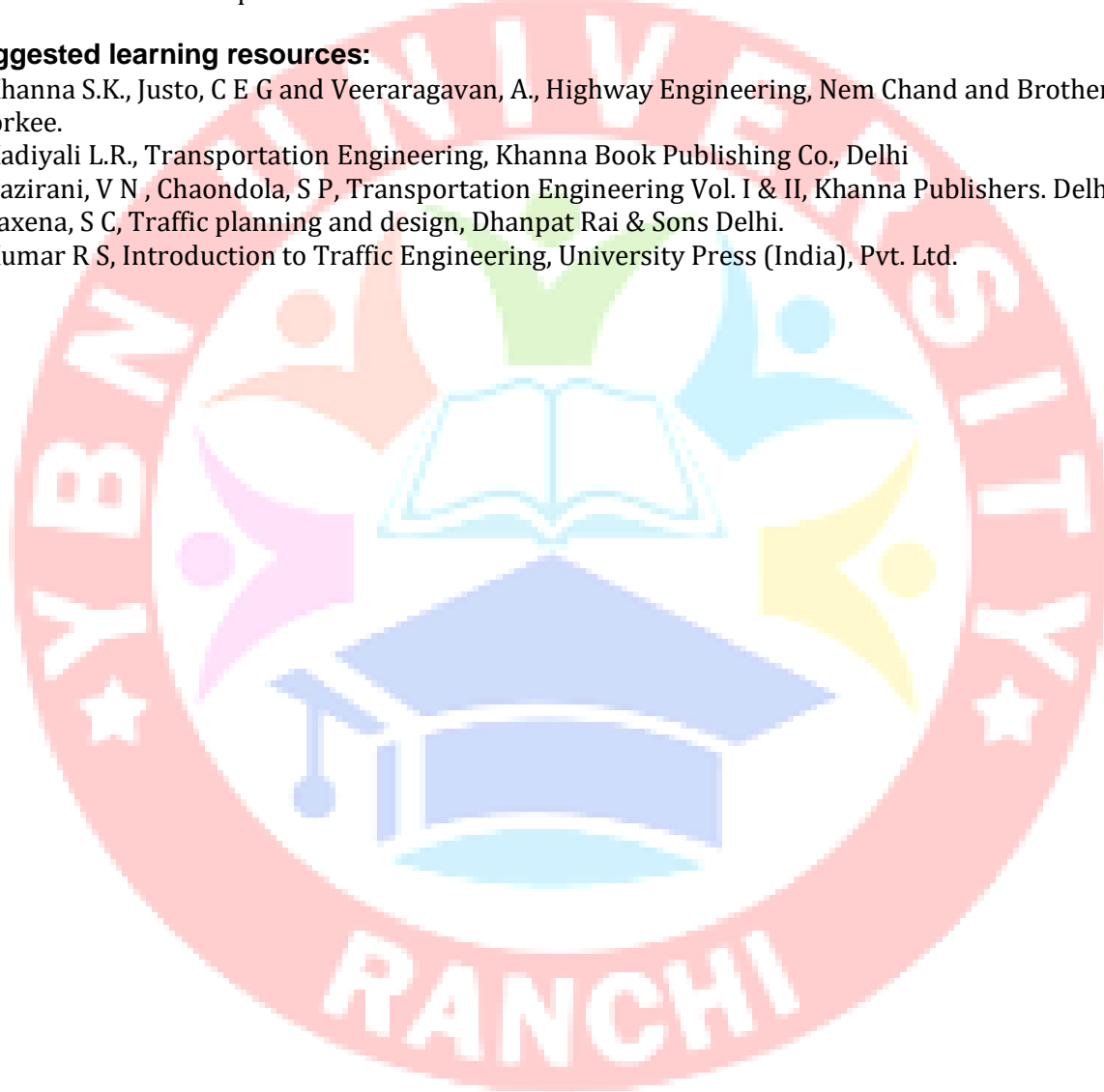
Solid Waste Management(YDCEP05)

Objectives:

Following are the objectives of this course:

• To know various sources of solid.

• To learn techniques of collection and transportation of solid waste.

• To know various methods of disposal of solid waste.

• To understand and identify different biomedical and E-waste and their subsequent disposal techniques.

Content:

Unit – I Introduction

• Definition of solid waste, different solid waste – domestic Waste, commercial waste, industrial waste, market waste, agricultural waste, biomedical waste, E-waste, hazardous waste, institutional waste, etc.

• Sources of solid waste, Classification of solid waste – hazardous and non- hazardous waste.

• Physical and chemical characteristics of municipal solid waste.

Unit– II Storage, Collection and Transportation of Municipal Solid Waste

• Collection, segregation, storage and transportation of solid waste.

• Tools and Equipment-Litter Bin, Broom, Shovels, Handcarts, Mechanical road sweepers, Community bin - like movable and stationary bin.

• Transportation vehicles with their working capacity -Animal carts, Auto vehicles, Tractors or Trailers, Trucks, Dumpers, Compactor vehicles. Transfer station- meaning, necessity, location.

• Role of rag pickers and their utility for society.

Unit– III Composting of Solid Waste

• Concept of composting of waste, Principles of composting process. Factors affecting the composting process.

• Methods of composting – Manual Composting – Bangalore method, Indore Method, Mechanical Composting – Dano Process, Vermi composting.

Unit IV Techniques for Disposal of Solid Waste

• Solid waste management techniques – solid waste management hierarchy, waste prevention and waste reduction techniques

• Land filling technique, Factors to be considered for site selection, Land filling methods-Area method, Trench method and Ramp method, Leachate and its control, Biogas from landfill, Advantages and disadvantages of landfill method, Recycling of municipal solid waste

• Incineration of waste: Introduction of incineration process, Types of incinerators - Flash, Multiple chamber Incinerators, Products of incineration process with their use, Pyrolysis of waste – Definition, Methods

Unit– V Biomedical and E-waste management

• Definition of Bio medical Waste.

• Sources and generation of Biomedical Waste and its classification

• Bio medical waste Management technologies.

• Definition, varieties and ill effects of E- waste,

• Recycling and disposal of E- waste.

Suggested learning resources:

1. Gupta O.P, Elements of Solid Hazardous Waste Management, Khanna Book Publishing Co., Delhi Ed. 2018
2. Bhide, A. D., Solid Waste Management, Indian National Scientific Documentation Centre, New Delhi.
3. George Techobanoglous, Kreith, Frank., Solid Waste, McGraw Hill Publication, New Delhi.
4. Sasikumar, K., Solid Waste Management, PHI learning, Delhi.
5. Hosetti, B.B., Prospect and Perspectives of Solid Waste Management, New Age International Publisher.

Advanced Construction Technology(YDCEP06)

Objectives:

Following are the objectives of this course:

• To gain knowledge on different materials in advanced construction

• To know different methods in concreting.

• To know the relevance of advanced construction methods for particular site condition.

• To identify the requisite hoisting and conveying machinery for the given situation.

Content:

Unit – I Advanced Construction Materials

• Fibres: Use and properties of steel, polypropylene, carbon and glass fibres.

• Plastics: Use and properties of PVC, RPVC, HDPE, FRP, GRP.

• Miscellaneous Materials: Properties and uses of acoustics materials, wall claddings, plaster boards, micro-silica, waterproofing materials, adhesives.

• Use of waste products and industrial by products in bricks, blocks, concrete and mortar.

Unit– II Advanced Concreting Methods and Equipments

• Ready Mix Concrete: Necessity and use of ready mix concrete. Products and equipments for ready mix concrete plant. Conveying of ready mix concrete, transit mixers.

• Vibrators for concrete consolidation: Internal, needle, surface, platform and form vibrators.

• Underwater Concreting: Procedure and equipments required for Tremie method, Drop bucket method. Properties, workability and water cement ratio of the concrete.

• Special concrete: procedure and uses of special concretes: Roller compacted concrete, Self-compacting concrete (SCC), Steel fibre reinforced concrete, Foam concrete, shotcreting.

Unit– III Advanced Technology in Constructions

• Construction of bridges and flyovers: Equipments and machineries required for foundation and super structure.

• Construction of multi-storeyed Building: Equipments and machinery required for construction of multi-storeyed building such as use of lifts, belt conveyers, pumping of concrete.

• Prefabricated construction: Methods of prefabrication, Plant fabrication and site fabrication, All prefabricated building elements such as wall panels, slab panels, beams, columns, door and window frames etc. Equipments and machineries used for placing and Jointing of prefabricated elements.

• Strengthening of embankments by soil reinforcing techniques using geo-synthetics

Unit– IV Hoisting and Conveying Equipments

• Hoisting Equipments: Principles and working of Derrick-Pole, Gin Pole, Crane, Power driven scotch derrick crane, Hand operated crane, Locomotive crane, Tower crane, Lattice Girder, Winches, Elevators, ladders. Crawler cranes, Truck mounted cranes, Gantry cranes, Mast cranes.

• Conveying Equipments: Working of belt conveyers, types of belts and conveying mechanism. Capacity and use of dumpers, tractors and trucks.

Unit– V Miscellaneous Machineries and Equipments

• Excavation Equipments: Use, working and output of following machinery – bull dozers, scrapers, graders, Clam Shell, trenching equipment, Tunnel boring machine, Wheel mounted belt loaders, power shovels, JCB, and drag lines.

• Compacting Equipments: Output of different types of rollers such as plain rollers, ship footed rollers, vibratory, pneumatic rollers rammers.

• Miscellaneous Equipments: Working and selection of equipments: Pile driving equipments, Pile hammers, Hot mix bitumen plant, bitumen paver, grouting equipment, guniting equipments, floor polishing and cutting machine selection of drilling pattern for blasting, Bentonite/ mud slurry in drilling, Explosives for blasting, Dynamite, process of using explosives.

Suggested learning resources:

1. Sharma S C and Deodhar S V, Construction Engineering and Management, Khanna Book Publishing, New Delhi

2. Chudly, R., Construction Technology Vol. I to II, ELBS-Longman Group.

3. Peurifoy, R. L., Construction Planning Equipment and Methods, McGraw Hill Co. Ltd. New York.

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4. Seetharaman, S., Construction Engineering and Management, Umesh Publication, New Delhi.

5. Sengupta, B. and Guha., Construction Management and Planning, McGraw Hill Education, New Delhi.

6. Smith, R. C., Materials of Construction, McGraw Hill Co. Ltd.

7. Satyanarayana, R Saxena, S. C., Construction Planning and Equipment, Standard Publication, New Delhi.

8. Rangawala,S. C., Construction of Structures and Management of works, Charotar Publication, Anand.

9. Ghose,D. N., Materials of Construction, McGraw Hill Publishing Co, New Delhi.
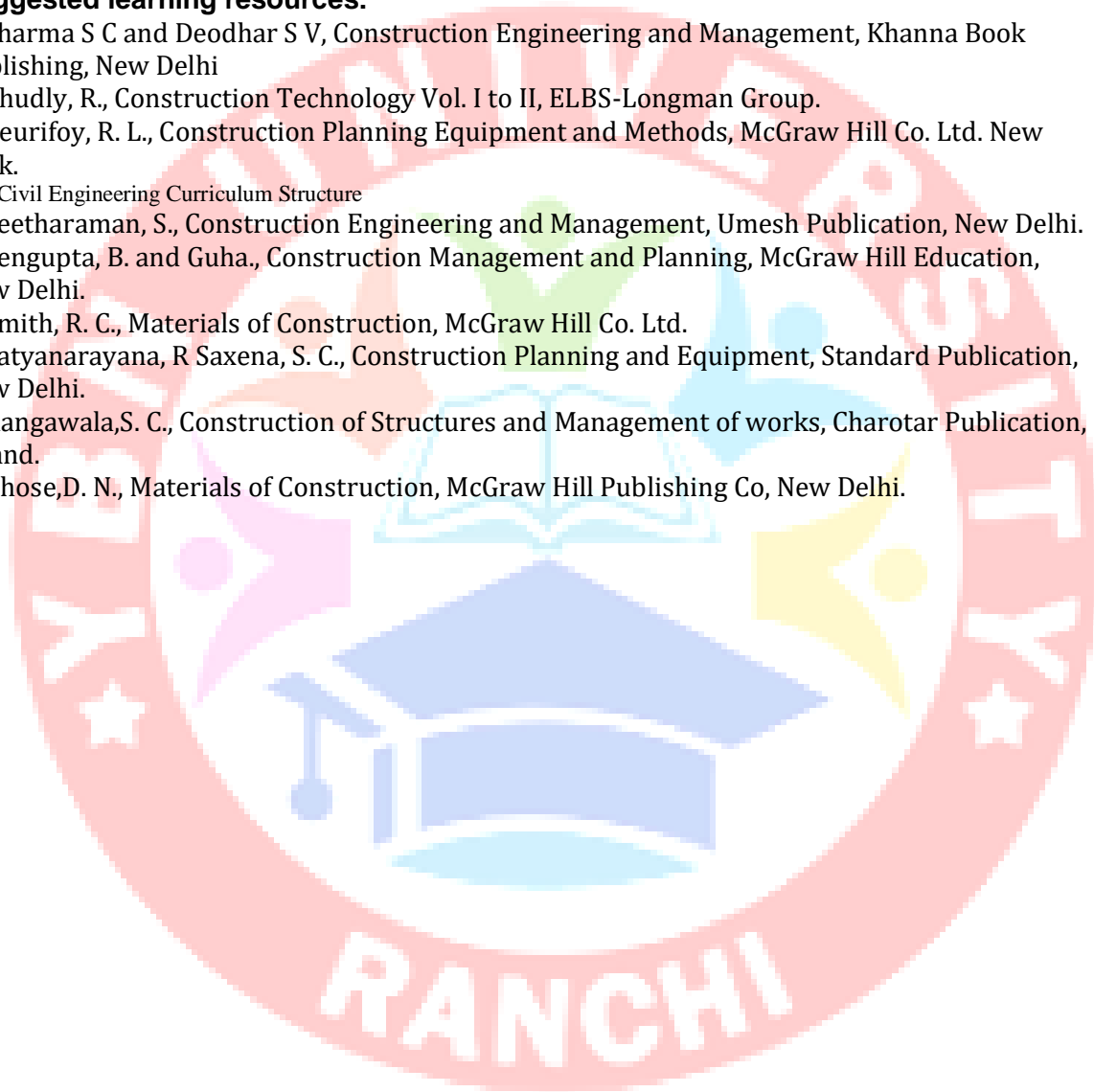
Pavement Design and Maintenance(YDCEP07)

Objectives:

Following are the objectives of this course:

• To know types of pavements and their uses.

• To learn issues in design of flexible and rigid pavements.

• To understand methods of pavement evaluation.

• To learn pavement maintenance methods.

Content:

Unit – I Basics of pavement Design

• Types of pavement - Flexible, Rigid and Semi Rigid

• Comparison of Rigid and flexible pavement according to Design precision, life maintenance, initial cost, stages of construction, availability of materials, surface characteristic, penetration of water in the pavement, utility location, glare and night visibility.

• Functions and characteristics of pavement.

• Factors affecting selection of type of pavement.

Unit– II Fundamentals of pavement design

• Factors affecting pavement design-design wheel load ,Traffic factors, Environmental factors, Road geometry and material, Characteristics of soil and Drainage situation.

Unit– III Design overview of Flexible and Concrete pavement

• Methods of flexible pavement design-Theoretical method, Empirical method with and without soil strength test.

• IRC37 guidelines for design of flexible pavement (overview only)

• Factors affecting design of concrete pavement.

• IRC58 guidelines for design of concrete pavement (overview only)

• Joints-Need, Types, requirements, spacing of joints

Unit– IV Pavement evaluation

• Definition and purpose of pavement evaluation

• Methods of Pavement evaluation –Visual rating, Pavement serviceability index, Roughness measurements, Benkelman Beam deflection method

Unit V - Pavement Maintenance

• Types of pavement maintenance - routine, periodic, and special. Need for inspection and maintenance schedule. Causes of pavement failure and remedial measures. Typical flexible and rigid pavement failures

• Types and causes of damages in flexible pavement, surface defects, cracks. Deformations - Rutting, fatigue, settlement and upheaval. Disintegration- loss of aggregate, stripping, pothole. Remedial measures - slurry seal, liquid seal, fog seal, patching, ready mix patch.

• Types of damages to rigid pavement - cracking, spalling, slab rocking, settlement, joint sealant failure. Methods of repair - repair of spalled joints, full depth reconstruction, replacement of dowel bars.

Suggested learning resources

1. Kadiyali, L.R., Highway Engineering, Khanna Book Publishing House, New Delhi (ISBN: 978-93-86173-133)
2. Chakroborty, Partha Das, Animesh., Principles of Transportation engineering, Prentice-Hall of India Pvt.Ltd
3. Vazirani, V N, Chaondola, S P., Transportation Engineering Vol. I & II, Khanna Publishers. Delhi
4. Yoder, E J, Principles of Pavement Design, Wiley India Pvt Ltd.
5. Bindra, S P., Highway Engineering, Dhanpat Rai Publications (P) Ltd
6. Kumar R S, Pavement Evaluation and Maintenance Management system, University Press (India), Pvt. Ltd.
7. Sharma S K, Principles, Practice and Design of Highway Engineering, S Chand, New Delhi.
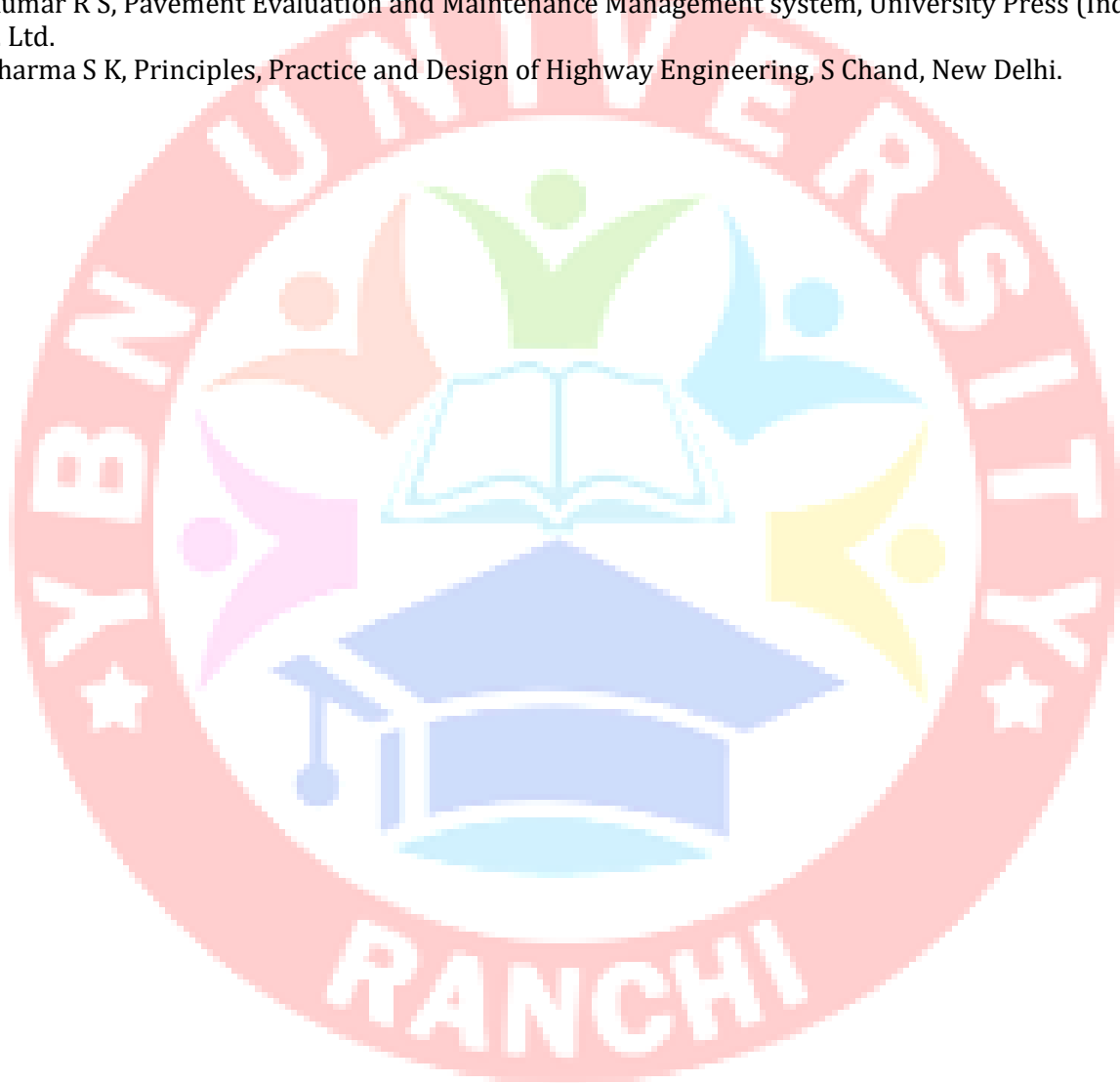
Green Building and Energy Conservation(YDCEP08)

Objectives:

Following are the objectives of this course:

• To know various aspects of green buildings

• To use different steps involved in measuring environmental impact assessment.

• To relate the construction of green building with prevailing energy conservation policy and regulations.

• To know and identify different green building construction materials.

• To learn different rating systems and their criteria.

Course Content:

Unit I : Introduction to Green Building and Design Features

• Definition of Green Building, Benefits of Green building, Components/features of Green Building, Site selection, Energy Efficiency, Water efficiency, Material Efficiency, Indoor Air Quality.

• Site selection strategies, Landscaping, building form, orientation, building envelope and fenestration, material and construction techniques, roofs, walls, fenestration and shaded finishes, advanced passive heating and cooling techniques, waste reduction during construction

Unit–II Energy Audit and Environmental Impact Assessment (EIA)

• Energy AudiT: Meaning, Necessity, Procedures, Types, Energy Management Programs

• Environmental Impact Assessment(EIA): Introduction, EIA regulations, Steps in environmental impact assessment process, Benefits of EIA, Limitations of EIA, Environmental clearance for the civil engineering projects.

Unit– III Energy and Energy conservation

• Renewable Energy Resources: Solar Energy, Wind Energy, Ocean Energy, Hydro Energy, Biomass Energy

• Non-renewable Energy Resources: Coal, Petroleum, Natural Gas, Nuclear Energy, Chemical Sources of Energy, Fuel Cells, Hydrogen, Biofuels.

• Energy conservation: Introduction, Specific objectives, present scenario, Need of energy conservation, LEED India Rating System and Energy Efficiency.

Unit– IV Green Building

• Introduction: Definition of Green building, Benefits of Green building,

• Principles: Principles and planning of Green building

• Features: Salient features of Green Building, Environmental design (ED) strategies for building construction.

• Process: Improvement in environmental quality in civil structure

• Materials: Green building materials and products- Bamboo, Rice husk ash concrete, plastic bricks, Bagasse particle board, Insulated concrete forms. reuse of waste material-Plastic, rubber, Newspaper wood, Nontoxic paint, Green roofing

Unit V Rating System

• Introduction to (LEED) criteria,

• Indian Green Building council (IGBC) Green rating,

• Green Rating for Integrated Habitat Assessment. (GRIHA) criteria

• Heating Ventilation Air Conditioning (HVAC) unit in green Building
• Functions of Government organization working for Energy conservation and Audit(ECA)-
• National Productivity council(NPC)
• Ministry of New and Renewable *Energy* (MNRE)
• Bureau of Energy efficiency (BEE)

Suggested learning resources:

1. Kibert, C.J., Sustainable construction: Green Building design and Delivery, John Wiley Hobo�-ken, New Jersey.
2. Chauhan, D S Sreevasthava, S K., Non-conventional Energy Resources, New Age International Publishers, New Delhi.
3. O.P. Gupta, Energy Technology, Khanna Publishing House, New Delhi
4. Jagadeesh, K S, Reddy Venkatta Rama & Nanjunda Rao, K S., Alternative Building Materials and Technologies, New Age International Publishers, Delhi.
5. Sam Kubba., Handbook of Green Building Design and Construction, Butterworth-Heinemann.
6. Means R S, Green Building - Project Planning and Cost Estimating, John Wiley & Sons
7. Sharma K V, Venkataseshaiah P., Energy Management and Conservation, IK International.
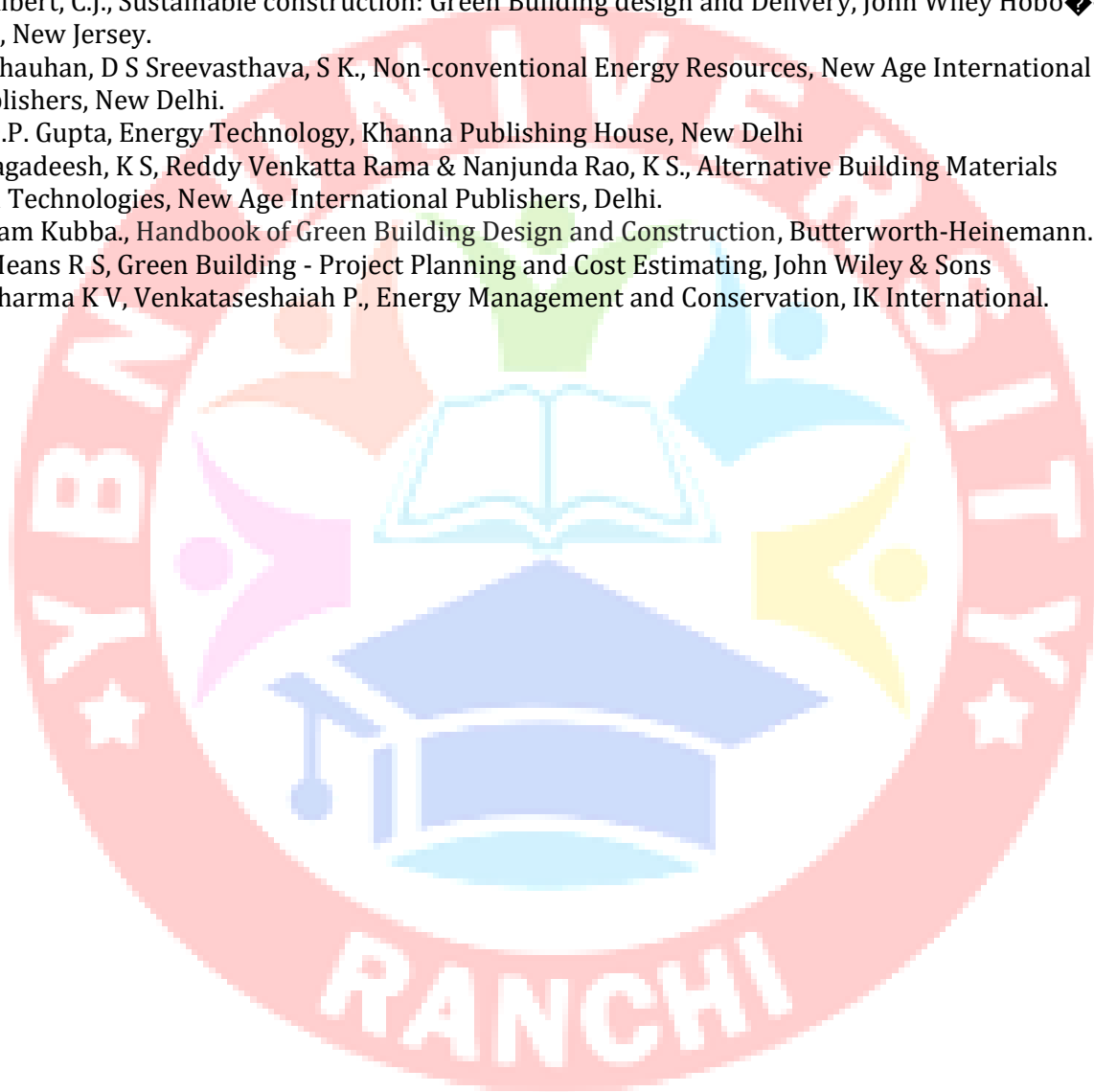
Building Services Maintenance(YDCEP09)

Objectives:
Following are the objectives of this course:
• To know the procedure for classifying various types of building services.
• To know the fire safety requirements for multi-storeyed building.
• To devise suitable plumbing system for given type of building.
• To understand the procedure for rain water harvesting and solar water heater.
• To know the system for designing lighting, ventilation and acoustics for any building.

Course Content:
Unit – I Overview of Building Services
☐ Introduction to building services, Classification of buildings as per National Building code, Necessity of building services, Functional requirements of building, Different types of building services i.e. HVAC (Heat, Ventilation and Air Conditioning), Escalators and lifts, fire safety, protection and control, plumbing services, rain water harvesting, solar water heating system, lighting, acoustics, sound insulation and electric installation etc.
☐ Role and responsibility of Building Service Engineer, Introduction to BMS (Building Management Services), Role of BMS, concept of smart building.

Unit– II Modes of vertical communication
• Objectives and modes of vertical communication in building.
• Lifts**:** Different types of lifts and its uses, Component parts of Lift- Lift Well, Travel, Pit, Hoist Way, Machine, Buffer, Door Locks, Suspended Rope, Lift Car, Landing Door, Call Indicators, Call Push etc., Design provisions for basic size calculation of space enclosure to accommodate lift services, Safety measures.
• Escalators**:** Different Types of Escalators and its Uses, Components of escalators, Design provisions for basic size calculation of space enclosure to accommodate escalator services, Safety measures.
• Ramp: Necessity, design consideration, gradient calculation, layout and Special features required for physically handicapped and elderly.

Unit– III Fire Safety
• Fire protection requirements for multi-storeyed building, causes of fire in building, Fire detecting and various extinguishing systems, Working principles of various fire protection systems.
• Safety against fire in residential and public buildings (multi-storeyed building), National Building Code provision for fire safety, Fire resisting materials and their properties, Fire resistant construction, procedures for carrying out fire safety inspections of existing buildings, Provisions for evacuation.

Unit– IV Plumbing Services
• Importance of plumbing, AHJ (Authority Having Jurisdiction) approval, Plumbing Terminology and fixtures: Terms used in plumbing, Different types of plumbing fixtures, shapes/ sizes, capacities, situation and usage, Traps, Interceptors.
• System of plumbing for building water supply: storage of water, hot and cold water supply system.
• System of plumbing for building drainage: Types of drainage system such as two pipe system, one pipe system, types of Vents and purpose of venting, Concept of grey water and reclaimed water.

• Different pipe materials, and jointing methods, fittings, hanger, supports and valves used in plumbing and their suitability.

Unit– V Lighting, Ventilation and Acoustics

• Concept of SWH (Solar water heating), component parts of SWH, various system of SWH (heat transfer, propulsion, passive direct system, active direct system, Do-it-yourself), installation and maintenance.

• Concept of lighting, types of lighting (natural and artificial), factors influencing the brightness of room, factors affecting selection of artificial lighting, installation of light (direct, half-direct, indirect, half-indirect and direct-indirect), types of light control (manual switch, remote switch, timer switch and photo-electric cell switch), types of

• lamps (incandescent, tungsten halogen and electric discharge), Lamp selection as per room sizes.

• Concept of ventilation, necessity and Types of ventilation.

• Building Acoustic, Objectives, acoustic Control in a building, acoustic material (porous absorber and cavity resonator)

Suggested learning resources:

1. Patil, S. M., Building Services, Seema Publication, Mumbai.
2. Mantri and Sandeep., The A to Z of Practical Building Construction and its Management, Satya Prakashan, New Delhi**.**
3. Bag S P, Fire Services in India: History, Detection, Protection, Management, Mittal Publications, New Delhi.
4. Deolalikar,S. G., Plumbing Design and Practice, McGraw-Hill,
5. Akhil Kumar Das., Principles of Fire Safety Engineering: Understanding Fire and Fire Protection, PHI Learning Pvt. Ltd, New Delhi.
6. Shraman N L, Solar panel installation guide & user manual**,** The Memory Guru of India.
7. Gupta M K, Practical handbook on building maintenance - Civil works, Nabhi Publications.
8. BIS., National Building Code Part1, 4, 8, 9., Bureau of Indian Standard, New Delhi
9. BIS., IS 12183(Part 1):1987 Code of practice for plumbing in multistoried buildings., Bureau of Indian Standard, New Delhi
10. BIS., 2008 Uniform plumbing code – India (UPC-I)., Bureau of Indian Standard

COMMON COURSES TO ALL BRANCHES
(From III to VI Semesters)
Entrepreneurship and start-ups(YDHS302)

Course Learning Objectives:
1. Acquiring Entrepreneurial spirit and resourcefulness.
2. Familiarization with various uses of human resource for earning dignified means of living.
3. Understanding the concept and process of entrepreneurship - its contribution and role in the growth and development of individual and the nation.
4. Acquiring entrepreneurial quality, competency, and motivation.
5. Learning the process and skills of creation and management of entrepreneurial venture.

Course Content:
Unit 1 - Introduction to Entrepreneurship and Start – Ups
• Definitions, Traits of an entrepreneur, Intrapreneurship, Motivation
• Types of Business Structures, Similarities/differences between entrepreneurs and managers.

Unit 2 – Business Ideas and their implementation
• Discovering ideas and visualizing the business
• Activity map
• Business Plan

Unit 3 – Idea to Start-up
• Market Analysis – Identifying the target market,
• Competition evaluation and Strategy Development,
• Marketing and accounting,
• Risk analysis

Unit 4 – Management
• Company's Organization Structure,
• Recruitment and management of talent.
• Financial organization and management

Unit 5 - Financing and Protection of Ideas
• Financing methods available for start-ups in India
• Communication of Ideas to potential investors – Investor Pitch
• Patenting and Licenses

Unit 6: Exit strategies for entrepreneurs, bankruptcy, and succession and harvesting strategy

SUGGESTED LEARNING RESOURCES:

S. No.	Title of Book	Author	Publication
1.	The Startup Owner's Manual: The Step-by-Step Guide for Building a Great Company	Steve Blank and Bob Dorf	K & S Ranch ISBN – 978-0984999392
2.	The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses	Eric Ries	Penguin UK ISBN – 978-0670921607
3.	Demand: Creating What People Love Before They Know They Want It	Adrian J. Slywotzky with Karl Weber	Headline Book Publishing ISBN – 978-0755388974
4.	The Innovator's Dilemma: The Revolutionary Book That Will Change the Way You Do Business	Clayton M. Christensen	Harvard business ISBN: 978-142219602

SUGGESTED SOFTWARE/LEARNING WEBSITES:
a. https://www.fundable.com/learn/resources/guides/startup
b. https://corporatefinanceinstitute.com/resources/knowledge/finance/corporatestructure/
c. https://www.finder.com/small-business-finance-tips
d. https://www.profitbooks.net/funding-options-to-raise-startup-capital-for-your-business/

OPEN ELECTIVE COURSES (OE)

S. No.	Code No.	Course Title	Hours per week			Semester	Credits
			L	T	P		
1	**OE###	Economic Policies in India	3	0	0	V / VI	3
2	**OE###	Artificial Intelligence & Machine Learning	3	0	0	V / VI	3
3	**OE###	Soft Computing Techniques	3	0	0	V / VI	3
4	**OE###	Project Management	3	0	0	V / VI	3
5	**OE###	Renewable Energy Technologies	3	0	0	V / VI	3
6	**OE###	Energy Conservation & Audit	3	0	0	V / VI	3
7	**OE###	Product Design	3	0	0	V / VI	3
8	**OE###	Engineering Economics & Accountancy	3	0	0	V / VI	3
9	**OE###	Operations Research	3	0	0	V / VI	3
10	**OE###	Renewable Energy Technologies	3	0	0	V / VI	3
11	**OE###	Energy Efficiency and Audit	3	0	0	V / VI	3
12	**OE###	Web Designing and Multimedia Technology (*)	3	0	0	V / VI	3
13	**OE###	History of Science and Engineering (*)	3	0	0	V / VI	3
14	**OE###	Internet of Things	3	0	0	V / VI	3
15	**OE###	Professional Orientation (*)	3	0	0	V / VI	3
16	**OE###	Disaster Management	3	0	0	V / VI	3
17	**OE###	Sustainable Development (*)	3	0	0	V / VI	3
18	**OE###	Smart Systems (*)	3	0	0	V / VI	3
19	**OE###	Robotics (*)	3	0	0	V / VI	3
20	**OE###	Introduction to E-Governance (*)	3	0	0	V / VI	3
21	**OE###	Cyber Security Laws, Standards and IPR (*)	3	0	0	V / VI	3
22	**OE###	Organic and Natural Farming Practices (*)	3	0	0	V / VI	3
23	**OE###	Classical Text Reading (*)	3	0	0	V / VI	3
24	**OE###	3-D Printing (*)	3	0	0	V / VI	3
25	**OE###	Virtual Reality (*)	3	0	0	V/ VI	3
26	**OE###	Mechatronics	3	0	0	V/VI	3
27	**OE###	Artificial Intelligence	3	0	0	V/VI	3

Economics Policies in India(YDOE01)

Course Learning Objectives:
The objective of this course is to familiarize the students of different streams with the basic concepts, structure, problems and issues concerning Indian economy.

Course Content:

UNIT-I: Basic features and problems of Indian Economy: Economic History of India; Nature of Indian Economy, demographic features and Human Development Index, Problems of Poverty, Unemployment, Inflation, income inequality, Black money in India.

UNIT-II: Sectoral composition of Indian Economy: Issues in Agriculture sector in India, land reforms Green Revolution and agriculture policies of India,

UNIT-III: Industrial development, small scale and cottage industries, industrial Policy, Public sector in India, service sector in India.

UNIT-IV: Economic Policies: Economic Planning in India, Planning commission v/s NITI Aayog, Five Year Plans, monetary policy in India, Fiscal Policy in India, Centre state Finance Relations, Finance commission in India. LPG policy in India

UNIT-V: External sector in India: - India's foreign trade value composition and direction, India Balance of payment since 1991, FDI in India, Impact of Globalization on Indian Economy, WTO and India.

Reference Books:

1. Dutt Rudder and K.P.M Sunderam (2017). Indian Economy. S Chand & Co. Ltd. New Delhi.
2. Mishra S.K & V.K Puri (2017). Indian Economy and –Its Development Experience. Himalaya Publishing House.
3. Singh, Ramesh, (2016): Indian Economy, Tata-McGraw Hill Publications, New Delhi.
4. Dhingra, I.C., (2017): March of the Indian Economy, Heed Publications Pvt. Ltd.
5. Karam Singh Gill, (1978): Evolution of the Indian Economy, NCERT, New Delhi
6. Kaushik Basu (2007): The Oxford Companion to Economics of India, Oxford University Press.

Artifical Intelligence & Machine Learning(YDOE02)

Course Learning Objectives:
Have a thorough understanding of classical and modern AI applications. Be able to implement a wide range of AI concepts using Prolog. Understand non-classical AI approaches such as genetic algorithms and neural networks. Be able to assess the potential of AI in research and real-world environments.

Course Content:
UNIT-I: Introduction: History and foundations of AI, Problem solving: Uninformed and informed Search; Constraint Satisfaction Problems and Constrained Optimization problems (complete and incomplete techniques).

UNIT-II: Adversarial Search: Two players games, games with uncertainty; Decision support systems and technologies; Knowledge representation, Reasoning, Expert systems Contents (2/2), Planning (basics).

UNIT-III: Machine learning Basics: Decision trees, Ensemble learning, Reinforcement learning, Evolutionary computation, Neural networks, Problems, data, and tools; Visualization;

UNIT-IV: Linear regression; SSE; gradient descent; closed form; normal equations; features, Over fitting and complexity; training, validation, test data, and introduction to Matlab.
UNIT-V: Classification problems; Decision boundaries; Probability and classification, Bayes optimal decisions, Naive Bayes and Gaussian class-conditional distribution.

References:
1. Russell, Norvig, Artificial intelligence: A modern approach, 2nd edition. Pearson/Prentice Hall.
2. M.C. Trivedi, A classical approach to Artificial Intelligence, Khanna Publishing House, New Delhi (2018)
3. V.K. Jain, Machine Learning, Khanna Publishing House, New Delhi (2018)
4. Ethem Alpaydin, Introduction to Machine Learning, Second Edition, http://mitpress.mit.edu/catalog/item/default.asp?ttype=2&tid=12012.

Soft Computing Techniques(YDOE03)

Course Learning Objectives:

☐ To learn Fuzzy logic and its applications.

☐ To learn artificial neural networks and its applications.

☐ To solving single-objective optimization problems using GAs.

☐ To solving multi-objective optimization problems using Evolutionary algorithms (MOEAs).

☐ Applications of soft computing to solve problems in varieties of application domains.

Course Content:

UNIT-I: Problem Solving Methods and Tools: Problem Space, Problem solving, State space, Algorithm's performance and complexity, Search Algorithms, Depth first search method, Breadth first search methods their comparison, A*, AO*, Branch and Bound search techniques, p type, Np complete and Np Hard problems.

UNIT-II: Evolutionary Computing Methods: Principles of Evolutionary Processes and genetics, A history of Evolutionary computation and introduction to evolutionary algorithms, Genetic algorithms, Evolutionary strategy, Evolutionary programming, Genetic programming.

Genetic Algorithm and Genetic Programming: Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators, Mutation, Generational Cycle, applications.

UNIT-III: Swarm Optimization: Introduction to Swarm intelligence, Ant colony optimization (ACO), Particle swarm optimization (PSO), Artificial Bee colony algorithm (ABC), Other variants of swarm intelligence algorithms.

UNIT-IV: Advances in Soft Computing Tools: Fuzzy Logic, Theory and applications, Fuzzy Neural networks, Pattern Recognition, Differential Evolution, Data Mining Concepts, Applications of above algorithms in manufacturing engineering problems.

Artificial Neural Networks: Neuron, Nerve structure and synapse, Artificial Neuron and its model, activation functions, Neural network architecture: single layer and multilayer feed forward networks, recurrent networks. Back propagation algorithm, factors affecting back propagation training, applications

UNIT-V: Application of Soft Computing to Mechanical Engineering/Production Engineering

Problems: Application to Inventory control, Scheduling problems, Production, Distribution, Routing, Transportation, Assignment problems

Reference Books:

1. Tettamanzi Andrea, Tomassini and Marco, Soft Computing Integrating Evolutionary, Neural and Fuzzy Systems, Springer, 2001.
2. Elaine Rich, Artificial Intelligence, McGraw Hill, 2/e, 1990.
3. Kalyanmoy Deb, Multi-objective Optimization using Evolutionary Algorithms, John Wiley and Sons, 2001.
At the end of the course, the student will be able to:

Project Management(YDOE04)

Course Learning Objectives:
☐ To develop the idea of project plan, from defining and confirming the project goals and objectives, identifying tasks and how goals will be achieved.
☐ To develop an understanding of key project management skills and strategies.

Course Content:

UNIT-I: Concept of a project: Classification of projects- importance of project management- The project life cycle- establishing project priorities (scope-cost-time)project priority matrix- work break down structure.

UNIT-II: Capital budgeting process: Planning- Analysis-Selection-Financing-Implementation-Review. Generation and screening of project ideas- market and demand analysis- Demand forecasting techniques. Market planning and marketing research process- Technical analysis

UNIT-III: Financial estimates and projections: Cost of projects-means of financing-estimates of sales and production-cost of production-working capital requirement and its financing-profitability projected cash flow statement and balance sheet. Break even analysis.

UNIT-IV: Basic techniques in capital budgeting: Non discounting and discounting methods-payback period- Accounting rate of return-net present value-Benefit cost ratio-internal rate of return. Project risk. Social cost benefit analysis and economic rate of return. Non-financial justification of projects**.**

UNIT-V: Project administration: progress payments, expenditure planning, project scheduling and network planning, use of Critical Path Method (CPM), schedule of payments and physical progress, time-cost trade off. Concepts and uses of PERT cost as a function of time, Project Evaluation and Review Techniques/cost mechanisms. Determination of least cost duration. Post project evaluation. Introduction to various Project management softwares.

Reference Books:
1. Project planning, analysis, selection, implementation and review – Prasannachandra – Tata McGraw Hill
2. Project Management – the Managerial Process – Clifford F. Gray & Erik W. Larson - McGraw Hill
3. Project management - David I Cleland - Mcgraw Hill International Edition, 1999
4. Project Management – Gopala krishnan – Mcmillan India Ltd.
5. Project Management-Harry-Maylor-Peason Publication

Renewable Energy Technologies(YDOE05)

Course Learning Objectives:

☐ To understand present and future scenario of world energy use.

☐ To understand fundamentals of solar energy systems.

☐ To understand basics of wind energy.

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☐ To understand bio energy and its usage in different ways.

☐ To identify different available non-conventional energy sources.

Course Content:

UNIT-I: Introduction: World Energy Use; Reserves of Energy Resources; Environmental Aspects of Energy Utilisation; Renewable Energy Scenario in India and around the World; Potentials; Achievements / Applications; Economics of renewable energy systems.

Unit-II: Solar energy: Solar Radiation; Measurements of Solar Radiation; Flat Plate and Concentrating Collectors; Solar direct Thermal Applications; Solar thermal Power Generation Fundamentals of Solar Photo Voltaic Conversion; Solar Cells; Solar PV Power Generation; Solar PV Applications.

Unit-III: Wind Energy: Wind Data and Energy Estimation; Types of Wind Energy Systems; Performance; Site Selection; Details of Wind Turbine Generator; Safety and Environmental Aspects.

Unit-IV: Bio-Energy: Biomass direct combustion; Biomass gasifiers; Biogas plants; Digesters; Ethanol production; Bio diesel; Cogeneration; Biomass Applications.

Unit-V: Other Renewable Energy Sources: Tidal energy; Wave Energy; Open and Closed OTEC Cycles; Small Hydro-Geothermal Energy; Hydrogen and Storage; Fuel Cell Systems; Hybrid Systems.

Reference Books:

1. O.P. Gupta, Energy Technology, Khanna Publishing House, Delhi (ed. 2018)
2. Renewable Energy Sources, Twidell, J.W. & Weir, A., EFN Spon Ltd., UK, 2006.
3. Solar Energy, Sukhatme. S.P., Tata McGraw Hill Publishing Company Ltd., New Delhi, 1997.
4. Renewable Energy, Power for a Sustainable Future, Godfrey Boyle, Oxford University Press, U.K., 1996.
5. Fundamental of Renewable Energy Sources, GN Tiwari and MK Ghoshal, Narosa, New Delhi, 2007.
6. Renewable Energy and Environment-A Policy Analysis for India, NH Ravindranath, UK Rao, B

Natarajan, P Monga, Tata McGraw Hill.
7. Energy and The Environment, RA Ristinen and J J Kraushaar, Second Edition, John Willey & Sons, New York, 2006.
8. Renewable Energy Resources, JW Twidell and AD Weir, ELBS, 2006.

Energy Conservation And Audit(YDOE06)

Course Learning Objectives:
☐ To Identify demand supply gaps in present scenario.
☐ To understand conservations approaches to an industry.
☐ To draw the energy flow diagram of an industry.
☐ To identify energy wastage and suggest alternative methods.
☐ To understand the concepts energy audit.

Course Content:
UNIT-I: Introduction: General energy problem, Sector wise Energy consumption, demand supply gap, Scope for energy conservation and its benefits; Energy Efficiency Principle – Maximum energy efficiency, Maximum cost effectiveness; Mandatory provisions of EC act; Features of EC act-Standards and labeling, designated consumers, Energy Conservation Building Codes (ECBC);

Unit-II: Energy Conservation Approaches In Industries: Methods and techniques of energy conservation in ventilation and air conditioners- compressors pumps, fans and blowers - Area Sealing, Insulating the Heating / cooling fluid pipes, automatic door closing- Air curtain, Thermostat / Control; Energy conservation in electric furnaces, ovens and boilers.

Unit-III: Energy Conservation Option: New equipment, technology, staffing, training; Calculation and costing of energy conservation project; Depreciation cost, sinking fund method. Cost evaluation by Return On Investment(ROI) and pay back method etc.

Unit-IV: Performance improvement of existing power plant: cogeneration, small hydro, DG Set; Demand side management; Load response programmes; Types of tariff and restructuring of electric tariff Technical measures to optimize T and D losses.

Unit-V: Energy Audit: Energy audit and its benefits; Energy flow diagram; Preliminary, Detailed energy audit; Methodology of -preliminary energy audit and Detailed energy audit – Phase I, Pre audit, Phase II- Audit and Phase III- Post audit; Energy audit report; Electrical Measuring Instruments - Power Analyzer.

Reference Books:
1. Electric Energy Generation, Utilisation and Conservation Sivaganaraju, S Pearson, New Delhi, 2012
2. Project Management, Prasanna Chandra, Tata Mcgraw Hill, New Delhi
3. O.P. Jakhar, Energy Conservations in Buildings, Khanna Publishing House, New Delhi

4. Financial Management, Prasanna Chandra Tata Mcgraw Hill, New Delhi.
5. Energy management Handbook, Prasanna Chandra, Tata Mcgraw Hill, New Delhi.
6. O.P. Gupta, Energy Technology, Khanna Publishing House, New Delhi (ed. 2018)

Production Design (YDOE07)

Course Learning Objectives:
 To acquire the basic concepts of product design and development process
 To understand the engineering and scientific process in executing a design from concept to finished product
 To study the key reasons for design or redesign.

Course Content:
UNIT-I: Definition of a product; Types of product; Levels of product; Product-market mix; New product development (NPD) process; Idea generation methods; Creativity; Creative attitude; Creative design process; Morphological analysis; Analysis of interconnected decision areas; Brain storming.

Unit-II: Product life cycle; The challenges of Product development; Product analysis; Product characteristics; Economic considerations; Production and Marketing aspects; Characteristics of successful Product development; Phases of a generic product development process; Customer need identification; Product development practices and industry-product strategies.

Unit-III: Product design; Design by evolution; Design by innovation; Design by imitation; Factors affecting product design; Standards of performance and environmental factors; Decision making and iteration; Morphology of design (different phases); Role of aesthetics in design.

Unit-IV: Introduction to optimization in design; Economic factors in design; Design for safety and reliability; Role of computers in design; Modeling and Simulation; The role of models in engineering design; Mathematical modeling; Similitude and scale models; Concurrent design; Six sigma and design for six sigma; Introduction to optimization in design; Economic factors and financial feasibility in design; Design for manufacturing; Rapid Prototyping (RP); Application of RP in product design; Product Development versus Design.

Unit-V: Design of simple products dealing with various aspects of product development; Design starting from need till the manufacture of the product,

Reference Books:
1. Product Design and Development, Karl T. Ulrich and Steven D. Eppinger, Tata McGraw–Hill edition.
2. Engineering Design –George E. Dieter.
3. An Introduction to Engineering Design methods Vijay Gupta.
4. Merie Crawford : New Product management, McGraw-Hill Irwin.
5. Chitale A K and Gupta R C, "Product Design and Manufacturing", Prentice Hall of India, 2005.
6. Kevin Otto and Kristin Wood, Product Design, Techniques in Reverse Engineering and New Product Development, Pearson education.

Engineering Econimics & Accountancy(YDOE08)

Course Learning Objectives:
☐ To acquire knowledge of basic economics to facilitate the process of economic decision making.
☐ To acquire knowledge on basic financial management aspects.
☐ To develop the basic skills to analyze financial statements.

Course Content:
UNIT-I: Introduction: Managerial Economics; Relationship with other disciplines; Firms: Types, objectives and goals; Managerial decisions; Decision analysis.

Unit-II: Demand & Supply Analysis: Demand; Types of demand; Determinants of demand; Demand function; Demand elasticity; Demand forecasting; Supply; Determinants of supply; Supply function; Supply elasticity.

Unit-III: Production and Cost Analysis: Production function; Returns to scale; Production optimization; Least cost input; Isoquants; Managerial uses of production function; Cost Concepts; Cost function; Types of Cost; Determinants of cost; Short run and Long run cost curves; Cost Output Decision; Estimation of Cost.

Unit-IV: Pricing: Determinants of Price; Pricing under different objectives and different market structures; Price discrimination; Pricing methods in practice; Role of Government in pricing control.

Unit-V: Financial Accounting (Elementary Treatment): Balance sheet and related concepts; Profit & Loss Statement and related concepts; Financial Ratio Analysis; Cash flow analysis; Funds flow analysis; Comparative financial statements; Analysis & Interpretation of financial statements; Investments; Risks and return evaluation of investment decision; Average rate of return; Payback Period; Net Present Value; Internal rate of return,

Reference Books:
1. Premvir Kapoor, Sociology & Economics for Engineers, Khanna Publishing House, New Delhi, 2018
2. McGuigan, Moyer and Harris, 'Managerial Economics; Applications, Strategy and Tactics',

Thomson South Western, 10th Edition, 2005.

3. Prasanna Chandra. 'Fundamentals of Financial Management', Tata Mcgraw Hill Publishing Ltd., 4th edition, 2005.

4. Samuelson. Paul A and Nordhaus W.D., 'Economics', Tata Mcgraw Hill Publishing Company Limited, New Delhi, 2004.

5. Paresh Shah, 'Basic Financial Accounting for Management', Oxford University Press, New Delhi, 2007. 3. Salvatore Dominick, 'Managerial Economics in a global economy'. Thomson South Western, 4th Edition, 2001.

Operation Research(YDOE09)

Course Learning Objectives:

☐ To understand and analyze managerial problems in industry so that they are able to use resources (capitals, materials, staffing, and machines) more effectively.

☐ To acquire knowledge of formulating mathematical models for quantitative analysis of managerial problems in industry.

Course Content:

UNIT-I: Development: Definition, Characteristics and phase of Scientific Method, Types of models; General methods for solving operations research models.

Unit-II: Allocation: Introduction to linear programming formulation, graphical solution, Simplex Method, artificial variable technique, Duality principle. Sensitivity analysis.

Unit-III: Transportation Problem: Formulation; Optimal solution; Unbalanced Transportation problems; Degeneracy; Assignment problem: Formulation; Optimal solution.

Unit-IV: Sequencing: Introduction; Terminology; Notations and Assumptions; Problems with n-jobs and two machines; Optimal sequence algorithm; Problems with n-jobs and three machines.

Unit-V: Theory of games: Introduction; Two-person zero-sum games; The Maximum–Minimax principle; Games without saddle points; Mixed Strategies; 2 x n and m x 2 Games; Graphical solutions; Dominance property; Use of L.P. to games.

Reference Books:

1. Operations Research: Principles and Applications - G.Srinivasan, PHI Learning Private Limited.
2. Operations Research: An Introduction - Hamdy A. Taha, Pearson.
3. Operations Research: Principles and Practice - Ravindran, Phillips and Solberg, Wiley India
4. Operations Research: Concepts and Cases - Hillier and Liberman, McGraw-Hill

Renewable Energy Technologies(YDOE10)

Course Learning Objectives:
The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:
☐ Maintain the renewable energy technology equipment.

Course Contents:
Unit – I Ocean Energy Technologies
Ocean energy map of India and its implications; Specification, Construction and working of the following ocean energy technologies:
☐ Tidal power technologies
☐ Wave power technologies
☐ Marine current technologies
☐ Ocean Thermal Energy Conversion (OTEC) technologies

Unit – II Solar PV and Concentrated Solar Power Plants
☐ Solar Map of India: Global solar power radiation, Solar PV
☐ Concentrated Solar Power (CSP) plants, construction and working of: Power Tower, Parabolic Trough, Parabolic Dish, Fresnel Reflectors
☐ Solar Photovoltaic (PV) power plant: components layout, construction, working.
☐ Rooftop solar PV power system

Unit – III Large Wind Power Plants
Wind Map of India: Wind power density in watts per square meter, Lift and drag principle; long path theory, Geared type wind power plants: components, layout and working, Direct drive type wind power plants: components, layout and working, Constant Speed Electric Generators: Squirrel Cage Induction Generators (SCIG), Wound Rotor Induction Generator (WRIG), Variable Speed Electric Generators: Doubly-fed induction generator (DFIG), wound rotor synchronous generator (WRSG), permanent magnet synchronous generator (PMSG).

Unit– IV Small Wind Turbines
☐ Horizontal axis small wind turbine: direct drive type, components and working.

□ Horizontal axis small wind turbine: geared type, components and working.
□ Vertical axis small wind turbine: direct drive and geared, components and working.
□ Types of towers and installation of small wind turbines on roof tops and open fields.
□ Electric generators used in small wind power plants.

Unit– V Biomass-based Power Plants
□ Properties of solid fuel for biomass power plants: bagasse, wood chips, rice husk, municipal waste.
□ Properties of liquid and gaseous fuel for biomass power plants: Jatropha, bio-diesel gobar gas.
□ Layout of a Bio-chemical based (e.g. biogas) power plant.
□ Layout of a Thermo-chemical based (e.g. Municipal waste) power plant.
□ Layout of a Agro-chemical based (e.g. bio-diesel) power plant.

Reference Books:
1. O.P. Gupta, Energy Technology, Khanna Publishing House, New Delhi
2. Neill, Simon P.; Hashemi, M. Reza: Fundamentals of Ocean Renewable Energy: Generating Electricity from the Sea, Academic Press, ISBN:978-0-12-810448-4
3. David M. Buchla, Thomas E. Kissell, Thomas L. Floyd, Renewable Energy Systems, Pearson Education New Delhi , ISBN: 9789332586826,
4. Rachel, Sthuthi, Earnest, Joshua; -Wind Power Technologies, PHI Learning, New Delhi, ISBN: 978-93-88028-49- 3; E-book 978-93-88028-50-9
5. Deambi, Suneel: From Sunlight to Electricity: a practical handbook on solar photovoltaic application;
TERI, New Delhi ISBN:9788179935736
6. Gipe, Paul: Wind Energy Basics, Chelsea Green Publishing Co; ISBN: 978-1603580304
7. Wizelius, Tore, Earnest, Joshua - Wind Power Plants and Project Development, PHI Learning, New Delhi, ISBN:978-8120351660
8. Kothari, D.P. et aL: Renewable Energy Sources and Emerging Technologies, PHI Learning, New Delhi, ISBN: -978-81-203-4470-9
9. Bhadra, S.N., Kastha, D., Banerjee, S, Wind Electrical Systems installation; Oxford University Press, New Delhi, ISBN: 9780195670936.

Energy Efficiency And Audit(YDOE11)

Course Learning Objectives:

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

☐ Undertake energy efficiency measures and energy audit.

Course Contents:

Unit – I Introduction to Energy Efficiency

- Energy Scenario: Energy demand and supply, National scenario.
- Energy Efficiency and Energy Conservation; concepts
- Indian Electricity Act 2001; relevant clauses of energy conservation
- BEE and its Roles
- Star Labelling: Need and its benefits.

Unit – II Pumping Systems, Fans and Blowers

- Factors affecting pump performance
- Efficient Pumping system operation
- Energy conservation opportunities in Pumping systems
- Fan types, flow control strategies
- Fan performance Assessment
- Energy Conservation opportunities in Pumping systems
- Tips for energy saving in fans and blowers

Unit – III Air Compressors and Diesel Power Generator sets

- Classification of compressors
- Pneumatic System components
- Effect of various parameters on efficiency of Compressor
- Capacity control of Compressors
- Checklist for Energy Efficiency in Compressed air systems
- Operating guidelines for diesel generator, operational factors

- Effects of improper ventilation of genset
- Energy saving measures for DG sets

Unit –IV Energy Conservation in Lighting System
- Replacing Lamp sources
- Using energy efficient luminaries
- Using light controlled gears
- Installation of separate transformer / servo stabilizer for lighting
- Periodic survey and adequate maintenance programs
- Innovative measures of energy savings in lighting

Unit– V Energy Efficient Electrical Machines
- Need for energy conservation in induction motor and transformer
- Energy conservation techniques in induction motor by:
- Energy conservation techniques in Transformer
- Energy Conservation Equipment: Soft starters, Automatic star delta convertor, Variable Frequency
- Drives, Automatic p. f. controller (APFC)
- Energy efficient motor; significant features, advantages, applications and Limitations
- Energy efficient transformers, amorphous transformers; epoxy Resin cast transformer / Dry
- type of transformer
- Aggregated Technical and commercial losses (ATC), Technical losses; causes and measures to
- reduce, Commercial losses: pilferage, causes and remedies
- Application of tariff system to reduce energy bill
- Co-generation and Tariff; concept, significance for energy conservation

Unit– VI Energy Audit of Electrical Systems
- Energy audit (definition as per Energy Conservation Act)
- Energy audit instruments and their use
- Questionnaire for energy audit projects
- Energy flow diagram (Sankey diagram)
- Simple payback period, Energy Audit procedure (walk through audit and detailed audit).
- Energy Audit report format.

Reference Books:
1. Guide Books No. 1 and 3 for National Certification Examination for Energy Managers and Energy Auditors, Bureau of Energy Efficiency (BEE), Bureau of Energy Efficiency (A Statutory body under Ministry of Power, Government of India) (Fourth Edition 2015).
2. O.P. Gupta, Energy Technology, Khanna Publishing House, Delhi, Edition 2018, (ISBN: 978-93-86173-683).
3. Henderson, P. D., India - The Energy Sector, University Press, Delhi, 2016. ISBN: *978-*0195606539
4. Turner, W. C., Energy Management Handbook, Fairmount Press, 2012, ISBN 9781304520708
5. Sharma, K. V., Venkataseshaiah; P., Energy Management and Conservation, I K International Publishing House Pvt. Ltd; 2011 ISBN 9789381141298

6. Mehta ,V. K., Principles of Power System, S. Chand andCo.New Delhi, 2016, ISBN 9788121905947

7. Singh, Sanjeev; Rathore, Umesh, Energy Management, S K KatariaandSons,New Delhi ISBN-13: 9789350141014.

8. Desai, B. G.; Rana, J. S.; A. Dinesh, V.; Paraman, R., Efficient Use and Management of Electricity in Industry, Devki Energy Consultancy Pvt. Ltd.

9. Chakrabarti, Aman, Energy Engineering And Management, e-books Kindle Edition

☐ Use Co-generation and relevant tariff for reducing losses in facilities.

Internet of Things(YDOE12)

Course Content:

Unit I - Introduction to Internet of Things

☐ Define the term "Internet of Things"

☐ State the technological trends which have led to IoT.

☐ Describe the impact of IoT on society.

Unit II - Design consideration of IoT

☐ Enumerate and describe the components of an embedded system.

☐ Describe the interactions of embedded systems with the physical world.

☐ Name the core hardware components most commonly used in IoT devices.

Unit III Interfacing by IoT devices

☐ Describe the interaction between software and hardware in an IoT device.

☐ Explain the use of networking and basic networking hardware.

☐ Describe the structure of the Internet.

SUGGESTED LEARNING RESOURCES:

S. No.	Title of Book	Author	Publication
1	Internet of Things	Raj Kamal	McGraw Hill Education; First edition (10 March 2017) ISBN 978-9352605224
2	internet of Things: A Hands-On Approach	Arsheep Bahge and Vijay Madisetti	Orient Blackswan Private Limited - New Delhi; First edition (2015) ISBN : 978-8173719547

SUGGESTED SOFTWARE/LEARNING WEBSITES:

1. https://www.raspberrypi.org/blog/getting-started-with-iot/
2. https://www.arduino.cc/en/IoT/HomePage
3. https://www.microchip.com/design-centers/internet-of-things
4. https://learn.adafruit.com/category/internet-of-things-iot
5. http://esp32.net/

Disaster Management (YDOE13)

Course Learning Objectives:
Following are the objectives of this course:
☐ To learn about various types of natural and man-made disasters.
☐ To know pre- and post-disaster management for some of the disasters.
☐ To know about various information and organisations in disaster management in India.
☐ To get exposed to technological tools and their role in disaster management.

Course Content:
Unit – I: Understanding Disaster
Understanding the Concepts and definitions of Disaster, Hazard, Vulnerability, Risk, Capacity
– Disaster and Development, and disaster management.

Unit – II: Types, Trends, Causes, Consequences and Control of Disasters
Geological Disasters (earthquakes, landslides, tsunami, mining); Hydro-Meteorological Disasters (floods, cyclones, lightning, thunder-storms, hail storms, avalanches, droughts, cold and heat waves) Biological Disasters (epidemics, pest attacks, forest fire); Technological Disasters (chemical, industrial, radiological, nuclear) and Manmade Disasters (building collapse, rural and urban fire, road and rail accidents, nuclear, radiological, chemicals and biological disasters) Global Disaster Trends – Emerging Risks of Disasters – Climate Change and Urban Disasters.

Unit- III: Disaster Management Cycle and Framework
Disaster Management Cycle – Paradigm Shift in Disaster Management. Pre-Disaster – Risk Assessment and Analysis, Risk Mapping, zonation and Microzonation, Prevention and Mitigation of Disasters, Early Warning System; Preparedness, Capacity Development; Awareness. During Disaster – Evacuation – Disaster Communication – Search and Rescue – Emergency Operation

Centre – Incident Command System – Relief and Rehabilitation – Post-disaster – Damage and Needs Assessment, Restoration of Critical Infrastructure – Early Recovery – Reconstruction and Redevelopment; IDNDR, Yokohama Stretegy, Hyogo Framework of Action.

Unit– IV: Disaster Management in India

Disaster Profile of India – Mega Disasters of India and Lessons Learnt. Disaster Management Act 2005 – Institutional and Financial Mechanism, National Policy on Disaster Management, National Guidelines and Plans on Disaster Management; Role of Government (local, state and national),Non-Government and Inter Governmental Agencies

Unit– V: Applications of Science and Technology for Disaster Management

Geo-informatics in Disaster Management (RS, GIS, GPS and RS). Disaster Communication System (Early Warning and Its Dissemination). Land Use Planning and Development Regulations, Disaster Safe Designs and Constructions, Structural and Non Structural Mitigation of Disasters S&T Institutions for Disaster Management in India

References

1. Publications of National Disaster Management Authority (NDMA) on Various Templates and Guidelines for Disaster Management
2. Bhandani, R. K., An overview on natural & man-made disasters and their reduction, CSIR, New Delhi
3. Srivastava, H. N., and Gupta G. D., Management of Natural Disasters in developing countries, Daya Publishers, Delhi
4. Alexander, David, Natural Disasters, Kluwer Academic London
5. Ghosh, G. K., Disaster Management, A P H Publishing Corporation
6. Murthy, D. B. N., Disaster Management: Text & Case Studies, Deep & Deep Pvt. Ltd.

Course outcomes:

After competing this course, student will be:

 Acquainted with basic information on various types of disasters

 Knowing the precautions and awareness regarding various disasters

 Decide first action to be taken under various disasters

 Familiarised with organisation in India which are dealing with disasters

 Able to select IT tools to help in disaster management.

Mechatronics (YDOE14)

Content:

Unit 1 – Introduction to Mechatronics
• Introduction to System Concepts, Analysis and Design
• Mechatronics basic definitions; systems and components;
• Systems with mixed disciplines
• Electronics Fundamentals Review

Unit 2 – Elements in Mechatronics
• Data conversion devices, sensors, micro-sensors, transducers, signal processing devices, timers
• Microprocessors, Microcontrollers
• PID Controllers and PLCs

Unit 3 – Drives
• Stepper Motors, Servo Drives
• Linear Motion bearings, cams
• Systems controlled by camshafts, electronic cams
• Tool magazines and indexing mechanisms.

Unit 4 – Hydraulic Systems
• Flow, Pressure and Direction Control Valves
• Actuators, Supporting Elements, Hydraulic Power Packs, Pumps
• Design of Hydraulic circuits

Unit 5 – Pneumatic System

- Production, Distribution and conditioning of compressed air
- System Components and Graphic representations
- Design of Systems

SUGGESTED LEARNING RESOURCES:

S.No.	Title of Book	Author	Publication
1.	Analysis and design of Dynamic Systems	Cochin, Era and Cadwallender	AddisonWesley, 1997
2.	Mechatronics Engineering	Tomkinson, D. And Horne, J. Longman	McGraw Hill, 1996
3.	Mechatronics	Bolton, W	Pearson

SUGGESTED SOFTWARE/LEARNING WEBSITES:
6. https://youtu.be/Ro_tFv1iH6g
7. https://www.motioncontroltips.com/faq-what-are-stepper-drives-and-how-do-they-work/
8. https://science.howstuffworks.com/robot.htm
9. https://howtomechatronics.com/

Artifical Intelligence (YDOE15)

Course Content:
Unit 1 – Introduction to Artificial Intelligence
- Artificial Intelligence (AI) definition
- Goals of AI
- History of AI
- Applications of AI

Unit 2 – Agents and Environments
- Agent Terminology, Types of Agents – Simple Reflex Agents, Model Based Reflex Agents, Goal Based Agents
- Nature of Environments, Properties of Environments

Unit 3 – Search Algorithms
Terminology
- Brute Force Search Strategies – Breadth First Search, Depth First Search.
- Heuristic Search Strategies, Local Search Algorithms.

Unit 4 – Fuzzy Logic Systems
Introduction to Fuzzy Logic and Fuzzy systems,
- Membership functions,
- Fuzzification/Defuzzification

Unit 5 – Neural Networks
Basic structure of Neural Networks
- Perceptron

• Back-propagation

Suggested Learning Resources:

S. No.	Title of Book	Author	Publication
1	Artificial Intelligence By Example: Develop machine intelligence from scratch using real artificial intelligence use cases	Denis Rothman	Packt Publishing ISBN – 978-1788990547

Environmental Science(YDAU102)

Course Learning Objectives:
Technicians working in industries or elsewhere essential require the knowledge of environmental science so as to enable them to work and produce most efficient, economical and eco-friendly finished products.
☐ Solve various engineering problems applying ecosystem to produce eco – friendly products.
☐ Use relevant air and noise control method to solve domestic and industrial problems.
☐ Use relevant water and soil control method to solve domestic and industrial problems.
☐ To recognize relevant energy sources required for domestic and industrial applications.
☐ Solve local solid and e-waste problems.

Content:
Pre requisite: - High School Chemistry

Unit 1: Ecosystem
☐ Structure of ecosystem, Biotic & Abiotic components
☐ Food chain and food web
☐ Aquatic (Lentic and Lotic) and terrestrial ecosystem
☐ Carbon, Nitrogen, Sulphur, Phosphorus cycle.
☐ Global Warming-Causes, effects, process, Green House Effect, Ozone depletion

Unit 2: Air and, Noise Pollution
☐ Definition of pollution and pollutant, Natural and manmade sources of air pollution (Refrigerants,

I.C., Boiler)

☐ Air Pollutants: Types, Particulate Pollutants: Effects and control (Bag filter, Cyclone separator, Electrostatic Precipitator)

☐ Gaseous Pollution Control: Absorber, Catalytic Converter, Effects of air pollution due to Refrigerants, I.C., Boiler

☐ Noise pollution: sources of pollution, measurement of pollution level, Effects of Noise pollution, Noise pollution (Regulation and Control) Rules, 2000

Unit– 3 Renewable sources of Energy

☐ Solar Energy: Basics of Solar energy. Flat plate collector (Liquid & Air). Theory of flat plate collector. Importance of coating. Advanced collector. Solar pond. Solar water heater, solar dryer. Solar stills.

☐ Biomass: Overview of biomass as energy source. Thermal characteristics of biomass as fuel. Anaerobic digestion. Biogas production mechanism. Utilization and storage of biogas.

☐ Wind energy: Current status and future prospects of wind energy. Wind energy in India. Environmental benefits and problem of wind energy.

☐ New Energy Sources: Need of new sources. Different types new energy sources. Applications of (Hydrogen energy, Ocean energy resources, Tidal energy conversion.) Concept, origin and power plants of geothermal energy

Unit-4 Solid Waste Management, ISO 14000 & Environmental Management

☐ Solid waste generation- Sources and characteristics of: Municipal solid waste, E- waste, biomedical waste.

☐ Metallic wastes and Non-Metallic wastes (lubricants, plastics, rubber) from industries.

☐ Collection and disposal: MSW (3R, principles, energy recovery, sanitary landfill), Hazardous waste

☐ Air quality act 2004, air pollution control act 1981 and water pollution and control act1996.

☐ Structure and role of Central and state pollution control board.

☐ Concept of Carbon Credit, Carbon Footprint.

☐ Environmental management in fabrication industry.

☐ ISO14000: Implementation in industries, Benefits.

Reference Books:
Suggested Learning Resources:
a) **Books:**

☐ C.N. R. Rao, Understanding Chemistry, Universities Press (India) Pvt. Ltd., 2011.

☐ Arceivala, Soli Asolekar, Shyam, Waste Water Treatment for Pollution Control and Reuse, Mc-Graw Hill Education India Pvt. Ltd., New York, 2007, ISBN:978-07-062099-5.

☐ Nazaroff, William, Cohen, Lisa, Environmental Engineering Science, Willy, New York, 2000, ISBN 10: 0471144940.

☐ Rao, C. S., Environmental Pollution Control and Engineering, New Age International Publication, 2007, ISBN: 81-224-1835-X.

☐ Rao, M. N.Rao, H.V.N, Air Pollution, Tata Mc-Graw Hill Publication, New delhi, 1988, ISBN: 0-07-451871-8.

☐ Frank Kreith, Jan F Kreider, Principles of Solar Engineering, McGraw-Hill, New York ; 1978, ISBN: 9780070354760.

☐ Aldo Vieira, Da Rosa, Fundamentals of renewable energy processes, Academic Press Oxford,

UK; 2013. ISBN: 9780123978257.

☐ Patvardhan, A.D, Industrial Solid Waste, Teri Press, New Delhi, 2013, ISBN:978-81-7993-502-6

☐ Metcalf & Eddy, Waste Water Engineering, Mc-Graw Hill, New York, 2013, ISBN: 077441206.

b) **Open source software and website address:**

☐ www.eco-prayer.org

☐ www.teriin.org

☐ www.cpcp.nic.in

☐ www.cpcp.gov.in

☐ www.indiaenvironmentportal.org.in

☐ www.whatis.techtarget.com

☐ www.sustainabledevelopment.un.org

465 Audit Courses

☐ www.conserve-energy-future.com)

Course outcomes:

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

1. Understand the ecosystem and terminology and solve various engineering problems applying ecosystem knowledge to produce eco – friendly products.

2. Understand the suitable air, extent of noise pollution, and control measures and acts.

3. Understand the water and soil pollution, and control measures and acts.

4. Understand different renewable energy resources and efficient process of harvesting.

5. Understand solid Waste Management, ISO 14000 & Environmental Management.

Essence of Indian Knowledge and Tradition(YDAU202)

SUGGESTED TEXT/REFERENCE BOOKS:

S. No.	Title of Book	Author	Publication
1.	Cultural Heritage of India-Course Material	V. Sivaramakrishna	Bharatiya Vidya Bhavan, Mumbai, 5th Edition, 2014
2.	Modern Physics and Vedant	Swami Jitatmanand	Bharatiya Vidya Bhavan
3.	The wave of Life	Fritzof Capra	
4.	Tao of Physics	Fritzof Capra	
5.	Tarkasangraha of Annam Bhatta, Inernational	V N Jha	Chinmay Foundation, Velliarnad, Amaku,am
6.	Science of Consciousness Psychotherapy and Yoga Practices	RN Jha	Vidyanidhi Prakasham, Delhi, 2016

Indian Constitution(YDAU302)

Course Content

Unit 1 – The Constitution - Introduction
• The History of the Making of the Indian Constitution
• Preamble and the Basic Structure, and its interpretation
• Fundamental Rights and Duties and their interpretation
• State Policy Principles

Unit 2 – Union Government
• Structure of the Indian Union
• President – Role and Power
• Prime Minister and Council of Ministers
• Lok Sabha and Rajya Sabha

Unit 3 – State Government
• Governor – Role and Power
• Chief Minister and Council of Ministers
• State Secretariat

Unit 4 – Local Administration
• District Administration
• Municipal Corporation
• Zila Panchayat

Unit 5 – Election Commission
• Role and Functioning
• Chief Election Commissioner
• State Election Commission

Suggested Learning Resources:

S. No.	Title of Book	Author	Publication
1.	Ethics and Politics of the Indian Constitution	Rajeev Bhargava	Oxford University Press, New Delhi, 2008
2.	The Constitution of India	B.L. Fadia	Sahitya Bhawan; New edition (2017)
3.	Introduction to the Constitution of India	DD Basu	Lexis Nexis; Twenty-Third 2018 edition

Suggested Software/Learning Websites:
a. https://www.constitution.org/cons/india/const.html
b. http://www.legislative.gov.in/constitution-of-india
c. https://www.sci.gov.in/constitution
d. https://www.toppr.com/guides/civics/the-indian-constitution/the-constitution-of-india/