BHARTI VISHWAVIDYALAYA DURG(C.G.)

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SCHEME OF EXAMINATION

&

SYLLABUS OF

BACHELOR OF TECHNOLOGY

IN

DEPARTMENT OF CIVIL ENGINEERING

UNDER

FACULTY OF CIVIL & ENGINEERING

Session 2021-22
(Approved by Board of Studies)

BHARTI VISHWAVIDYALAYA, DURG

SCHEME OF TEACHING AND EXAMINATION

Courses of Study and Scheme of Examination of P1 Group

B. Tech. (First Semester - Common to all Branches of Engineering)

S. No.	Courses (Subject)	Course Code	Period per Week			Scheme of Examination			Total Marks	Credit (L+T+P/2)
						Theory/Lab				
			L	T	P	ES E	CT	TA		
1.	Physics-I	BT00101	3	1	-	70	10	20	100	4
2.	Mathematics-I**	BT00102	3	1	-	70	10	20	100	4
3.	Basic Electrical and Electronics Engg.	BT00103	2	1	-	70	10	20	100	3
4.	Engineering Graphics and Design	BT00104	1	0	-	70	10	20	100	1
5.	Fundamentals of Computer	BT00105	2	0	-	70	10	20	100	2
6.	Physics (Lab)	BT00106	-	-	2	35	-	15	50	1
7.	Basic Electrical and Electronics Engg. (Lab)	BT00107	-	-	2	35	-	15	50	1
8.	Fundamentals of Computer (Lab)	BT00108	-	-	2	35	-	15	50	1
9.	Engineering Graphics and Design (Lab)	BT00109	-	-	4	35	-	15	50	2
10.	Value Education	BT00110	-	-	-	-	-	50	50	-
Total Marks			11	3	10	490	50	210	750	19

L-Lecture, T-Tutorial, P-Practical, ESE-End Semester Exam,

CT–Class Test, TA–Teacher's Assessment

Note: - (a) The teaching in the 1st and 2nd Semester will be divided in two groups consisting of branches as shown below:

P1–GROUP: Mechanical Engineering, ET&T, Civil Engineering.

Q1–GROUP: Computer Science and Engineering, Electrical Engineering.

(b) *Mathematics–I will be taught to both the groups in the first semester.

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 1st | **Branch: Common to all Branches**

Subject: Physics-I | **Course Code: BT00101**

Total Marks in End Semester Exam: 70 | **L: 3 T: 1 P: 0**

Minimum number of Class Tests: 02 | **Min. Marks - 28**

Unit-1: Physical Quantities, Motion in Two or Three dimensions (10hrs.)

Standards and Units, Unit consistency and conversions, Uncertainty and Significant figures, Position and velocity vectors, The Acceleration vector, Projectile motion, Motion in a circle, Relative velocity, Free body diagrams, Conservative and Non-conservative Forces; Central forces, No inertial frames of reference.

Unit-2: Mechanics of Solids (10hrs.)

Angular velocity and acceleration, Rotation with constant angular acceleration, Energy in rotational motion, Parallel axis theorem, Moment of Inertia calculations, Conditions for equilibrium, Bending Stress, Shear stress, Concept of strain energy, *Determination of Moment of Inertia of Fly Wheel*, *Young's Modulus*, Elastic Module, Concepts of elasticity and plasticity.

Unit-3: Wave Optics (10hrs.)

Superposition of waves and interference of light by wave front splitting and amplitude splitting, Fresnel bi- prism; wedge shaped film, Newton's rings, *Diffraction*, Farunhofer diffraction from a single slit, Diffraction gratings and their resolving power, *Difference between Interference and Diffraction*.

Unit-4: Electrostatics in vacuum and dielectric medium (10hrs.)

Calculation of electric field and electrostatic potential for a charge distribution, Divergence and curl of electrostatic field, Laplace's and Poisson's equations for electrostatic potential, Laws of electrostatics, Polarization, Permeability and dielectric constant, Polar and non-polar dielectrics.

Unit-5: Magneto static in a linear magnetic medium (10hrs.)

Bio-Savart law, Divergence and curl of static magnetic field, vector potential and calculating it for a given magnetic field using Stokes' theorem, Magnetization, Solving for magnetic

field due to simple magnets likea bar magnet, Permeability and Susceptibility, Classification of magnetic materials, Ferromagnetism, Paramagnetic and diamagnetic materials, Magnetic domains and hysteresis.

Unit-6: Faraday's law and Electromagnetic waves (10hrs.)

Faraday's law of electromagnetic induction, Continuity equation for current densities, Maxwell's equation in vacuum, Energy in an electromagnetic field, Flow of energy and Pointing vector, Plane electromagnetic waves in vacuum, Their transverse nature and polarization, Relation between electric and magnetic fields of an electromagnetic wave.

Unit-7: Introduction to Quantum Mechanics (10hrs.)

Wave nature of Particles, Time-dependent and time-independent Schrodinger equation for wave function, Free-particle wave function and wave-packets, Uncertainty principle, Solution of stationary-state Schrodinger equation for one dimensional problem like particle in a box.

Unit -8: Solid electronic materials (10hrs.)

Electron in periodic potential, Kronig-Penny model (only basic to introduce origin of band gap), E-k diagram, Electron conduction, Conductivity, Drift velocity, Energy bands in solids, Direct and indirect band gaps, Types of electronic materials: metals, semiconductors, and insulators, Fermi level, Effective mass, Density of states and energy band diagrams.

Unit -9: Semiconductors (10hrs.)

Intrinsic and extrinsic semiconductors, Electron and hole concentration, Concept of Fermi Level, Dependence of Fermi level on carrier-concentration and temperature, Doping, impurity states, n and p type semiconductors, Carrier generation and recombination, Law of mass action, Charge neutrality condition, Carrier transport: diffusion and drift, p-n junction, Depletion region and potential barrier, Energy band structure of PN junction in forward and reverse biasing.

Unit-10: Lasers & Fiber Optics (10hrs.)

Einstein's theory of matter radiation interaction and A & B coefficients, amplification of light by population inversion in optical resonator, different types of lasers: gas lasers (He Ne,),

solid-state lasers (ruby, Neodymium), semiconductor laser, Properties of laser beams. Fiber Optics: Introduction, Optical fiber as a dielectric wave guide, Total internal reflection, Numerical aperture, Losses associated with optical fibers, Step and graded index fibers, Application of optical fibers.

Text Books:

1. Introduction to Mechanics-Mahindra K. Verma, Universities Press, Hyderabad
2. David Griffiths, Introduction to Electrodynamics, Addison-Wesley Professional
3. H. J. Pain, The Physics of Oscillations and Waves, Wiley
4. J. Singh, Semiconductor Optoelectronics: Physics and Technology McGraw-Hill Inc

Reference Books:

1. Engineering Physics by PG Kshirsagar & M N Avadhanulu, S. Chand Publications
2. Modern Physics for Engineers, S.P. Taneja, R. Chand
3. Engineering Physics, Malik and Singh, Tata McGraw Hill
4. Sears and Zemansky's University Physics, Volume-1 Mechanics, Pearson

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.- Ist | **Branch: Common to all Branches**

Subject: Mathematics - I | **Course Code: BT00102**

Total Marks in End Semester Exam: 70 | **Min. Marks - 28**

Minimum number of Class Tests: 02 | **L: 3 T: 1 P: 0**

UNIT I: Calculus **(8 hours)**

Evaluation of improper integrals, reduction formulae, Beta and Gamma functions and their properties; *Applications areas and volumes*.

UNIT II: Calculus **(8 hours)**

Rolle's Theorem, Mean value theorems, *Taylor's and Maclaurin's theorems*; indeterminate forms and Maxima and minima.

UNIT III: Sequences and series **(8 hours)**

Convergence of sequence and series, tests for convergence; Power series, Taylor's series, series for exponential, trigonometric and logarithm functions; Fourier series: Half range sine and cosine series.

UNIT IV: Multivariable Calculus (Differentiation) **(8 hours)**

Limit continuity and partial derivatives, total derivative; Tangent plane and normal line; Maxima,minima and saddle points; Gradient, curl and divergence directional derivatives.

UNIT V: Matrices **(8 hours)**

Elementary row and column transformations, Consistency of linear system of equations; Symmetric, skew symmetric and orthogonal matrices; Eigen values and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem and Orthogonal transformation, *Complex and unitary matrixes.*

Text/Reference Books

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

3. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
4. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
5. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint,2010.
6. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications,Reprint, 2010.
7. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
8. V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, AffiliatedEast–West press, Reprint 2005.

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.- 1st | **Branch: Common to all Branches**

Subject: Basic Electrical and Electronics | **Course Code: BT00103**

Total Marks in End Semester Exam: 70 | **Min. Marks - 28**

Minimum number of Class Tests: 02 | **L: 2 T: 1 P: 0**

Unit – I: D.C. Networks:

Introduction, Ohm's law, Kirchhoff's laws, Mesh and Nodal analysis, *Definition of Electrical Component*. Definitions of MMF, Magnetic field strength, Reluctance, Leakage flux and fringing, Core losses, Comparison of the Electric and Magnetic Circuits, Problems on Series and Parallel Magnetic Circuits.

Unit – II: A. C. Circuits:

Production of AC voltage, Basic Definitions of root mean square and average values, form factor and peak factor and *Phasor Algebra*, Analysis of ac series and Parallel Circuits, Series-Parallel Circuits.

Unit – III: Single phase Transformers:

Introduction, Principles of operation, Constructional details, Ideal Transformer and Practical Transformer, EMF equation, Rating, Phasor diagram at no load *and on load*, Losses in Transformers.

Unit-IV: Diode:

Brief Review of Semiconductors, N-Type & P-Type Semiconductors, Formation of Depletion Layer in a PN Junction, Forward & Reverse Biased, V-I Characteristic, Diode Current Equation. LED, Seven-segment displays.

Unit-V: Transistor:

BJT Construction, Junction Biasing of BJT, Operation of NPN & PNP BJT, Input and Output Characteristics of Transistor in CE configuration; *Characteristics of Transistor in CB configuration*; Transistor as an Amplifier & as a Switch.

Text Books:

1. Fundamentals of Electrical Engineering & Electronics, B.L. Theraja, S. Chand Publication.

2. Principles of Electronics by V. K. Mehta, 3rd Edition, S. Chand and Co. Ltd. (Unit-IV & V).
3. D.P. Kothari and I.J. Nagrath, –Theory and Problems of Basic Electrical Engineering‖, PHI.
4. Electronics Devices and Circuits by Jacob Millman and Christos C. Halkias, 3rd Edition Mc. Grah Hill Pub.

Reference Books:

1. Fitzrald and Higgonbothom, –Basic Electrical Engineering‖, Fifth Edition, McGraw Hill.
2. V.N. Mittal and Arvind Mittal, –Basic Electrical Engineering‖, Second Edition, Tata McGraw Hill.
3. Electrical and Electronic Technology By Hughes 10th Edition, Pearson Education.
4. A textbook of Electronic Circuits. By R. S. Sedha, S. Chand Publication.

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.- 1st | **Branch: Common to all Branches**

Subject: Engineering Graphics and Design | **Course Code: BT00104**

Total Marks in End Semester Exam: 70 | **Min. Marks - 28**

Minimum number of Class Tests: 02 | **L: 1 T: 0 P: 0**

Unit I: Introduction to Engineering Drawing

Principles of Engineering drawing and their significance, Lines, Lettering, Dimensioning, Scales, *Types of Scale – Plain, Diagonal.*

Unit II: Projection

Principles of projection, Method of projection, First and third angle projections, *Traces*, Orthographic projections, Isometric projection, Projection of Plain, Solid.

Unit – III: Development of Surface

Development of Surface of Right, Regular Solids, Development of Prisms, Cylinders, Pyramids, Cone and their Parts.

Isometric Projection: Principles of Isometric Projection – Isometric View, Isometric Scale, Conventional Plane figure, Simple and Compound Solids.

Unit IV: Basic concept of drafting software

Introduction to CAD software, merits and demerits of CAD, Application of CAD, GUI, limits and units, Basic co-ordinate system, setting of status bar option-snap, grid, O-snap, Dynamic input, ortho, polar, and etc. concept of block, viewports and layer.

Unit V: Drafting using CAD software

Drawing Tools: Circle, Arcs, Rectangle, Polygon, Ellipse, Spline, Poly-Line, and Multi-Line. Editing Tools: Trim, Move, and Copy, Rotate. Geometry Modifying Tools: Fillet, Chamfer, Scale, Stretch. Copying Tools: Array, Mirror, and Offset. Dimensioning and Annotations.

Text Books:

1. Bhatt, N. D., "Elementary Engineering Drawing", Charotar Book Stall, Anand
2. George Omura, " Mastering AutoCAD" B.P.B. Publication, New Delhi
3. Mastering AutoCAD and AutoCAD LT-George Omura, Brian C. Benton, Wiley publisher, 2018.

Reference Books:

1. Engineering Graphics – Laxminarayanan & V. and Vaish Wanar, R.S. Jain Brothers, New Delhi
2. Engineering Graphics – Chandra, AM & Chandra Satish 1998.
3. Engineering Graphics – K.L. Narayan and P. Kannaih, Tata McGraw Hill
4. AutoCAD: A problem solving approach- Tickoo, S. Delmar Cengage Learning 2015.

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.- 1st	**Branch: Common to all Branches**
Subject: Fundamentals of Computer	**Course Code: BT00105**
Total Marks in End Semester Exam: 70	**Min. Marks - 28**
Minimum number of Class Tests: 02	**L: 2 T: 0 P: 0**

Unit I: Fundamentals of Computers

History of computer, concept of data and information, computer hardware and software components: Central Processing Unit (CPU), VDU, Keyboard and Mouse, Other input/output Devices, Computer Memory, Memory Hierarchy: Primary and Secondary Storage (Auxiliary Storage), Secondary storage; magnetic disks vs. optical disks (CD, CD-RW and DVD Memory), data – numeric data, alpha numeric data, concept of data and information: storage, seeking, processing and transmission, *and file organization*.

Unit II: Hardware and Software

Introduction of Computer Peripherals: Cables, Buses, Device drivers, installation of devices: keyboard, mouse, scanner, printer, web-camera, speakers and many more; plug-and-play devices; expansion slots……..System software, *difference between software and hardware*, Program Language Translators, application software, Programming Language Paradigms: Imperative, Object-Oriented and Logic languages, Basics of Popular Operating Systems (Windows and Linux); The User Interface, Using Mouse and Organizing Desktop components, Running an Application, File, Folders and Directory management features, Using Help; Creating Short cuts, Configuring Operating System: Windows and Ubuntu, BIOS, System Utilities and Antivirus software.

Unit III: Basic Computer Literacy

Word Processing Basics (MS Word / LibreOffice Writer): *Creating, deleting,* Opening and Closing of documents; Text creation and Manipulation; Formatting of text; Table handling; Spell check, language setting and thesaurus; Printing of word document; Using Spread Sheets (MS Excel / LibreOffice Calc) Basic operations of Spreadsheets; Manipulation of cells; Formulas and Functions; Editing of Spread Sheet, printing of Spread Sheet; Basics of presentation software (MS PowerPoint / LibreOffice Impress) Preparation and Presentation of Slides; Slide Show; *with shortcuts* How to make an effective presentation: Working with

Presentation Tools (Create, Edit, Move, Delete, Resize, Format text object), Working with Graphics tools (Creating Tables, Organization Charts, Hyperlinks), Saving, editing and closing presentation; Taking printouts of presentation / handouts.

Unit IV: Computers and Communication

WWW and Web Browsers: Basic of Computer networks; LAN, WAN, *MAN, PAN, SAN*; Networking Devices, Topologies, Cables and connectors, Connecting to internet; ISP; Basics of internet connectivity related troubleshooting, Web Browsing software, *IP Addressing, Wi-Fi and Bluetooth technology* overview Search Engines; URL; Domain Names;, Internet and Intranet: architecture, various file formats, Applications of INTERNET: Electronic mailing systems (Google Mail features): Creating and Managing mailing accounts, folders, Document collaboration, Instant Messaging, Netiquettes; Skype calling and Messenger services; functioning and features of smart gadgets: Smartphones, 4K smart television gadgets, kindle, gaming-gadgets, fitness gadgets and alike.

Unit V: Application Domains

Computer applications in office automation, *graphics and multimedia,* book publishing, data analysis, accounting, investment, inventory control, robotics, cyber security, air and railway ticket reservation sites, Audio and Video-conferencing, social networking, surveillance, Case Studies: Computer Literacy for banking, KYC, Insurance and financial transactions, operating mobile banking, Nine Pillars of Mission Digital India (DI-Initiatives) and their scheme highlights.

Text Books:

1. Computer Basics by IGNOU.
2. Suresh K Basendrea: Computers Today
3. Pradeep K. Sinha, Priti Sinha, –Computer Fundamentals‖. BPB Publications.
4. Rajaraman, V., –Fundamental of Computers‖. Prentice Hall India, New Delhi
5. Sanders Donald H Computers Today

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 1st **Branch: Common to all Branches**

Subject: Physics (Lab) **Course Code: BT00106**

Total Marks in End Semester Exam: 35 **L: 0 T: 0 P: 2**

Min. Marks - 14

Total 36 labs. Hrs. About 10 – 12 experiments to illustrate the concepts learnt in Physics (Hrs. 3/ week).Suitable number of experiments from the following categories:

- Mechanics
- Optics and its applications
- Electromagnetic
- Semiconductor Physics
- Laser & Optical fiber

Text book:

1. A textbook of Engineering Physics Practical 2nd edition, University Science Press

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 1st **Branch: Common to all Branches**

Subject: Basic Electrical and Electronics Engineering (Lab) **Course Code: BT00107**

Total Marks in End Semester Exam: 35 **L: 0 T: 0 P: 2**

Min. Marks - 14

List of Experiments (To perform minimum 10 experiments):

1. To verify Superposition theorem.
2. To verify Kirchhoff's Current Law and Kirchhoff's Voltage Law.
3. To determine V– I characteristics of Incandescent lamp.
4. To study B-H curve.
5. To measure current, power, voltage and power factor of series RLC circuit.
6. To measure current, power, voltage of parallel RLC circuit.
7. To measure current, power, voltage of series parallel RLC circuit.
8. To measure R and L of choke coil.
9. To study construction of a single phase transformer.
10. To perform ratio test and polarity test of a single phase transformer.
11. To calculate efficiency of a single phase transformer by direct loading.
12. To verify the venin's theorem and Norton's theorem.
13. To study construction of Single Phase A.C. machines.
14. To study construction of Three Phases Induction motors.
15. To study charging and discharging of a capacitor.

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.- 1st **Branch: Common to all Branches**

Subject: Fundamental of Computer (Lab) **Course Code: BT00108**

Total Marks in End Semester Exam: 35 **L: 0 T: 0 P: 2**

Min. Marks - 14

The laboratory should be preceded or followed by a Practical Lecture to explain the approach oralgorithm to be implemented for the problem given. Open Source software can be used.

Practical Lecture (L T P) – 0 0 1	**Lab. Work (L T P) – 0 0 3**
Practical Lecture 1:Introduction and workingof Hardware Components	**Lab1**: Identifying the computer hardware likeinput output devices, CPU, mother board, Buses etc.
Practical Lecture 2: Introduction and workingof Software.	**Lab 2**: Making Algorithm, DFD, ER diagram. Working of software's like system, Utility, Application software.
Practical Lecture 3: Introduction and working of Operating System	**Lab 3**: Basic operations of Operating System: creating file, Directory, Removing file, directory, date time setting, renaming etc. use internal and external connabds.
Practical Lecture 4: Introduction and working of MS Office	**Lab 4**: use the basic features of MS Office
Practical Lecture 5: Introduction of MS Word	**Lab5: Create** the document with a Alignment. Use the different properties of MSWord
Practical Lecture 6: Introduction of MS Excel	**Lab 6**: Make the use of Spreadsheet for data representations, Calculation and graphical presentations. Use properties of Excel
Practical Lecture 7: Introduction of Power presentation	Lab 7: MS-PowerPoint Make the presentation with features. Use the animation tools Multimedia
Practical Lecture 8 &9: Introduction of computer communication	**Lab 8 and 9**: *Computer communication related practical*

	1. Connect the Internet; open any website of your choice and save the WebPages. 2. Search any topic related to your syllabi using any search engine and download the relevant material. 3. Send any greeting card to your friend. 4. Create your E-Mail ID on any free E-Mail Server. 5. Login through your E-Mail ID and do the following: a. Read your mail b. Compose a new Mail c. Send the Mail to one person d. Send the same Mail to various persons e. Forward the Mail f. Delete the Mail g. Send file as attachment 6. Surf Internet using Google to find information about your state 7. Surf Internet using Google to find Tourism information about your state 8. Surf Internet using Yahoo to find Hotels around your state 9. Surf Internet using Google to find information about educational institutes for teaching M.S in comp science in India a. Surf Internet using Google to find information about Indian Compare the cost, overheads and

Practical Lecture 10: installing Computer System	**Lab 10:** Installing the working computer system
Practical Lecture 11: Different ICT use of Government Schemes	**Lab 11: Filling online AAADHAR, Voter id, PAN etc. form**
Practical Lecture 12: Applications of Computer in Digital India	**Lab 12**: online filling of different digital India applications

Laboratory Outcomes:

- To give idea about fundamentals of Computer
- To make familiar with MS Office
- To be able to write, document, present their work when developing project
- To be able to better foundations in Computer Field.
- To be able to know online applications of Digital India.

Text & Reference books:

1. Pradeep K. Sinha, Priti Sinha, –Computer Fundamentals‖. BPB Publications.
2. Rajaraman, V., –Fundamental of Computers‖. Prentice Hall India, New Delhi
3. Suresh K Basendrea: Computers Today
4. Sanders Donald H Computers Today

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.- 1st **Branch: Common to all Branches**

Subject: Engineering Graphics and Design (Lab) **Course Code: BT00109**

Total Marks in End Semester Exam: 35 **L: 0 T: 0 P: 4**

Min. Marks - 14

List of Practical:

1. Study of any drafting software- GUI, limits and units, drawing tools, editing tools, annotations, etc.
2. Study of co-ordinates systems- Cartesian and polar (absolute and relative system of measurement) and Practice drawing by using following tools: Grid, snap, O-snap, Lines, Erase, Zoom.
3. Study and create drawing by using Drawing tools: Circle, arcs, rectangle, polygon, ellipse, Editing tools: trim, move, copy, rotate and practice of drawing using these commands.
4. Study and create drawing by using Geometry modifying tools: fillet, chamfer, scale, stretch
5. Study and create drawing by using copying tools like array, mirror, block and offset.
6. Study and detailing of drawing by using dimensioning and annotations tools.
7. Study and create drawing with different types of line by using Layer command
8. Create geometry by modify it by using Scales- plane and diagonal scale and create conicssections- ellipse, parabola, hyperbola, rectangular hyperbola, involutes.
9. Draw regular solids: Cube, Prism, Pyramid, Cylinder, Cones
10. Draw sectional views of solids- Cube, Prism, Pyramid, Cylinder, Cones.

BHARTI VISHWAVIDYALAYA, DURG

SCHEME OF TEACHING AND EXAMINATION

Courses of Study and Scheme of Examination of Q1 Group

B. Tech. (Second Semester - Common to all Branches of Engineering)

S. No.	Courses (Subject)	Course Code	Period per Week			Scheme of Examination			Total Marks	Credit (L+T+P/2)
						Theory/Lab				
			L	T	P	ES E	CT	TA		
1.	Chemistry-I	BT00201	3	1	-	70	10	20	100	4
2.	Mathematics-II**	BT00202	3	1	-	70	10	20	100	4
3.	Programming for Problem Solving	BT00203	3	-	-	70	10	20	100	3
4.	English	BT00204	2	-	-	70	10	20	100	2
5.	Basic Civil Engineering and Mechanics	BT00205	3	-	-	70	10	20	100	3
6.	Chemistry (Lab)	BT00206	-	-	2	35	-	15	50	1
7.	Programming for Problem Solving (Lab)	BT00207	-	-	4	35	-	15	50	2
8.	Basic Civil Engg. & Mechanics (Lab)	BT00208	-	-	2	35	-	15	50	1
9.	Workshop Practice/ Manufacturing Process(Lab)	BT00209	-	1	4	35	-	15	50	3
10.	Language (Lab)	BT00210	-	-	2	-	-	50	50	1
Total Marks			14	3	14	490	50	210	750	24

L-Lecture, T-Tutorial, P-Practical, ESE-End Semester Exam,

CT–Class Test, TA–Teacher's Assessment

Note: - (a) The teaching in the 1st and 2nd Semester will be divided in two groups consisting of branches as shown below:

P1–GROUP: Mechanical Engineering, ET&T, Civil Engineering

Q1–GROUP: Computer Science and Engineering, Electrical Engineering

(b) **Mathematics–II will be taught to both the groups in the first semester.

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 2nd | **Branch: Common to all Branches**

Subject: Chemistry–I | **Course Code: BT00201**

Total Marks in End Semester Exam: 70 | **L: 3 T: 1 P: 0**

Minimum number of Class Tests: 02 | **Min. Marks – 28**

Unit – I Atomic & Molecular Structure **10 hours**

Molecular orbital Theory: Equations for atomic and molecular orbitals (LCAO), Energy level diagram of homo(H2, N2, O2, Li2, F2) & hetero molecules (CO, NO, HF), Concept of bond order. Pi-molecular orbitals of butadiene, Aromaticity.

Crystal Field Theory: Splitting of d-orbital of octahedral and tetrahedral complexes, Energy level diagram of transition metal ion & magnetic property, Application of crystal field Theory.

Unit – II Spectroscopic Techniques and Applications **10 hours**

Principle of spectroscopy. Electromagnetic radiation, Spectrophotometer (line diagram) Electronic Spectroscopy (Ultraviolet–visible spectroscopy): Theory, Types of electronic transition, Chromosphere, auxo chromes , Electronic excitation in conjugated Dienes , Uses or application of Electronic Spectroscopy, Vibrational spectroscopy (Infrared spectroscopy): Molecular vibration, Selection rule, functional group region, fingerprint region and uses or application of Vibrational spectroscopy. Nuclear magnetic resonance spectroscopy: Introduction, number of signal, chemical shift, Spin-spin coupling and uses or application of Nuclear magnetic resonance spectroscopy.

Unit – III Use of free energy in Chemical Equilibriums **8 hours**

Thermodynamic Functions: Energy, Entropy, Free energy, Cell potential, Estimations of entropy and free energies, Nernst Equation & its application to voltaic cell.

Corrosion: Electrochemical theory of corrosion, galvanic series, Galvanic corrosion, Differential aeration corrosion, Pitting, and Water line corrosion, factors affecting corrosion , Cathodic Protection, *Boiler Corrosion Scale of Sludge.*

Unit –IV Periodic properties **8 hours**

Periodic table, atomic and ionic radii, ionization energies, electron affinity, electronegativity. Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms. Polari ability, Oxidation states, coordination numbers and geometries, Hard, soft acids

and bases (Classification, Pearson's HSAB principle, its applications & limitations) Molecular Geometry(Valence shell electron pair repulsion theory to NH3,H3O+, SF4, CIF3, ICl2 and H2O), *Application of Molecular Geometry*.

Unit –V Organic reactions and synthesis of drug molecule 8 hours

Introduction to reactions involving substitution (free radical-Chlorination of molecule, Gomberg reaction, Wurtz reaction, Electrophilic, Nucliophilic-SN1, SN2), Addition (Electrophilic–Morkownihoff rule, Nucleophile)Elimination (α elimination , β elimination , unimolecular E1, bimolecular E2), oxidation (Baeyer villager oxidation), reduction (Clemmensen reduction, Wolff Kishner reduction), Reimer- Thiemann reaction, Canannizaro, *Condensation Reaction, Aldal Condensation*.

Synthesis of a commonly used drug molecule: General guidelines of drug making, synthesis of Aspirin, Paracetamol.

Unit – VI Introduction to quantum theory 8 hours

Schrodinger equation & its importance, Applications to hydrogen atom, Wave mechanical model for many electron atoms, radial distribution curves.

Unit –VII Chemical Bonding in Molecules 10 hours

MO theory, Structure, bonding and energy levels of bonding and shapes of many atom molecules, Coordination Chemistry, Electronics plectra and magnetic properties of complexes with relevance to bio- inorganic chemistry, organometallic chemistry.

Unit –VIII Stereochemistry: 8 hours

Introduction to Stereochemistry: Representations of 3 dimensional structures, Chirality, Optical activity. Isomerism structural isomerism, stereoisomers, enantiomers, diastereomers, Configurations (D, L & R, S), Geometrical isomerism (cis and Trans & E and Z). Racemic modification & their resolution, Isomerism in transitional metal compounds. Conformational analysis: Conformations of cyclic (cyclohexane) and acyclic compounds (ethane & butane).

Unit –IX Reactivity of organic molecules: 8 hours

Organic acids and bases: factors influencing acidity, basicity, and nucleophilicity of

molecules, kinetic vs. thermodynamic control of reactions.

Unit –X Strategies for synthesis of organic compounds: 10 hours

Reactive intermediates substitution, elimination, rearrangement, kinetic and thermodynamic aspects, role of solvents.

Text Books:

1. A Text Book of Engg. Chemistry, Shashi Chawala, Dhanpat Rai &Co.(P)Ltd.
2. Engineering Chemistry by P. C. Jain (Dhanpat Rai Publishing Company.
3. Engineering Chemistry, Concept in engineering Chemistry by Satyaprakash and Manisha Agrawal by Khanna Publication.

Books for Chemical Engineering:

1. Advanced Inorganic Chemistry Vol 1 & II by Gurdeep Raj, Goel Publishing House.
2. Organic Reaction and Their Mechanism, P. S Kalsi, New Age International Publishers.

Reference Books:

1. University chemistry, by B. H. Mahan
2. Chemistry: Principles and Applications, by M. J. Sienko and A. Plane
3. Fundamentals of Molecular Spectroscopy, by C. N. Banwell
4. Engineering Chemistry (NPTEL Web- book), by B. L. Tembe, Kamal uddin and M. S. Krishnan
5. Physical Chemistry, by P. W. Atkins
6. Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5thEdition
7. Essentials of Physical Chemistry, Bahi & Tuli, S. Chand Publishing
8. Introduction to Nano science by S. M. Lindsay

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 2nd | **Branch: Common to all Branches**

Subject: Mathematics - II | **Course Code: BT00202**

Total Marks in End Semester Exam: 70 | **L: 3 T: 1 P: 0**

Minimum number of Class Tests: 02 | **Min. Marks – 28**

UNIT I Multivariable Calculus (Integration) (8 hours)

Double and triple integrals (Cartesian), change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes, Center of mass and Gravity (constant and variable densities); Triple integrals (Cartesian),

Orthogonal curvilinear coordinates, Simple applications involving cubes, sphere and rectangular parallelepipeds; Scalar line integrals, vector line integrals, scalar surface integrals, vector surface integrals, Theorems of Green, Gauss and Stokes (without proof) & its applications.

UNIT II First Order Ordinary Differential Equations (8 hours)

Exact, linear and Bernoulli's equations, Euler's equations, *Formation of Differential Equation, Linear Equation*, *Equation Reducible to exact equation*, Equations of first order and higher degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut'stype.

UNIT III Ordinary differential equations of higher orders (8 hours)

Higher order linear differential equations with constant coefficients & variable coefficients, methodof variation of parameters, Cauchy-Euler equation. Power series solutions; Legendre polynomials and their properties, Bessel functions of the first kindand their properties.

UNIT IV Complex Variable – Differentiation (8 hours)

Limit of complex function, Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm) and their properties; Conformal mappings, Mobius transformations and their properties.

UNIT V Complex Variable – Integration (8 hours)

Contour integrals, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof), Lowville's theorem and Maximum-Modulus theorem (without proof); Taylor's series, zeros of analytic functions, singularities, Laurent's series. Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals using the Bromwich contour.

Textbooks/References:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint,2002.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006
3. W. E. Boyce and R. C. Di Prima, Elementary Differential Equations and Boundary ValueProblems,9th Edn., Wiley India, 2009.
4. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
5. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice HallIndia, 1995.
6. E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.
7. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., Mc-Graw Hill, 2004.
8. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications,Reprint, 2008.
9. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 2nd | **Branch: Common to all Branches**

Subject: Programming for Problem Solving | **Course Code: BT00203**

Total Marks in End Semester Exam: 70 | **L: 3 T: 0 P: 0**

Minimum number of Class Tests: 02 | **Min. Marks – 28**

Unit I: Introduction **(4 lectures)**

Introduction to Programming, *Evaluation of programming language*, Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.), and Idea of Algorithm: steps to solve logical and numerical problems.

Unit II: Programming Concepts **(9 lectures)**

Algorithm: Flowchart, Pseudo code and Source code with examples. Variables, data types, memory locations, Syntax and Logical Errors in compilation, object and executable code, Arithmetic expressions and precedence, Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching, Iteration and loops, *Sub program implementing sub program.*

Unit III: Arrays **(9 lectures)**

Introduction to Arrays (1-D, 2-D), Character arrays and Strings, Basic Algorithms: Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required), *Expression statements*.

Unit IV: Function **(9 lectures)**

Function programming, prototyping, built in libraries, Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference, Recursion: Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.

Unit V: Structure **(9 lectures)**

Defining structures and Array of Structures, Union, and enumeration, Pointers: Idea of pointers, Defining pointers, Use ofPointers in self-referential structures, notion of linked list (no implementation), bit-fields. File handling: concept of a file, text files and binary files, Formatted I/O, file I/O operations,example programs

Text Books:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 2nd | **Branch: Common to all Branches**

Subject: English | **Course Code: BT00204**

Total Marks in End Semester Exam: 70 | **L: 2 T: 0 P: 0**

Minimum number of Class Tests: 02 | **Min. Marks – 28**

UNIT – I

Vocabulary Building

1.1 Root words from foreign languages and their use in English

1.2 Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives.

1.3 Synonyms, antonyms, Homonyms and Homophones.

1.4 One Word Substitution

1.5 Basics of Phonetics: Definitions, Phonetic Symbols, Transcription of one and two syllablewords

1.6 Communication: Definition, Cycle, Elements, 7Cs & Barriers

UNIT – II

Basic Writing Skills

2.1 Types of Sentences and Tenses, Voices and narration

2.2 Use of phrases and clauses in sentences

2.3 Importance of proper punctuation

2.4 Creating coherence

2.5 Techniques for writing precisely

UNIT – III

Identifying Common Errors in Writing

3.1 Parts of speech, Subject-verb agreement

3.2 Noun-pronoun agreement

3.3 Misplaced modifiers

3.4 Articles

3.5 Prepositions

3.6 Redundancies

3.7 Clichés

3.8 Errors in Spelling/ Misspelled words

UNIT – IV

Writing Practices

4.1 Comprehension

4.2 Précis Writing

4.3 Essay Writing

4.4 Business Letters & Job Application

4.5 Formal Reports: Components & Characteristics

4.6 Writing e-mails

UNIT – V

Listening

5.1 Listening: Definition, purposes, types, and strategies to improve listening.

5.2 Characteristics of effective listening.

5.3 Barriers to Listening and measures to overcome barriers

5.4 Note making: types and conversion of notes into texts.

UNIT – VI

Oral Communication (This unit involves interactive practice sessions in Language Lab)

6.1 Listening Comprehension

6.2 Pronunciation, Intonation, Stress and Rhythm

6.3 Common Everyday Situations: Conversations and Dialogues

6.4 Communication at Workplace

6.5 Interviews

6.6 Formal Presentations

Suggested Books:

1. Practical English Usage. Michael Swan. OUP. 1995.
2. Remedial English Grammar. F.T. Wood. Macmillan.2007

3. On Writing Well. William Zinsser. Harper Resource Book. 2001
4. Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
5. Communication Skills. Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.
6. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press
7. English and Communication Skills for Students of Science and Engineering. S.P. Dhanavel Orient Blackswan Ltd.2009.
8. Scientific English: A Guide for Scientists and Other Professionals. R A Day. Universities Press. 2000.
9. Word Power Made Easy. Norman Lewis. W R Goyal Publishers and Distributors. Publishers. 2009
10. Textbook of English Phonetics for Indian Students. T Balasubramaniam. MacmillanPublishers.2012
11. Technical Communication: Principles and Practice. Meenakshi Raman and Sangeeta Sharma. Oxford University Press. 2015.

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 2nd	**Branch: Common to all Branches**
Subject: Basic Civil Engineering & Mechanics	**Course Code: BT00205**
Total Marks in End Semester Exam: 70	**L: 3 T: 0 P: 0**
Minimum number of Class Tests: 02	**Min. Marks – 28**

UNIT – I Building Material

Nominal and actual dimensions of modular and traditional bricks, Qualities of good brick, Water absorption and Compressive Strength test for bricks. Types of Cement, Ingredients of Portland cement and their functions, Fineness, Setting Times and Compressive Strength of Cement, Functions of Sand in mortar, Mortar Mix proportions for various uses.

UNIT – II Building Construction

Ingredients of Cement Concrete, *Coarse and Fine Aggregates*, Grades of Concrete, proportions for Nominal mix concrete, Workability & Compressive Strength of Concrete, Curing of Concrete.

Define Footing Foundation, Necessity of foundations, Definitions of Safe bearing capacity, Ultimate bearing capacity and factor of safety, *Relationship between SBC, UBC and FOS,* Difference between Load Bearing & framed Construction.

UNIT – III Surveying & Levelling

Principles of Surveying, Technical terms, Calculation of reduced level by Height of instrument and Rise & Fall method, Simple problems in levelling.

UNIT – IV General System of Forces

Equations of equilibrium for a system of concurrent forces in a plane. Constraint, Action and Reaction. Types of support and support reactions. Free Body Diagram – Body subjected to two forces & Body subjected to three forces. Theorem of Varigonon's, Equations of Equilibrium.

UNIT –V Analysis of Plane Trusses

Rigid or perfect Truss, Determination of Axial forces in the members of truss, Method of Joints, Method of Sections.

Text books:

1. Comprehensive Basic Civil Engineering B.C. Punmia
2. Building construction by Ahuja and Birdi
3. Engineering Mechanics by A. K. Tayal

Reference books:

1. Basic Civil Engineering by Ramamurutham
2. Engineering Mechanics by R. K. Bansal

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 2nd | **Branch: Common to all Branches**

Subject: Chemistry-I (Lab) | **Course Code: BT00206**

L: 0 T: 0 P: 2 | **Minimum number of Class Tests: 02**

Total Marks in End Semester Exam: 35 | **Min. Marks – 14**

List of Experiments:

Choice of 8 – 10 experiments from the following:

1. Determination of surface tension and viscosity.
2. Thin layer chromatography.
3. Ion exchange column for removal of hardness of water.
4. Determination of chloride content of water.
5. Colligative properties using freezing point depression.
6. Determination of the rate constant of a reaction.
7. Determination of cell constant and conductance of solutions.
8. Potentiometric - determination of redox potentials and emfs.
9. Synthesis of a polymer/drug/ organic compounds.
10. Saponification/acid value of oil.
11. Chemical analysis of salt / organic compounds.
12. Lattice structures and packing of spheres.
13. Models of potential energy surfaces.
14. Chemical oscillations- Iodine clock reaction.
15. Determination of the partition coefficient of a substance between two immiscible liquids.

Text Books:

1. Laboratory Manual Engg. Chemistry, Anupama Rajput, Dhanpat Rai & Co. (P) Ltd.
2. Laboratory Manual on Engg. Chemistry, S. K. Bhasin& Sudha Rani, Dhanpat Rai & Co. (P) Ltd.

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 2nd **Branch: Common to all Branches**

Subject: Programming for Problem Solving (Lab) **Course Code: BT00207**

Total Marks in End Semester Exam: 35 **L: 0 T: 0 P: 4**

Min. Marks - 14

The laboratory should be preceded or followed by a Practical Lecture to explain the approach oralgorithm to be implemented for the problem given.

Practical Lecture (L T P) – 0 0 1	**Lab. work (L T P) – 0 0 3**
Practical Lecture 1: Problem solving using computers	**Lab1**: Familiarization with programming environment
Practical Lecture 2: Variable types and type conversions	**Lab 2**: Simple computational problems using arithmetic expressions
Practical Lecture 3: Branching and logical expressions	**Lab 3**: Problems involving if-then-else structures:
Practical Lecture 4: Loops, while and for loops	**Lab 4**: Iterative problems e.g., sum of series
Practical Lecture 5: 1D Arrays: searching, sorting	**Lab 5**: 1D Array manipulation
Practical Lecture 6: 2D arrays and Strings	**Lab 6**: Matrix problems, String operation
Practical Lecture 7: Functions, call by value	**Lab 7**: Simple functions
Practical Lecture 8 & 9: Numerical methods (Root finding, numerical differentiation, numerical integration):	**Lab 8 & 9**: Programming for solving Numerical methods problems
Practical Lecture 10: Recursion, structure of recursive calls	**Lab 10**: Recursive functions
Practical Lecture 11: Pointers, structures and dynamic memory allocation	**Lab 11**: Pointers and structures
Practical Lecture 12: File handling	**Lab 12**: File operations

Text Books:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill.

Reference Books:

3. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 2nd | **Branch: Common to all Branches**

Subject: Basic Civil Engineering & Mechanics (Lab) | **Course Code: BT00208**

Total Marks in End Semester Exam: 35 | **L: 0 T: 0 P: 2**

Min. Marks - 14

List of Experiments:

1. Water Absorption test on bricks.
2. Compressive strength test on bricks.
3. Fineness of cement by sieve analysis.
4. Initial setting time of cement.
5. Final setting time of cement.
6. Consistensy test of cement.
7. Soundness test of cement.
8. Compressive Strength test of Cement.
9. Sieve analysis and F.M. of fine aggregate.
10. Sieve analysis and F.M. of coarse aggregate.
11. Compressive strength test of Concrete.
12. Determination of workability by slump cone test.
13. Determination of workability by compaction factor test.
14. Difference in level between two given stations by Height of Instrumentmethod.
15. Difference in level between two given stations by Rise & Fall method.

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 2nd **Branch: Common to all Branches**

Subject: Workshop **Course Code: BT00209**

Practice/Manufacturing Process (Lab)

Total Marks in End Semester Exam: 35 **L: 0 T: 1 P: 4**

Min. Marks - 14

Unit I:

Forging: Introduction to manufacturing process, and its classification, use of various forging tools,forging operations, forging defects.

Suggested Jobs: Forging of chisel, forging of screw driver.

Unit II:

Carpentry: Different types of wood, carpentry tools, different joints, polishing, wood workingLathe.

Suggested Jobs: Making of name plate, stools and a small job on wood working lathe.

Unit III:

Fitting Shop: Introduction to bench working. Work holding devices, measuring instruments, fittingtools and their specification, types of joints fitting operations.

Suggested Jobs: Preparation of job by use of filling, sawing, chipping, drilling and tapping operations.

Unit IV:

Moulding: Pattern materials, allowances, moulding terminology.

Suggested Jobs: Prepare moulds of patterns, casting small household objects like paper-weight etc.

Unit V:

Welding: Study and use of gas, Arc, soldering, brazing methods. Safety precaution.

Suggested Jobs: Preparing Lap and Butt joints by gas and arc welding method.

Unit VI:

Metal Cutting: Common machining operations, different machine tools, cutting tools

materials, different type of Lathes, Lathe operations, shaper and its specification. Quick return mechanism of shaper.

Suggested Jobs: Making small shaft, cutting screw thread on Lathe.

Text Books:

1. Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., –Elements of Workshop Technology‖, Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
2. Rao P.N., –Manufacturing Technology‖, Vol. I and Vol. II, Tata McGrawHill House, 2017.
3. B.S. Raghuvanshi, Workshop Technology, Vol I&II, Dhanpat Rai & Sons.
4. V. Narula, Workshop Technology, S.K. Kataria and sons.

Reference Books:

1. Kalpakjian S. And Steven S. Schmid, –Manufacturing Engineering and Technology‖, 4th edition,Pearson Education India Edition, 2002.
2. Gowri P. Hariharan and A. Suresh Babu,‖Manufacturing Technology – I‖ Pearson Education, 2008.
3. Roy A. Lindberg, –Processes and Materials of Manufacture‖, 4th edition, Prentice Hall India, 1998.
4. M.L.Begeman and B.H.Amstead, Manufacturing Process, Wiley

BHARTI VISHWAVIDYALAYA, DURG

B.TECH IN CIVIL ENGINEERING

Scheme of Examinations: Semester III

Sl. No.	Courses (Subject)	CourseCode	Period per Week			Scheme of Examination			Total Marks	Credit
						Theory/Lab				
			L	T	P	ESE	CT	TA		
1.	Mathematics - III	BT04301	3	1	-	70	10	20	100	4
2.	Introduction to Fluid Mechanics	BT04302	3	1	-	70	10	20	100	4
3.	Introduction to Solid Mechanics	BT04303	3	1	-	70	10	20	100	4
4.	Plane Surveying	BT04304	3		-	70	10	20	100	3
5.	Building Materials	BT04305	2	-	-	70	10	20	100	2
6.	Fluid MechanicsLab	BT04306	-	-	2	35	-	15	50	1
7.	Surveying Lab	BT04307	-	-	2	35	-	15	50	1
8.	Building MaterialLab	BT04308	-	-	2	35	-	15	50	1
9.	Software Lab	BT04309	-	-	2	35	-	15	50	1
10.	Personality Development	BT04310	-	-	2	-	-	50	50	-
Total Marks			**14**	**3**	**10**	**490**	**50**	**210**	**750**	**21**

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 3rd | **Branch: CIVIL**

Subject: Mathematics - III | **Course Code: BT04301**

Total Marks in End Semester Exam:70 | **L: 3 T: 1 P: 0**

Minimum number of Class Tests: 02 | **Min. Marks - 28**

UNIT-I Laplace transform:

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

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.

UNIT- III Random variable:

Discrete and continuous probability distributions, Mathematical expectation, Mean and Variance, Moments, Moment generating function, probability distribution, Binomial, Poisson and Normal distributions.

UNIT- IV Interpolation with equal and unequal intervals:

Finite differences, Newton's Forward & Backward Difference Formulae, Central Difference Formula, Stirling's Formula, Bessel's Formula, Lagrange's Formula and Newton's Divided Difference Formula.

UNIT-V Numerical Solution of Ordinary Differential Equations:

Picard's Method, Taylor's Series Method, Euler's Method, Euler's Modified Method, Runge-Kutta Methods, Predictor-corrector Methods- Milne's Method, Adams-Bashforth Method.

Text Books:

1. "Higher Engg. Mathematics", Dr. B.S. Grewal– Khanna Publishers.
2. "Advanced Engg. Mathematics" , Erwin Kreyszig – John Wiley & Sons.
3. "Numerical Methods in Engineering and Science" , Dr. B.S. Grewal, Khanna Publishers.
4. "Numerical Methods for Scientific and Engineering Computation" , M .K. Jain, S. R. K

Reference Books:

1. "Applied Mathematics", P. N. Wartikar& J. N. Wartikar. Vol-II Pune Vidyarthi Griha Prakashan, Pune.
2. "Applied Mathematics for Engineers & Physicists", Louis A. Pipes- TMH.
3. "Numerical Methods for Scientists and Engineers" K. Shankar Rao, Prentice Hall of India.
4. "Numerical Methods" P. Kandasamy, K. Thilagavathy and K. Gunavathi, S. Chand publication.

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 3rd	**Branch: CIVIL**
Subject: Introduction to Fluid Mechanics	**Course Code: BT04302**
Total Marks in End Semester Exam:70	**L: 3 T: 1 P: 0**
Minimum number of Class Tests:02	**Min. Marks - 28**

UNIT – I: Introduction –

Fluid and continuum, *General terms related to fluid, Surface tension and capillarity* physical properties of fluids ideal and real fluid, Newtonian and Non-Newtonian Fluid. Fluid Statics- Pressure density height relationship, pressure measurement by Manometers, Pressure on plan surface, centre of pressure, buoyancy, stability of immersed and floating bodies, metacentric height.

UNIT – II: Kinematics of fluid flow –

Types of flow- Steady and unsteady flow, uniform and non- uniform flow, laminar and turbulent flow, *compressible and incompressible flow* one, two and three dimensional flow, streamlines, streak lines and path lines, circulation and vorticity, rotational and irrotational flow, velocity potential and stream function, continuity equation, *velocity and acceleration.*

UNIT – III: Dynamics of fluid flow –

Equation of motion, Euler's equation of motion along a streamline and its integration, *Bernoulli's equation from euler's equation and its applications* – Pitot tube, Venturimeter, orificemeter, nozzles, momentum equation and its application to stationary and moving plates/vanes, pipe bends, problems related to combined application of energy and momentum equations

UNIT – IV: Flow in Pipes –

Reynolds's experiment, experimental determination of critical velocity, transition from laminar to turbulent flow, Laminar flow through circular tubes, *loss of energy in pipe,* minor losses in pipe lines, loss due to sudden contraction, expansion, etc; *Flow through siphon,* Hot wire anemometer and LDA. Flow in open Channel Comparison between open channel and pipe flow,

definition of uniform and non-uniform flow, uniform flow formulae, Chezy's and Manning's Formula, Hydraulically efficient channel section of rectangular and trapezoidal shape.

UNIT-V: Flow through mouthpiece and orifices –

Classification of orifice, flow through of orifice **,** Hydraulic coefficients of orifice, bell method orifice, mouthpieces, Borda's mouthpiece, running free and submerged. *Classification of Notches and Weirs*- Rectangular, triangular and trapezoidal notches and weir, cippoletti and broad crested weir.

Text Books:

1. Fluid Mechanics and Machines – Dr. R.K. Bansal (Laxmi Publications)
2. Fluid Mechanics – Dr. P.N. Modi (Standard Book House)
3. Fluid Mechanics and Machines – Dr. A.K. Jain (Khanna Publications)
4. Hydraulic and Hydraulic Machine(Hindi) by B. L. Gupta, Amit Gupta Standard Publishers 6th Edition , 2012

Reference Books:

1. Mechanics of Fluid – Irving H. Shames (McGraw Hill)
2. Introduction to Fluid Mechanics – James A. Fay (Prentice Hall India)
3. Fluid Mechanics – R.J. Garde (New Age International Publication)
4. Fluid Mechanics – Streeter V.L. & Wylie E.B. (Tata McGraw Hills)

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 3rd | **Branch: CIVIL**

Subject: Introduction to Solid Mechanics | **Course Code: BT04303**

Total Marks in End Semester Exam:70 | **L: 3 T: 1 P: 0**

Minimum number of Class Tests:02 | **Min. Marks - 28**

UNIT – I: **Stress-Strain Relations** –

Types of stresses and strains, Mechanicals properties and testing of steel, Hooke's law, Uniaxial tensile test, stress – strain curve, hardness, impact, Poisson's ratio, Modulus of rigidity, Bulk modulus, Relation between the elastic constants, *Composite bars*, Thermal effects, Elongation of bars of constant and varying sections, Statically indeterminate problems in tension and compression, Thin cylindrical and spherical vessels.

UNIT – II: Analysis of Stresses and Strains –

Two dimensional stress-system, Stress at a point on an inclined plane, Principal stresses and principal planes, Transformation equations, Mohr's circle for plane stress and their applications, Two dimensional Strain-system, Normal and shear strain, Strain components at a point on a plane, Transformation-equations, Principal strains, *Mohr's circle for strain*

UNIT – III: Bending of Beams –

Loads, types of loads, types of supports, types of beams, Theory of simple bending - limitations - bending stresses in beams of different cross sections, beams of two materials, shear stresses in symmetrical elastic beams transmitting both shear and bending moment. Shear force and bending moment diagrams for simply supported overhanging and cantilever beams, relation between shear force, bending moment and intensity of loading.

UNIT – IV: Columns and Combined stresses –

Introduction; Short and long columns, Eccentrically loaded short column, Kern of rectangular and circular sections, Middle third rule, Stable and unstable equilibrium, Euler's formula for long columns with different end conditions, Rankin's formula, stability of gravity dams and retaining walls.

UNIT – V: Unsymmetrical Bending and Torsion –

Unsymmetrical bending and Torsion - Introduction , Location of neutral axis, Torsion of circular solid and hollow circular shafts - power transmission, Closed-coiled and Open-Coiled helical springs.

Text Books:

1. Strength of Materials – R.K. Rajput (S. Chand & Co.)
2. Mechanics of Materials – B.C. Punmia (Laxmi Publication)
3. Strength of Materials – S. Ramamurtham (Dhanpat Rai Publications)
4. Strength of Materials (Part-I) – Timoshenko (CBS Pubishers)

Reference Books:

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)

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 3rd	**Branch: CIVIL**
Subject: Plane Surveying – I	**Course Code: BT04304**
Total Marks in End Semester Exam:70	**L: 3 T: 1 P: 0**
Minimum number of Class Tests:02	**Min. Marks - 28**

UNIT – I: Levelling –

Definition and object of levelling, Type of levelling, Spirit levelling-Definitions of terms, Principle, Construction, Temporary and permanent adjustment of levels. Sensitivity of bubble tube, Curvature and refraction, Reciprocal levelling, *differential levelling, fly levelling,* Study of Automatic levels,correction *applied in levelling*.

UNIT – II: Contouring –

General definition, properties of contouring, Direct and Indirect methods of contouring. Interpolation of contours, Uses of Contours. Application and Modern methods of depicting relief on a Map. Minor Instruments – Construction and field use of altimeter, Description and use of Hand level, Abney Level, Clinometers, Ceylon Ghat Tracer, Box Sexant, Pentagraph, Planimeter.

UNIT – III: Theodolite and Traversing –

Type, purpose and part of theodolite, Vernier and microptic theodolites, Temporary and permanent adjustments, Measure of horizontal and vertical angles by different methods. *traverse type, method of traversing,* Principle of traversing by theodolite ,*temporary adjustment of plane table,* Field work and checks, *type of alidate*.

UNIT – IV: Traverse Computations and Plane Table Survey –

Definition, Computation of coordinates, Source of errors, Precision of traversing, Checking and Balancing the traverses, *degree of accuracy in traverse method, transite rule,* Plane table equipment, Different methods of Plane Table Surveying, *resection, intersection ,by back orientation,* Resection-Two and Three point problems. Advantages and disadvantages of Plane Table Surveying.

UNIT – V: Curves –

Classification of curves; Elements of Circular, compound, Transition and Vertical curves, *horizontal curve setting by chain and tape method*, Theory and method of setting out Simple, Transition, compound curves with field problems, general requirements, *rankines method of tangential angle, spiral revrse curve.*

Text Books:

1. Surveying (Vol. I & II) – Punmia, B.C. (Laxmi Publications, New Delhi, 1996)
2. Surveying (Vol. II & III) – Agor, R (Khanna publications, Delhi, 1995)
3. Surveying (Vol. I & II) – C. Venkataramaih (Universities Press Hyderabad)
4. प्रारं□भक सव□□ण-I by Gurucharan singh Standard publishers distributers delhi

Reference Books:

1. Surveying (Vol. II & III) – Arora, K.R. (Standard Book House, Delhi, 1993)
2. Fundamentals of Surveying – S.K. Roy (Prentice Hall of India)
3. Surveying (Vol. I & II) – S.K. Duggal (Tata McGraw Hill)
4. Surveying (Vol. I & II) – Kanetkar T.P. (Pune Vidyarthi Griha Prakashan, Pune)

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 3rd	**Branch: CIVIL**
Subject: Building Materials	**Course Code: BT04305**
Total Marks in End Semester Exam:70	**L: 3 T: 1 P: 0**
Minimum number of Class Tests:02	**Min. Marks - 28**

UNIT – I: Cement and Aggregate –

Cement

Ingredients of cement-manufacturing, Bouges compound, Hydration of cement, Classification of Pozzolanas and applications, *field and lab tests*

Aggregate

Introduction Classification of Aggregates (Coarse and Fine), Ennore sand. *Tests of aggregates*

UNIT – II: Concrete –

Elements of concrete, Properties of concrete in fresh and hardened state, *Workability*, water cement ratio, Modulus of elasticity, factors affecting strength of concrete and durability, variables in proportioning concrete mixes, tests on concrete.

UNIT – III: Timber and Low cost materials –

Introduction of timber, Seasoning, Wood and timber, Characteristics of good timber, wood products plywood, veneers, hard boards, particle board, fibre board need for wood substitutes, form work. *Low cost materials for construction and it's purpose*– cost effective materials, industrial wastes, agricultural wastes and other materials for green buildings.

UNIT – IV: Paints and Varnishes, Bitumen and asphaltic materials –

Introduction of paint and varnish Composition of oil paint, PVC and PVCN of paint, Material for White washing, colour washing, varnishing and distempering, painting on wood and steel or metal, enamels. Bitumen and asphalt *types, difference and uses.*

UNIT – V: Other Engineering materials –

Steel - *structural properties of steel,* composition, use and grade of steels. Aluminium and its alloys: properties, uses and *advantages and disadvantages*. Glass and their uses, plastics with/without reinforcement- types and uses, *advantages and disadvantages,* Ceramics, types of tiles, Refractories, paver block, uses of PVC. *Introduction of modern engineering materials.*

Text Books:

1. Building Materials – S.K. Duggal (New Age Publication)
2. Building Materials – S. C. Rangwala (Charotar Publication)
3. Building Materials – M.L. Gambhir, Neha Jamwal (Mc. Grawhill)
4. Building Materials – Gurucharan Singh (Standard Publishers, Delhi)

Reference Books:

1. Concrete Technology – A.M. Neville & J.J. Brooks (Pearson Education)
2. Concrete Technology – M.S. Shetty (S. Chand & Co.)
3. Engineering Materials – Surendra Singh (Laxmi Publication)
4. Construction Engineering and Management – S. Seetharaman (Umesh Publication)

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 3rd **Branch: CIVIL**

Subject: Fluid Mechanics Laboratory **Course Code: BT04306**

Total Marks in End Semester Exam:35 **L: 3 T: 1 P: 0**

Min. Marks - 14

List of Experiments: (At least Ten experiments are to be performed by each student)

1. To determine the meta centric height of a ship model.
2. Verification of Bernoulli's equation.
3. Verification of momentum equation.
4. To calibrate a ventureimeter and study the variation of the coefficient of discharge with the Reynolds number.
5. To calibrate a orifice meter and study the variation of the coefficient of discharge with the Reynolds number.
6. Experimental determination of critical velocity in pipe.
7. Determination of head loss coefficient due to sudden expansion in pipe.
8. Determination of head loss coefficient due to sudden contraction in pipe.
9. Determination of head loss coefficient in pipe bends.
10. To determine the hydraulic coefficients (C*c*, C*d* and C*v*) of an orifice.
11. To determine the coefficient of discharge of a mouth piece.
12. To calibrate a triangular notch.
13. To calibrate a rectangular notch.
14. Determination of impact of jet on vane.
15. Performance test on reciprocating pump.

Equipment/Machines/Instruments/Tools/Software Required:

- Ship Model
- Bernoulli's Apparatus
- Apparatus for momentum theorem
- Venturimeter
- Orificemeter
- Pipe Flow Apparatus
- Orifice Apparatus
- Mouth Piece Apparatus
- Notch Apparatus

- Vortex Flow Apparatus

Recommended Books:

1. Hydraulics Laboratory Manual – S.K. Likhi (New Age International Ltd.)
2. Fluid Mechanics – JagdishLal (Metropolitan Educational, New Delh-2)

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 3rd **Branch: CIVIL**

Subject: Surveying Laboratory **Course Code: BT04307**

Total Marks in End Semester Exam:35 **L: 3 T: 1 P: 0**

Min. Marks - 14

List of Experiments: (At least Ten experiments are to be performed by each student)

1. To determine the elevation of a point with respect to reference elevation by Fly Levelling
2. To determine sensitivity of bubble tube of a dumpy level.
3. Contouring and its plotting.
4. Measurement of horizontal angle by repetition method.
5. Measurement of horizontal angle by reiteration method.
6. To determine the height of object when base is accessible.
7. To determine the height of tower when base is inaccessible and instrument stations are in same vertical plane.
8. To find out the position of points by the Plane Table Radiation and Intersection method.
9. Determination of location of a point with the help of Two point problem.
10. Determination of location of a point with the help of Three point problem.
11. Setting out of curve by ordinates or offsets from long chord.
12. Setting out of curve by successive bisection of arcs.
13. Setting out of curve by offsets from chords produced .
14. Setting out of curve by two theodolite method
15. Setting out of curve by Rankine's method.

Equipment/Machines/Instruments/Tools/Software Required:

- Metric Chain (30 m)
- Tape (15m, 30 m)
- Ranging Rod (2 m, 3m)
- Plumb bob
- Arrows
- Theodolite
- Levelling Staff (Folding and Non-folding)

- Wooden Pegs
- Plain Table Accessories (Drawing Board – 70 x 60 x 1.5 cm, Spirit Level, Trough Compass, Tripod Stand, Alidade,
- Plumb bob for centering)
- Offset Rod
- Optical Square
- Cross Staff

Recommended Books:

1. Surveying (Vol. I & II) – Punmia, B.C. (Laxmi Publications, New Delhi, 1996)
2. Surveying (Vol. I & II) - C Venkataramaih (Universities Press Hyderabad)
3. Surveying (Vol. I & II) – Kanetkar T.P. (Pune VidyarthiGrihaPrakashan, Pune)

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 3rd **Branch: CIVIL**

Subject: Building Material Laboratory **Course Code: BT04308**

Total Marks in End Semester Exam:35 **L: 3 T: 1 P: 0**

Min. Marks - 14

List of Experiments: (At least Ten experiments are to be performed by each student)

1. Determination of Compressive strength of cement.
2. Determination of Tensile strength 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 Specific gravity of cement.
7. To determine Uniaxial Tensile Test of mild steel.
8. To determine IzodCharpy Value of given mild steel.
9. To determine Compressive Strength of Wood: (a) Along the fibre and (b) Across the fibre.
10. Determination of Specific gravity and water absorption of aggregate.
11. Loss Angle"s Abrasion Test on tiles.
12. Deval's Abbration test
13. Impact test on tiles.
14. Flexural Strength of Tiles.
15. To study the Cupping Test Machine and determine Ericheser value of mild steel sheet.

Equipment/Machines/Instruments/Tools/Software Required:

1. Cube mould 7.06 cm size
2. IS Sieve 80, 40, 20, 10, 4.75, 2.36, 1.18 mm and 600, 300, 150, 90 Micron
3. Sieve Shakers
4. Tensile Strength Testing Machine
5. Oven Wire Basket
6. Spring Balance and Weighing Balance
7. Air permeability blain apparatus

8. Abrasion Testing Machine
9. Flexural Strength Testing Machine for tiles
10. Universal Testing Machine
11. Hardness Testing Machine
12. Impact Testing Machine

Recommended Books:

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

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 3rd **Branch: CIVIL**

Subject: Software Laboratory **Course Code: BT04309**

Total Marks in End Semester Exam:35 **L: 3 T: 1 P: 0**

Min. Marks - 14

List of Experiments: (At least Ten experiments are to be performed by each student)

1. Analysis of a cantilever beam with concentrated loadings using MD Solids 4.0.
2. Analysis of a cantilever beam with uniformly distributed loading using MD Solids 4.0.
3. Analysis of cantilever beam with combination of loading using MD Solids 4.0.
4. Analysis of simply supported beam using concentrated loadings using MD Solids 4.0.
5. Analysis of simply supported beam using uniformly distributed load loadings using MD Solids 4.0.
6. Analysis of simply supported beam with combination of loading using MD Solids 4.0.
7. To plot Mohr's Circle to determine Principal stresses and position of principal planes using MD Solids 4.0.
8. To plot Mohr's Circle to determine Maximum shear stress and its position using MD Solids 4.0.
9. To determine the Torque a shaft can safely transmit if shear stress is given using MD Solids 4.0.
10. To determine buckling load of column when the permissible stresses and material, dimensions of the column are given using MDSolids 4.0

Equipment/Machines/Instruments/Tools/Software Required:

- MD Solids 4.0

Recommended Books / Software Link:

- https://web.mst.edu/~mdsolids/download.htm

BHARTI VISHWAVIDYALAYA, DURG

B.TECH IN CIVIL ENGINEERING

Scheme of Examinations: Semester IV

Sl. No.	Courses (Subject)	CourseCode	Period per Week			Scheme of Examination			Total Marks	Credit
						Theory/Lab				
			L	T	P	ESE	CT	TA		
1.	Structural Analysis-I	BT04401	3	1	-	70	10	20	100	4
2.	Hydraulic Engineering	BT04402	3	1	-	70	10	20	100	4
3.	Surveying andgeomatics	BT04403	3	1	-	70	10	20	100	4
4.	Building Construction and planning	BT04404	3		-	70	10	20	100	3
5.	Engineering Geology	BT04405	2		-	70	10	20	100	2
6.	Hydraulics Lab	BT04406	-	-	2	15	-	35	50	1
7.	Surveying and Geomatics Lab	BT04407	-	-	2	15	-	35	50	1
8.	Geology Lab	BT04408	-	-	2	15	-	35	50	1
9.	Virtual Lab	BT04409	-	-	2	15	-	35	50	1
10.	Indian Culture and Constitution of India	BT04410	-	-	2	-	-	50	50	-
Total Marks			14	3	10	490	50	210	750	21
Internship-I to be completed after fourth semester exam and its evaluation to be done in fifth semester										

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 4th | **Branch: CIVIL**

Subject: Structural Analysis – I | **Course Code: BT04401**

Total Marks in End Semester Exam:70 | **L: 3 T: 1 P: 0**

MinimumnumberofClassTests:02 | **Min. Marks - 28**

Unit-1: Determinate Structures – *Degree of freedom,* Equation of equilibrium. Determinate vs. Indeterminate structures, plane frames and space frames, Static Indeterminacy - External and Internal, Indeterminacy of rigid and pin jointed frames, rules for determining degree of indeterminacy, Analysis of simple and determinate space trusses. Method of tension coefficient for pin jointed space truss.

Unit-2:Deflection and Slope – *Introduction of sign convention*, Moment curvature relation, the elastic curve, Relation between Loading, SF and BM, Slope and Deflection, Deflection and slopes of statically determinate beams by Double integration method, Macaulay's method, Area moment method, *Basic* of Conjugate beam.

Unit-3: Strain Energy - Strain energy due to axial load, bending, shear and torsion, *Finding deflection using Castigliano's theorem, Principal of minimum potential energy.*
Betti's or Rayleighs theorem, Maxwell's law of reciprocal deflections, unit load and strain energy method for determination of displacement of statically determinate beams, pin-joined trusses and rigid frames.

Unit-4: Rolling Loads & Influence Lines - Introduction to Rolling loads, concept of influence lines, influence lines for reaction, *Uses of influence line , Influence Lines for 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.

Unit-5: Cables, suspension bridges & arches - Analysis of forces in cables with concentrated and continuous loadings, *suspension bridge component and their function,* suspension bridges

with three-hinged stiffening girders, Theory of arches - Eddy's theorem, analysis of three-hinged *and two hinged arches. Advantage of arch over beam.*

Text Books:

1. Mechanics of Materials – Dr. B. C. Punmia, Jain & Jain (Laxmi Publications)
2. Theory of Structures - Dr. B. C. Punmia, Jain & Jain (Laxmi Publications)
3. Theory of Structures – Ramamurtham S. & Narayan R. (DhanpatRai Publications)
4. Basic Structural Analysis (Vol. I & II) – Bhavikatti S.S. (Vikas Publishing)

Reference Books:

1. Theory & Analysis of Structures (Vol. – I & II) – Jain, O.P. and Jain B.K. (Nem Chand)
2. Structural Analysis – R.C. Hibber (Pearson Publication)
3. Structural Analysis – Ghali, A. & Neville, M. (Chapman & Hall Publication. 1974)
4. Elementary Structural Analysis – Willbur and Norris (Tata McGraw Hill)
5. Structural Analysis – Negi L.S. &Jangid R.S. (Tata McGraw Hill)

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 4th | **Branch: CIVIL**

Subject: Hydraulic Engineering | **Course Code: BT04402**

Total Marks in End Semester Exam: 70 | **L: 3 T: 1 P: 0**

MinimumnumberofClassTests:02 | **Min. Marks - 28**

UNIT-1: Turbulent flow in pipe –

Nature of turbulence, free and wall turbulence, turbulent flow in pipes, equation for velocity distribution over smooth and rough surfaces, *Velocity distribution for turbulent flow in term of average velocity*, energy and momentum correction factor, Resistance coefficient (Friction factor) and its variation, Colebrook-White equation, Moody's diagram, Explicit equation for friction factors, concept of equivalent length, pipes in series and parallel, Analysis of pipe network (Hardy-Cross method). *Reynold Experiment*

UNIT-2: Boundary Layer Analysis -

Definition- Displaacement thickness, Energy thickness, Boundary layer thickness, boundary layer over a flat plate, laminar boundary layer, turbulent boundary layer, and laminar sub layer, Application of momentum equation, local and average friction coefficient. Fluid flow past submerged bodies Drag and lift, drag on sphere, cylinder and disc, Magnus effect.

UNIT-3: Non-uniform flow in open channel –

Specific energy, Specific energy curve, discharge curve, *critical depth, flow and velocity, minimum specific energy in term of critical depth*, analysis of flow over hump and transition, broad crested weir, equation of gradually varied flow, Classification of channel bottom slopes, Classification of surface profile, hydraulic jump and evaluation of its elements in rectangular channel.

UNIT-4: Compressibility effect in pipe flow –

Transmission of pressure waves in rigid and elastic pipes, water hammer, Dimensional analysis and Hydraulic similitude Dimensional analysis, Buckingham's theorem, Important dimensionless numbers and their significances, geometric, kinematics and dynamic similarity, model study.

UNIT-5: Hydraulic Machines – Turbines: *General layout of hydraulic power plant*, Classification of turbine- *Pelton wheel turbine, radial flow reaction turbine, francis turbine*, draft tube, specific speed, unit quantities, and characteristics curves of turbines, and governing of turbine. Pump: Classification of pumps, types, efficiencies, specific speed, selection, cavitations, characteristic curves.

Text Books:

1. Fluid Mechanics and Machines – Dr. A.K. Jain (Khanna Publications)
2. Fluid Mechanics and Machines – Dr. R.K. Bansal (Laxmi Publications)
3. Fluid Mechanics – Dr. P.N. Modi (Standard Book House)

Reference Books:

1. Mechanics of Fluid – Irving H. Shames (McGraw Hill)
2. Introduction to Fluid Mechanics – James A. Fay (Prentice Hall India)
3. Fluid Machines – Dr. JagdishLal (Metropolitan Book Company Private Ltd.)

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 4th | **Branch: CIVIL**

Subject: Surveying and Geomatics Surveying | **Course Code: BT04403**

TotalMarksinEndSemesterExam:70 | **L: 3 T: 1 P: 0**

MinimumnumberofClassTests:02 | **Min. Marks - 28**

UNIT-1: Trilateration and Triangulation –

Geodetic surveying, Principle of Trilateration, Principle and classification of Triangulation System, *Triangulation figures or system*, Triangulation chains, Station marks and Signals, Satellite station, field work- Reconnaissance, Intervisibillty of station, Angular measurement, Base line measurement, *tape correction*.

UNIT-2: Adjustment Computations –

Introduction: kind of error, definition, law of weights, Treatment of random errors, probability equation, Normal law of error, Most Probable Value, Propagation of errors and variances. Most probable value, Principle of Least square, Observations and correlatives, Normal Equations. Adjustment of triangulation figures.

UNIT-3: Tacheometery –

Definitions, Principles of stadia systems. Instrument constants, *characteristics of tacheometer*, *method of tacheometric surveying*, Subtense and Tangential Systems. Construction and use of Reduction Tacheometers, Range Finders, EDM instruments, Total Station and their uses. Study of Laser Distance Meter, *numerical related tacheometery*.

UNIT-4: Photographic and aerial surveying –

Introduction, basic principle, Photo theodolite, *horizontal and vertical angle from terrestrial photograph,* aerial surveying, scale and distortion of the vertical and tilted photograph, comparison between air photograph and map, Study of GPS, GIS and Remote Sensing.

UNIT-5: Hydrographic surveying –

Introduction, shore line survey, *sounding, making the sounding*, soundings methods, gauges, equipment required for hydrographic surveying, sounding party, methods of locating soundings,

reduction of soundings and plotting of soundings, problems related to hydrographic surveying, *mean sea level as datum.*

Text Books:

1. Surveying (Vol. I & II) – Punmia, B.C. (Laxmi Publications, New Delhi, 1996)
2. Surveying (Vol. II & III) – Agor, R. (Khanna publications, Delhi, 1995)
3. Surveying (Vol. I & II) – C. Venkataramaih (Universities Press Hyderabad)
4. Surveying (Vol. II) 4e – S.K. Duggal, McGraw Hill Publications

Reference Books:

1. Surveying (Vol. II & III) – Arora, K.R. (Standard Book House, Delhi)
2. Engineering Surveying Technology – Kennie, T.J.M. and Petrie G. (Blackie & Sons Pvt. Ltd., London, 1990)
3. An Introduction to Remote Sensing and its Applications- Shivangi Somvanshi, Maya Kumari (S.K. Kataria and Sons, New Delhi.
4. Surveying (Vol. I & II) T.P. (Pune Vidyarthi)

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 4th | **Branch: CIVIL**

Subject: *Building Construction & planning* | **Course Code: BT04404**

Total Marks in End Semester Exam:70 | **L: 3 T: 1 P: 0**

MinimumnumberofClassTests:02 | **Min. Marks - 28**

UNIT-1: INTRODUCTION

Introduction and types of principal, classification of building on the basis of occupation, basic terminology used for sites, requirements of different public and residential building. Municipal regulations and bye-laws for public and residential building.

UNIT-2: Foundations

Types of foundations, Depth of foundation, contact pressure bellow footing such as strip and isolated footing. Construction of typical cross section for foundation under walls and R.C.C columns. Eccentrically loaded footing, purpose of pile foundation and its classification, well and caisson, shoring and deep cutting, foundation in black cotton soils, under reamed pile, foundation failures and remedial measures.

UNIT-3: Masonry

Technical terms in masonry, classification and brief specifications of stone masonry, bonds in Brick Masonry (English and Flemish), Walls Different types (load bearing and non load bearing walls, cavity –walls and partition walls) .common defects in construction and their effects on strength and performance of walls. Doors, windows and lintels different types based on materials and methods of construction, technical terms, size and locations.

UNIT-4: Floors

Introduction, Ground floors-components of floor, various types, and their suitability. Upper floor, construction of slab floor, R.C.C floor, precast concrete floor, timber floor etc .repair techniques for floor. 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-5: Damp Proofing & **Sound proofing** –

Causes and effect of Dampness, damp proofing treatment in building, parts of a building likely to be affected most, methods of Damp proofing, material used for damp proofing. Plastering and Pointing - Types and considerations during plastering and pointing. Joints- Construction, Contraction and Expansion Joints. Materials and Methods of sound proof construction.

Fire protection –fire resisting

properties of materials, fire resistance construction, and requirement for multi-storied building

Text Books:

1. Civil engg drawing- shah ,kale & patki (tata mcgraw hill)
2. Building Construction – B.C. Punmia (Laxmi Publication Pvt. Ltd.)
3. Building Construction – Sushil Kumar (Standard Publication Distributors)
4. A course in civil engg drawing- V B SIKKA (katson technical publication***)***

Reference Books:

1. Building Construction – Gurucharan Singh (Standard Publication Distributors)
2. Building Construction – S. C. Rangwala (Charotar Publishing House, Anand, Gujarat)
3. Building Construction by S.S.Bhavikatti Vikas Publication House
4. Building Construction by S.K.Sharma S. Chand and Co

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 4th | **Branch: CIVIL**

Subject: Engineering Geology | **Course Code: BT04405**

Total Marks in End Semester Exam:70 | **L: 3 T: 1 P: 0**

Minimum number of Class Tests:02 | **Min. Marks - 28**

UNIT-1: General Geology

Introduction to the subject of Geology -To understand fundamental concepts of engineering geology, engineering, strength, physical & mechanical properties of minerals, *Classification of rocks according to their origin,* rock forming minerals its objects and methods division of the subject. Age, origin and interior of the earth.

UNIT-2: Mineralogy

Study of the physical properties of minerals, Moho's scale of hardness. The study of following minerals, Silica, Feldspars, Mica Tourmaline, Beryl Hornblende, Asbestos, Garnet, Stibnite, Kiyanite, Graphite, Topaz, Hematite, Iron Pyrites, Magnetite, Limonite, Galena, Malachite, Chalcopyrite :

UNIT-3: Petrology

Igneous rocks, mode of occurrence, structure and texture, classification. Study of Granite, Syentie, Diorite, Gabbro, Dunite, Dolerite, Pegmatite, Graphic Granite, Ryholite, Trachyte, Andesite, Basalt Pumics, Pitch stone, Obsidian Con cordant and Discordant. Sedimentary Rocks formation, classification. The study of : Laterite, Bauxite, Conglomerate Breccia, Sandstones (Ferruginous, Ripple Marks, Dentritic Markings), Grit, Arkose, Shale, Mudstone, Limestone, Shell and Coralline Limestones, Stalactites and Stalamites.

UNIT-4: Structural Geology

Introduction Folds: Part of fold classification of folds based on different geometrical parameters, Relation between major folds and minor folds. Joints: Types of Joints. Unconformity and Overlap Faults. Effect on out crop of beds, Classification of faults. Criteria for recognition of faults with folds. Morphology of principal types of secondary planer, structure in rocks relation of schistosity and cleavage to folds.

UNIT-5: Engineering Geology

Preliminary Geological Investigations, relation between Geology and Civil Engineering. Engineering properties of rocks and their relation to rock mass deformation. .Landslides, Land subsidence and Geological Hazards, Landslides, its causes, classification and preventive measures, land subsidence, its causes and preventive measures, major geological hazards & geological considerations in design of constructed facilities and infrastructure, mitigation of landslide hazard: A case study.

Text Books:

1. A Textbook of Geology – Mukherjee P.K. (World Press Publishers)
2. Engineering Geology – D.S. Arora (Mohindra Capital Publisher, Chandigarh)
3. Geology and Engineering – Leggot, R.F. (Mc-Graw Hill, New York)
4. A Geology for Engineers – Blyth, F.G.M. (Arnold, London)

Reference Books:

1. Civil Engineering Geology – Cyril Sankey Fox (C. Lockwood and son, U.K.)
2. Engineering and General Geology – Prabin Singh (Katson Publication House)

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 4th **Branch: CIVIL**

Subject: Hydraulics Lab **Course Code: BT04406**

Total Marks in End Semester Exam:35 **L: 3 T: 1 P: 0**

Min. Marks - 14

List of Experiments: (At leastTen experiments are to be performed by each student)

1. To study the transition from laminar to turbulent flow and to determine the lower acritical Reynolds's number.
2. To study the velocity distribution in pipe and to compute the discharge by integrating Velocity profile
3. To study the variation of friction factor for pipe flow.
4. To determine the roughness coefficient of an open channel.
5. To determine the coefficient of discharge of a weir.
6. To determine the coefficient of discharge of a venturiflume.
7. Study of the hydraulic jump in an open channel.
8. To determine the coefficient of discharge of a spillway.
9. To study the performance characteristics of Pelton wheel turbine.
10. To study the performance characteristics of Francis turbine.
11. To study the performance characteristics of Kaplan turbine.
12. To study the performance characteristics of variable speed centrifugal pump.
13. To study the performance characteristics of rated speed centrifugal pump.
14. To study the performance characteristics of multistage pump.
15. To study the performance characteristics of reciprocating pump.

Equipment/Machines/Instruments/Tools/Software Required:

- Pipe Flow Apparatus Tilting Flume
- Pelton Wheel Turbine Francis Turbine
- Kaplan Turbine
- Variable Speed Centrifugal Pump Rated Speed Pump
- Multistage Pump
- Reciprocating Pump

Recommended Books:

1. Hydraulics Laboratory Manual – S.K. Likhi (New Age International Ltd.)
2. Fluid Mechanics – JagdishLal (Metropolitan Educational, New Delhi)

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 4th **Branch: CIVIL**

Subject: Surveying and Geomatics Lab **Course Code: BT04407**

Total Marks in End Semester Exam:35 **L: 3 T: 1 P: 0**

Min. Marks - 14

List of Experiments: (At least Ten experiments are to be performed by each student)

1. To perform the experiment for reduction to centre from different positions of a satellite station when: (i) Satellite station in north position, (ii) Satellite station in left position.
2. To perform the experiment for reduction to centre from different positions of a satellite station when: (i) Satellite station in south position, (ii) Satellite station in right position.
3. To find the most probable value of angle for combined triangle by method of difference.
4. To find the most probable value of triangles of a quadrilateral shapes by method of correlates.
5. To find the most probable value of triangles by the method of Gauss rule.
6. Adjustment of two connected triangles.
7. Adjustment of quadrilateral by method of least square.
8. Adjustment of geodetic triangles with central station by method of least square.
9. Determination of Tacheometric constants.
10. Determination of elevation and distance when line of sight inclined upward.
11. Determination of elevation and distance when line of sight inclined downward.
12. Determination of elevation and height by tangential method when both angles are angles of elevation.
13. Study of Electronic Digital Theodolite.
14. Study of Total Station.
15. Study of Auto level.

Equipment/Machines/Instruments/Tools/Software Required:

- Metric Chain(30 m) Tape (15m, 30 m)
- Ranging Rod (2m, 3m) Plumb bob
- Arrows
- Theodolite
- Electronic Digital Theodolite Auto level
- Total Station

- Levelling Staff (Folding and Non-folding) Wooden Pegs
- Cross Staff
- Laser Distance Meter.

Recommended Books:

1. Surveying (Vol. I & II) – Punmia, B.C. (Laxmi Publications, New Delhi, 1996)
2. Surveying (Vol. I & II) – Kanetkar T.P. (Pune VidyarthiGrihaPrakashan, Pune)

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 4th **Branch: CIVIL**

Subject: Engineering Geology Lab **Course Code: BT04408**

Total Marks in End Semester Exam:35 **L: 3 T: 1 P: 0**

Min. Marks - 14

List of Experiments: (At least Ten experiments are to be performed by each student)

1. Identification of granite, pegmatite, syenite megascopic observations.
2. Identification of basalt, gabbro, charnokite, dolerite.
3. Identification of limestone, sand - stone, shale.
4. Identification of conglomerate, breccias, clay.
5. Identification of slate, phyllite, marble.
6. Identification of quartzite, schist, gneiss.
7. A study on simple geological maps
8. To draw a cross section, filling of geological data there in.
9. To make a sketch of faults, with identification of folds, faults and unconformity.
10. A case Study of structural folds, faults and unconformity.
11. A study of Talc, gypsum, calcite, fluorite apatite.
12. A study of feldspar, quartz, topaz, corundum.
13. A study of hornblende, garnet, tourmaline asbestos, olivine.
14. A study of serpentine, barite, muscovite, biotite, orpiment, realgar, sulphur, amethyst & varieties of quartz, zeolite.
15. A study of hematite, magnetite, pyrite, chalespyrite, pyrolusite, psilomelane, beryl, magnesite, bauxite, zincite, galena etc.

Equipment/Machines/Instruments/Tools/Software Required:

- Crystallographic Model
- Wooden Cabinet
- Axis of symmetrical of 6 System
- Planes of symmetrical of 6 System
- Crystallographic Axis & Centre of System

- Mohr Scale of Hardness
- Streak Plates
- Hardness Testing Knife
- Model Showing Strike, Dip, Pitch
- Symmetrical Anticline Showing Axis-Axial Plane
- Asymmetrical Anticline Showing Axis-Axial Plane
- Isoclinals Anticline & Syncline
- Recumbent Fold
- Fan Fold
- Step Fault
- Rock Specimen
- Wooden Specimen Tray
- Polarizing Petrological Microscope
- Mineral Specimens

Recommended Books:

1. Geology and Engineering – Leggot, R.F. (Mc-Graw Hill, New York)
2. Engineering and General Geology – Prabin Singh (Katson Publication House

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 4th **Branch: CIVIL**

Subject: Virtual Lab **Course Code: BT04409**

L: 3 T: 1 P: 0

Course objective:

The objective of this course is to inculcate a habit of self learning in our students through virtual lab. Virtual Labs is a project initiated by the Ministry of Human Resource Development, Government of India, under the National Mission on Education through Information and Communication Technology. Virtual lab provides remote experimentation which furnishes basic learning skill, and built advanced concepts as well. It provide complete Learning Management System around the Virtual Labs where the students can avail the various tools for learning, including additional web-resources, video-lectures, animated demonstrations and self evaluation.

List of Experiments

Sl.	Name of Virtual Lab	Website link	
A.	Hydraulics and Fluid Mechanics Lab	**http://eerc03-iiith.vlabs.ac.in/ https://fmc-nitk.vlabs.ac.in/fluid-machinery/**	**(Any 03)**
	• Bernoulli's Experiment • Venturi Meter Experiment • Jets Experiment • Performance Characteristics of Centrifugal Pump • Performance Characteristics of Kaplan Turbine • Performance Characteristics of Pelton Turbine		
B.	Structural Analysis Lab	**http://bsa-iiith.vlabs.ac.in/**	**(Any 03)**

	• Single Span Beams Experiment • Continuous Beams Experiment • Column Analysis Experiment • Portal Frames Experiment • Arches Experiment		
C.	Surveying Lab	**http://sl-iitr.vlabs.ac.in/sl-iitr/**	**(Any 03)**
	• Profile Levelling using Auto Level • Observations of Vertical and Horizontal angles using Total Station • Carry out Contouring in the field • Study of Global Positioning System (GPS) and its Accessories • Observations using GPS		
D.	Strength-of-Materials lab	**http://sm-nitk.vlabs.ac.in/**	**(Any 03)**
	• Charpy Impact Test • Direct Shear Test on Mild Steel Rod • Direct Shear Test on Timber Specimen • Rockwell Hardness Test • Torsion Test on Mild Steel		

Equipment/Machines/Instruments/Tools/Software Required:	
1.	Computer system with good connectivity to Internet, any specific software is not required.

Note:	
1.	Refer Virtual Labs website which is an initiative of ministry of education under the national mission on education through ICT to conduct virtual lab. Link: https://www.vlab.co.in/
2.	It is advised to visit https://www.vlab.co.in/broad-area-civil-engineering frequently for any update and new experiments on the listed subjects.

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 4th **Branch: CIVIL**

Subject: Indian Culture and Constitution of India **Course Code: BT04410**

L: 3 T: 1 P: 0

Objective:

The Constitution is the supreme law and it helps to maintain integrity in the society and to promote unity among the citizens to build a great nation. The main objective of the Indian Constitution is to promote harmony throughout the nation.

UNIT-I Meaning and concepts of Culture:

Traditional and Modern concepts of Culture-Notions of Culture in textual tradition, anthropological, archaeological and sociological understanding of the term culture. Elements of Culture, concept of Indianness and value system. Relation between culture and civilization. Historiography and approaches to the study of Indian Culture– Stereotypes, Objectivity and Bias, Imperialist, Nationalist, Marxist and Subaltern. Heritage of India and world's debt to Indian Culture.

UNIT–II Sources of the Study of Indian Culture:

Archaeological: cultural remains, Monuments, Numismatics, Epigraphy; Literary sources and Oral traditions; Foreign Accounts; Archival sources.

UNIT–III History of Indian Constitution

Constitutional History, Preamble salient features, citizenship, Method of Amendment and Recent Amendments. Rights and Duties Fundamental Rights and Directive Principles of State Policy. Fundamental Duties. Difference between Fundamental Rights and Directive Principles of State Policy Union Government a) President-powers and functions. Vice president powers and functions, Prime Minister and council of ministers powers and functions. b) Parliament-Loksabha, Rajyasabha- composition powers and functions. c) Judiciary (Supreme Court) composition powers and functions Judicial Activism

UNIT–IV State Government

a) Governor: powers and functions b) Chief minister: powers and functions c) State Legislative Assembly and Legislative Council- composition powers and functions. d) High Court : composition powers and
functions

UNIT–V Recent Trends in Indian Constitutional

a) Basic structure of Indian Constitution.

b) Electoral Reforms

c) Panchayati Raj system in India.

Books of Reference:

1. Dr. P. K. Agrawal Indian Culture, Art and Heritage,
2. P. Raghunadha Rao Indian Heritage and Culture
3. M.V.Pylee, An Introduction to the Constitution of India,NewDelhi,Vikas,2005.
4. Subhash C.Kashyap, Our Constitution: An Introduction to India's Constitution and constitutional Law, New Delhi, National Book Trust, 2000.
5. Durga Das Basu, Introduction to the Constitution of India ,NewDelhi,Prentice Hall of India,2001.
6. D.C.Gupta, Indian Government and Politics,VIII Edition,New Delhi, Vikas, 1994.
7. V.D.Mahajan, Constitutional Development and National Movement inIndia, New Delhi, S. Chand and Co., latest edition.

BHARTI VISHWAVIDYALAYA, DURG

B.TECH IN CIVIL ENGINEERING

Scheme of Examinations: Semester V

Sl. No.	Courses (Subject)	Course Code	Period per Week			Theory/Lab			TotalMarks	Credits
			L	T	P	ESE	CT	TA		
1.	Structural Engineering Design-I	BT04501	3	1	-	70	10	20	100	4
2.	Hydrology & Water Resources Engineering	BT04502	3	1	-	70	10	20	100	4
3.	Geotechnical Engineering	BT04503	3	1	-	70	10	20	100	4
4.	Transportation Engineering	BT04504	2	1	-	70	10	20	100	3
5.	Professional Elective –I(Refer Table I)		2	0	-	70	10	20	100	2
6.	Structural Analysis lab	BT04506	-	-	2	35	-	15	50	1
7.	Transportation Engineering Lab	BT04507	-	-	2	35	-	15	50	1
8.	Geotechnical Engineering Lab	BT04508	-	-	2	35	-	15	50	1
9.	Project-I based on Summer Internship/ Industrial Training	BT04509	-	-	2	35	-	15	50	1
10.	Environmental Studies	BT04510	-	-	2	-	-	50	50	-
Total						490	50	210	750	21

TABLE-1

S.N.	Course Code	Subject
1	BT04505(01)	Structural Analysis-II
2	BT04505(02)	Repairs and rehabilitation of structures
3	BT04505(03)	Groundwater Engineering

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 5th | **Branch: CIVIL**

Subject: Structural Engineering Design – I | **Course Code: BT04501**

Total Marks in End Semester Exam:70 | **L: 3 T: 1 P: 0**

Minimum number of Class Tests:02 | **Min. Marks - 28**

UNIT-1: Objectives of structural design, Steps in RCC Structural Design Process, Role of structural designer.

Design philosophies: Working stress design and limit state design method. Advantages of Limit State Method over other methods.

Introduction: *Properties of Concrete and mix design* reinforcing steel, stress-strain curves, permissible stresses, modular ratio, loads on structure, shrinkage, creep, Type of Loads on Structures and Load combinations. Introduction to IS 456:2000 , *IS 875, IS 800:2007,* a*nd SP- 16*

Introduction to working stress method: Basis for design of rectangular beam using working stress method. Analysis and design of singly reinforced and doubly reinforced sections by working stress method, *shear and torsion* in beams.

UNIT-2: Limit State Method – Rectangular Beams:

Introduction to limit state method, characteristic loads, partial safety factor, safety and serviceability considerations

Limit state of Collapse (Flexure): Assumptions, stress block parameters, neutral axis, analysis and design of singly and doubly reinforced section. Effective span to effective depth ratio, modification factors for singly reinforced, doubly reinforcement and flanged beams.

Limit State of Collapse (Shear, bond and torsion): shear in beams, Torsion in beams, bond and development length, design of lintels.

Limit State of Serviceability: *Deflection and it's general specification according to IS code*

UNIT-3: Limit State Method – L, T-Beams, Slab and Stairs:

Properties of L and T-section, *moment of resistance and design of singly and doubly reinforced T-beam, L beam*. Dead loads, imposed loads, thickness of slabs, modification factors, effective span, reinforcement in slab, design of one-way slab and two-way slabs. *Design of different types of stairs*

UNIT-4: Limit State of Collapse (Compression): Columns: ***Axially loaded columns,*** minimum eccentricity, longitudinal and transverse reinforcement, effective length of column, safe load on columns, circular columns, Pu – Mu interaction curves, combined axial load and uni-axial bending, combined axial load and bi-axial bending.

UNIT-5: Limit State Method – Column Footings- Isolated and Combined Rectangular Footing, *trapezoidal footing*, 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. Limit State Design of Combined Rectangular footing.

Text Books:

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).
4. Design of Reinforced Concrete Structures – M. L. Gambhir (PHI Learning)

Reference Books:

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)

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BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 5th | **Branch: CIVIL**

Subject: Hydrology and Water Resources Engineering | **Course Code: BT04502**

Total Marks in End Semester Exam:70 | **L: 3 T: 1 P: 0**

Minimum number of Class Tests:02 | **Min. Marks - 28**

UNIT-1: Introduction –

Hydrologic cycle, water-budget equation, world water balance, applications in engineering, *water budget equation.*

Precipitation -

Introduction, weather system for precipitation, Forms of precipitation, characteristics of precipitation in India, measurement of precipitation, *raingauge network,* rain gauge network, mean precipitation over an area, depth area-duration relationships, maximum intensity/depth-duration-frequency relationship, Probable Maximum Precipitation (PMP).

UNIT-2:

Abstractions from precipitation –

Evaporation process, *measurement of evapotranspiration,* evaporimeters, *actual evapotranspiration* analytical methods of evaporation estimation ,interception, depression storage, infiltration, infiltration capacity, measurement of infiltration, modelling infiltration capacity, classification of infiltration capacities, infiltration indices.

Runoff –

Runoff volume, SCS-CN method of estimating runoff volume, flow duration curve, ***droughts***, flow-mass curve, hydrograph, factors affecting runoff hydrograph, components of hydrograph, base flow separation, effective rainfall, unit **hydrograph, *surface water resource of India.***

UNIT-3:

Water withdrawals and uses –

Water requirement of crops-Crops and crop seasons in India, cropping pattern, duty and delta; Quality of irrigation water; Soil-water relationships, root zone, soil water, consumptive use, irrigation requirement, frequency of irrigation; Methods of applying water to the fields: surface, sub-surface, sprinkler and trickle / drip irrigation.

UNIT-4:

Distribution systems –

Canal systems, alignment of canals, canal losses, estimation of design discharge. Design of channels- rigid boundary channels, alluvial channels, Kennedy's and Lacey's theory of regime channels. Water logging: causes, effects and remedial measures. Lining of canals, types of lining, design of lined canal.

UNIT-5:

Reservoir Planning –

Introduction, reservoir sementation ,life of reservoir, Type of reservoirs, storage zones of a reservoir, mass curve and demand curve, determination of reservoir capacity, safe field.

Flood Routing:

Basic equation, flood control, Graphical method, trial and error method, reservoir losses, reservoir sedimentation, and life of reservoir.

Text Books:

1. Engineering Hydrology – K. Subramanya (Tata McGraw Hill)
2. A Text Book of Hydrology – Dr. P. Jaya Rami Reddy (Laxmi Publications)
3. Irrigation Engineering and Hydraulic Structures – S.K. Garg (Khanna Publications)
4. Irrigation Engineering – B.C. Punmia (Laxmi Publications)

Reference Books:

1. Applied Hydrology – VenTe Chow, David R. Maidment, Larry W. Mays (McGraw Hill)
2. Applied Hydrology – Linsely R.K. Kohler, M.A. and J.L.H. Paulhus (McGraw Hill)
3. Irrigation, Water Resources and Water Power Engineering – Dr. P.N. Modi (Standard Book House)
4. Theory and Design of Irrigation Structures (Volume – I & II) – Varshney (Nem Chand & Bros.)

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 5th | **Branch: CIVIL**

Subject: Geotechnical Engineering | **Course Code: BT04503**

Total Marks in End Semester Exam:70 | **L: 3 T: 1 P: 0**

Minimum number of Class Tests:02 | **Min. Marks - 28**

UNIT-1: Introduction and soil classification:

Definitions:

Soil mechanics, soil engineering, rock mechanics, geotechnical engineering, *Soil formation cycle, Types of soil*, Basic Definitions and Relationships-Soil as three-phase system in terms of weight, volume, voids ratio, and porosity. Definitions: *moisture content (water content)*, unit weights, degree of saturation, voids ratio, porosity, specific gravity, mass specific gravity, etc. Relationship between volume weight, voids ratio- moisture content, unit weight- percent air voids, saturation moisture content, moisture content- specific gravity etc.

Numericals based on index properties, Introduction to definitions of: plasticity of soil, *consistency limits (Atterberg limit)* -liquid limit, plastic limit, shrinkage limit, plasticity, liquidity and consistency indices, definitions of activity and sensitivity. Determination of: liquid limit, plastic limit and shrinkage limit. Use of consistency limits. Classification of Soils-Introduction of soil classification: textural classification, *USCS Classification*, *HRB classification* Indian standard soil classification system.

UNIT-2: Permeability, Compaction and effective stress:

Introduction, Darcy's law, validity of Darcy's law. Determination of coefficient of permeability: Laboratory method: constant-head method, falling-head method. Permeability aspects: permeability of stratified soils, factors affecting permeability of soil. ***Compressibility*** Compaction, theory of compaction, laboratory determination of optimum moisture content and maximum dry density. Compaction in field. Introduction, effective stress principle, nature of effective stress, effect of water table. Fluctuations of effective stress, effective stress in soils saturated by capillary action, quick sand condition. *Numericals on effective stress*

UNIT-3: Consolidation of Soil and Shear Strength:

Introduction, comparison between compaction and consolidation, spring analogy for primary consolidation, interpretation of consolidation test results, Terzaghi's theory of consolidation, final settlement of soil deposits. Mohr circle and its characteristics, principal planes, relation between major and minor principal stresses, Mohr-Coulomb theory, types of shear tests: direct shear test, merits of direct shear test, triaxial compression tests, test behaviour of UU, CU and CD tests, pore pressure measurement, *Vane shear test* computation of effective shear strength parameters. unconfined compression test.

UNIT-4: Stability of Slopes - Introduction, types of slopes and their failure mechanisms, factor of safety, analysis of finite and infinite slopes, wedge failure Swedish circle method, friction circle method, stability numbers and charts.

UNIT-5: *Site Exploration*

Introduction, Definition of site exploration, methods of site exploration and soil investigation, methods of boring, soil samplers, sampling procedures, trail pits, borings, penetrometer test, analysis of borehole logs, geophysical and advance soil exploration methods.

Text Books:

1. Soil Mechanics and Foundation Engineering – Garg S.K. (Khanna Publishers)
2. Soil Mechanics and Foundations – B.C. Punmia, A. K. Jain, A. K. Jain (Laxmi Publication)
3. Geotechnical Engineering- Shashi K Gulhati,Manoj Datta (Mc Graw Hil Education)
4. Text Book of Geotechnical Engineering – I. H. Khan (PHI Learning)

Reference Books:

1. Soil Mechanics and Foundation Engineering – S.N. Murthy (Dhanpat Rai Publications)
2. Basic and Applied Soil Mechanics – Gopal Ranjan and Rao A.S.R. (New Age International)
3. Soil Mechanics and Foundation Engineering –K.R. Arora (Standard Publisher Dist.)
4. Soil Mechanics and Foundation Engineering – Purushothama Raj (Pearson Education)

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 5th | **Branch: CIVIL**

Subject: Transportation Engineering | **Course Code: BT04504**

Total Marks in End Semester Exam:70 | **L: 3 T: 1 P: 0**

Minimum number of Class Tests:02 | **Min. Marks - 28**

UNIT-1: Highway development and planning:

Importance of transportation, Historical development, Classification of roads, road development in India, Current road projects in India; highway alignment and project preparation. Geometric Design: Typical Cross Sections in Urban and Rural roads, Various Cross Sections Elements, Width of Carriage-way, Shoulders, Medians, Width of Roadways, Right of Way, Camber, Design Speed, Sight Distance, Stopping Sight Distance, Passing Sight Distance, Sight Distance at Inter-Section, Passing Zones, Super Elevations, Set Back, Extra Widening on Horizontal Curve, Transition Curve, Design of Horizontal and Vertical Alignment, Combinations of Horizontal and Vertical Alignment.

UNIT-2: Traffic engineering and control:

Traffic Characteristics, *traffic operation*, traffic engineering studies, traffic flow and capacity, traffic regulation and control; design of road intersections; design of parking facilities; highway lighting; problems. *Traffic planning and administration*

UNIT-3: Pavement materials:

Materials used in Highway Construction- *Soils and its test*, *Stone aggregates and its test*, *bituminous binders and its test*, bituminous paving mixes; Portland cement and cement concrete: desirable properties, tests, requirements for different types of pavements. Problems.

Design of pavements: Introduction; flexible pavements, factors affecting design and performance; stresses in flexible pavements; design of flexible pavements as per IRC;rigid pavements- components and functions; factors affecting design and performance of CCpavements; stresses in rigid pavements; design of concrete pavements as per IRC; problems.

UNIT-4: Railway Engineering: Permanent way, gauges- *narrow and broad gauges*, coning of wheels and tilting of rails. Rail types, wear and failure, Sleepers, rail Fixtures and fastening, ballast cushion.

UNIT-5: Geometric design of railway track: *Alingment of railway line*, Gauge, Gradients speed, super elevation, cant deficiency, *Creep of rail*, Negative super elevation, curves, length of transition curves, grade compensations.

Points and crossings: Left and right hand turnout, design calculations for turnout & Crossover, railway track functions. Station and Yards: Types, functions facilities & equipment.

Text Books:

1. Highway Engineering – S. K. Khanna& C.E.G. Justo (Khanna Publishers, Delhi)
2. Highway Engineering –L.R. Kadiyalai,' Traffic Engineering and Transport Planning', Khanna Publishers.
3. Railway Engineering – S.C. Saxena& Arora, "A Text Book of Railway Engineering", Dhanpat Rai & Sons Publications.
4. Railway Engineering – S.C. Rangwala, "Railway Engineering"(Charotar Publishing House Pvt. Ltd.)

Reference Books:

1. Partha Chakraborty, Principles of Transportation Engineering, PHI Learning.
2. Paul H. Wright and Karen K. Dixon, Highway Engineering, 7th Edition, Wiley StudentEdition, 2009.
3. Railway Tracks Engineering: J.S. Mundrey, Tata Mc. Graw-Hill Publishing.
4. Highway Engg., annah K . K . S& C.E. Justo, Nem chand & Brothers, Latest Revised

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 5th | **Branch: CIVIL**

Subject: Structural Analysis – II(Professional Elective –I) | **Course Code: BT04505(01)**

Total Marks in End Semester Exam:70 | **L: 3 T: 1 P: 0**

Minimum number of Class Tests:02 | **Min. Marks - 28**

UNIT-1: Analysis by Classical Methods:

Introduction- What makes a structure and roles of a structural engineer.

Review of solid mechanics: Stability of structures, Indeterminate Structures, *Degree of indeterminacy*, *Principal of superposition* Static and kinematic indeterminacies, Boundary conditions, Redundancy, Flexural Rigidity, Elastic Curve, Force and Displacement methods of structure analysis

Analysis of indeterminate beams using by Classical Methods:Consistent deformation method, Theorem of three moments (Clapeyorn's theorem of three moments).Application to problems of beams and frames to determine the support reactions, plot shear force and bending moment diagrams, *Introduction to sinking and considering sinking of support.*

UNIT-2: Analysis by Energy Method: Introduction –

Introduction to Concepts of energy principles, Strain energy of linear elastic systems due to axial load, bending moment and torsion. Minimum strain energy and Castigliano's second theorem, Principle of virtual displacement and virtual forces - Castigliano's first theorem - Maxwell's reciprocal theorem,Betti's law. Resilience, lack of fit, Thermal stresses, Settlement of supports,

Application to problems of indeterminate beams, 2D pin jointed frames (trusses), 2 hinged arches and 2D rigid frames to determine the support reactions, plot shear force and bending moment diagrams.

UNIT-3: Method of Moment distribution:

Introduction and analysis of Framed structure, sway and non-sway framed structure, causes of sway in framed structure, deformation in sway and non-sway framed structure, Stiffness, Fixed end moments due to various loads and settlement, Bending stiffness, Distribution factors, Carryover factors, Sign convention.

Application of Method of Moment Distribution to problems of indeterminate beams (also with cases of sinking of supports) and rigid frames (single/ multiple bay, single/ multi storey portals) without and with sway problem to determine the support reactions, plot shear force, bending moment diagrams and elastic curve.

UNIT-4: Method of Slope deflection:

General terms Joint equilibrium equations, compatibility and Boundary conditions Application of Method of Slope deflection to problems of indeterminate beams (also with cases of sinking of supports) and rigid frames (single/ multiple bay, single/ multi storey portals) without and with sway problem to determine the support reactions, slope, deflections, plot shear force, bending moment diagrams and elastic curve. Basics of Column analogy method and its application for fixed beams.

UNIT-5: Influence lines by Muller Breslau Principle:

Introduction and Review of Influence line, *Qualitative and quantitative influence lines for Support Reactions*, rolling load, Difference between ILD, SFD, BMD, Joint equilibrium equations, compatibility, Boundary conditions, Maxwell Betti's theorem. Muller Breslau Principle. Application of Muller Breslau principle: Shear Force Diagram and Bending Moment.Diagram of indeterminate beams - propped Cantilevers and continuous beams. Basics of Influence lines for Arches and stiffening girders.

Text Books:

1. SMTS – II Theory of Structures – Punmia B.C., A. K. Jain, A. K. Jain (Laxmi Publications)
2. Fundamentals of Structural Analysis (with Computer Analysis and Applications) – Sujit Kumar Roy and Subrata Chakrabarty (S. Chand)
3. Basic Structural Analysis – C.S. Reddy (Tata McGraw Hill)
4. Fundamentals of Structural Mechanics and Analysis – M. L. Gambhir (PHI Learning)

Reference Books:

1. Intermediate Structural Analysis – Wang. C.K. (Tata McGraw Hill)
2. Fundamentals of Structural Analysis – Harry H. West and Louis F. Geschwindner (Wiley India)
3. Theory of Structures (Vol. I & Vol. II) – G. Pandit, S. Gupta & R. Gupta (Tata McGraw Hill)
4. Structural Analysis – Hibbeler (Pearson Education)

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 5th **Branch: CIVIL**

Subject: Repair & Rehabilitation of Structures **Course Code: BT04505(02)**

(Professional Elective –I)

Total Marks in End Semester Exam:70 **L: 3 T: 1 P: 0**

Minimum number of Class Tests:02 **Min. Marks - 28**

UNIT I: QUALITY ASSURANCE

Introduction of Quality assurance for Concrete and Steel construction, Properties such as strength, permeability, thermal, properties, and, cracking., Corrosion, prevention.

UNIT II: INFLUENCE ON SERVICEBILITY AND DURABILITY

Introduction and Effects due to climate, temperature, chemicals, wear and erosion, Design and construction errors, corrosion mechanism, Effects of cover thickness and cracking, methods of corrosion protection, corrosion inhibitors, corrosion resistant steels, coatings, cathodic protection.

UNIT III: MAINTENANCE AND REPAIR STRATEGIES

Definitions: Maintenance, repair and rehabilitation, Facets of Maintenance importance of Maintenance Preventive measures on various aspects Inspection, Assessment procedure for evaluating a damaged structure causes of deterioration - testing techniques.

UNIT IV: MATERIALS FOR REPAIR

Introduction of 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 V: TECHNIQUES FOR REPAIR

Introduction of Rust eliminators and polymers coating for rebar's during repair foamedconcrete, mortar and dry pack, vacuum concrete, Gunite and Shotcrete, Epoxy injection, Mortar repair for cracks, shoring and underpinning.

Text Books:

1. Denison Campbell, Allen and Harold Roper, “Concrete Structures”, Materials, Maintenance and Repair, Longman Scientific and Technical UK, 1991.
2. R.T.Allen and S.C.Edwards, “Repair of Concrete Structures”, Blakie and Sons, UK, 1987.

Reference Books:

1. M.S.Shetty, "Concrete Technology - Theory and Practice", S.Chand and Company, New Delhi, 1992.
2. Raikar, R.N., "Learning from failures - Deficiencies in Design", Construction and Service - R & D Centre (SDCPL), RaikarBhavan, Bombay, 1987.

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 5th **Branch: CIVIL**

Subject: Groundwater Engineering **Course Code: BT04505(03)**

(Professional Elective –I)

Total Marks in End Semester Exam:70 **L: 3 T: 1 P: 0**

Minimum number of Class Tests:02 **Min. Marks - 28**

Unit 1 Introduction

Definition and scope, Hydrology & Hydrologic Cycle and components, The necessity for hydrologic data. Presence of water on earth and its distribution, ground water resources.

Unit 2 Groundwater hydrology

Occurrence of groundwater, well hydraulics and well construction, geo-physical explorations, groundwater quality and management of groundwater resources; Problems and perspectives regarding groundwater in India.

Unit 3 Hydrogeology:

Darcy's Equation; flow characteristics; general flow equations; unsaturated flow; Well Hydraulics: Steady and
unsteady radial flows in aquifers; partially penetrating wells; multiple well systems;
characteristic well losses ,
specific capacity.

Unit 4 Surface and Subsurface investigations:

Geologic methods; remote sensing; geophysical explorations; electrical resistivity and seismic refraction.

Unit 5 Water Wells:

Construction; completion, development, protection and rehabilitation of wells. Groundwater quality, Groundwater Management: Basin management, investigations, conjunctive use, modeling, artificial recharge.

Text Books:

1. Engineering Hydrology – K. Subramanya (Tata McGraw Hill)

2. A Text Book of Hydrology – Dr. P. Jaya Rami Reddy (Laxmi Publications)

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 5th | **Branch: CIVIL**

Subject: Structural Analysis Lab | **Course Code: BT04506**

Total Marks in End Semester Exam: 35 | **L: 3 T: 1 P: 0**

Min. Marks - 14

List of Experiments: (At least Ten experiments are to be performed by each student)

1. To determine the flexural rigidity (EI) for a given beam using various prototype models.
2. To verify the Maxwell's theorem of reciprocal deflection
3. To determine the vertical deflections of a variety of curved bars.
4. To determine the horizontal deflection and deformed shape of portal frames with different end conditions.
5. To determine the strain in an externally loaded beam using digital strain indicator.

Analysis using Standard Structural Analysis Package such as SAP2000:

6. Determinate Beams
7. Determinate pin-jointed frames
8. Determinate rigid frames
9. To draw influence lines for determinate beams

Analysis using Standard Structural Analysis Package such as SAP2000:

10. Indeterminate Beams
11. Indeterminate pin-jointed frames
12. Indeterminate rigid frames
13. To draw influence lines for indeterminate beams

Analysis using MS Excel:

14. Application of MS excel in Structure Analysis for problems in determinate structures.

Finite Element Analysis Package | ANSYS:

15. Introduction to the latest version of a Standard Finite Element Analysis Package such as ANSYS.

16.

Equipment/Machines/Instruments/Tools/Software Required:

1. Elastic properties of beam apparatus
2. Maxwell's law of reciprocal deflection apparatus
3. Universal frame with variety of curved bars
4. Universal frame with variety of portal frames
5. Digital Strain Indicator
6. Dial gauges for measuring deflections
7. Weights and hangers to apply loads
8. Latest Release of Software Package SAP2000 (Computers & Structures Inc., USA)
9. Latest Release of Software Package ANSYS (ANSYS Inc., USA)

Recommended Books:

1. Reference Manual of Respective Software
2. Verification Manual of Respective Software

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 5th **Branch: CIVIL**

Subject: Transportation Engineering Lab **Course Code: BT04507**

Total Marks in End Semester Exam: 35 **L: 3 T: 1 P: 0**

Min. Marks - 14

List of Experiments: (At least Ten experiments are to be performed by each student)

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.
15. Study of Benkelman Beam.

Equipment/Machines/Instruments/Tools/Software Required:

1. Ring and Ball Apparatus
2. Standard Penetrometer
3. Los Angles Abrasion Machine
4. Deval's Abrasion Machine
5. Ductility Testing Machine

6. Tar Viscometer

7. Sieve Shaker

8. Standard I.S. Sieves for Fine and Coarse Aggregate

9. Length Gauge

10. Thickness Gauge

11. Crushing Value Cylinder and Mould with Plunger

12. Aggregate Impact Testing Machine

13. Flash and Fine Point Apparatus

14. Benkelman Beam

15. Hot Air Oven

16. Water Bath

17. Marshall Stability Machine and with Mould

18. Proving Ring and Dial Gauge

19. Weighing Balance up to 10 kg capacity

Text Books:

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

COURSE OUTCOME:

On completion of this course, the student:

1. Will determine the crushing strength value of aggregate.
2. Will determine abrasion value of aggregate.
3. Will list physical properties of bitumen for road construction
4. Will list index properties of aggregate.
5. Will determine flash and fire point of bitumen.

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 5th | **Branch: CIVIL**

Subject: Geotechnical Engineering Lab | **Course Code: BT04508**

Total Marks in End Semester Exam: 35 | **L: 3 T: 1 P: 0**

Min. Marks - 14

List of Experiments: (At least Ten experiments are to be performed by each student)

1. Field Density using Core Cutter method.
2. Natural moisture content using Oven Drying method.
3. Specific gravity of Soils.
4. Grain size distribution by Sieve Analysis.
5. Grain size distribution by Hydrometer Analysis.
6. Consistency limits by Liquid limit
7. Consistency limits by Shrinkage limit.
8. Permeability test using Falling-head method.
9. Compaction test: Standard Proctor test.
10. Compaction test: Modified Proctor test.
11. Relative density.
12. Consolidation Test.
13. Triaxial Test (UU)
14. Direct Shear Test
15. Unconfined Compression Strength Test.

Equipment/Machines/Instruments/Tools/Software Required:

1. Core Cutter Mould
2. Pycnometer of capacity 500 ml and 1000 ml

3. Small and Big Soil Container
4. Hydrometer Apparatus
5. Oven
6. Liquid Limit Apparatus
7. Shrinkage Limit Apparatus
8. Constant Head Permeability Test Apparatus
9. Following Head Permeability Test Apparatus
10. Mechanical Sieve Analysis (Complete Sets of Sieves)
11. Static Cone Penetrometer Test Apparatus
12. Skempton's Core Pressure Apparatus
13. Soil Sampling Tube, Piston Tube
14. Rammer for Compaction
15. Soil Extractor
16. Measuring Jar Cylinder (1000 CC)
17. Light Compaction Mould
18. Heavy Compaction Mould
19. Direct Shear Test Apparatus with full accessories
20. Triaxial Compression Test Apparatus with full accessories
21. Consolidometer Apparatus
22. Unconfined Compression Test Apparatus

Recommended Books:

1. Soil Mechanics and Foundation Engineering – B.C. Punmia (Laxmi Publication)
2. Soil Engineering in Theory and Practice (Vol-II) –Alam Singh (Asia Publishing House, New Delhi)

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 5th **Branch: CIVIL**

Subject: Environmental Studies **Course Code: BT04509**

Total Marks in End Semester Exam: 50 **L: 3 T: 1 P: 0**

PREREQUISITE: Knowledge of basic Chemistry, Physics and Mathematics.

COURSE OBJECTIVES:

1. Basic knowledge of environment, ecology, ecosystems, biodiversity and conservation.
2. Fundamentals of natural resources, control, uses and its impact on environment.
3. Human population, growth, growing needs and its impact on society and environment.
4. Types of environmental pollution, legislations, enactment and management.

COURSE DETAILS:

UNIT I: Introduction to environmental studies, ecology and ecosystems (06 hours)

Introduction to environment; Concept and structure of ecology and ecosystem, energy flow; Community ecology; Food chains and webs; Ecological succession; Characteristic features of forest, grassland, desert and aquatic ecosystem; Multidisciplinary nature of environmental studies, scope and importance; Concept of sustainability and sustainable development.

UNIT II: Biodiversity and conservation (06 hours)

Introduction to biological diversity and levels of genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns and global biodiversity hot spots; Threats to biodiversity, habitat loss, conflicts and biological invasions; In-situ and Ex-situ conservation of biodiversity: Ecosystem and biodiversity services.

UNIT III: Natural resources and environment (08 hours)

Concept of Renewable and non-renewable resources; Land resources, land use change, land degradation, soil erosion; Desertification; Deforestation: causes, consequences and remedial measures; Water: Use and over-exploitation of surface and ground water, floods, droughts,

conflicts over water (international & inter-state); Energy resources: environmental impacts of energy generation, use of alternative and nonconventional energy sources, growing energy needs.

UNIT IV: Human communities, social issues and environment (08 hours)

Basic concept of human population, growth and communities; Impacts on environment, human health, welfare and human rights; Resettlement and rehabilitation; Environmental natural disaster: floods, earthquake, cyclones, tsunami and landslides; Manmade disaster; Environmental movements; Environmental ethics: role of gender and cultures in environmental conservation; Environmental education and public awareness; Human health risks and preventive measurements.

UNIT V: Environmental pollution, policies, legislations, assessment and practices (12 hours)

Environmental pollution: Causes, effects and controls of air, water, soil, noise and marine pollution; Concept of hazardous and non-hazardous wastes, biomedical and e-wastes; Solid waste management and control measures; Climate change, global warming, ozone layer depletion, acid rain and their societal impacts; Environment laws: Wildlife Protection Act, Forest Conservation Act, Water (Prevention and control of Pollution) Act, Air (Prevention & Control of Pollution) Act, Environment Protection Act, Biodiversity Act, International agreements negotiations, protocols and practices; EIA, EMP.

TEXT BOOKS:

1. De, A.K., (2006).*Environmental Chemistry*, 6th Edition, New Age International, New Delhi.
2. Bharucha, E. (2013). *Textbook of Environmental Studies for Undergraduate Courses*. Universities Press.
3. Asthana, D. K. (2006).*Text Book of Environmental Studies*. S. Chand Publishing.

REFERENCE BOOKS:

1. Odum, E. P., Odum, H. T., & Andrews, J. (1971).*Fundamentals of ecology*. Philadelphia: Saunders.
2. Basu, M., Xavier, S. (2016). Fundamentals of Environmental Studies, Cambridge University Press, India.
3. Sharma, P. D., & Sharma, P. D. (2005).*Ecology and Environment*. Rastogi Publications.

OPEN SOURSE LEARNING:

http://nptel.ac.in/

BHARTI VISHWAVIDYALAYA, DURG

B.TECH IN CIVIL ENGINEERING

Scheme of Examinations: Semester VI

Sl. No.	Board of Studies	Courses (Subject)	Course Code	Period per Week			Theory/Lab			Total Marks	Credits
				L	T	P	ESE	CT	TA		
1.	Civil Engg	Structural Engineering Design-II	BT04601	3	1	-	100	10	20	100	4
2.	Civil Engg	Environmental Engineering	BT04602	3	1	-	100	10	20	100	4
3.	Civil Engg	Engineering economics, estimating and costing	BT04603	3	1	-	100	10	20	100	4
4.	Professional Elective-II (Refer Table I)			2	1	-	100	10	20	100	20
5.	Open Elective – I (Refer Table II)			2	0	-	100	10	20	100	20
6.	Civil Engg	Structural Engineering Lab	BT04606	-	-	2	35	-	15	50	1
7.	Civil Engg	Environmental Engineering Lab	BT04607	-	-	2	35	-	15	50	1
8.	Civil Engg	Computer Aided Civil Engineering Drawing lab	BT04608	-	-	2	35	-	15	50	1
9.	Civil Engg	Concrete Technology Lab	BT04609	-	-	2	35	-	15	50	1
10.	Humanities	Technical Communication and Soft Skill	BT04610	-	-	2	-	-	50	50	-
Total				13	4	10	490	50	210	750	21

L – Lecturer
P – Practical,
CT –ClassTest

T – Tutorial, TA – Teacher's Assessment
ESE – End Semester Exam,

Table I (Professional Elective II)

S.N.	Board of Studies	Subject	Course Code
1.	Civil Engg	Structural Analysis by matrix method	BT04604(01)
2.	Civil Engg	Concrete technology	BT04604(02)
3.	Civil Engg	Traffic engineering and management	BT04604(03)

Note: (1) 1/4th of total strength of students subject to minimum of 20 students is required to offer andelective in the college in a particular academic session.

(2) Choice of elective course once made for an examination cannot be changed in future examinations.

List of Open Elective – I (Table III) (For 6th Semester)

S.N.	Board of Studies	Subject	Course Code
1	Civil Engg	Construction engineering and management	BT04605(01)
2	Civil Engg	Metro system and engineering	BT04605(02)
3	Civil Engg	Infrastructure Planning and Management	BT04605(03)

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 6th	**Branch: CIVIL**
Subject: Structural Engineering Design – II	**Course Code: BT04601**
Total Marks in End Semester Exam:70	**L: 3 T: 1 P: 0**
Minimum number of Class Tests:02	**Min. Marks - 28**

UNIT-1: Materials and Methods: Review of Methods of design:

Limitations of Working stress, Advantages of Limit State Design, Limit States of Strength and Serviceability, Partial Safety Factors

Design specifications as per IS: 800: 2007-Types of Structural Steel, Physical and Mechanical Properties, Convention for Member Axes.

Steel as a structural material, Rolled Sections - Tapered Flange and Parallel Flange, Built up sections,

Plastic Theory: Shape factor, Plastic Hinge Mechanism, Length of plastic hinge, Fully Plastic Moment of section, Collapse mechanism, plastic analysis of simple beams and frames.

UNIT-2: Structural Steel Fasteners: Introduction:

Location details of fasteners, simple, semi-rigid and rigid connections, Lap and Butt Joints, *Bearing type bolts and revet*, Friction Grip type *Bolting and riveting,* Welds and Welding, Advantages and Disadvantages of Welded Connections, Behavior of bolted and welded connections (types, designations, properties, permissible stresses), *comparison between bolt and welded connection* failure of bolted and welded joints. Strength of bolt and strength of weld, Efficiency of joints, Design of simple, bolted and welded joint subjected to axial loads. Truss Joint Connections by bolts and welds.

UNIT-3: Tension Members:

Geometrical Properties considerations for tension members, Maximum effective slenderness ratio, Terms: Shear-lag, Tension Splice, Gusset plate and Lug angles.Design Strength due to Yielding of Gross Section, Rupture of Critical Section, Block Shear. *Design of Axially and uniaxially Loaded Tension Members, Steel Angles under Tension.*

UNIT-4: Compression Members: Considerations for compression members as per IS: 800: 2007:

Geometrical Properties, Effective length, Classification of Cross Sections (buckling), Imperfection factor, Maximum effective slenderness ratio. Column splice, Encased Columns. Design Strength, Design of Axially loaded compression members, Steel Angles under Compression, Design of built-up column with Lacing, Battened columns. Column Bases & Column cap.: Introduction, slab base, gusseted base, column cap, *Design of Column bases under axial and uniaxial load.*

UNIT-5: Flexural Members:

Plastic behavior of beam in flexure, section modulus, Classification of Cross Sections (flexure), Limit state safety – Flexure and shear, Limit state serviceability – Deflection, Design Strength in Bending (Flexure), Effective length for lateral torsional buckling, Shear, web buckling, web crippling, built up beams, Design of Laterally Supported beams and Laterally Unsupported Beams with unstiffened webs.

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. Indian Standard – General Construction in Steel –Code of Practice (3rd Revision) (IS:800 – 2007)
4. Design of Steel Structures – K. S. Sai Ram (Pearson Education)

Reference Books:

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

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 6th | **Branch: CIVIL**

Subject: Environmental Engineering | **Course Code: BT04602**

Total Marks in End Semester Exam:70 | **L: 3 T: 1 P: 0**

Minimum number of Class Tests:02 | **Min. Marks - 28**

UNIT-1: Introduction to Water demand:

Necessity and importance of water supply schemes. Sources of water. Classification of water demands, Per capita demand, factors affecting per capita demand, Population Forecasting Techniques.

Quality of water: Common impurities, physical, chemical and biological characteristics of water/wastewater, Drinking water quality standards for municipal and domestic supplies.

Unit-2: Water Processing

Objects of water processing Theory of sedimentation, Design of sedimentation tanks, Sedimentation with coagulations, Theory of filtration, Design of slow sand and rapid sand filters, Methods of disinfection, Methods of Softening, Miscellaneous treatment methods.

UNIT-3: Distribution System:

Methods of distribution, layouts of distribution system, functions and its types of distribution reservoirs, storage capacity of distribution reservoir.

Sewage and Sewerage Systems: System of sanitation, Estimation of domestic and storm sewage, Design of circular sewers, Sewer appurtenances,

Sewage Treatment: Preliminary treatment systems, Screens, grit chamber, detritus tanks. Primary treatment systems- Plain Sedimentation Process, Design of Septic Tanks.

UNIT-4: Secondary treatment Systems:

Trickling filters, Design of standard and high rates, Activated Sludge Process, Oxidation Pond and oxidation ditch, Aeration and Mixing Techniques,

Sewage sludge Treatment: Importance, amount and characteristics of sludge, Sludge digestion process, Design of sludge digestion tank

UNIT-5: Sewage disposal:

Disposal by dilution, self-purification of polluted streams, Oxygen Sag curve, Disposal on land surfaces. Stream standards and Effluent standards, Theories of waste treatment (Volume reduction, strength reduction, new Equalization and proportioning) Summery of Industrial waste, its origin, character and treatment.

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.

Text Books:

1. Water Supply Engineering – S.K. Garg (Khanna Publication).
2. Water Supply Engineering – B.C. Punmia (Laxmi Publication, New Delhi)
3. Elements of Public Health Engineering by K.N. Duggal S. Chand Publication Latest Revised Edition
4. Lok swasthya Abhiyantriki by A.K. Saxena Deepak prakashan Gwalior Latest Revised Edition

Reference Books:

1. Environmental Engineering – Peavy& Rowe (Tata McGraw Hill, New Delhi).
2. Water Supply and Sanitary Engineering – G.S. Birdi (Dhanpat Rai Publications).
3. Introduction to Environmental Science – Y. Anjaneyulu (B.S. Publications)
4. The committee on PHE manual and code of practice, the ministry of health, govt. of India,PHE manual and code of practice-sectiosI,II,III and IV.

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 6th	**Branch: CIVIL**
Subject: Engineering economics, Estimation & Costing	**Course Code: BT04603**
Total Marks in End Semester Exam:70	**L: 3 T: 1 P: 0**
Minimum number of Class Tests:02	**Min. Marks - 28**

UNIT-1: Introduction:

Introduction of Estimation & its purpose, data required for estimation, factors to be considered for estimation, different types of estimates, approximate estimation – objective, purpose & various methods.

Accounts and Technical Terms: Administrative approval, technical & expenditure sanction, competent authority, BOQ, SOR, Layout plan, *Muster roll,* Measurement book, establishment charges, contingencies etc.

UNIT-2: Detailed Estimate:

Various Methods for detailed estimate, Modes and units of measurements of various items of work as per IS-1200, preparation of detailed quantity estimates for single storey residential building, preparation of schedule of reinforcements for RCC building components, ***Bar-bending schedule,*** determination of earth work in road and canals.

UNIT-3: Rate Analysis:

Definition, market survey of basic materials, Purpose, factors affecting, ***Thumb rule for*** *computation of material and labour,* required for different works, Task works per day, Rate analysis of important items of work, Current Schedule of Rates (CSR).Introduction to Acts pertaining of minimum wages, Workmen's' compensation.

UNIT-4: Introduction of Contracts and Tender Documents:

Contracts & its essentials, types of engineering contract, conditions, *termination of contract, brief idea about types of tenders and contracts* , tender notice, preparation of tender document, procedure for inviting tender, security deposit, liquidated damages, arbitration, and escalation.

UNIT-5: Engineering Economics:

Engineering Economics & its importance in construction industry, Basic Macroeconomic (GDP) Direct &Indirect taxes of construction projects, Interest rates, Cost, Types of costs, cost control techniques, budgets, break even analysis, property valuation, Depreciation, percentage breakup of cost.

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)
3. A Textbook of Estimating and Costing – Kohli & Kohli (S. Chand & Co.)
4. Engineering Economics – R. Panneerselvam, (PHI)

Reference Books:

1. Textbook of Estimating and Costing – G.S. Birdi (Dhanpat Rai Publications)
2. Valuation of real properties – S.C. Rangwala (Charotar Publication)
3. Estimating,& Costing Anand Birdi, J.C. Kapoor Dhanpet Rai & Sons, Delhi & Julandhar Latest Revised Edition
4. Estimating & Costing Vol. I & II J.C. Malhotra, Khanna Publishers, 28, Nath Market, Nai Sarak, New Delhi Latest Revised Edition

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 6th | **Branch: CIVIL**

Subject: Professional Elective-II (Structural Analysis by Matrix Methods) | **Course Code: BT04603**

Total Marks in End Semester Exam:70 | **L: 3 T: 1 P: 0**

Minimum number of Class Tests:02 | **Min. Marks - 28**

UNIT I: INTRODUCTION

Review of force and displacement methods of structural analysis, Degree of Static Indeterminacy, Degree of Kinematic Indeterminacy, Basic Concepts of Matrix methods in structural analysis, Determinants and Matrices.

UNIT II: FLEXIBILITY METHOD FOR BEAMS

Flexibility coefficients, development of flexibility matrix, Analysis of continuous beams by flexibility method.

UNIT III: FLEXIBILITY METHOD FOR FRAMES

Analysis of rigid jointed plane frame and pin jointed plane frame by flexibility method.

UNIT IV: STIFFNESS METHOD FOR BEAMS

Stiffness coefficient, development of stiffness matrix, relationship between flexibility matrix and stiffness matrix, Analysis of continuous beams by stiffness method.

UNIT V: STIFFNESS METHOD FOR FRAMES

Analysis of rigid jointed plane frame and pin jointed plane frame by stiffness method.

Text Books:

1. Pandit G.S. and Gupta S.P., Structural Analysis – A Matrix Approach, Tata McGraw-Hill Publishing Company Limited, New Delhi
2. Weaver W. and Gere J. M., Matrix Analysis of Framed Structures, CBS Publishers and Distributors, Delhi

Reference Books:

1. Krishanmurthy C.S., Finite Element Analysis – Theory and Programming, Tata McGraw-Hill Publishing
2. Company Limited, New Delhi.
3. Proceedings of recent seminars / workshops / conferences and Papers from relevantNational and
4. International Journals.

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 6th | **Branch: CIVIL**

Subject: Professional Elective-II (Concrete Technology) | **Course Code: BT04604(01)**

Total Marks in End Semester Exam:70 | **L: 3 T: 1 P: 0**

Minimum number of Class Tests:02 | **Min. Marks - 28**

UNIT I Concrete Making Materials:

Introduction of material, Bouge's compound Review of Hydration and structure of hydrated cement, Classification of Aggregates, Properties, grading requirements, Methods of combining aggregates, Surface index, specified grading, Alkali aggregate reaction, Quality of mixing and curing water. Sustainability issues in concrete marking materials.

UNIT II Admixtures and Fresh Concrete:

Chemical admixtures – Functions of Admixtures, Classification of Admixtures. Mineral Admixture – (Fly ash, Silica fumes, GGBS, Rice husk ash) sources ad utilization. Effects of use of chemical and mineral admixtures on the properties of fresh concrete, Segregation, Bleeding and terms related to fresh concrete. Compressive strength and parameters affecting it: water cement ratio, compaction, curing. Gain of strength with age, Shrinkage and its Types, Maturity Concept, Time dependent behavior of concrete -creep, shrinkage and fatigue. Elasticity, porosity, Durability of Concrete, Permeability of Concrete relation between durability and permeability, Corrosion of steel rebars, Carbonation of concrete. Quality control in concrete. Effects of use of chemical and mineral admixtures on the properties of hardened concrete.

UNIT IV Concrete Mix Design :

Principles of Concrete mix design, Target strength, nominal mix, design mix, sampling, statistical interpretation of cube results, understanding of normal distribution curve, characteristic strength of concrete, factors in the choice of mix proportion. *Role of W/C ratio in mix design, W/C curve in different grades* Concrete mix design using OPC, PPC, PSC as per Indian standard Code 10262 :2019, study of IS 10262: 2019, American & British methods, Non-destructive tests on concrete.

UNIT V Special Concrete & Concreting Methods:

Introduction of special concrete, Behavior of concrete in extreme environment; temperature problem in concreting, hot weather, cold weather and under water conditions, Resistance to freezing, Need of special concrete, properties, ingredients, method of development and applications of Light weight concrete, Fibre reinforced concrete, Polymer Concrete, self-compacted concrete, High performance concrete, Ready mix concrete, special concreting methods, Vacuum dewatering - underwater concrete, special from work.

Text Books:

1. Concrete Technology – M.L. Gambhir (Tata McGraw Hill)
2. Concrete Technology Theory and Practice - M. S. Shetty, (S.Chand and Company Ltd. Delhi)
3. Concrete Technology S. S. Bhavikatti I. K. International Publishing House 2015
4. Concrete Technology A.R.Santhakumar Oxphord University Press.

Reference Books:

1. Concrete Technology – A. M. Neville, J. J. Brooks, (Pearson Education)
2. Light Weight Concrete Academic Kiado – Rudhani G. (Publishing Home of Hungarian Academy of Sciences)
3. Concrete Technology – R.S. Varshney (Oxford, IBH Publishers)

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 6th | **Branch: CIVIL**

Subject: Professional Elective-II (Traffic Engineering and Management) | **Course Code: BT04604(02)**

Total Marks in End Semester Exam:70 | **L: 3 T: 1 P: 0**

Minimum number of Class Tests:02 | **Min. Marks - 28**

Unit 1 -Traffic Engineering and Management:

Introduction of traffic management, Traffic Forecast: *PEIV theory,* General travel forecasting principles, different methods of traffic forecast - Mechanical and analytical methods,3E's of traffic Engineering, Special problems due to mixed traffic and other conditions in developing countries, Concept of PCU.

Unit 2 -Traffic measurement

Traffic measurement procedures: Measurement at a point: Traffic volume measurement, equipment for flow measurements, data analysis, concepts of ADT, AADT;

Measurement over a short section: Speed measurements, 15th and 85th percentile speeds, design speed, speed distributions;

Measurement along a length of road: Density measurement, travel time measurement;; Capacity studies - Capacity of different highway facilities including unsignalised and signalized intersections. Problems in Mixed Traffic flow; Case studies;

Unit 3 -Traffic safety

Accident Analysis: Analysis of individual accidents and statistical data; Methods of representing accident rate, Factors in traffic accidents; influence of roadway and traffic conditions on traffic safety; accident coefficients; Driver strains due to roadway and traffic conditions; Highway lighting,

Unit4 -Traffic intersection control:

Principles of traffic control: Requirements, basic driving rules, priority movements, principles of traffic control, intersections conflicts;

Traffic signs and road markings: Regulatory, warning, and information signs; longitudinal, transverse, and object marking;

Uncontrolled intersection: Level of service concept, priority streams, confliting traffic, critical gap and follow-up time, capacity, queue length, control delay;

Channelization: channelizing devices, geometrical aspects, turning radius

Traffic rotary: Conflict resolution in a rotary, geometric layout, design elements

Unit 5 Traffic signal design:

Elements of traffic signal: Definitions, analysis of saturation headway, saturation flow, lost time, critical flows, derivation of cycle length;

Design principles of a traffic signal :Phase design, cycle time determination, green splitting, pedestrian phases, and performance measures;

Evaluation of a traffic signal: Definitions and measurement of stopped and control delay, Webster's delay model, oversaturated conditions.

Text Books:

1. Traffic Engineering and Transport Planning – Kadiyali, L.R. (Khanna Publishers, Delhi, 1996)
2. Kadiyali, LR (1987), Traffic Engineering and Transportation Planning,Khanna.
3. Transport Planning and Traffic Engineering – Flaherty, CAO (John Wiley & Sons, Inc., New York, 1997)
4. Khanna,S.K. and Justo, C.E. G.(1991), Highway Engineering, Nemchand.

Reference Books:

1. Principles of Urban Transport Systems Planning – Hutchinson, B.G. (Scripta Book Company, Washington, D.C., 1974)
2. Modelling Transport – Ortuzar, title D. and Willumson, L.G. (John Wiley & Sons, New York, 1995)
3. Highway Capacity Manual (2000), Transportation Research Board, USA.

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 6th | **Branch: CIVIL**

Subject: Structural Engineering Lab | **Course Code: BT04605**

Total Marks in End Semester Exam:35 | **L: 3 T: 1 P: 0**

Min. Marks - 14

List of Experiments: (At least Ten experiments are to be performed by each student)

Experiments to be performed usinglatest version of a Standard Structural Engineering Design Package such as STAAD Pro or ETABS**:**

1. Introduction to latest version of a Standard Structural Engineering Design Package such as STAAD Pro, STAAD.etc

RCC Design Using Design Package:

2. Geometrical Modelling of RCC Frame.

3. Modelling of loads and load combinations on RCC Frame.

4. Analysis and Interpretation of Results of Analysis of RCC Frame.

5. Design of RCC Frame.

6. Interpretation of Results of Design of RCC Frame.

7. Design of R.C.C. Column (STAAD.etc)

8. Design of R.C.C. Isolated Footing (STAAD.etc)

9. Case Study of design of a RCC Multistorey Building

Steel Design Using Design Package:

10. Geometrical Modelling of Steel Frame.

11. Modelling of loads and load combinations on Steel Frame.

12. Analysis and Interpretation of Results of Analysis of Steel Frame

13. Design of Steel Frame.

14. Interpretation of Results of Design of Steel Frame.

15. Case Study of design of a Steel Industrial Building.

Equipment/Machines/Instruments/Tools/Software Required:

1. Latest Release of Software Package STAAD Pro (Research Engineers International, Kolkata)

2. 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

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 6th **Branch: CIVIL**

Subject: Environmental Engineering Lab **Course Code: BT04606**

Total Marks in End Semester Exam:35 **L: 3 T: 1 P: 0**

Min. Marks - 14

List of Experiments: (At least Ten experiments are to be performed by each student)

1. To determine acidity of water/wastewater sample.
2. To determine alkalinity of water/wastewater sample.
3. To determine hardness of water/wastewater sample.
4. To determine chloride content of water/wastewater sample.
5. To determine D.O. content of water/wastewater sample.
6. To estimate the quantity of BOD from water/wastewater sample.
7. To determine the availability of chlorine in bleaching powder for drinking water.
8. To determine the residual Cl2 Content in drinking water.
9. To determine the quantity of Optimum Coagulant Dose and pH of water sample.
10. To determine the Total Solids in water/wastewater sample.
11. To determine the COD in Sewage / Industrial wastewater.
12. To determine the MPN in Sewage / Industrial wastewater.
13. To determine the Fluoride content in Sewage / Industrial wastewater.
14. To determine the Nitrates in Sewage / Industrial wastewater.
15. To determine the Phosphates in Sewage / Industrial wastewater.

Equipment/Machines/Instruments/Tools/Software Required:

- BOD Incubator
- Dust Sampler
- Turbidity meter
- Microscope

- pH meter
- Muffle Furnace
- Hot Air Oven
- Jar Test Apparatus

Text Books:

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

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 6th **Branch: CIVIL**

Subject: Computer Aided Civil Engineering Drawing Lab **Course Code: BT04607**

Total Marks in End Semester Exam:35 **L: 3 T: 1 P: 0**

Min. Marks - 14

1. **Introduction To Autocad Drafting Package.**(Week 1 & 2)

Review of concept of drawings, Introduction to Computer-Aided Drawing, co-ordinate systems, reference planes.

Commands: Initial settings, drawing aids, drawing basic entities, Modify commands, Layers, Text and Dimensioning, Blocks .Drawing presentation norms and standards (to show information concisely and comprehensively); optimal layout of drawings and Scales; Dimensioning standards

Symbols and Sign conventions: materials, architectural, structural, electrical, and plumbing symbols. Use of Notes to improve clarity.

2. **Building Drawing:**(Week 3 & 4)

i. Primary school building.

ii. Hostel building.

iii. Hospital building.

Terms, Elements of planning building drawing, Methods of making line drawing, and detailed drawing.

Building Drawing: Floor plan and Elevation

3. **Residential Building Drawing.**(Week 5 to 8)

To draw Site plan, floor plan, Roof drainage plans, elevation and section drawing of small residential buildings (single storey and double storey) with load-bearing walls and frame structure including details of doors and windows.

To draw the front elevation and section for the above plan showing area statement and schedule of openings (doors and windows).

4. **Cross-Section of Walls.**(Week 9)

i. To draw the cross-section of a wall and its foundation.

ii. To draw the foundation details of internal and external walls.

iii. To draw section of a Single storey 2 BHK residence.

iv. To draw the section of a Double storey with staircase.

5. **Perspective View.**(Week 10)

One point and two-point Perspective view of simple blocks.

Introduction to 3D

6. **Interpretation of Typical Drawings.**(Week 11 & 12)

Taking standard drawings of a typical two-storeyed building including all MEP (Mechanical and Electrical engineering with Plumbing design), joinery, rebars, finishing and other details and write out a description of all the facility in about 500 – 700 words.

List of Experiments: (At least Ten experiments are to be performed by each student)

1. To draw plan and section of footing and foundation for load bearing wall and framed structure.
2. To draw plan and section of load bearing and partition walls and its foundation.
3. To draw the single line plan of a primary school building.
4. To draw the line plan of a hostel building.
5. To draw the line plan of a hospital building.
6. To draw working drawing of single storey of 2BHK residential building
7. To draw elevation and section of single storey of 2BHK residential building
8. To draw working drawing of 3BHK double storey residential building
9. To draw elevation and section drawing 3BHK double storey residential building.
10. To draw One point and two-point Perspective view of simple blocks.
11. Perspective view using 3D for single storey buildings.

Equipment/Machines/Instruments/Tools/Software Required:

1. PC system.
2. AutoCAD Software.

Recommended Books:

1. AutoCAD 2000 Complete – et. al. (BPB Publications)

2. An introduction to AutoCAD 2000 – A. Yarwood (Pearson Educations)

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 6th | **Branch: CIVIL**

Subject: Concrete Technology Lab | **Course Code: BT04608**

Total Marks in End Semester Exam:35 | **L: 3 T: 1 P: 0**

Min. Marks - 14

List of Experiments: (At least Ten experiments are to be performed by each student)

Test on Aggregates:

1. Determination of Soundness test on aggregate
2. Determination of Deleterious materials in fine aggregate
3. Determination of Grading curve of Mix aggregate & sieve analysis

Properties of Fresh Concrete:

4. To study the effect of use of mineral admixture and chemical admixture on the workability of fresh concrete using Slump Cone test.
5. To study the effect of use of mineral admixture and chemical admixture on the workability of fresh concrete using Compaction Factor Test.
6. To study the effect of use of mineral admixture and chemical admixture on the workability of fresh concrete using Vee-bee test.
7. To study the effect of use of mineral admixture and chemical admixture on the workability of fresh concrete using Flow table test

Properties of Hardened Concrete:

8. Determination of Compressive Strength (3d, 7d and 28d) of concrete
9. Determination of Compressive strength of concrete by non-destructive test – Rebound Hammer
10. Determination of flexural strength of concrete (28d)
11. Determination of Modulus of elasticity of concrete and strain measurement by longitudinal compressometer Mix Design:
12. Mix Design by I.S. Code method (with OPC Cement)
13. Mix Design by I.S. Code method (with Slag Cement)

14. Mix Design by I.S. Code method (with Admixtures Cement)

Self Compacting Concrete:

15. Parametric study of self-compacting concrete.

Equipment/Machines/Instruments/Tools/Software 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)
- 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

Recommended Books:

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

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 6th **Branch: CIVIL**

Subject: Technical Communication & Soft Skills **Course Code: BT04609**

Total Marks in End Semester Exam:35 **L: 3 T: 1 P: 0**

Min. Marks - 14

UNIT-1 Communication Skills-Basics:

Understanding the communicative environment, Verbal Communication; Non Verbal Communication & Cross Cultural Communication, Body Language & Listening Skills; Employment Communication & writing CVs, Cover Letters for correspondence. Common errors during communication, Humour in Communication.

UNIT-2 Interpersonal communication:

Presentation, Interaction and Feedbacks, Stage Manners, Group Discussions (GDs) and facing Personal Interviews, Building Relationships, Understanding Group Dynamics- I, Emotional and Social Skills, Groups, Conflicts and their Resolution, Social Network, Media and Extending Our Identities.

UNIT- 3 Vocational skills

: Managing time: Planning and Goalsetting, managing stress: Types of Stress; Making best out of Stress, Resilience, Work-life balance, Applying soft-skills to workplace.

UNIT-4 Mindsets and Handling People:

Definitions and types of Mindset, Learning Mindset, Developing Growth Mindset, Types of People, How to Lead a Meeting, How to Speak Effectively in Meetings, Behavior & Roles in Meetings, Role Play: Meeting.On Saying "Please", How to say "NO".

UNIT-5 Positive Pschycology:

Motivating oneself, Persuasion, Survival Strategies, Negotiation, Leadership and motivating others**,** controlling anger**,** Gaining Power from Positive Thinking.

Text Books:

1. Petes S. J., Francis. Soft Skills and Professional Communication. New Delhi: Tata McGraw-Hill Education, 2011.
2. Stein, Steven J. & Howard E. Book. The EQ Edge: Emotional Intelligence and Your Success. Canada: Wiley & Sons, 2006.
3. Dorch, Patricia. What Are Soft Skills? New York: Execu Dress Publisher, 2013.

Reference Books:

1. Kamin, Maxine. Soft Skills Revolution: A Guide for Connecting with Compassion for Trainers, Teams, and Leaders. Washington, DC: Pfeiffer & Company, 2013.
2. Peale Norman Vincent. The Power of Positive Thinking: 10 Traits for Maximum Result. Paperback Publication. 2011.
3. Klaus, Peggy, Jane Rohman & amp; Molly Hamaker. The Hard Truth about Soft Skills. London: Harper Collins E-books, 2007.