

Lingaya's Vidyapeeth

Deemed-to-be-University u/s 3 of UGC Act 1956, Government of India
NAAC ACCREDITED
Approved by MHRD / AICTE / PCI / BCI / COA / NCTE
Nachauli, Jasana Road, Faridabad- 121002 | Ph: 0129-2598200-05
Website: www.lingayasvidyapeeth.edu.in

1.1.3 Courses having focus on employability/ entrepreneurship/ skill development offered by the University during the year

Color Index	
Employability	Yellow
Entrepreneurship	Green
Skill Development	Pink



LINGAYA'S VIDYAPEETH

SCHEME OF STUDIES

SESSION: 2021-22

School: Engineering & Technology								Batch:2021-2025					
Department: Civil Engineering								Year: 1st					
Course: B.Tech								Semester:1st					
SN	Cate-gory	Course Code	Course Name	Periods			Credits	Evaluation Scheme					Subject Total Marks
				L	T	P		Theory			Practical		
								ABQ	MSE	ESE	IP	EXP	
1	BSC	BS-107	Mathematics-I	3	1	0	4	15	25	60	-	-	100
2	BSC	BS-109	Physics	3	1	0	4	15	25	60	-	-	100
3	ESC	EC-101	Basic Electrical and Electronics Engg.	3	0	0	3	15	25	60	-	-	100
4	ESC	CS-101	Programing for Problem Solving Using-C	3	0	0	3	15	25	60	-	-	100
5	HSMC	HSS-101	Effective Technical Communication	3	0	0	3	15	25	60	-	-	100
6	ESC	ME-151	Workshop Practice	0	0	4	2	15	25	60	-	-	100
7	BSC	BS-155	Physics Lab	0	0	2	1	-	-	-	60	40	100
8	ESC	EC-151	Basic Electrical and Electronics Engg Lab	0	0	2	1	-	-	-	60	40	100
9	HSMC	HSS-151	English Communication Lab	0	0	2	1	-	-	-	60	40	100
10	ESC	CS-151	Programing for Problem Solving using-C Lab	0	0	2	1	-	-	-	60	40	100
							23						

Abbreviations:

ESC: Engineering Sciences Course

ABQ: Assignment Based Quiz

BSC: Basic Sciences Course

MSE: Mid Semester Examination

PROJ: Project

ESE: End Semester Examination

PDP: Personality Development Programme

IP: Internal Practical

L: Lecture

EXP: External Practical

T: Tutorial

P: Practical

HSMC: Humanities and Social Sciences including Management Courses

LINGAYA'S VIDYAPEETH

SCHEME OF STUDIES

SESSION: 2021-22

School: Engineering & Technology								Batch:2021-2025					
Department: Civil Engineering								Year: 1st					
Course: B.Tech								Semester:2nd					
SN	Cate- gory	Course Code	Course Name	Periods			Credits	Evaluation Scheme					Subject Total Marks
				L	T	P		Theory			Practical		
								ABQ	MSE	ESE	IP	EXP	
1	BSC	BS-108	Mathematics-II	3	1	0	4	15	25	60	-	-	100
2	BSC	BS-110	Environmental Science and chemistry	2	0	0	2	15	25	60	-	-	100
3	HSMC	PEP-102	Universal Human Values	3	0	0	3	15	25	60	-	-	100
4	ESC	ME-102	Engineering Mechanics	3	0	0	3	15	25	60	-	-	100
5	PCC	CE-102	Surveying	3	0	0	3	15	25	60	-	-	100
6	PCC	CE-104	Introduction to Civil Engineering	3	1	0	4	15	25	60	-	-	100
7	ESC	ME 152	Engineering Graphics Lab	0	0	4	2	-	-	-	60	40	100
8	PCC	CE 152	Surveying Lab	0	0	2	1	-	-	-	60	40	100
9	BSC	BS 156	Environmental Science and chemistry Lab	0	0	2	1	-	-	-	60	40	100
							23						

Abbreviations:

PCC: Program Core Courses

ESC: Engineering Sciences Course

HSC: Humanities

BSC: Basic Sciences Course

L: Lecture

T: Tutorial

P: Practical

BSC: Basic Sciences Course

HSMC: Humanities and Social Sciences including Management Courses

ABQ: Assignment Based Quiz

MSE: Mid Semester Examination

ESE: End Semester Examination

IP: Internal Practical

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LINGAYA'S VIDYAPEETH

SCHEME OF STUDIES

SESSION: 2022-23

School: Engineering & Technology								Batch:2021-2025					
Department: Civil Engineering								Year:2nd					
Course: B.Tech								Semester:3rd					
SN	Category	Course Code	Course Name	Periods			Credits	Evaluation Scheme					Subject Total Marks
				L	T	P		Theory			Practical		
								ABQ	MSE	ESE	IP	EXP	
1	BSC	BS-207	Engineering Mathematics	3	1	0	4	15	25	60	-	-	100
2	PCC	CE-201	Surveying & Geomatics	3	0	0	3	15	25	60	-	-	100
3	PCC	CE-203	Fluid Mechanics	3	1	0	4	15	25	60	-	-	100
4	PCC	CE-205	Building Materials & Construction	3	0	0	3	15	25	60	-	-	100
5	PCC	CE-207	Hydrology	3	0	0	3	15	25	60	-	-	100
6	PCC	CE-251	Surveying & Geomatics Lab	0	0	2	1	-	-	-	60	40	100
7	PCC	CE-253	Fluid Mechanics Lab	0	0	2	1	-	-	-	-	-	100
8	PCC	CE-255	Computer Aided Civil Engineering Drawing	0	0	2	1	-	-	-	60	40	100
9	HSMC	PEP-201	PEP-Exploring Self	1	0	2	2	-	-	-	-	-	100
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Abbreviations:

PCC: Programme Core Courses

ESC: Engineering Sciences Courses

PROJ: Project

PDP: Personality Development Programme

L: Lecture

T: Tutorial

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HSMC: Humanities and Social Sciences including Management Courses

ABQ: Assignment Based Quiz

MSE: Mid Semester Examination

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IP: Internal Practical

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LINGAYA'S VIDYAPEETH

SCHEME OF STUDIES

SESSION: 2022-23

School: Engineering & Technology								Batch:2021-2025					
Department: Civil Engineering								Year: 2nd					
Course: B.Tech								Semester:4th					
SN	Cate- gory	Course Code	Course Name	Periods			Credits	Evaluation Scheme					Subject Total Marks
				L	T	P		Theory			Practical		
								ABQ	MSE	ESE	IP	EXP	
1	PCC	CE-202	Soil Mechanics & Engineering Geology	3	0	0	3	15	25	60	-	-	100
2	ESC	ME-204	Mechanics of Solids	3	0	0	3	15	25	60	-	-	100
3	PCC	CE-204	Wastewater Engineering	3	0	0	3	15	25	60	-	-	100
4	PCC	CE-206	Structural Analysis	3	1	0	4	15	25	60	-	-	100
5	PCC	CE-208	Irrigation Engineering	3	0	0	3	15	25	60	-	-	100
6	PCC	CE-252	Soil Mechanics & Engineering Geology Lab	0	0	2	1	-	-	-	60	40	100
7	ESC	ME-254	Mechanics of Solids Lab	0	0	2	1	-	-	-	60	40	100
8	PCC	CE-254	Hydraulic Engineering Lab	0	0	2	1	-	-	-	60	40	100
9	PCC	CE-256	Structural Analysis Lab	0	0	2	1	-	-	-	60	40	100
10	MC	MC-202	Indian Constitution	1	0	0	0	-	-	-	-	-	100
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Abbreviations:

PCC: Program Core Courses
 ESC: Engineering Sciences Courses
 PROJ: Project
 PDP: Personality Development Programme
 L: Lecture
 T: Tutorial
 P: Practical

ABQ: Assignment Based Quiz
 MSE: Mid Semester Examination
 ESE: End Semester Examination
 IP: Internal Practical
 EXP: External Practical
 MC: Mandatory Course



LINGAYA'S VIDYAPEETH

SCHEME OF STUDIES

SESSION: 2023-24

School: Engineering & Technology								Batch:2021-2025					
Department: Civil Engineering								Year: 3 rd					
Course: B.Tech								Semester:5 th					
SN	Category	Course Code	Course Name	Periods			Credits	Evaluation Scheme					Subject Total Marks
				L	T	P		Theory			Practical		
								AB Q	MSE	ESE	IP	EXP	
1	PCC	CE-301	Concrete Technology	3	0	0	3	15	25	60	-	-	100
2	PCC	CE-303	Geotechnical Engineering	3	1	0	4	15	25	60	-	-	100
3	PCC	CE-305	Transportation Engineering-I	3	0	0	3	15	25	60	-	-	100
4	PEC	CE-307A/ CE-307B/ CE-307C	Program Elective-I	3	0	0	3	15	25	60	-	-	100
5	PCC	CE-309	water Engineering	3	1	0	4	15	25	60	-	-	100
6	PCC	CE-351	Concrete Technology Lab	0	0	2	1	-	-	-	60	40	100
7	PCC	CE-353	Geotechnical Engineering Lab	0	0	2	1	-	-	-	60	40	100
8	PCC	CE-355	Transportation Engineering-I Lab	0	0	2	1	-	-	-	60	40	100
9	PCC	CE-357	Water and Wastewater Engineering Lab	0	0	2	1	-	-	-	60	40	100
10	HSMC	PEP-301	PEP - Leadership & Management Skills	1	0	2	2	-	-	-	-	-	100
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Abbreviations:

PCC: Programme Core Courses
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 PDP: Personality Development Programme
 L: Lecture
 T: Tutorial
 P: Practical

ABQ: Assignment Based Quiz
 MSE: Mid Semester Examination
 ESE: End Semester Examination
 IP: Internal Practical
 EXP: External Practical
 MC: Mandatory Course



LINGAYA'S VIDYAPEETH

SCHEME OF STUDIES

SESSION: 2023-24

School: Engineering & Technology								Batch:2021-2025					
Department: Civil Engineering								Year: 3rd					
Course: B.Tech								Semester:6th					
SN	Category	Course Code	Course Name	Periods			Credits	Evaluation Scheme					Subject Total Marks
				L	T	P		Theory			Practical		
								ABQ	MSE	ESE	IP	EXP	
1	PCC	CE-302	Transportation Engineering-II	3	0	0	3	15	25	60	-	-	100
2	PCC	CE-304	Design of Concrete Structure-I	3	1	0	4	15	25	60	-	-	100
3	PCC	CE-306	Design of Steel Structure-I	3	1	0	4	15	25	60	-	-	100
4	PEC	CE-308A/ CE-308B/ CE-308C	Program Elective-II	3	0	0	3	15	25	60	-	-	100
5	PEC	CE-310A/ CE-310B/ CE-310C	Program Elective-III	3	0	0	3	15	25	60	-	-	100
6	PCC	CE-352	Transportation Engineering -II Lab	0	0	2	1	-	-	-	60	40	100
7	PCC	CE-356	Building Drawing Lab	0	0	2	1	-	-	-	60	40	100
8	PROJ	CE-358	Minor Project	0	0	8	4	-	-	-	-	-	100
9	MC	MC-302	Essence of Indian Tradition Knowledge	1	0	0	0	-	-	-	-	-	100
							23						

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ABQ: Assignment Based Quiz
 MSE: Mid Semester Examination
 ESE: End Semester Examination
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LINGAYA'S VIDYAPEETH

SCHEME OF STUDIES

SESSION: 2024-25

School: Engineering & Technology								Batch:2021-2025					
Department: Civil Engineering								Year: 4th					
Course: B.Tech								Semester:7th					
SN	Category	Course Code	Course Name	Periods			Credits	Evaluation Scheme					Subject Total Marks
				L	T	P		Theory			Practical		
								ABQ	MSE	ESE	IP	EXP	
1	PCC	CE-401	Specification Estimating & Costing	3	0	0	3	15	25	60	-	-	100
2	PCC	CE-403	Design of Concrete Structure-II	3	1	0	4	15	25	60	-	-	100
3	PCC	CE-405	Design of Steel Structure-II	3	1	0	4	15	25	60	-	-	100
4	PEC	CE-407A/ CE-407B/ CE-407C	Program Elective IV	3	0	0	3	15	25	60	-	-	100
5	OE	CE-409A/ CE-409B	Open Elective-I	3	0	0	3	-	-	-	60	40	100
6	PROJ	CE-451	Major Project	0	0	16	8	-	-	-	60	40	100
7	PROJ	CE-453	Seminar	0	0	2	1	-	-	-	60	40	100
8	HSMC	PEP-401	PEP - Professional Skills	1	0	2	2	-	-	-	-	-	100
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Abbreviations:

PCC: Programme Core Courses
 PEC: Programme Elective Courses
 PROJ: Project
 PDP: Personality Development Programme
 L: Lecture
 T: Tutorial
 P: Practical

ABQ: Assignment Based Quiz
 MSE: Mid Semester Examination
 ESE: End Semester Examination
 IP: Internal Practical
 EXP: External Practical
 OE: Open Elective

LINGAYA'S VIDYAPEETH

SCHEME OF STUDIES

SESSION: 2024-25

School: Engineering & Technology								Batch:2021-2025					
Department: Civil Engineering								Year: 4th					
Course: B.Tech								Semester:8th					
SN	Cate- gory	Course Code	Course Name	Periods			Credits	Evaluation Scheme					Subject Total Marks
				L	T	P		Theory			Practical		
								ABQ	MSE	ESE	IP	EXP	
1	PEC	CE-402A/ CE-402B/ CE-402C	Program Elective V	3	0	0	3	15	25	60	-	-	100
2	PEC	CE-404A/ CE-404B/ CE-404C	Program Elective VI	3	0	0	3	15	25	60	-	-	100
3	OE	CE-410A/ CE-410B	Open Elective-II	3	0	0	3	15	25	60	-	-	100
4	PROJ	CE-452	Internship	0	0	6	3	-	-	-	-	-	100
5	PROJ	CE-454	Seminar	0	0	2	1	-	-	-	-	-	100
							13						

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 L: Lecture
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ABQ: Assignment Based Quiz
 MSE: Mid Semester Examination
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 EXP: External Practical
 OE: Open Elective



LINGAYA'S VIDYAPEETH

SCHEME OF STUDIES

SESSION: 2021-22

BSC-107	Mathematics-I	L T P	Cr
		3 -1 -0	4

Course Content:

<p>Unit I: Matrix Algebra</p> <p>8 Lecture Hours</p> <p>Elementary operations and their use in getting the Rank, Inverse of a matrix and solution of linear simultaneous equations. Orthogonal, Symmetric, Skew-symmetric, Hermitian, Skew-Hermitian, Normal & Unitary matrices and their elementary properties. Eigen-values and Eigenvectors of a matrix, Cayley-Hamilton theorem, Diagonalization of a matrix.</p>
<p>Unit II: Differential Calculus</p> <p>12 Lecture Hours</p> <p>Limit, Continuity and differentiability of functions of two variables, Euler's theorem for homogeneous equations, Tangent plane and normal. Change of variables, chain rule, Jacobians, Taylor's Theorem for two variables, Error approximations. Extrema of functions of two or more variables, Lagrange's method of undetermined multipliers.</p>
<p>Unit III: Integral Calculus</p> <p>12 Lecture Hours</p> <p>Review of curve tracing and quadric surfaces, Double and Triple integrals, Change of order of integration. Change of variables. Gamma and Beta functions. Dirichlet's integral. Applications of Multiple integrals such as surface area, volumes, centre of gravity and moment of inertia.</p>
<p>Unit IV: Vector Calculus</p> <p>8 Lecture Hours</p> <p>Differentiation of vectors, gradient, divergence, curl and their physical meaning. Identities involving gradient, divergence and curl. Line and surface integrals. Green's, Gauss and Stroke's theorem and their applications.</p>

Suggested Reading

1. Shanti Narayan (2005), Differential Calculus, S. Chand Limited, ISBN 978-8-121-90471-4
2. P. K. Mittal (2005), Integral Calculus, S. Chand Limited, ISBN-13: 978-8-121-90681-4
3. Thomas (1996), Calculus and Analytical Geometry, Pearson Education, ISBN: 978-8-817-758325-0.
4. Erwin Kreyszig, Herbert Kreyszig, Edward J. Norminton (2011), Advanced Engineering Mathematics, Wiley. ISBN: 978-0-470-45836-5.
5. R. K. Jain, S. R. K. Iyengar (2004), Advanced Engineering Mathematics, Alpha Science International. ISBN: 978-1-842-65185-8.



LINGAYA'S VIDYAPEETH

SCHEME OF STUDIES

SESSION: 2021-22

BSC-109	PHYSICS	L T P	Cr
		3 -1 -0	4

<p>Unit I: Mechanics</p> <p>8 Lecture Hours</p>	
<p>Transformation of scalars and vectors under Rotation transformation; Forces in Nature; Newton's laws and its completeness in describing particle motion; Form invariance of Newton's Second Law; Solving Newton's equations of motion in polar coordinates; Problems including constraints and friction; Extension to cylindrical and spherical Coordinates.</p>	
<p>Unit II: Wave optics</p> <p>10 Lecture Hours</p>	
<p>Huygens' principle, superposition of waves and interference of light by wave front splitting and amplitude splitting; Young's double slit experiment, Newton's rings, Michelson interferometer, Mach-Zehnder interferometer.</p> <p>Fraunhauffer diffraction from a single slit and a circular aperture, the Rayleigh criterion for limit of resolution and its application to vision; Diffraction gratings and their resolving power.</p>	
<p>Unit III: Lasers</p>	8 Lecture Hours
<p>Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: gas lasers (He-Ne, CO₂), solid-state lasers (ruby, Neodymium), dye lasers; Properties of laser beams: mono-chromaticity, coherence, directionality and brightness, laser speckles, applications of lasers in science, engineering and medicine.</p>	
<p>Unit IV: Electrostatics</p>	7 Lecture Hours
<p>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, Boundary conditions of electric field and electrostatic potential; method of images; energy of a charge distribution and its expression in terms of electric field.</p>	
<p>Unit V: Magnetostatics</p>	5 Lecture Hours
<p>Principle of work and energy for a particle and a rigid body in plane motion – Conservation of energy - Principle of impulse and momentum for a particle and a rigid bodies in plane motion – Conservation of momentum – System of rigid bodies – Impact - direct and central impact – coefficient of restitution.</p>	



LINGAYA'S VIDYAPEETH

SCHEME OF STUDIES

SESSION: 2021-22

Suggested Reading

1. David J. Griffiths Pati (2017), Introduction to Electrodynamics, Cambridge University Press. ISBN: 978-1-108-35714-2.
2. W H Hayt Jr, , J A Buck, M Jaleel Akhtar (2020), Engineering Electromagnetics, 9th Edition, McGraw-Hill International Edition. ISBN: 978-9-353-16973-2
3. Manoj K. Harbola (2009), Engineering Mechanics , 2nd Edition, Cengage Learning India Private Limited. ISBN: 978-8-131-50990-6
4. Mahendra K. Verma (2019), Introduction to Mechanics, Taylor & Francis Group. ISBN: 978-1-138-11677-1
5. Robert Eisberg, Robert Martin Eisberg, Robert Resnick, David O. Caldwell, Edward Derringh (1985), Quantum Physics of Atoms, Molecules, Solids, Nuclei, and Particles, Wiley Publishers. ISBN: 978-0-471-87373-0.



LINGAYA'S VIDYAPEETH

SCHEME OF STUDIES

SESSION: 2021-22

EC-101	Basic Electrical and Electronics Engineering	L T P	Cr
		3 -1 -0	4

Course Objectives:

1. To understand and analyze basic electric and Electronics concepts.
2. To study the working principles of electrical machines and power converters.
3. To study the Network Theorems.

Course Outcomes

CO1	Students are able to understand and analyze basic electric and magnetic circuits
CO2	Students are able to understand the working principles of electrical machines and power converters.
CO3	Students are able to understand the components of low voltage electrical installations and power converters.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
15	25	60	100

Course Content:

<p>Unit I: Historical Background</p> <p>8 Lecture Hours</p> <p>Vacuum tubes; working of vacuum tube and their characteristics; vacuum diode; triode; tetrode and pentode. PN JUNCTION: Depletion layer; Barrier potential; Forward and reverse bias; Breakdown voltage; PIV; switching characteristics of p-n junction diode; knee voltage; load line; and operating Point Ideal p-n junction diode; junction capacitance; Zener diode.</p>
<p>Unit II: Rectifiers and filters</p> <p>8 Lecture Hours</p> <p>Half wave; centre tap full wave and bridge rectifier; percentage of regulation; PIV; ripple factor; C; RC; LC and PI filter; voltage doubler; clipping and clamping circuit; voltage regulation. Bipolar Junction Transistor: Introduction; basic theory of operation of PNP ad NPN transistor-1 characteristics; CB; CE and CC configuration; different biasing techniques.</p>
<p>Unit III: FET</p> <p>8 Lecture Hours</p>



LINGAYA'S VIDYAPEETH

SCHEME OF STUDIES

SESSION: 2021-22

Introduction; Theory of operation; JFET Parameters; and JFET Amplifiers. MOSFET: Introduction; theory of operation; MOSFET parameters; application; graphical analysis of BJT and FET circuits; linear models of BJT and FET; pulse and large signal models of BJT and FET.
Unit IV: DC Circuits 8 Lecture Hours
Representation of sinusoidal waveforms, peak and rms values, phasor representation, real Power, reactive power, apparent power, power factor. Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin, Norton and maximum power transfer Theorems.
Unit V: Electrical Machines 8 Lecture Hours
Three phase balanced circuits, voltage and current relations in star and delta connections. Generation of rotating magnetic fields, Construction and working of a three-phase induction Motor, Significance of torque-slip characteristic, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of dc motor. Construction and working of synchronous generators.

Suggested Reading

1. Millman and Halkias (2000), Electronic Devices and Circuits, 2nd Edition, Tata McGraw Hill Publication, ISBN: 978-0-070-42380-0.
2. D P Kothari, I J Nagrath (2020), Basic Electrical and Electronics Engineering, Second Edition, McGraw-Hill Education, ISBN: 978-9-389-81125-4.
3. W.A.J.Chapman (2001), Workshop Technology, Vol 1, 5th Edition, CBS Publishers, ISBN: 978-8-123-90401-6.
4. Boylestad and Nashelsky (1999) , Electronic Devices and Circuit , 4th Edition, Pearson Education, ISBN: 978-9-332-54260-0.



LINGAYA'S VIDYAPEETH

SCHEME OF STUDIES

SESSION: 2021-22

CS-101	Programming for problem solving using C	L T P	Cr
		3 -1 -0	4

Course Content:

<p>Unit I: Introduction to Computer Systems, Programming Languages, Operating System, Networking, and Security</p> <p>8 Lecture Hours</p> <p>Overview of Computer Systems: Characteristics of Computer- speed, storage, Accuracy, Categories of computer- Micro Computers, Mini Computers, Main Frames, Super Computers, Computer Organization- Central processing unit, Arithmetic and Logic Unit, Control Unit, Memory System- Primary memory, secondary memory. Data Representation in a Computer System- Number system - decimal, Binary, Octal, Hexadecimal representation and conversion.</p> <p>Software Basics: Application software, System Software, Programming languages: Low level languages, Machine language, Assembly language, High Level languages, Translator, Assembler, Interpreter, Compiler, Operating System: Need of Operating System, Function of Operating System, Types of Operating System, Introduction to Networking: Local and Wide Area Networks. Security Threats: Intruders, Password Cracking, Types of malicious Software- Virus, Worms, Trojan Horse, Prevention from malicious Software- Antivirus</p>	8 Lecture Hours
<p>Unit II: Basics of Programming using C</p> <p>Problem definition, Representation of Algorithms: Flow charts/ Pseudocode with example, Types of programming languages, Translators, From algorithms to programs; source code, variables and memory location, Introduction to C: Structure of C program, C character set, Identifier and Keywords, Data types, constants, variables, Declaration, Arithmetic expressions & precedence , statements, Symbolic constants, type conversion, Types of operators, Input and output functions in C, header files, common programming errors, Control Statements, Sequencing, Selection, Condition and iteration, Arrays and Strings: Declaring, Referencing and initializing arrays, array subscript, using for loop for sequential access, multi-dimensional array, String basics string library functions, assignment and substring, concatenation, string comparison.</p>	8 Lecture Hours
<p>Unit III: Functions and Pointers</p> <p>Definition of function, function prototype, Purpose of main function, passing parameters, Scope of function, recursion, Call by value and reference, Types of storage classes, Scope of variable: Global and local, static variables, Recursion. Pointer variables, initializing pointers, pointer operators, pointer expressions, pointers and arrays, pointer and functions.</p>	8 Lecture Hours
<p>Unit IV: Structures, Unions & Recursion</p> <p>Defining a structure, Declaring structure variables, Structure initialization, Copying and Comparing Structure variables, Array of structures, Arrays within structure, nested structures, Unions. Recursion as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc.</p>	8 Lecture Hours



LINGAYA'S VIDYAPEETH

SCHEME OF STUDIES

SESSION: 2021-22

Unit V: Dynamic Allocation, and File Handling	8 Lecture Hours
C's dynamic allocation functions. Streams and file types, opening and closing a data file, input and output operations, text mode versus binary mode, formatted input output operations with files, random access to files.	

Suggested Reading

1. Pradeep K. Sinha, Priti Sinha (2004), Computer Fundamentals, BPB Publications, ISBN: 9788176567527.
2. Byron S. Gottfried (1996), Programming with C, McGraw-Hill Education, ISBN:9780070240353.
3. E. Balagurusamy (1990), Programming in C, Tata McGraw-Hill Publishing ISBN: 9780074600474



LINGAYA'S VIDYAPEETH

SCHEME OF STUDIES

SESSION: 2021-22

HSS-101	Effective Technical Communication	L T P	Cr
		3 -1 -0	4

Course Outcomes

CO1	Comprehend and summarize characteristics & various structural principles prerequisite to Technical Communication
CO2	Classify and formulate the elementary intricacies of Scientific and Technical Writing using applicative grammar construct
CO3	Create cohesive technical paragraphs & text
CO4	Paraphrase text(s) and use appropriate referencing styles
CO5	Design and present/publish technical documents

Course Content:

Unit I: Introduction to Technical Writing	10 Lecture Hours
<ul style="list-style-type: none"> ➤ An overview of Technical Writing ➤ Nature of Scientific English & Technical writing ➤ Taxonomy of Technical writing ➤ Examples of Technical Writing 	
Unit II: Technical Writing Design & Development	10 Lecture Hours
<ul style="list-style-type: none"> ➤ Linguistic know-how in Technical Writing ➤ Techniques of precision ➤ Organization of Technical contents 	
Unit III: Signposting Paragraph Structure & Development	10 Lecture Hours
<ul style="list-style-type: none"> ➤ Signposting with strong Topic Sentence ➤ Writing for Purpose: Explanation, Instruction, Description, Definition, Comparison & Contrast, Classification, Narration, Hypotheses 	
Unit IV: Finding Data & Incorporating Sources	10 Lecture Hours
<ul style="list-style-type: none"> ➤ Finding data & incorporating sources ➤ Paraphrasing ➤ Avoiding Plagiarism ➤ Referencing styles 	
Unit V: Creating Technical Documents	10 Lecture Hours
<ul style="list-style-type: none"> ➤ Creating Technical Documents – Report, Manuals, Brochures etc. (Selected) ➤ Technical Presentation in Groups 	



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Suggested Reading

1. Technical Communication – Principles and Practices by Meenakshi Raman & Sangeeta
2. Modern Technical Writing by Sherman, Theodore A (et.al); Apprentice Hall; New Jersey; U.S.
3. A Text Book of Scientific and Technical Writing by S.D. Sharma; Vikas Publication, Delhi.
4. Rizvi, M.A. Academic Writing: A course in English for Science and Technology, Nabodaya
5. Price, Jonathan and Korman H., (1993) How to Communicate Technical Information: The Benjamin Cummings Publishing Company.
6. Muralikrishna and S. Mishra (2011) Communication Skills for Engineers, Pearson education. ISBN: 9788131733844.
7. Murphy, R. (2007) Essential English Grammar, CUP. ISBN: 8175960299.
8. Essential English Grammar by Raymond Murphy, CUP, 2011.
9. Intermediate English Grammar by Raymond Murphy, CUP, 2011.
10. Practical English Usage by Michael Swan, OUP, 2013.
11. Dignen, Bob. Presentation Skills in English. Orient Black Swan, 2007



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SCHEME OF STUDIES

SESSION: 2021-22

ME-151	Workshop Practice	L T P	Cr
		3 -1 -0	4

Course Content:

Unit I: MACHINE SHOP	12
Practical Hours	
Step turning & Taper turning Operation	
Exercise 1: To obtain required diameters (steps) on a cylindrical work piece with the given lengths.	
Shoulder Turning	
Exercise 2: To obtain required diameters on a cylindrical work piece with the given dimensions.	
Unit II: CARPENTARY SHOP	
12 Practical Hours	
Dove Tail Lap Joint	
Exercise 3: To make a dovetail lap joint Cross Half Lap Joint	
Exercise 4: To make a Cross Half Lap Joint	
Unit III: SHEET METAL SHOP	
12 Practical Hours	
Exercise 5: To make a funnel using G.I Sheet as per dimensions provided.	
Exercise 6: To make a Square box using G.I Sheet as per the dimension.	
Unit IV: WELDING SHOP	
12 Practical Hours	
Exercise 7: To make a single v-butt joint, using the given mild steel pieces of and by arc welding.	
Exercise8: To make a T- joint using the given mild steel pieces and by arc welding.	
Unit V: FOUNDARY SHOP	
12 Practical Hours	



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SCHEME OF STUDIES
SESSION: 2021-22

BS-159	Physics lab	L T P	Cr
		3 -1 -0	4

Course Content:

List of Experiments

60 Practical Hours

1. To study response curve of a series LCR circuit.
2. To determine the Planck's constant using LEDs.
3. To determine the Rydberg's constant of Hydrogen atom.
4. To find the refractive index and Cauchy's constants of a prism.
5. To find the wavelength of light by Newton's rings experiment.
6. To determine the thickness of a thin wire by interference.
7. To determine the wavelength of LASER using diffraction grating.
8. To determine the resolving power of a telescope.
9. To find the numerical aperture of an optical fiber cable.
10. To find the wavelength of light using Michelson's interferometer.



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SCHEME OF STUDIES

SESSION: 2021-22

EC-151	Basic Electrical and electronics Engineering lab	L T P	Cr
		3 -1 -0	4

Course Content:

List of Experiments

30 Practical Hours

1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi – meter, oscilloscope. Resistors, capacitors and inductors.
2. To study V-I characteristics of diode; and its use as a capacitance.
3. Study of the characteristics of transistor in Common Base configuration.
4. Study of the characteristics of transistor in Common Emitter configuration.
5. Study of characteristics of MOSFET/JFET in CS configuration.
6. To verify the Thevenin's & Norton's theorem.
7. To verify the Superposition theorem.
8. To study frequency response of series & parallel RLC Circuit.
9. Demonstration of cut – out sections of machines:
10. Load test on D.C. Shunt generator



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SESSION: 2021-22

HSS-151	English Communication Lab.	L T P	Cr
		3 -1 -0	4

List of Topics

30 Practical Hours

1. Intro - Lab & Seating Plan/Ice-breaking
2. Basic Ear training & Listening Skills: Practice
3. Listening Skills Test: Graded Exercise
4. International Phonetic Alphabet & Mispronounced Words: Practice.
5. International Phonetic Alphabet-2: Practice
6. Group Discussion Techniques – Dos & Don'ts – Practice GD
7. Extempore based on Cue Cards
8. Individual Speaking Activity: Graded Exercise.
9. Reading Skills & Comprehension: Practice
10. Reading Skills & Comprehension - Graded Exercise
11. Creating Technical Posters
12. Technical Poster Presentation Graded Exercise

Suggested Reading

1. Jones, D. (1909), "The Pronunciation of English", Cambridge: CUP; rpt in facsimile in Jones (2002).
2. Jones, D. (1918), "An Outline of English Phonetics", Leipzig: Teubner; rpt in Jones (2002).
3. Jones, D. (1909) "The Dictionary of English Phonetics" Cambridge: CUP (2002).
4. Bansal, R.K. The Intelligibility of Indian English, Monograph, 4 CIEFL, Hyderabad, Second abridged edition, 1976.
5. Jones, Daniel, English Pronouncing Dictionary, revised by A.C. Gimson, 14th Edition, The



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English Language Book Society and JM Dent Sons Ltd. London 1977.

6. Senthil. J and P.V. Dhamija, A Course in Phonetics and Spoken English Prentice Hall of India Private Ltd. New Delhi, 1989.

7. Taylor, Ken, Telephoning and Teleconferencing Skills. Orient Black Swan, 2008.

8. Dignen, Bob. Presentation Skills in English. Orient Black Swan, 2007.

9. Murphy, R. (2007) Essential English Grammar, CUP. ISBN: 8175960299.

10. C. Muralikrishna and S. Mishra (2011) Communication Skills for Engineers, Pearson education. ISBN: 9788131733844.

11. Essential English Grammar by Raymond Murphy, CUP, 2011

12. Intermediate English Grammar by Raymond Murphy, CUP, 2011

13. Practical English Usage by Michael Swan, OUP, 2013



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SS-151	B Programming for problem solving using C lab	L T P	Cr
		3 -1 -0	4

Course Content:

List of Topics (Students have to do at 3-4 programs from each section)

30 Practical Hours

SEQUENTIAL CONTROL STATEMENTS

1. Write a program to Print HELLO
2. Write a program to add two numbers
3. Write a program to calculate simple interest
4. Write a program to calculate average of three numbers
5. Write a program to swap two numbers
6. Write a program to illustrate mixed data types
7. Write a program to calculate area and circumference of circle
8. Write a program to evaluate a polynomial expression
9. Write a program to add digits of a four digit number
10. Write a program to check whether the person is eligible for voting or not

CONDITIONAL CONTROL STATEMENTS

11. Write a program to find greatest of two numbers
12. Write a program to find out which type of triangle it is
13. Write a program to find out greatest of three numbers
14. Write a program to evaluate performance of the student
15. Write a program to make a basic calculator

LOOP CONTROL STATEMENTS

16. Write a program to print Fibonacci up-to the given limit
17. Write a program to find the sum of digits of a number
18. Write a program to find factorial of a number
19. Write a program to print table of any number



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20. Write program for printing different pyramid pattern

ARRAYS AND STRINGS

21. Write a program to enter the elements in a one dimensional array
22. Write a program to find the sum and average of five numbers
23. Write a program to sort the array elements
24. Write a program to enter the marks of 50 students and calculate the average
25. Write a program to add 2 matrix
26. Write a program to multiply 2 matrices
27. Write a program to calculate the length of string
28. Write a program to concatenate 2 strings
29. Write a program to reverse the string
30. Write a program to count the numbers of characters in a string
31. Write a program that converts lower case characters to upper case
32. Write a program without using predefined functions to check whether the string is palindrome or not

FUNCTIONS & POINTERS

33. Write a program using function to find the largest of three numbers
34. Write a program using function to sum the digits of a number
35. Write a program to calculate factorial of a number using recursive function
36. Write a program to print first n Fibonacci using recursive function
37. Write a program to illustrate the concept of chain of pointers
38. Write a program using function to swap two numbers using call by reference
39. Write a program to calculate the area and perimeter of circle using pointers
40. Write a program to copy the contents of one array into another in the reverse order using pointers

STRUCTURES

41. Write a program to read an employee record using structure and print it
42. Write a program to prepare salary chart of employee using array of structures
43. Write a program to print the name and percentage of 20 students (array of structures and arrays within structures).
44. Write a program to demonstrate structure within structure.

FILE HANDLING

45. Write a program to create, open, and close files.
46. Write a program to demonstrate the purpose of different file opening modes.
47. Write a program to count the number of characters, spaces, tabs, new line characters in a file.
48. Write a program to receive strings from keyboard and write them to a file.
49. Write a program to copy a file to another.
50. Write a program to read strings from a file and display them on screen

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SCHEME OF STUDIES

SESSION: 2021-22

BSC-108	MATHEMATICS II	L T P	Cr
		3 -1 -0	4

Course objectives:

CO1. To acquaint the students with the various concepts and tools of applied mathematics which will be very basic and the very soul and guide of various engineering subject.

CO2. Students will use mathematics concepts in real world situations.

CO3. Students will simplify and perform operations with nonlinear expressions

Unit-I: SOLUTION OF NONLINEAR EQUATIONS : Introduction to numbers and their accuracy; absolute, relative and percentage errors and their analysis; Bisection method ; Regula- falsi method; secant method; Newton- Raphson method.

Unit-II: SOLUTION OF SIMULTANEOUS LINEAR EQUATIONS & INTERPOLATION :
Gauss elimination method; Gauss-Jordan method; Jacobi's iteration method; Gauss-Seidal iteration method; : Introduction to interpolation; Newton's forward and backward interpolation formulae; Stirling formula; Lagrange interpolation; Newton's divided difference formula.

Unit-III: NUMERICAL DIFFERENTIATION AND INTEGRATION & SOLUTION OF ORDINARY

DIFFERENTIAL EQUATION: Numerical differentiation formulae: differentiation by using forward interpolation formula; backward interpolation formula; Stirling formula; Newton-Cotes formula for numerical integration: Trapezoidal rule; Simpson's rules. Taylor series method; Euler method; Euler modified method; Runge kutta method.

Unit-IV: LAPLACE TRANSFORMS AND ITS APPLICATIONS: Laplace transform (LT) of elementary functions; properties of LT; existence conditions of LT; LT of derivatives; LT of integrals; LT of the function multiplication by t; LT of the function division by t; inverse LT's; LT of convolution of two functions.

Unit V: FOURIER SERIES: Euler's formula; conditions for a Fourier expansion; change of interval; Fourier expansion of odd and even function; Fourier expansion of square wave, rectangular wave.

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SESSION: 2021-22

TEXT BOOK

Grewal, B. S., "Numerical methods in Engineering and Science", 9th Edition, 2010, Khanna publishers. And Higher Engineering Mathematics: B. S. Grewal

REFERENCE BOOKS

1. Jain, R.K. and Iyengar, S.R.K., "Numerical Methods for Scientific and Engg. Computations", 5th Edition, 2007, New Age International publishers.
2. Sastry, S.S., "Introductory Methods of Numerical Analysis", 3rd Edition, 1999, Prentice Hall of India.
3. Advanced Engg Mathematics: Michael D. Greenberg
4. Advanced Engineering Mathematics: E. Kreyszig

MATHEMATICS II ME - 108 B	Course objectives	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
	CO1	2	1	2		1	2	2	1		1	3	1
	CO2	2	2		1		2		1		1	3	2
	CO3	2		1			2	1		2	1	3	1

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BS-110	ENVIRONMENTAL SCIENCE AND CHEMISTRY	L T P	Cr
		2 -0 -0	0

Course objectives:

- CO1. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.
- CO2. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.
- CO3. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world

- 1. THE MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES:** Basic definitions related to environment; Scope, vis-à-vis environmental science and environmental engineering; a uses of environmental degradation, atmospheric composition and associated spheres, habitat and climate; objective, goals and principals involved in environmental education, environmental awareness, Environmental ethics, environmental organization and their involvement.
- 2. NATURAL RESOURCES:** Renewable and non-renewable resources; forest resources, over- exploitation, and deforestation / afforestation; water resources, impact of over-utilization of surface and ground water, floods, drought, conflicts over water, dams; mineral resources: dereliction of mines, environmental effects of extracting and using mineral resources; Food resources, modern agriculture and its impact, problem associated with fertilizer and pesticide, water logging, salinity ; energy resources, renewable, non-renewable energy sources, solar energy, wind energy, hydro energy, biomass energy, geothermal energy, nuclear energy and its associated hazards; land as a resource, land degradation, man induced landslides, soil erosion and desertification.
- 3. ECOSYSTEMS:** Concept of an ecosystem, structure and function of an ecosystem, producers, consumers and decomposers, energy flow in the ecosystem, ecological succession, food chains, food webs and ecological pyramids; characteristic features, structure and function of the following ecosystem -forest ecosystem, grassland ecosystem desert ecosystem and aquatic ecosystems.
- 4. BIODIVERSITY AND ITS CONSERVATION:** Bio-geographical classification of India; biodiversity at global, national and local levels, India as a mega-diversity nation, hot-spots of biodiversity; value of biodiversity-consumptive use, productive use, social, ethical aesthetic and option values; threats to biodiversity; conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.
- 5. ENVIRONMENTAL POLLUTION:** Causes, effects and control measures of air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution; solid waste management, e-waste management; disaster management –floods, earthquake, cyclone and landslides.
- 6. SOCIAL ISSUES AND THE ENVIRONMENT:** Water conservation, rain water harvesting, watershed management; climate change, global warming, acid rain, ozone layer depletion; Environmental Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Wildlife Protection Act, Forest

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Conservation Act.

7. **HUMAN POPULATION AND THE ENVIRONMENT:** Population growth, population explosion –family welfare programmes; role of information technology in environment and human health; case studies, Chipko movement, Sardar Sarovar dam, mining and quarrying in Udaipur, salinity and water logging in Punjab, Haryana and Rajasthan, Bhopal gas tragedy, Chernobyl nuclear disaster, arsenic pollution in ground water.

TEXT BOOK

Kaushik, Anubha, and Kaushik, C.P., “Perspectives in Environmental Studies”, 4th Edition, New Age International Publishers, 2004

REFERENCE BOOKS

1. Agarwal, K.C., “Environmental Biology”, 2nd Edition, Nidhi Publ. Ltd., Bikaner, 2001.
2. Bharucha Erach, “The Biodiversity of India”, 2nd Edition, Mapin Publishing Pvt. Ltd., 2006.
3. Brunner R. C., “Hazardous Waste Incineration”, 1st Edition McGraw Hill Inc., 1989.
4. Clark R.S., “Marine Pollution”, 1st Edition Clanderson Press Oxford, 1989
5. .Cunningham, W.P., Cooper, T.H. Gorhani, E. & Hepworth, M.T., Environmental Encyclopedia”, 2nd Edition, Jaico Publ. House, 2001.
6. De, A. K., “Environmental Chemistry”, 2nd Edition, Wiley Eastern, 1989
7. Jadhav, H. and Bhosale, V.M ., “Environmental Protection and Laws”, 1st Edition, Himalaya Pub. House, Delhi, 1995.
8. Mckinney, M.L. and Schocl. R.M., “Environmental Science Systems & Solutions”, 2nd Edition, Web enhanced edition, 1996.
9. Rao M.N. and Datta, A.K., “Waste Water Treatment”, 2nd Edition, Oxford & IBH Publ.Co., 1987.
10. Sharma B.K., “Environmental Chemistry”, 2nd Edition, Goel Publ. House, Meerut, 2001
11. Trivedi R.K. and Goel, P.K., “Introduction to Air Pollution”, 2nd Edition, Techno- science Publications, 1996

ENVIRONMENTAL SCIENCE BS-110	Course objectives	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
	CO1	2	1	2		1	2	2	1		1	3	1
	CO2	2	2		1		2		1		1	3	2
	CO3	2		1			2	1		2	1	3	1
ME - 102	ENGINEERING MECHANICS										L T P	Cr	

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		300	3
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Course objectives:

CO1. Engineering Mechanics is one of the core subjects that introduces the student to analysis of forces and motion and prepares the student for studying strength of materials and theory of machines.

CO2. To enable students to apply fundamental laws and basic concepts of rigid body mechanics to solve problems of bodies under rest or in motion

CO3. To enable the students to apply conditions of static equilibrium to analyse physical systems.

Course outcomes:

1.	Solve engineering problems involving the equilibrium of particles and rigid bodies.
2.	Solve the problems involving dry friction and virtual work.
3.	Determine the centroid, center of gravity, and moment of inertia of various surfaces and solids.
4.	Solve problems related to kinematics and kinetics of a rigid body.
5.	Solve problems using the energy-momentum principle for a particle and rigid bodies in plane motion.

- FORCE SYSTEMS:** Basic concepts of space, time, mass, force, particle and rigid body; scalars and vectors; principle of transmissibility; force classification; Representation of force in vector form; rectangular components of two dimensional force systems; resultant of two dimensional and concurrent force systems; moment about a point; Varignon's theorem; Representation of moment in vector form; couple. Numerical.
- EQUILIBRIUM:** Equilibrium in two dimensions; Lame's Theorem; system isolation and the free-body-diagram; modeling the action of forces; equilibrium conditions; Numerical.
- PROPERTIES OF SURFACES/CROSS SECTIONS:** Centre of mass; determining the centre of gravity; centre of gravity of areas including composite sections; moments of inertia; MI of plane figures; parallel axis & perpendicular axis theorem;; MI of composite figures. Numerical.
- RECTILINEAR AND CURVILINEAR MOTION :** Types of motion ,definitions of displacement , distance, velocity , speed , acceleration Newton's laws of motion , Uniform and non uniform motion equations of motion , motion under gravity. Numerical.
- PROJECTILES :** Angle of projection , Trajectory , Range of projectile , Duration of flight , Path of projectile , Greatest height attained by a projectile. Numerical.

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SESSION: 2021-22

TEXT BOOK

Meriam, J. L. "Engineering Mechanics", John Wiley & Sons.

REFERENCE BOOKS

1. Beer, F.P. and Johnston, E.R. "Mechanics of Materials", Tata McGraw Hill
2. Shames, I.H. "Engineering Mechanics", 4th Edition, Pearson Education, 2003
3. Pytel, A and Kiusalaas, J. Thomson, "Mechanics of Materials", Brooks & Cole, 2003

WEB REFERENCES

www.eCourses.ou.edu



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SCHEME OF STUDIES

SESSION: 2021-22

CE 104	INTRODUCTION TO CIVIL ENGINEERING	L	T	P	Cr
		3	-0	-0	3

UNIT I:

Evolution and history of Civil Engineering.
 Classification and domains of Civil Engineering.
 Surveying; Compass survey, chain survey,
 Introductions to modern surveying equipment's and techniques such as EDM or Distometer,
 Total station, Remote sensing & GPS.

UNIT II:

Basic building materials and constructions:
 Common building materials, properties, Bricks, limes, timbers, stones, asphalt, bitumen, tar, Foundations,
 Types of buildings, Masonary: brick & composite, plastering, walls, roofs, floors.

UNIT III:

Concrete materials and technology: Concrete materials & their compositions, properties,
 cements, grades of concrete, admixtures, formwork, concrete handling in fields.

UNIT IV:

Traffic & Transportation Engineering: History of transportation engineering,
 Modes of transportation, Classification of roads, road plans, traffic signs, traffic signals, road markings,
 traffic & parking surveys, street lights, road accidents,
 railway engineering, airport engineering and planning, airport components, zonings, obstructions.

UNIT V:

Environmental & hydraulic Engineering: Water supply, waste water, irrigation & hydraulic structures.
 Geotechnical Engineering & soil mechanics:
 Soil constituents, water contents, void ratio, porosity,
 soil classification, soil stabilization, soil exploration, bearing capacity.

Books:

1. Building materials, S.C. Rangwala
2. Building Construction, B.C Punmia
3. Concrete Technology, Neville & Brooks, Pearson

Highway Engineering, S.K. Khanna, Soil Mechanics, K. R. Arora



Course code	Course title	L	T	P	Credits
CE-104	Surveying	3	1	0	4

OBJECTIVE

Surveying or land surveying is the technique and science of accurately determining the terrestrial or three-dimensional position of points and the distances and angles between them. These points are usually on the surface of the Earth and they are often used to establish land maps and boundaries for ownership or governmental purposes. To accomplish their objective, surveyors use elements of geometry, engineering, trigonometry, mathematics, physics and law.

- FUNDAMENTALS & LINEAR MEASUREMENTS:** Principles of Surveying; Definition, objects, classification, fundamental; principles, methods of fixing stations. Measurement; Direct measurement, instruments for measuring distance, instruments for making stations, chaining of line. Errors; in chaining, tape corrections examples.
- COMPASS AND CHAIN TRAVERSING:** Methods of traversing, instruments for measurement of angles-prismatic and surveyor's compass, bearing of lines, local attraction, examples.
- LEVELLING:** levelling; Definition of terms used in levelling, Type; types of levels and staff. Temporary adjustment of levels. Principles of levelling; reduction of levels, booking of staff readings, examples, contouring, characteristics of contours lines; locating contours, interpolation of contours.
- THEODOLITE AND THEODOLITE:** Traversing; Theodolites; temporary adjustment of theodolite, measurement of angles, repetition and reiteration method. Traverse surveying with theodolite; checks in traversing, adjustment of closed traverse, examples.
- PLANE TABLE SURVEYING:** Plane table; methods of plane table surveying, radiation, intersection, traversing and resection. Problems; two point and three point problems.
- TACHEOMETRY:** Uses of tacheometry, principle of tacheometric surveying, instruments used in tacheometry, systems of tacheometric surveying-stadia system fixed hair method, determination of tacheometric constants, tangential systems, examples.
- CURVES:** Classification of Curves, elements of simple circular curve, location of tangent points; Chain & Tape methods, instrumental methods, examples of simple curves, Transition curves; Length & type of transition curves, length of combined curves, examples. Vertical curves; Necessity & types of vertical curves.

TEXT BOOK

Punmia, B.C., Jain Ashok Kumar, Jain. Arun Kumar., "SURVEY –I", Laxmi Publication Pvt Limited, New Delhi, 2005

REFERENCE BOOKS

- Kanitkar T.P., "SURVEY –I", Standard Publication, New Delhi, 2008
- Duggal, S.K., "Surveying Volume –I" Tata McGraw Hill, July 2004
- Bannister., "Surveying", 7th Edition, Pearson Education, 2009
- William, Irvine., Finlay, Macleannan., "

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SESSION: 2021-22

Course code	Course title	L	T	P	Credits
PEP-102	UNIVERSAL HUMAN VALUES	1	0	2	2

Course Objectives:

1. To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity, which are the core aspirations of all human beings
2. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of Universal
3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature

UNIT 1: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education
 1. Understanding the need, basic guidelines, content and process for Value Education
 2. Self Exploration—what is it? - its content and process; ‘Natural Acceptance’ and Experiential Validation- as the mechanism for self exploration
 3. Continuous Happiness and Prosperity- A look at basic Human Aspirations
 4. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority
 5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
 6. Method to fulfill the above human aspirations: understanding and living in harmony at various levels

UNIT 2: Understanding Harmony in the Human Being - Harmony in Myself!
 7. Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’
 8. Understanding the needs of Self (‘I’) and ‘Body’ - Sukh and Suvidha
 9. Understanding the Body as an instrument of ‘I’ (I being the doer, seer and enjoyer)
 10. Understanding the characteristics and activities of ‘I’ and harmony in ‘I’
 11. Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail
 12. Programs to ensure Sanyam and Swasthya - Practice Exercises and Case Studies will be taken up in Practice Sessions.

UNIT 3: Understanding Harmony in the Family and Society- Harmony in Human Human Relationship
 13. Understanding Harmony in the family – the basic unit of human interaction
 14. Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship
 15. Understanding the meaning of Vishwas; Difference between intention and competence
 16. Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship
 17. Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals
 18. Visualizing a universal harmonious order in society- Undivided

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SCHEME OF STUDIES

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Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha)- from family to world family! - Practice Exercises and Case Studies will be taken up in Practice Sessions.

UNIT 4: Understanding Harmony in the Nature and Existence - Whole existence as Co-existence
 19. Understanding the harmony in the Nature
 20. Interconnectedness and mutual fulfillment among the four orders of nature
 recyclability and self-regulation in nature
 21. Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space
 22. Holistic perception of harmony at all levels of existence - Practice Exercises and Case Studies will be taken up in Practice Sessions.

UNIT 5: Implications of the above Holistic Understanding of Harmony on Professional Ethics
 23. Natural acceptance of human values
 24. Definitiveness of Ethical Human Conduct
 25. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
 26. Competence in professional ethics: a) Ability to utilize the professional competence for augmenting universal human order
 b) Ability to identify the scope and characteristics of people-friendly and ecofriendly production systems,
 c) Ability to identify and develop appropriate technologies and management patterns for above production systems.
 27. Case studies of typical holistic technologies, management models and production systems
 28. Strategy for transition from the present state to Universal Human Order: a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers
 b) At the level of society: as mutually enriching institutions and organizations.

UNIVERSAL HUMAN VALUES	Course objectives	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
		1	2	3	4	5	6	7	8	9	0	1	2	
PEP-102	CO1		1	1		1							1	
		2										2		1
	CO2						2	1		1				
		2	2	1	1							2		1
	CO3	3	2				1					2		2

LINGAYA'S VIDYAPEETH

SCHEME OF STUDIES

SESSION: 2021-22

Course code	Course title	L	T	P	Credits
ME-154	MATERIAL SCIENCE LAB	0	0	2	1

Course Objectives:

1. To expose the students to the testing of different materials under the action of various forces and determination of their characteristics experimentally.
2. It also provides knowledge about the structure of materials and the effect of temperature; composition and time on various metallurgical processes.
3. The study of this course will help the students to identify and select suitable materials for various engineering applications.

Course outcomes:

1.	Interpret the hardness values obtained from different heat treatment processes.
2.	Identify the materials based on their microstructures.

LIST OF EXPERIMENTS

1. To study the creep deformation of the solder wire
2. To study the Bravais Lattices
3. To study the arrangement of atoms in simple crystal with the aid of models
4. To study the chemical methods of corrosion
5. To normalize a given specimen and check its toughness
6. To temper the given hardened steel specimen at 300°C and measure hardness
7. To temper the given hardened steel specimen at 500°C and measure hardness
8. To study the microstructure of heat treated steel
9. To harden a given specimen and check its hardness
10. To anneal a given specimen and check its hardness

LINGAYA'S VIDYAPEETH

SCHEME OF STUDIES

SESSION: 2021-22

MATERIAL SCIENCCELAB ME-154	Course objectives	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO12
	CO1	2	1					1	1		1		
	CO2	1	2		1		2		1		1		1
	CO3	2			1			1				1	

LINGAYA'S VIDYAPEETH

SCHEME OF STUDIES

SESSION: 2021-22

Course code	Course title	L	T	P	Credits
BS-160	Environmental science and chemistry lab	0	0	2	1

Course Objectives:

1. The student will learn concepts and vocabulary related to environmental science by completing the various labs. Students will explore several important concepts that of of concern to us as citizens, educators, and scientists. They will do this by completing lesson and lab activities which may include collecting visual data photographs.
2. The student will properly apply the scientific method to research a problem and formulate conclusions. All sciences share a common methodology of attaining knowledge that sees to eliminate bias and prejudice in research. You will learn the difference between a hypothesis and a scientific theory.
3. The student will synthesize information from external sources and personal observations and incorporate them into lab activities. Learn how scientists think. Scientists observe, question, and analyze, and you will be expected to do the same.

LIST OF EXPERIMENTS

1. Searching for Iron Ore
2. To study Sea Floor Spreading
3. To study Soil pH
4. To study Soil Salinity
5. To study Magnetic Field Sensor
6. To study Magnetic Field Sensor
7. To study pH Sensor
8. To study Conductivity Probe

Environmental science and chemistry lab BS-160	Course objectives	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
		1	2	3	4	5	6	7	8	9	0	1	2	
	CO1	2	1						1	1		1		
	CO2	1	2		1		2		1			1		1
	CO3	2			1				1				1	

LINGAYA'S VIDYAPEETH

SCHEME OF STUDIES

SESSION: 2021-22

ME-152	ENGINEERING GRAPHICS LAB	L-T-P	Credits
		0-0-4	2

Course objectives:

1. Demonstrate basics of CAD/CAM concepts.
2. Explain computer graphics and solid modeling techniques.
3. Demonstrate part programs and group technology techniques.
4. Discuss latest advances in the manufacturing perspectives.

Course outcomes:

- | | |
|----|---|
| 1. | Apply design concepts. |
| 2. | Utilise CAD standards for geometrical modeling. |
| 3. | Demonstrate Solid modeling techniques. |
| 4. | Develop part programs for solid models. |

UNIT 1: INTRODUCTION TO ENGINEERING DRAWING

Principles of Engineering Graphics and their significance, usage of drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Dimensioning.

UNIT 2: ORTHOGRAPHIC PROJECTIONS

Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes;

UNIT 3: PROJECTIONS OF SOLIDS

Projections of planes inclined Planes - Auxiliary Planes; Projection of Regular Solids covering those inclined to both the planes, Auxiliary Views; Section of such solids and the true shape of the section.

UNIT 4: SECTIONS AND SECTIONAL VIEWS OF RIGHT ANGULAR SOLIDS

Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; objects from industry and dwellings (foundation to slab only) Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids Conversion of Isometric Views to Orthographic Views and Vice-versa

UNIT 5: OVERVIEW OF COMPUTER GRAPHICS

Introduction to Computer Aided Drafting and CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area



LINGAYA'S VIDYAPEETH

SCHEME OF STUDIES

SESSION: 2021-22

CE-152	Surveying LAB	L-T-P	Credits
		0-0-2	1

1. Introduction to Surveying Laboratory-I
2. Survey of an area by chain survey (closed traverse) & plotting
3. Chaining across obstacles
4. Determine of distance between two inaccessible points with compass
5. Surveying of a given area by prismatic compass (closed traverse) and plotting after adjustment
6. Correction for Local Attraction by Prismatic Compass.
7. Radiation method, intersection methods by plane table survey
8. Two point problems in plane table survey
9. Three point problems in plane table survey
10. Traversing by plane table survey

Course Code	Course Name	L-T-P	Credit
BS-207	Engineering Mathematics	3-1-0	4

Unit I: Matrix Algebra

8 Lecture Hours

Elementary operations and their use in getting the Rank, Inverse of a matrix and solution of linear simultaneous equations. Orthogonal, Symmetric, Skew-symmetric, Hermitian, Skew-Hermitian, Normal & Unitary matrices and their elementary properties. Eigen-values and Eigenvectors of a matrix, Cayley-Hamilton theorem, Diagonalization of a matrix.

Unit II: Sequence, Power Series and Fourier Series : (8 lectures)

Sequence, Convergence of Sequence, Series, geometric series, Convergence of series, comparison test, p-test, Leibnits Test, Periodic Function, Fourier series, Dirichlet's condition for Fourier series, Determination of Fourier coefficients (Euler's formulae), Fourier series for discontinuous, even, and odd functions.

Unit III: Ordinary differential equations (ODs): (8 lectures)

First order ordinary differential equations, Separation of variables, Exact, Linear and Bernoulli's equations, Second order differential equation with constant coefficients, Cauchy-Euler equation, Sturm-Liouville's problems.

Unit IV: Partial Differential Equations (PDEs): (8 lectures)

Formation and classification of first-order PDEs, Linear first-order PDEs, Lagrange's method, Nonlinear first-order PDEs, Charpit's method, Linear partial differential equations with constant coefficients, Method of separation of Variables, Heat Equation, Wave Equation.

Unit V: Complex Variable : (8 lectures)

Differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm), Contour integrals, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof) singularities, Laurent's series; Residues, Cauchy Residue theorem.

Texts Books:

1. Advanced Engineering Mathematic By D. G. Zill and W. S. Wright.
2. Advanced Engineering mathematics by Erwin Kreyszig.

Reference Books:

1. Higher Engineering mathematics By B.S. Grewal.
2. Mathematical Analysis. By S.C. Malik and Savita Arora.
3. Higher Engineering Mathematics By H.K. Dass and Er. Rajnish Verma

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Course Code	Course Name	L-T-P	Credit
CE-201	Surveying and Geomatics	3-0-0	3

Unit 1

FUNDAMENTALS & LINEAR MEASUREMENTS: Principles of Surveying; Definition, objects, classification, fundamental; principles, methods of fixing stations. Measurement; Direct measurement, instruments for measuring distance, instruments for making stations, chaining of line. Errors; in chaining, tape corrections examples. **COMPASS AND CHAIN TRAVERSING:** Methods of traversing, instruments for measurement of angles-prismatic and surveyor's compass, bearing of lines, local attraction, examples.

Unit 2

LEVELLING:levelling; Definition of terms used in levelling, Type; types of levels and staff. Temporary adjustment of levels. Principles of levelling; reduction of levels, booking of staff readings, examples, contouring, characteristics of contours lines; locating contours, interpolation of contours. **THEODOLITE AND THEODOLITE:** Traversing; Theodolites; temporary adjustment of theodolite, measurement of angles, repetition and reiteration method. Traverse surveying with theodolite; checks in traversing, adjustment of closed traverse, examples.

Unit 3

PLANE TABLE SURVEYING: Plane table; methods of plane table surveying, radiation, intersection, traversing and resection. Problems; two point and three point problems.

Unit 4

TACHEOMETRY: Uses of tacheometry, principle of tacheometric surveying, instruments used in tacheometry, systems of tacheometric surveying-stadia system fixed hair method, determination of tacheometric constants, tangential systems, examples.

Unit 5

CURVES: Classification of Curves, elements of simple circular curve, location of tangent points; Chain & Tape methods, instrumental methods, examples of simple curves, Transition curves; Length & type of transition curves, length of combined curves, examples. Vertical curves; Necessity & types of vertical curves.

TEXT BOOK

Punmia, B.C., Jain Ashok Kumar, Jain. Arun Kumar., "SURVEY –I", Laxmi Publication Pvt Limited, New Delhi, 2005

REFERENCE BOOKS

1. Kanitkar T.P., "SURVEY –I", Standard Publication, New Delhi, 2008
2. Duggal, S.K., "Surveying Volume –I" Tata McGraw Hill, July 2004
3. Bannister., "Surveying", 7th Edition, Pearson Education, 2009
4. William, Irvine., Finlay, Macleannan., "Survey for Construction", McGraw-Hill, 5th Edition, 2006

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Course Code	Course Name	L-T-P	Credit
CE-203	Fluid Mechanics	3-1-0	4

Unit 1

INTRODUCTION: Fluid properties; mass density, specific weight, specific volume and specific gravity, surface tension, capillarity, pressure inside a droplet and bubble due to surface tension, compressibility, viscosity. Newtonian and Non-Newtonian fluids. Real and ideal fluids.

Unit 2

KINEMATICS OF FLUID FLOW: Kinematics; Steady & unsteady, uniform and non-uniform, laminar & turbulent flows, one, two & three dimensional flows. streamlines; streak lines and path lines. continuity equation in differential form, rotation and circulation, elementary explanation of stream function and velocity potential function rotational and irrotational flows, graphical and experimental methods of drawing flow nets.

Unit 3

FLUID STATICS: Pressure; density, height relationship, gauge and absolute pressure, simple differential and sensitive manometers, two liquid manometers, pressure on plane and curved surfaces, centre of pressure, Buoyancy, stability of immersed and floating bodies, determination of metacentric height, fluid masses subjected to uniform acceleration, free and forced vortex.

Unit 4

DYNAMIC OF FLUID FLOW: Euler's equation of motion along a streamline and its integration, limitation of Bernouli's equation. Pitot tubes, venturimeter, Orificemeter, flow through orifices & mouth pieces, sharp crested weirs and notches, aeration of nappe.

Unit 5

BOUNDARY LAYER ANALYSIS: Boundary layer thicknesses, boundary layer over a flat plate, laminar boundary layer, turbulent boundary layer, laminar sub-layer, smooth and rough boundaries, local and average friction coefficient, separation and its control.

Unit 6

FUNDAMENTALS OF FLOW THROUGH OPEN CHANNELS: flow through open Channels ;Types of flow, phases formula, Menniges formula, rectangular and trapezoidal channels. velocity distributions in open channels, measurement of velocity and discharge in irregular channels.

Unit 7

DIMENSIONAL ANALYSIS: Principles of Dimensional homogeneity, Rayleigh's method, Buckingham's theorem, dimensional analysis problems, use and limitation of dimensional analysis.

TEXT BOOK

P.N. Modi & S.M. Seth., "Hydraulic and Fluid Mechanic" Standard Book House, 2009

REFERENCE BOOKS

1. Streeter & Wylie., "Fluid mechanics", McGraw-Hill Companies, 9th Sub edition (December 1, 1997)
2. V.T. Chow., "Open channel Hydraulics", McGraw-Hill Companies (June 1, 1959)
3. R. J. Garde, & A. G. Mirajgaoker., "Engineering Fluid Mechanics", Eurasia Publishing House (P) Ltd., New Delhi, 1995

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Course Code	Course Name	L-T-P	Credit
CE-207	Hydrology	3-0-0	3

Unit 1

INTRODUCTION: Importance of hydrology in relation to water resources development, Hydrologic cycle, scope and application of hydrology to engineering problems, water budget equation, drainage basins and its characteristics, stream geometry, hypsometric curves.

Unit 2

PRECIPITATION: Forms and types of precipitation, measurement of precipitation, recording and non recording rain gauges, rain gauge station, rain gauge network, estimation of missing data, presentation of rainfall data, mass curves, mean precipitation, depth -area -duration relationship, frequency of point rainfall, intensity -duration- frequency curves, probable max. Precipitation, rainfall distribution in India.

Unit 3

EVAPORATION & TRANSPIRATION: Process, evaporimeters and empirical relationships, analytical method, reservoir evaporation and methods of its control, transpiration, evapo-transpiration and its measurement, Penman's equation and potential evapo-transpiration, Depression storage. **INFILTRATION:** Infiltration process, initial loss, infiltration capacity and measurement of infiltration, infiltration indices Horton's equation. **GROUND WATER:** Sources of ground water, Occurrence, types of aquifers, mass balance equation, compressibility of aquifers, water table and its effects on fluctuations, wells and springs, movement of ground water, Darcy's law, permeability and its determination, porosity, specific yield and specific retention, storage coefficient, transmissibility, Well Hydraulics: Steady state flow to wells in unconfined and confined aquifers. Characteristics of wells and their yield, mutual interference of wells, ground water budgeting, recharging of ground water.

Unit 4

RUNOFF: Factor affecting run-off, estimation of runoff, rainfall; run off relationships, measurement of stage and velocity, Area Velocity method, staff gauge, wire gauge, automatic stage recorder and stage hydrograph, measurement of velocity-current meters, floats, area velocity method, moving boat and slope area method, electromagnetic, ultra-sonic and dilution methods of stream flow measurement, stage discharge relationship.

Unit 5

HYDROGRAPH: Discharge hydrograph, components and factors affecting shape of hydrograph, basic flow separation techniques, effective rainfall, unit hydrograph and its derivation, unit hydrograph of different durations, use and limitations of unit hydrograph, methods of superimposition and S-curve, dimensionless unit hydrograph, instantaneous Unit Hydrograph. Snyder's synthetic unit hydrograph, flood : computation of peak floods by empirical formulas, rational methods, empirical formulae, Unit Hydrograph method, flood frequency methods, Gumbel's method, graphical method, design flood.

TEXT BOOK

K. Subramanya., "Engineering Hydrology", 2nd Edition, Tata McGraw Hill Publishing Company Limited, 1984.

REFERENCE BOOKS

1. H. M. Raghunath., "Hydrology", New Age International (p) Limited, 2006

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Course Code	Course Name	L-T-P	Credit
CE-205	Building Materials and Construction	3-0-0	3

Unit 1

MASONRY CONSTRUCTION: Introduction; various terms used Stone Masonry: Classification, dressing of stone, safe permissible loads. Brick Masonry: Bonds in brickworks, laying brick work, defects in brick masonry.

Unit 2

DAMP PROOFING, HEAT AND SOUND INSULATION: Defects, causes and prevention of dampness, damp – proofing treatment in buildings, materials used, water proofing treatment of roofs. Cavity and partition walls, advantages, position of cavity, construction details, precautions, construction of masonry cavity wall. Acoustics, sound insulation of buildings. Fire resisting properties of materials, fire – resistant construction. Fire protection requirements for buildings.

Unit 3

ROOFS AND FLOORS: Types of roofs, various terms used Roof trusses: King Post truss, Queen Post truss etc. Floor structure: ground, basement and upper floors, various types of floorings. **DOOR AND WINDOWS:** Location, sizes, types of doors and windows, details, fixtures and fasteners for doors and windows. **STONES, BRICKS AND TILES:** Stones: Classification of stones, quarrying, blasting and storing out, dressing, sawing, polishing and seasoning of stones. Bricks: classification, constituents of good brick earth, harmful ingredients, manufacturing and testing of bricks. Tiles: Terra – cotta, manufacturing of tiles and terra – cotta, types and uses of terra – cotta.

Unit 4

LIMES, CEMENT AND MORTARS: Limes: Classification of limes, artificial hydraulic lime, pozzolana, testing and storage of lime. Cements: Composition of cement, types manufacturing of ordinary Portland cement, testing and storage, special types of cement. Mortars: Definition, properties of lime and cement mortars, mortars for masonry and plastering..

Unit 5

TIMBERS, PAINTS AND VERNISHES: Timbers: Classification of timber, seasoning of timber, defects in timber, fire – proofing of timber. Plywood, fire board, masonite and its manufacturing, important Indian timbers. Paints & Varnishes: Basic constituents of paints, types of paints, painting of wood, constituents of varnishes, classification and types of varnishes.

TEXT BOOK

Punmia, B. C., Jain, Ashok Kumar., Jain, Arun Kumar., “Building Construction”, Laxmi Publication Pvt Ltd., New Delhi, 2005

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2ndYear 3rdSem

Course Code	Course Name	L-T-P	Credit
CE-251	Surveying and Geomatics Lab	0-0-2	1

LIST OF EXPERIMENTS

1. Chain surveying : chaining and chain traversing
2. compass Traversing
3. Plane tabling : methods of plane table surveying ,Two point Problem
4. Plane tabling :Three point problem
5. Leveling : profile leveling and plotting of longitudinal section and cross sections , Fly leveling
6. Use of tangent clinometer.
7. contours ; Block and radial contours
8. Use of total station ,measurement; lenear measurement, angle ; vertical and horizontal
9. Traversing : differtent poles and alignme
10. study of Theodolite

Course Code	Course Name	L-T-P	Credit
CE-253	Fluid Mechanics Lab	0-0-2	1

LIST OF EXPERIMENTS

1. To Determine the coefficient of impact for the vanes
2. To Determine the coefficient of discharge of an orifice meter
3. To Determine coefficient of Discharge of Notch (V-Notch and Rectangular Notch)
4. To Determine the friction factor for the pipes
5. To Determine the coefficient of Discharge of Venturimeter
6. To Determine the coefficient of Discharge of an orifice.
7. To Verify the Bernoulli's Theorem
8. To find critical Reynolds's number for a pipe flow
9. To Determine the metacentric height of a floating body.
10. To Determine the minor losses due to sudden enlargement, sudden contraction and bends for pipe flow.

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2ndYear 3rdSem

Course Code	Course Name	L-T-P	Credit
CE-255	Computer Aided Civil Engineering Drawing Lab	0-0-2	1

LIST OF EXPERIMENTS

1. Introduction and Refreshing to AutoCAD (Introduction of AutoCAD and Various Commands)
2. Fundamental Line Drawings (Fundamental line drawings & Practice Drawings)
3. Foundation Drawings (Various Types of Foundation drawings)
4. Brick Masonry Drawings (Drawings of Various Types of Bond of Brick Masonry)
5. House Planning Drawing (Planning and Drawings of Plumbing and Electrical in all Floors)
6. House Planning Drawing (Planning and Drawings of Different Floors)
7. Office Building Drawing (Planning and Drawings of Different Floors)
8. To design and draw a Primary Health Centre
9. To design and draw a Primary School
10. To design and draw a Rest House

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Course Code	Course Name	L-T-P	Credit
CE-202	Soil Mechanics & Engineering Geology	3-0-0	3

Unit 1:

General Geology

Engineering Geology: Introduction; Formations of Rocks; Characterisation; Weathering Processes, Types of Rocks, Fold and fault in Rock, Physical Properties of Minerals

Unit 2:

Introduction of Soil Engineering:

Soil and soil-mass constituents, water content, specific gravity, void ratio, porosity, degree of saturation, air void and air content, unit weights, density index etc. Inter- relationships of the above. Determination of index properties of soil: water content, specific gravity, particle size distribution, consistency limits, void ratio and density index. Classification of soil for general engineering purposes: particle size and I.S. Classification systems.

Unit 3:

Soil Permeability

Permeability of soil and its determination in laboratory. Field pumping out tests, factors affecting permeability, permeability of stratified soil masses

Unit 4:

Stress in soil mass and compaction of soil

Stresses in soil mass: total, effective and neutral pressure, calculation of stresses, influence of water table on effective stress, quick sand phenomenon. Seepage and Seepage Pressure, Principles of soil compaction, laboratory compaction tests; Proctor's test Modified Proctor tests

Unit 5:

Shearing strength of soil

shearing strength of soil, parameters of shear strength, Coulomb's failure envelope, determination of shear parameters by Direct Shear Box. Tri-axial and unconfined compression test apparatuses

Suggested Readings:

1. Parbin Singh-A Text Book of Engineering & General Geology- S.K.Kataria& sons
2. K.R. Arora - A text Book of Soil Mechanics
3. N ChennaKesavulu- A Text book of Engineering Geology- Macmillan India Ltd.
4. M.T.Maruthesha Reddy- A Text book of Applied Engineering Geology- New Age International Publisher
5. Remote Sensing and GIS: B.Bhatta- Oxford Publ

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2nd Year 4th Sem

Course Code	Course Name	L-T-P	Credit
CE-204	Waste Water Engineering	3-0-0	3

Unit 1

COLLECTION OF SEWAGE: Importance of sanitation. Sewers appurtenances, Systems of sewerage: separate, combined and partially separate. Shapes of sewer: circular and egg shaped. Construction, testing and maintenance of sewer lines.

Unit 2

SEWAGE CHARACTERIZATION: Quality parameters: BOD, COD, Solids, D.O., Oil & Grease. Indian Standards for disposal of effluents into inland surface sources and on land. **AIR POLLUTION:** Air quality criteria. NAAQs guidelines. Effects of air pollutants on materials, structures and health. **SOLID WASTE AND ITS MANAGEMENT :** Sources, Composition & Properties of Municipal solid waste. Handling & Separation of solid waste. Introduction to Municipal Waste (Management & Handling Rules, 2000), Disposal of Municipal Solid Wastes

Unit 3

SEWAGE TREATMENT: Objectives, sequence and efficiencies of conventional treatment units. Preliminary treatment, screening and grit removal units. Theory and design aspects of primary treatment, secondary treatment: Activated sludge process & its modifications, Trickling filter. Nutrient removal, Nitrification and denitrification, Air stripping for ammonia removal, Phosphorous removal, dissolved solids removal, waste water reuse.

Unit 4

SLUDGE THICKENING AND SLUDGE DIGESTION: Sludge characteristics, sludge volume and solids relationships, Aerobic and anaerobic digestion, factors affecting sludge digestion and their control, disposal of digested sludge and drying beds. Stabilization pond, aerated lagoon, UASB process.

Unit 5

DISPOSAL OF SEWAGE: Disposal of sewage by dilution, self-purification of streams. Sewage disposal by irrigation (sewage treatment). Septic tanks, Imhoff tanks and onsite sanitation. Sewerage project and building drainage works.

TEXT BOOK:

Garg, S.K., "Sewage and Sewage Treatment", Khanna Publishers, New Delhi, 1994.

REFERENCE BOOKS

1. Metcalf and Eddy., "Waste Water Engineering", McGraw-Hill Companies
2. S.R. Krishna, Sagar., "Sewage and Sewage Treatment",
3. Punmia, B. C., "Waste Water Engineering", Laxmi Publications, 1998.
4. Manual on Sewerage and Sewage Treatment: Ministry of Urban Dev., New Delhi.

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2ndYear 3rdSem

Course Code	Course Name	L-T-P	Credit
ME-204	Mechanics of Solids	3-0-0	3

UNIT-1: SIMPLE STRESSES AND STRAINS

Resistance to deformation; Hook's law and stress-strain diagram; types of stresses; stresses and strains in bars of varying sections; stresses in composite bars; lateral strain and Poisson's ratio; volumetric strain, modulus of rigidity and bulk modulus; relation between elastic constants. Numerical

UNIT-2: TORSION OF CIRCULAR SHAFTS AND REACTION OF BEAMS

Torsion formula of circular shaft, power transmission by shaft, types of beams and loads, reaction produced on supports for beams with point load uniformly distributed load, uniformly varying load and combined loads. Numerical.

UNIT-3: SHEAR FORCE & BENDING MOMENT

Definitions: SF and BM diagrams for cantilevers, simply supported beams with or without overhang and calculation of max. BM and SF and point of contra-flexure under i) concentrated loads, ii) uniformly distributed loads over whole span or part of it iii) combination of concentrated and uniformly distributed loads

UNIT-4: ANALYSIS OF PERFECT FRAMES

Types of frames, Assumptions made in finding out the forces in frames, Reactions of supports of a frame, Analysis of frame by Method of Joint, Analysis of frames by Method of Section.

UNIT-5: MOHR CIRCLE OF STRESSES

Mohr's circle of stress for a material under similar stresses in two mutually perpendicular plane, Mohr's circle of stress for a material under dissimilar stresses in two mutually perpendicular plane Mohr's circle of stress for a material under similar stresses in two mutually perpendicular plane along with shear stresses acting on all the planes, Mohr's circle for a material under dissimilar stresses in two mutually perpendicular plane along with shear stresses acting on all the planes. Numerical

TEXT BOOKS

Ferdinand P Beer & Russel E Johnston; Mechanics of Materials, Tata McGraw Hill; 2009

REFERENCE BOOKS:

1. Hibbeler, R. C., Mechanics of Materials, Pearson Education, 2005
2. Ryder, G H., Strength of Materials, Macmillan, 2001
3. Srinath LS, Strength of Materials, Macmillan, 2001
4. Andrew / Kiusalaas, Jaan, Mechanics of Materials, Thomson, 2003

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2nd Year 4th Sem

Course Code	Course Name	L-T-P	Credit
CE-206	Structural Analysis	3-1-0	4

Unit 1

SIMPLE STRESSES AND STRAIN: Types of stresses and strain, Hooks Law, modulus of elasticity, Analysis for simple stresses and strains, deformation of bars under axial loads, various elastic constants and their relationship, poisson's ratio, temperature stresses.

Unit 2

ANALYSIS OF PLANE STRESSES AND PLANE STRAINS: Principal stresses due to combined bending and torsion, Analysis of strain, Mohr's circle for two dimensional stresses and strain

Unit 3

BENDING MOMENT AND SHEAR FORCE: Definitions, sign convention, bending moment and shear force diagrams for beams and cantilevers under concentrated, distributed and varying loads, beams with overhangs

Unit 4

BENDING, SHEAR AND TORSION: Theory of simple bending, Assumptions, Flexure formula, Moment of resistance, Distribution of shear stress for various cross – sections. Theory of pure torsion, assumptions, torsion in solid and hollow circular sections.

Unit 5

COLUMNS AND STRUTS: End conditions, short and long columns, Euler's critical buckling loads. Various empirical formulae. Axially and eccentrically loaded columns. **DEFLECTION IN BEAMS:** Determination of slope and deflection by differential equations, moment area method, conjugate beam method, unit load method, principle of virtual work. Maxwell's law of reciprocal deflections. **ANALYSIS OF STATICALLY DETERMINATE TRUSSES:** Analysis of plane trusses by: method of joints, method of sections, graphical method. Analysis of space trusses by tension coefficient method.

TEXT BOOK

S. Ramamurthan., "Strength of Materials", Dhanpat Rai & sons, 2nd Edition, New Delhi, 2007.

REFERENCE BOOKS

1. Bhavikatti, S. S., "Strength of Materials", Vikas Publishing House Pvt. Ltd, New Delhi, 2008
2. Timoshenko, S., "Strength of Materials Part-I", New Delhi, 2008
1. Popov, Nagarjan., & Lu., "Mechanics of Materials", Prentice Hall of India.
3. Jain, A.K., "Elementary Structural Analysis", Nem Chand & Bros, Roorkee, 2003
- Wibur & Nooris., "Elementary Structural Analysis", McGraw Hill Book Co., New York

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2nd Year 4th Sem

Course Code	Course Name	L-T-P	Credit
CE-208	Irrigation Engineering	3-0-0	3

Unit 1:

INTRODUCTION: definition, necessity, benefits of irrigation, ill effects of irrigation, types of irrigation, and history of irrigation development in India. **METHODS OF IRRIGATION:** free flooding, contour laterals, model strip method, check flooding, basin flooding, zigzag and furrow method, sub surface irrigation, sprinkler irrigation, drip irrigation

Unit 2:

REGULATION WORKS: Canal falls-necessity and location, development of falls, design of cistern element, roughening devices, design of Sarda type fall, design of straight Glacis fall. Off-take alignment, cross;regulator and distributory head regulators, devices to control silt entry into the off-taking channel and silt ejector, canal escapes, types of escapes.

Unit 3:

CROSS DRAINAGE WORKS:Classification and their selection, hydraulic design aspects of aqueducts, syphon aqueducts, super passage, canal syphon and level crossing, design of transitions. **DIVERSION CANAL HEADWORKS:** Various components and their functions, layout plan, selection of site for diversion headworks, Bligh's creep theory, Khosla's method of independent variables, use of Khosla's curves, various corrections, silt excluders.

Unit 4:

STORAGE HEADWORKS: Types of dams, selection of a site, gravity dam; two dimensional design, forces acting, stability criterion, elementary profile of a dam, cutoffs and drainage galleries, arch dams-constant angle and constant radius arch dam, simple design and sketches, most economical angle, Earth dam, design principles, seepage through earth dams, seepage line, control of seepage, design of filters.

Unit 5:

SPILLWAYS AND ENERGY DISSIPATORS: Essential requirements of spillway and spillway's capacity, types of spillways and their suitability, Ogee spillways, chute, side channel, shaft and syphon spillways, energy dissipation below spillways, stilling basins, USBR and I.S. Stilling Basins.

TEXT BOOK

Modi, P.N., "Irrigation Water Resources and Water Power Engineering", Standard Book.House, 2008.

REFERENCE BOOKS

1. Singh Bharat, "Fundamentals on Irrigation Engineering., Nemchand Bros., Roorkee
 2. Garg, S. K., "Irrigation Engineering and Hydraulic Structures", KhannaPublishers, New Delhi, 2009
- Varshney, R.S. Gupta, Gupta, R. L., "Theory and Design of Irrigation Structures" Vol.I & II.Nem Chand Publication, 2007.

Department of Civil Engineering
Syllabus 2021-2025 Batch
2nd Year 4th Sem

Course Code	Course Name	L-T-P	Credit
CE-252	Soil Mechanics & Engineering Geology Lab	0-0-2	1

1. Physical Properties of Minerals
2. Physical Properties of Rocks
3. Identification of Minerals in Hand Specimen
4. Identification of Rocks in Hand Specimen
5. Determination of C- ϕ values by direct shear test apparatus
6. Grain size distribution by sieving
7. Determination of water content by Pycnometer
8. Determination of specific gravity by Pycnometer

Course Code	Course Name	L-T-P	Credit
ME-254	Mechanics of Solids Lab	0-0-2	1

1. To perform the Brinell Hardness Test
2. To perform the Rockwell Hardness Test
3. To study the Impact Testing Machine and perform the Impact Tests (IZOD & CHARY)
4. To study UTM and Torsion Testing Machine
5. To perform the Tensile Test on UTM
6. To perform the Shear Test on UTM
7. To perform the torsion test on Torsion Testing Machine
8. To determine the Moment of Inertia of a Flywheel about its own axis of rotation
9. To study the Erichsen Sheet Metal Testing Machine and Perform the Erichsen Sheet Metal Test.
10. To verify support reactions for different types of loads at different locations on the beam

Course Code	Course Name	L-T-P	Credit
CE-254	Water and Waste Water Engineering Lab	0-0-2	1

1. To determine the pH value of a given sample of water /waste water.
2. To determine the turbidity of a given water waste /water sample.
3. To determine the acidity of a given sample of water /waste water.
4. To determine the alkalinity of a given sample of water /waste water.
5. To determine the level of chlorides in a given sample of water/ waste water
6. To determine temporary and permanent hardness in a given water/waste sample.
7. To determine the dissolved oxygen of a given water/waste sample.
8. To determine total solids, total dissolved solids, total suspended solids in a sewage sample.
9. To determine the BOD of a given sample of water/waste water.
10. To determine the COD of a given sample of water/waste water.

Department of Civil Engineering
Syllabus 2021-2025 Batch
2ndYear 3rdSem

Course Code	Course Name	L-T-P	Credit
CE-256	Structural Analysis Lab	0-0-2	1

1. Experiment on a 2 hinged arch for horizontal thrust and influence line for horizontal thrust.
2. Experimental and analytical study of a 3 bar pin jointed truss.
3. Experimental and analytical study of deflection and unsymmetrical bending of a cantilever beam.
4. Beggdefometer- verification of Muller Breslau principle.
5. Experimental and analytical study of an elastically coupled beam.
6. Sway in portal frames- demonstration.
7. To study the cable geometry and statics for different loading condition.
8. To plot stress –strain curve for concrete.
9. Use of mechanical and electrical strain and stress gauge.

Department of Civil Engineering
Syllabus 2021-2025 Batch
3rd Year 6thSem

Course Code	Course Name	L-T-P	Credit
CE-301	Concrete Technology	3-0-0	3

Unit 1:

Cement Hydration: Cement Types, Paste Micro-structure; Workability; Durability; Factors affecting strength of concrete,

Ingredients of concrete: Cement: hydration of cement and its basic compounds, structure of hydrated cement, C-S-H gel, heat of hydration, gelspace ratio and its significance.

Aggregates: types, physical properties and standard methods for their determination.

Unit 2:

Concrete : Grade of concrete, proportioning of ingredients, water content and its quality for concrete, water/cement ratio and its role, Properties of fresh concrete including workability, air content, Flow ability, Segregation, Bleeding and Viscosity etc. _ Factors affecting, methods of determination Hardening plasticity and fatigue; Creep and shrinkage; Fresh concrete modelling; Moisture/Ionic diffusion in concrete.

Unit 3:

Admixture in concrete: Chemical and mineral admixtures, their types and uses: water reducers, accelerator, retarders, water-proofing plasticizers, super plasticizers, air-entraining agents. Use of fly ash and silica fume in concrete, their properties and effect.

Unit 4:

Quality control; Concrete mix design; Types of concrete; Concrete production; Tests of concrete in structures; Failure criteria; Fracture mechanics;

Concrete Handling in Field: Batching, mixing, placing and transportation of concrete, equipment's for material handling, various methods their suitability and precautions. Compaction of concrete: methods & equipment's. Curing of concrete: various methods their suitability. Durability of concrete

Unit 5:

Fabrication and Erection Work: Fabrication of Structural steel at slopes and sites, Handling and transportation of units to be erected, Erection of Fabricated steel structures, Prefabricated/precast construction; relative advantages & disadvantage and various precast units & Erection of Precast Reinforced Concrete Structures

Suggested Readings:

1. Concrete Technology by Neville & Brooks, Pearson Education.
2. Concrete: Microstructure, Properties & Materials by Mehta P.K, Tata McGraw Hill.
3. Concrete Technology by M.S.Shetty, S.Chand& Co.
4. Concrete materials by Popovics, Standard Publishers

Department of Civil Engineering
Syllabus 2021-2025 Batch
3rd Year 5th Sem

Course Code	Course Name	L-T-P	Credit
CE-303	Geotechnical Engineering	3-1-0	4

Unit I: Soil Exploration : Planning for soil exploration, Spacing of boring, Depth of boring, Soil Sampling, Sample disturbance, Split Spoon Sampler

Soil Bearing Capacity : Ultimate soil bearing capacity, Terzaghi's theory, Effect of ground water table on bearing capacity, Settlement of foundation, Construction practices to avoid differential settlement

Unit II

Lateral Earth Pressure: Introduction, Types of earth retaining structures, Lateral earth pressures, Earth Pressure at Rest, Earth Pressure theories, Active and Passive Pressures

Stability of Retaining Walls: Stability considerations for gravity retaining walls, Coulombs theory Vs Rankins theory, Choice of appropriate theory, Numerical Problems based on lateral earth pressure and stability of retaining walls

Unit III

Slope Stability: Infinite Slopes, Finite Slopes, Total Stress analysis for purely cohesive soil, Effect of tension cracks, Method of slices for a cohesive frictional soil, Effective Stress Analysis, Steady seepage, Rapid drawdown

Unit IV

Shallow Foundation: Introduction to Shallow Foundation, Types of foundations settlement, Elastic settlement based on the theory of elasticity, Elastic Settlement of foundations on saturated clay, Elastic Settlement of Sand Soil, Types of Shallow foundation.

Deep Foundation: Introduction, Necessity, Classification of piles, Uses of Piles, Load carrying capacity of piles, Negative skin friction.

Design of Pile Foundation: Design of pile foundation, Construction of pile foundations, laterally loaded piles (Batter Piles)

Unit V

Well Foundations: Introduction, Advantages of well foundations, Elements of well foundation, Design Aspects of well foundation, Grip length, Forces acting on well foundation, Terzaghi analysis, Tilts and Shifts, Remedial measures for rectification of tilts and shifts

Machine Foundation: Natural frequency of machine foundation, Transmissibility, Transmitted force, Machine foundation Special features, Design Approach for machine foundation, Vibration Isolation, Properties of isolating materials, Construction Aspects of machine foundations

Text Books: 1. SOIL MECHANICS AND FOUNDATION ENGINEERING by K.R ARORA, STANDARD PUBLISHERS & DISTRIBUTORS, 3rd Edition, (2011)

Department of Civil Engineering
Syllabus 2021-2025 Batch
3rd Year 5th Sem

Course Code	Course Name	L-T-P	Credit
CE-305	Transportation Engineering - I	3-0-0	3

Unit 1:

INTRODUCTION: Transportation and its importance. Different modes of transportation. Brief review of history of road development in India. Classification of roads, Planning surveys. Saturation system of planning. Main features of 20 years road development plans in India. Requirements of an ideal highway alignment. Factors affecting alignment. **BITUMINOUS MATERIALS AND BITUMINOUS MIXES:** Types of bituminous materials; bitumen, tar, cutback and emulsions. Various tests, testing procedures and IRS/IS specifications for suitability of bituminous materials in road construction. Bituminous mix, desirable properties. Basic concept of use of polymers and rubber modified bitumen in bituminous mixes.

Unit 2:

HIGHWAY CONSTRUCTION/EQUIPMENTS: Brief introduction to earthwork machinery; shovel, hoe, clamshell, dragline, bulldozers. Principles of field compaction of subgrade. Compacting equipments. Granular roads. Construction steps of WBM. WMM.

Unit 3:

DESIGN OF FLEXIBLE PAVEMENTS: Types of pavements; Flexible and rigid pavements. Components of a pavement and their functions. Factors affecting design of pavements. Design of thickness of a flexible pavement by Group Index method, CBR method (including latest IRC guidelines), Triaxial method and Burmister's method.

Unit 4:

DESIGN OF RIGID PAVEMENTS: Westergaard's theory, critical locations of loading, load and temperature stresses. Critical combination of stresses. IRC guidelines for determination of thickness of a rigid pavement. Joints; requirements, types, patterns. Spacing of expansion and contraction joints. Functions of dowel and tie bars.

Unit 5:

CONSTRUCTION OF BITUMINOUS PAVEMENTS: Various types of bituminous constructions. Prime coat, tack coat, seal coat and surface dressing. Construction of BUSG, Premix carpet, BM, DBM and AC. Brief coverage of machinery for construction of bituminous roads; bitumen boiler, sprayer, pressure distributor, hot mix plant, cold-mix plant, tipper trucks, mechanical paver or finisher, rollers. Mastic asphalt. Introduction to various IRC specifications. **CONSTRUCTION OF CEMENT CONCRETE PAVEMENT-Slip-form pavers,** Basic concepts following; soil stabilized roads, use of geo synthetics, reinforced cement concrete pavements, prestress concrete pavements, roller compacted concrete pavements and fibre reinforced concrete pavements. Pavement failures. Maintenance operations.

TEXT BOOK

S.K. Khanna & C.E.G. Justo., "Highway Engg.", Nem Chand & Brothers, 2009.

REFERENCE BOOKS

- 1 Rao, G. V., "Principles of Transportation and Highway Engg.", Tata McGraw Hill Pub., N. Delhi.
- 2 Kadiyali, L. R., "Traffic Engg. And Transport Planning", Khanna Pub. Delhi, 2008.

Department of Civil Engineering
Syllabus 2021-2025 Batch
3rd Year 5thSem

Course Code	Course Name	L-T-P	Credit
CE-309	WasteWater Engineering	3-1-0	4

Unit 1

SOURCES OF SUPPLY: Surface sources and types of intake, storage reservoirs, ground water, types of aquifers and wells, well hydraulics, yield of wells, radial collector wells.

Unit 2

WATER QUANTITY: Sources of water (Surface & ground Water sources) Estimation of quality and quantity of water from various surface & ground water sources. Storage reservoirs, streams, infiltration galleries, shallow wells deep wells, artesian wells, radial collector wells. Selection of a source of water supply, Importance and necessity of water supply scheme. Water demands and its variations. Factors effecting water demand, Estimation of total quantity of water requirement. Population forecasting.

Unit 3

WATER QUALITY: Impurities in water, their sources and their sanitary significance. Physical, chemical and bacteriological analysis of water, water borne diseases, water quality standards.

Unit 4

WATER TREATMENT (a): Objectives, treatment processes and their sequence in conventional treatment plant, sedimentation; plain and aided with coagulation. Types, features and design aspects. Mixing basins and Flocculation units.

Unit 5

WATER TREATMENT (b:)Filtration; mechanism involved, types of filters, slow and rapid sand filtration units (features and design aspects), Disinfection principles and aeration.

1.

2. **WATER DISTRIBUTION SYSTEM:** Layout of Distribution system ; Dead End system, Grid Iron system, Ring system, Radial system, their merits and demerits, Distribution Reservoir- functions and determination of storage capacity, Water Distribution Network, analysis of distribution network, leak detection, Maintenance, Water supply in buildings and plumbing.

TEXT BOOK

B.C. Punmia., Ashok, Jain & Arun, Jain., “Water Supply Engineering”, Laxmi Publication , New Delhi ,1995

REFERENCE BOOKS

1. E.W. Steel., “Water Supply and Sewerage”, McGraw Hill, New Delhi.
2. S.R. Krishirsagar., “Water Supply Engineering”
3. S.K. Garg., Water Supply Engineering, Khanna **Publisher**, Delhi
4. Manual on Water Supply and Treatment: Ministry of Urban Dev., New Delhi.

Department of Civil Engineering
Syllabus 2021-2025 Batch
3rd Year 5thSem

Course Code	Course Name	L-T-P	Credit
CE-351	Concrete Technology Lab	0-0-2	1

1. Determination of specific gravity of cement
2. Determination of standard consistency
3. Determination of the initial setting time
4. Determination of the final setting time
5. To determine the compressive strength of 1:3 cement and sand mortar cubes after 3 days and 7 days curing
6. Gradation of fine aggregate (fineness modulus)
7. To study the bulking of fine aggregate
8. Gradation of coarse aggregates
9. To determine the slump value of a prepared concrete mix (Slump test)
10. To determine the compaction factor of concrete mix of given proportion (Compaction factor test)

Course Code	Course Name	L-T-P	Credit
CE-353	Geotechnical Engineering Lab	0-0-2	1

1. Determination of liquid limit by Casagrande's apparatus.
2. Determination of plastic limit
3. Determination of shrinkage limit
4. Determination of field density by sand replacement method
5. Determination of compaction properties by standard Proctor Test Apparatus
6. To determine the compressibility parameters of soil by consolidation test
7. To determine the permeability of soil by constant and falling head methods.
8. To determine the CBR of soil.

Course Code	Course Name	L-T-P	Credit
CE-355	Transportation Engineering - I Lab	0-0-2	1

1. Aggregates impact test
2. loss –angles abrasion test on aggregates
3. dorry's abrasion test on aggregates
4. Deval attrition test on aggregates
5. crushing strength test on aggregates
6. Penetration test on bitumen.
7. Ductility test on bitumen
8. Viscosity test on Bituminous materials
9. softening point test on Bitumen
10. Flash and Fire point Test on Bitumen

Department of Civil Engineering
Syllabus 2021-2025 Batch
3rd Year 5thSem

Course Code	Course Name	L-T-P	Credit
CE-357	Hydraulic Engineering Lab	0-0-2	1

1. Viscous flow analogy (Hele-Shaw apparatus) for flow net.
2. Electrical analogy for flow net.
3. Study of development of boundary layer over a flat plate.
4. Study of Magnus effect using wind tunnel
5. Study of fluid flow around a cylinder.
6. Study of fluid flow around a sphere.
7. Study of hydraulic jump in open channel flow.
8. Specific energy studies in an open channel flow.
9. Study of flow profile over a spillway.
10. Study of sluice gates.
 Tilting Flume/Adjustable Channel
11. Study of characteristics of Pelton Wheel
 - A) Pelton Wheel Turbine Test Rig (Closed Circuit Type) 5H.P. Output
 - B) Option Miniature Model (1 H.P. output)
12. Study of characteristics of Francis Turbine
 - A) Francis Turbine Test Rig (Closed Circuit Type) 5 H.P. Output
 - B) Option Miniature Model (1 H.P. output)
 - C) Study of centrifugal pump test rig.
 - D) Study of reciprocating pump test rig.

Department of Civil Engineering
Syllabus 2021-2025 Batch
3rd Year 5th Sem

Course Code	Course Name	L-T-P	Credit
CE-302	Transportation Engineering - II	3-0-0	3

Unit 1:

CROSS SECTION ELEMENTS AND ROAD GEOMETRICS: Cross section elements: friction, carriageway, formation width, land width, camber, IRC recommended values. Types of terrain Design speed. Sight distance, stopping sight distance, sight distance at intersections, head light sight distance, set back distance. Critical locations for sight distance. **DESIGN OF HORIZONTAL AND VERTICAL ALIGNMENT:** Effects of centrifugal force. Design of superelevation. Providing superelevation in the field. Radius of circular curves. Extra-widening. Type and length of transition curves. Gradient, types, values. Summit curves and valley curves, their design criterion. Grade compensation on curves.

Unit 2: TRAFFIC CHARACTERISTICS AND TRAFFIC SURVEYS: Road user and vehicular characteristics. Traffic studies such as volume, speed and O & D study. Parking and accident studies. Fundamental diagram of traffic flow. Level of service. PCU. Capacity for non-urban roads. Causes and preventive measures for road accidents

Unit 3: TRAFFIC CONTROL DEVICES: Traffic control devices: signs, signals, markings and islands. Types of signs. Types of signals. Design of an isolated fixed time signal by IRC method. Intersections at grade and grade separated intersections. Design of a rotary. Types of grade separated intersections

Unit 4:

AIRPORT PLANNING AND DESIGN: traffic characteristics and operations, fleet requirement, component parts of airport and site selection, Runway design, orientation, basic runway length, geometric design of taxiway and aprons, terminal area and their planning, Environmental requirement of airport projects **RAILWAYS ENGINEERING:** Introduction, general history of development of Railways, requirement of an ideal permanent, sleepers, ballast & Rail fixture & fastenings, cross section of railway tracks, turnouts, points & crossings. Railway Maintenance, rail gauges, wear of rails.

Unit 5:

DOCKS AND HARBOURS: Historical development of ports, harbours and docks, tides, winds and waves, causes and impact of tsunami waves, types of harbours, types of docks, break waters classification and types.

TEXT BOOK

S.K. Khanna & C.E.G. Justo, Highway Engg, Nem Chand Bros., Roorkee

REFERENCE BOOKS

1. Kadiyali, L. R., "Principles and Practice of Highway Engg.", Khanna Publishers, Delhi.
2. Yoder, E.J. & Witzak, M.W., "Principles of Pavement Design", John Wiley and Sons, USA.
3. Saxena, S. C., "Tunnel Engineering", Dhanpat Rai Publications, N. Delhi.
4. A. S. P. Bindra., "Text book of Tunnel, Bridges and Railway Engg.", Dhanpat Rai Delhi.

Department of Civil Engineering
Syllabus 2021-2025 Batch
3rd Year 5th Sem

Course Code	Course Name	L-T-P	Credit
CE-304	Design of Concrete Structure - I	3-0-0	3

Unit 1:

INTRODUCTION : Introduction to Concrete Making materials , mix design , Properties of concrete and reinforcements , testing of concrete

Unit 2:

VARIOUS DESIGN PHILOSOPHIES: Introduction to Various Design Philosophies, Working stress and limit state methods, Limit state v/s working stress method, Building code, characteristic strength and characteristics loads, design values, Partial safety factors and factored loads

Unit 3:

WORKING STRESS METHOD:- Design of Rectangular Singly and Doubly Reinforced Sections by Working Stress Method. **LIMIT STATE METHOD:** Assumptions in Limit State Design Method, Design of Rectangular Singly and Doubly Reinforced beams, T-beams, L-beams by Limit State Design Method.

Unit 4:

SHEAR, DEVELOPMENT LENGTH, ANCHORAGE BOND, FLEXURAL BOND:- Behaviour of RC beam in Shear, Shear Strength of beams with and without shear reinforcement, Minimum and Maximum shear reinforcement, design of beam in shear, Introduction to development length, Anchorage bond, flexural bond. (Detailed Examples by Limit State Design Method), Failure of beam under shear, Concept of Equivalent Shear and Moments.

Unit 5:

DESIGN OF SLABS:- Design of one way and two way solid slabs by Limit State Design Method, Serviceability Limit States, Control of deflection, cracking and vibrations. **DESIGN OF COLUMNS:-** Design of Columns by Limit State Design Method- Effective height of columns, Assumptions, Minimum eccentricity, Short column under axial compression

requirements for reinforcement, Column with helical reinforcement, Short column under axial load

NOTE : All designs shall be conforming to IS : 456 – 2000.

TEXT BOOK

I.C. Syal & A.K. Goel., “Reinforced Concrete”, A.H. Wheeler & Co. Delhi.

REFERENCE BOOKS

1. P. Dayaratnam., “Design of Reinforced Concrete Structures”, Oxford & IBH Pub. N. Delhi
2. Jain, A.K., “Reinforced Concrete-Limit State Design”, Nem Chand & Bros., Roorkee.
3. Sinha, S. N., “Reinforced Concrete Design”, Tata McGraw Hill.
4. SP-16(S&T)-1980, “Design Aids for Reinforced Concrete”, to IS: 456, BIS, N. Delhi.
5. SP-34(S&T)-1987 Handbook on Concrete Reinforcement and Detailing, BIS, N. Delhi.

Department of Civil Engineering
Syllabus 2021-2025 Batch
3rd Year 5th Sem

Course Code	Course Name	L-T-P	Credit
CE-306	Design of Steel Structure - I	3-0-0	3

Unit 1

INTRODUCTION: Properties of structural steel. I.S. Rolled sections and I.S. specifications.

Unit 2

CONNECTIONS: Importance, various types of connections, simple and moment of resistant, riveted, bolted and welded connections design problems.

Unit 3

DESIGN OF TENSION MEMBERS: Introduction, types of tension members, net sectional areas, design of tension members, lug angles and splices design problems.

Unit 4

DESIGN OF COMPRESSION MEMBERS: Introduction, effective length and slenderness ratio, various types of sections used for columns, built up columns, necessity, design of built up columns, laced and battened columns including the design of lacing and battens, design of eccentrically loaded compression members. **COLUMN BASES AND FOOTINGS:** Introduction, types of column bases, design of slab base and gusseted base, design of gusseted base subjected to eccentrically loading, design of grillage foundations.

Unit 5

DESIGN OF BEAMS: Introduction, types of sections, general design criteria for beams, design of laterally supported and unsupported beams, design of built up beams, web buckling, web crippling and diagonal buckling.

1. **GANTRY GIRDER:** Introduction, various loads, specifications and design of gantry girder & retaining wall.

TEXT BOOK

Arya, A.S. & Ajmani, J. L., "Design of steel structures" Nemchand & Bros., Roorkee.

REFERENCE BOOKS

1. Raghupati M, Design of steel structures, Tata McGraw Hill, Pub., New Delhi.
2. A.Kazmi SM & Jindal SK., "Design of steel structures", Prentice Hall, New Delhi.
3. DuggalSK , "Design of steel structures", Tata McGraw Hill, Pub., New Delhi.

Department of Civil Engineering
Syllabus 2021-2025 Batch
3rd Year 5thSem

Course Code	Course Name	L-T-P	Credit
CE-308	Specification Estimating & Costing	3-0-0	3

Unit I

ESTIMATE: Methods of estimating, Deductions for openings, Building estimate by long wall-short wall method and centre line method, Arch masonry calculations

Unit II

ESTIMATE OF BUILDINGS: Estimate of single room with varandah, estimate of double room with varandah, estimate of masonry platform, estimate of masonry tank, estimate of hexagonal room, estimate of septic tank, estimate of roads and canals

Unit III

SPECIFICATIONS: Specification of roads, Specification of various building parameters, Specification of industries, Specification of earthwork

Unit IV

R.C.C WORKS AND STRUCTURES: R.C.C works, Standard hooks and cranks of reinforcement bars, Estimate of R.C.C slab, Estimate of R.C.C column, Estimate of R.C.C beam, Estimate of R.C.C footing, Estimate of R.C.C retaining wall

Unit V

RATE ANALYSIS: Preparing analysis of rates, Analysis of rates for cement concrete foundation, Analysis of rates for Earthwork in excavation with a concept of lead and lift, Analysis of rates for RCC in roof slab, Analysis of rates for Terrazzo and marble Flooring, Analysis of rates for Brick masonry in cement mortar

Text Books:

1. ESTIMATING AND COSTING IN CIVIL ENGINEERING by B.N .DUTTA, UBS PUBLISHERS' DISTRIBUTORS (P) LTD.-NEW DELHI, 26th Edition, (2013)

Department of Civil Engineering
Syllabus 2021-2025 Batch
3rd Year 5thSem

Course Code	Course Name	L-T-P	Credit
CE-352	Transportation Engineering – II Lab	0-0-2	1

Highway Materials Testing:

1. Tests on Bitumen
2. Tests on Emulsion

Design of Asphalt Concrete Mixes:

3. Marshall Stability Test

Pavement Evaluation Tests:

4. Benkelman Beam test
5. Roughness Test
6. Abrasions and Index Test
7. Ductility Test
8. To study model of soil stabilized roads.
9. To study model of geo-synthetics roads
10. To study for different geo-textiles used in highway embankments.

Course Code	Course Name	L-T-P	Credit
CE-356	Building Drawing Lab	0-0-2	1

DRAWINGS

1. Masonary; Drawing of different type of bonds showing L-Junction, T-Junction, Cross junction
2. Sketch of different type of bond; English, Flemish, double flemish and diagonal bond T & L Junctions
3. Sketches of different type of stone masanory .
4. Sketches of DPC at basement ,plinth level and roof level
5. Arch, doors and window ; sketches of different type of arch illustrating the key points
6. sketches of fully paneled ,glazed door and window, solid flush door
7. Sketches of collapsible and rollings shutters
8. Roofs sloping (king post queen post), jack

ARCH ROOFING

1. Details Drawing of single stotey houses 3BHK
2. Sketches of different type of stair case with landing and hand rail provision
sketches for shear wall provision and sketches of modern lintel and chajja

Department of Civil Engineering
Syllabus 2021-2025 Batch
3rd Year 5thSem

Course Code	Course Name	L-T-P	Credit
CE-358	Minor Project	0-0-2	1

Presentation by each student on topics specified by the course coordinator.

Department of Civil Engineering
Syllabus 2021-2025 Batch
4th Year 7th Sem

Course Code	Course Name	L-T-P	Credit
CE-401	Earthquake Resistant Design of Structures	3-0-0	3

Unit 1

Seismic-resistant building architecture Introduction; Lateral load resisting systems- moment resisting frame, Building with shear wall or bearing wall system, building with dual system; Building configuration – Problems and solutions; Building characteristics – Mode shape and fundamental period, building frequency and ground period, damping, ductility, seismic weight, hyperstaticity/redundancy, non-structural elements, foundation soil/ liquefaction. Foundations; Quality of construction and materials – quality of concrete, construction joints, general detailing requirements

Unit 2

Design forces for buildings Introduction; Equivalent static method; Mode superposition technique; Dynamic inelastictime history analysis; Advantages and disadvantages of these methods; Determination of lateral forces as per IS 1893(Part 1) – Equivalent static method, Model analysis using response spectrum

Unit 3

Ductility considerations in earthquake resistant design of RCC buildings Introduction; Impact of ductility; Requirements for ductility; Assessment of ductility– Member/element ductility, Structural ductility; Factor affecting ductility; Ductility factors; Ductility considerations as per IS13920

Unit 4

Earthquake resistant design of a long two-storey, two-bay RCC building Determination of lateral forces on an intermediate plane frame using Equivalent static method and Model analysis using response spectrum; Analysis of the intermediate frame for various load combinations as per IS1893(Part 1); Identification of design forces and moments in the members; Design and detailing of typical flexural member ,typical column, footing and detailing of a exterior joint as per IS13920.

Unit 5

Base isolation of structures Introduction; Considerations for seismic isolation; Basic elements of seismic isolation; seismic isolation design principle; Feasibility of seismic isolation; Seismic-isolation configurations.

Text Books:

1. Earthquake resistant design of structures by PankajAgarwal and Manish Shrikhande, Prentice-Hall of India, 2006.
2. Seismic design of reinforced concrete and masonry buildings by T. Paulay and M.J.N. Priestley, John Wiley & Sons, 1991.
3. The seismic design handbook, Edited by F. Naeim, Kluwer Academic publishers, 2001.

Department of Civil Engineering
Syllabus 2021-2025 Batch
4th Year 7th Sem

Course Code	Course Name	L-T-P	Credit
CE-403	Design of Concrete Structure -II	3-0-0	3

1. **FOUNDATIONS:** Structural behavior of footings, design of footing for a wall and a single column, combined rectangular and trapezoidal footings, Design of strap footing.
2. **FLAT SLABS:** Advantages of flat slabs, general design considerations, approximate direct design method, design of flat slabs, openings in flat slab.
3. **STAIRCASES:** various types of staircases, design of doglegged & bifurcated stair cases, design examples
4. **PRESTRESSED CONCRETE: Introduction,** basic principles, advantages of Pre-stressing, methods of pre-stressing, classification of pre-stressed members, various pre-stressing systems and losses in pre- stress.
5. **PRESTRESSED CONCRETE, ANALYSIS & DESIGN:** Initial and final stress conditions, analysis of sections for flexure and shear, load balancing concept, IS Specifications

TEXT BOOK

I.C. Syal & A.K. Goel., “Reinforced Concrete”, A.H. Wheeler & Co. Delhi.

REFERENCE BOOKS

1. Jain, A.K., “Reinforced Concrete-Limit State Design”, Nem Chand & Bros., Roorkee.
2. N.Krishna Raju- Prestressed concrete
3. Sinha, S. N., “Reinforced Concrete Design”, Tata McGraw Hill.
4. SP-16(S&T)-1980, “Design Aids for Reinforced Concrete”, to IS: 456, BIS, N. Delhi.
5. SP-34(S&T)-1987 Handbook on Concrete Reinforcement and Detailing, BIS, N. Delhi.

Department of Civil Engineering
Syllabus 2021-2025 Batch
4th Year 7th Sem

Course Code	Course Name	L-T-P	Credit
CE-405	Design of Steel Structure -II	3-0-0	3

UNIT 1

INTRODUCTION: Properties of structural steel. I.S. Rolled sections and I.S. specifications

UNIT 2

ELEMENTARY PLASTIC ANALYSIS AND DESIGN: Introduction, Scope of plastic analysis, ultimate load carrying capacity of tension members and compression members, flexural members, shape factor, mechanisms, plastic collapse, analysis, plastic analysis applied to steel beams and simple portal frames and design.

UNIT 3

INDUSTRIAL BUILDINGS: Loads, general arrangement and stability, design considerations, design of purlins, design of roof trusses, industrial building frames, bracings and stepped columns
DESIGN OF WATER TANKS: Introduction, permissible stresses, design of circular, rectangular and pressed steel tanks including staging

UNIT 4

COLD FORMED SECTIONS: Introduction and brief description of various type of cold-formed sections, local buckling, concepts of effective width and effective sections, elements with stiffeners, design of compression and bending elements.

UNIT 5

PLATE GIRDER: Introduction, elements of plate girder, design steps of a plate girder, necessity of stiffeners in plate girder, various types of stiffeners, web and flange splices (brief introduction), Curtailment of flange plates, design beam to column connections: introduction, design of framed and seat connection.

GANTRY GIRDER: Introduction, various loads, specifications and design of gantry girder & retaining wall.

Text Books:

Steel Structures (Design & Practice), N. Subramanian, Oxford University Press, N.D.

Reference Books:

- 1.Design of Steel Structures, A.S.Arya & J.L.Ajmani, Nem Chand & Bros., Roorkee.
- 2.Design of Steel Structures, P.Dayartnam, Wheeler Pub. Allahabad.
- 3.Design of Steel Structures, Gaylord & Gaylord, McGraw Hill, Newyork/International Students Edn., Toyo Kogakusha, Tokyo.
- 4.IS:800-1984, Indian Standard Code of Practice for General Construction in Steel.
- 5.IS-801-1975, Indian Standard Code of Practice for Use of cold-formed light gauge steel structural members in general building construction

Department of Civil Engineering
Syllabus 2021-2025 Batch
4th Year 7th Sem

Course Code	Course Name	L-T-P	Credit
CE-451	Major Project	0-0-16	8

Presentation by each student on topics specified by the course coordinator.

Course Code	Course Name	L-T-P	Credit
CE-453	Seminar	0-0-2	1

Presentation by each student on topics specified by the course coordinator.

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4th Year 8th Sem

Course Code	Course Name	L-T-P	Credit
CE-452	Internship	0-0-6	2

Presentation by each student on topics specified by the course coordinator.

Course Code	Course Name	L-T-P	Credit
CE-454	Seminar	0-0-2	1

Presentation by each student on topics specified by the course coordinator.