Program Outcomes (POs)

Engineering Graduates will be able to:

PO1	**Engineering knowledge**	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem analysis**	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences, data and synthesis of the information to provide valid conclusions
PO3	**Design/development of solutions**	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations
PO4	**Conduct investigations of complex problems**	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions
PO5	**Modern tool usage**	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	**The engineer and society**	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environment and sustainability**	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
PO8	**Ethics**	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual and team work**	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings
PO10	**Communication**	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project management and finance**	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Life-long learning**	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

University Campus
Arang-Kharora Highway,
Raipur -493 441 (C. G.) INDIA

City Information Centre
MATS Tower, Pandri, Raipur (C.G.) 492 002
Tel:+917714078995,4078996 Fax: +917714078997
www.matsuniversity.ac.in

Scheme & Syllabus

(I[st] & IInd Semester)
Bachelor of Technology
Civil Engineering

MATS UNIVERSITY
ARANG, RAIPUR (C.G.)

Scheme of Teaching & Examination

B. TECH. I SEMESTER

S. No.	Code	Subject	Periods per week			Scheme of marks		Total Credit
			L	T	P	ESE	IM	
1.	BT100	Engineering Mathematics – I	3	1	-	70	30	4
2.	BT101	Engineering Physics	3	1	-	70	30	4
3.	BT102	Programming for Logic Building	3	0	-	70	30	3
4.	BT103	Engineering Graphics & Design	2	0	-	70	30	2
5.	BT104	Environmental Sciences	1	0	-	70	30	1
6.	BT105	Technical English	2	0	-	70	30	2
7.	BT106	Engineering Physics Laboratory	-	-	2	30	20	1
8.	BT107	Programming & Soft Skills Laboratory	-	-	2	30	20	1
9.	BT108	Engineering Graphics & Design Laboratory	-	-	4	30	20	2
10.	BT109	Communication Skills laboratory	-	-	2	30	20	1
11	BT 110	Manufacturing Practices – I Lab	-	-	4	30	20	2
		Total	**14**	**2**	**14**	**570**	**280**	**23**

L – Lecture, T – Tutorial, ESE – End Semester Examination,
P – Practical, IM – Internal Marks (Include Class Test & Teacher's Assessments)

MATS School of Engineering &I.T

MATS UNIVERSITY
ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester: I B.Tech   Branch: All Streams of Engineering
Subject: Engineering Mathematics-I   Code: BT 100
Total Lecture + Tutorial Periods: 60   Total Tutorial Periods: 01/week
Total Credits: 04

OBJECTIVES:

- To develop the use of matrix algebra techniques this is needed by engineers for practical applications.
- To make the student knowledgeable in the area of infinite series and their convergence so that he/ she will be familiar with limitations of using infinite series approximations for solutions arising in mathematical modeling.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To introduce the concepts of improper integrals, Gamma, Beta and Error functions which are needed in engineering applications.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.

UNIT-I

MATRICES

Real vector space, Subspace, Linear span, Linear dependence and linear independence of vectors, Basis, Dimension, Linear transformation, Matrix associated with a linear transformation, Rank and inverse by elementary transformation (Gauss Jordan method), System of linear equations, Eigenvalues and eigenvectors, Cayley-Hamilton theorem, Diagonalization of matrices.

UNIT- II

DIFFERENTIAL CALCULUS

Successive differentiation, Lebnitz theorem, Rolle's Theorem, Taylor's theorem with Lagrange's form of remainder, Expansions of functions in Taylor's and McLaurin's series

MATS School of Engineering &I.T

UNIT-III

PARTIAL DIFFERENTIATION

Functions of two variables: Limit, continuity and partial derivatives, derivatives of higher order, Euler's theorem on homogeneous functions, Total derivative, Change of variables, Jacobians, Maxima, minima and saddle points of functions of two variables

UNIT-IV

ORDINARY DIFFERENTIAL EQUATION

First order ordinary differential equations: Exact, linear and Bernoulli's equations, Euler's equations, Equations of first order and higher degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

Ordinary differential equations of higher order linear differential equations with constant coefficients & variable coefficients, method of variation of parameters, Cauchy-Euler equation, Legendre polynomials and their properties

UNIT-V

MULTIPLE INTEGRAL

 Beta and Gamma functions – elementary properties, Double and triple integrals, change of order of integration, Application to area and volume.

OUTCOMES:

- This course equips students to have basic knowledge and understanding in one fields of materials, integral and differential calculus.

NAME OF TEXT BOOKS:

1. Higher Engineering Mathematics by B.S.Grewal (42th edition)-Khanna Publisher.
2. Advanced Engineering Mathematics by Erwin Kreyszig (8th edition)-John Wiley & Sons.

NAME OF REFERENCE BOOKS:
1. Differential Calculus by Gorakh Prasad-Pothisala Private Limited.
2.Advanced Engineering Mathematics by R.K.Jain and S.R.K. Iyengar-Narosa Publishing House.
3.Applied Mathematics by P.N.Wartikar&J.N.Wartikar Vol-ll –Pune VidyarthiGrihaPrakasan, Pune.
4. Integral Calculus by Gorakh Prasad-Pothisala Private Limited.

MATS School of Engineering &I.T

MATS UNIVERSITY
ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)

SCHOOL OF ENGINEERING & I.T.

Semester: I B.Tech   Branch: All Streams of Engineering
Subject: Engineering Physics   Code: BT101
Total Lecture + Tutorial Periods: 60   Total Tutorial Periods: 01/Week
Total Credits: 04

OBJECTIVES:

- To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology.

Unit -I

THEORY OF RELATIVITY SPACE

Time and motion, frame of reference, Galilean Transformation Outline of relativity, Michelson-Morley experiment, Special theory of Relativity, transformation of space and time, Time dilation, Doppler effect ,length contraction, addition of velocities, Relativistic mass: variation of mass with velocity, kinetic energy, equivalence of mass and energy, Relation between energy and momentum.

Unit- II

(a) LASERS

Temporal and spatial coherence of light wave Principle of laser, Laser characteristics, components of laser, Principle of Ruby, He-Ne &Nd -YAG lasers, application, basic concepts of Holography (only introductory part, No detail derivation)

(b) FIBRES OPTICS:

Optical fibers: Introduction & advantages, structure & classification, Option of propagation in fiber, attenuation & distortion, acceptance angle and cone, numerical aperture (only introductory part, No detail derivation).

Unit -III

NUCLEAR PHYSICS

Controlled and uncontrolled chain reaction, criteria of critical mass, nuclear reactor and its site selection & numerical ,nuclear forces, Nuclear fusion in stars . Introduction of

MATS School of Engineering &I.T

elementary particles. Electron ballistic: Motion of charged particles in electric and magnetic field. Aston and Bainbridge mass spectrograph.

Unit -IV

WAVE OPTICS

Wedge shaped films, Interferences by division of amplitude: Newton's rings and its applications Interference by division of wave front: Fresnel's bi prism, fringe width, diffraction grating, resolving power of grating,

Unit- V

SOLID STATE DEVICES:

Transistor: Input and Output characteristics in CE mode, Transistor as an amplifier, Hartley Oscillator. FET: Input and output characteristics of J-FETs & MOSFETs, Operational amplifiers (Op-Amp).

OUTCOMES:

The students will have knowledge on the basics of physics related to properties of matter, optics, acoustics etc., and they will apply these fundamental principles to solve practical problems related to materials used for engineering applications.

TEXT BOOKS:

1. Gaur and Gupta "Engineering Physics"
2. Avadhanulu and Kshirsagar "Engineering Physics".
3. Verma H.C.: Concepts of Physics, Part-1 & Part-2, BharatiBhawan (P&D)
4. A.K. Tayal: Engineering Mechanics (Statics and Dynamics)

REFERENCE BOOKS:

- Jenkins and White: "Optics", MeGrew-Hill Book Company.
- Singh R.B.: "Physics of Oscillations and Waves"
- Ghatak A.K.: "Optics"
- Mani and Mehta: "Modern Physics", Affiliated East-West Press Pvt. Ltd, 1998.
- Sanjeev Puri: Modern Physics, narosa Pub. Co.2004.
- Azroff: Solid State Physics, Tata McGraw-Hill, 2004.
- Theraja: B.L., Basic Electronics, S.Chand, 2002.
- Puri: Digital Electronics, Tata McGraw-Hill, 2002.
- Millman, J and Halkias: integrated Electronics, Tata MeGraw-Hill, 2004.
- Tyagrajan and Ghatak: Lasers, Macmillan, 2001. •

MATS School of Engineering &I.T

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester: I B.Tech	Branch: All Streams of Engineering
Subject: Programming For Logic Building	Subject Code: BT 102
Total Theory Periods: 48	Total Tutorial Periods: 00
Total Credits: 03	

COURSE OBJECTIVE:

- To distinguish and recognize low-level and high-level programming languages
- To know fundamental concepts of structured programming
- To understand logic development
- To design pseudo logic for various programming problems.
- To understand the basic structure of a program including sequence, decisions and looping.
- To design solutions to real world problems using C language.
- To use C language for problem solving and numerical computations.
- To apply computer-programming concepts to new problems or situations.

UNIT – I
ELEMENTS OF C LANGUAGE

Tools for Problem Solving: Problem Analysis, Flowchart, Algorithm Development. Top-Down Program Design, Structured Design Approach, Origin of C, Features & Characteristic of C, C Compiler, Character Set, Keywords, Identifiers, Constants, Variables, Input/ Output Statements, Basic Data Types, Operators and Expressions, Basic structure of C programs, A simple C Program.

UNIT – II
CONTROL FLOW CONSTRUCTION

Decision making and branching: Simple if statement, if else statement, Nesting of if-else statement, else - if Ladder, Switch statement, Operator, goto statement, Decision making and looping, While statement, Do-While statement, For statement, Jumps in loops, Break and Continue statement.

UNIT – III
DEFINING AND MANIPULATING ARRAYS

One Dimensional Arrays: Declaration of Arrays, Initialization of Arrays, Reading and Writing of integer, real and Character arrays, sorting and Searching in Arrays, Multi-Dimensional Arrays, Handling of Character Strings.

MATS School of Engineering &I.T

UNIT – IV
 USER DEFINED FUNCTIONS
Syntax of Function, Calling functions, Actual & Formal Arguments, Categories of Functions, Function prototype, Scope Rules: Local & Global variables, Recursion, Recursion vs. iteration, Passing Arguments: call by values & call by reference, passing array to function.
Structures: Declaration and initialization of Structure, Array of structures, Array within structure, structure within structure, Structures and functions, Introduction to unions.

UNIT – V
 POINTER DATA TYPE AND ITS APPLICATION
Pointer Operator, Pointer Expression, Initialization of pointers, Pointer Arithmetic, Pointer and Function Arguments, Pointer to function, Pointer and Arrays, Pointers and String, Arrays of Pointers, Pointers to Pointers, Dynamic memory allocation.
Files in C: Defining and Opening a file, closing a file, Input/ Output operations on files, Error handling during I/O operations, Random access to files.

COURSE OUTCOME:
After completion of the course study, students are going to be in a position to
- Analyze issues and style algorithms in pseudo code.
- Able to implement the algorithms and draw flowcharts for solving Mathematical and Engineering problems
- Read, perceive and trace the execution of programs written in C language.
- Develop confidence for self-education and ability for life-long learning needed for Computer language.
- Write down C program for a given algorithm by means of modular approach.

 TEXT BOOKS:
1. The C programming Language, Dennis M Ritchie and Kernighan, PHI.
2. Let us C, Yashwant Kanetkar, BPB Publication.
3. Programming in C, E. Balaguruswamy, TMH.

 REFERENCE BOOKS:
1. Programming in C, Byron Gottfried, Schaum's series outline TMH.
2. Programming in C, Ghosh, PHI.
3. Computer Programming in C, V. Raja Raman, PHI.

MATS School of Engineering &I.T

MATS UNIVERSITY
ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)

SCHOOL OF ENGINEERING & I.T.

Semester: I B.Tech   Branch: All Streams of Engineering

Subject: Engineering Graphics and Design   Code: BT 103

Total Theory Periods: 28   Total Tutorial Periods: 00

Total Credits: 02

OBJECTIVES:

- To develop in students, graphic skills for communication of concepts, ideas and design of engineering products.
- To expose them to existing national standards related to technical drawings.

UNIT – I

a) IMPORTANCE OF ENGINEERING DRAWING: Scales: Representative Fraction, Type of Scale, Plain and Diagonal Scale.

b) ENGINEERING CURVES: Conic section, Ellipse, parabola, hyperbola, Cycloidal Curves: Cycloid, Epicycloids, Hypocycloid and Involutes.

UNIT – II

a) PROJECTION: Introduction, Principle of Projection, method of projection, planes of projection, four quadrants, first and third angle projection and reference line symbols for methods of projection, Orthographic projection.

b) PROJECTION OF POINTS: Introduction point situated in first, second, third & fourth quadrant. Projection of lines: Introduction, line parallel to one or both the planes, line contained by one or both the planes, line perpendicular to one of the planes, line inclined to one plane and parallel to other. Line inclined to both the planes. [Simple problems only]

UNIT – III

a) PROJECTIONS OF PLANES: Introduction, types of planes, projection of planes, projection of planes perpendicular to both the reference planes, perpendicular to one plane and parallel to the other plane, perpendicular to one plane and inclined to the other plane.

b) PROJECTIONS OF SOLIDS: Introduction, types of solids, projections of solids in simple position, projections of solids with axes inclined to one of the reference planes and   parallel to the other, projections of solids with axes inclined to both H.P. and the V.P., section planes, types of sections, true shape of section, section of solids.

MATS School of Engineering &I.T

UNIT – IV

a) DEVELOPMENT OF SURFACES: Introduction, methods of development, development of lateral surfaces of right solids, cube, prisms, cylinders, pyramids & cone.

b) ISOMETRIC PROJECTION: Introduction, Isometric axes, lines & planes, Isometric scale, Isometric projection and Isometric view of simple objects.

UNIT – V

COMPUTER AIDED DRAWING: Introduction to CAD, benefits and limitation of CAD, CAD Software's, AutoCAD introduction, Basic Commands of AutoCAD, Concept of Layers, Dimensioning and text, Creation of two dimensional drawing.

OUTCOMES:

On Completion of the course the student will be able to

- Perform free hand sketching of basic geometrical constructions and multiple views of objects.
- Do orthographic projection of lines and plane surfaces.
- Draw projections and solids and development of surfaces.
- Prepare isometric and perspective sections of simple solids.
- Demonstrate computer aided drafting.

TEXT BOOKS:

(i)   Bhatt, N.D., "Elementary Engineering Drawing", Charotar Book Stall, Anand

 (ii) George Omura, "Mastering AutoCAD" B.P.B. Publication, New Delhi

REFERENCE BOOKS:

(i) Engineering Graphics – Laxminarayanan V. and VaishWanar, R.S. Jain Brothers, New Delhi

(ii)   Engineering Graphics – Chandra, AM & Chandra Satish 1998.

(iii) Engineering Graphics – K.L. Narayan and P. Kannaih, Tata McGraw Hill

(iv) A Text book of Engineering Drawing (Plane & Solid Geometry) – N.D. Bhatt & V.M. Panchal, Charotar Publishing House

 (v) The Fundamental of Engineering Drawing and Graphics Technology – French and Vireck, McGraw Hill.

MATS School of Engineering &I.T

MATS UNIVERSITY, RAIPUR (C.G.)

SCHOOL OF ENGINEERING & I.T.

Semester: I B. Tech	**Branch: All Streams of Engineering**
Subject: Environmental Sciences	**Code: BT 104**
Total Theory Periods: 15	**Total Tutorial Periods: 00**
Total Credits: 01	

OBJECTIVES

- To create and disseminate knowledge to the students about environmental problems at local, regional and global scale.
- To provide practical training on modern instrumentation and analytical techniques for environmental analyses.
- To sensitize students towards environmental concerns, issues, and impacts of climate change and related mitigation strategies.
- To make the students to apply their knowledge for efficient environmental decision-making, management and sustainable development.
- To prepare students for successful career in environmental departments, research institutes, industries, consultancy and NGOs, etc.

UNIT-I:

CONCEPTS OF ENVIRONMENTAL SCIENCES AND NATURAL RESOURCES

Environment, Levels of organizations in environment, Structure and functions in an ecosystem; Biosphere, its Origin and distribution on land, in water and in air, Broad nature of chemical composition of plants and animals. Renewable and Non-renewable Resources, Forests, water, minerals, Food and land (with example of one case study); Energy, Growing energy needs, energy sources (conventional and alternative).

UNIT-II:

BIODIVERSITY AND ITS CONSERVATION

Biodiversity at global, national and local levels: India as a mega-diversity nation; Threats to biodiversity (biotic, abiotic stresses), and strategies for conservation.

UNIT-III:

ENVIRONMENTAL POLLUTION

Types of pollution- Air, water (including urban, rural, marine), soil, noise, thermal, nuclear; Pollution prevention; Management of pollution- Rural/Urban/Industrial waste management [with

MATS School of Engineering &I.T

case study of any one type, e.g., power (thermal/nuclear), fertilizer, tannin, leather, chemical, sugar], Solid/Liquid waste management, disaster management.

UNIT-IV:

ENVIRONMENTAL BIOTECHNOLOGY AND ENVIRONMENTAL MONITORING Biotechnology for environmental protection- Biological indicators, bio-sensors; Remedial measures- Bio-remediation, phyto-remediation, bio-pesticides, bio-fertilizers; Bio-reactors- Design and application. Monitoring- Identification of environmental problem, tools for monitoring (remote sensing, GIS); Sampling strategies- Air, water, soil sampling techniques.

UNIT-V:

SOCIAL ISSUES AND ENVIRONMENT

Problems relating to urban environment- Population pressure, water scarcity, industrialization; remedial measures; Climate change- Reasons, effects (global warming, ozone layer depletion, acid rain) with one case study; Legal issues- Environmental legislation (Acts and issues involved), Environmental ethics.

OUTCOMES
- After completion of the course, the students have: Acquired fundamental knowledge of different aspects of environment and local, regional and global environmental problems.
- Developed environmental monitoring skills, including conduct of experiments and data analysis.
- Obtained exposure to the environmental pollution control technologies. Acquired the knowledge and skills needed for the environmental design and management.
- Acquired skills in the preparation, planning and implementation of environmental projects.

TEXTBOOKS:

1. Gilbert M. Masters, "Introduction to Environmental Engineering and Science", 2nd Edition, Pearson Education, 2004.

2. Benny Joseph, "Environmental Science and Engineering", Tata McGraw-Hill, New Delhi, 2006.

MATS School of Engineering &I.T

REFERENCE BOOKS:

1. A. K. Chatterji, "Introduction to Environmental Biotechnology", Prentice Hall of India, New Delhi, 2006.

2. R.K. Trivedi,"Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol. I and II, Enviro Media.

3. Nebel B. J., "Environmental Science", Prentice Hall of India, New Delhi, 1987.

MATS UNIVERSITY, RAIPUR (C.G.)

SCHOOL OF ENGINEERING & I.T.

Semester: I B.Tech   Branch: All Streams of Engineering

Subject: Technical English   Code: BT 105

Total Theory Periods: 28   Total Tutorial Periods: 00

Total Credits: 02

OBJECTIVES:

- To enable learners of Engineering and Technology develop their basic communication skills in English.
- To emphasize specially the development of speaking skills amongst learners of Engineering and Technology.
- To ensure that learners use the electronic media such as internet and supplement the learning materials used in the classroom.
- To inculcate the habit of reading and writing leading to effective and efficient communication.

UNIT-I

Technical vocabulary-meaning in context, sequencing words, articles, prepositions, intensive reading and predicting content-reading and interpretation- process description.

UNIT-II

Phrases/structures indicating use/purpose- nonverbal communication- listening- corelating verbal and nonverbal communication-speaking in group discussion- formal letter writing- writing analytical paragraphs.

UNIT III

Cause and effect expressions- different grammatical forms of the same word- speaking stress and intonation- writing using connectives- report writing- types, structures, data collection, content form recommendation.

UNIT –IV

Numerical adjectives- oral instructions- descriptive writings, letter of application-content, format (c.v./biodata)-imperative forms –checklists, yes/no question forms- e mail communication.

MATS School of Engineering &I.T

UNIT-V

Speaking – discussion of problems and solutions- creative and critical thinking, writing a proposal.

OUTCOMES:

Learners should be able to

- Speak clearly, confidently, comprehensibly, and communicate with one or many listeners using appropriate communicative strategies.
- Write cohesively and coherently and flawlessly avoiding grammatical errors, using a wide vocabulary range, organizing their ideas logically on a topic.
- Read different genres of texts adopting various reading strategies.

Listen/view and comprehend different spoken discourses/excerpts in different accents.

BOOKS AND REFERENCES:

1. P.k. dutta, g. Rajeevan and c.l.n.prakash, 'a course in communication skills,. Cambridge university press, india2007

2. Krishna mohan and meerabanerjee, 'developing communication skills' Macmillan india limited

3. Edger thrope, showickthrope, 'objective english' second edition,pearson education,2007

MATS UNIVERSITY, RAIPUR (C.G.)

SCHOOL OF ENGINEERING & I.T.

Semester: I B.Tech.   Branch: All Streams of Engineering
Lab: Engineering Physics Laboratory   Code: BT 106
Total Practical Periods: 28   Total Credit: 01

OBJECTIVES:

- To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics and properties of matter.

OUTCOMES:

- The hands on exercises undergone by the students will help them to apply physics principles of optics and thermal physics to evaluate engineering properties of materials.

LIST OF EXPERIMENTS (Any ten experiments can be performed)

1. To determine the surface tension by Capillary/Jager's method.
2. To determine the wave length of light by Newton's rings method.
3. To determine the wave length of light by Fresnel's Biprism.
4. To determine the focal length of combination of two thin lenses by nodal slide assembly and its verification.
5. To determine specific resistance of a wire by Carry Foster's Bridge.
6. To determine the Hall coefficient of semiconductor.
7. To determine e/m by Thomson's method.
8. Study of Photo – Cell and determination of Planck's constant.
9. Determination of wavelength of a spectral line using diffraction grating.
10. Determination of divergence of LASER beam.
11. Determination of grating element of a diffraction grating using LASER beam.
12. To determine the coefficients of viscosity of a liquid by capillary flow/Stoke's method.
13. To determine the frequency of A.C. mains using sonometer.
14. To determine the moment of inertia of flywheel.
15 To determine the forbidden energy gap of semiconductor diode.
16. To determine the mechanical equivalent of heat (J) by Calender&Barne's method.
17. To determine the numerical aperture (NA) of the given fiber cables.
18. To study the characteristics of LDR.

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester: I B.Tech. Branch: All Streams of Engineering
Lab: Programming & Soft Skills laboratory Code: BT 107
Total Practical Periods: 28 Total Credits: 01

List of Programs:

1 Write a program to take the radius of a sphere as input and print the volume and surface area of that sphere.

2 Write a program to take a 5-digit number as input and calculate the sum of its digits.

3 Write a program to take three sides of a triangle as input and verify whether the triangle is an isosceles, scalene Oran equilateral triangle.

4 Write a program that will take 3 positive integers as input and verify whether or not they form a Pythagorean triplet or not.

5 Write a program to print all the Prime numbers between a given ranges.

6 Write a program to define a function that will take an integer as argument and return the sum of digits of that integer**.**

7 Write a program to define a macro that can calculate the greater of two of its arguments. Use this macro to calculate the greatest of 4 integers.

8 Write a program to define a recursive function that will print the reverse of its integer argument.

9 Write a program to print the sum of first N even numbers using recursive function.

10 Write a program to sort an array using Bubble sort technique.

11 Write a program that will take the elements of two integer arrays of 5 element each, and insert the common elements of both the array into a third array (Set intersection)

12 Write a program to take 5 names as input and print the longest name.

13 Write a program to check whether two given strings are palindrome or not using user defined function.

14 Write a program to find sum of all array elements by passing array as an argument using user define functions.

15 Write a program to convert decimal number to binary number using the function.

MATS School of Engineering &I.T

16 Write a program to get the largest and smallest element of an array using the function.

17 Write a program to define a structure Student that will contain the roll number, name and total marks of a student. The program will ask the user to input the details of 5 students and print the details of all the students whose total marks is greater than a given value.

18 Write a program to define a union Contact that will contain the members Mobile no and E-mail id. Now define structure Employee that will contain name, roll number, mode of contact (mob/e-mail) and a variable of type Contact as members. The program will ask the user to give the details of two Employees including mode of contact and the contact num/ E-mail. Print the details of both the Employees.

19 Write a program to count vowels and consonants in a string using pointer.

20 Write a program to swap two numbers using pointers.

21 Write a program to find sum of array elements using Dynamic Memory Allocation.

22 Write a program that will ask the user to input a file name and copy the contents of that file into another file.

23 Write a program that will take any number of integers from the command line as argument and print the sum of all those integers.

24 Write a program to process sequential file for payroll data.

25 Write a program to process random file of library data.

Smart Working with MS-Office

MS-Word

    a) Creating, editing, saving and printing text documents

    b) Font and paragraph formatting

    c) Simple character formatting

    d) Inserting tables, smart art, page breaks

    e) Using lists and styles

    f) Working with images

    g) Using Spelling and Grammar check

    h) Understanding document properties

    i) Mail Merge

MATS School of Engineering &I.T

MS-Excel

a) Spreadsheet basics

b) Creating, editing, saving and printing spreadsheets

c) Working with functions & formulas

d) Modifying worksheets with color &auto formats

e) Graphically representing data : Charts & Graphs

f) Speeding data entry : Using Data Forms

g) Analyzing data : Data Menu, Subtotal, Filtering Data

h) Formatting worksheets

i) Securing & Protecting spreadsheets

MS-PowerPoint

a) Opening, viewing, creating, and printing slides

b) Applying auto layouts

c) Adding custom animation

d) Using slide transitions

e) Graphically representing data : Charts & Graphs

f) Creating Professional Slide for Presentation.

LIST OF EQUIPMENT'S / MACHINE REQUIRED:

PCs, C-Compiler, C Online Compiler, Microsoft Office (version 2007 or above)

REFERENCES:

1. Programming in ANSI C – E. Balaguruswamy Tata Mc-Gcraw Hill.

2. Let us C, YashwantKanetkar, BPB Publication

3. C: The Complete Reference, Herbert Schildt, McGraw Hill.

4. Office 2007 for Dummies, Wallace Wang, Wiley Publishing

5. MS-Office 2010 Training Guide, Satish Jain/M.Geeta/Kratika, BPB Publications

MATS School of Engineering &I.T

MATS UNIVERSITY
ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)

SCHOOL OF ENGINEERING & I.T.

Semester: I B.Tech **Branch: All Streams of Engineering**
Lab: Engineering Graphics and Design Laboratory **Code: BT 108**
Total Practical Periods: 60 **Total Credits: 02**

LIST OF EXPERIMENTS

Component-1
Sheet-1: Projection of Solids (4 problems) + Section and Development of solid surfaces (4 problems) Sheet -2: Orthographic projection without section (4 problems).
Sheet -3: Orthographic projection with section (4 problems). Sheet- 4: Isometric Projections (6 problems).

Component -2
One A-3 size sketch book consisting of:-
1) 6 problems each from Projection of Curves, Lines, Planes and Solids.
2) 6 problems from Section and Development of Solids.
3) 4 problems each from the Orthographic Projections (with Section), Reading of orthographic projections and Isometric projections.

Component - 3
1. An introduction of cad software and its utilities in the engineering software.
2. Study of the basic initial setting and viewing of drafting software interface.
3. Study of various tool bar options and exercises to familiarize all the drawing tools.
4. Use of various modify commands of drafting software.
5. Dimensioning in 2d and 3d entities.
6. Draw different types of 3d modeling entities using viewing commands, to view them (isometric projection).
7. Sectioning of solid primitives and rendering in 3d.
8. Intersection of solid primitives.

MATS School of Engineering &I.T

MATS UNIVERSITY, RAIPUR (C.G.)

SCHOOL OF ENGINEERING & I.T.

Semester: I B.Tech   **Branch: All Streams of Engineering**
Lab: Communication & Soft Skills Laboratory   **Code: BT 109**
Total Practical Periods: 28   **Total Credits: 01**

LIST OF TASKS:

1. Listening comprehension – Achieving ability to comprehend material delivered at relatively fast speed; comprehending spoken material in Standard Indian English, British English, and American English; intelligent listening in situations such as interview in which one is a candidate.

2. Vocabulary building, Creativity, using Advertisements, Case Studies etc.

3. Personality Development: Decision-Making, Problem Solving, Goal Setting, Time Management & Positive Thinking

4. Cross-Cultural Communication: Role-Play/ Non-Verbal Communication.

5. Meetings- making meeting effective, chairing a meeting, decision making, seeking opinions , interrupting and handling interruptions, clarifications, closure- Agenda, Minute writing.

6. Group Discussion – dynamics of group discussion, Lateral thinking, Brainstorming and Negotiation skills

7. Resume writing – CV – structural differences, structure and presentation, planning, defining the career objective

8. Interview Skills – formal & informal interviews, concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele and video-conferencing   9. Writing Skills - Business Communication, Essays for competitive examinations.

10. Technical Report Writing/ Project Proposals – Types of formats and styles, subject matter – organization, clarity, coherence and style, planning, data-collection, tools, analysis.- Feasibility, Progress and Project Reports.

MATS UNIVERSITY, RAIPUR (C.G.)

SCHOOL OF ENGINEERING & I.T.

Semester: I B.Tech   Branch: All Streams of Engineering
Lab:Manufacturing Practices -I Laboratory   Code: BT 110
Total Practical Periods: 45+ (15 Instructional Periods)   Total Credits: 02

INSTRUCTIONAL SYLLABUS

Carpentry:
Timber, definition, engineering applications, seasoning and preservation, plywood and ply boards.

Foundry:
Moulding sands, constituents and characteristics. Pattern, definition, materials, types, core prints. Role of gate, runner, riser, core and chaplets. Causes and remedies of some common casting defects like blow holes, cavities, inclusions.

Welding:
Definitions of welding, brazing and soldering processes, and their applications, Oxyacetylene gas welding process, equipment and techniques, type of flames and their applications. Manual met an arc Welding technique and equipment, AC and DC welding, electrodes, constituents and functions of electrode coating, Welding positions. Type of weld joint. Common welding defects such ascracks, undercutting slag inclusion, porosity.

LIST OF EXPERIMENTS

1. T-Lap joint and Bridle joint (Carpentry shop)

2. Mould of any pattern (foundry shop)

3. Casting of any simple pattern (foundry shop)

4. (a) Gas welding practice by students on mild steel flat

(b) Lap joint by Gas welding

5. (a) MMA Welding practice by students

(b) Square butt joint by MMA Welding

6. (a) Lap joint by MMA Welding

    (b) Demonstration of brazing

MATS School of Engineering &I.T

MATS UNIVERSITY
ARANG, RAIPUR (C.G.)

MATS UNIVERSITY
SCHOOL OF ENGINEERING & I.T.
SCHEME OF TEACHING AND EXAMINATION SESSION 2022-23
B. TECH.II – SEMESTER

S. No.	Code	Subject	Periods per week			Scheme of marks		Total Credit
			L	T	P	ESE	IM	
1.	BT200	Engineering Mathematics –II	3	1	-	70	30	4
2.	BT201	Engineering Chemistry	3	-	-	70	30	3
3.	BT202	Basic Electrical & Electronics Engineering	3	-	-	70	30	3
4.	BT203	Object Oriented Programming	3	-	-	70	30	3
5.	BT204	Constitution of India, Professional Ethics and Human Rights	1	-	-	70	30	1
6.	BT205	Professional Elective						
	BT2051	Fundamental of Mechanical Engineering (For Aero/Mech/Mining/Civil)	3	-	-	70	30	3
	BT2052	Introduction to Scripting (For CSE/Elex/Electrical)						
7.	BT206	Engineering Chemistry Laboratory	-	-	2	30	20	1
8.	BT207	Basic Electrical & Electronics Engineering Laboratory	-	-	2	30	20	1
9.	BT208	Advance Programming Laboratory	-	-	2	30	20	1
10.	BT209	Professional Elective Laboratory						
	BT2091	Fundamental of Mechanical Engineering Laboratory (For Aero/Mech/Mining/Civil)	-	-	2	30	20	1
	BT2092	Java Script Laboratory (For CSE/Elex/Electrical)						
11.	BT210	Manufacturing Practices – II Laboratory	-	-	4	30	20	2
		Total	**16**	**1**	**12**	**570**	**280**	**23**

L – Lecture, T – Tutorial, ESE – End Semester Examination,
P – Practical, IM – Internal Marks (Include Class Test & Teacher's Assessment

MATS School of Engineering &I.T

MATS UNIVERSITY
ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester: II B.Tech	Branch: All Streams of Engineering
Subject: Engineering Mathematics-II	Subject Code: BT 200
Total Lecture + Tutorial Periods: 60	Total Credits: 04

OBJECTIVES:

- To make the scholars perceive the series analysis could be a powerful methodology wherever the formulas square measure integrals and to possess information of increasing periodic functions that explore sort of applications of Fourier series.
- To possess intensive information of PDE those arise in mathematical descriptions of things in engineering. To review a few amount which will take any of a given vary of values that will not be foreseen because it is however can be delineated in terms of their likelihood.
- To acquaint the student with the concepts of vector calculus needed for problems in all engineering disciplines.
- To produce a sound background of advanced analysis to perform an intensive investigation of major theorems of complex analysis and to use these ideas to a large vary of issues that features the analysis of each complex line integrals and real integrals.
- To make the student appreciate the purpose of using transforms to create a new domain in which it is easier to handle the problem that is being investigated.

UNIT I

FOURIER SERIES

Fourier series, Even odd function, Half range sine and cosine series, Parseval's theorem, practical harmonic analysis & Fourier Transform

UNIT II

PARTIAL DIFFERENTIAL EQUATION

Formation, Solution by direct integration method, Linear equation of first order, Homogeneous linear equation with constant coefficients, Non-homogeneous linear equations, Method of separation of variables & application of PDE

UNIT III

COMPLEX ANALYSIS

Derivative, Cauchy-Riemann equations, Analytic functions, Harmonic functions, Flow problems, Complex integration, Cauchy theorem, Cauchy integral formula, Taylor & Laurent series, Singularity, Residue

MATS School of Engineering &I.T

UNIT IV

LAPLACE TRANSFORMATION

Definition, Transform of elementary functions, Properties of Laplace transform, of derivatives & integrals, Multiplication by tn, Division by t, Evaluation of integrals, Inverse Laplace function, Convolution theorem, Unit step functions, Unit impulse function, periodic function. Application to solution of ordinary differential equations

UNIT V

VECTOR CALCULUS

Directional derivative, Gradient, Divergence and curl, Line, Surface and Volume integrals, Green's, Gauss's &Stoke's theorem (without proof) and applications

OUTCOMES:

The subject helps the students to develop the fundamentals and basic concepts in vector calculus, PDE, Laplace transform and complex functions. Students will be able to solve problems related to engineering applications by using these techniques.

TEXT BOOKS:

1. Higher Engineering Mathematics by B.S.Grewal (40th edition)-Khanna Publisher.
2. Advanced Engineering Mathematics by Erwin Kreyszig (8th edition)-John Wiley & Sons.

REFERENCE BOOKS:

1. Differential Calculus by Gorakh Prasad-Pothisala Private Limited.
2. Advanced Engineering Mathematics by R.K.Jain and S.R.K. Iyengar-Narosa Publishing House.
3. Applied Mathematics by P.N.Wartikar&J.N.Wartikar Vol-ll –Pune VidyarthiGrihaPrakasan, Pune

MATS School of Engineering &I.T

MATS UNIVERSITY, RAIPUR (C.G.)

SCHOOL OF ENGINEERING & I.T

Semester: II B. Tech	**Branch: All Streams of Engineering**
Subject: Engineering Chemistry	**Code: BT 201**
Total Theory Periods: 48	**Total Tutorial Periods: 00**
Total Credits: 03	

OBJECTIVES:

- To make the students conversant with boiler feed water requirements, related problems and water treatment techniques.
- Principles of electrochemical reactions, redox reactions in corrosion of materials and methods for corrosion prevention and protection of materials.
- Principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells.
- Preparation, properties and applications of engineering materials.
- Types of fuels, calorific value calculations, manufacture of solid, liquid and gaseous fuels

UNIT-I:

(a) ELECTROCHEMISTRY AND BATTERY TECHNOLOGY ELECTROCHEMISTRY: Introduction, Derivation of Nernst equation for electrode potential. Reference electrodes: Introduction, construction, working and applications of calomel and Ag / AgCl electrodes. Measurement of electrode potential using calomel electrode. Ion selective electrode: Introduction; Construction and working of glass electrode, determination of pH using glass electrode. Concentration cells: Electrolyte concentration cells, numerical problems.

(b) BATTERY TECHNOLOGY:

Introduction, classification - primary, secondary and reserve batteries. Characteristics - cell potential, current, capacity, electricity storage density, energy efficiency; cycle 10 hours life and shelf life. Construction, working and applications of Zinc Air, Nickel- metal hydride batteries. Lithium batteries: Introduction, construction, working and applications of Li-MnO2 and Li-ion batteries.

(c) FUEL CELLS:

Introduction, difference between conventional cell and fuel cell, limitations & advantages. Construction, working & applications of methanol-oxygen fuel cell with H2SO4 electrolyte.

MATS School of Engineering &I.T

UNIT-II:

(a) CORROSION AND METAL FINISHING CORROSION:

Introduction, electrochemical theory of corrosion, galvanic series. Factors affecting the rate of corrosion: ratio of anodic to cathodic areas, nature of metal, nature of corrosion product, nature of medium – pH, conductivity, and temperature. Types of corrosion- Differential metal, differential aeration (Pitting and water line) and stress. Corrosion control: Inorganic coatings Anodizing of Al and phosphating; Metal coatings-Galvanization and Tinning. Cathodic protection (sacrificial anodic and impressed current methods).

(b) METAL FINISHING:

Introduction, Technological importance. Electroplating: Introduction, principles governing-Polarization, decomposition potential and overvoltage. Factors influencing the nature of electro deposit-current density, concentration of metal ion & electrolyte; pH, temperature & throwing power of plating bath; additives- brighteners, levelers, structure modifiers & wetting agents. Electroplating of Nickel (Watt's Bath) and Chromium (decorative and hard). Electro less plating: Introduction, distinction between electroplating and electro less plating, electro less plating of copper & manufacture of double sided Printed Circuit Board with copper.

UNIT-III:

(a)FUELS AND SOLAR ENERGY FUELS:

Introduction, classification, calorific value- gross and net calorific values, determination of calorific value of fuel using bomb calorimeter, numerical problems. Cracking: Introduction fluidized catalytic cracking, synthesis of petrol by Fishcher-Tropsch process, reformation of petrol, octane and cetane numbers. Gasoline and diesel knocking and their mechanism, anti-knocking agents, power alcohol & biodiesel.

(b)SOLAR ENERGY:

Introduction, utilization and conversion, photovoltaic cells- construction and working. Design of PV cells: modules, panels & arrays. Advantages & disadvantages of PV cells. Production of solar grade silicon: Union carbide process, purification of silicon (zone refining), doping of silicon-diffusion technique (N&P types).

UNIT-IV:

POLYMERS:

Introduction, types of polymerization: addition and condensation, mechanism of polymerization- free radical mechanism taking vinyl chloride as an example. Molecular weight of polymers: number average and weight average, numerical problems. Glass transition temperature (Tg): Factors influencing Tg-Flexibility, inter molecular forces, molecular mass, branching & cross linking and stereo regularity. Significance of Tg. Structure property relationship: crystallinity, tensile strength, elasticity & chemical resistivity. Synthesis, properties and applications of PMMA (plexi glass), Polyurethane and polycarbonate. Elastomers: Introduction, synthesis, properties and applications of Silicone rubber.

MATS School of Engineering &I.T

Adhesives: Introduction, synthesis, properties and applications of epoxy resin. Polymer Composites: Introduction, synthesis, properties and applications of Kevlar. Conducting polymers: Introduction, mechanism of conduction in Poly aniline and applications of conducting poly aniline.

UNIT-V:

WATER TECHNOLOGY AND NANOMATERIALS

(a)WATER TECHNOLOGY:

Introduction, boiler troubles with disadvantages & prevention methods-scale and sludge formation, priming and foaming, boiler corrosion (due to dissolved O_2, CO_2 and $MgCl_2$). Determination of DO, BOD and COD, numerical problems on COD. Sewage treatment: Primary, secondary (activated sludge method) and tertiary methods. Softening of water by ion exchange process. Desalination of sea water by reverse osmosis & electro dialysis (ion selective).

(b)NANO MATERIALS:

Introduction, properties (size dependent). Synthesis-bottom up approach (sol-gel, precipitation, gas condensation & chemical vapour condensation processes). Nano scale materials- carbon nano tubes, nano wires, fullerenes, dendrimers, nano rods, &nano composites.

OUTCOMES:

- The knowledge gained on engineering materials, fuels, energy sources and water treatment techniques will facilitate better understanding of engineering processes and applications for further learning.

TEXTBOOKS:

1. B.S.Jai Prakash, R.Venugopal, Sivakumaraiah&PushpaIyengar., "Chemistry for Engineering Students", Subhash Publications, Bangalore.

2. R.V.Gadag&A.Nityananda Shetty., "Engineering Chemistry", I K International Publishing House Private Ltd. New Delhi.

3. P.C.Jain& Monica Jain., "Engineering Chemistry", Dhanpat Rai Publications, New Delhi.

REFERENCE BOOKS:

1. O.G.Palanna,"Engineering Chemistry", Tata McGraw Hill Education Pvt. Ltd. New Delhi, Fourth Reprint.

2. G.A.Ozin& A.C. Arsenault, "Nano chemistry A Chemical Approach to Nanomaterials", RSC publishing, 2005.

3. "Wiley Engineering Chemistry", Wiley India Pvt. Ltd. New Delhi. Second Edition.

4. V.R.Gowariker, N.V.Viswanathan&J.Sreedhar., "Polymer Science", Wiley-Eastern Ltd.

5. M.G.Fontana., "Corrosion Engineering", Tata McGraw Hill Publishing Pvt. Ltd. New Delhi

MATS School of Engineering &I.T

MATS UNIVERSITY
ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)

SCHOOL OF ENGINEERING & I.T

Semester: II B. Tech   **Branch: All Streams of Engineering**
Subject: Basic Electrical & Electronics Engineering   **Code: BT 202**
Total Theory Periods: 48   **Total Tutorial Periods: 00**
Total Credits: 03

COURSE OBJECTIVES
• Understand the basic concepts of DC and AC circuits.
• Analyse the series, parallel and series, parallel ac circuits.
• Acquire knowledge about working principle, construction and losses of a transformer.
• Understand the working, characteristics and applications of diodes.
• Understand the construction, working, characteristics and applications of a transistor.

Unit – I

D.C. Networks:

Elementary idea about power generation, transmission and distribution. Node voltage and mesh current method. Superposition, Thevenin's and Norton's theorems. Star- delta and Delta- star conversions.

Unit – II

Single Phase A.C. Circuits:

Single phase EMF generation, Effective & Average values of sinusoids and determination of form-factor, Analysis of simple series R-L, R-C and RLC circuits, power and power factor

Unit – III

(a) Three Phase AC circuits:

Introduction, Generation of Three-phase EMF, Phase sequence, Connection of Three-phase Windings - Delta and Star connection: Line and Phase quantities, phasor diagrams, Power equations in balanced conditions.

(b)Magnetic Circuits:

Introduction, Magneto motive force (MMF), Magnetic field strength, Reluctance, B-H curve, Comparison of the Electric and Magnetic Circuits, Series-Parallel Magnetic Circuit, Leakage flux and fringing, Magnetic Hysteresis, Eddy currents.

MATS School of Engineering &I.T

Unit – IV

(a)Single phase Transformers:

Introduction, Principles of operation, Constructional details, Ideal Transformer and Practical Transformer, EMF equation, Rating, Phasor diagram on no load, Losses, Efficiency calculations.

(b)Direct current machines:

Basic concepts and elementary idea of AC and DC machines, construction and working principal of DC Generator, emf and torque equation dc machine and types of dc motor.

Unit – V

(a)Semiconductor Devices and Applications

Introduction - Characteristics of PN Junction Diode – Zener Effect - Zener Diode and its Characteristics - Half wave and Full wave Rectifiers - Voltage Regulation. Bipolar Junction Transistor - CB, CE, CC Configurations and Characteristics - Elementary Treatment of Small Signal Amplifier

(b)Digital Electronics

Binary Number System – Boolean algebra theorems, Digital circuits - Introduction to sequential Circuits,

Flip-Flops - Registers and Counters – A/D and D/A Conversion.

COURSE OUTCOMES

• Apply the knowledge of basic laws to electric and magnetic circuits.

• Distinguish between various types of representation of ac quantities.

• Draw the phasor diagrams of an ideal and a practical transformer at no load.

• Analyse and design basic circuits which include diode, LED and seven segment display.

• Analyse and design circuits consisting of transistors.

TEXT BOOKS:

1. V.N. Mittle and Arvind Mittal, "Basic Electrical Engineering", Second Edition, Tata McGraw Hill.
2. 2 Del Torro, Vincent "Electrical Engineering Fundamentals", Second Edition Prentice Hall of India Pvt. Ltd.

MATS School of Engineering &I.T

REFERENCE BOOKS:

1. Fitzrald and Higgonbothom, "Basic Electrical Engineering", Fifth Edition, McGraw Hill.

2. D.P. Kothari and I.J. Nagrath, "Theory and Problems of Basic Electrical Engineering", PHI.

3. I.J. Nagrath and D.P. Kothari, "Electrical Machines", Tata McGraw Hill.

4. Ashfaq Hussain, "Fundamentals of Electrical Engineering", Third Edition, Dhanpat Rai and Co.

5. H. Cotton, "Advance Electrical Technology," ISSAC Pitman, London. 6. Parker Smith S. (Ed. Parker Smith N.N.), "Problems in Electrical Engineering", Tenth edition, Asia publication

MATS UNIVERSITY
ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)

SCHOOL OF ENGINEERING & I.T.

Semester: II B. Tech.   Branch: All Streams of Engineering
Subject: Object Oriented Programming   Code: BT 203
Total Theory Periods: 48   Total Tutorial Periods: 00
Total Credits: 03

COURSE OBJECTIVES
- To learn the object-oriented programming concepts using C++.
- To design and implement C++ programs with the concept of OOP.
- To understand implementation issues related to object-oriented techniques.
- To learn how to build good quality software using object-oriented programming technique.

UNIT-I
INTRODUCTION TO OOP AND C++
Concept of Object Oriented Programming, Procedural programming Vs. Object oriented programming (OOP), Features and Benefits of OOPs, Object Oriented Languages, Introduction to C++, C++ Compiler, C++ Standard library, Basics of a typical C++ environment and C++ program, Pre-processors directives, and illustrative simple C++ programs. Header files and namespaces, library files, Data Types, Keywords, Operators and Expressions, Control Structure, Loops, Arrays, Structures, Functions.

UNIT-II
CLASSES & OBJECT, CONSTRUCTORS&DESTRUCTORS
Introduction to class, class object creation, Access of class members, Scope of class and its member, Nested class, Data hiding & encapsulation, Friend function, Array within a class, Array of object as function argument, Function returning object, Static member. Constructor function, Parameterized multiple constructor, Default constructor, Dynamic memory allocation with new and delete, Copy constructor, Constant and class, Data conversion between objects of different classes, Destructor function.

UNIT- III
INHERITANCE, POINTER, VIRTUAL FUNCTIONS & POLYMORPHISM
Fundamentals of operator overloading, restrictions on operators overloading, operator functions as class members vs. as Friend functions, Overloading, <<, >> Overloading unary operators, overloading binary operators. Introduction to inheritance, Base classes and derived classes, protected members, Casting base class pointers to derived class pointers, Using member functions, Overriding base class members in a derived class, public, protected and private inheritance, Using constructors and destructors in derived classes, Implicit derived class object to base class object conversion, Composition Vs. Inheritance. Introduction to virtual functions, Abstract base classes and concrete classes, new classes and dynamic binding, virtual destructors, polymorphism, dynamic binding.

MATS School of Engineering &I.T

UNIT-IV
FILE I/O, TEMPLATES& EXCEPTION HANDLING

Files and streams, Creating a sequential access file, Reading data from a sequential access file, Updating sequential access files, Random access files, creating a random access file, Writing data randomly to a random access file, reading data sequentially from a random access file. Stream Input/output classes and objects, Stream output, Stream input, Unformatted I/O (with read and write), Stream manipulators. Function templates, Overloading template functions, Class template, Class templates and non-type parameters, Templates and inheritance, Templates and friends, Templates and static members. Basics of C++ Exception handling: Try Throw, Catch, Throwing an exception, catching an exception, rethrowing an exception, Exception specifications, processing unexpected exceptions.

UNIT-V
OOPS CONCEPTS WITH PYTHON

Python Basics, Python Objects, Standard Types, Other Built-in Types, Internal Types, Standard Type Operators, Standard Type Built-in Functions, Categorizing the Standard Types, Unsupported Types Numbers - Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Operators, Built-in Functions, Related Modules Sequences - Strings, Lists, and Tuples, Mapping and Set Types. Creating classes and objects, inheritance in python.

COURSE OUTCOME:

After completion of the course study, students will be able to
1. Explain the basics of Object Oriented Programming concepts.
2. Design and develop a C++ program with concept of Object Oriented Programming.
3. Apply the object initialization and destroy concept using constructors and destructors.
4. Apply the concept of polymorphism to implement compile time polymorphism in programs by using overloading methods and operators.
5. Use the concept of inheritance to reduce the length of code and evaluate the usefulness.
6. Apply the concept of run time polymorphism by using virtual functions, overriding functions and abstract class in programs.
7. Use I/O operations and file streams in programs.
8. Make an application/project using C++.

TEXT BOOKS:
1. Object Oriented Programming in C++, Robert Lafore, CourseSams Publishing.
2. Object Oriented Programming with C++, E. Balagurusamy, McGraw Hill Education.
3. Python 3 Object-Oriented Programming - Third Edition

REFERENCE BOOKS:
1. The Complete Reference C++, Herbert Schildt, McGraw Hill Education.
2. Let Us C++, YashavantKanetkar, BPB Publication.
3. Programming with C++, John R. Hubbard, Schaum's Outlines, McGraw Hill Education.
4. Programming with C++, D. Ravichandran, McGraw Hill Education.
5. Core Python Programming, Wesley J. Chun, Second Edition, Pearson.

MATS School of Engineering &I.T

MATS UNIVERSITY
ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)

SCHOOL OF ENGINEERING & I.T.

Semester: II B. Tech   Branch: All Streams of Engineering
Subject: Constitution of India, Professional Ethics and Human Rights   Code: BT 204
Total Theory Periods: 15   Total Tutorial Periods: 00
Total Credits: 01

COURSE OBJECTIVES
• To assimilate and get familiarized with basic information about Indian constitution and provide overall legal literacy to the young technocrats to manage complex societal issues in the present scenario.
• To identify their individual roles and ethical responsibilities towards society.
• To understand engineering ethics & responsibilities, through the learning of these topics students will be able to understand human rights/ values and its implications in their life.

UNIT-I: CONSTITUTION OF INDIA

Introduction to the Constitution of India, The Making of the Constitution and Salient features of the Constitution, Preamble to the Indian Constitution Fundamental Rights & its limitations.

UNIT-II: FUNDAMENTAL DUTIES AND UNION EXECUTIVES

Directive Principles of State Policy & Relevance of Directive Principles State Policy Fundamental Duties. Union Executives – President, Prime Minister Parliament Supreme Court of India

UNIT-III: STATE LEGISLATURE AND ELECTORAL PROCESS

State Executives – Governor Chief Minister, State Legislature High Court of State, Electoral Process in India, Amendment Procedures, 42nd, 44th, 74th, 76th, 86th &91st Amendments.

UNIT-IV: HUMAN RIGHTS

Special Provision for SC & ST Special Provision for Women, Children & Backward Classes Emergency Provisions. Human Rights –Meaning and Definitions, Legislation Specific Themes in Human Rights-Working of National Human Rights Commission in India ,Powers and functions of Municipalities, Panchyats and Co - Operative Societies..

UNIT-V: PROFESIONAL ETHICS

Scope & Aims of Engineering Ethics, Responsibility of Engineers Impediments to Responsibility. Risks, Safety and liability of Engineers, Honesty, Integrity & Reliability in Engineering.

MATS School of Engineering &I.T

COURSE OUTCOMES

At the end of the course students will be able to...

- Understand the meaning and importance of Constitution
- Explain about making of Indian Constitution - contribution of Constituent assembly on it.
- Describe the Salient (Outstanding) features of Indian Constitution.
- Describe the importance of Preamble of the Indian Constitution and its significance.

TEXTBOOKS:

1. Durga Das Basu: "Introduction to the Constitution on India", (Students Edn.) Prentice –Hall EEE, 19th / 20th Edn., 2001

2. Charles E. Haries, Michael S Pritchard and Michael J. Robins "Engineering Ethics" Thompson Asia, 2003-08-05.

REFERENCE BOOKS:

1. M.V.Pylee, "An Introduction to Constitution of India", Vikas Publishing, 2002.

2. M.Govindarajan, S.Natarajan, V.S.Senthilkumar, "Engineering Ethics", Prentice –Hall of India Pvt. Ltd. New Delhi, 2004

3. Brij Kishore Sharma,"Introduction to the Constitution of India", PHI Learning Pvt. Ltd., New Delhi, 2011.

MATS UNIVERSITY, RAIPUR (C.G.)

SCHOOL OF ENGINEERING & I.T.

Semester: II B. Tech   **Branch: Aero., Aero (Hons) Civil, Mining and Mechanical Engg.**
Subject: Fundamentals of Mechanical Engineering   **Code: BT 2051**
Total Theory Periods: 48   **Total Tutorial Periods: 00**
Total Credits: 03

OBJECTIVES:

- To develop capacity to predict the effect of force and motion in the course of carrying out the design functions of engineering.

UNIT – I:

RESULTANT AND EQUILIBRIUM ANALYSIS:

Basic concepts and laws of mechanics, system of forces, free body diagram, Resultant and equilibrium of concurrent, parallel and non-concurrent co-planar force system.   General numerical applications.

UNIT – II :

(a) ANALYSIS OF PLANE TRUSSES Perfect truss, basic assumptions for perfect truss, analysis of axial forces in the members by method of joint and method of sections. General numerical applications.

(b) FRICTION Static, dynamic and limiting friction, Law of limiting friction, Angle of friction,

Angle of Repose, Cone of Friction, Wedge friction. General numerical applications

UNIT –III :

PROPERTIES OF SURFACES Centre of Gravity, Second moment of area, determination of second moment of area by integration, polar moment of inertia, radius of gyration of area, Parallel axis theorem, Moment of inertia of composite areas, and determination of Product of inertia by integration.

UNIT –IV :

KINETICS OF PARTICLES

 (a) D'Alembert's principle applied to bodies having rectilinear motion.

 (b) Principle of work and Energy: General numerical applications

 (c) Principle of Impulse and momentum: General numerical applications

MATS School of Engineering &I.T

UNIT – V :

 LAWS OF THERMODYNAMICS

(a) Thermodynamic System, properties, process, cycle, thermodynamic equilibrium, Quasi-static Process, Zeroth Law of thermodynamics, Work and Heat transfer, flow work, general numerical application.

(b)First Law of thermodynamics, internal energy, proof of internal energy as a point function, general numerical application of first law to non-flow process and steady flow process.

OUTCOMES:

> (a)Ability to explain the differential principles applies to solve engineering problems dealing with force, displacement, velocity and acceleration.
> (b)Ability to analyses the forces in any structures.
> **(c)** Ability to solve rigid body subjected to dynamic forces.

TEXT BOOKS:

1. Engineering Mechanics (Statics and Dynamics) ; A. K. Tayal ,Umesh Pub., Delhi .

2. Engineering Mechanics : S. Timoshenko and D.H. Young,TMH

3. Engineering Thermodynamics: P.K.Nag, TMH

4. Engineering Thermodynamics: C.P.Arora, TMH

 REFERENCE BOOKS:

1. Engineering Mechanics (Statics and Dynamics): R.C.Hibbeler, Pearson

2. Engineering Mechanics:Meriam and Kreige ,John Wiley and sons

3. Thermodynamics: Cengel and Boles, TMH

4. Essentials of Engg Mechanics: S.Rajasekharan&G.ShankaraSubramaniyam, Vikas Publications

5. Engineering Mechanics: BasudebBhatytacharya , Oxford

MATS UNIVERSITY, RAIPUR (C.G.)

SCHOOL OF ENGINEERING & I.T.

Semester: II B. Tech
Subject: **Introduction to Scripting**
Total Theory Periods: 48
Total Credits: 03

Branch: **Comp. Sci. and Engg. and CSE(Hons)**
Code: **BT 2052**
Total Tutorial Periods: 00

COURSE OBJECTIVE:
1. Design and develop static and dynamic web pages.
2. Familiarize with Client-Side Programming,
3. Learn web page validations.
4. To design and implement web page scripts.
5. To learn how to build good interactive web pages using HTML and Javascript.

UNIT I – INTRODUCTION TO SCRIPTING LANGUAGES
Introduction to PERL and Scripting Scripts and Programs, Origin of Scripting, Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines.

UNIT II - HTML BASICS
HTML basics, Elements, Attributes and Tags, Basic Tags, Advanced Tags, Frames, Images. Cascading style sheets: Adding CSS, CSS and page layout. JavaScript: Introduction, Variables, Literals, Operators, Control structure, Conditional statements, Arrays, Functions, Objects, Predefined objects, Object hierarchy, Accessing objects.

UNIT III - JAVASCRIPT PROGRAMMING OF REACTIVE WEB PAGES ELEMENTS
Events, Event handlers, multiple windows and Frames, Form object and Element, Advanced JavaScript and HTML, Data entry and Validation, Tables and Forms. Introduction to Python Programming: History of Python, Need of Python Programming, Running Python Scripts, Variables, Assignment, Keywords, Input-Output, Indentation, Types - Integers, Strings, Booleans.

UNIT IV - OPERATORS AND EXPRESSIONS
Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations. Data Structures: Lists - Operations, Slicing, Methods; Tuples, Sets, Dictionaries, Sequences.

MATS School of Engineering &I.T

UNIT V - CONTROL FLOW

if, if-else, for, while, break, continue, pass Functions - Defining Functions, Calling Functions, Passing Arguments, Default Arguments, Variable-length arguments, Fruitful Functions (Function Returning Values), Scope of the Variables in a Function - Global and Local Variables. Development of sample scripts and web applications. Client Side Scripting, Server-Side Scripting, Managing data with SQL, Cookies, use the cookies, advantages of the cookies and how to create cookies. Introduction to Node.js.

COURSE OUTCOME:

After completion of the course study, students will be able to

1. Explain the basics of websites and WebPages concepts.
2. Design and develop a Web Page with DOM Elements.
3. Apply the validation and verification of data at client end.

TEXT BOOKS:

1. Beginning PERL, Curtis Poe, Wrox Publication
2. Sams Teach Yourself HTML, CSS and Java Script, Julie C, Meloni.
3. Javascript by Example, Ellie Quigley, Prentice Hall.
4. Programming Python, Mark Lutz, O'Reilly.

REFERENCE BOOKS:

1. Learning Perl: Making Easy Things Easy and Hard Things Possible 7th Edition, O'Reilly
2. Mastering HTML, CSS &Javascript Web Publishing, Laura Lemay, Rafey Colburn, BPB Publications.
3. Eloquent Javascript, MarjinHaverbeke
4. Programming Javascript Applications, Eric Elliott, O'Reilly Media.

MATS School of Engineering &I.T

MATS UNIVERSITY
ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)

SCHOOL OF ENGINEERING & I.T.

Semester: II B. Tech   Branch: All Streams of Engineering
Subject: **Engineering Chemistry Laboratory**   Code: BT 206
Total Theory Periods: 28   Total Tutorial Periods: 00
Total Credits: 01

COURSE OBJECTIVE:
1. To make the student acquire practical skills in the wet chemical and instrumental methods for quantitative estimation of hardness, alkalinity, metal ion content, corrosion in metals and cement analysis.

LIST OF EXPERIMENTS
1. Acid-base titration (estimation of commercial caustic soda)

2. Redox titration (estimation of iron using permanganometry)

3. Complexometric titration (estimation of hardness of water using EDTA titration).

4. Preparation and analysis of metal complex (for example thiourea/copper sulfate or nickel chloride/ammonia complexes).

5. Chemical kinetics (determination of relative rates of reaction of iodide with H_2O_2 at room temperature (Clock reaction).

6. Viscosity of solutions (determination of percentage composition of sugar solution from viscosity).

7. Detection of functional groups in organic compounds.

8. Utilization of paper/thin layer/column chromatographic techniques in the separation of organic compounds

9. Conduct metric titration (determination of the strength of a given HCl solution by titration against a standard NaOH solution).

10. Determine the amount of oxalic Acid and sulphuric Acid/Hydrochloric Acid in one liter of solution given standard Sodium Hydroxide and Potassium Permangate.

11. To determine the Carbonate, Bicarbonate and Chloride contents in irrigation water.

12. Determination of dissolved Oxygen in given sample of water.

13. Determination of calorific value of fuel by Bomb Calorimeter.

14. Determination of Flash Point and Fine Point of Lubricant by Abels and Pensky Martin apparatus.

COURSE OUTCOME:
1. The students will be conversant with hands-on knowledge in the quantitative chemical analysis of water quality related parameters, corrosion measurement and cement analysis.

MATS School of Engineering &I.T

MATS UNIVERSITY, RAIPUR (C.G.)

SCHOOL OF ENGINEERING & I.T.

Semester: II B. Tech   Branch: All Streams of Engineering
Subject: Basic Electrical & Electronics Engineering Laboratory   Code: BT 207
Total Theory Periods: 28   Total Tutorial Periods: 00
Total Credits: 01

List of Experiments (To perform minimum 10 experiments)

1. To verify Thevenin's theorem and Norton's theorem.

2. To verify Superposition theorem.

3. To verify Kirchhoff's Current Law and Kirchhoff's Voltage Law.

4. To verify Maximum Power Transfer theorem

5. To determine V– I characteristics of Incandescent lamp.

6. To study B-H curve.

7. To measure current, power, voltage and power factor of series RLC circuit.

8. To measure current, power, voltage of parallel RLC circuit.

9. To measure current, power, voltage of series parallel RLC circuit.

10. To measure R and L of choke coil.

11. To study construction of transformer.

12. To perform ratio test and polarity test of single phase transformer.

13. To calculate efficiency of single phase transformer by direct loading.

14. To study construction of D.C. machine.

15. To study charging and discharging of a capacitor.

16. To study the Wattmeter and Energy meter.

MATS School of Engineering &I.T

MATS UNIVERSITY, RAIPUR (C.G.)

SCHOOL OF ENGINEERING & I.T.

Semester: II B. Tech   Branch: All Streams of Engineering
Subject: **Advance Programming Laboratory**   **Code: BT 208**
Total Theory Periods: 28   **Total Tutorial Periods: 00**
Total Credits: 01

1. Write a program to check whether a given number is Prime or not.

2. Write a program to read number and to display the largest value between two, three or four numbers by using switch-Case statements.

3. Write a program to find sum of first natural numbers : sum= 1+2+3+4+……. 100 by using

   a. for loop   b. while loop   c. do-while loop

4. Write a program to find sum of the following series using function:

   Sum= $x-(x)^3/3!+(x)^5/5!-………..(x)^n/n!$

5. Write a program to read the elements of two matrices & to perform the matrix multiplication.

6. Write a program to swap the contents of two variable by using

   a. call by value   b. Call by reference

7. Write a program to perform the following arithmetic operations on complex numbers using structure

   a. Addition of the two complex numbers   b. Subtraction of two complex numbers

   c. Multiplication of two complex numbers   d. Division of two complex numbers

8. Write a C++ program to declare a class. Declare pointer to class. Initialize and display the contents of the class member.

9. Write an object-oriented program (OOP) using C++ to exchange the private data members of two different functions using friend functions.

10. Write an OOP using C++ to count how many times a particular member function of a class is called by:

    a. A particular object   b. Any objects

11. Write an OOP using C++ to define a constructor for a "Date" class that initializes the Date objects with initial values. In case initial values are not provided, it should initialize the objects with default values.

MATS School of Engineering &I.T

12 Write an OOP using C++ to overload:

    a. + Operator   b. = operator   c. >> operator   d. ++ operator

13 Write a C++ program to demonstrate how ambiguity is avoided using scope resolution operator in the following:

    a. Single Inheritance   b. Multiple Inheritance

14 Write a C++ Program to demonstrate function overloading for swapping of two variables of the various data types (integer, floating-point number and character type).

15 Write a C++ program to declare a class. Declare pointer to class. Initialize and display the contents of the class member.

16 Write a C++ program to access the private data of a class by non-member function through friend function where the friend function is declared:

    a. in the location of public category   b. in the location of private category

    c. within the scope of a class definition itself   d. defined with inline code subtraction

17 Write a C++ program to demonstrate how a pure virtual function is defined, declared and invoked from the object of derived class through the pointer of the base class.

18 Write a C++ program to open a file and count the number of characters, number of vowels and number of newline characters present in the file.

19 Write a program to copy the contents of one text file to another and display both the files using a text Menu.

20 Create a database of 10 students. The database should contain the name, marks of 5 subjects, aggregate marks, aggregate percentage and division according to the following conditions:

    a. Percentage greater or equal to 60 – First division

    b. Percentage between 50 and less than 60 – Second division

    c. Percentage between 40 and less than 50 – Third division

    d. Percentage below 40 – Improvement required

Display the above database of every student in a tabulated form. Implement the above program using Structures, Text-Menu and File I/O operations.

21 Write an OOP using a class template to read any five parameterized data type such as float and integer, and print the average.

22 Write a program for sorting of numbers with Bubble Sort using template function.

23 Write a C++ program to declare a class. Declare pointer to class. Initialize and display the contents of the class member.

24 Write a C++ program to read two numbers and find the division of these two numbers using exception handling.

MATS School of Engineering &I.T

25 Write a C++ program to create a function which take a parameter, if the value of parameter is > 0 then throw integer type, if parameter is = 0, then throw character type, if parameter is < 0 then throws float type exception but for all design use only one catch block.

26 Write a python program for finding biggest number among 3 numbers.

27 Implement Python Script to generate prime numbers series up to n

28 Implement python script to read person's age from keyboard and display whether he is eligible for voting or not.

29 Write a python program to work with classes and objects.

30 Write a python program that makes use of function to display all such numbers, which are divisible by 7 but are not a multiple of 5, between 1000 and 2000.

LIST OF EQUIPMENT/ MACHINE REQUIRED

PCs, Turbo C++ compiler, Online C++ Compiler, Python 3/Python IDE, Online python compiler

REFERENCES:

1. Programming with C++, D. Ravichandran, McGraw Hill Education.

2. Object Oriented Programming with C++, E. Balagurusamy, McGraw Hill Education.

3. Mastering C++, K. R. Venugopal, Mcgraw Hill Education.

4. The Complete Reference C++, Herbert Schildt, McGraw Hill Education.

5. Object Oriented Programming in C++, Robert Lafore, CourseSams Publishing.

6. Let Us C++, YashavantKanetkar, BPB Publication.

7. Head-First Python: A Brain-Friendly Guide (2nd Edition), Paul Barry, Oreilly.

8. Python Programming: An Introduction to Computer Science (3rd Edition), John Zelle,

MATS School of Engineering &I.T

MATS UNIVERSITY, RAIPUR (C.G.)

SCHOOL OF ENGINEERING & I.T.

Semester: II B. Tech   Branch: Aero., Aero. (Hons.) Civil, Mining and Mechanical Engg.
Lab: Fundamentals of Mechanical Engineering Laboratory   Code: BT 2091
Total Practical Periods: 28   Total Credits: 01

Note: MINIMUM TEN NUMBERS OF EXPERIMENTS IS TO BE PERFORMED

LIST OF EXPERIMENTS

1. To verify law of triangle of forces.

2. To verify the Lami's theorem.

3. To verify the law of polygon of forces.

4. To verify the law of lever. 5. To determine the support reactions of a simply supported beam subjected to point loads.

6. To draw the variation of bending moment at a given section in a simply supported beam under a moving point load.

7. To find the coefficient of friction between surfaces of wooden plane and following blocks: i) Aluminum ii) Tin iii) Glass iv) Asbestos v) Teak ply vi) Sand paper vii) card board .

8. To determine the coefficient of friction between (i) Belt and pulley (ii) Rope and pulley.

9. To study simple jib crane and to determine the internal forces in members of jib crane.

10. To determine the stiffness of helical compression spring.

11. To study lifting machine.

12. To study the lifting machine "second order pulley system" and to draw the following characteristic diagram: (i) Load-effort diagram (ii) Load- ideal effort diagram (iii) Load-efficiency diagram Also to determine the law of machine and the maximum efficiency of machine.

13 To study the lifting machine "Wheel and Differential axle" and to draw the following characteristic diagram: (i). Load-effort diagram (ii) Load- ideal effort diagram (iii). Load-efficiency diagram. Also to determine the law of machine and the maximum efficiency of machine.

14. To study the lifting machine "Worm and worm wheel" and to draw the following characteristic diagram: (i). Load-effort diagram (ii). Load- ideal effort diagram (iii). Load-efficiency diagram. Also to determine the law of machine and the maximum efficiency of machine.

MATS School of Engineering &I.T

15. To study the lifting machine "Simple screw jack" and to draw the following characteristic diagrams of the machine: (i) Load-effort diagram (ii). Load- ideal effort diagram (iii) Load-efficiency diagram Also to determine the law of machine and the maximum efficiency of machine.

16. To study the lifting machine "Modified screw jack" and to draw the following characteristic diagrams of the machine: (i) Load-effort diagram (ii) Load- ideal effort diagram (iii) Load-efficiency diagram Also to determine the law of machine and the maximum efficiency of machine.

17. To study the lifting machine "Geared Jib crane" and to draw the following characteristic diagrams of the machine: (i) Load-effort diagram (ii) Load- ideal effort diagram (iii) Load-efficiency diagram Also to determine the law of machine and the maximum efficiency of machine.

18. To study the lifting machine "Single Purchase Winch crab" and to draw the following characteristic diagrams of the machine: (i) Load-effort diagram (ii) Load- ideal effort diagram

(iii) Load-efficiency diagram Also to determine the law of machine and the maximum efficiency of machine.

19. To study the lifting machine "Double Purchase Winch crab" and to draw the following characteristic diagrams of the machine: (i) Load-effort diagram (ii) Load- ideal effort diagram (iii) Load-efficiency diagram Also to determine the law of machine and the maximum efficiency of machine.

MATS UNIVERSITY, RAIPUR (C.G.)

SCHOOL OF ENGINEERING & I.T.

Semester: II B. Tech   **Branch: Comp. Sci. and Engg. and CSE(Hons)**
Lab: Java Script Laboratory   **Code: BT 2092**
Total Practical Periods: 28   **Total Credits: 01**

Note: MINIMUM TEN NUMBERS OF EXPERIMENTS IS TO BE PERFORMED

1. Design a HTML page describing your profile in one paragraph. Design in such a way that it has a heading, a horizontal rule, three links and your photo also write three HTML documents for the links.
2. Design HTML page describing your academic career. The page will tell about the degrees, Institutions and your hobbies. Add some lists too**.**
3. Design HTML page demonstrating concept of Internal Hyper-link
4. Design HTML page which gives the list of grocery Items by using Ordered List , List consist of Roman no, A,B…. and so on.
5. Design HTML page which gives the list of grocery Items by using Unordered List bullets are of form disc, square and circle.
6. Design a HTML page for partitioning browser window in frames display the different pages in partitioned windows.
7 Design HTML page to partition window, Design in such a way that link clicked in on page can display the corresponding pages in other window.
8 Write a Java script to prompt for users name and display it on the screen.
9 Write a java script program to test the first character of a string is uppercase or not.
10 Write a java script program for pattern that matches e-mail addresses.
11 Write a java script program to check whether a given number is Prime or not.
12 Write a java script function to print an integer with commas as thousands separators.
13 Write a java script program to sort a list of elements using any sorting algorithm.
14 Write a java script for loop that will iterate from 0 to 15. For each iteration, it will check if the current number is odd or even, and display a message to the screen.
15 Write a java script program which compute, the average marks of the following students then this average is used to determine the corresponding grade.
16 Write a java script program to sum the multiple s of 3 and 5 under 1000.
17 To design the scientific calculator and make event for each button using java script.
18 Write a java script program to find sum of first natural numbers : sum= 1+2+3+4+……. 100 by using
    a. for loop   b. while loop   c. do-while loop
19 Write a java script program to find sum of the following series using function:
    Sum= $x-(x)^3/3!+(x)^5/5!-\ldots\ldots..(x)^n/n!$

MATS School of Engineering &I.T

20 Design HTML form for keeping student record and validate it using Java script.
21 Write programs using Java script for Web Page to display browsers information.

List of Equipment/ Machine Required

PCs, Java script supported Browser, Node.js

References:

1. Mastering HTML, CSS & JavaScript Web Publishing, Laura Lemay, Rafey Colburn, BPB Publications.
2. Head First JavaScript programming, Eric Pressman & Elizabeth Robson, O'Reilly.

MATS UNIVERSITY, RAIPUR (C.G.)

SCHOOL OF ENGINEERING & I.T.

Semester: II B. Tech   Branch: All Streams of Engineering
Manufacturing Practices– II Laboratory   Code: BT 210
Total Practical Periods: 45 + (15 Instructional Periods)   Total Credits: 02

Note: MINIMUM TEN NUMBERS OF EXPERIMENTS IS TO BE PERFORMED

Course Objective:
1. To make the student acquire practical skills in the machining, fitting and forging operations.

Instructional Syllabus
Machining:
Introduction to machining and common machining operations. Cutting tool materials. Definition of machine tools, specification and block diagram of lathe, shaper, drilling machine and grinder. Common lathe operations such as turning parting, chamfering and facing. Quick return mechanism of shaper. Difference between drilling and boring. Files-material and classification.
Fitting:
Need of fitting, different types of instruments used in fitting shop.
Forging:
Forging principle, materials, operations like drawing, upsetting, bending and forge welding, use of forged parts.
List of Experiments
1. Job on lathe with one step turning and chamfering operations

2. Job on shaper for finishing two sides of a job

3. (a) Drilling two holes of size 5 and 12 mm diameter on job used/to be used for shaping.

(b) Grinding a corner of above job on bench grinder
4. Finishing of two sides of a square piece of filling

5. Tin smithy for making mechanical joint and soldering of joints

6. Perform step cutting on mild steel plate.

Course Outcome:
1. The students will be conversant with hands-on knowledge in the machining, fitting and forging operations.

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

Scheme & Syllabus

(III Semester)

Bachelor of Technology

Civil Engineering

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

Scheme of Teaching & Examination

III - Semester

S. No.	Code	Subject	Periods per Week			Scheme of Marks		Total Credit
			L	T	P	ESE	IM	
1.	BT300	Engineering Mathematics-III	3	0	-	70	30	3
2.	BT341	Fluid Mechanics	3	1	-	70	30	4
3.	BT342	Structural Analysis-I	3	1	-	70	30	4
4.	BT343	Surveying-I	3	0	-	70	30	3
5.	BT344	Building Material & Construction	3	0	-	70	30	3
6.	BT305	Universal Human Values	1	0	-	70	30	1
7.	BT346	Fluid Mechanics Laboratory	-	-	2	30	20	1
8.	BT347	Structural Analysis-I Laboratory	-	-	2	30	20	1
9.	BT348	Surveying-I Laboratory	-	-	2	30	20	1
10.	BT349	Material Testing Laboratory	-	-	2	30	20	1
		Total	16	2	8	540	260	22

L – Lecture,   T – Tutorial,   ESE – End Semester Examination,
P – Practical, IM – Internal Marks (Include Class Test & Teacher's Assessments)

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester	:	III B.Tech
Branch	:	Civil
Subject	:	Engineering Mathematics-III
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	BT300

COURSE OBJECTIVE:

- To provide required skills to apply different statistical tools to analyze Engineering problems.
- To provide the necessary basic concepts of few numerical methods.
- To provide procedures for solving numerically different kinds of problems occurring in the field of Engineering and Technology.

UNIT-I   Statistics

Random variables, Discrete and continuous probability distributions, expectation, mean and standard deviation, moments and moment generating function, distributions binomial, poissoin and normal distributions.

UNIT-II   Numerical Solution of Algebraic, Transcendental & Simultaneous Linear Equation

Errors in numerical computation, error type, bisection method, Regula–Falsi Method, secant Method, Newton Raphson Method, direct Methods: Gauss Elimination, Gauss-Jordan & Crout's Triangularisation method, Iterative methods: Jacobi, Gauss-Seidel & relaxation methods.

UNIT-III   Interpolation & Curve Fitting

Finite differences, forward, backward & central difference interpolation, Lagrange's method and Newton's divided difference method, Principle of least squares, Fitting a straight line, Fitting a parabola, exponential function, method of group averages.

UNIT-IV   Numerical Differentiation & Integration

Derivatives using forward, backward and central difference methods, Derivatives using unequally spaced values, Newton-Cote's quadrature method, Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule, Weddle's rule.

UNIT-V   Numerical Solution of ODE & PDE

Numerical solution of ODE's by Taylor's series method, Picard's method, Euler's method, Euler's modified method, Runge–Kutta method, Predictor, corrector method, Milne's method, Adams Bash forth method.

MATS School of Engineering &I.T

Numerical Solution of PDE's: Classifications of second order PDE, Elliptic equations, solution of Laplace equations, solution of poisons equation, Solution of elliptic equation by relaxation method, Parabolic equations, Solution of one dimensional and 2-D heat equations, Hyperbolic equation, Wave equations.

COURSE OUTCOME:

On completion of course students will be able to:

- Solve statistics problems that arise during the study of Engineering.
- Use various interpolation techniques for solving problems in Engineering.
- Use numerical methods to solve problems involving numerical differentiation and integration.
- Solve initial value problems numerically that arise in Science and Engineering.
- Solve boundary value problems that encounter in different fields of engineering study.

TEXT BOOK:

1. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publications (2007).

REFERENCES:

1. Glyn James "Advanced Modern Engineering Mathematics, Pearson Education (2007).
2. B. V. Ramana, "Higher Engineering Mathematics" Tata McGraw Hill 2007.
3. N. P. Bali, and Manish Goyal, "A Text Book of Engineering 7th Edition (2007) Lakshmi Publications (P) Limited, New Delhi.

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester : III B.Tech
Branch : Civil
Subject : Fluid Mechanics
Total Theory Periods : 48
Total Tutorial Periods : 12
Total Credits : 04
Code : BT341

COURSE OBJECTIVE:
- Students will be familiar with different fluids properties.
- Students will be familiar with different fluids flow condition.
- Students will learn different flow & losses in pipes.
- Students will be familiar with flow in open channel & different sections.

UNIT-I   Introduction of Fluid Statics
Fluid and its properties, Pressure density, height relationship, Pressure measurement by manometers, Center of pressure, Buoyancy, Meta-centric height, Fluid mass subjected to uniform accelerations.

Kinematics of Fluid Flow: Classification of fluid flow: steady and unsteady flow, uniform and non-uniform flow, laminar and turbulent flow, rotational and irrotational flow, compressible and incompressible flow, ideal and real fluid flow, one, two and three dimensional flows, vortex flows, Stream line, path line, streak line and stream tube, One, two and three-dimensional continuity equations in Cartesian coordinates.

UNIT-II   Turbulent Flow in Pipe
Turbulent flow in pipes, Energy and momentum correction factor, Resistance coefficient (Friction factor) and its variation, Explicit equation for friction factors, Concept of equivalent length, pipes in series and parallel, Analysis of pipe network (Hardy-Cross method).

Boundary Layer Analysis: Boundary layer thickness, Boundary layer over a flat plate, Types of boundary layer, Application of momentum equation, Fluid flow past submerged bodies, Drag and lift, Drag on sphere, Cylinder and disc, Magnus effect.

UNIT-III   Dynamics of Fluid
Euler's equation of motion, Bernoulli's equation and its application, Momentum equation and its application to stationary and moving plates/vanes, Combined application of energy and momentum equations.

Flow in Pipes: Reynolds's experiment, experimental determination of critical velocity ,transition from laminar to turbulent flow. Different types of losses in pipe.

MATS School of Engineering &I.T

UNIT-IV   Compressibility Effect in Pipe Flow

Water hammer, Analysis of simple surge tank excluding friction, Buckingham's theorem, Kinematics and dynamic similarity.

Flow in Open Channel: Comparison between open channel and pipe flow, definition of uniform and non-uniform flow, uniform flow formula, Chezy's and Manning's formula, Hydraulically efficient channel section of rectangular, trapezoidal and circular type. Specific energy, critical flow, analysis of flow over hump and transition, broad crested weir, equation of gradually varied flow, hydraulic jump and evaluation of its elements in rectangular channel.

UNIT-V   Flow through Mouthpiece & Orifice

Hydraulic coefficients of orifice, bell method orifice, mouthpieces, Borda's mouthpiece, running free and submerged.

Notches and Weirs: Rectangular, triangular and trapezoidal notches and weir, cippoletti and crested weir, aeration of nape, cavitations submerged weir.

Hydraulic Machines: Turbines and Pumps& their types**.**

COURSE OUTCOME:
- Students are able to understand different types of fluids and their mechanical behaviour.
- Students are able to compare fluids flow condition.
- Students are able to understand & evaluate flow in pipes & losses.
- Students are able to compare flow of different fluids.

TEXT BOOK:
1. A text book of fluid mechanics by R. K. Bansal (Laxmi publication).
2. A text book of fluid mechanics and Hydraulic mechanics in SI Units by R. K. Rajput (S. Chand and company).

REFERENCES:
1. Fluid Mechanics by Frank M. White (TMH).
2. Theory and Applications of Fluid Mechanics by K. Subramanya, Tata McGraw, Hill Publishing Company Ltd., New Delhi, 1993.
3. Fluid Mechanics and its applications by Vijay Gupta and Santosh K. Gupta, Wiley Eastern Ltd., New Delhi, 1984.
4. Engineering Fluid Mechanics by K.L. Kumar, Eurasia Publishing House Pvt. Ltd., New Delhi, 2009.
5. Applied Hydrodynamics by Vallentine, H.R. Butterworths & Co Ltd., London 1959.

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester	:	III B.Tech
Branch	:	Civil
Subject	:	Structural Analysis-I
Total Theory Periods	:	48
Total Tutorial Periods	:	12
Total Credits	:	04
Code	:	BT342

COURSE OBJECTIVE:
- To make student to understand between determinate and indeterminate structures.
- To understand the methods to analyze slopes and deflections of structures.
- To understand the method of Strain Energy to analyze deflections of structures.
- To provide an understanding about loads position variation on structures and corresponding analysis by rolling loads and ILDs.
- To understand behavior of suspension bridges, cables and Arches.

UNIT-I   Stress-Strain Relation
Stresses and Strains, Properties and testing of Steel, Stress–Strain Curve, Relation between the elastic constants, Elongation of bars, Statically indeterminate problems in tension and compression.
Analysis of Stresses and Strains Principal stresses, Transformation equations, Stress invariants, Plane stresses, Differential equations of equilibrium, Deformable bodies, Transformation equations, Principal strains, Mohr's circle, Compatibility conditions, Displacement equation of equilibrium.

UNIT-II   Bending of Beams & Frames
Theory of simple bending, limitations, Beams of uniform strength, Beams of two materials, Shear stresses in symmetrical elastic beams. Shear force and bending moment diagrams.
Determinate Structures: Determinate vs. Indeterminate structures. Pin Jointed determinate space trusses, Distinction between determinate and indeterminate space trusses and simple.
Deflection and Slope: Moment curvature relation, the elastic curve, Macaulay's method, Area moment method, Basics of Conjugate beam method.

UNIT-III   Columns & Combined Stresses
Stable and unstable equilibrium, Short columns, Euler's formula for long columns, Rankine's formula, Beams subjected to bending and shear, eccentrically loaded short column, Middle third rule.

UNIT-IV   Torsion
Torsion of circular, solid and hollow circular shafts, power transmission, closed coiled and open coiled helical springs.

MATS School of Engineering &I.T

Strain Energy: Strain energy due to axial load, bending, shear and torsion, Castigliano's theorem for deflection, Betti's theorem, Maxwell's law of reciprocal deflections, Unit load and strain energy method for determination of deflections of statically determinate beams, pin-joined trusses and rigid frames.

UNIT-V   Rolling Loads & Influence Line

Introduction to Rolling loads, concept of influence lines , influence lines for reaction, Shear force and Bending moment in simply supported beams , influence lines for forces in trusses, analysis for different types of rolling loads , single concentrated load , several concentrated loads , uniformly distributed load shorter and longer than the span, Absolute maximum bending moment.

COURSE OUTCOME:
- Students are able to understand various methods to analyze structures for slopes and deflections.
- Students are able to understand various types of determinate and indeterminate structures.
- Students are able to understand rolling effects of loads and Influence diagrams.
- Students are able to understand concept of bridges of suspension and arch types.

TEXT BOOK:
1. Strength of Materials – R.K. Rajput (S. Chand & Co.).
2. Basic Structural Analysis (Vol. I & II): S.S. Bhavikatti (Vikas Publishing).
3. Theory of Structures: B.C. Punmia (Laxmi Publication).
4. Strength of Materials – S. Ramamurtham (Dhanpat Rai Publications).

REFERENCE:
1. Mechanics of Structures (Vol. – I) – Junarkar (Charotar Publications).
2. Strength of Materials – Timoshenko, S. & Gere (CBS Publishers).
3. Introductions to Solid Mechanics –Shames & Pitarresi (Prentice Hall of India).
4. Engineering Mechanics of Solid – Popov (Pearson Publication).
5. Strength of Materials (Part-I) – Timoshenko (CBS Pubishers).
6. Theory& Analysis of Structures (Vol. – I & II): O.P. Jain and B.K. Jain (Nem Chand).
7. Structural Analysis: R.C. Hibber (Pearson Publication).
8. Structural Analysis: A. Ghali & M. Neville (Chapman & Hall Publication. 1974).
9. Elementary Structural Analysis: Willbur and Norris (Tata McGraw Hill).
10. Structural Analysis: L.S. Negi & R.S. Jangid (Tata McGraw Hill).
11. Theory of Structures: S. Ramamurtham & R. Narayan (Dhanpat Rai Publications).

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester   :   III B.Tech
Branch   :   Civil
Subject   :   Surveying-I
Total Theory Periods :   48
Total Tutorial Periods : 00
Total Credits   :   03
Code   :   BT343

COURSE OBJECTIVE:

- To provide basic knowledge about principles of surveying for location, design and construction of engineering projects
- To develop skills using surveying instruments including measuring tapes, automatic levels, theodolites, and electronic distance measurement equipment.
- The ability to identify error sources and the procedures to minimize errors.
- To use standard survey tools and apply measurement error, accuracy, precision and techniques to improve accuracy of surveys.

UNIT – I   Chain & Compass Surveying

Chain: Definition, Principles, Classification, field and office work, conventional signs, Ranging and chaining, reciprocal ranging, Setting perpendiculars, well conditioned triangles.

Compass: Prismatic compass, Surveyor's compass, Bearing systems and conversions, Local attraction, Magnetic declination, dip, Traversing, Plotting, Adjustment of error.

UNIT – II   Leveling

Level line, Horizontal line, Levels and Staves , Spirit level, sensitiveness, Bench marks, Temporary and Permanent adjustments, Fly and check leveling, Booking, Reduction, Curvature and Refraction, Reciprocal leveling, Longitudinal and Cross sections, Plotting .

UNIT – III   Trilateration & Triangulation

Principle of Trilateration, EDM instrument and their uses, Reduction of observation, Principle and classification of Triangulation System, Triangulation chains, Strength of Figures, Station marks and Signals, Satellite station, intersected and resected points, field work, Reconnaissance, Intervisibility of station, Angular measurement, Base line measurement and its extension, Adjustment of Field observation and computation of co-ordinates.

UNIT – IV   Adjustment & Computation

Weighting of observation, Treatment of random errors, probability equation, Normal law of error, Most Probable value measures of precision, Propagation of errors and variances, Most probable value,

MATS School of Engineering &I.T

Principle of least square, observations and co-relative normal equations, adjustment triangulation figures and level net.

UNIT – V   Plane Table Surveying & Minor Instrument

Plane Table Surveying: Plane table instruments and accessories – merits and demerits – methods – Radiation, Intersection – Resection – Traversing.

Minor Instrument: Hand level, Abney level, Clinometers, Ceylon ghat tracer, Pentagraph, Planimeter, Ideograph.

COURSE OUTCOME:

Students will be able to:

- Determine elevations by applying different techniques.
- Deal with the minor instruments and will be familiar with their functioning.
- Do transverse computations, detect and rectify errors.
- Set out various curves with the field problems.

TEXT BOOK:

1. Surveying Vol-I by B.C. Punmia& Ashok Jain.
2. Surveying Vol-II by B.C. Punmia & Ashok Jain.
3. Surveying Vol- I by S.K. Duggal.
4. Surveying Vol-II by S.K. Duggal.

REFERENCE:

1. James Williamson, Surveying & Field Work, A Practical Text Book on Surveying, Levelling & Setting Out, Paperback – Import, 1 May 2012.
2. M. Chandra, Advanced Surveying, New Age International Publishers, New Delhi, 2000.

MATS School of Engineering &I.T

Semester	:	III B.Tech
Branch	:	Civil
Subject	:	Building Material & Construction
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	BT344

COURSE OBJECTIVE:
- To provide an understanding of materials of construction.
- To provide an understanding of Special types of materials.
- To provide an understanding about timber, plywood, paints and glass materials.

UNIT-I   Building Material
Bricks: Classification, Dimension, Characteristics, moulding, Various Test on bricks, Fly ash bricks.
Mortar: Definition, properties and uses.
Stone: Geological, physical and chemical classification of stone, important stones, uses of stone.
Steel: Cast, iron, Wrought iron, Steel, mild steel and Tor, steel.
Other Metals: Aluminum, Various Alloys.

UNIT-II   Cement, Aggregate, Timber & Plywood
Lime: Lime, Types of Lime.
Cement: Raw materials, manufacturing process, Setting times, Vicat apparatus, Grades of cement, Pozzolana cement & its classification, usages, Fly ash.
Types of Cement, Hydration of cement, tests on properties of cement, ferro cement.
Aggregate: Classification of Aggregates and their properties, grading curve and fineness modules.
Timber and Plywood: Characteristics of good timber, seasoning and preservation, Types and uses of plywood, veneers and hard boards, low cost materials for construction.

UNIT-III   Foundation
Brief study of different Types of foundations, nature of soil (expansive or non-expansive, alluvial or residual, sandy or clayey for settlement etc.), Approximate values of bearing capacities, breadth and depth of foundation, typical cross sections for foundations under walls and R.C.C. Columns. Foundations in black cotton soils, under-reamed pile foundations, foundation failures and remedial measures.

UNIT-IV   Building Components
Masonry: Technical terms in masonry, classification and brief specifications of stone masonry, bonds in brick masonry,

MATS School of Engineering &I.T

Walls: Different types (load bearing, cavity, walls and partition walls), thickness considerations.

Doors, Windows and Lintels: Different types based on materials and methods of construction, technical terms, size and location.

Floors: Ground and upper floors, various types, their suitability, construction details of concrete and terrazzo floors, Floor tiles.

Roofs: Technical terms and different types of pitched and flat roofs, Various roof coverings for pitched and flat roofs.

Formwork: Different types of formwork, stripping times

UNIT-V   Damp Proofing, Plastering, Pointing & Stairs

Damp Proofing: Causes and effect of Dampness, parts of a building likely to be affected most, methods of damp proofing in different locations including roofs.

Plastering and Pointing: Types and considerations during plastering and pointing

Stairs: Types based on geometry and material, suitability, proportioning of stairs, lifts and escalators.

Sound Proofing: Materials and Methods of sound proof construction.

Fire Proofing: Materials and Methods of fire proof construction.

COURSE OUTCOME:
- Students are able to understand materials of construction.
- Students are able to read about timber, plywood, paints and glass materials
- Students are able to understand various parts of building.
- Students are able to understand various types of foundation and importance of foundation.
- Students are able to understand importance of damp proofing and fire in construction.

TEXT BOOK:
1. Building Materials – S.K. Duggal (New Age Publication).
2. Building Materials – S. C. Rangwala (Charotar Publication).
3. Building Construction: B.C. Punmia (Laxmi Publication Pvt. Ltd.).
4. Building Construction: Sushil Kumar (Standard Publication Distributors).

REFERENCE:
1. Engineering Materials – Surendra Singh (Laxmi Publication).
2. Construction Engineering and Management – S. Seetharaman (Umesh Publication).
3. Building Materials – Gurucharan Singh (Standard Publishers, Delhi).
4. Building Construction: Gurucharan Singh (Standard Publication Distributors).

MATS School of Engineering &I.T

MATS UNIVERSITY
ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester	:	III B.Tech
Branch	:	Civil
Subject	:	Universal Human Values
Total Theory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	BT305

COURSE OBJECTIVE:

- To develop a holistic perspective based on self, exploration about themselves (human being), family, society and nature/existence.
- To understand (or developing clarity) the harmony in the human being, family, society and nature/existence.
- To strengthen of self, reflection.
- To develop commitment and courage to act.

UNIT-I   Course Introduction: Need, Basic Guideline, Content & Process for Value Education

Purpose and motivation for the course, recapitulation from Universal Human Values-I, Self-Exploration what is it? and Experiential Validation, as the process for self exploration, Continuous Happiness and Prosperity, A look at basic Human Aspirations, Right understanding, Relationship and Physical Facility, the basic requirements for fulfillment of aspirations of every human being with their correct priority, Understanding Happiness and Prosperity correctly, A critical appraisal of the current scenario, Method to fulfill the above human aspirations: understanding and living in harmony at various levels, Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking, disliking.

UNIT-II   Understanding Harmony in The Human Beings: Harmony in Myself

Understanding human being as a co-existence of the sentient 'I' and the material 'body', Understanding the needs of Self ('I') and 'Body': Happiness and Physical facility, Understanding the body as an instrument of 'I' (I being the doer, seer and enjoyer), Understanding the characteristics and activities of 'I' and harmony in 'I', Understanding the harmony of 'I' with the Body: Sanyam and Health, correct appraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure Sanyam and Health, Include practice sessions to discuss the role others have played in making, Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease.

MATS School of Engineering &I.T

UNIT-III Understanding Harmony in The Family & Society: Harmony in Human-Human Relationship

Understanding values in human-human relationship, meaning of Justice (nine universal values in relationships) and program for its fulfillment to ensure mutual happiness, Trust and Respect as the foundational values of relationship, Understanding the meaning of Trust, Difference between intention and competence, Understanding the meaning of Respect, Difference between respect and differentiation, the other salient values in relationship, Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals, Visualizing a universal harmonious order in society, Undivided Society, Universal Order, from family to world family. Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher, student relationship, goal of education etc., Gratitude as a universal value in relationships, Discussion.
.

UNIT-IV Understanding Harmony in The Nature & Existence: Whole Existence as Coexistence

Understanding the harmony in the Nature, Interconnectedness and mutual fulfillment among the four orders of nature, recyclability and self regulation in nature, Understanding Existence as Co-existence of mutually interacting units in all pervasive space, Holistic perception of harmony at all levels of existence, Include practice sessions to discuss human being as cause of imbalance and role of technology etc.

UNIT-V   Amplification of Holistic Understanding of Harmony on Professional Ethics

Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics: Ability to utilize the professional competence for augmenting universal human order, Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, Ability to identify and develop appropriate technologies and management patterns for above production systems, Case studies of typical holistic technologies, management models and production systems. Strategy for transition from the present state to Universal Human Order: At the level of individual: as socially and ecologically responsible engineers, technologists and managers, At the level of society: as mutually enriching institutions and organizations, Summary, include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions e.g., to discuss the conduct as an engineer or scientist etc.

COURSE OUTCOME:
- By the end of the course, students are expected to become more aware of themselves, and their surroundings (family, society, nature).
- The students would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
- The students would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society). It is hoped that they would

MATS School of Engineering &I.T

be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

TEXT BOOK:
1. Human Values and Professional Ethics by R. R. Gaur, R. Sangal, G. P. Bagaria, Excel Books, New Delhi, 2010.

REFERENCE:
1. Jeevan Vidya: EkParichaya, A. Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A. N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth, by Mohandas Karamchand Gandhi.
5. Small is beautiful, E. F Schumacher.
6. Slow is Beautiful, Cecile Andrews.
7. Economy of Permanence, J C Kumarappa.
8. Bharat Mein Angreji Raj, Pandit Sunderla-l
9. Rediscovering India, by Dharampal.
10. Hind Swaraj or Indian Home Rule, by Mohandas K. Gandhi.
11. India Wins Freedom, Maulana Abdul Kalam Azad.
12. Vivekananda, Romain Rolland (English).
13. Gandhi, Romain Rolland (English).

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester   :   III B.Tech
Branch   :   Civil
Subject   :   Fluid Mechanics Laboratory
Total Laboratory Periods   :   28
Total Tutorial Periods   :   00
Total Credits   :   01
Code   :   BT346

COURSE OBJECTIVE:
The course should enable the students to:
- Enrich the concept of fluid mechanics and hydraulic machines.
- Demonstrate the classical experiments in fluid mechanics and hydraulic machinery. Correlate various flow measuring devices such as venturimeter, orifice meter and notches etc.
- Discuss the performance characteristics of turbines and pumps

List of Experiment (Minimum 10 numbers of experiments to be perform)

1. To determine the meta-centric height of a ship model.
2. To calibrate an orifice meter.
3. To determine the head loss in various pipe fittings.
4. To study the variation of friction factor for pipe flow.
5. To verify the Bernoulli's theorem.
6. To verify impulse momentum principle.
7. To calibrate a venturimeter and study the variation of coefficient of discharge.
8. Experimental determination of critical velocity of pipe.
9. To study the transition from laminar to turbulent flow and to determine the lower critical Reynolds's number.
10. To determine the hydraulic coefficients (Cc, Cd and Cv) of an orifice.
11. To determine the roughness coefficient of an open channel.
12. To determine the coefficient of discharge of a weir.
13. To determine the coefficient of discharge of a venturiflume.
14. To Study of hydraulic jump in an open channel.
15. To determine the coefficient of discharge of a spillway.
16. To determine the performance characteristics of Variable Speed Centrifugal Pump.
17. To determine Impact of moment for impact of free jet.

MATS School of Engineering &I.T

COURSE OUTCOME:

At the end of the course, the student will have the ability to:

- Calibration of venturimeter & Orifice meter.
- Coefficient of discharge for a small orifice / Mouth piece by constant head method.
- Calibration of contracted rectangular notch / triangular Notch.
- Determination of friction factor of pipe.
- Co-efficient for minor losses in different types of pipes.

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester   :   III B.Tech
Branch   :   Civil
Subject   :   Structural Analysis-I Laboratory
Total Laboratory Periods   :   28
Total Tutorial Periods   :   00
Total Credits   :   01
Code   :   BT347

COURSE OBJECTIVE:
- To impart the principles of elastic structural analysis and behaviour of indeterminate structures.
- To impart knowledge about various methods involved in the analysis of indeterminate structures.
- To apply these methods for analyzing the indeterminate structures to evaluate the response of structures

<u>List of Experiment</u> (Minimum 10 numbers of experiments to be perform)

1. To determine Uni-axial tensile test of mild steel.
2. To determine Izod Charpy Value of given mild steel.
3. To determine the Rockwell Hardness of given material.
4. To determine the Brinell hardness of given material.
5. To study the cupping test machine and determination of Ericheser value of mild steel sheet.
6. To determine the modulus of rigidity of material of given shaft
7. To find the Shear force diagram and bending moment diagram for a given continuous beam.
8. To find the Shear force diagram and bending moment diagram for a given cantiliver beam.
9. To study the Shear force diagram and bending moment diagram for a given portal frame.
10. To make the students familiar with the finite element theory behind standard plates.

COURSE OUTCOME:
The student after undergoing this course will be able to:
- Apply the concept of impact loading and to determine impact values for various materials.
- Determine response of structures by classical and iterative methods.
- Calculate the modulus of rigidity of ductile materials.

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester : III B.Tech
Branch : Civil
Subject : Surveying-I Laboratory
Total Laboratory Periods : 28
Total Tutorial Periods : 00
Total Credits : 01
Code : BT348

COURSE OBJECTIVE:

- To impart practical knowledge in the field, measuring distance, direction, angels.
- To determine RL'S Area and volume.
- To stake out points by using different methods.

List of Experiment (Minimum 10 numbers of experiments to be perform)

1. Determination of location of a point with the help of two point problem.
2. Determination of location of a point with the help of three point problem.
3. Determination of area of polygon by chain and cross staff survey.
4. To plot a transverse of area by prismatic compass (open).
5. To plot a transverse of area by prismatic compass (close).
6. Measurement of horizontal angles theodolite by method of repetition.
7. To workout relative elevation of various points on area by performing profile leveling.
8. To determine the elevation of a point with respect to reference by fly leveling.
9. Determination of elevation of point by trigonometric levelling.
10. Study of minor instruments.

COURSE OUTCOME:

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

- Apply principle of surveying for civil engineering application.
- To determine location of a point.
- To determine elevation of points.

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester	:	III B.Tech
Branch	:	Civil
Subject	:	Material Testing Laboratory
Total Laboratory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	BT349

COURSE OBJECTIVE:
- Investigate the properties and behavior of materials.
- Develop skills for analyzing experimental data and working in teams.
- Design and conduct a custom laboratory experiment, analyze and interpret the data, and make a presentation on the results of the testing

List of Experiment (Minimum 10 numbers of experiments to be perform)

1. Determination of normal consistency of cement.
2. Determination of Initial & final setting time of cement.
3. Determination of fineness of cement by sieving method.
4. Determination of fineness of cement by Blain Apparatus.
5. Determination of Soundness of cement.
6. Determination of compressive strength of cement cube.
7. Determination of tensile strength of cement cube.
8. Determination of Water absorption of aggregate.
9. To perform Sieve Analysis of Aggregate
10. To determine Compressive strength of wood: (a.) Along the fiber and (b.) Across the fiber.

COURSE OUTCOME:
- Understand terminology and units related to engineering properties and testing of construction materials (aggregates, cement, concrete, steel, masonry, wood, and soil).
- Understand terminology and selected standard test methods for construction materials.
- Understand how to interpret select testing reports for construction materials.

MATS School of Engineering &I.T

MATS UNIVERSITY
ARANG, RAIPUR (C.G.)

Scheme & Syllabus
(IV Semester)
Bachelor of Technology
Civil Engineering

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

Scheme of Teaching & Examination

IV - Semester

S. No.	Code	Subject	Periods per Week			Scheme of Marks		Total Credit
			L	T	P	ESE	IM	
1.	BT440	Structural Analysis-II	3	0	-	70	30	3
2.	BT441	Soil Mechanics	3	0	-	70	30	3
3.	BT442	Surveying-II	3	0	-	70	30	3
4.	BT443	Engineering Geology	3	0	-	70	30	3
5.	BT444	Engineering Geology Laboratory	-	-	2	30	20	1
6.	BT445	Structural Analysis-II Laboratory	-	-	2	30	20	1
7.	BT446	Soil Mechanics Laboratory	-	-	2	30	20	1
8.	BT447	Surveying-II Laboratory	-	-	2	30	20	1
9.	BTP4XX	Professional Elective-I	3	0	-	70	30	3
10.	BTOXX	Open Elective-I	3	0	-	70	30	3
Total			**18**	**0**	**8**	**540**	**260**	**22**

L – Lecture,   T – Tutorial,   ESE – End Semester Examination,
P – Practical, IM – Internal Marks (Include Class Test & Teacher's Assessments)

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester : IV B.Tech
Branch : Civil
Subject : Structural Analysis-II
Total Theory Periods : 48
Total Tutorial Periods : 00
Total Credits : 03
Code : BT440

COURSE OBJECTIVE:
- To introduce the difference between determinate and indeterminate structure.
- To learn the methods which are applied to analyze indeterminate structures.
- To gain the expertise in analysis of indeterminate beams and rigid frames.
- To develop professional skill in analyzing indeterminate pin jointed structures.

UNIT-I   Introduction of Determinate & Indeterminate Structure

Static indeterminacy, external and internal indeterminacy, rules for determining degree of indeterminacy, degree of freedom, kinematics indeterminacy, introduction of trusses.

UNIT-II   Method of 3-Moment Equation

Indeterminate beams, Principle of superposition, Analysis by consistent deformation method, Theorem of three moments, sinking of support.

UNIT-III   Moment Distribution Method

Moment distribution method, Application to indeterminate beams and rigid frames without sway & with sway problem.

UNIT-IV   Slope Deflection Method

Slope deflection method, Application to indeterminate beams and rigid frames without sway & with sway problem, Basics of Column analogy method.

UNIT-V   Cable & Arches

Analysis of forces in cables with concentrated and continuous loadings, suspension bridges with three hinged and two hinged stiffing girders, theory of arches- eddy's theorem analysis of three hinged and two hinged arches

COURSE OUTCOME:
- Students are able to analyze different kinds of structures such as determinate, indeterminate, rigid jointed or pin-jointed plane frames.

MATS School of Engineering &I.T

- Students are able to understand about the suitable method for a given structure.
- Students are able to proceed for designing of analyzed structure.

TEXT BOOK:
1. Structural Analysis –B.C. Punmia (Laxmi Publications).
2. Structural Analysis (Vol. – II) – S.S. BhaviKatti (Vikas Publishers).

REFERENCE:
1. Intermediate Structural Analysis – C.K Wang.. (McGraw Hill Book Company, 1983).
2. Matrix analysis of Framed Structures – W. Weaver, & J.M. Gere (CBS Publishers and Distribution, Delhi 1990).
3. Theory of Structure – S. Ramamurtham (Dhanpat Rai Publication).

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester	:	IV B.Tech
Branch	:	Civil
Subject	:	Soil Mechanics
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	BT441

COURSE OBJECTIVE:

- To provide basic knowledge about soil formation, index properties of soil, physical and engineering properties of soil.
- To know about the types of soil according to their classification, classification system, field identification, study of effective stress, capillary seepage force, etc.
- To measure the compaction and permeability of soil by lab experiments.
- To know about stresses due to applied load a soil mass, consolidation and their factor one dimensional consolidation as per Terzaghi theory
- To find shear strength of soil and methods of soil exploration.

UNIT-I   Introduction

Introduction to soil mechanics and geotechnical engineering, Unique nature of soil, Soil formation and soil types, interrelationship of soil, aim and scope of soil mechanics, Index properties of soil, Basic definitions, phase relations, physical and engineering properties of soil, soil grain and properties coarse and fine grained soils, Stoke's law, method of fine grained analysis.

UNIT-II   Soil Classification & Effective Stress

Clay mineralogy, soil structure, Indian standard soil classification system, Purpose of soil Classification, Different System of soil Classification, Field Identification, Principal of Effective Stress and Related Phenomena, Types of soil moisture; capillarity.

UNIT-III   Compaction, Permeability & Seepage of Soil

Compaction theory, laboratory compaction tests, method of compaction control, permeability, one dimensional flow, permeability of soil, Darcy's law, laboratory methods of determination, pumping out tests for field determination of permeability, seepage through soils, two-dimension flow problems, confined flow and unconfined flow, flow nets and their characteristics, exit gradient and failure due to piping, criteria for design of filters.

UNIT-IV   Stress due to Applied Load & Consolidation

MATS School of Engineering &I.T

Stresses due to applied loads, Boussinesq's equation of vertical pressure under concentrated loads, rectangularly loaded area, circular Loaded Area Newmark's Chart, Westergoard's equation, compressibility, effects of soil type, stress history and effective stress on compressibility, consolidation, factors affecting consolidation and compressibility parameters, Terzaghi theory of one-dimensional consolidation and time rate of consolidation.

UNIT-V   Shear Strength & Soil Exploration

Introduction, stress at a point and Mohr's stress circle; Mohr- Columb Failure criterion: Laboratory tests for shear strength determination; shear strength parameters; UU, CU and CD tests and their relevance to field problems; Shear strength characteristics of normally consolidated and reconsolidated clays; Shear strength Characteristics of sands, Soil Exploration, Various Method of field Exploration, Undisturbed Soil Sampling equipment's

COURSE OUTCOME:
- Students are able to analyze and classify the soil.
- Students are able to analyze the effect of flow of fluids through soil.
- Students are able to evaluate the compressibility of soil.
- Students are able to obtain and analyze the shear strength of soils and different method of soil exploration.

TEXT BOOK:
1. Soil Mechanics and Foundations – B.C. Punmia, A. K. Jain (Laxmi Publication).
2. Soil Engineering in Theory and Practice (Vol-II) – Alam Singh (Asia Publishing House).

REFERENCE:
1. Soil Mechanics and Foundation Engineering – S.N. Murthy (Dhanpat Rai Publications).
2. Basic and Applied Soil Mechanics – Gopal Ranjan and A.S.R Rao. (New Age International).
3. Design Aids in Soil Mechanics and Foundation Engineering – S.R. Kaniraj (Tata McGraw Hill).
4. Geotechnical Engineering Principles and Practice – D. P. Coduto (Prentice Hall of India).
5. Soil Mechanics and Foundation Engineering – S.K. Garg (Khanna Publishers).
6. Soil Mechanics and Foundation Engineering – Purushothama Raj (Pearson Education).
7. Text Book of Geotechnical Engineering – I. H. Khan (PHI Learning).
8. Foundation Engineering – R. B. Peck, W. E. Hanson, and T. H. Thornburn (John Wiley).
9. Foundation Design and Construction – M. J. Tomlinson (Pearson Education).

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester	:	IV B.Tech
Branch	:	Civil
Subject	:	Surveying-II
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	BT442

COURSE OBJECTIVE:
- To be familiar with various aspects of Trilateration and Triangulation
- To deal with the relevant computations, errors and observations.
- To gain the knowledge of Tachometry, various systems, instruments etc.
- To learn the concepts of Photographic and aerial surveying.
- To learn and apply the concept of Hydrographic surveying.

UNIT-I   Curves
Definition, classification of curves, Elements of circular, Transition and vertical curves, Theory and method of setting out simple, Transition and vertical curves, Special field problems.

UNIT-II   Total Station
Introduction, Features of total station, Angle measurement, Accessories, Distance measurement etc., Technical specification, orientation, Electronic data records, Field procedures in topographic survey, Electronic distance measurement, Basic concept, Total station instruments.

UNIT-III   Tachometry & Contour
Definitions, Principles of stadia systems, Tangential method Systems, Range Finders, movable hair method and contours, methods and classification of contouring.

UNIT-IV   Photographic & Aerial Surveying
Photo Theodolite, principle of the method of terrestrial photogrametry, aerial surveying terms used, comparison between stereo photograph and aerial photography, comparison between air photographs and maps, stereoscopes, wind effects.

UNIT-V   Hydrographic Surveying
Introduction, process of hydrographic surveying, soundings methods, gauges, equipment required for sounding, methods of locating soundings and plotting of soundings, tides.

MATS School of Engineering &I.T

COURSE OUTCOME:

Students will be able to:

- Deal with the various aspects of Trilateration and Triangulation.
- Do the relevant computations, errors and observations.
- Gain and apply the knowledge of tachometry, various systems, instruments etc.
- Apply the concepts of Photographic and aerial surveying.
- Efficiently deal with the Hydrographic surveying

TEXT BOOK:

1. Surveying (Vol. I & II): B.C Punmia, (Laxmi Publications, New Delhi, 1996).
2. Surveying (Vol. I & II): T.P. Kanetkar (Vidyarthi Griha Prakashan, Pune).

REFERENCE:

1. Engineering Surveying Technology: T.J.M. Kennie and G. Petrie (Blackie & Sons Pvt. Ltd., London, 1990).
2. Surveying (Vol. II & III): R. Agor (Khanna publications, Delhi, 1995).
3. Surveying (Vol. II & III): K.R. Arora (Standard Book House, Delhi, 1993).
4. Solving Problems in Surveying: A. Bannister and R. Baker (Longman Scientific Technical, U.K., 1994).

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester	:	IV B.Tech
Branch	:	Civil
Subject	:	Engineering Geology
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	BT443

COURSE OBJECTIVE:
- To understand fundamental concepts of engineering geology.
- To learn about the various types of rocks and their properties.
- To study about the Earthquakes, its causes, classification etc.
- To learn about Geological investigations in Civil Engineering.

UNIT-I   Minerals
Minerals, their physical properties, optical properties and chemical properties, The detailed study of certain rock forming minerals with respect to the physical properties.

UNIT-II   Rocks and Rock Deformation
Their origin, structure, texture, classification of rocks in brief and their suitability as Engineering materials, dip and strike of bed, Folds, Faults, joints, unconformity and their classification, causes and relation to engineering behavior of rock masses.

UNIT-III   Earthquake
Earthquake, its causes, classification, seismic zones of India and Geological consideration for construction of building, reservoir related, earthquake problem and its preventive measures, distribution of seismic zones in India.

UNIT-IV   Landslides and Land Subsidence
Landslides, its causes, classification and preventive measures, land subsidence, its causes and preventive measures.

UNIT-V   Engineering Geological Sites Selection
Engineering Geological considerations for site selection of Dams and Reservoirs, Tunnels, Bridges and Highways, Geological Maps, concept of geological maps, important terminology used for map and making a section from the map.

MATS School of Engineering &I.T

COURSE OUTCOME:

Students will be able to:

- Show the knowledge about engineering geology, important rocks, and minerals and be able to identify them.
- Analyze the Earthquakes and its various types.
- Do the Geological investigations; understand the geological conditions and geological maps.

TEXT BOOK:

1. A Textbook of Geology : P.K. Mukherjee (World Press Publishers)
2. Engineering Geology : D.S. Arora (Mohindra Capital Publisher, Chandigarh)

REFERENCE:

1. Geology and Engineering: R.F. Leggot (Mc-Graw Hill, New York).
2. Geology for Engineers: F.G.M Blyth (Arnold, London).
3. Civil Engineering Geology: Cyril Sankey Fox (C. Lockwood and son, U.K.).
4. Engineering and General Geology: Prabin Singh (Katson Publication House).

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester	:	IV B.Tech
Branch	:	Civil
Subject	:	Engineering Geology Laboratory
Total Laboratory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	BT444

COURSE OBJECTIVE:

- To expose the students to identify the minerals and rocks based on their inherent properties and uses in civil engineering.
- Students will learn the dip and strike, thickness of strata, Bore hole problems related to geological formation related to foundation, tunnels, reservoirs and mining.
- Students will understand the Field knowledge by visiting the site like problems Faults, Folds, Joints, Unconformity etc.

<u>List of Experiment</u> (Minimum 10 numbers of experiments to be perform)

1. Megascopic description of Granite, Pegmatite and Synite.
2. Megascopic description of Basalt, Gabbro, Charnokite and Dolerite.
3. Megascopic description of Limestone, Sand stone and Shale.
4. Megascopic description of Conglomerate, Marble and Skate.
5. Megascopic description of Quartzite, Schist and Gneiss.
6. Megascopic description of Tale, Gypsum and Calcite.
7. Megascopic description of Feldspar, Quartz and Corundum.
8. Megascopic description of Hematite, Magnetite and Bauxite.
9. Study of structural models of Fault, Fold and Unconformity.
10. Study of simple geological map.

COURSE OUTCOME:

- The students able to identify the minerals, rocks and utilize them effectively in civil engineering practices.
- The students will interpret and understand the geological conditions of the area for implementation of civil engineering projects.
- The students will interpret subsurface information such as thickness of soil, weathered zone, depth of hard rock and saturated zone by using geophysical methods.

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester   :   IV B.Tech
Branch   :   Civil
Subject   :   Structural Analysis-II Laboratory
Total Laboratory Periods   :   28
Total Tutorial Periods   :   00
Total Credits   :   01
Code   :   BT445

COURSE OBJECTIVE:

- To learn the methods which are applied to analyze indeterminate structures.
- To gain the expertise in analysis of indeterminate beams and rigid frames.
- To develop software skill in analyzing indeterminate pin jointed structures.

List of Experiment (Minimum 10 numbers of experiments to be perform)

1. To determine the flexural rigidity (EI) for a given beam
2. To verify the Maxwell's theorem of reciprocal deflection
3. To determine the vertical deflections of a variety of curved bars.
4. To obtain the horizontal deflection and deformed shape of portal frames with different end conditions.
5. To determine the strain in an externally loaded beam with the help of digital strain indicator.
6. Analysis of determinate beams on a Standard Structural Analysis Package such as SAP2000.
7. Analysis of indeterminate beams on a Standard Structural Analysis Package such as SAP2000.
8. Analysis of determinate pin-jointed frames on a Standard Structural Analysis Package such as SAP2000.
9. Analysis of indeterminate pin-jointed frames on latest version of a Standard Structural Analysis Package such as SAP2000.
10. Analysis of determinate rigid frames on latest version of a Standard Structural Analysis Package such as SAP2000.
11. Analysis of indeterminate rigid frames on latest version of a Standard Structural Analysis Package such as SAP2000.
12. To draw influence lines for determinate beams on latest version of a Standard Structural Analysis Package such as SAP2000.
13. To draw influence lines for indeterminate beams on latest version of a Standard Structural Analysis Package such as SAP2000.

List of Equipments / Machine Required:
Elastic properties of beam apparatus

MATS School of Engineering &I.T

Maxwell's law of reciprocal deflection apparatus
Universal frame with variety of curved bars
Universal frame with variety of portal frames
Digital Strain Indicator
Dial gauges for measuring deflections
Weights and hangers to apply loads
Latest Release of Software Package SAP2000 (Computers & Structures Inc., USA)

COURSE OUTCOME:
- Students are able to analyze different kinds of structures such as determinate, indeterminate, rigid jointed or pin-jointed plane frames.
- Students are able to understand about the suitable method for a given structure.
- Students are able to apply software skills to analyze the structures.

RECOMMENDED BOOKS:
1. Reference Manual of Respective Software.
2. Verification Manual of Respective Software.

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester	:	IV B.Tech
Branch	:	Civil
Subject	:	Soil Mechanics Laboratory
Total Laboratory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	BT446

COURSE OBJECTIVE:

- Students will able to identify physical and mechanical properties of soil in the field and laboratory settings.
- Student will be familiar with ASTM laboratory test standards and procedures.
- This include preparing soil samples for testing, performing the test, collecting and analyzing data, interpreting the results and writing technical reports.

List of Experiment (Minimum 10 numbers of experiments to be perform)

1. Determination of water content dry density relation using light-compaction test.
2. Determination of water content dry density relation using heavy compaction test.
3. Determination of liquid limit, plastic limit and shrinkage limit of soil specimen.
4. To determine California Bearing Ratio for the designing of pavements, laboratory determination of CBR test.
5. Direct Shear Test on the dry cohesion-less / cohesive soil
6. Triaxial Compression Test (Triaxial compression test): (a) UU, (b) CU, (c) CC.
7. Determination of bearing capacity of soil by Triaxial UU Test.
8. Determination of Unconfined Compression Strength of cohesive soils (Remoulded/ Unremoulded)
9. Laboratory Vane Shear Test (Remoulded / Unremoulded)
10. Consolidated test (Remoulded / Unremoulded) Consolidated test (Fixed Ring / Floating Ring).
11. To determine swelling pressure of purely cohesive soil (Remoulded / Unremoulded specimen).
12. Study of field CBR Test.
13. Study of ground improvement techniques.

COURSE OUTCOME:

Students who successfully complete this course will be able to:

- Perform common soil tests to identify physical and mechanical properties of soils.
- Be familiar with soil mechanics tests and determines which test is needed in designing civil engineering projects.

MATS School of Engineering &I.T

- Determine the shear strength of soil.

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester	:	IV B.Tech
Branch	:	Civil
Subject	:	Surveying-II Laboratory
Total Laboratory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	BT447

COURSE OBJECTIVE:
- To determine the relative position of any objects or points of the earth.
- To determine the distance and angle between different objects.
- To develop methods through the knowledge of modern science and the technology and use them in the field.

List of Experiment (Minimum 10 numbers of experiments to be perform)

1. Study of Total Station.
2. Study of Auto Level.
3. To find level at different points in field with the help of Auto Level.
4. Profile Leveling with the help of Auto Level for highway.
5. Determination of Tachometric constants.
6. Study of Electronic Digital Theodolite.
7. Study of Plane Table Survey.
8. Field Survey and Site Visit of a building.
9. Counter plan of given area (on full size drawing sheet)
10. To conduct the chain survey closed traverse around a building and plot the existing building
11. To draw the position in plan of the given points by radiation method.

COURSE OUTCOME:
Students who successfully complete this course will be able:
- To find out elevation of a point on earth by leveling.
- To find distance and direction of a point.
- To find out elevation of a point by Auto level.

MATS School of Engineering &I.T

MATS UNIVERSITY
ARANG, RAIPUR (C.G.)

Scheme & Syllabus
(V Semester)
Bachelor of Technology
Civil Engineering

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

Scheme of Teaching & Examination

V - Semester

S. No.	Code	Subject	Periods per Week			Scheme of Marks		Total Credit
			L	T	P	ESE	IM	
1.	BT540	Reinforced Cement Concrete Design	3	1	-	70	30	4
2.	BT541	Highway and Airport Engineering	3	0	-	70	30	3
3.	BT542	Water Supply Engineering	3	0	-	70	30	3
4.	BT543	Construction Planning and Management	3	0	-	70	30	3
5.	BT544	Concrete Technology Laboratory	-	0	2	30	20	1
6.	BT545	Highway Engineering Laboratory	-	-	2	30	20	1
7.	BT546	Civil Engineering Drawing Laboratory	-	-	2	30	20	1
8.	BT547	Vocation Training/ Internship-I	-	-	-	-	50	3
9.	BTP4XX	Professional Elective-II	3	0	-	70	30	3
		Total	**15**	**1**	**6**	**440**	**260**	**22**

L – Lecture,   T – Tutorial,   ESE – End Semester Examination,
P – Practical,   IM – Internal Marks (Include Class Test & Teacher's Assessments)

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester	:	V B.Tech
Branch	:	Civil
Subject	:	Reinforced Cement Concrete Design
Total Theory Periods	:	48
Total Tutorial Periods	:	12
Total Credits	:	04
Code	:	BT540

COURSE OBJECTIVE:

- To educate the student about the concept of reinforced cement concrete and different method of design of reinforced concrete.
- To educate the student about concept of working stress method to analysis and design of beams.
- To educate the student about concept of limit state method to analysis and design of beams, slabs and columns.
- To educate the student about analysis and design of footings and staircases by limit state method.

UNIT –I   Working Stress Method

Properties of concrete and reinforcing steel, stress-strain curves, Permissible stresses, modular ratio, loads on structure, Basis for design by working stress method. Analysis and design of singly reinforced and doubly reinforced sections by working stress method, shear in beams.

UNIT –II   Limit State Method- Rectangular Beams

Rectangular Beams: Introduction to limit state method, characteristic loads, partial safety factor, limit state of flexure, assumptions, stress block parameters, neutral axis, analysis and design of singly and doubly reinforced section, shear in beams, bond and development length, design of lintels.

UNIT –III   Limit State Method – T-Beam & Slab

T-Beams and Slabs: Properties of T-section, moment of resistance and design of singly reinforced T-beam. Dead loads, imposed loads, thickness of slabs, modification factors, effective span, reinforcement in slab, design of one way slab and two way slabs.

UNIT –IV   Limit State Method - Columns

Columns: Axially loaded short columns, minimum eccentricity, longitudinal and transverse reinforcement, effective length of column, safe load on columns, circular columns, $P_u – M_u$ interaction curves, combined axial load and uni-axial bending, combined axial load and bi-axial bending.

UNIT-V   Limit State Method - Staircase and Column Footings

MATS School of Engineering &I.T

Staircases and Column Footings: Design of stairs – dog legged stair, open newel stair. General principle of design of reinforced concrete footing, proportioning of footings, edge thickness, depth of footing, design of isolated column footings – square and rectangular footings.

COURSE OUTCOME:

Students are able to:

- Understand the importance of reinforced concrete structure.
- Understand the different method of analysis and design of reinforced concrete structures.
- Understand the procedure of analysis and design of beams by working stress and limit state method.
- Understand the procedure of analysis and design of other elements such as slabs, columns, footings and staircases.

TEXT BOOK:

1. Limit State Design of Reinforced Concrete – B. C. Punmia, A. K. Jain and A. K. Jain (Laxmi Publications)
2. Limit State Theory and Design of Reinforced Concrete (IS:456-2000) – V. L. Shah and S. R. Karve (Structures Publications, Pune)
3. Reinforced Concrete Design – S. U. Pillai and D. Menon (Tata McGraw Hill)

REFERENCE:

1. Relevant IS codes IS: 456:2000, IS 875, Part 1, 2.
2. Reinforced Concrete Structures – Dayaratam P. (Oxford and IBH Publishing Co.).
3. Reinforced Concrete Limit State Design – Jain, A.K. (Nem Chand and Bros. Roorkee).
4. Fundamentals of Reinforced Concrete Design – M. L. Gambhir (PHI Learning).
5. Design of Reinforced Concrete Structures – M. L. Gambhir (PHI Learning).
6. Design Aids for Reinforced Concrete to I.S.-456-1978 – SP-16, 1980 (Bureau of Indian Standards, New Delhi).

MATS School of Engineering &I.T

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester	:	V B.Tech
Branch	:	Civil
Subject	:	Highway and Airport Engineering
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	BT541

COURSE OBJECTIVE:
- To be familiar with principles of Highway planning & Geometric design.
- Fundamental Concepts of Traffic Engineering.
- Learning different highway materials & their testing.
- Learning pavement design & its Construction.
- Learning different aspect of Airport planning.

UNIT- I   Principle of Highway Planning
Road development and planning in India Highway alignment, requirements, Engineering Surveys for highway location Maps and Drawing, Elements of Transportation Engineering (Vehicle, Driver, Terminal and Control),

UNIT-II   Traffic Engineering
Introduction to Traffic flow theory speed-density, speed-flow and flow-density relation, data collection techniques for traffic parameters and delay studies, parking facilities, etc. and their uses, Traffic control, Devices, Prevention of road accidents, rotary intersection, highway lighting,

UNIT- III   Geometric Design
Geometric Design: Cross Section elements of horizontal and vertical alignment, Highway drainage, Surface and subsoil drainage, Camber, Kerb, Road Margin, Sight distance, Super elevation, Geometry of Hill Roads, curve layout.
Highway Materials: Behavior of highway materials, properties of Sub grade and pavement component materials, Tests on sub grade soil, Aggregate and bituminous materials.

UNIT-IV   Pavement Design & Construction Technique
Study of flexible and rigid pavements, Basic concepts of pavement analysis and design, Stresses in rigid pavements, I.R.C. recommendations. Types of Pavements water bound macadam, bituminous and cement concrete pavements. Joints in cement concrete pavements, pavement failures, Modern materials in pavements

MATS School of Engineering &I.T

UNIT-V   Airport Planning

Definition of terms related to airport engineering, factors affecting site, selection, obstructions, various surveys for site selection, Classification of Obstructions Runways Orientation, Basic runway length and it's corrections. Geometric design, runway configuration taxiways layout geometric, Standards, exit taxiways fillets separation.

COURSE OUTCOME:
- Students are able to understand highway planning &design.
- Students are able to understand traffic Engineering.
- Students are able to understand & evaluate highway construction material.
- Students are able to develop exposure in pavement design &airport planning.

TEXT BOOK:
1. Principle and Practices of Highway Engineering – Kadiyali (Khanna Publishers, Delhi).
2. Highway Engineering – S. K. Khanna & C.E.G. Justo (Khanna Publishers, Delhi).

REFERENCE:
1. Air-port planning and Design – Khanna and Arora (Khanna Publishers, Delhi).
2. Highway Engineering – S.C. Rangawala (Charotar Publishers).
3. Specifications for Road and Bridge Works – MOST (IRC Publishers).

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester	:	V B.Tech
Branch	:	Civil
Subject	:	Water Supply Engineering
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	BT542

COURSE OBJECTIVE:
- To provide fundamental knowledge about the water sources, population forecasting, water quality.
- To learn about quality of water for its treatment needed for public water supplies.
- To develop a professional skill for design of water distribution system and environmental problems related to civil engineering.

UNITT-I   Introduction

Necessity and importance of water supply schemes. Water demand: Classification of water demands, Estimation of quantity of water required by a town, per capita demand, factors affecting per capita demand, design period and population forecasting, variation in water demand, Sources of water supply Surface sources and underground sources, Intake works, site selection, type of intake works.

UNIT-II   Quality of Water

Common impurities, physical, chemical and biological characteristics of water, water quality standards for municipal and domestic supplies. Water Processing: Object of water processing, flow diagrams of typical ground water system and surface water systems. Sedimentation, Theory of sedimentation, sedimentation tanks and its types, design parameters related with sedimentation tanks, sedimentation with coagulations, coagulants and coagulant aids, Jar test for determining coagulant dosage.

UNIT-III   Filtration

Theory of filtration, slow sand and rapid sand filters, Construction and operation. Disinfection: Methods of disinfection, Chlorination, Types of chlorination, Break Point chlorination.

UNIT-IV   Softening

Methods of Softening, Iron Removal, Floridization, Distribution System: Methods of distribution, layout of distribution system, methods of analysis, pressure in the distribution system, distribution reservoirs, functions and its types, storage capacity of distribution reservoir.

MATS School of Engineering &I.T

UNIT-V   Air Pollution

Introduction, causes, sources, characteristics, effects of air pollution on plants, humans, animals and materials and atmosphere, air pollution control methods and equipment.

COURSE OUTCOME:

- Students are able to understand about quality of water and treatment required for water supply.
- Students are have understanding about planning, designing, construction and monitoring of a water treatment plant as per a city's water demand.
- Students possess the ability to design an analysis the complexities of water distribution system.
  .

TEXT BOOK:

1. Water Supply Engineering – S.K. Garg (Khanna Publication).
2. Water Supply Engineering – B.C. Punmia, A. K. Jain, A. K. Jain (Laxmi Publications).

REFERENCE:

1. Environmental Engineering – Peavy and Rowe (Tata McGraw Hill).
2. Water Supply and Sanitary Engineering – G.S. Birdi (Dhanpat Rai Publications).
3. Introduction to Environmental Science – Y. Anjaneyulu (B.S. Publications).
4. Environmental Science and Engineering – Henry and Heinke (Pearson Education).

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester	:	V B.Tech
Branch	:	Civil
Subject	:	Construction Planning & Management
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	BT543

COURSE OBJECTIVE:
- To understand the basic principles of sustainable construction.
- To analyze methods, materials, and equipment used to construct projects.
- Understand different methods of project delivery and the roles and responsibilities of all constituencies involved in the design and construction process.
- To provide an understanding of labour, material and equipment utilization.

UNIT-I   Introduction
Objectives and functions of construction management, stages in construction, stages of planning, bar charts and milestone charts, project feasibility reports, scheduling job layout and line of balance technique, applications.

UNIT-II   Construction Scheduling PERT
Necessity for good scheduling, Elements of Network, Development of Network, PERT: Time estimates, Time computation, Network Analysis – slack, critical path.

UNIT-III   Construction Scheduling
CPM - Steps in CPM Project Planning, Network Analysis, Activity times and floats, Critical activities and Critical Path Determination

UNIT-IV   Cost Control and Resource Allocation
Cost control in construction-importance, objectives of cost control, cost control systems. Economic analysis of engineering projects, economic studies, Resources allocation, Resources leveling, Project updating, Construction cost monitoring Construction Equipment, Choice of Equipment and Standard production Rates, Construction Processes Queues and Resource Bottlenecks

UNIT-V   Construction safety and Quality Control
Importance, Causes of Accidents, Safety measures, Responsibility for safety, Safety benefits to various parties, Safety clauses in contract, Safety policy, Safety hazards. Quality control in construction: Importance, Elements of Quality, Quality Assurance Techniques, Quality Control Circles.

MATS School of Engineering &I.T

COURSE OUTCOME:
- Students are able to make time estimates of construction work.
- Students learned about various safety hazards.
- Students learned to manage construction work.

TEXT BOOK:
1. Construction Project Management Planning, Scheduling and Control – K.K. Chitkara (Tata McGraw Hill Publishing Co., New Delhi, 1998).
2. Project Management: A systems Approach to Planning, Scheduling and Controlling – Harold Kerzner (CBS Publishers & Distributors, Delhi, 1988).

REFERENCE:
1. Project management for Construction: Fundamental Concepts for owners, Engineers, Architects and Builders – Chris Hendrickson and Tung Au, (Prentice Hall, Pittsburgh, 2000).
2. Construction Project Management – Frederick E. Gould (Wentworth Institute of Technology, Vary E. Joyce, Massachusetts Institute of Technology, 2000).
3. Project Management – S. Choudhury (Tata McGraw Hill Publishing Co., New Delhi, 1988).
4. Applied project Engineering and Management – Ernest E. Ludwig (Gulf Publishing Co., Houston, Texas, 1988).
5. Construction cost management, learning from case studies – Keith Potts, Taylor and Francis, London and New York.

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester   :   V B.Tech
Branch   :   Civil
Subject   :   Concrete Technology Laboratory
Total Laboratory Periods   :   28
Total Tutorial Periods   :   00
Total Credits   : 01
Code   :   BT544

COURSE OBJECTIVE:

- To test the basic properties ingredients of concrete, fresh and hardened concrete properties.
- To determine the workability of concrete by different methods.
- Students will learn mix design of concrete by using IS code method.

<u>List of Experiment</u> (Minimum 10 numbers of experiments to be perform)

1. Determination of Strength of concrete
2. Determination of Workability by compaction factor
3. Determination of Slump test for a concrete mix
4. Determination of workability by Vee-bee test
5. Determination of workability by Flow table test
6. Determination of Modulus of elasticity of concrete and strain measurement by longitudinal compressometer.
7. Determination of Soundness test on aggregate
8. Determination of Deleterious materials in fine aggregate
9. Determination of flexural strength of concrete
10. Mix Design by I.S. Code method (with OPC Cement)
11. Mix Design by I.S. Code method (with Slag Cement)
12. Mix Design by I.S. Code method (with Admixtures Cement)
13. Determination of grading curve of Mix aggregate & sieve analysis
14. Determination of Compressive strength of concrete by nondestructive test – Rebound Hammer

List of Equipments / Machine Required:

- Slump Cone with Tamping Rod
- Concrete Cubes (15 x 15 x 15) cm3
- Tray (45 x 60) cm2, (60 x 60) cm2, (30 x 45) cm2
- Trowel (6 Nos.)
- I.S. Sieves for Coarse and Fine Aggregate
- Compression Testing Machine (200 T)

MATS School of Engineering &I.T

- Weighing Balance
- Sieve Shaker
- Compaction Factor Test Apparatus
- Vee-Bee Consistometer
- Flow Table
- Longitudinal Compressometer
- Cylindrical Mould
- Concrete Test Hammer
- Graduated Glass Cylinder (500 ml, 1000 ml)
- Beaker (500 ml)
- Rebound Hammer

COURSE OUTCOME:

Upon successful completion of this course, student will be able to:-

- Determine the fineness of cement & fineness modulus of fine aggregate.
- Determine the setting times of cement.
- Determine the specific gravity and soundness of cement.
- Determine the compressive strength of cement & concrete.
- Determine the workability of cement concrete by compaction factor, slump and Vee – Bee tests

TEXT BOOK:

1. Lab Manual Concrete – M.L. Gambhir (Tata McGraw Hill)
2. Concrete Technology – M.S. Shetty (S. Chand & Co.)
3. Concrete Technology – M.L. Gambhir (Tata McGraw Hill

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester   :   V B.Tech
Branch   :   Civil
Subject   :   Highway Engineering Laboratory
Total Laboratory Periods :   28
Total Tutorial Periods   :   00
Total Credits   : 01
Code   :   BT545

COURSE OBJECTIVE:
To introduce:-
- Bitumen and & its engineering behavior.
- Aggregate & its engineering behavior.
- Concept of pavement behavior.

List of Experiment (Minimum 10 numbers of experiments to be perform)

1. Determination of crushing value of aggregates.
2. To determine 10 percent finer value.
3. Determination of abrasion value by Los Angle's Machine.
4. Determination of abrasion value by Deval's Abrasion Machine.
5. Determination of Impact Value of aggregates.
6. Determination of Specific Gravity and Water Absorption of aggregate.
7. Determination of Softening Point of Bitumen.
8. Determination of Ductility Value of Bitumen.
9. Determination of Viscosity Value of Bitumen.
10. Determination of Elongation Index of Aggregate.
11. Determination of Flakiness Index of aggregate.
12. Determination of Penetration Value of Bitumen.
13. Flash and Fire Point Test.
14. Study of Marshal Stability Test.

List of Equipment's / Machine Required:
Ring and Ball Apparatus
Standard Penetrometer
Los Angles Abrasion Machine
Deval's Abrasion Machine
Ductility Testing Machine

MATS School of Engineering &I.T

Tar Viscometer
Sieve Shaker
Standard I.S. Sieves for Fine and Coarse Aggregate
Length Gauge
Thickness Gauge
Crushing Value Cylinder and Mould with Plunger
Aggregate Impact Testing Machine
Flash and Fine Point Apparatus
Benkelman Beam
Hot Air Oven
Water Bath
Marshall Stability Machine and with Mould
Proving Ring and Dial Gauge
Weighing Balance up to 10 kg capacity

COURSE OUTCOME:
The student will be able to:-
- Identify engineering properties of aggregate.
- Indentify the grade & properties of bitumen.
- Find out peak hour traffic & peak time for a given location on the road.

TEXT BOOK:
1. Highway Engineering – Justo & Khanna (Khanna Publishers).
2. Highway Engineering Manual – Justo & Khanna (Khanna Publishers).

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester   :   V B.Tech
Branch   :   Civil
Subject   :   Civil Engineering Drawing Laboratory
Total Laboratory Periods :   28
Total Tutorial Periods   :   00
Total Credits   : 01
Code   :   BT546

COURSE OBJECTIVE:
- To communicate a design idea/concept graphically/ visually.
- To develop parametric design and the conventions of formal engineering drawing.
- To lean broader aspect of civil engineering drawing.

List of Experiment (Minimum 10 numbers of experiments to be perform)

1. To draw section and elevation of fully glazed, half glazed and half glazed-half paneled doors and windows.
2. To draw the plan and section of a fully furnished bathroom.
3. To draw the plan and section of a fully furnished kitchen.
4. To draw the line plan of a Primary School building.
5. To draw the line plan of a Hostel building.
6. To draw the line plan of a Hospital building.
7. To draw the line plan of a single storey residential building.
8. To draw ground floor plan of residential building.
9. To draw the section of a building showing maximum details
10.   To draw the corresponding front elevation of residential building.

COURSE OUTCOME:
- Students are able to draw different components of a building.
- Students learned to draw various doors and windows.
- Students gained concept of broader aspect of civil engineering drawing.

MATS School of Engineering &I.T

MATS UNIVERSITY
ARANG, RAIPUR (C.G.)

Scheme & Syllabus
(VI Semester)
Bachelor of Technology
Civil Engineering

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

Scheme of Teaching & Examination

VI - Semester

S.No.	Code	Subject	Periods per Week			Scheme of Marks		Total Credit
			L	T	P	ESE	IM	
1.	BT640	Design of Steel Structure	3	1	-	70	30	4
2.	BT641	Railway, Harbor and Tunnel Engineering	3	0	-	70	30	3
3.	BT642	Waste Water Engineering	3	0	-	70	30	3
4.	BT643	Design of Steel Structure Laboratory	-	0	-	30	20	1
5.	BT644	Environmental EngineeringLaboratory	-	-	2	30	20	1
6.	BT645	Computer Aided Design Laboratory	-	-	4	30	20	2
7.	BT646	Project-I	-	-	2	70	30	2
8.	BTP4XX	Professional Elective-III	3	0	-	70	30	3
9.	BTOXX	Open Elective-II	3	0	-	70	30	3
		Total	**15**	**1**	**8**	**510**	**240**	**22**

L – Lecture,   T – Tutorial,   ESE – End Semester Examination,
P – Practical, IM – Internal Marks (Include Class Test & Teacher's Assessments)

MATS School of Engineering &I.T

Semester	:	VI B.Tech
Branch	:	Civil
Subject	:	Design of Steel Structure
Total Theory Periods	:	48
Total Tutorial Periods	:	12
Total Credits	:	04
Code	:	BT640

COURSE OBJECTIVE:
- To know about the merits of steel structures.
- To know about shapes and grades of structural steel available.
- To know about the different methods of design and the advantages of limit state design over other methods.
- To understand the behavior of structural steel under tension, compression and flexure.

UNIT-I   Introduction
Types of Structural Steel, Physical and Mechanical Properties, Advantages of steel as a structural material, Rolled Sections , Tapered Flange and Parallel Flange, Built up sections, Convention for Member Axes. Plastic Theory, Shape factor, Methods of design, Limitations of Working stress and Plastic design methods, Advantages of Limit State Design, Limit States of Strength and Serviceability, Partial Safety Factors, Loads and Load Combinations, Geometrical Properties, Classification of Cross Sections, Maximum effective slenderness ratio.

UNIT-II   Fasteners
Location details of fasteners, Bearing type bolts, Friction Grip type Bolting, Welds and Welding, Advantages and Disadvantages of Welded Connections, Lap and Butt Joints, Truss Joint Connections by bolts and welds.

UNIT-III   Tension Member
Design Strength due to Yielding of Gross Section, Rupture of Critical Section, Block Shear, Design of Axially Loaded Tension Members, Steel Angles under Tension.

UNIT-IV   Compression Member
Design Strength, Effective length of compression members, Design of Axially loaded compression members, Steel Angles under Compression, Design of Column bases under axial load, Laced Columns, Battened columns.

UNIT-V   Flexural Member

MATS School of Engineering &I.T

Design Strength in Bending (Flexure), Effective length for lateral torsional buckling, Shear, Design of Laterally Supported and Laterally Unsupported Beams with un-stiffened webs.

COURSE OUTCOME:
- Students have ability to select adequate shape and grade of structural steel.
- Students have ability of economical and safe design of steel structures.. Student will have ability of choosing proper fastener for a particular joint.
- Students have ability to design structural steel elements by Limit State Method.

TEXT BOOKS:
1. Design of Steel Structures - N. Subramanian (Oxford University Press).
2. Limit State Design of Steel Structures – S. K. Duggal (Tata McGraw Hill).

REFERENCE:
1. Indian Standard – General Construction in Steel –Code of Practice (3rd Revision) (IS: 800 – 2007).
2. Design of Steel Structures – K. S. Sai Ram (Pearson Education).
3. Structural Steel Design: LRFD Method – J. C. McCormac, J. K. Nelson (Pearson Education).
4. Limit State design in Structural Steel – M. R. Shiyekar (PHI Learning).
5. Limit State Design of Steel Structures (IS: 800-2007) – V. L. Shah, V. Gore (Structures Publications).
6. Design Manual for Designing Steel Structures according to New IS: 800, Publication Number INS/PUB/114 – Institute for Steel Development and Growth, Kolkata.

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester	:	VI B.Tech
Branch	:	Civil
Subject	:	Railway, Harbour and Tunnel Engineering
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	BT641

COURSE OBJECTIVE:
- To educate the students on the various means of transportation i.e., Railway Engineering, Tunnel Engineering and Harbour Engineering.
- To expose the students the concepts of Geometric design of Railway Engineering.
- To expose the students the concepts of Bridge Engineering.
- To educate the students the concepts of Tunnel and Harbour Engineering.

UNIT-I   **Railway Engineering**

Railway track cross-section, coning of wheels, rail cross-section, weight of rail, length of rail, wear of rails, creep of rails, rail joints and welding of rail, sleepers, various types, spacing and density fastenings, ballasts.

UNIT-II   **Railway Geometrics**

Grading, cant and cant deficiency, transition curves, widening of gauges on curves. Point and crossing, design of turn outs various types of track junctions, signaling and interlocking, signals, control of movements of trains.

UNIT-III   **Bridge Engineering**

Bridge site investigation and planning, selection of bridge site, alignment, collection of bridge design data, economic span, scour depth, depth of foundation afflux, clearance, free board.

UNIT-IV   **Tunnel Engineering**

Consideration in tunneling shape and size, methods of tunnel, constructions, tunneling in soft soil and rocks, lining of tunnels, ventilation, drainage of tunnels.

UNIT-V   **Harbour Engineering**

Harbour layout, harbor works, break water jetties, wharves, piers and berthing facilities, port facilities, docks, transit shed and ware houses.

MATS School of Engineering &I.T

COURSE OUTCOME:
- The students have ability to make safe design for railway track with high speed.
- The students have ability to selection of site and collection of data for Bridge Design.
- The students understood methods of construction of Tunnel and Harbour.

TEXT BOOKS:
1. Railway Engineering – S.C. Saxena and S.P. Arora, "A textbook of Railway Engineering", (Dhanpat Rai Publications).
2. Railway Engineering – S.C. Rangwala, "Railway Engineering", (Charotar Publishing House Pvt. Ltd.).
3. Bridge Engineering – S.P. Bindra, "Principles and practice of bridge engineering", (Dhanpat Rai Publications).
4. Tunnel Engineering – S.C. Saxena (Dhanpat Rai Publications).
5. Harbour Engineering – R. Srinivasan (Charotar Publishing House Pvt. Ltd).

REFERENCE:
1. Tunnel and Harbour – S. Seetharaman (Umesh Publication).
2. Harbour Engineering – R. Srinivasan (Charotar Publishing House Pvt. Ltd.).

MATS School of Engineering &I.T

Semester	:	VI B.Tech
Branch	:	Civil
Subject	:	Waste Water Engineering
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	BT642

COURSE OBJECTIVE:
- To introduce the students the estimation of domestic sewage and other sewer appurtenances.
- To impart a detailed knowledge in the design of various sewage treatment processes.
- To give an overview of importance of proper sewage disposal and various sewerage systems.
- To impart knowledge about the different industrial waste treatment technique.
- To provide knowledge about the environmental social and health implications of solid waste management.

UNIT-I   Estimation of Sewage
Sewage and Sewerage, definitions and some common terms, object of sewage disposal. System of sanitation: Conservancy systems, Water system, sewage system-combined, separate and partially separate, patterns of collection system. Amount of sewage: Estimation of domestic and storm sewage, variations in the quantity of sewage, Design of sewers (Only circular sewer) Manholes, Pumping stations, Wet well capacity.

UNIT-II   Characteristics of Sewage Treatment
Characteristics of sewage: Physical, chemical and biological characteristics, fundamentals of aerobic & anaerobic process. Sewage treatment: Preliminary treatment systems, Racks and screens, comminute Grit chambers. Primary treatment systems: Plain sedimentation, detention time and over-flow rates, types of inlets and outlets, onsite wastewater treatment- septic tank, Inhoff tank, oxidation pond.

UNIT-III   Secondary Treatment
Secondary treatment systems Attached growth process: Trickling filters, standard and high rates, efficiency (NRC) formula, and operational problems of trickling filters. Suspended growth process, principle of suspended growth process, Activated sludge process, Oxidation ditch aeration and mixing techniques, Operational problems of activated sludge systems, stabilization tools aerobic, anaerobic and facultative lagoon.

UNIT-IV   Sewage Sludge Treatment & Sludge Disposal

MATS School of Engineering &I.T

Importance, amount and characteristics of sludge, sludge digestion, anaerobic digestion, aerobic digestion, sludge drying beds. Disposal by dilution, self-purification of polluted streams, factors affecting self-purification, Sag curve, disposal on land surfaces, Stream standards, Effluent standards, Theories of waste treatment (Volume reduction, strength reduction, new Equalization and proportioning) Summery of industrial waste, its origin, character and treatment.

UNIT-V   Solid Waste Management

Solid waste management, source and characteristics, environmental and health implications, refuse characteristics, collection methods, disposal of solid waste by land filling, composting and incineration methods, Collection and disposal of refuse, Composting of refuse.

COURSE OUTCOME:

- The students are able in designing a sewerage system for a city taking into consideration the variations in flow.
- The students are able to managing, controlling the sewage treatment plant with complete knowledge of the design values and the functioning.
- The students are able to decide upon the quantum of treatment to be given to the wastewater from different sources before they are discharged to open water courses.
- The students are socially responsible and aware of the social, environmental and health implications of solid waste and its management.

TEXT BOOKS:
1. Environmental Engineering – Peavy & Rowe (Tata McGraw Hill, New Delhi).
2. Waste Water Engineering – S.K. Garg (Khanna Publication).
3. Waste Water Engineering – B.C. Punmia (Laxmi Publication, New Delhi)

REFERENCE:
1. Environmental Science and Engineering – Henry and Heinke (Pearson Education).
2. Waste Water Engineering – Metcalf Eddy (Tata McGraw Hill, New Delhi).
3. Introduction to Environmental Science – Y Anjaneyulu (B S Publications).
4. Environmental Science and Engineering – henry and heinke (Pearson Education).
5. Waste Water Engineering – Metcalt Eddy (Tata McGraw Hill, New Delhi)

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester   :   VI B.Tech
Branch   :   Civil
Subject   :   Design of Steel Structure Laboratory
Total Laboratory Periods :   28
Total Tutorial Periods   :   00
Total Credits   :   01
Code   :   BT643

COURSE OBJECTIVE:

- The objective of this course is to introduce students to the fundamental design process of steel as a structural member.
- The emphasis is on the general theory and performance of structural steel, as well as design and analysis of structural members subjected to various loading conditions.

List of Experiment (Minimum 10 numbers of experiments to be perform)

1. Draw the layout of different types of Rivet connections.
2. Draw the neat sketch of staggered joints and show pitch.
3. Draw the neat sketch of staggered joints and show gauge.
4. Draw the neat sketch of staggered joints and show edge distance.
5. Draw the plan of Grillage foundation.
6. Draw the elevation of Grillage foundation.
7. Draw the plan and elevation of slab base.
8. Draw the plan and elevation of Gusset base.
9. Draw the neat sketch of column made by channel section with necessary arrangement of lacing and battening.
10. Draw the neat sketch of column made by angle section with necessary arrangement of lacing and battening.

COURSE OUTCOME:

- Understand the design philosophy and behavior of structural steel.
- Students are Able to analyze and design tension members, columns (compression members), built up sections, beams (flexural members) and plate girders.
- Students are able to identify different type of steel connections.

TEXT BOOKS:
1. Design of Steel Structures - N. Subramanian (Oxford University Press).

MATS School of Engineering &I.T

2. Limit State Design of Steel Structures – S. K. Duggal (Tata McGraw Hill).

REFERENCE:
1. Indian Standard – General Construction in Steel –Code of Practice (3rd Revision) (IS: 800 – 2007).
2. Design of Steel Structures – K. S. Sai Ram (Pearson Education).
3. Structural Steel Design: LRFD Method – J. C. McCormac, J. K. Nelson (Pearson Education).
4. Limit State design in Structural Steel – M. R. Shiyekar (PHI Learning).

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester	:	VI B.Tech
Branch	:	Civil
Subject	:	Environmental Engineering Laboratory
Total Laboratory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	BT644

COURSE OBJECTIVE:

- To introduce students to how the common environmental experiments relating to water and wastewater quality are performed.
- This course will help students know which tests are appropriate for given environmental problems, statistically interpret laboratorial results and write technical reports and apply the laboratorial results to problem identification, quantification, and basic environmental design and technical solutions.

<u>List of Experiment</u> (Minimum 10 numbers of experiments to be perform)

1. To determine acidity of water sample.
2. To determine alkalinity of water sample.
3. To determine hardness of water sample.
4. To determine chloride content of water sample.
5. To determine D.O. content of water sample.
6. To estimate the quantity of BOD from water sample.
7. To determine the availability of chlorine in bleaching powder.
8. To determine the residual quantity of Chlorine.
9. Determination of quantity of Optimum Coagulant Dose.
10. Determination of Break Point Chlorination.
11. Determination of Total Solids.
12. Determination of Turbidity.
13. Determination of particulates in air.
14. Determination of MPN.
15. Determination of pH of water.

List of Equipment/ Machine Required

BOD Incubator
Dust Sampler
Turbidity meter
Microscope

MATS School of Engineering &I.T

PH meter
Muffle Furnace
Hot Air Oven
Jar Test Apparatus

COURSE OUTCOME:
Students who successfully complete this course will be able to:
- Perform common environmental experiments relating to water and wastewater quality, and know which tests are appropriate for given environmental problems.
- Statistically analyze and interpret laboratorial results.
- Apply the laboratorial results to problem identification, quantification, and basic environmental design and technical solutions.

TEXT BOOK
1. Environmental Engineering Lab Manual – Dr. B. Kottaiah & N. Kumaraswamy (Charotar
2. Publications)
3. Water Supply Engineering – S.K. Garg (Khanna Publication).
4. Water Supply Engineering – B.C. Punmia (Laxmi Publication, New Delhi)
5. Environmental Science and Engineering – Henry and Heinke (Pearson Education).

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester	:	VI B.Tech
Branch	:	Civil
Subject	:	Computer Aided Design Laboratory
Total Laboratory Periods	:	30
Total Tutorial Periods	:	00
Total Credits	:	02
Code	:	BT645

COURSE OBJECTIVE:
- To teach the students to understand the details of STAAD. Pro software package.
- To enable the students to prepare input data for RCC & Steel structures.
- To enable the students to design different components of structures.

List of Experiment (Minimum 10 numbers of experiments to be perform)

1. Introduction to latest version of a Standard Structural Engineering Design Package such as STAAD Pro.
2. Geometrical Modeling of RCC Frame on latest version of a Standard Structural Engineering Design Package such as STAAD Pro.
3. Modeling of loads and load combinations on RCC Frame on latest version of a Standard Structural Engineering Design Package such as STAAD Pro.
4. Analysis and Interpretation of Results of Analysis of RCC Frame on latest version of a Standard Structural Engineering Design Package such as STAAD Pro.
5. Design of RCC Frame on latest version of a Standard Structural Engineering Design Package such as STAAD Pro.
6. Interpretation of Results of Design of RCC Frame on latest version of a Standard Structural Engineering Design Package such as STAAD Pro.
7. Geometrical Modeling of Steel Frame on latest version of a Standard Structural Engineering Design Package such as STAAD Pro.
8. Modeling of loads and load combinations on Steel Frame on latest version of a Standard Structural Engineering Design Package such as STAAD Pro.
9. Analysis and Interpretation of Results of Analysis of Steel Frame on latest version of a Standard Structural Engineering Design Package such as STAAD Pro.
10. Design of Steel Frame on latest version of a Standard Structural Engineering Design Package such as STAAD Pro.

MATS School of Engineering &I.T

11. Interpretation of Results of Design of Steel Frame on latest version of a Standard Structural Engineering Design Package such as STAAD Pro.
12. Design of R.C.C. Column on latest version of a Standard Structural Engineering Design Package such as STAAD.etc
13. Design of R.C.C. Isolated Footing on latest version of a Standard Structural Engineering Design Package such as STAAD.etc
14. Case Study of design of a RCC Multistorey Building on latest version of a Standard Structural Engineering Design Package such as STAAD Pro.
15. Case Study of design of a Steel Industrial Building on latest version of a Standard Structural Engineering Design Package such as STAAD Pro.

List of Equipment/ Machine Required

Latest Release of Software Package STAAD Pro (Research Engineers International, Kolkata)
Latest Release of Software Package STAAD.etc (Research Engineers International, Kolkata)
Recommended Books:
(1) Reference Manual for Respective Software
(2) Verification Manual of Respective Software

COURSE OUTCOME:
On completion of this course, the students will be able to:

- Understand the details of STAAD.Pro software package.
- To prepare input data of STAAD.Pro.
- Run STAAD.Pro for analysis and designing of structures.
- Design different components of structures.

MATS School of Engineering &I.T

MATS UNIVERSITY
ARANG, RAIPUR (C.G.)

Scheme & Syllabus
(VII Semester)
Bachelor of Technology
Civil Engineering

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

Scheme of Teaching & Examination

VII - Semester

S.No.	Code	Subject	Periods per Week			Scheme of Marks		Total Credit
			L	T	P	ESE	IM	
1.	BT740	Structural Engineering Design	3	0	-	70	30	3
2.	BT741	Hydrology & Water Resources Engineering	3	0	-	70	30	3
3.	BT742	Quantity Surveying and Cost Evaluation	3	0	-	70	30	3
4.	BT743	Structural Engineering Design Laboratory	-	-	2	30	20	1
5.	BT744	Hydrology & Water Resources Engineering Laboratory	-	-	2	30	20	1
6.	BT745	Internship - II	-	-	-	-	50	3
7.	BT746	Project – II	-	-	4	70	30	2
8.	BTP4XX	Professional Elective -IV	3	0	-	70	30	3
9.	BTOXX	Open Elective - III	3	0	-	70	30	3
Total			**15**	**0**	**8**	**480**	**270**	**22**

L – Lecture,   T – Tutorial,   ESE – End Semester Examination,
P – Practical, IM – Internal Marks (Include Class Test & Teacher's Assessments)

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester	:	VII B.Tech
Branch	:	Civil
Subject	:	Structural Engineering Design
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	BT740

COURSE OBJECTIVE:
- To understand the behavior of plate girders.
- To understand the behavior of retaining walls.
- To understand designing of water tanks.
- To understand the behavior of roof trusses under different loads.

UNIT-I   Plate Girder
Plate Girders with solid webs Components of a Plate Girder, Typical sections, Proportioning of the section, Design bending strength, Design shear strength, Stiffened Web panels, minimum web thickness, bearing stiffeners, load carrying stiffeners, intermediate stiffeners, stiffener design, Design of beams and plate girders with solid webs, Column Bases and Gantry Girders Types of column bases, slab base, gusset base.

UNIT-II   Footings
Combined Footings, limit state design of combined rectangular and combined trapezoidal Footings, Introduction to design of strap footing and raft foundation, Retaining walls Limit State Design of Cantilever retaining wall with horizontal and sloping backfill, Counterfort retaining wall with horizontal backfill.

UNIT-III   Pre-stressed Concrete
Pre=stressed Concrete Basic concepts, classification and types of pre-stressing, Pre-stressing systems, Losses in Pre-stress, Properties of materials, merits and demerits of pre-stressed concrete, Analysis of beam for flexure, Kern distances and efficiency of Sections.

,

UNIT-IV   Water Tanks
Water Tanks Circular tank (resting on ground) with flexible / rigid joint between floor and wall (by approximate method), Design of Circular overhead tank with domed bottom and top (membrane analysis), Intze Tank (Membrane Analysis): Dimensions, Design of top dome, Top ring beam, cylindrical wall, middle ring beam, conical dome, bottom dome. Introduction to design of water tanks using IS Codes, Introduction to continuity analysis.

MATS School of Engineering &I.T

UNIT-V   Roof Trusses & Bridges

Roof Trusses Types of roof trusses, Loads - Dead, Imposed and wind loads, load combinations, Design of Purlins, Analysis & Design of roof trusses (with angle sections), Bridges Various types of Bridges, Loading for road bridges, Design of super structure for solid slab bridge, Design of cantilever slab for T-Beam bridge, Introduction to design of interior panels and girders of a T-Beam Bridge.

COURSE OUTCOME:

- Students are capable of designing Plate Girders.
- Students are capable of designing retaining wall.
- Students are capable of designing Column bases & footing.
- Students are capable of designing Roof trusses.

TEXT BOOKS:

1. Design of Steel Structures - N. Subramanian (Oxford University Press).
2. Limit State Design of Steel Structures – S. K. Duggal (Tata McGraw Hill).
3. Limit State Design of Reinforced Concrete – B. C. Punmia, A. K. Jain and A. K. Jain (Laxmi Publications).
4. Pre-stressed Concrete – Krishna Raju N. (New Age International)

REFERENCE:

1. Indian Standard – General Construction in Steel –Code of Practice (3rd Revision) (IS: 800 – 2007).
2. Design of Steel Structures – K. S. Sai Ram (Pearson Education).
3. Structural Steel Design : LRFD Method – J. C. McCormac, J. K. Nelson (Pearson Education)
4. Limit State design in Structural Steel – M. R. Shiyekar (PHI Learning).
5. Limit State Design of Steel Structures (IS: 800-2007) – V. L. Shah, V. Gore (Structures Publications).
6. Design Manual for Designing Steel Structures according to New IS: 800, Publication Number INS/PUB/114 – Institute for Steel Development and Growth, Kolkata.
7. Relevant IS codes IS: 456:2000, IS 875, Part 1, 2.

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester	:	VII B.Tech
Branch	:	Civil
Subject	:	Hydrology & Water Resource Engineering
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	BT741

COURSE OBJECTIVE:
- To understand basic concepts of irrigation and water requirements of crops.
- To understand the concepts of design of canal.
- To learn about water logging
- Be familiar with the concepts of river training.
- To understand the concepts of reservoir planning.

UNIT- I   Introduction
Need for Irrigation, Advantages and Disadvantages of irrigation, development of irrigation in India. Types of Irrigation systems –Soil-Water-Crop relationship
Methods of Irrigation: Surface and sub surface irrigation, sprinkler and drip irrigation.
Water Requirement of Crops: Crop season and crops of India, crop period and base period, delta, duty of water, relationship between delta duty and base period, factors affecting duty, methods of improving duty, Intensity of irrigation, irrigation requirement of crops.
Cross Drainage Works: Introduction, types, suitability, design of various types of C-D Works, Aqueduct, Syphon Aqueduct, Super Passage, Syphon, level crossing, inlets and outlets.

UNIT –II   Canal Irrigation
Classification of canal, parts of canal irrigation system, canal alignment, lay-out of canal system, typical canal cross section, command areas, losses in irrigation systems, and water requirement of irrigation channels.
Hydraulic Gates: Control equipments for out-lets, spillway gates, types, design criteria for radial gates, air vents.
Diversion Head Works: Introduction, Types of diversion works, location and components, Weir and Barrage, Effect of construction of weir on the river regime, Causes of failures of Weirs on permeable foundations, their remedies

UNIT-III   Water Logging & It's Control
Causes and ill effects of water logging, prevention and control, reclamation of water logged and saline lands, surface drainage.

MATS School of Engineering &I.T

Design of Lined Channels: Introduction, benefits of lining, types of lining, economics of lining, procedure and design of lined canals.

Water Distribution System: Rotational delivery (Warabandi), Continuous delivery and delivery on demand, Role of command area development authority, Functions and organizational structures.

UNIT-IV   River Behavior, Control & Training

Objects, river characteristics, river patterns, classification of river training works, methods of river training embankments, bank protection, spurs, cutoffs, pitched island, river diversion, meandering causes and parameters.

Spillways and Energy Dissipaters: Introduction, essential requirements of a spillway, spillway capacity, components, Types of spillways, Design of Ogee Spillway, Energy Dissipation below spillways, Types of Energy dissipater,

UNIT-V   Reservoir Planning

Introduction, Type of reservoirs, storage zones of a reservoir, mass curve and demand curve, determination of reservoir capacity, safe field, Types of Dams, Suitability of a type of dam, Gravity dams, Forces acting on dams, failure of dams and criteria for structural stability, Overturning, Compression or crushing, tension, sliding, principal and shear stress, stability analysis, Elementary profile of a gravity dam, High and low gravity dams, Profile from practical.

COURSE OUTCOME:
- Students are able to understand the different types of irrigation.
- Students are able to design the canal.
- Students can explain the effects of water logging.
- Students should be able to understand the behavior of river.
- Students can plan the reservoir for different demands.

TEXT BOOKS:
1. Irrigation Engineering and Hydraulic Structures – S.K. Garg (Khanna Publications).
2. Irrigation Engineering – B.C. Punmia (Laxmi Publications).

REFERENCE:
1. Irrigation, Water Resources and Water Power Engineering – Dr. P.N. Modi (Standard Book House).
2. Theory and Design of Irrigation Structures (Volume – I & II) – Varshney (Nem Chand & Bros.).
3. Irrigation Engineering – G.L. Asawa (New Age International Publications).
4. Fundamentals of Irrigation Engineering – Bharat Singh (Nem Chand & Bros.).

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester   :   VII B.Tech
Branch   :   Civil
Subject   :   Quantity Surveying & Cost Evaluation
Total Theory Periods :   48
Total Tutorial Periods :   00
Total Credits   :   03
Code   :   BT742

COURSE OBJECTIVE:
- To provide an understanding of estimate, their types, items and units of work, and types of approximate estimate.
- To provide an understanding of determining quantity estimate of civil engineering works.
- To provide an understanding of rate analysis and its application to different items.
- To provide an understanding of general requirements of contracts.
- To provide an understanding of the concept of valuation of properties.

UNIT-I   Introduction
Introduction to quantity surveying, methods of measurements and units of measurements of various items of work, Principles of estimating, different types of estimates, procedure for computation of stage I estimate.
General terms: Administrative approval, technical sanction, competent authority, Deposit works, suspense account, imprest account, indent of stores, muster roll. Measurement book, material at site account, stock account, establishment charges, contingencies.

UNIT-II   Quantity Estimate
Types of estimate, data required for estimation detailed estimates of civil engineering works. Buildings, canals, roads steel works, water supply and sanitary works

UNIT-III   Analysis of Rates
Purpose and principles factors affecting the rates of items of works, Analysis of rates of different items such as cement concrete of different proportions, brick masonry different mortars, flooring (tiles, mosaic, cement concrete flooring), Use of Schedule of rates and specifications.

UNIT-IV   Contracts
Brief idea about types of tender, tender notice, earnest money, security deposit, liquidated damages, arbitration, escalation- General requirements of contract, types of contract, conditions, termination of contract**.**

MATS School of Engineering &I.T

UNIT-V   Valuation of Property

General, object of valuation, definitions of terms related to valuation, methods of determining value of property, development method of valuation, concept of capitalized value and year purchase, depreciation, lease, mortgage, easement.

COURSE OUTCOME:
- Students are able to identify various items of building and able to determine approximate estimate of buildings.
- Students are able to determine quantities estimate of civil engineering works from given details.
- Students are able to know about determination of quantities of materials and rate analysis of any items in residential building works.
- Students are able to know contract and its types.
- Students are able to know concept of valuation.

TEXT BOOKS:
1. Estimating and Costing in Civil Engineering – B.N. Dutta (UBS Publishers, New Delhi).
2. Estimating and Costing and specifications – M. Chakrabarty (UBS Publishers, New Delhi).

REFERENCE:
1. Textbook of Estimating and Costing – G.S. Birdi (Dhanpat Rai Publications).
2. Valuation of real properties – S.C. Rangwala (Charotar Publication).
3. A Textbook of Estimating and Costing – Kohli & Kohli (S. Chand & Co.).

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester	:	VII B.Tech
Branch	:	Civil
Subject	:	Structural Engineering Design Laboratory
Total Laboratory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	BT743

COURSE OBJECTIVE:
- Understand the behavior of plate girders.
- Understand the behavior of column bases and gantry girders.
- Understand the behavior of eccentric and moment connections.

List of Experiment (Minimum 10 numbers of experiments to be perform)

1. Drawing of plan and section of various types of bolted and welded joints.
2. Detailing of a Axially Loaded angle Tension Member
3. Detailing of an Axially Loaded Compression Member with base plate.
4. Detailing of an Axially Loaded Built up Laced Compression Member.
5. Detailing of an Axially Loaded Built up Battened Compression Member.
6. Detailing of a Riveted / Bolted Plate girder.
7. Detailing of a Welded Plate girder.
8. Detailing of flexible connections
9. Detailing of Semi – Rigid Connections
10. Detailing of Rigid Connections
11. Detailing of a Industrial shed
12. Detailing of a Truss Bridge Railway Bridge.
13. Preparation of Bill of Materials
14. Preparation of Fabrication drawings.
15. Preparation of Erection drawings.

COURSE OUTCOME:
- Students are capable of designing Plate Girders.
- Students are capable of designing members subjected to combined forces.
- Students are capable of designing eccentric and Moment connections.

TEXT BOOK & REFERENCE:

MATS School of Engineering &I.T

1. Design of Steel Structures – K. S. Sai Ram (Pearson Education)
2. Structural Steel Design : LRFD Method – J. C. McCormac, J. K. Nelson (Pearson Education)
3. Limit State design in Structural Steel – M. R. Shiyekar (PHI Learning)
4. Limit State Design of Steel Structures (IS:800-2007) – V. L. Shah, V. Gore (Structures Publications)

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester	:	VII B.Tech
Branch	:	Civil
Subject	:	Hydrology & Water Resource Engineering Laboratory
Total Laboratory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	BT744

COURSE OBJECTIVE:
- To understand the concepts of design of canal.
- Be familiar with the concepts of river training.
- To understand the concepts of reservoir planning.

List of Experiment (Minimum 10 numbers of experiments to be perform)

1. Experimental investigation of relationship between specific energy and depth of flow.
2. To study the flow characteristics over the weirs in the Flume
3. To study the characteristics of hydraulic jump development in the Laboratory Flume.
4. Potential Estimation of a particular Dam Site.
5. To Develop Relationships between Surface Area, Capacity and Elevation of a Reservoir.
6. Estimation of Live Storage of a Reservoir and Hydropower Potential for the Site.
7. Estimation of Suspended Load, Bed Load and Total Load and Life of Reservoir.
8. Design of an Irrigation System for a particular Area including the Design of canal
9. Design of Outlets.
10. Design of Water Courses and schedule.
11. Study of various existing Barrages and Canals.
12. Comprehensive Design of a Barrage

COURSE OUTCOME:
- Students are able to design the canal.
- Students should be able to understand the behavior of river.
- Students can plan the reservoir for different demands.

TEXT BOOK:
1. Irrigation Engineering and Hydraulic Structures – S.K. Garg (Khanna Publications)
2. Irrigation Engineering – B.C. Punmia (Laxmi Publications)

REFERENCE:

MATS School of Engineering &I.T

1. Irrigation, Water Resources and Water Power Engineering – Dr. P.N. Modi (Standard Book House)
2. Theory and Design of Irrigation Structures (Volume – I & II) – Varshney (Nem Chand & Bros.)
3. Irrigation Engineering – Asawa G.L. (New Age International Publications)
4. Fundamentals of Irrigation Engineering – Bharat Singh (Nem Chand & Bros.)

MATS School of Engineering &I.T

MATS UNIVERSITY
ARANG, RAIPUR (C.G.)

Scheme & Syllabus
(VIII Semester)
Bachelor of Technology
Civil Engineering

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

Scheme of Teaching & Examination

VIII - Semester

S.No.	Code	Subject	Periods per Week			Scheme of Marks		Total Credit
			L	T	P	ESE	IM	
1.	BT840	Internship/ Training-III	-	-	-	70	30	6
2.	BT841	Project-III	-	-	-	120	80	6
3.	BTP4XX	Professional Elective-V	3	-	-	70	30	3
4.	BTOXX	Open Elective-IV	3	-	-	70	30	3
		Total	6	0	0	330	170	18

L – Lecture,   T – Tutorial,   ESE – End Semester Examination,
P – Practical, IM – Internal Marks (Include Class Test & Teacher's Assessments)

MATS School of Engineering &I.T

MATS UNIVERSITY
ARANG, RAIPUR (C.G.)

Scheme & Syllabus
Professional Elective
Bachelor of Technology
Civil Engineering

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

Professional Elective for B.Tech

S. No.	Code	Subject
1	**BTP401**	Concrete Technology
2	**BTP402**	Construction Planning And Management
3	**BTP403**	Urban Transportation Planning
4	**BTP404**	Composite Material
5	**BTP405**	Architecture and Town Planning
6	**BTP406**	Computer Aided Structural Analysis
7	**BTP407**	GIS and Remote Sensing
8	**BTP408**	Construction Equipment & Techniques
9	**BTP409**	Solid & Hazardous Waste Management
10	**BTP410**	Hydrology and Irrigation Engineering
11	**BTP411**	Foundation Engineering
12	**BTP412**	Ground Improvement Techniques
13	**BTP413**	Traffic Engineering
14	**BTP414**	Repairs and Rehabilitation of Structures
15	**BTP415**	Environmental Pollution and Control Engineering
16	**BTP416**	Pre-Stressed Concrete
17	**BTP417**	Water Power Engineering
18	**BTP418**	Expansive Soil
19	**BTP419**	Bridge Engineering
20	**BTP420**	Industrial Waste Engineering
21	**BTP421**	Earthquake Engineering

MATS School of Engineering &I.T

22	BTP422	Environmental Impact Assessment
23	BTP423	Structural Dynamics
24	BTP424	FEM Application in Civil Engineering
25	BTP425	Pavement Analysis and Design

MATS School of Engineering &I.T

Branch	:	Civil
Subject	:	Concrete Technology
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	BTP401

COURSE OBJECTIVE:
- To develop Fundamental knowledge of properties of concrete and its ingredients.
- To acquire an interest in concrete technology and admixture and its filled requirements.
- Developing a good skill of various methods of concrete making, placing and special

UNIT –I   Introduction
Concrete and its ingredients and their functions, various mixes and grades, various types of concrete and their uses, Types of cement and their properties

UNIT–II   Cement and Admixtures
Ordinary Portland cement, Rapid hardening cement, Quick setting cement, Low heat cement, Portland pozzolana cement, Colored cement, High strength cement, High alumina cement, Sulphate resistant cement, Chemical composition, properties and uses of various types of additives &admixtures-uses and function, Heat of hydration, Water requirement for hydration

UNIT-III   Testing of Cement
Field testing and laboratory testing, Fineness test, Setting time test, Strength test, Soundness test, Heat of hydration test, Aggregate abrasion value test., Suitability of different aggregates for different concrete works

UNIT-IV   Aggregate
Classification on the basis (i) Source (ii) Size (iii) Shape (iv) Texture, Strength of aggregates, Aggregate impact value, Aggregate abrasion value, Modulus of elasticity, Bulk density, Specific gravity, Absorption and moisture content, Bulking of aggregates, Measurement of moisture content of aggregates by (i) Drying method (ii) Displacement method, Cleanliness, soundness of aggregates, Grading of aggregates, Sieve analysis, Specific surface and surface index, Standard grading curve., Testing of aggregates (i) Flakiness index (ii) Elongation index (iii) Test for determination of clay, fine silt and fine dust (iv) Specific Gravity test (v) Bulk Density and Voids (vi) Test for aggregate crushing value (vii) ten percent fineness value test (viii) Aggregate impact value test.

UNIT–V   Fresh Concrete

MATS School of Engineering &I.T

Workability, Factors affecting workability, Measurement of workability by (i) slump test (ii) compaction factor test (iii) flow test (iv) Vee Bee consistometer test, segregation and bleeding

Strength of Concrete, Strength of concrete, Water/cement ratio, Gel/Space ratio, Gain of strength with age, Maturity concept of concrete, Effect of maximum size of aggregates on strength, Relation between compressive and tensile strength, Bond strength, Aggregate cement bond strength, High strength concrete, Joints in concrete work-their position and types, lasting of concrete-destructive and non destructive, Related Indian standard numbers and its contents for all ingredients of concrete

COURSE OUTCOME:
After completing this course the student must demonstrate the knowledge and ability to:
- Explain the properties of the constituent materials of concrete.
- Describe the physical & mechanical properties of aggregates.
- Study the behavior of concrete at its fresh and hardened state, describe and carry out tests relevant to the use of concrete on site.
- Explain factors affecting strength of concrete.

TEXT BOOK:
1. Concrete Technology – M.L. Gambhir (Tata McGraw Hill).
2. Concrete Technology – R.S. Varshney (Oxford, IBH Publishers).

REFERENCE:
1. P Kumar Mehta, Monteiro; Concrete Technology, Indian Concrete Institute
2. A. R. Santhakumar; Concrete Technology, Oxford University Press.
3. A. M. Neville ; Properties of Concrete , Pearson Education

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Branch   :   Civil
Subject   :   Construction Planning & Management
Total Theory Periods   :   48
Total Tutorial Periods   :   00
Total Credits   :   03
Code   :   BTP402

COURSE OBJECTIVE:

- To provide an understanding of owners perspective towards life cycle of project and the changing environment of construction industry.
- To provide an understanding of organizing for project management.
- To provide an understanding of innovation, feasibility and value engineering in design and construction.
- To provide an understanding of labour, material and equipment utilization.
- To provide an understanding of approaches to cost estimation in construction project.

UNIT-I   Introduction

Objectives and functions of construction management, stages in construction, stages of planning, bar charts and milestone charts, project feasibility reports, scheduling job layout and line of balance technique, applications.

UNIT-II   Construction Scheduling PERT

Necessity for good scheduling, Elements of Network, Development of Network, PERT: Time estimates, Time computation, Network Analysis – slack, critical path.

UNIT-III   Construction Scheduling

CPM - Steps in CPM Project Planning, Network Analysis, Activity times and floats, Critical activities and Critical Path Determination

UNIT-IV   Cost Control and Resource Allocation

Cost control in construction-importance, objectives of cost control, cost control systems. Economic analysis of engineering projects, economic studies, Resources allocation, Resources leveling, Project updating, Construction cost monitoring Construction Equipment, Choice of Equipment and Standard production Rates, Construction Processes Queues and Resource Bottlenecks

UNIT-V   Construction safety and Quality Control

MATS School of Engineering &I.T

Importance, Causes of Accidents, Safety measures, Responsibility for safety, Safety benefits to various parties, Safety clauses in contract, Safety policy, Safety hazards. Quality control in construction: Importance, Elements of Quality, Quality Assurance Techniques, Quality Control Circles.

COURSE OUTCOME:
- Students should be able to identify owner's perspective / perspective of project participants towards construction projects.
- Students are expected to identify the structure of project participant's organization and effect of project risks.

TEXT BOOK:
1. Construction Project Management Planning, Scheduling and Control – Chitkara, K.K. (Tata McGraw Hill Publishing Co., New Delhi, 1998)
2. Project Management: A systems Approach to Planning, Scheduling and Controlling – Harold Kerzner (CBS Publishers & Distributors, Delhi, 1988)

REFERENCE:
1. Project management for Construction: Fundamental Concepts for owners, Engineers, Architects and Builders – Chris Hendrickson and Tung Au, (Prentice Hall, Pittsburgh, 2000).
2. Construction Project Management – Frederick E. Gould (Wentworth Institute of Technology, Vary E. Joyce, Massachusetts Institute of Technology, 2000).
3. Project Management – Choudhury, S. (Tata McGraw Hill Publishing Co., New Delhi, 1988).
4. Applied project Engineering and Management – Ernest E. Ludwig (Gulf Publishing Co., Houston, Texas, 1988).
5. Construction cost management, learning from case studies – Keith Potts, Taylor and Francis, London and New York.

MATS School of Engineering &I.T

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Branch	:	Civil
Subject	:	Urban Transportation Planning
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	BTP403

COURSE OBJECTIVE:
- Students will Understand and apply basic concepts and methods of urban transportation planning.
- They will know about the methods of designing, conducting and administering surveys to provide the data required for transportation planning.
- Students will understand the process of developing an organized mathematical modelling approach to solve select urban transportation planning problem.
- They will know about and understand the use of various types of models used for travel forecasting, prediction of future travel patterns.

UNIT-I   Urban Transport Planning
Urbanization, urban class groups, transportation problems and identification, impacts of transportation, urban transport system planning process, modelling techniques in planning. Urban mass transportation systems: urban transit problems, travel demand, types of transit systems, public, private, para-transit transport, mass and rapid transit systems, BRTS and Metro rails, capacity, merits and comparison of systems, coordination, types of coordination.

UNIT-II   Data Collection and Inventories
Collection of data, Organisation of surveys and Analysis, Study Area, Zoning, Types and Sources of Data, Road Side Interviews, Home Interview Surveys, Commercial Vehicle Surveys, Sampling Techniques, Expansion Factors, Accuracy Checks, Use of Secondary Sources, Economic data, Income , Population, Employment, Vehicle Owner Ship.

UNIT-III   Trip Generation & Distribution
UTPS Approach, Trip Generation Analysis: Zonal Models, Category Analysis, Household Models, Trip Attraction models, Commercial Trip Rates; Trip Distribution by Growth Factor Methods. Problems on above

UNIT-IV   Trip Distribution
Gravity Models, Opportunity Models, Time Function Iteration Models. Travel demand modelling: gravity model, opportunity models, Desire line diagram. Modal split analysis, Problems on above.

MATS School of Engineering &I.T

UNIT-V   Traffic Assignment

Diversion Curves; Basic Elements of Transport Networks, Coding, Route Properties, Path Building Criteria, Skimming Tree, All-or-Nothing Assignment, Capacity Restraint Techniques, Reallocation of Assigned Volumes, Equilibrium Assignment. Introduction to land use planning models, land use and transportation interaction.

COURSE OUTCOME:
- Students learned about urban transportation system planning process, land use planning, different urban mass transit systems-their merits and limitations.
- They came to know about different types of transportation surveys, travel demand modeling, urban mass transit system operation and urban goods movement .
- They came to know about Carry out trip generation, trip distribution, modal split and trip assignment analysis.

TEXT BOOK:
1. Traffic Engineering – McShane, W.R. and Roes, R.P. (Prentice Hall, New Jersey, 1990).
2. Traffic Engineering and Transport Planning – Kadiyali, L.R. (Khanna Publishers, Delhi, 1996).
3. Jotin Khisty, S.C. and Kent Lall, B., Transportation Engineering – An Introduction, Prentice-Hall, NJ

REFERENCE:
1. Transport Planning and Traffic Engineering – Flaherty, CAO'(Ed.) (John Wiley & Sons, Inc., New York, 1997)
2. Traffic Flow Fundamentals – May, A.D. (Prentice Hall, Englewood Cliffs, New Jersey, 1990).
3. John W. Dickey, Metropolitan Transportation Planning, Tata McGraw Hill Pub. Co.
4. Vukan R. Vuchic, Urban Public Transportation System & Technology, Prentice Hall, Inc.

MATS School of Engineering &I.T

MATS UNIVERSITY
ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Branch	:	Civil
Subject	:	Composite Material
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	BTP404

COURSE OBJECTIVE:

- Students will develop understanding of the structure of ceramic materials on multiple length scales.
- Students will develop knowledge of point defect generation in ceramic materials, and their impact on transport properties.
- Students will learn key processing techniques for producing metal, ceramic-, and polymer-matrix composites.

UNIT-I   Introduction

Introduction, Historical background, Technological Applications, Composites, various reinforcement and matrix materials, Classification of composites.

UNIT-II   Fiber Reinforcement

Forms of fiber reinforcement, comparisons of composites with R.C.C. and metals, Strength and stiffness properties.

UNIT-III   Manufacturing of Fiber Reinforced Composite Material

Fiber reinforced composite materials, Manufacturing Technique, Cost and Weight advantages.

UNIT-IV   Behavior of Composite Material

Behavior of uni-directional, cross-ply, angle-ply and other composites-strength and stiffness, anisotropy, generalized Hooks law. Laminates-Laminated Plates, Analysis, Strength and design with composites, Fiber reinforced Pressure vessels.

UNIT-V   Laminated Plates

Laminates-Laminated Plates, Analysis, Strength and design with composites, fibre reinforced Pressure vessels.

COURSE OUTCOME:

MATS School of Engineering &I.T

- Students are able to identify the properties of fiber and matrix materials used in commercial composites, as well as some common manufacturing techniques.
- Students are able to predict the failure strength of a laminated composite plate.
- Students understood the linear elasticity with emphasis on the difference between isotropic and anisotropic material behaviour.
- Students acquired the knowledge for the analysis, design, optimization and test simulation of advanced composite structures and Components.

TEXT BOOKS:
1. Mechanics of Composite Materials – Robert M.Jones (Taylor & Francis, Philadelphia, 1998)
2. Fiber Reinforced Composites – P.K. Mallick (Marcel Dekker, Inc., New York, 1993)

REFERENCE:
1. Introduction to Design and Analysis with Advanced Composite Materials – Stephen R. Swanson (Prentice Hall, New Jersey, 1997)
2. Stress Analysis of Fiber-Reinforced Composite Materials – M.W. Hyer (WCB McGraw Hill, New York, 1998)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Branch	:	Civil
Subject	:	Architecture & Town Planning
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	BTP405

COURSE OBJECTIVE:
- Students will know about objects, necessity, and principles of town planning.
- Students can apply and appreciate the professional responsibilities in building bye -laws and National building code.
- Students will learn to develop basic skills in designing simple landscape for residential building.

UNIT -I   Introduction
Concept of computer aided drafting, Preliminary of CAD, Terminology, Advantages and disadvantages of CAD, Hardware and software of CAD, Graphical input devices, Menus, Input techniques, Output devices, Software, Shape and size description, Drawing primitives, Dimension, Delete and redraw, Window (Zoom), Text and editing (move, copy rotate, mirror), Scale, filters and round, Grouping of entities, Layers

UNIT –II   AutoCAD Feature
Drawing primitives, Invoking and quitting AutoCAD, Grid, Snap Ortho, Arc, Circle, Poly line, polygon, Ellipse, Text, Edit (erase, copy move, rotate, arrays, mirrors, break, trims, change, fillet
and chamfer), PEDIT, Scale, display and zoom, pan, fill redraw, region, Q Text, Dimensioning, Sectioning, hatching styles, Layer, Block and its creation

UNIT –III   Application of AutoCAD
Introduction, objection, Drawing, aids, Enquiry commands, Plotting of drawing, Uses of plotters, changing plot specification, Application of civil engineering
 Advance 3-D Drafting:- Extude, Subtract and union, 3D views, Shading, Rendering

UNIT –IV   Drawing editor & Decision Making
Get list, get angle, get orient, get string, Get real, SS Get, Test for condition
Working with Geometry & Text:- Find angles and distances, Angle, distance and polar function, String data type, Search for string, Conversion.

UNIT –V   Changing Properties of Object

MATS School of Engineering &I.T

Filtering, Selecting, Accessing, Improving speed, understand the property list, Changing property list, Getting objects name and coordinate together

COURSE OUTCOME:
- Students designed basic furniture items and their spatial layout keeping optimum utilization of space and human comfort in mind.
- Students formulated a design process for architectural design of single activity space for one or two users and demonstrate the same in the form of design proposal.

TEXT BOOK:
1. A course in Civil Engineering Drawing: V.B. Sikka (Katson Technical Publications).

REFERENCE:
1. Charles Wallschlacgerm and Cynthia Busic-Snyder, "Basic Visual Concepts and Principles for Artists, Architects and Designers", Mc Graw Hill, New York 1992.
2. Exner V., Pressel D., "Basics Spatial Design", Birkhanser, 2009.
3. Francis D.K.Ching, "Architecture: Form, Space and Order", Van Nostrand Reinhold Co., (Canaa), 1979.

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Branch	:	Civil
Subject	:	Computer Aided Structural Analysis
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	BTP406

COURSE OBJECTIVE:
- Students will illustrate the basic concepts of structural analysis.
- Students will analyses indeterminate structures using moment distribution method.
- Students will analyses the indeterminate structures using flexibility matrix method.
- Students will analyses the indeterminate structures using stiffness matrix method.
- Students will analyses a multistoried frame using approximate methods.

UNIT-I   Introduction
Principles of virtual work, basic concepts of flexibility and stiffness, types of skeletal structures, internal forces and deformations, introduction and applications of flexibility method and stiffness method to analyze beams, trusses and plane frames.

UNIT-II   Matrix Concepts and Matrix Analysis of Structures
Matrix, vector, basic matrix operations, rank, solution of linear simultaneous equations, eigen values and eigenvectors, coordinate systems, displacement and force transformation matrices, contra gradient principle, element and structure stiffness matrices, element and structure flexibility matrices, equivalent joint loads, stiffness and flexibility approaches.

UNIT-III   Stiffness Member Approach
Analysis of continuous beam, plane truss, plane frame and composite structures including secondary effects such as temperature variations, Pre-strains and restrained displacement, programming direct stiffness method.

UNIT-IV   Special Problems
Member discontinuities, non-prismatic members, curved members, beams on elastic supports, semi-rigid connections, effect of shear deformations by stiffness method, sub-structure analysis and symmetry concepts

UNIT-V   Programming

MATS School of Engineering &I.T

Analysis of structures using C++ Application, excel spread sheets for the design of (1) Reinforced Concrete members like slabs, beams, columns, isolated, footings etc. (2) Steel members like Beam/Girders, Compression & Tension members, Connections etc.

COURSE OUTCOME:

At the end of the course the student are able to:

- Estimate the deflection and crack width of beams and slabs.
- Analyze and design the flat slabs.
- Analyze and design concrete members subjected to fire.
- Examine the structures for earthquake forces.
- Apply codal provisions for ductile detailing of flexural members.

TEXT BOOK & REFERENCE:

1. Matrix Analysis of Framed Structure – W. Weaver and J. M. Gere CBS Publishers, Delhi.
2. Structural Analysis – Ghali & Nevelle, Spon Press, London.
3. Matrix Analysis of Structures – Aslam Kassimali, Cengage Learning, USA.
4. Elementary matrix analysis of structures- H. Kardestuncer, Mc-Graw Hill, USA.
5. Matrix Analysis of Structures - Meghre& Deshmukh, Charotar Publication, Anand.
6. Computer Methods of Structural Analysis - Beauf

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Branch	:	Civil
Subject	:	GIS & Remote Sensing
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	BTP407

COURSE OBJECTIVE:
- Students will know the concepts of Remote Sensing, its interpreting Techniques and concepts of Digital images.
- Students will know the concept of Geographical Information System (GIS), coordinate system GIS Data and its types.
- Students will understand the students managing the spatial Data Using GIS.
- Students will understand Implementation of GIS interface for practical usage.

UNIT-I   Physics of Remote Sensing

Sources of Energy, active and passive radiation, electromagnetic radiation - reflectance, transmission, absorption, thermal emissions, interaction with atmosphere, atmospheric windows, spectral reflectance of earth's surface features, multi concept of remote sensing.

UNIT-II   Platforms

Data acquisition platforms, various types of platforms, different types of aircraft, manned and unmanned space crafts used for data acquisition - characteristics of different types of platforms - LANDSAT, SPOT, IRS, ERS, INSAT, data acquisition Sensors, photographic products, Resolving power of lenses and films, opto-mechanical / Electro-optical sensors.

UNIT-III   Data Analysis

Data products and their characteristics, data pre-processing, atmospheric, radiometric, geometric corrections, basic principles of visual interpretation, equipment for visual interpretation, ground truth, Ground Truth Equipment.

UNIT-IV   Fundamentals of GIS

GIS- Definition, advantages of digital maps, information Systems, modeling real world features data , data formats, spatial and non-spatial, components, data collection and input, data conversion, database management, database structures, files, standard data formats, compression techniques, hardware, computing, printing and scanning systems, software, standard packages like Arcview, ArcGIS, Autocad map, map info etc.

UNIT-V   Spatial Analysis and Modeling

MATS School of Engineering &I.T

Proximity analysis overlay analysis, buffer analysis, network analysis. GIS project planning and implementation, understanding the requirements, phases of planning, specifications, data procurement.

COURSE OUTCOME:
- Students understood about the principles of Remote Sensing and its advantages and limitations.
- Students retrieved the information content of remotely sensed data.
- Students are able to apply problem specific remote sensing data for engineering applications.
- Students are able to analyse spatial and attribute data for solving spatial problems.
- Students are able to create GIS and cartographic outputs for presentation

TEXT BOOK & REFERENCE:
1. Campbell, J.B.2002: Introduction to Remote Sensing. Taylor Publications S.A. Drury, 1987:
2. Image Interpretation in Geology. Allen and Unwin Gupta, R.P.., 1990:
3. Remote Sensing Geology. Springer Verlag Jensen, J.R. 2000:
4. Remote Sensing of the Environment: An Earth Resource Perspective.
5. Prentice Hall. Joseph George, 2003: Fundamentals of Remote Sensing.
6. Universities Press Lillesand, T.M. and Kieffer, R.M., 1987:
7. Remote Sensing and Image Interpretation, John Wiley, F.F. Sabbins, 1985: Remote Sensing Principles and interpretation.

MATS School of Engineering &I.T

Branch	:	Civil
Subject	:	Construction Equipment & Technique
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	BTP408

COURSE OBJECTIVE:

- The main objective of this course is to make the student aware of the various construction techniques, practices and the equipment needed for different types of construction activities.
- Students will learn to perform comparative cost analysis for owning and operating heavy equipment.
- Students will understand general process/methods for constructing industrial, heavy Civil, and commercial projects.

UNIT-I   Construction Equipment

Fundamentals of earthwork operations, Earth moving operations, Types of Earthwork Equipment-Tractors, Motor Graders, Scrapers, Front end waders, Earth Movers, Equipment for Dredging, Trenching, Tunneling, Drilling, Blasting, Equipment for compaction, Erection Equipment. Types of pumps used in construction, Equipment for Dewatering and Grouting, Foundation and Pile Driving Equipment, Forklifts and Related Equipment, Portable Material Bins, Conveyors, Hauling Equipment.

UNIT-II   Equipment for Production of Aggregate and Concreting

Crushers-Feeders, Screening equipment, Handling equipment, Batching and mixing equipment, Hauling, pouring and pumping equipment, Transporters.

UNIT-III   Sub-structure Construction Techniques

Box jacking, Pipe Jacking, Under Water Construction of diaphragm walls and basement, Tunneling Techniques, piling techniques driving well and caisson-sinking cofferdam, cable anchoring and grouting Driving, diaphragm walls, sheet piles-laying operations for built up offshore system, shoring for deep Cutting, Large reservoir, construction with membranes and Earth system-well points dewatering and stand by Plant equipment for underground open excavation

UNIT-IV   Super Structure Construction

Vacuum Dewatering of concrete flooring-Concrete paving technology-Techniques of construction for continuous concreting operation in Tall buildings of various shapes and Varying sections-Launching Techniques-Suspended from work-erection techniques of tall structures, Large span structures-Launching techniques for heavy decks in situ pre-stressing in high rise structures, aerial transporting handling

MATS School of Engineering &I.T

erecting light weight components on tall structures-erection of lattice tower as and rigging of transmission line structures.

UNIT-V   Repair Construction Mud Jacking Grout through Slab Foundation

micro piling for strengthening floor and shallow profile-pipeline laying protecting sheet piles, screw anchors-sub grade water proofing under pining advanced techniques and sequence in demolition and dismantling.

COURSE OUTCOME:

- Students understood terminology and units of measurements related to equipment usage in industrial, heavy civil, and commercial projects
- Students are able to understand standard designations, sizes, and graduations of equipment
- Students are able to perform the proper selection, application, utilization, and productivity of heavy equipment

TEXT BOOKS:

Construction Planning, Equipment and Methods (5th Edition) – R.L. Peurifoy, Ledbetter, W.B. and Schexnayder, C. (McGraw Hill, Singapore, 1995).

Construction Equipment and Management – Sharma S.C. (Khanna Publishers New Delhi, 1988).

REFERENCE:

Construction Equipment and Job Planning – S.V. Deodhar (Khanna Publishers, New Delhi, 1988).
Construction Equipment and its Planning and Application – Dr. Mahesh Varma (Metro-politan Book Company, New Delhi-, 1983).
Practical foundation engineering hand book – Robertwade Brown (McGraw Hill Publications, 1995).
Construction Dewatering: New Methods and Applications –J. Patrick Powers. (John Wiley and Sons, 1992).

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Branch   :   Civil
Subject   :   Solid & Hazardous Waste Management
Total Theory Periods   :   48
Total Tutorial Periods   :   00
Total Credits   :   03
Code   :   BTP409

COURSE OBJECTIVE:

- To understand the problems of municipal waste, biomedical waste, hazardous waste, e-waste, industrial waste etc.
- Students will gain knowledge of legal, institutional and financial aspects of management of solid wastes.
- Students will become aware of Environment and health impacts solid waste mismanagement.
- To understand engineering, financial and technical options for waste management.

UNIT–I   Introduction to Environment

Ecosystem: Meaning, Types , Components, Structure, Functions, Levels of organization in nature, Food chain and Tropic structure, Biogeochemical Cycles, Energy flow.

UNIT – II   Municipal Solid Waste

Definition - Sources and types of solid waste, composition and its determinants of Solid waste, factors influencing generation, quantity assessment of solid wastes, methods of sampling and characterization.

UNIT – III   Collection and Transfer

Collection of Solid waste, collection service, collection system, equipment's – time and frequency of collection, labour requirement, factors affecting collection, analysis of collection system , collection routes, preparation of master schedules.

Transfer and Transport: Need for transfer operation, transfer stations, types, transport means and methods, location of transport stations, Manpower requirement,

Collection Routes: Transfer stations, selection of location, types & design requirements, operation & maintenance.

UNIT – IV   Processing Techniques and Recovery of Energy

Processing techniques, purposes mechanical volume reduction, necessary equipment's, chemical volume reduction, incinerators, mechanical size reduction selection of equipment's, components separation methods, drying and dewatering, recovery of resources, conversion products and energy recovery, recoverable materials, processing and recovery systems, incineration with heat recovery.

MATS School of Engineering &I.T

UNIT –V   **Disposal of Solid Wastes**

Refuse disposal: Various methods, incinerations, Principle features of an incinerator , site selection and plant layout of an incinerator , sanitary landfill, methods of operation, advantages and disadvantages of sanitary land fill, site selection, reactions accruing in completed landfills, gas and leachate movement and control, equipments necessary.

COURSE OUTCOME:
- After completion of the course students should be able to-do sampling and characterization of solid waste; analysis of hazardous waste constituents.
- understand health and environmental issues related to solid waste management; apply steps in solid waste management-waste reduction at source, collection techniques, materials and resource recovery/recycling, transport, optimization of solid waste transport, treatment and disposal techniques; economics of the onsite vs. offsite waste management options.

TEXT BOOK & REFERENCE:

1. George Techobanoglous etal, 'Integrated Solid Waste Management" McGraw - Hill, 1993
2. Techobanoglous Thiesen Ellasen; Solid Waste Engineering Principles and Management, McGraw - Hill 1997.
3. R.E. Landrefh and P.A. Rebers," Municipal Solid Wastes-Problems & Solutions" Lewis, 1997.
4. Manual on Municipal 1 Solid waste Management, CPHEEO, Ministry of Urban Development, Govt. of India, New Delhi, 2000.
5. A.D. Blide & B.B. Sundaresan 'Solid Waste Management in Developing Countries", INSDOC, 1993.
6. Ecology Science and Practice; Claude Fourie, Christian Ferra, Paul Medori, TeanDevaux, Oxford and IBH Publishing Co (Pvt) LTD, special Indian edition.
7. Principles of Ecology- P.S. Verma, V.K. Agarwal, S.Chand & Company (Pvt) LTD 1989

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Branch	:	Civil
Subject	:	Hydrology & Irrigation Engineering
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	BTP410

COURSE OBJECTIVE:
- The students will learn basic concepts of irrigation and construction of various hydraulic structures.
- To introduce students to basic concepts of water, plants, their interactions, as well as irrigation and drainage systems design, planning and management. The structures involved the elementary hydraulic design of different structures and the concepts of maintenance shall also form part.
- The students will gain analytical skills relevant to the areas mentioned above, particularly the design of irrigation and drainage projects.

UNIT-I   Introduction
Necessity of irrigation, Importance of irrigation, Benefits of irrigation, Ill effects of irrigation, Methods of irrigation
Hydrology: Definitions, Hydrological cycles, Rainfall, Runoff, Flood discharge

UNIT-II   Water Requirement of Crops
Function of water, various crops of area, Crop season, Delta, Duty, Crop rotation.
Survey for Irrigation Project: Importance of survey, Various type of survey, Reasonability and feasibility of projects

UNIT-III   Storage Woks
Components of storage works, various zone of storages, various types of dams and their suitability, Construction materials and procedures, Foundation treatment.

UNIT-IV   Diversion Works
Components of diversion work, Types of diversion work, Functions and suitability of diversion work, Types of Weirs.

UNIT-V   Canal Works
Components of canal work, Types of canal, Alignment, Design of canal, Different structures in canal network, Canal lining.
Lift Irrigation Scheme: Importance of lift irrigation, Suitability, Advantages and limitations.

COURSE OUTCOME:
- Students are able to understand the different types of irrigation.

MATS School of Engineering &I.T

- Students should be able to design the canal.
- Students are able to explain the effects of water logging.
- Students should be able to understand the behavior of river.
- Students can plan the reservoir for different demands.

TEXT BOOKS:
1. Irrigation Engineering and Hydraulic Structures – S.K. Garg (Khanna Publications).
2. Irrigation Engineering – B.C. Punmia (Laxmi Publications).

REFERENCE:
1. Irrigation, Water Resources and Water Power Engineering – Dr. P.N. Modi (Standard Book House).
2. Theory and Design of Irrigation Structures (Volume – I & II) – Varshney (Nem Chand & Bros.).
3. Irrigation Engineering – G.L. Asawa (New Age International Publications).
4. Fundamentals of Irrigation Engineering – Bharat Singh (Nem Chand & Bros.).

MATS School of Engineering &I.T

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Branch	:	Civil
Subject	:	Foundation Engineering
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	BTP411

COURSE OBJECTIVE:

- Students will know about the stability of slopes and stability analysis.
- To study about the earth pressure in different condition of soil, Coulomb earth pressure theories, earthquake loading.
- The students will study about the types of shallow foundation basic for design, bearing capacity of soil and settlement of foundation.
- The students will gain knowledge about another types of foundation like well and pile foundation and their design criterion.

UNIT-I   Stability of Slopes

Embankment slopes, examples of embankment, road and earth dams, stability analysis for finite and infinite slopes, Concept of factor of safety, friction circle method, method of slices, Bishop's simplified method, limiting values of factor of safety; critical conditions for the stability of earth dams.

UNIT-II   Earth Pressure

Earth Pressure at rest, active and passive earth pressure, computations using Rankine's and Coulomb's earth pressure theories, Culmann's graphical method, additional earth pressure due to surcharge and earthquake loading.

UNIT-III   Shallow Foundation and Settlement

Common types of foundations with examples, brief illustration of situations where each one of them is adopted, basis for design, review of major soil parameters used in proportioning of shallow foundations, types and their selection, Bearing Capacity, various method of determination of bearing capacity, computation of bearing capacity in cohesion less and cohesive soils, effect of various factors on bearing capacity, use of field test data, limits of settlement, differential and permissible settlement of footing, rafts on sand using penetration and load test data, estimation of settlement of footing for rigid and flexible, proportioning of footings.

UNIT-IV   Well and Pile Foundation

MATS School of Engineering &I.T

Various types of caissons situations where adopted, elements of wells, types, method of construction, Tilt and shift, remedial measures, bearing capacity and settlement, Terzaghi's lateral stability analysis, Pile Foundation, their types, criteria of selection of piles, outline of steps involved in proportioning, bearing Capacity and settlement of single and group of piles, design of pile groups and settlement of pile group in clay, negative skin friction.

UNIT-V Machine Foundation, Contaminated Expansive Soil, Ground Improvement Techniques and Introduction of Rock Mechanics

Introduction of machine foundation, types of machines and their foundations, Design criteria, Field methods of determining design Parameters, block vibration test, response of block foundations under vertical vibrations, I.S. code recommendations and foundation on expansive soil, identification of expansive soil, contaminated soil, problems associated with contaminated and expansive soil, design consideration of foundation on expansive soil, CNS soils. Various ground improvement techniques- grouting, stone piling, reinforced earth. Introduction of Rock mechanics – RQD, Rock Properties related to design considerations.

COURSE OUTCOME:
- The students are able to know how to achieve stability of soil against gravitational force and seepage of water infinite slope concept of factor of safety.
- Students can design of earth structure and their stability against soil pressure.
- Students can design shallow foundation and their failure how to measure bearing capacity of soil, effect of settlement of foundation.
- Students can design of deep foundation selection of type of deep foundation design criterion for pile foundation.

TEXT BOOK:
1. Basic and applied Soil Mechanics (Revised Edition) – Gopal Rajan and Rao A.S.R. (New Age, New Delhi. 1998)
2. Soil Mechanics and Foundation Engineering – B.C. Punmia (Laxmi Publication)

REFERENCE:
1. Geotechnical Engineering: Gulhati S.K., Datta, M. (Tata McGraw-Hill Publshing Company Limited, New Delhi, 2005).
2. Soil Engineering in Theory and Practice (Vol-II) – Alam Singh (Asia Publishing House, New Delhi)
3. Foundation Engineering (2nd Edition) – Peck,R.B., Hanson (W.E. and Thornburn. W.H. Johan Wiley, New York 1976)
4. Foundation design and Construction (5th Edition) – Tomlinson, M.J. (ELBS, Singpore. 1988) Foundation Analysis and Designing – J.E. Bowles (McGraw Hill, New Delhi).

MATS School of Engineering &I.T

5. Soil Engineering in Theory and Practice (Vol. - II) – Alam Singh (Asia Publishing House, New Delhi, 1981)
6. Physical Methods of Soil Characterization – J. Behari (Narosa Publishing Hall, New Delhi)

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Branch	:	Civil
Subject	:	Ground Improvement Technique
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	BTP412

COURSE OBJECTIVE:
- Students will learn the importance and fundamentals of ground improvement techniques for measuring field parameters by using traditional and modern methods involved in civil construction.
- Students will learn the mechanical methods and suitable equipment to proliferate the ground for making the soil to withstand all the loads acting on it.
- Students will learn the physical, chemical and hydraulic modification methods and its applications for strengthen the soil.
- The applications of modern methods in civil construction alteration works, short creating, soil reinforcement, soil nailing, bolting involved in inclusion and confinement process

UNIT- I   Ground Improvement Mechanical Modification
Ground Improvement: Definition, Objectives of soil improvement, Classification of ground improvement techniques, Factors to be considered in the selection of the best soil improvement technique. Mechanical Modification: Type of mechanical modification, Aim of modification, compaction, Principle of modification for various types of soils.

UNIT – II   Compaction
Effect of grain size distribution on compaction for various soil types like BC soil, lateritic soil, coarse-grained soil, micaceous soil, Effect of compaction on engineering behavior like compressibility, swelling and shrinkage, permeability, relative density, liquefaction potential. Field compaction – static, dynamic, impact and vibratory type, Specification of compaction, Tolerance of compaction. Shallow and deep compaction

UNIT – III   Hydraulic Modification
Definition, aim, principle, techniques, gravity drain, lowering of water table, multistage well point, vacuum dewatering. Discharge equations, Design of dewatering system including pipe line effects of dewatering.

UNIT – IV   Drainage & Preloading

MATS School of Engineering &I.T

Drainage of slopes, Pre-loading, vertical drains, sand drains, Assessment of ground condition for preloading, Electro kinetic dewatering.

UNIT – V   Grouting& Miscellaneous Methods (Only concepts)

Grouting: Introduction, Effect of grouting, Chemicals and materials used, Types of grouting, Grouting procedure, Applications of grouting. Miscellaneous Methods (Only concepts): Introduction, Soil reinforcement, Thermal methods, Ground improvement by confinement, Crib walls, Gabions and Mattresses, Anchors, Rock bolts and soil nailing.

COURSE OUTCOME:
- Students gain knowledge on methods and selection of ground improvement techniques.
- Students understood dewatering techniques and design for simple cases.
- Students got knowledge on in-situ treatment of cohesionless and cohesive soils.
- Students understood the concept of earth reinforcement and design of reinforced earth.
- Students got to know types of grouts and grouting technique.

TEXT BOOK:
1. Gopal Ranjan, ASR Rao "Basic and applied soil mechanics" New Age International (P) Ltd. Publisher, New Delhi
2. VNS Murthy "Soil Mechanics and Foundation Engineering Vol.- II" Sri Priya Technical Consultants, Bangalore

REFERENCE:
1. A. Singh & G.R. Chowdhury "Soil Engineering in Theory and practice", CBS Publishers, 1990.
2. CECR Journals
3. IGC Proceeding

MATS School of Engineering &I.T

Branch	:	Civil
Subject	:	Traffic Engineering
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	BTP413

COURSE OBJECTIVE:
- The students will gain knowledge of traffic, its problem and remedial measures in mixed traffic in developing country.
- To provide the knowledge of traffic characteristic in details.
- The students will know about geometric design of road, road lightening.
- This will help the students to know about controlling the different pollution occurring in road.

UNIT-I   Introduction Traffic Engineering
Growth of Traffic, Function of Traffic Engineer, 3E's of traffic Engineering, Special problems due to mixed traffic and other conditions in developing countries, Measures to meet the Problem, Concept of PCU.

UNIT-II   Traffic Characteristics Road user Characteristics
Vehicular characteristics, Traffic flow characteristics, Capacity, Traffic studies, Volume, Spot speed, Speed and delay, Origin and destination, Parking and accident, Design of Parking Facilities.

UNIT-III   Traffic Operations
Traffic regulations, Controls on vehicles, Drivers and flow, One way street tidal flow operation, priority for high occupancy vehicles, Traffic control devices, Signs, Signals, Islands and markings, Design of isolated traffic signals by IRC method.

UNIT-IV   Traffic Safety Accidents
Analysis of traffic accidents, Preventive measures, Highway lighting, Effect of road conditions and road geometrics on traffic safety, Traffic safety awareness.

UNIT-V   Traffic and Environment Pollution
Problems of cities, Noise pollution, Air pollution, Vibration, Environmental impact assessment, Mitigative measures, and Road site development and Arboriculture.

COURSE OUTCOME:

MATS School of Engineering &I.T

- This subject will provide the knowledge of traffic, its problem and remedial measures in mixed traffic in developing country.
- It will provide the knowledge of traffic characteristic in details.
- It will help in reducing the accidents.
- It will help in geometric design of road, road lightening.
- It will help in controlling the different pollution occurring in road.

TEXT BOOK:
1. Traffic Engineering – McShane, W.R. and Roes, R.P. (Prentice Hall, New Jersey, 1990).
2. Traffic Engineering and Transport Planning – Kadiyali, L.R. (Khanna Publishers, Delhi, 1996).

REFERENCE:
1. Transport Planning and Traffic Engineering – Flaherty, CAO'(Ed.) (John Wiley & Sons, Inc., New York, 1997)
2. Traffic Flow Fundamentals – May, A.D. (Prentice Hall, Englewood Cliffs, New Jersey, 1990).

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Branch   :   Civil
Subject   :   Repairs & Rehabilitation of Structures
Total Theory Periods   :   48
Total Tutorial Periods   :   00
Total Credits   :   03
Code   :   BTP414

COURSE OBJECTIVE:

- The students will acquire the knowledge on Quality of concrete, durability aspects, causes of deterioration, assessment of distressed structures, repairing of structures and demolition procedures.
- The students will learn various distress and damages to concrete and masonry structures.
- To understand the importance of maintenance of structures.
- The students will study the various types and properties of repair materials.

UNIT- I   Maintenance and Repair Strategies
Maintenance, Repair and Rehabilitation, Facets of Maintenance, importance of Maintenance, Various aspects of Inspection, Assessment procedure for evaluating a damaged structure, causes of deterioration.

UNIT- II   Serviceability and Durability of Concrete
Quality assurance for concrete, Strength, Durability and Thermal properties, of concrete Cracks, different types, causes, Effects due to climate, temperature, Sustained elevated temperature, Corrosion - Effects of cover thickness and cracking.

UNIT- III   Materials for Repair
Special concretes and mortar, concrete chemicals, special elements for accelerated strength gain, Expansive cement, polymer concrete, Sulphur infiltrated concrete, Ferro cement, Fiber reinforced concrete.

UNIT –IV   Techniques for Repair and Protection
Rust eliminators and polymers coating for rebars during repair, foamed concrete, mortar and dry pack, vacuum concrete, Gunite and Shotcrete, Epoxy injection, Mortar repair for cracks, shoring and underpinning. Methods of corrosion protection, corrosion inhibitors, corrosion resistant steels, coatings and cathodic protection. Engineered demolition techniques for dilapidated structures – case studies

UNIT –V   Repair, Rehabilitation and Retrofitting of Structures

MATS School of Engineering &I.T

Repairs to overcome low member strength, Deflection, Cracking, Chemical disruption, Weathering Corrosion, wear, fire, Leakage and Marine exposure.

COURSE OUTCOME:

By the end of this course the students have capability knowledge of-

- Various distress and damages to concrete and masonry structures.
- The importance of maintenance of structures, types and properties of repair materials etc.
- Assessment of the damage to structures using various tests.

TEXT BOOKS:

1. Denison Campbell, Allen and Harold Roper, "Concrete Structures, Materials, Maintenance and Repair", Longman Scientific and Technical UK, 1991.
2. Allen R.T. & Edwards S.C, Repair of Concrete Structures, Blakie and Sons, UK, 1987

REFERENCES:

1. Shetty M.S., "Concrete Technology - Theory and Practice", S. Chand and Company, 2008.
2. Dov Kominetzky. M.S., " Design and Construction Failures", Galgotia Publications Pvt. Ltd., 2001
3. K. Ravishankar., T.S. Krishnamoorthy, " Structural Health Monitoring, Repair and Rehabilitation of Concrete Structures", Allied Publishers, 2004.
4. CPWD and Indian Buildings Congress, Hand book on Seismic Retrofit of Buildings, Narosa Publishers, 2008.
5. M.L. Gambhir, "Concrete Technology", McGraw Hill, 2013

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Branch	:	Civil
Subject	:	Environmental Pollution & Control Engineering
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	BTP415

COURSE OBJECTIVE:

- To know about various causes the effects of air pollution.
- To impart knowledge on the principle and design of control of Indoor/particulate/gaseous air pollutant and its emerging trends.
- The course will provide students with an understanding and appreciation of the complex interactions of man, health and the environment.

UNIT-I   Introduction

Necessity and importance of water supply schemes. Water demand: Classification of water demands, Estimation of quantity of water required by a town, per capita demand, factors affecting per capita demand, design period and population forecasting, variation in water demand. Sources of water supply Surface sources and underground sources, Intake works, site selection, type of intake works

UNIT-II   Air Pollution Meteorology

stability class condition, plume behavior, topographical effects on air pollution, wind profiles, wind roses. Gaussian plume models, assumptions and limitations of GPM, problem on modelling.

UNIT-III   Softening and Filtration

Methods of softening, Iron removal, Fluoridization, Distribution System: Methods of distribution, layout of distribution system, methods of analysis, pressure in the distribution system, distribution reservoirs, functions and its types, storage capacity of distribution reservoir. Filtration: Theory of filtration, slow sand and rapid sand filters, Construction and operation. Disinfection: Methods of disinfection, Chlorination, Types of chlorination, Break Point chlorination.

UNIT-IV   Major Air Pollution Disaster Episodes

Special diseases caused by air pollution, symptoms of chronic air pollution. Mechanisms of deterioration in polluted atmospheres, effect of air pollution on art treasures in India.

UNIT-V   Air Quality Criteria and Emission Standards

MATS School of Engineering &I.T

U.S. and Indian standards, air pollution act, constitution, power and functions of the boards. Global effects of air pollution, Green house effect, acid rains, ozone layer depletion, etc ,Environmental Research Methodology, approaches, method of Data collection, sampling systems, approach to environmental problems, health and environmental implications of solid waste management, Fate of pollutants in air, water, soil and ground water

COURSE OUTCOME:
- To be able to plan and handle issues related to air pollution and its control.
- Understand major concepts and terminology in the field of environmental pollutants, its interconnections and direct damage to the wildlife in addition to human communities and ecosystems.
- Understand and investigate how empirical evidence supports to refute or to control the environmental problems especially disasters.

TEXT BOOK:
1. Environmental Engineering – Peavy& Rowe (Tata McGraw Hill, New Delhi).
2. Environmental Science and Engineering – Henry and Heinke (Pearson Education).

REFERENCE:
1. Air Pollution – Henry C. Perkins, (McGraw Hill Kogakusha Ltd., Tokyo, Japan, 1974)
2. Air Pollution – Stern, Arthur C. (Academic Press, New York, USA, 1977)
3. Introduction to Environmental Science – Y. Anjaneyulu (B.S. Publications)
4. Waste Water Engineering – Metcalf Eddy (Tata McGraw Hill, New Delhi).

MATS School of Engineering &I.T

MATS UNIVERSITY
ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Branch   :   Civil
Subject   :   Pre-Stressed Concrete
Total Theory Periods :   48
Total Tutorial Periods : 00
Total Credits   :   03
Code   :   BTP416

COURSE OBJECTIVE:
- Students will know about the introduction of material properties and pre-stressing.
- Students will be able to design various types pre-stressing members of structure.
- Students will gain knowledge about advantage and disadvantages of pre-stressing.

UNIT- I   Introduction- Theory and Behaviour

Basic concepts, Advantages, Materials required, Systems and methods of pre-stressing, Analysis of sections, Stress concept, Strength concept, Load balancing concept, Effect of loading on the tensile stresses in tendons, Effect of tendon profile on deflections, Factors influencing deflections, Calculation of deflections, Short term and long term deflections, Losses of pre-stress, Estimation of crack width.

UNIT- II   Design for Flexure and Shear

Basic assumptions for calculating flexural stresses, Permissible stresses in steel and concrete as per I.S.1343 Code, Design of sections of Type I and Type II post-tensioned and pre-tensioned beams, Check for strength limit based on I.S. 1343 Code, Layout of cables in post-tensioned beams, Location of wires in pre-tensioned beams, Design for shear based on I.S. 1343 Code.

UNIT-III   Deflection and Design for Anchorage Zone

Factors influencing deflections – Short term deflections of un-cracked members – Prediction of long term deflections due to creep and shrinkage – Check for serviceability limit state of deflection. Determination of anchorage zone stresses in post-tensioned beams by Magnel's method, Guyon's method and IS1343 code – design of anchorage zone reinforcement – Check for transfer bond length in pre-tensioned beams.

UNIT -IV   Composite Beam and Continuous Beam

Analysis and design of composite beams, Methods of achieving continuity in continuous beams, Analysis for secondary moments, Concordant cable and linear transformation, Calculation of stresses,   Principles of design.

UNIT- V   Miscellaneous Structure

MATS School of Engineering &I.T

Design of tension and compression members, Tanks, Pipes and poles, Partial pre-stressing, Definition, methods of achieving partial pre-stressing, Merits and demerits of partial pre-stressing.

COURSE OUTCOME:
- Students learned about the pre stressing steel material properties.
- Students learned about the structural effect of pre stressing, and practical performance.
- Students designed the most common types of precast concrete elements and the connections between them.

TEXT BOOK:
1. Pre-stressed Concrete – Krishna Raju N. (New Age International).
2. G.S. Panditand S.P. Gupta, "Prestressed Concrete", CBS Publishers and Distributers Pvt. Ltd, 2012

REFERENCE:

1. N. Rajagopalan, "Pre-stressed Concrete", Narosa Publishing House, 2002.
2. P. Dayaratnam, "Pre-stressed Concrete Structures", Oxford and IBH, 2013
3. T.Y. Lin and Ned. H. Burns, "Design of pre-stressed Concrete Structures", Third Edition, Wiley India Pvt. Ltd., New Delhi, 2013.
4. IS 1343:1980, Code of Practice for Pre-stressed Concrete, Bureau of Indian Standards, New Delhi, 2012
5. IS 3370- Part 4 (2008) Indian standard Code of practice for concrete structures for the storage of liquid- Design tables, code of practice, bureau of Indian standards, New Delhi.

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Branch   :   Civil
Subject   :   Water Power Engineering
Total Theory Periods   :   48
Total Tutorial Periods :   00
Total Credits   :   03
Code   :   BTP417

COURSE OBJECTIVE:
- The students will understand power requirements, load patterns, firm power and secondary power, types of power plants and its principal components.
- The students will learn to design economical diameter of penstock, select turbines and understand cavitations phenomenon of turbines.
- To learn about plan underground and surface powerhouse structure dimensions its ventilation and lighting.

UNIT-I   Introduction
Development of water power, hydroelectric power, power potential, important hydropower plant in India, comparison of hydro, thermal & nuclear powers, future of hydro power, relation of water power and hydrology.

UNIT-II   Water Power Estimate
Estimate of stream flow for water power studies, flood formulae, rational method, unit hydrograph method, analysis of stream flow data, mass curve and determination of reservoir capacity, pondage, and estimation of available water power.

UNIT-III   Types of Hydropower Plant
Classification of hydro power plants, run-off river plant, storage plants, diversion canal plants, pumped storage plants, hydro electric power from sea and oceans.

UNIT-IV   Water Conveyance
Pen stocks, classification of pen stocks, design criteria for pen stocks, economical diameter of pen stock, water hammer, surg tank, intakes, canals.

UNIT-V   Power House Planning
General layout of power house and arrangement of hydro power units, general arrangement of hydro electric unit, sub structure, super structure, abbreviated power houses, underground power house.

MATS School of Engineering &I.T

COURSE OUTCOME:

- The students are able to prepare a load curve and calculate firm power and secondary power from power duration curve.
- The students Understood runoff type river power plants, storage plants, and pumped storage plants and principal components of hydropower plant.
- The students are able to determine economical diameter of penstocks, work out Thoma coefficient for cavitation in turbines.

TEXT BOOKS:

1. Water Power Engineering – M.M. Dandekar, K.N. Sharma (Vikas Publishing House Pvt. Ltd.)
2. Water Power Engineering – Deshmukh (Dhanpat Rai & Sons)

REFERENCE:

1. Irrigation and Water Power Engineering – B.C. Punmia (Laxmi Publication)
2. Hydro Electric Engineering – Creager and Justin (Willay Institutional)
3. Hydro Electric Engineering Practice – J.G. Brown, (Blackie and Sons Ltd., London)
4. Irrigation and Water Power Engineering – Dr. P.N. Modi (Standard Book House)

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Branch   :   Civil
Subject   :   Expansive Soil
Total Theory Periods   :   48
Total Tutorial Periods   :   00
Total Credits   :   03
Code   :   BTP418

COURSE OBJECTIVE:
- To enable students to know about various properties of expansive soil
- To understand the suitability of foundation in expansive soil.
- To gain knowledge about improvement or properties of expansive soil.

UNIT-I   Introduction and Identification
Expansive Soils of India, related civil engineering problems, formation of expansive soils in field, identification of expansive solids in laboratory by X-ray diffraction method and differential thermal analysis.

UNIT-II   Physical and Chemical Properties
Soil structure and clay mineralogy of expansive soil, atomic bond and molecular bonds, honey comb structure, base exchanges capacity, clay water relation, electrolysis processes.

UNIT-III   Foundation on Black Cotton Soil
Foundations on swelling soils, swelling potential and mechanism of volume change, chemical composition of black cotton soil, construction techniques in black cotton soil, modern method of construction in under reamed coil.

UNIT-IV   Ground Improvement Techniques
Stabilization of expansive soils with lime, slag (silica fume and aluminum sludge), cement, fly ash, chemicals. Reinforced earth technique, Micro reinforced vegetation, Vibro floatation, Grouting and soil nailing.

UNIT-V   Liquefaction Hazard Mitigation
Factors affecting the expansive soil, method of assessment for liquefaction, effect instrumentation for monitoring, consolidation of marine clay deposits, expansive soil model of Bingham fluid bounded by porous beds.

COURSE OUTCOME:
- Students can identify the expansive soil.

MATS School of Engineering &I.T

- Students are able to design foundation on expansive soil.
- Students are able to improve soil characteristics.

TEXT BOOK:
1. Design Aids in Soil Mechanics and Foundation Engineering – S.R. Kaniraj (Tata McGraw Hill, New Delhi).
2. Foundation Engineering – Dr. B.J. Kasmalkar (Pune Vidyarthi GrihaPrakashan, Pune).

REFERENCE:
1. Basic and applied Soil Mechanics (Revised Edition) – Gopal Rajan and A.S.R. Rao (New Age, New Delhi. 1998).
2. Foundation Engineering (2nd Edition) – R.B Peck,. Hanson (W.E. and Thornburn. W.H. Johan Wiley, New York 1976).
3. Foundation Analysis and Designing – J.E. Bowles (McGraw Hill).
4. Soil Engineering in Theory and Practice (Vol. - II) – Alam Singh (Asia Publishing House, New Delhi, 19

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Branch	:	Civil
Subject	:	Bridge Engineering
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	BTP419

COURSE OBJECTIVE:

- This will help student to know about various bridge structures, selection of appropriate bridge structures and its design for given site conditions.
- Students will develop an understanding of and appreciation for basic concepts in proportioning and design of bridges in terms of aesthetics, geographical location and functionality.
- The course will help the student develop an intuitive feeling about the sizing of bridge elements, i.e., develop a clear understanding of conceptual design.
- Students will understand the load flow mechanism and identify loads on bridges.
- The will know how carry out a design of bridge starting from conceptual design, selecting suitable bridge, geometry to sizing of its elements

UNIT-I   Components of Bridges

Classification of bridges, Importance and investigation for bridges, Hydrology, design flood discharge, linear waterway and scour depth, Choice of Bridge Type, subsoil exploration, location of piers and abutments. Specification of road bridges, width of carriage way, IRC loads to be considered, calculation of live load by effective width method.

UNIT-II   General Design

Consideration, design of pipe culvert, design of Slab Bridge, design of T-beam Bridge, design of box culverts, Components and design principles of RC balanced cantilever bridge and Pre-stress concrete bridges. Type of sub structures, Forces acting on substructures, Design of abutments, piers, Types of Foundations

UNIT-III   Importance of Bearings

Types of bearings, design of elastomeric bearings, joint, types of joints, Construction and maintenance of bridges, Assessment of load carrying capacity of bridges, Lessons from bridge failures.

UNIT-IV   Solid Slab Bridges

Introduction, General design features, Effective width method. Simply supported and cantilever Slab Bridge, analysis and design, Box Culverts: Introduction to analysis, design and detailing, Loading conditions.

MATS School of Engineering &I.T

UNIT-V   Culvert

Difference between bridge and culvert, Components of a bridge**,**Various terminologies used in bridges**,** Main classification of bridges **,**Requirements of an ideal bridge Identification of bridge.

COURSE OUTCOME:
- Students learned to identify loads on bridges and selection of type of bridge for the site condition.
- They came to know how to analyze the super structure by various methods.
- They learned how to Design the trussed bridge and plate girder bridges.
- Students learned about the Design reinforced concrete slab and T beam bridges and prestressed concrete bridges.
- After learning this now they can Decide the appropriate sub structural systems , bearings and expansion joints for the bridges.

TEXT BOOK:
1. D .Johnson Victor, "Essentials of bridge engineering", Oxford University Press, 2019.
2. N. Krishna Raju, "Design of bridges", Oxford University Press, 2019.
3. Mosley. B. John B., & Ray Hulse "Reinforced Concrete Design to Eurocode-2"Red Globe Press, 2012.

REFERENCE:
1. S. Ponnuswamy, Bridge Engineering, Tata McGraw-Hill, New Delhi, 1996.
2. N. Rajagopalan Bridge Superstructure, Alpha Science International, 2006

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Branch	:	Civil
Subject	:	Industrial Waste Engineering
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	BTP420

COURSE OBJECTIVE:

- The course introduces various concepts of water efficiency and waste minimization in industrial sectors.
- To understand various Sources of industrial waste water generation & their characteristics.
- To learn about quality, quantity, treatment and disposal of industrial waste.

UNIT-I   Introduction

General Effect of discharge of industrial wastewaters on streams, land and environment, Importance and scope, Problems involved in treatment, Variation in quality and quantity of industrial wastewaters. Standards & Criteria: Indian standards for discharge of treated wastewaters on land, into municipal sewer and natural water courses. Sampling of Wastewaters: Representative sample, Grab and composite samples.

UNIT-II   Quality of Industrial Waste

Effluent Quality and Quantity Approaches to minimization – good housekeeping, equalization and neutralization by mixing of different effluent streams; recycling of wastewater streams. Process modifications in terms of raw materials and chemicals used Treatment of industrial wastes, Removal of dissolved and suspended solids, Organic waste treatment processes, Sludge treatment and handling.

UNIT-III   Characteristics of Industrial Waste

General Approaches for Handling and Treatment of Specific Characteristics of Industrial Wastewaters Stream Water Quality, DO Sag Curve, etc. Approaches for treating wastes having shock loads, colours, toxic metal-ions, refractory substances, e.g., ABS and other detergents, growth inhibiting substances such as insecticides, high concentration of nutrients (N.P.K., etc.), oil and grease, suspended solids, BOD., hot wastes, wastes with acidity, alkalinity, etc.

UNIT-IV   Treatment and Disposal

General Approaches to Planning of Industrial Wastewater Treatment and Disposal Equalization and proportioning, Neutralization Treating different effluent streams separately, Treating different streams

MATS School of Engineering &I.T

jointly after mixing them partly or fully Including / excluding domestic wastewater along with the industrial waste Treating industrial wastewaters along with town waste.

UNIT-V   Industrial Pollution

Process Flow Diagrams, Characteristics and Treatment of Various Industrial Wastes Industrial wastes of pulp and paper, textile, tannery, food, canning, sugar mill, distillery, dairy, pharmaceutical, electroplating etc., Industrial pollution abatement measures, referring to case studies in fertilizer industries, textile, petroleum refineries and distilleries.

COURSE OUTCOME:

Upon the successful completion of this course, the students will be able to:

- Design treatment methods for any industrial wastewater.
- Examine the manufacturing process of various industries.
- Assess need for common effluent treatment plant for an industry
- To plan and handle the issues related to industrial waste.

TEXT BOOK:

1. Introduction to Environmental Science – Y. Anjaneyulu (B.S. Publications)
2. Elements of Environmental Engineering – K.N. Duggal (S. Chand & Co., New Delhi)

REFERENCE:

1. The Treatment of Industrial Wastes – Besselieure, E.B. and Schwartz, M. (McGraw Hill Kogakusha Ltd., New Delhi, 1969)
2. Industrial Water Pollution – Nemerow, N.L. (Ann Arbour, New York, 1978)
3. Waste Water Engineering – MetCalaff Eddy (Tata McGraw Hill, New Delhi)
4. Environmental Engineering – G.N. Pandey & G.C. Karney (Tata McGraw Hill, New Delhi)

MATS School of Engineering &I.T

MATS UNIVERSITY

ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Branch   :   Civil
Subject   :   Earthquake Engineering
Total Theory Periods   :   48
Total Tutorial Periods :   00
Total Credits   :   03
Code   :   BTP421

COURSE OBJECTIVE:
- To provide a coherent development to the students for the courses in sector of earthquake engineering.
- The students will know about foundations of many basic engineering concepts related earthquake Engineering.
- The students will experience the implementation of engineering concepts which are applied in field of earthquake engineering

UNIT-I   Introduction
Definitions of basic problems in dynamics, static versus dynamic loads, different types of dynamic loads, un-damped vibration of SDoF system, natural frequency and period of vibration, damping in structure.

UNIT-II   Seismology
Seismological background, seismicity of a region, earthquake faults and waves, structure of earth, plate tectonics, elastic – rebound theory of earthquake, Richter scale, measurement of ground motion, Seismogram.

UNIT-III   Determination of Frequencies of Earthquake
Direct determination of frequencies and mode shape, Orthogonality principle, approximate methods for determination of frequencies and mode shape model error of forced vibration of MDoF.

UNIT-IV   Characteristics of Ground Motion
Characterization of ground motion, earthquake response spectra, factors influencing response spectra, design response spectra for elastic system, peak ground acceleration, response spectrum shapes.

UNIT-V   Seismic Design
Review of damage during past earthquakes and remedial measures, seismic design consideration, ductility demand, reinforcement detailing for member and joints.

COURSE OUTCOME:
- The students gained an experience in the implementation of Earthquake Engineering on engineering concepts which are applied in field Structural Engineering.

MATS School of Engineering &I.T

- The students got a diverse knowledge of earthquake engineering practices applied to real life problems.
- The students learned to understand the theoretical and practical aspects of Earthquake Engineering along with the planning and design aspects.

TEXT BOOK:
1. Earthquake Resistant Design of Structures – P. Agrawal & M. Srikhande (Prentice Hall)
2. Earthquake Resistant Design of Structures – S. K. Duggal (Oxford University Press)

REFERENCE:
1. Dynamics of Structures Theory & Applications to Earthquake Engineering – A. K. Chopra (Pearson Education)
2. Structural Dynamics – Theory & Computation – Mario Paz (CBS Publishers)
3. Basics of Structural Dynamics and Asesismic Design – S. R. Damodarasamy, S. Kavitha (PHI Learning)

MATS UNIVERSITY
ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Branch	:	Civil
Subject	:	Environmental Impact Assessment
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	BTP422

COURSE OBJECTIVE:
- To study the importance of EIA.
- To know the role of public in EIA studies.
- Understand phenomena of impacts in the environment.
- Know the impact quantification of various projects on the environment.

UNIT-I   Concept of EIA
Introduction of EIA, Utility and scope of EIA, Significant Environmental Impacts, Stage of EIA, Environmental Inventory, Environmental Impact Statement (EIS)

UNIT-II   Methods of Impact Identification
Environmental indices and indicators for describing the affected environment, matrix methodologies, network, checklist and other method.

UNIT-III   Impact Analysis
Framework, statement predication and assessment of impact of air, water, noise and socio-economic environment.

UNIT-IV   Preparation of Written Documentation
Initial planning phase, detailed planning phase, writing phase, organizing relevant information, co-ordination of team writing effort.

UNIT-V   Public Participation in Environmental Decision making
Basic definitions, Regulatory requirements, Advantages & disadvantages of public participation, Selection of public participation techniques, Practical considerations for implementation.

COURSE OUTCOME:
- Explicate the concept of EIA.
- Illustrate the necessity of public participation in EIA studies.
- Summarize the importance of Environmental Attributes.

MATS School of Engineering &I.T

- Quantify impacts for various developmental projects.

TEXT BOOK:
1. Environmental Impact Analysis, Urban & Stacey, Jain R.K.
2. Environmental Impact Assessment, Mc Graw Hill Inc, L.W. Canter (1996).
3. Environmental Impact Assessment and Management, Daya Publishing house, Hosetti B.B., Kumar A. (2014)

REFERENCE:
1. Guidelines for EIA of Developmental Projects, MoEF, GOI.
2. Environmental Quality management, south asian publishers pvt ltd., Bindu N. Lohani

MATS School of Engineering &I.T

MATS UNIVERSITY
ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Branch   :   Civil
Subject   :   Structural Dynamics
Total Theory Periods   :   48
Total Tutorial Periods   :   00
Total Credits   :   03
Code   :   BTP423

COURSE OBJECTIVE:

- Students will learn the responses of structures to various dynamic excitations of single degree of freedom system are explained.
- Students will learn the Numerical methods for calculating the dynamic responses of the structures are illustrated.
- Students will learn the earthquake response of linearly elastic systems, analysis of generalized single degree of freedom systems and dynamic analysis of multi-degree of freedom systems are studied

UNIT I   Principles of Vibration Analysis
Mathematical models of single degree of freedom systems - Free and forced vibration of SDOF systems, Response of SDOF to special forms of excitation, Effect of damping, Transmissibility.

UNIT II   Dynamic Response of Two- Degree of Freedom System
Mathematical models of two degree of freedom systems, free and forced vibrations of two degree of freedom systems, normal modes of vibration, applications.

UNIT III   Dynamic Response of Multi- Degree of Freedom System
Mathematical models of Multi-degree of freedom systems, orthogonality of normal modes, free and force vibrations of multi degree of freedom systems, Mode superposition technique, Applications.

UNIT IV   Dynamic Response of Continuous System
Mathematical models of continuous systems, Free and forced vibration of continuous systems, Rayleigh – Ritz method, Formulation using Conservation of Energy – Formulation using Virtual Work, Applications.

UNIT V   Introduction to Earthquake Analysis
Introduction - Excitation by rigid base translation–Lumped mass approach - SDOF and MDOF systems - I. S. Code methods of analysis for obtaining response of multistoried buildings.

MATS School of Engineering &I.T

COURSE OUTCOME:

The student should be able to:

- Relate the structural idealization studied to the properties of real structures.
- Theory of dynamic response of structures in a manner that emphasizes physical insight into the analytical procedures.
- Application of the theory to solutions of practical problems.
- interpret the theoretical results to understand the response of structures to various dynamic excitations

TEXT BOOKS:

1. Anil K. Chopra, Dynamics of Structures, Pearson Education, 2007.
2. Leonard Meirovitch, Elements of Vibration Analysis, McGraw Hill, 1986, IOS Press, 2006.

REFERENCES:

1. Mario Paz, Structural Dynamics -Theory and Computation, Kluwer Academic Publishers, 2004.
2. Roy R. Craig, Jr, Andrew J. Kurdila, Fundamentals of Structural Dynamics, John Wiley &Sons,

MATS UNIVERSITY
ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Branch   :   Civil
Subject   :   FEM Application in Civil Engineering
Total Theory Periods :   48
Total Tutorial Periods :   00
Total Credits   :   03
Code   :   BTP424

COURSE OBJECTIVE:

- To enable student with fundamentals of Finite element method.
- The students will gain the knowledge and skill of analyzing physical problems with FE software
- The students will implement the formulation technique to solve 2-D problems using triangle and quadrilateral element.

UNIT-I   Basic Principles

Equilibrium equations-Linear strain-displacement relations-Linear constitutive relations– Plane stress and plane strain-Potential energy-Principle of stationary potential energy

UNIT-II   Properties of Elements in One- and Two- Dimensions

Types of elements-Displacement models-Relation between nodal degrees of freedom and generalized coordinates-Convergence requirements –Compatibility requirement-Geometric invariance-Natural coordinate systems-Shape functions for for bar, beam and constant strain triangle elements-Element strains and stresses

UNIT-III   Element Stiffness Matrix and Nodal Load Vector

Derivation of expressions for element stiffness matrix and element nodal load vector using Principle of stationary potential energy-Evaluation of stiffness matrices and nodal load vectors for bar-beam and constant strain triangle elements

UNIT-IV   Direct Stiffness Method and Solution Technique

Assemblage of elements–Obtaining Global stiffness matrix and Global load vector-Governing equilibrium equation for static problems-Application of boundary conditions-Solution to resulting simultaneous equations using Gauss elimination method
Solution to One- and Two- Dimensional Problems:- Solution to plane-truss-plane-frame-plane-stress and plane-strain problems

UNIT-V   Soil and Rock Mechanics

MATS School of Engineering &I.T

Application of the finite element method in soil and rock mechanics – Loading - Non-uniform material properties- Tension in soils and rocks-Constitutive laws-Elastic-plastic behavior

Inviscid and Incompressible Fluid Flows:- Finite element equations using Galerkin's Approach-Introduction-Potential function formulation- Finite element solution using Galerkin's Approach-Stream function formulation.

COURSE OUTCOME:
After the successful completion of the course student will be able to.
- Select the appropriate element and mesh for FE analysis for given problem.
- Evaluate the type of problem and develop the FE-model.
- Estimate the stresses and strain in soil through FE analysis for given physical problem

TEXT BOOK:
1. Finite element analysis by C.S. Krishnamurthy, Tata McGraw-Hill Publishing Company Ltd., 1994.
2. Introduction to the finite element method by C.S. Desai and J.F. Abel, CBS Publishers and distributors, 1987.
3. The finite element method in engineering by S. S. Rao, Butterworth-Heinemann, New Delhi, 1999.

REFERENCE:
 1. Roy R. Craig, Jr, Andrew J. Kurdila, Fundamentals of Structural Dynamics, John Wiley &Sons,

MATS School of Engineering &I.T

MATS UNIVERSITY
ARANG, RAIPUR (C.G.)

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Branch	:	Civil
Subject	:	Pavement Analysis and Design
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	BTP425

COURSE OBJECTIVE:
- Students will know the engineering analysis of stresses and strain in typical highway pavement
- They will get knowledge related to structure due to loading of traffic and climate.
- The students can understand the characterization of pavement materials

UNIT-I   Introduction

Types of pavement, Factors affecting design of pavements, wheel loads, ESWL Concept, Tyre pressure, contact pressure, Material characteristics, Environmental and other factors.

UNIT-II   Stresses in Pavement

Stresses in rigid pavements, relative stiffness of slab, modulus of sub-grade reaction, stresses due to warping, stresses due to loads, stresses due to friction.

UNIT-III   Highway Material

Highway Materials, Soil, Aggregate and Bitumen, Tests on aggregates, Aggregate Properties and their Importance, Tests on Bitumen, Bituminous Concrete, Requirements of Design Mix, Marshall's Method of Bituminous Mix design.

UNIT-IV   Highway Construction

Highway construction, Construction of Earth Roads, Gravel Roads, WBM Roads, Bituminous Pavements, Cement Concrete Roads, Steps in Construction, Reinforced Concrete Pavements, Soil Stabilization, Methods and Objectives, Soil-cement Stabilization and Soil-lime

UNIT-V   Pavement Design

CBR Method of flexible pavement design, IRC Method of flexible pavement design, AASTHO Method of flexible pavement design, IRC Method of rigid pavement design, Importance of joints in rigid pavements, Types of joints, Use of tie bars and dowel bars.

COURSE OUTCOME:
- After leaning this students can analyse the stresses and strains in a flexible pavement using multi-layered elastic theory.
- The Students can analyse stresses and strains in a rigid pavement using Westergaard's theory.

MATS School of Engineering &I.T

- They learned design a flexible pavement using IRC, Asphalt Institute, and AASHTO methods.
- The Students can now design a rigid pavement using IRC, and AASHTO methods.
- Now Students learned how to design of joints, Dowel & tie bars.

TEXT BOOKS:
1. Highway Engineering – S.K. Khanna & C. J. Justo, Nemchand & Bros., 7th Edition (2000).
2. Principles and Practices of Highway Engineering – Dr. L.R. Kadiyali & Dr. N. B. Lal – Khanna publishers – (2003).

REFERENCE:
1. Principles of pavement design – Yoder & wit zorac – Jhonwilley & Sons. CODEs.
2. IRC Code for flexible pavement – IRC – 37 -2001. v2. IRC Code for Rigid pavement – IRC – 58 – 2002.

MATS School of Engineering &I.T