Bharati Vidyapeeth

(Deemed to be University) Pune,
India

College of Engineering, Pune

Program Curriculum

B.Tech (Civil Engineering)-2023

Sem – I & II

(As Per NEP 2020 Guidelines)

(w.e.f. 2023-24)

BHARATI VIDYAPEETH (DEEMED TO BE UNIVERSITY)
COLLEGE OF ENGINEERING, PUNE

VISION OF UNIVERSITY:

Social Transformation through Dynamic Education

MISSION OF UNIVERSITY:

- To make available quality education in different areas of knowledge to the students as per their choice and inclination
- To offer education to the students in a conducive ambience created by enriched infrastructure! and academic facilities in its campuses.
- To bring education within the reach of rural, tribal and girl students by providing them substantive fee concessions and subsidized hostel and mess facilities
- To make available quality education to the students of rural, tribal and other deprived sections of the population

VISION OF THE INSTITUTE

To be World Class Institute for Social Transformation through Dynamic Education.

MISSION OF THE INSTITUTE

- To provide quality technical education with advanced equipment, qualified faculty members, infrastructure to meet needs of profession and society.
- To provide an environment conducive to innovation, creativity, research and entrepreneurial leadership.
- To practice and promote professional ethics, transparency and accountability for social community, economic and environmental conditions.

DEPARTMENT OF CIVIL ENGINEERING

VISION OF DEPARTMENT

To create Civil Engineers who will transform Civil Engineering Industry for sustainable development of society.

MISSION OF DEPARTMENT

- To create Civil Engineers enriched with quality technical education.
- To inculcate innovation, creativity and research approach among the graduants.
- To create entrepreneurs practicing professional ethics.

BHARATI VIDYAPEETH (DEEMED TO BE UNIVERSITY)
COLLEGE OF ENGINEERING, PUNE

PROGRAMME: B.TECH (CIVIL ENGINEERING)

Programme Educational Objectives (PEOs):

PEO1: To prepare students for career in Civil Engineering Profession.

PEO2: To develop a responsible 'Entrepreneur.'

PEO3: To develop the student to cope up with the advancements in Civil Engineering.

Programme Outcomes (PO): An Engineering Graduates will be able to:

PO-1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO-2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO-3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO-4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO-5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO-6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO-7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO-8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO-9. Individual and team-work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO-10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive

clear instructions.

PO-11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO-12. Life-long learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Specific Outcomes (PSOs): A Civil Engineering Graduates will be able to:

PSO1: Industry Exposure: adapt to work and address challenges in construction Industry

PSO2: Optimal and Sustainable Solution: workout optimal and sustainable solution to infrastructural needs of the society.

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COLLEGE OF ENGINEERING, PUNE

B. Tech. (Civil Engineering): Semester –I (2023 COURSE)- 2311202

Sr. No	Category	Subject Code	Subject	Teaching Scheme			Examination Scheme-Marks						Credits			
				L	P	T	ESE	IA	TW	PR	OR	Total	Th	Pr/ Or	Tut	Total
1.	BM	BM1113101	Engineering Mathematics- I	3	-	1	60	40	-	-	-	100	3	-	1	4
2.	BC	BC1113102	Engineering Chemistry	3	2	-	60	40	50	-	-	150	3	1	-	4
3.	MJ	MJ1102103	Fundamentals of Civil Engineering	4	2	-	60	40	25	-	-	125	4	1	-	5
4.	EG	EG1111104	Engineering Graphics	3	2	-	60	40	25	-	-	125	3	1	-	4
5.	MJ	MJ1102105	Building Construction and Materials	4	2	-	60	40	50	-	-	150	4	1	-	5
6.	AE	AE1113106	Communication skills	-	2	-	-	-	50	-	-	50	-	1	-	1
7.	SE	SE1102107	Skill Based Course-I – Computer Aided Drawing	-	4	-	-	-	25	-	25	50	-	2	-	2
			Total	**17**	**14**	**1**	**300**	**200**	**225**	**-**	**25**	**750**	**17**	**7**	**1**	**25**

BHARATI VIDYAPEETH (DEEMED TO BE UNIVERSITY)

COLLEGE OF ENGINEERING, PUNE

B. Tech. (Civil Engineering): Semester –II (2023 COURSE)- 2311202

Sr. No	Category	Subject Code	Subject	Teaching Scheme			Examination Scheme-Marks						Credits			
				L	P	T	ESE	IA	TW	PR	OR	Total	Th	Pr/Or	Tut	Total
1.	BM	BM1113201	Engineering Mathematics- II	3	-	1	60	40	-	-	-	100	3	-	1	4
2.	BP	BP1113202	Engineering Physics	3	2	-	60	40	50	-	-	150	3	1	-	4
3.	ES	ES1102203	Engineering Mechanics	4	2	-	60	40	25	-	-	125	4	1	-	5
4.	MJ	MJ1102204	Building Planning and Design	3	4	-	60	40	50	-	-	150	3	2	-	5
5.	MJ	MJ1102205	Surveying and Levelling	3	2	-	60	40	25	-	-	125	3	1	-	4
6.	UH	UH1113206	Universal Human Values	-	2	-	-	-	50	-	-	50	-	1	-	1
7.	SE	SE1102207	Skill Based Course -II Hands on Training on Total station	-	4	-	-	-	25	-	25	50	-	2	-	2
			Total	**16**	**16**	**1**	**300**	**200**	**225**	**-**	**25**	**750**	**16**	**8**	**1**	**25**

Programme:
B. Tech. (Civil)-2023
Sem – I

	Engineering Mathematics-I (Common for all Branches)		
Teaching Scheme:	**Examination Scheme:**		**Credits Allotted**
Theory:-03 Hours/ Week	End Semester Examination	60Marks	Theory: 03 Tutorial: 01 Practical: 00
Practical :- 00 Hours/ Week	Internal Assessment	40Marks	
Tutorial :-01 Hours/ Week	Term Work	00 Marks	
	Oral/Practical Examination	00 Marks	
	Total	100 Marks	04

Course Prerequisites:-	The students should have knowledge of Algebra of matrices and its Determinants, Maxima and Minima of single variable functions.
Course Objective	On completion of the course – 1. Fundamental theorems, concepts in Matrices, Demoivr's theorem and its applications in engineering. 2. Various techniques in Calculus, Explanation of functions and Infinite series. 3. Partial differentiation, maxima, minima and its applications in engineering.
Course Outcomes:-	After completion of the course students will be able to 1. Understand rank of matrix and apply it to solvesystemoflinearequations 2. UnderstandtheDeMoiver'stheorem,hyperbolicfunctionsandapply itinengineeringproblems. 3. UnderstandtheLeibnitz'srule andapplyittofindnthderivativeofafunction. 4. Understandfundamentalconceptsofconvergence,divergenceofinfi niteseriesanditstests. 5. Understandtheconceptofpartialdifferentiationandapplyittofindtot alderivative. 6. Evaluatethemaximaandminimaofany twovariablesfunctions..

Unit I:Matrices **(06 Hrs)**

Rank, Normal form, System of Linear Equations, Linear Dependence and Independence, Linear and Orthogonal Transformations, Eigen values, Eigen Vectors, Cayley – Hamilton Theorem.

Unit II: Complex Numbers and Applications: **(06 Hrs)**

Definition, Cartesian, Polar and Exponential Forms, Argand's Diagram, De'Moivre's theorem and its application to find roots of algebraic equations., Hyperbolic Functions, Logarithm of Complex Numbers, Separation into Real and Imaginary parts, Application to problems in Engineering.

Unit III: Differential Calculus: **(06 Hrs)**

Successive Differentiation, nth Derivatives of Standard Functions, Leibnitz's Theorem,.
Expansion of Functions: Taylor's Series and Maclaurin's Series

Unit IV: Differential Calculus: **(06 Hrs)**

Indeterminate Forms, L' Hospital's Rule, Evaluation of Limits.
Infinite Series: Infinite Sequences, Infinite Series, Alternating Series,Tests for Convergence, Absolute and Conditional Convergence, Power series, Range of Convergence

Unit V: Partial Differentiation and Applications: **(06 Hrs)**

Partial Derivatives, Euler's Theoremon Homogeneous Functions, Implicit functions, Total Derivatives, Change of Independent Variables, Errors and Approximations.

Unit VI:Jacobian: **(06 Hrs)**

Jacobians and their applications, Chain Rule, Functional Dependence.

Maxima and Minima: Maxima and Minima of Functions of two variables, Lagrange's method ofundeterminedmultipliers.

PBL: Project Base Learning (Topics)

1	Echelonform
2	Normalform
3	Linearandorthogonaltransformation
4	Eigenvaluesandeigenvectors
5	Arganddiagram
6	De Movre'stheorem
7	Hyperbolicandlogarithmicfunctions
8	Leibnitztheorem
9	Taylor'stheorem
10	L'Hospitalrule
11	Testsforconvergence
12	Eulertheoremforhomogeneousfunctions
13	Totalderivative
14	Maximaandminimafortwovariablefunction
15	Langrageundeterminedmultipliers

Textbooks

1. Applied Mathematics (Volumes I and II) by P. N. Wartikar& J. N. Wartikar (Pune VidyarthiGrihaPrakashan, Pune),7th Edition, 1988, Reprint 2010.

Reference Books

1.HigherEngineeringMathematics byB.S. Grewal(KhannaPublication,Delhi),42th

Edition,2012

2. HigherEngineeringMathematicsbyB.V. Ramana(Tata McGraw-Hill),Edition,2008
3. Advanced Engineering Mathematics by Erwin Kreyszig (Wiley Eastern Ltd.), 8th Edition,1999,Reprint2010
4. Advanced EngineeringMathematics,7e,byPeterV.O'Neil(ThomsonLearning),Edition 2007
5. AdvancedEngineeringMathematics, 2e,byM.D.Greenberg(Pearson Education),2nd,Edition, 2002

Unit Test - I	**Unit I, II, III**
Unit Test - II	**Unit IV, V, VI**

Programme: B. Tech. (Civil) Sem – I

COURSE: ENGINEERING CHEMISTRY (Common for all Branches)		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS:**
Theory: 03Hrs / Week Practical: 02Hrs / Week	End Semester Examination: 60 Marks Internal Assessment: 40Marks Term work: 50 Marks Total -150 Marks	Theory: 03 Practical: 01
		Total: 04

Course Pre-requisites: The students should have knowledge of

	Basic knowledge of chemistry. Basic knowledge of electrochemistry and chemistry of materials Introductory knowledge of polymers.

Course Objective: On completion of the course -

	The student should acquire the knowledge of 1. To develop the interest among the students regarding chemistry and their applications in engineering. 2. To develop confidence among students about chemistry, how the knowledge of chemistry is applied in technological field. 3. The student should understand the concepts of chemistry to lay the groundwork for subsequent studies in the Engineering field

Course Outcomes: On completion of the course, the students will be able to -

1	Understand the different methods of analysis of water, different environmental pollutants and importance of green chemistry
2	Understand the importance of fuels and apply it for various engineering applications.
3	Explain the drawbacks of corrosion and different methods of elimination of corrosion
4	Apply the concept of polymer to study advanced materials
5	Apply the basic concept of chemistry to explain the chemical properties and processes of materials of nano scale
6	Understand the instrumental analysis helpful for various engineering applications

Course Content:

Unit-I	**Water Technology& Green Chemistry** Introduction, sources and impurities in water, Hardness of water, types, and determination of hardness using EDTA titration, softening of hard water by ion- exchange process. Numerical problems on hardness of water. Major environmental pollutants, Basic principles of green chemistry. Atom economy, Synthesis of adipic acid, Industrial applications of green chemistry, Numerical problems on Atom economy	**(06 Hrs)**
Unit-II	**Electrochemical energy and solar energy** Fuels: Introduction, Definition, importance of fuels, calorific value, types, fluidized bed catalytic cracking, knocking(Petrol engine), mechanism and its ill effects, biodiesel, power alcohol, octane and cetane number. Solar Energy: Introduction, construction,	**(06 Hrs)**

	working and applications of photovoltaic cell	
Unit-III	**Corrosion technology and it's control** Introduction, Electrochemical theory of corrosion, Types of corrosion, Differential metal and differential aeration (pitting and water line) caustic embrittlement. Factors affecting the rate of corrosion, Corrosion control: Cathodic protection, sacrificial anode and impressed current methods, Metal coatings, Galvanization and tinning, Anodizing, Anodizing of aluminum, Organic coatings: Paint and varnishes. Metal finishing: Introduction, Technological importance. Principles of electroplating. Electroplating of chromium. Electro less plating: Introduction, electro less plating of nickel & copper on PCB with applications	**(06 Hrs)**
Unit-IV	**Engineering Materials and Technology** Polymers: Introduction, classification, Synthesis and applications of Polyurethane, polycarbonates, Conducting Polymers: Synthesis & Mechanism of conduction in poly aniline. Composites: Introduction, constitution, classification. Types: fiber glass, hybrid and reinforced Composites with applications.	**(06 Hrs)**
Unit-V	**Nano materials** Introduction, size dependent properties (Surface area, Electrical, Optical, Catalytic and Thermal properties). Synthesis of nano materials: Top down and bottom up approaches, Synthesis by Sol-gel, precipitation and chemical vapour deposition, Nano scale materials: Fullerenes, Carbon nano tubes and graphenes – properties and applications.	**(06 Hrs)**
Unit-VI	**Instrumental methods of analysis** Introduction, Theory, Instrumentation and applications of colorimetry, pHmetry, conductometry Introduction to spectroscopy, principles and applications of UV/Vis. Spectroscopy	**(06 Hrs)**

Internal Assessment:			
Part A	**Unit Tests**		
	Unit Test -1	Units: I, II, III	
	Unit Test -2	Units: IV, V, VI	
Part B	**Project Based Learning: Any ONE** based on following topics but not limited to it		
	1	Comparison of Hardness, Alkalinity, Dissolved oxygen, Chlorides and COD of water from two different sources	
	2	Removal of industrial pollutants from wastewater by adsorption on activated charcoal	
	3	Preparation of biofuels from two natural sources	
	4	Two synthetic approaches for the production of H_2 as a clean fuel	
	5	Prevention of corrosion by metal coupling	
	6	Construction of bio sensor in engineering applications	
	7	Design and simulation of automatic solar - photo voltaic panels as renewable energy source.	

	8	Synthesis of Conjugated Polymers and Molecules Using Sugar Reagents and Solventless Reactions. OR Composite materials and it properties, applications and types
	9	To study mechanism of lubrication
	10	Electroplating- study on how different metals can be used and the practical applications
	11	Prepare Ag- nanoparticles by using sol-gel method
	12	Preparation of Ag nano particle from two natural sources
	13	With the help of green chemistry principles, prepare any organic dye by using Traditional and Green pathway.
	14	Prepare epoxy resins by using suitable method
	15	Measurement and effect of waste disposal from laboratories in the college

Term work: The term work shall consist of **any eight** of the following experiments -

1	Determination of Hardness of water sample by EDTA method
2	To determine strength of acid by pH – metric Titration
3	To measure the strength of acid by conductometric titration
4	Measurement of Surface tension of a given liquid by Stalgmometer
5	To determine alkalinity water sample.
6	Estimation of the given amount of copper in the given solution by colorimetry
7	Synthesis of conducting polyaniline from aniline by oxidative polymerization
8	Determination of iron content in the given solution by Mohr's method
9	To determine the strength of given acid solution by titrating it against base solution using indicator
10	Determination of reaction rate, order and molecularity of hydrolysis of ethyl acetate
11	Verification of Beer-Lambert's Law.
12	Determination of Viscosity of Liquids by Ostwald's Viscometer
13	Determination Of Chloride Content Of Water By Argentometry
14	Estimation of copper from brass by iodometry
15	To study set up of Daniel cell.

Text Books

1	Engineering Chemistry, Jain P.C & Jain Monica,Dhanpat Rai & Sons, Delhi (1992)
2	Engineering Chemistry, O. G. Palanna, Tata McGraw-Hill Publication, New Delhi
3	A textbook of Engineering Chemistry, S. S. Dara, McGraw-Hill Publication, New Delhi

Reference Books:

1	Engineering Chemistry- Fundamentals and applications, Shikha Agarwal,Cambridge Publishers (2015)
2	Polymer Science and technology (2nd Edition), P. Ghosh, Tata McGRAW Hill, (2008)
3	Principles of Instrumental Analysis, Douglas A. Skoog, F. James Holler,Stanley R. Crouch, Cengage learning (2017)
4	Polymers: Chemistry & Physics of Modern Materials (2nd edition) J.M.G.Cowie, Blackie, Academic & Professional(1994)
5	Integrated design and operation of water treatment facilities, Kawamura, Susumu. John Wiley & Sons(2000)

Programme: B. Tech. (Civil) Sem – I

COURSE: FUNDAMENTALS OF CIVIL ENGINEERING		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS:**
Theory: 04Hrs / Week Practical: 02Hrs / Week	End Semester Examination: 60 Marks Internal Assessment: 40Marks Term work: 25 Marks	Theory: 04 Practical: 01
		Total: 05

Course Pre-requisites: The students should have knowledge of

	Mathematics and Physics principles to comprehend the fundamental concepts of civil engineering.

Course Objective: On completion of the course -

	The student should be able to developfoundational understanding of fundamental principles and concepts in Civil Engineering.

Course Outcomes: On completion of the course, the students will be able to -

1	Describe the scope and applications of various disciplines of Civil Engineering.
2	Identify various structural components in different types of structures.
3	Identify different soils and rocks and their Engineering properties.
4	Describe various components of different modes of transportation.
5	Explain process of water and sewage treatment and solid waste management.
6	Estimate quantities of materials required for construction.

Course Content:

Unit-I	**Civil Engineering Scope and Applications:** Civil Engineering scope, importance and applications to other disciplines of Engineering; Civil Engineering construction process and role of Civil engineer; Government authorities related to Civil Engineering and their role.	**(08 Hrs)**
Unit-II	**Structural Engineering:** Structural system, Types of structures, Materials of Structural Systems, Structural Design Process, Types of Loads, Types of Forces, Importance and layout of structural system, Components of structural system, Types of members, Types of connections, Philosophy of Structural Design, Role of Structural Engineer, Introduction to IS Codes, Basic properties and classification of Structural Materials, Scope for Structural Engineers, Introduction to Structural Engineering Software's.	**(08 Hrs)**
Unit-III	**Geotechnical Engineering:** Types of soils and rocks, their engineering properties, bearing capacity of soils and rocks. Methods of estimation of bearing capacity. Function of foundations, Types of foundations and their suitability, causes of failure of foundations.	**(08 Hrs)**
Unit-IV	**Transportation Engineering:** Roads- types of roads and their suitability, cross section of rigid and flexible	**(08 Hrs)**

	pavements, materials of construction meaning of terms; width of roads, super elevation, camber, gradient ,sight distance, materials used for construction of roads. Traffic studies. Railways- Types of gauges, section of railway track, components of railway track, advantages. Bridges: Types, Components - Foundation, Piers, Bearings, Deck. Airways: Components Runway, Taxiway and Hangers.	
Unit-V	**Environmental Engineering:** Water supply: quality standards for drinking water, process of treatment of water, distribution of water. Waste water system: sources of waste water, process of treatment of waste water. Solid waste management: methods of treatment and disposal Air and water pollution: causes and remedial measures.	**(08 Hrs)**
Unit-VI	**Quantity Survey and Estimation:** Units: (Numbers & Sizes): This method is used to work out quantities for Doors, Windows, Sanitary fittings, Bathrooms and WC accessories, Grills, Railings. Length: This method is used to work out quantities based on length measurement. Like Skirting, Pipeline, Electrical Wiring. Area: This method is used for working out quantities of Tiles, Plaster Work, Painting Work, Pointing Work, Glass Work, Aluminium Cladding, Land Measurement (Regular and Irregular Shape, Sloping Grounds) Volume: This method is used to work out quantities like Concrete, Slab, Land Excavation, Land Filling, Rubble Masonry, Brick Masonry.	**(08 Hrs)**

Internal Assessment:			
Part A	**Unit Tests**		
	Unit Test -1	Units: I, II, III	
	Unit Test -2	Units: IV, V, VI	
Part B	**Project Based Learning: Any ONE** based on following topics but not limited to it		
	1	Presentation on various Government Organizations in Civil Engineering	
	2	Model on various Structural members and Types of Structures	
	3	Collection and Identification of different Types of Soils	
	4	Collection and Identification of different Types of Rocks	
	5	Flowchart for Water Treatment Process	
	6	Flowchart for Sewage Treatment Process	
	7	Presentation on various Methods of Solid Waste Disposal	
	8	Estimation of Quantity and Cost of Painting for a given building	

Term work: The term work shall consist of following experiments -	
1	Building line out.
2	Identification of structural system by visit to RCC and steel structure.
3	Identification of different types of soils and their properties.
4	Identification of different types of rocks and their properties.
5	Testing quality of drinking water in Laboratory.
6	Traffic volume study at intersection and estimation of PCU.

7	A project on estimation of brick work for a given building
8	Estimation of quantity of concrete foe slab, beam , column and Foundation
Reference Books:	
1	"Basic Structural Analysis" by C.S. Reddy (McGraw-Hill Education)
2	"Basic Civil Engineering" by S.S. Bhavikatti (IK International Publishing House)
3	"Principles of Geotechnical Engineering" by Braja M. Das and Khaled Sobhan (Cengage Learning)
4	"Transportation Engineering an Introduction" by Khisty Lal (Pearson India)
5	"Environmental Engineering" by Mukesh Rai and Surabhi Jain (Booksclinic Publishing)
6	"Estimating and Costing in Civil Engineering" by B.N. Datta (CBS Publishers)

ENGINEERING GRAPHICS

	ENGINEERING GRAPHICS		
Teaching Scheme:	**Examination Scheme:**		**Credits Allotted**
Theory :- 03 Hrs./ Week	End Semester Examination	60 Marks	03
Practical:- 02 Hrs./Week	Unit Test	40 Marks	
	Term Work	25 Marks	01
	Total	125 Marks	04

Course Prerequisites:-	Basics of Mathematics at Secondary School Level
Course Objectives	To provide knowledge about • Fundamentals of engineering drawing and curves • Isometric views and projection • Projections of points, lines, planes & solids
Course Outcomes:-	The students must be able to 1. Understand dimensioning methods and drawing of engineering curves. 2. Draw orthographic projections using 1st angle method of projection. 3. Draw Isometric views from given orthographic projections. 4. Draw projection of points, lines and planes. 5. Draw projection of different solids. 6. Draw development of lateral surfaces of solids.

Course Contents

Unit 1	**LinesandDimensioninginEngineeringDrawing and Engineering Curves**	**(06 Hrs.)**

Introduction to Engineering Drawing, Types of lines and Dimensioning, Layout and size of drawingsheets, Scales.

Engineering Curves-Ellipse drawing by Directrix Focus Method, Arc of Circle Method and ConcentricCircle Method,Involutesofacircle,Cycloid,ArchimedeanSpiral,HelixonconeandCylinder.

Unit 2	**OrthographicProjections**	**(06 Hrs.)**

Basicprinciplesoforthographicprojection(FirstandThird anglemethod).Orthographicprojectionofobjectsbyfirstangleprojectionmethodonly.Procedurefor preparingscaleddrawing,sectionalviewsandtypesofcuttingplanesandtheirrepresentation,hatchin gofsections.

Unit 3	**Sectional OrthographicProjections**	**(06 Hrs.)**

Types of Sections, Sectional orthographicProjection.		
Unit 4	**IsometricProjections**	**(06 Hrs.)**
Isometricview,Isometricscaletodrawisometricprojection, non-isometriclines,andconstructionof isometricviewfromgivenorthographicviewsandtoconstruct isometricview.		
Unit 5	**ProjectionsofPoints, Lines, Planes and Solids**	**(06 Hrs.)**
Projectionsofpoints,projectionsoflines,linesinclinedtoonereferenceplane, linesinclinedtoboth referenceplanes. (Lines in FirstQuadrantOnly). Projectionofprism,pyramid,coneandcylinderbyrotationmethod.		
Unit 6	**Development of Lateral Surfaces**	**(06 Hrs.)**
Developmentofthelateralsurfacesof solidslikeprisms,pyramids,cylindersandcones.		

Project Based Learning

1 To obtain industrial drawings to identify the types of lines, dimensioning methods and method of projection.
2 To develop the model/charts based on engineering curves.
3 To prepare model/chart for identification of engineering curves in nature for industrial, societal, etc application.
4 To demonstrate different methods of orthographic projection.
5 To demonstrate projection of Points.
6 To demonstrate projection of Lines.
7 To demonstrate projection of Planes.
8 To demonstrate projection of Solids.
9 To demonstrate developments of surfaces for solids.
10 To demonstrate industrial application of development of surfaces such as steam carrying pipes, Ducts of air conditioning systems, etc.
11 To demonstrate Isometric projection method through model of a cube.

Assignments: Minimumfive problemsoneachunitinA3sizeDrawingBook

Term Workshallconsistof**seven**A_2size(594mm×420 mm)sheetsby hand.

1. Types of lines, Dimensioning practice, 1st and 3rd angle methods symbol.
2. Engineering Curves
3. Orthographic Projections
4. Isometric views
5. ProjectionsofLinesandplanes
6. ProjectionofSolids
7. Development of Lateral surfaces

Text Books/References

1. "ElementaryEngineeringDrawing",N.D. Bhatt,CharotarPublishinghouse, AnandIndia.
2. "TextBookonEngineeringDrawing",K. L. Narayana &P .Kannaiah,Scitech Publications,

Chennai.
3. “FundamentalsofEngineeringDrawing”, WarrenJ.Luzzader,PrenticeHallofIndia,NewDelhi
4. “EngineeringDrawingandGraphics”, VenugopalK.,NewAgeInternationalpublishers.
5. M.B.ShahandB.C.Rana,"EngineeringDrawing",1st Ed,PearsonEducation,2005.
6. P.S.Gill,"EngineeringDrawing(GeometricalDrawing)",10Edition,S.K.KatariaandSons,2005.

Syllabus for Unit Tests

Unit Test I: Units I, II, and III

Unit Test II: Units IV, V, and VI

Programme :B.Tech Civil
Sem - I (Civil)

Course: Building Construction and Material		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 4Hours / Week	End Semester Examination: 60 Marks Internal Assessment: 40 Marks	Credits: 4
Practical: 2 Hours / Week	Term Work: 50 Marks	Credit: 1

Course Pre-requisites: The students should have knowledge of	
1	Basic concepts of Engineering Drawing
Course Objectives:	
	To develop the knowledge of building components, materials and construction practices
Course Outcomes: The student will be able to	
1	Elaborate the scope of construction materials in Building constructions
2	Identify and Elaborate Natural and Artificial Construction Materials
3	Explain building foundation, types of masonry
4	Identify the types of doors, windows and design various staircases
5	Select and apply the proper type of floors and types of roofs
6	Illustrate the types of plasters, pointing and paints

Course Content:

UNIT - I	**Overview of Construction Materials** Scope of construction materials in Building constructions, Criteria for Selection of construction materials on the basis of carrying prescribed load, serviceability, aesthetically pleasing, economical, environmental friendlyBroad classification of materials – Natural, Artificial, Special, Finishing and Recycled construction materials. **Natural Construction Materials** **Timber** – Timber as construction material, structure of timber, properties of good timber, seasoning of timber, defects in timber. **Bituminous materials and mixtures**: Terminology, different types of asphalt, bitumen, tar used in Civil Engineering works, their properties and uses. **Lime –** Manufacture of lime, classification, field slaking of lime and properties of lime	**(08 Hours)**
UNIT - II	**Artificial Construction Materials** **Artificial Construction Materials** **Bricks** – Brick earth and its constituents. Conventional bricks and Standard bricks. Characteristics of good brick, Classification of burnt clay bricks and their suitability, special bricks. Manufacturing of burnt clay bricks. Common Field tests on Bricks- shape and size, colour, sound, hardness test, finger scratch test, water absorption test **Tiles** –flooring and roofing tiles. Characteristic of good tiles, different types of tiles depending upon material used, sizes of tiles, uses of tiles, wall cladding **Materials for making concrete**-: Cement – definition, Manufacturing of cement, types of cements – Ordinary Portland, white cement colour cement and their suitability. Different brand name of cement, common pickings available in	**(08 Hours)**

	markets, common field tests on cement- lumps visible, colour, hand feeling ,water float test Aggregate – Definition, types of aggregate - coarse aggregate, fine aggregates (size). Addition of Fly ash to Concrete and its effects. **Artificial sand** – properties and advantages, suitability **Pre-cast concrete products** – concrete blocks- hollow, solid concrete blocks, pavement blocks, balustrades, their properties and uses. **Plywood**, particle board and veneers their properties and uses. **Glass** – properties- thickness and weight, thermal conductivity, light and heat translation, durability sound insulation, types of glass- soda lime glass, lead glass and borosilicate glass. Glass used for cladding	
UNIT - III	**Building Foundation and Masonry** Foundation: Types – Shallow foundation and Deep foundation, Suitability of foundations, failure of foundation and its causes. Stones and Stone Masonry: Stone masonry-principal terms, types(Random Rubble, Uncoursed Rubble, Coursed Rubble and Ashlar Masonry) Brickwork and Brick masonry: Types of bonds: English, Flemish, Header, Stretcher.	**(08 Hours)**
UNIT - IV	**Doors, Windows and Staircase** Doors: Definition and terminology, Installation of doors frames, Types of Doors: Glazed or sash door, flush door, louvered door, collapsible doors, revolving doors, sliding doors, swing doors. Windows: Definition and terminology, Types of window: Casement window, Sliding Window, Louvered or venetian window, gable window, skylight window, Ventilators. Stairs: Classification, Terminology used, Types: Straight staircase, Open well stair, quarter turn stairs, half turn stairs, turning staircase, dog legged staircase, circular stairs, Bifurcated stairs and spiral stairs, Details of Ramps, Lifts and Escalators. Lintels:Types, Details ofR.C.C. lintels and chhajja.	**(08 Hours)**
UNIT - V	**Floors and Roofs** Flooring: I.S. Specifications, Types of floor finishes and suitability, Construction details of (mud, concrete, brick and stone flooring), Factors for selection of flooring, types of flooring: Timber flooring, tiled flooring, ceramic flooring, mosaic flooring, Industrial flooring: tremix or Vacuum Dewatered Flooring(VDF) Roofs: Types, Suitability, Roof structures, Selection of roof covering material, Methods of water proofing of roofs, Types of trusses, Fixtures & fastenings.	**(08 Hours)**
UNIT - VI	**Building Finishes** Plastering: Methods, tools used, Mortars, Defects,Plaster types: Lime plaster, cement plaster, gypsum plaster, Plaster of Paris and applications Pointing: Purpose and Types of pointing, Methods of pointing. Paints : Types and applications , Textures, Apex, Plastic emulsion Wall cladding: Materials, method of fixing, wall papering and glazing work Damp proofing: causes, effects, prevention, and treatments, Fire resistant construction: Fire resistant properties of common building materials, requirements for various building components.	**(08 Hours)**
Internal Assessment:		
Part- A	**Mid-Term Test:** UNIT – I to III	
Part- B	**Project based Learning**	
	1) Scope of construction materials in Building constructions	
	2) Natural and Artificial Construction Materials	

	3) Building foundations, Stone and Brick Masonry	
	4) Design of staircase.	
	5) Floors and roofs	
	6) Building finishes	
Term Work:		
Part- A	The term-work shall consist of minimum **Five** drawing sheets from list below.	
	1) Lettering, Symbols,Types of line and dimensioning	
	2) Foundation: Isolated, Combined footings, Under Reamed Piles, Rafts	
	3) Type of stone masonry: Elevation and Sectional Drawing	
	4) Types of Brick Masonry:	
	5) Types of Doors and windows:	
	6) Types of stairs: plan and sectional drawing	
	7) Trusses: Various types of Trusses	
	8) Site Visit: To understand Various building Material and their use.	

Text Books:

1. "Building Construction"-Rangwala,Charotar Publication
2. "The Text Book of Building Construction"-S.P.Arora&S.P.Bindra-DhanpatRai Publication
3. " Building Technology and Valuation"- TTTI Madras,-- Tata McGraw Hill Publication
4. "Building Construction" by B.C.Punmia, Laxmi Publications.

Reference Books:

1. " My Construction Practices "R.B.Chaphalkar
2. "A to Z" Building Construction" Mantri Publications
3. "Materials of Construction" – Ghose- Tata McGraw Hill Publications
4. " Civil engineering Material'- TTTI Chandigarh- Tata McGraw Hill Publications
5. 'Building Material Technology by Ruth T. Brantly& L Reed Brantley, Tata McGraw Hill
6. Building Materials by S.K.Duggal, New Age International Publishers.

e-Resources

1. https://nptel.ac.in/course.html
2. https://theconstructor.org/write-for-us/
3. https://www.engineerwing.com/2012/10/tremix-flooring.html
4. http://home.iitk.ac.in/~mohite/composite_introduction.pdf

	Communication Skills (Common for all Branches)		
Teaching Scheme:	**Examination Scheme:**		**Credits Allotted**
Theory:- 00 Hours/ Week	End Semester Examination	00	Theory: 00 Tutorial: 00 Practical: 01
Practical :- 02 Hours/ Week	Internal Assessment	00	
Tutorial :- 00 Hours/ Week	Term Work	50 Marks	
	Oral/Practical Examination	00 Marks	
	Total	50 Marks	01

Course Prerequisites:-	Students should have knowledge of Basic English grammar Students should have basic information of sound system of English language.
Course Objective	The course objective of Communication Skills puts the following class teaching objectives, considering English Language skills as a wheel rolling aspects in today's world, the focus is on honing the skills such as LSRW and presentation skills. It also puts emphasis on technical and professional writing skills. Honing the presentation skills among students through appropriate activities, this will help them in their business ventures.
Course Outcomes:-	After completion of the course students will be able to 1. Understand and construct the error free sentences of English language and do implementation of it in the spoken and written business communication 2. Understand and apply the sounds of English language for correct pronunciation 3. Understand and develop the ability to enhance sound vocabulary for effective communication 4. Understand communication process and principles to do applications in business communication 5. Understand the techniques of writing skills and apply them in appropriate context and domain 6. Create effective business presentation and do effective implementation of it through activities

Unit I:English grammar (4 Hrs)

Application of Basic Grammar: Articles, Prepositions, Tenses, Subject-verb agreement, Use of phrases & Clauses in sentences, Common errors

Unit II. Phonetics/study of sounds in English (4 Hrs)

Introduction to phonetics, study of speech organs, study of phonetic script, transcriptions of words, articulation of different sound in English, reducing MTI, stress and intonation

Unit III: Vocabulary Enrichment **(4 Hrs)**

Ways of word formation, Foreign phrases, One word substitutions, Synonyms & antonyms, Words often confused, Indian English words, Usage of idioms &phrases.GRAS-PT formula

Unit IV: Communication Skills **(4 Hrs)**

Introduction, forms and function of communication process, non-verbal codes in communication, Importance of listening skills, Listening V/s hearing, Types of listening, Barriers to communication and listening, Importance of LSRW skills in communication

Unit V: Technical Writing Skills **(4 Hrs)**

The mechanics and principles of written communication, Technical Communication, Need and Importance, technical report writing;, email writing, , notice, agenda, minutes of meeting writing. Use of technology in technical writing

Unit VI.Presentation skills **(4 Hrs)**

Designing effective presentation, understanding theme, developing content and layout of presentation, use of tone and language, technological tools for effective presentation

Reference Books:

1. Business Communication by Meenakshi Raman, Prakash Singh published by Oxford University press, second edition,
2. Spoken English- A manual of Speech and Phonetics by R. K. Bansal, J. B. Harrison published by Orient Blackswan
3. Technical Communication by Meenakshi Raman, Sangeeta Sharma published by Oxford University press
4. Developing Communication Skills by Krishna Mohan, Meera Banerji published by Macmillan India Pvt Ltd

Recommended web-links for enhancing English language and business communication

http://www.bbc.co.uk/worldservice/learningenglish

http://www.englishlearner.com/tests/test.html

http://www.hodu.com/default.html

http://www.communicationskills.co.in/index.html

Programme: B. Tech. (Civil) Sem – I

COURSE: SKILLED BASED COURSE-I – COMPUTER AIDED DRAWING		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS:**
Practical: 04Hrs / Week	Term work : 25 Marks Oral : 25 Marks	Practical: 02
		Total: 02

Course Pre-requisites: The students should have knowledge of	
1	Building Planning and Design
2	Proficiency in producing 2D drawings
3	Engineering Graphics and Drafting knowledge
Course Objective: On completion of the course -	
	The students will be able tocapableofdrawinganykindofEngineeringdrawingusingAutoCAD
Course Outcomes: On completion of the course, the students will be able to -	
1	draw various Engineering drawing using AutoCAD commands.
2	draw various elements of a building.
3	draw various elevation and sections of the building.
4	draw various Engineering drawing using AutoCAD 3D
5	draw various 3D elements of a building from 2d profiles.
6	Render 3D models and scale printing of 3D models

Course Content:

Unit-I	**IntroductiontoAutoCADandCommand:** IntroductiontoAutoCAD,BasicAutoCADcommands-Line,Circle,Polyline,Rectangle,Polygon,Array,Trim,Offset,Fillet,Champers,Units,Love,Copy, Paste,Drawingspace, Layout,Model.	
Unit-II	**2D Modelling and Editing:** Creating and managing layers, Drawing, and modifying basic geometric shapes,working with advanced object types (ellipses, splines, etc.), Adding dimensions and text annotations, Creating, and editing blocks, Applying hatching and gradients, application of layers and blocks in building plan.	**(04 Hrs)**
Unit-III	**2D BuildingPlanDrawing:** SmallbungalowsplanscaledprintoutonA3sheet,CommercialandPublic buildings, Flatsand bungalow plans, Elevation andSection.	**04 Hrs)**
Unit-IV	**Introduction to 3D Modelling:** Introduction to AutoCAD 3D, creating solid primitives, Mesh primitives Working in 3D, Commands for Editing in AutoCAD 3D	**(04 Hrs)**
Unit-V	**Modelling Workflow and Editing Models:** Creatingmodelsfrom 2Dplans &profiles,creatingcompositemodels, adding detail to your solid models, Editing solid models-Walls, Windows, Door etc	**(04 Hrs)**
Unit-VI	**Visualization:** Usingvisualstyles,usinglightsforDifferentviewangles,	**(04 Hrs)**

	UsingmaterialsfordifferentItems-Walls,Flooring,Door,Windows,Paints etc. AutoCAD3DModelRenderingProcess	

Term work: The term work shall consist of **ANY SIX**following practical-	
1	AutoCADDrawingofsmallobjects using different commands.
2	AutoCADDrawing using Geometric shapes.
3	AutoCAD Drawingof plan,elevation,andsection ofsmallbuilding.
4	Preparationof3D modelsfrom2Dprofiles
5	AutoCAD 3D Drawing of a plan, elevation, and section of small building.
6	PreparationofAutoCAD3Dviewsofsmallbuilding.
7	UseofdifferentMaterialsforItems.
8	3D Model rendering & Scale Printing of models.

Oral: The Oral examination will be based on above term work and course content.

Textbooks:

1	"Mastering AutoCAD 2018 and AutoCAD LT 2018 by Goerge Omura"
2	"AutoCAD 2018 Instructor perfect paperback by James A. Leach"
3	"Beginning AutoCAD Exercise workbook 2018 by Cheryl R. Shrock"

Reference Books:

1	"AutoCad:2DReferenceguide: 1Paperback=1january2010byC.S.Changeriya"
2	"AutoCAD14(TheCompleteReference)Paperback–Import,1 December 1998byDavidS.Cohn"

Programme:
B. Tech.(Civil)-2023
Sem – II

	Engineering Mathematics-II(Common for all Branches)		
Teaching Scheme:	**Examination Scheme:**		**Credits Allotted**
Theory:- 03 Hours/ Week	End Semester Examination	60 Marks	Theory: 03 Tutorial: 01 Practical: 00
Practical :- 00 Hours/ Week	Internal Assessment	40 Marks	
Tutorial :- 01 Hours/ Week	Term Work	00 Marks	
	Oral/Practical Examination	00 Marks	
	Total	100 Marks	04

Course Prerequisites:-	The students should have knowledge of differential calculus
Course Objective	On completion of the course – 1. Fundamental theorems, concepts in Matrices, Demoivre's theorem and its applications in engineering. 2. Various techniques in Calculus, Explanation of functions and Infinite series. 3. Partial differentiation, maxima, minima and its applications in engineering
Course Outcomes:-	After completion of the course students will be able to 1. Solve differential equations by different methods. 2. Apply different laws to solve Simple Harmonic Motion, One–Dimensional Conduction of Heat. 3. Solve integral calculus and Fourier series. 4. Solve integral calculus with error functions. 5. Determine position in solid geometry 6. Solve multiple integration problems.

Unit I:DifferentialEquation of First Order and First Degree: (06 Hrs)

Definition, Order and Degree of DE, Formation of DE, Solutions ofVariable Separable DE, Exact DE, Linear DE and reducible to these types

Unit II: Applications of Differential Equations: (06 Hrs)

Applications of DE to Orthogonal Trajectories, Newton's Law of Cooling, Kirchoff‟s Law of Electrical Circuits, Motion under Gravity, Rectilinear Motion, Simple Harmonic Motion, One–Dimensional Conduction of Heat

Unit III: Fourier Series: (06 Hrs)

Definition, Dirichlet's conditions, Fourier Series and Half Range Fourier Series, Harmonic Analysis

Unit IV: Integral Calculus:(06 Hrs)

Reduction formulae, Beta and Gamma functions, Differentiation under the Integral Sign, Error functions

Unit V. Solid Geometry: (06 Hrs)

Cartesian, Spherical Polar and Cylindrical Coordinate Systems, Sphere, Cone and Cylinder

Unit VI:Multiple Integrals and their Application: (06 Hrs)
Double and Triple integrations, Applications to Area, Volume, Mean and Root Mean Square Values

PBL: Project Base Learning (Topics)

1	Formationofdifferentialequation
2	ExactdifferentialEquation
3	Lineardifferentialequation
4	Newton'slawofcooling
5	Newton'ssecondlawofmotion
6	Fourier'slaw
7	Kirchhoff'svoltagelaw
8	Fourierseries
9	Harmonicanalysis
10	Gammaandbetafunction
11	Reduction formulae
12	Locatingpositioninthreedimensionalspace
13	Multipleintegralsapplications
14	Errorfunction
15	Differentiationunderintegralsign

Textbooks

1. Applied Mathematics (Volumes I and II) by P. N. Wartikar& J. N. Wartikar (Pune VidyarthiGrihaPrakashan, Pune),7th Edition, 1988, Reprint 2010.

Reference Books

1.Higher Engineering Mathematics by B.S. Grewal (Khanna Publication, Delhi), 42th

Edition, 2012

2. Higher Engineering Mathematics by B.V. Ramana (Tata McGraw-Hill), Edition, 2008
3. Advanced Engineering Mathematics by Erwin Kreyszig (Wiley Eastern Ltd.), 8th Edition, 1999, Reprint 2010
4. Advanced Engineering Mathematics, 7e, by Peter V.O'Neil (Thomson Learning), Edition 2007
5. Advanced Engineering Mathematics, 2e, by M. D. Greenberg (Pearson Education), 2nd, Edition, 2002

Unit Test –

Unit Test - I	**Unit I, II, III**
Unit Test - II	**Unit IV, V, VI**

	Engineering Physics (Common for all Branches)		
Teaching Scheme:	**Examination Scheme:**		**Credits Allotted**
Theory:- 03 Hours/ Week	End Semester Examination	60 Marks	Theory: 03 Tutorial: 00 Practical: 01
Practical :- 02 Hours/ Week	Internal Assessment	40 Marks	
Tutorial :- 00 Hours/ Week	Term Work	50 Marks	
	Oral/Practical Examination	00 Marks	
	Total	150 Marks	04

Course Prerequisites:-	Students are expected to have a basic understanding of physics and calculus.
Course Objective	To impart knowledge of basic concepts in physics relevant to engineering applications in a broader sense with a view to lay foundation for the engineers.
Course Outcomes:-	After completion of the course students will be able to 1. Analyze the properties of charged particles to develop modern instruments such as electron microscopy. 2. Understand the problems associated with architectural acoustics and give their remedies and use ultrasonic as a tool in industry for non destructive testing. 3. Apply quantum physics problems to micro level phenomena and solid state physics. 4. Understand the wave nature of light and apply it to measure stress, pressure and dimension etc. 5. Apply the principles of lasers and fiber optics for applications in the field of engineering. 6. Remember properties of solid matter and connect to applications in the field of engineering.

Unit I:Modern Physics (6 Hrs)

Motion of a charged particle in electric and magnetic fields, Electrostatic and Magnetostaticfocussing, Electron microscopy, interaction of electron beam with the material, Wavelength and resolution, transmission electron microscope (TEM), scanning electron microscope (SEM), Separation of isotopes by Bainbridge mass spectrograph, cathode ray tube (CRT), CRT in cathode ray oscilloscope (CRO).

Unit II. Architectural Acoustics (6Hrs)

Elementary acoustics, Reverberation and reverberation time, Sabine's formula (without Derivation), Intensity level, Sound intensity level, Loudness, Sound absorption, Sound absorption coefficient, different types of noise and their remedies, basic requirement for acoustically good hall, factors affecting the architectural acoustics and their remedies, introduction to ultrasonics, Production of ultrasonics by magnetostriction and piezoelectric methods, applications (thickness measurement, flaw detection).

Unit III: Quantum mechanics (6hrs)

Dual nature of matter, concept of wave packet, group and phase velocity and relation between them, physical significance of wave function, Schrodinger's time dependant and time independent wave equation, Application of Schrodinger's time independent wave equation to the problems of Particle in a rigid box, concept of tunnelling at potential barrier (no derivation-only conceptual discussion).

Unit IV: Optics – I (Interference and Diffraction) (6 Hrs)

INTERFERENCE: Interference due to thin film of uniform thickness and nonuniform thickness, engineering applications of interference (optical flatness, non-reflecting coatings).
DIFFRACTION: Diffraction at a single slit (Geometrical method), Conditions for maximum and minimum, Diffraction at a circular aperture (Result only), Plane diffraction grating, Conditions for principal maxima and minima.

Unit V: Optics – II (Polarisation and Lasers) (6 Hrs)

POLARISATION: Introduction, Double refraction and Huygen's theory, Positive and negative crystals, Nicol prism.
LASERS: Lasers introduction, Characteristics of Lasers, Working principle and components of He-Ne Laser, Nd -YAG Laser, Semiconductor diode Laser, Applications in the field optical fiber (Principle, Acceptance angle and acceptance cone, Numerical aperture, Types of optical fibers, Fiber optic communication).

Unit VI. Solid State Physics (6Hrs)

Origin of band gap, Energy bands in solids, Fermi-Dirac probability function and position of Fermi level in intrinsic semi-conductors (with derivation) and in extrinsic semi-conductors, Formation and band structure of p-n junction, Hall effect and Hall coefficient.
Introductions of nanoparticles, properties of nanoparticles (Optical, electrical, Magnetic, structural, mechanical), synthesis of nanoparticles (Physical and chemical), quantum dots – wide band semiconductors, direct/indirect band gap semiconductors.

PBL : Project Based Learning (topics)

Sr. No.	Topic
1.	Tesla Coil
2.	Thin film interference in soap film-formation of colors
3.	LiFi- wireless data transfer system using light
4.	Need of medium for propagation of sound wave
5.	Possible effects of electromagnetic fields (emf) on human health
6.	Design and simulation of automatic solar powered time regulated water pumping
7.	Solar technology: an alternative source of energy for national development
8	Measurement and effect of environmental noise in the college

1.	Electronic eye (Laser Security) as auto-switch/security system
2.	Electric power generation by road
3.	Design and construction of distance measuring instrument using LASER
4.	Design and construction of remote control devices – electronic bell, Fan etc
5.	Absorption coefficient of sound absorbing materials
6.	Velocity determination of O-ray and E-ray in double refracting materials
7.	Velocity determination of O-ray and E-ray in double refracting materials
8.	The design and construction of the hearing aid device
9.	Study of Quantum confinement effect
10.	Wind turbines - a source of electricity
11.	Measurement of gravitational constant 'g'

Practical (Any Eight of the Following)

1. Determination of radius of planoconvex lens/wavelength of light/Flatness testing by Newton's rings
2. Determination of wavelength of light using diffraction grating
3. Determination of frequency of ac voltage by CRO.
4. Determination of refractive index for O-ray and E-ray
5. Determination of divergence of a laser beam
6. Particle size by semiconductor laser
7. Determination of wavelength of laser by diffraction grating
8. To study Hall effect and determine the Hall voltage
9. Calculation of conductivity by four probe method
10. Study of solar cell characteristics and calculation of fill factor
11. Determination of band gap of semiconductor
12. Synthesis of metal oxide nanoparticles (ZnO/ZnS/silver/Gold)
13. Measurement of average SPL across spherical wavefront and behaviour with the distance
14. Determination of velocity of sound in liquid by ultrasonic interferometer
15. Study of B-H curve of a sample.
16. Determination of Plank's constant.

Text Books

1. A Textbook of Engineering Physics, M N Avadhanulu, P G Kshirsagar and TVS Arun Murthy, S. Chand Publishing (2018)
2. Engineering Physics, R K Gaur and S L Gupta, Dhanpat Rai Publishing Co Pvt Ltd (2015)

3. Concepts of Modern Physics, Arthur Beiser, Shobhit Mahajan and S. Rai Choudhury, McGraw Hill Education (2017)

Reference Books

1. Fundamentals of Physics, Jearl Walker, David Halliday and Robert Resnick, John Wiley and Sons (2013)
2. Optics, Francis Jenkins and Harvey White, Tata Mcgraw Hill (2017)
3. Principles of Physics, John W. Jewett,Cengage publishing (2013)
4. Introduction to Solid State Physics, C. Kittel, Wiley and Sons (2004)
5. Principles of Solid State Physics, H. V. Keer, New Age International (1993)
6. Laser and Non-Linear Optics, B. B. Laud, New Age International Private Limited (2011)
7. Nanotechnology: Principles and Practices, Dr. S. K. Kulkarni, Capital Publishing Company (2014)
8. Science of Engineering Materials- C.M. Srivastava and C. Srinivasan, New Age International Pvt. Ltd. (1997)

Unit Test –

Unit Test - I	**Unit I, II, III**
Unit Test - II	**Unit IV, V, VI**

Programme: B. Tech. (Civil) Sem – II

COURSE: ENGINEERING MECHANICS		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS:**
Theory: 03Hrs / Week Practical: 02Hrs / Week	End Semester Examination: 60 Marks Internal Assessment: 40Marks Term work: 50 Marks	Theory: 03 Practical: 01
		Total: 04

Course Pre-requisites: The students should have knowledge of	
1	Physics-Forces, Newton's law of motion, Concept of physical quantities, their units and conversion of units, Scalar and Vector
2	Mathematics-Algebra, Geometry, Concept of differentiation and integration
Course Objective: On completion of the course -	
	The student should be able to determine effect of forces on rigid objects in static and dynamic state.
Course Outcomes: On completion of the course, the students will be able to -	
1	calculate resultant and apply conditions of equilibrium.
2	calculate friction force and its effect.
3	analyze the truss
4	calculate centroid and moment of inertia.
5	evaluate kinematic effect of forces
6	evaluate kinetic effect of forces

Course Content:

Unit-I	**Resultant and Equilibrium:** Types and Resolution of forces, Moment and Couple, Free Body Diagram, Types of Supports, Classification and Resultant of a force system in a Plane - Analytical and Graphical approach. Equilibrant, Conditions of Equilibrium, Equilibrium of a force system in a Plane, Force and Couple system about a point.	**(06 Hrs)**
Unit-II	**Friction:** Coefficient of Static Friction, Impending motion of Blocks, Ladders and Belts.	**(06 Hrs)**
Unit-III	**Analysis of Truss:** Analysis of Perfect Trusses - Method of Joint, Method of Section and Graphical Method.	**(06 Hrs)**
Unit-IV	**Centroid and Moment of Inertia:** Centroid of line and plane areas, Moment of Inertia of plane areas, parallel and perpendicular axis theorem, radius of gyration, least moment of inertia.	**(06 Hrs)**
Unit-V	**Kinematics of a Particle:** Cartesian components, Normal and Tangential components of motion, Relative motion, Dependent motion, Motion of a Projectile,	**(06 Hrs)**
Unit-VI	**Kinetics of a Particle:** D'Alemberts Principle, Work-Energy Principle and Impulse-Momentum Principle, Coefficient of Restitution, Direct Central Impact.	**(06 Hrs)**

Internal Assessment:	
Unit Test -1	Units: I, II, III
Unit Test -2	Units: IV, V, VI
Project Based Learning: AnyONEbased on following topicsbut not limited to it	
1	Model on types of supports
2	Model on an equilibrium condition
3	Model on block friction
4	Model on belt friction
5	Model on truss
6	Presentation on analysis of truss
7	Model on determination of centroid of an object
8	Presentation on MI of an area
9	Model on projectile motion
10	Model on Work-Energy Principle
11	Model on curvilinear motion
12	Model of Collision
Term work: The term work shall consist of following -	
A	The term-work shall consist of **minimum Five** experiments from list below.
	1) Study of equilibrium of concurrent force system in a plane
	2) Determination of reactions of Simple and Compound beam.
	3) Determination of coefficient of friction for Flat Belt.
	4) Determination of coefficient of friction for Rope.
	5) Determination of Centroid of line or plane elements.
	6) Study of Curvilinear motion.
	7) Determination of Coefficient of Restitution.
B	The term-work shall also consist of **minimum Five** graphical solutions of the problems on different topics.
Reference Books:	
1	Hibbeler R.C., "Engineering Mechanics (Statics and Dynamics)", McMillan Publication
2	Beer F.P. and Johnston E.R., "Vector Mechanics for Engineers-Vol.-I and Vol.-II (Statics and Dynamics)", Tata McGraw Hill Publication.
3	Bhavikatti S.S. and Rajashekarappa "Engineering Mechanics", K.G., New Age International (P) Ltd.
4	Shames I.H., "Engineering Mechanics (Statics and Dynamics)", Prentice Hall of India (P) Ltd.
5	Singer F.L., "Engineering Mechanics (Statics and Dynamics)", Harper and Row Publication
6	Meriam J.L. and Kraige L.G., "Engineering Mechanics (Statics and Dynamics)", John Wiley and Sons Publication
7	Timoshenko S.P. and Young D.H., "Engineering Mechanics (Statics and Dynamics)", McGraw Hill Publication
8	Tayal A.K., "Engineering Mechanics (Statics and Dynamics)", Umesh Publication
9	Mokashi V.S., "Engineering Mechanics-I and II (Statics and Dynamics)", Tata McGraw Hill Publication

Programme: B. Tech. (Civil) Sem – II

COURSE: Building Planning & Design		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS:**
Theory: 03Hrs / Week Practical: 04Hrs / Week	End Semester Examination: 60 Marks Internal Assessment: 40Marks Term work: 25 Marks	Theory: 03 Practical: 2
		Total: 05

Course Pre-requisites: The students should have knowledge of	
1	Civil Engineering Drawing
2	Construction & Materials
Course Objective: On completion of the course -	
	To make the student illustrate the process of building planning and building byelaws
Course Outcomes: On completion of the course, the students will be able to -	
1	apply various Principals of planning and building byelaws.
2	apply design considerations for climate, ventilation, Noise & Acoustics in building planning.
3	apply design considerations for various building services & fire protection in building planning.
4	apply design considerations for plumbing services in building planning.
5	Understand the concept of .development plan
6	define the legal aspects of plan sanctioning.

Course Content:

UNIT - I	**Buildings Planning and Regulations** Principles of planning for building, Integrated approach in Built Environment. Building Rules Regulations and Byelaws necessity, (National Building Code), plot size, open space around the building. FSI, Building line, control line. Height, room size, Built up area, floor area, carpet area. Rules of lighting ventilation, Drainage and Sanitation; Principles of Architectural design – form, function, utility, aesthetics.	**(06 Hrs)**
UNIT - II	**Types of Buildings** (a)Types of Residential Building units – Bungalows, Twin bungalows, Row houses, Apartments; Requirements of Public buildings - Educational buildings, buildings for health care, industrial buildings and commercial buildings. Types of Drawing- Submission Drawing, Working Drawing, Architectural Drawing, One point perspective, Two point Perspective. (b) Concept of ECO building, Green buildings, Intelligent building, Low Cost Housing, Planning considerations in High rise buildings.	**(06 Hrs)**
UNIT - III	**Climate, Ventilation and Acoustics** Elements of climate, thermal design Principles, Heat exchange of building, Thermal insulation of roof and wall. Function of ventilation, stack effect wind effect, Mechanical ventilation, Air conditioning systems. Effect of noise, Noise control sound insulation, Acoustics reverberation Sabine's	**(06 Hrs)**

	formula, acoustical defects, conditions of good acoustics.	
UNIT - IV	**Building Services** Constructional requirements for different building services like Electrical, Telecommunication services, Circulation-Lift Types and Capacity, escalators, Entertainment services. Fire Protection – Fire safety, fire load, grading of occupancies by fire load, fire escape elements. Plumbing services, fixtures and fastenings, Layout of water supply & drainage system, Rate of water supply, storage and distribution arrangement, Plumbing systems.	**(06 Hrs)**
UNIT - V	Necessity and evolution of town planning in India. Development plan and its importance, Various surveys for development plan Objectives and Contents of DP, Land use zoning, Concept of regional plan.	**(06 Hrs)**
UNIT - VI	**Legal Aspects of Plan Sanctioning** Role of Plan Sanctioning Authority for layout, co-op Housing societies and apartments. Ownership of land, plot, 7/12 abstract, meanings of different terms of 7/12 abstract (Khasra), 6-D form, list of documents to be submitted along with building Plan for sanction from the authority. TDR, certificate of commencement and completion, various no objection certificates to be produced, format of permissions from pollution control board, MSEB, Water Supply and Drainage Department, State or National Highway Department.	**(06 Hrs)**

Internal Assessment:	
Unit Test -1	Units: I, II, III
Unit Test -2	Units: IV, V, VI

Project Based Learning: AnyONEbased on following topicsbut not limited to it	
1	Model on Principles of Planning.
2	Model on Building Byelaws.
3	Model on Types of Buildings.
4	Model on Green building.
5	Model on Heat Exchange Principle of Building.
6	Model on Wind Effect & Stack Effect.
7	Model on Plumbing Systems.
8	Model on water distribution arrangements.
9	Model on Land use zoning.
10	Model on Development Plan.
11	Presentation on various formats required in plan sanctioning.
12	Presentation on various 'No Objection Certificates'.
Term work: The term work shall consist of following -	
A	Preparation of working drawings of any one of the buildings listed below: a) Residential Building b) Commercial Building c) Educational Building

	d) Industrial Building e) Recreational Building f) Health Club
	Sheets to be drawn 1) Plan/Typical floor plan to a suitable scale. 2) Elevation and section to a suitable scale. 3) Site plan showing water supply and Drainage 4) Foundation Plan to a suitable scale.
B	Perspective Drawing
Reference Books:	
1	S.P. Bindra S.P. Arora, "Building Construction", Laxmi Publication
2	M. L. Shah, C. M. Kale, S. Y. Patki, "Building Drawing with integrated approach to Built Environment", Tata McGraw Hill Publishers
3	Rangwala, "Town Planning" ,Charaotar Publications
4	IS provisions "National Building Code"
5	"Development Control Rules" of local plan sanctioning authority
6	Calendar, "Time Saver Standards for Architectural Design", Tata McGraw Hill Publishers
7	Merit, "Building Design and Construction", Tata McGraw Hill Publishers

Surveying and Levelling		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED: 05**
Theory: 03Hours / Week	End Semester Examination: 60 Marks	Theory: 03 Credits
Practical: 02Hours / Week	Internal Assessment: 40 Marks	
	Term work: 50 Marks	TW: 01 Credits
	Total Credits	04

Course Pre-requisites:	
The Students should have knowledge of	
1.	Basic Mathematics and geometry
Course Objectives:	
	To develop the knowledge of Surveying techniques required for various construction projects.
Course Outcomes:	
On completion of the course, the students will be able to:	
1.	Use instruments for linear measurements
2.	Use of Compass and Vernier theodolite for angular measurements and for other applications
3	Develop skills to interpret and analyze survey records effectively
4.	Take and Record measurement as practiced in field.
5	Analyze contours which enables them to extract shape – related features
6.	Set out simple circular curves by various methods

UNIT - I	**Introduction to Surveying and Linear measurements**	**(6Hours)**
	Principle, objectives and classification of Surveying. Linear measurements, methods, types of tapes, ranging, field work and plotting. Principle and working of EDM.	
UNIT-II	**Angular Measurements**	**(6Hours)**
	Compass Survey: types of meridians and bearings, construction and use of prismatic compass, concept local attraction and its correction, dip and declination. Numerical on WCB,RB,FB,BB and Calculation of included angles from given bearings . Study and use of Vernier 20" theodolite, principle axes and temporary adjustments, measurements of horizontal angles by repetition and reiteration method, measurement of vertical angles.	
UNIY -III	**Records pertaining to land measurement**	**(6Hours)**
	Introduction to Land Measurement Records, Importance of records in land measurement surveys, Types and formats of records used in land measurement, Legal requirements and standards for record-keeping, Understanding boundary surveys and property descriptions , Admissibility of land measurement records in court ,Introduction to data management systems, Techniques for organizing and storing land measurement records Analysis and interpretation of measurement data, Digital Record-keeping, Ethical dilemmas in record-keeping and reporting	
UNIT - IV	**Leveling**	**(6Hours)**

	Introduction, types of levels, principle axes of levels ,Dumpy level, auto level and its working, temporary adjustments of Dumpy level and auto-level, types of leveling staves, Principle of leveling –Simple and Compound leveling computation of reduced levels by HI an Rise and fall method, profile leveling and cross sectioning. Contouring – direct and indirect methods, uses of contour maps. Introduction to trigonometrically leveling.	
UNIT -V	Contouring	**(6Hours)**
	Contouring – Introduction to Contouring , Characteristics of contours,Contour Generation Methods :direct and indirect methods, uses of contour maps, Digital Contouring Tools and Software Area and Volume Measurement: Study and use of digital survey, concept of computation of volume by Trapezoidal and prismoidal formulae(No numerical problem)	
UNIT - VI	**Curve Setting**	**(6Hours)**
	Necessity of providing curves, simple circular curves, elements, setting out circular curves by radial and perpendicular offsets, offsets from long chord and offsets from chords produced. Angular method of deflection angles. Transition curves, necessity and types.	
Term Work: The term work shall consist of Field book and drawing containing record of exercises listed below.		
1	Linear measurements with tape and accessories.	
2	Study and use Levelling Instruments	
3	Compound leveling calculation by rise and fall method	
4	Study and use of 20" Vernier Theodolite	
5	Measurement of horizontal angle of triangle by repetition method and applying check.	
6	Measurement of vertical angle by transit Theodolite	
7	Trigonometrical levelling by transit Theodolite	
8	Setting out simple circular curve by Rankin's method of deflection angle	
Text Books		
1	Surveying and Levelling Vol I and. II-T.P. Kanetkar and S.V. Kulkarni.	
2	Surveying Vol. I & II - Dr. B.C. Punmia, Ashok K. Jain, Arun K. Jain.	
3	Surveying for Engineers- John Uren & Bill Price- Palgrave Macmillan	
4	Plane Surveying- A.M.ChandraNew age International Publishers	
5	Surveying and Levelling- N. N. Basak, Tata Mc-Graw hill	
6	Surveying Vol. I & II - Dr. K. R. Arora.	
Reference Books:		
1	Surveying: Theory and practice-James M. Anderson, Edward M. Mikhail	
2	Surveying theory and practices-Devise R. E., Foot F.S.	
3	Plane and Geodetic Surveying for Engineers. Vol. I -David clark.	
4	Principles of Surveying. Vol. I - J.G.Olliver, J.Clendinning	
5	Surveying Vol. I & II -S.K.Duggal, Tata Mc-Graw Hill.	
6	Surveying and Levelling - Subramanian, oxford University Press.	

Syllabus for :		
Unit Test-I	UNIT – I, II, III	
Unit Test-II	UNIT- IV,V,VI	

Project base Learning topics List:	
UnitI	**Introduction to Surveying and Linear measurements**
1	Collect Information of Linear measurement techniques/instruments from oldagetill21st century,writereportalongwithphotos
2	Power Point Presentation on EDM
UnitII	**Angular Measurements**
3	Prepare leaflet on Angular Measurement.
4	VisittolaboratoryandcollectinformationofAngularMeasurementinstrumentandmakeppt.
UnitIII	**Records pertaining to land measurement**
6	Power point presentation on Digital Record-keeping
7	Report on Techniques for organizing and storing land measurement records
8	Leaflet on Ethical dilemmas in record-keeping and reporting
Unit IV	**Leveling**
9	Power Point Presentation on HI method with numerical
10	Power Point Presentation on Rise and Fall Method
11	Report on Levelling instruments Till the date
Unit V	Contouring
13	Power Point Presentation on Digital Contouring Tools and Software
14	Booklet on Characteristics of contours with field examples
Unit VI	Curves
16	Take Photograph of Curves of road you usually use and make a poster and display it on Notice Board.
17	Digital booklet on numerical of Rankine's method of Curves share it with your classmate and take feed back
18	Digital booklet on numerical of offset from long cord method of Curves share it with your classmate and take feed back

	Universal Human Values (Common for all Branches)		
Teaching Scheme:	**Examination Scheme:**		**Credits Allotted**
Theory:- 00 Hours/ Week	End Semester Examination	00	Theory: 00 Tutorial: 00 Practical: 01
Practical :- 02 Hours/ Week	Internal Assessment	00	
Tutorial :-00 Hours/ Week	Term Work	50 Marks	
	Oral/Practical Examination	00 Marks	
	Total	50 Marks	01

Course Prerequisites:-	During the Induction Program, students would get an initial exposure to human values through Universal Human Values. This exposure is to be augmented by this compulsory full semester foundation course.
Course Objective	Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence Strengthening of self-reflection. Development of commitment and courage to act
Course Outcomes:-	After completion of the course students will be able to 7. Create more awareness of themselves, and their surroundings (family, society, nature); 8. Understand the Human being is coexisting with self and body and able to recognize its different needs and fulfillment 9. Develop more responsible life with human relationships, while keeping in mind the human nature 10. Understand to imbibe sensitive approach towards society and understand the dimensions of harmony in the society 11. Understand the recycle structure of the nature and able to recognize the participation 12. Apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

Unit I:Introductions, Aspirations and Concerns (4Hrs)

Getting to know each other, Self-exploration, Individual academic, career Expectations of family, peers, society, and nation fixing one's goals Basic human aspirations Need for a holistic perspective, Role of UHV

Unit II. Self-Management,Health (4Hrs)

Self-confidence, peer pressure, time management, anger, stress Personality development, Self-improvement Harmony in the human being. Health issues, healthy diet, healthy lifestyle Hostel life Harmony of the self and Body Mental and physical health

Unit III: Relationships **(4Hrs)**

Home sickness, gratitude towards parents, teachers and others Ragging and interaction Competition andcooperationPeer pressure. Harmony in relationship Feelings of trust,respect, gratitude, glory, love

Unit IV: Society **(4 Hrs)**

Participation in society. Harmony in the society Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals .Visualizing a universal harmonious order in society- Undivided Society, Universal Order-from family to world family

Unit V: Natural Environment **(4Hrs)**

Participation in nature Harmony in nature/existence Understanding the harmony in the Nature Interconnectedness and mutual fulfillment among the four orders of nature-recyclability and self regulation in nature

Unit VI. Self-evaluation Strategy **(4 Hrs)**

Strategy for transition from the present state to Universal Human Order: a. Atthe level of individual: as socially and ecologically responsible engineers, technologists and managers. At the level of society: as mutually enriching institutions and organizations review role of education Need for a holistic perspective

Text Book

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

Reference Books

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

Programme: B. Tech. (Civil) Sem – II

COURSE: SKILLED BASED COURSE-II – Hands on Training on Total station		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS:**
Practical: 04Hrs / Week	Term work : 25 Marks Oral : 25 Marks	Practical: 02
		Total: 02

Course Pre-requisites: The students should have knowledge of	
1	Basic Surveying Techniques
Course Objective: On completion of the course -	
	The students will be able to use Total Station for various Field surveys
Course Outcomes: On completion of the course, the students will be able to -	
1	Measure horizontal and, vertical angles
2	Measure distance between survey stations
3	Perform traverse survey and contour survey
4	Perform stake out survey
5	Down load data from Total station to PC
6	Prepare a plane table map in CAD
Course Content: List of Practical's	
1	Setting Total station and study temporary adjustments
2	Study use of various keys and their function
3	Measure horizontal and vertical angles.
4	Study backsighting operation for traverse survey.
5	Orientation of total station by resection
6	Plane table survey and determine area of plot .
7	Perform contour survey of given area.
8	Perform Stake out operation
9	Perform survey for road
10	Measure remote distance and remote elevation
11	Down load data from total station to PC
12	Produce simple survey maps using Auto Cad
13	Detail survey project of a given area.
14	Transfer and Establish Bench marks
Term work: The term work shall consist of record of above practicals	
Oral: The Oral examination will be based on above term work and course content.	
Textbooks:	
1	**Advanced surveying: total station gps gis and remote sensing by Gopi Satheesh (Author), R.Sathikumar (Author), N. Madhu (Author) Pub- Pearson**
2	Surveying – S.K. Duggal-
3	Mannual of Total Station

B. Tech. – 2023 Course

Rules and Regulations

B. Tech. – 2023 Course

Rules and Regulations

(I) Theory

(A) Theory Examination

Theory examination consists of: (i) End semester examination (ESE), and (ii) Internal assessment (IA).

(i) ESE is of 60 marks for theory courses.

(ii) IA is of 40 marks. Out of 40 marks, 20 marks will be for Unit Tests and 20 marks will be for Project Based Learning for a given course. Two Unit Tests, each of 20 marks, will be conducted. Average of marks obtained in these two unit tests will be considered as UT marks. Roll numbers allotted to the students shall be the examination numbers for the conduction of unit tests.

(B) Standard of Passing

(i) There is a separate passing of 40% of 60 marks, i.e. 24 marks, for ESE for a given course.

(ii) There is a separate passing of 40% of 40 marks, i.e. 16, for IA for a given course.

(iii) A student who fails at ESE in a given course has to reappear only at ESE as a backlog student and clear the head of passing. Similarly, a student who fails at IA in a given course has to reappear only at IA as a backlog student and clear the head of passing

(II) Practical

(A) Practical Examination

Practical examination consists of: (i) Term work, and (ii) Practical/Oral examination for a given course based on term work.

(i) Term work (TW): TW marks are as mentioned in the curriculum structure.

(ii) Practical/Oral (PR/OR): PR/OR marks are as mentioned in the curriculum structure.

(B) Conduction of practical/oral examination

(i) A student will be permitted to appear for practical/oral examination only if he/she submits term work of a given course.

(ii) Practical/oral examination shall be conducted in the presence of internal and external examiners appointed by university.

(B) Standard of Passing

(i) A student shall pass both heads TW and PR/OR separately with minimum 40% of total marks of respective head.

(III) MOOC and Social Activity Course

(i) If a student completes one MOOC during a programme, he/ she will earn additional TWO credits, subjected to submission of the certificate of completion of the respective course. It is mandatory for a student to complete atleast two MOOC to obtain degree in a given discipline. Students shall register to MOOCs which are offered by any one the following agencies:

(a) SWAYAM : www.swayam.gov.in
(b) NPTEL : www.onlinecourse.nptel.ac.in
(c) Course Era : www.coursera.org
(d) edX online learning : www.edx.org
(e) MIT Open Course ware : www.ocw.mit.edu
(f) Udemy : www.udemy.com
(g) Spoken tutorial : www.spoken-tutorial.org

(ii) If a student completes social activity, he/she will earn additional TWO credits, subjected to submission of the certificate of completion of the respective course/ activity from the relevant authorities. It is mandatory for a student to complete atleast one social activities to obtain degree in a given discipline.

(iv) The additional credits for MOOC and Social Activity will be given only after verification of the authentic document by the Head of the Department and a separate mark-sheet will be submitted by the Head of the Department along with the course examiner.

(IV) Value Added Course (VAC) and Indian Knowledge System (IKS) Course

(i) The VAC and IKS courses are mandatory and must be passed by students during the designated semester to earn two credits.

(ii) These courses have an internal assessment worth 100 marks, which are distributed as follows: (a) three assignments, each worth 20 marks, and (b) two case studies, presentations, or quizzes, each worth 20 marks. Faculty members have the flexibility to choose between conducting two case studies, two presentations, two quizzes, or any combination thereof.

(V) Minor Programme

(i) A students shall receive a MINOR degree when he/she acquires additional 20 credits in a given specialization defined by the UG programmes offered at the institute.

(ii) The theory and practical/oral components for a given course are mentioned in curriculum structure. The theory and examination for a given course are mentioned in Section I and II.

(iii) The grade point, grade letter and equivalent marks system for MINOR programme is mentioned in Section V.

(iv) The MINOR DEGREE programme is OPTIONAL. The interested students may opt MINOR programme.

(v) A student shall complete the MINOR program prior to his/her graduation.

(VI) A. T. K. T

(i) A student who is granted term for B. Tech. Semester-I, III, V, VII will be allowed to keep term for his/her B. Tech. Semester-II, IV, VI, VIII examination, respectively even if he/she appears and fails or does not appear at B. Tech. Semester-I,III, V, VII examination respectively.

(ii) A student shall be allowed to keep term for the B. Tech. Semester-III course if he/she has a backlog of any number of Heads of passing at B. Tech. Semester-I & II taken together.

(iii) A student shall be allowed to keep term for the B. Tech. Semester-V of respective course if he/she has no backlog of B. Tech. Semester-I & II and he/she has a backlog of any number of Heads of passing at B. Tech. Semester-III & IV taken together.

(iv) A student shall be allowed to keep term for the B. Tech. Semester- VII of respective course if he/she has no backlog of B. Tech. Semester-I, II, III, IV and he/she has a backlog of any number of Heads of passing at B. Tech. Semester-V & VI taken together.

(VII) Grade Point, Grade Letter and Equivalent Marks

The student must obtain a minimum Grade Point of 5.0 (40% marks) in ESE and also in combined ESE + IA. A student who fails in ESE of a course has to reappear only to ESE as a backlog student and clear that head of passing.

Award of the Class for the Degree considering CGPA: A student who has completed the minimum credits specified for the programme shall be declared to be passed in the programme. The CGPA

will be computed every year of all the courses of that year. The grade will be awarded according to the CGPA of every year.

Range of CGPA	**Final Grade**	**Performance Descriptor**	**Equivalent range of Marks (%)**
9.50 ≤ CGPA ≤10.00	O	Outstanding	80 ≤ Marks ≤ 100
9.00 ≤ CGPA ≤ 9.49	A+	Excellent	70 ≤ Marks <80
8.00 ≤ CGPA ≤ 8.99	A	Very Good	60 ≤ Marks < 70
7.00 ≤ CGPA ≤ 7.99	B+	Good	55 ≤ Marks < 60
6.00 ≤ CGPA ≤ 6.99	B	Average	50 ≤ Marks < 55
5.00 ≤ CGPA ≤ 5.99	C	Satisfactory	40 ≤ Marks < 50
CGPA below 5.00	F	Fail	Marks Below 40