FIRST YEAR SYLLABI 2023

B.TECH.
CIVIL ENGINEERING

MAR BASELIOS COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)
Mar Ivanios Vidyanagar, Nalanchira, Thiruvananthapuram – 695 015
August 2023

DETAILED SYLLABI OF FIRST YEAR

FOR

B. TECH. DEGREE PROGRAMME

IN

CIVIL ENGINEERING

SEMESTERS I & II

2023 SCHEME

(AUTONOMOUS)

MAR BASELIOS COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)
(Approved by AICTE, Autonomous Institution Affiliated to APJ Abdul Kalam Technological University)
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MAR BASELIOS COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

DEPARTMENT OF CIVIL ENGINEERING

B. TECH DEGREE PROGRAMME
IN
CIVIL ENGINEERING

DETAILED SYLLABI OF FIRST YEAR

Items	Board of Studies (BoS)	Academic Council (AC)
Date of Approval	14-07-2023	09-08-2023

Head of Department
Chairman, Board of Studies

Principal
Chairman, Academic Council

MAR BASELIOS COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

Vision and Mission of the Institution

Vision:

To be an Institution moulding globally competent professionals as epitomes of Noble Values.

Mission:

To transform the Youth as technically competent, ethically sound and socially committed professionals, by providing a vibrant learning ambience for the welfare of humanity.

DEPARTMENT OF CIVIL ENGINEERING

Vision and Mission of the Department

Vision:

To be a Centre of Excellence in Civil Engineering education with a global perspective, creating ethically strong engineers for the service of society.

Mission:

To provide Engineering Education which can create exemplary professional Civil Engineers of high ethics with strong conceptual foundation coupled with practical insight, to serve the industry and community.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1: Graduates of the Programme will have a successful career as Civil Engineering practitioners, entrepreneurs or professionals, addressing the needs of the industry with a global perspective.

PEO2: They will contribute to society as ethical and responsible citizens with proven expertise

PEO3: They will engage in continuous professional development and advance to leadership roles in their chosen career.

PROGRAMME OUTCOMES (POs)

Engineering graduates will be able to:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
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.
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.
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.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
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.
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.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
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.

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.
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)

PSO1: Provide feasible and sustainable solutions to problems in various Civil Engineering disciplines such as Structural, Environmental, Geotechnical, Transportation and Construction Engineering.

PSO2: Apply the principles, methods, software and codes of practices to design various Civil Engineering Systems

CURRICULUM - (FIRST YEAR)

SEMESTER I						
Slot	**Cate-gory Code**	**Course Code**	**Courses**	**L-T-P-J**	**Hours**	**Credit**
A	BSC	23MAL10A	Linear Algebra and Calculus	3-1-0-0	4	4
B	BSC	23CYL10A	Engineering Chemistry	3-1-0-0	4	4
C	ESC	23ESB10A	Engineering Graphics	2-0-2-0	4	3
D	ESC	23ESB10K	Basics of Electrical Engineering B	1-0-2-0	3	2
E	ESC	23ESL10M	Basics of Mechanical Engineering	2-0-0-0	2	2
	ESC	23ESL10N	Basics of Civil Engineering	2-0-0-0	2	2
G	ESC	23ESL1NA	Environmental Science	2-0-0-0	2	1*
S	BSC	23CYP10A	Engineering Chemistry Lab	0-0-2-0	2	1
T	ESC	23ESP10A	Manufacturing and ConstructionPractices A	0-0-2-0	2	1
				TOTAL	**25**	**20**

SEMESTER II						
Slot	**Cate -gory Code**	**Course Code**	**Courses**	**L-T-P-J**	**Hours**	**Credit**
A	BSC	23MAL10B	Vector Calculus, Differential Equations and Transforms	3-1-0-0	4	4
B	BSC	23PYL10A	Engineering Physics	3-1-0-0	4	4
C	ESC	23ESL10B	Applied Mechanics	2-1-0-0	3	3
D	ESC	23ESB10F	Problem Solving and Programming	2-0-2-0	4	3
E	ESC	23ESL10R	Building Materials and Construction Technology	3-0-0-0	3	3
G	HSC	23HSJ1NB	Professional Communication	2-0-0-2	4	1*
S	BSC	23PYP10A	Engineering Physics Lab	0-0-2-0	2	1
T	ESC	23ESP10C	Design Studio I	0-0-2-0	2	1
				TOTAL	**26**	**20**

*Not to be considered for Grade/GPA/CGPA. Pass or Fail only

SEMESTER 1

Course Code	Course Name	Category	L	T	P	J	Credit
23MAL10A	LINEAR ALGEBRA AND CALCULUS	BSC	3	1	0	0	4

i) COURSE OVERVIEW

This course introduces students to some basic mathematical ideas and tools which are at the core of any engineering course. A brief course in Linear Algebra familiarizes students with some basic techniques in matrix theory which are essential for analyzing linear systems. The calculus of functions of one or more variables taught in this course are useful in modelling and analyzing physical phenomena involving continuous change of variables or parameters and have applications across all branches of engineering.

ii) COURSE OUTCOMES

After the completion of the course, the student will be able to:

CO 1	Solve systems of linear equations.	Apply
CO 2	Compute maxima and minima using partial derivatives.	Apply
CO 3	Compute areas and volumes of geometrical shapes using multiple integrals.	Apply
CO 4	Identify the convergence or divergence of an infinite series.	Apply
CO 5	Determine the Taylor and Fourier series expansion of functions and learn their applications.	Apply

iii) SYLLABUS

Basics of Linear Algebra – Solution of systems of linear equations, row echelon form, rank, eigen values and eigen vectors, diagonalization of matrices, orthogonal transformation, quadratic forms.

Partial Differentiation and Applications – Limit and continuity of functions of two or more variables, partial derivatives, chain rule, total derivatives, maxima and minima

Multiple Integrals – Double and triple integrals, double integrals over rectangular and non-rectangular regions, changing the order of integration, finding areas and volume, mass and centre of gravity.

Infinite series – Convergence and divergence of Infinite series, geometric series and p-series, test of convergence, Alternating series, absolute and conditional convergence.

Taylor series, Binomial series and series representation of exponential, trigonometric,

logarithmic functions –Fourier Series– Euler's formulas, Fourier sine and cosine series, Half range expansions

iv) a) TEXTBOOKS

1) Anton, Bivens & Davis, Calculus, 12th edition, John Wiley & Sons, 2021.
2) Erwin Kreyszig, Advanced Engineering Mathematics, 10th edition, John Wiley & Sons, Inc., 2020.

b) REFERENCES

1) James Stewart, Essential Calculus, 2nd edition, Cengage Learning, 2013.
2) George B. Thomas and Ross L. Finney, Calculus and Analytic geometry, 9th edition, Pearson, Reprint, 2002.
3) Peter V. O'Neil, Advanced engineering mathematics, 8th edition, Cengage learning, 2017.

Course Code	Course Name	Category	L	T	P	J	Credit
23CYL10A	ENGINEERING CHEMISTRY	BSC	3	1	0	0	4

i) COURSE OVERVIEW

The aim of the Engineering Chemistry program is to expose the students to basic concepts of chemistry and its Industrial as well as Engineering applications. It also lets the students to familiarize with different topics such as new-generation engineering materials, storage devices, different instrumental methods etc.

ii) COURSE OUTCOMES

After the completion of the course, the student will be able to:

CO1	Apply the basic concepts of Electrochemistry in various Engineering problems.	Apply
CO2	Apply the basic concepts of UV-Visible, IR and NMR spectroscopic techniques to analyze organic compounds.	Apply
CO3	Explain the significance of conducting polymers, Nanomaterials, Alloys and composite materials in Engineering.	Understand
CO4	Explain relevant techniques used for the identification and separation of chemical compounds and mixtures.	Understand
CO5	Explain the principles of green chemistry and various water treatment methods used for sustainability.	Understand

iii) SYLLABUS

Electrochemistry: Cell prototype- Daniel cell, Nernst equation and its uses, Primary and secondary electrodes- construction and working, applications of electrochemical series. Potentiometric titration – Acid Base titration, Fundamentals of corrosion, Galvanic series, Wet and dry corrosion – types, mechanism and its prevention.

Electrochemical power sources: different types of cells, construction, working and applications– Dry cell, Electrolytic cells, Galvanic cells, Lead-acid cell, accumulator, Lithium ion cell- different electrode materials, Fuel cells, H_2-O_2 fuel cell.

Basics of Spectroscopy: Beer Lambert's law, Principles and applications of UV-Visible spectroscopy, Fluorescence and its applications, Woodward-Feiser rule, instrumentation of UV- Visible spectroscopy, colorimetry, Principles and applications of IR spectroscopy, Number of vibrational modes – CO_2 and H_2O, Determination of force constant of diatomic molecules, Principles and applications of NMR spectroscopy, Shielding, Deshielding, Chemical shift, spin- spin splitting, MRI technique.

Engineering Materials: Basics of Polymer chemistry, Types of copolymers, Preparation, properties and applications- Butadiene Styrene, Acrylonitrile Butadiene Styrene, Kevlar, conducting polymers- Polyaniline and Polypyrene - preparation properties and applications, Organic Light Emitting Diode

Nanomaterials: Origin of nanomaterials, Classifications, Chemical synthesis- hydrolysis and reduction, Carbon Nanotubes, Graphene, Quantum dots-applications.

Alloys and Composites: Cast iron, Principal non-ferrous alloys, need, properties and applications of composites, super alloys, Ceramics- structure and applications.

Instrumental methods in chemistry: Thermal methods, Thermogravimetric Analysis, Differential Thermal Analysis, Chromatography techniques- Thin Layer Chromatography, Column Chromatography, Gas Chromatography, High Performance Liquid Chromatography, Surface characterization using Scanning Electron Microscopy (SEM), X-ray Photoelectron Spectroscopy (XPS), Auger Electron Spectroscopy(AES).

Green Chemistry and Sustainability: Green chemistry – Principles, Matrices to express greenness- E-Factor, Atom Economy, Environmental Quotient, Green chemistry and Catalysis, R_4M_4 Models-Econoburette, Survismeter, E-waste disposal, Life Cycle Analysis, Benefits and limitations of conducting Life Cycle Analysis.

Water Technology: Water characteristics, hardness, disadvantages of hard water, Estimation of hardness- EDTA method, Ion exchange process for water softening, Dissolved Oxygen, Biological Oxygen Demand and Chemical Oxygen Demand, its estimation and significance, Municipal water treatment, disinfection of water, Reverse Osmosis, Sewage water treatment.

iv) a) TEXT BOOKS

1) Dexter Harvey & Nicky Rutledge, Industrial Chemistry, 1st edition, ETP, 2019.
2) Muhammed Arif M., Annette Fernandez, Kavitha P. Nair, Engineering Chemistry,1st edition, Owl Books, 2019.
3) Shashi Chawla, A text book of Engineering Chemistry, 2nd edition, Dhanpat Rai & Co. 2017.
4) Roy K. Varghese, Engineering Chemistry, 2nd Edition, Crown Plus Publishers, 2019.
5) Prasanta Rath, Engineering Chemistry, 2nd edition, Cengage Learning, 2018.

b) REFERENCES

1) Colin. N. Banwell and Elaine M. McCash, Fundamentals of Molecular Spectroscopy, 4th edition, McGraw- Hill, 2017.
2) Willard, Merritt, Dean, Settle, Instrumental Methods of Analysis,7th edition, CBS Publishers & Distributors Pvt.Ltd., 2023.
3) Andrew Peacock and Allison Calhoun, Polymer Chemistry: Properties and Application, Hanser Gardner Publications, 2012.
4) Chris Binns, Introduction to Nanoscience and Nanotechnology, 2nd edition, John Wiley & Sons, 2021.

5) William D. Callister Jr. and David G. Rethwisch, Material Science and Engineering, 10th edition, John Wiley, 2019.
6) Tom Smolinka & Jürgen Garche, Electrochemical power sources: fundamentals, systems, and applications: hydrogen production by water electrolysis, Elsevier, 2021.

Course Code	Course Name	Category	L	T	P	J	Credit
23ESB10A	ENGINEERING GRAPHICS	ESC	2	0	2	0	3

i) COURSE OVERVIEW

Aim of the course is to enable the student to effectively perform technical communication through graphical representation as per global standards. The student will be able to apply the principles of projection and will be introduced to the fundamentals of Computer Aided Drawing (CAD).

ii) COURSE OUTCOMES

After the completion of the course, the student will be able to:

CO 1	Construct the orthographic projection of points and lines located in different quadrants.	Apply
CO 2	Prepare orthographic projection of solids by visualizing them in different positions.	Apply
CO 3	Prepare multiview projection and solid models of objects using CAD tools.	Apply
CO 4	Prepare assembly drawing of standard machine components using CAD tools.	Apply
CO 5	Construct drawings of engineering systems with CAD tools.	Apply

iii) SYLLABUS

Introduction: Relevance of technical drawing, basic principles of engineering drawing, BIS code of practice for technical drawing, types of lines, planes of projection, orthographic projection of points in different quadrants. Projection of straight lines.

Orthographic projection of regular solids. Introduction to section, development, isometric and perspective projection

Introduction to Computer Aided Drawing, sketching of simple 2D geometries, editing and dimensioning of 2D geometries, creating 3D models using suitable software.

Assembly drawing of machine components using suitable CAD software.

Plan and elevation of simple building with dimensions, electrical drawing and circuit drawings using suitable CAD software.

iv) a) TEXT BOOKS

1) N.D Bhatt, Engineering Drawing, 54th Edition, Charotar Publishing House Pvt. Ltd, 2023.
2) K.C. John, Engineering Graphics, 1st Edition, Prentice Hall India Publishers, 2009.
3) C. M. Agrawal and Basant Agrawal, Engineering Graphics, 2nd Edition, McGraw-Hill, 2014.

b) REFERENCES

1) G. S. Phull and H. S. Sandhu, Engineering Graphics, 1st Edition, John Wiley & Sons Inc. Pvt. Ltd, 2014.
2) P. I. Varghese, Engineering Graphics, 21st Edition, V.I.P. Publishers, 2010.
3) Dhananjay A. Johle, Engineering Drawing with an Introduction to AutoCAD, 1st Edition, McGraw Hill Education, 2017.

Course Code	Course Name	Category	L	T	P	J	Credit
23ESB10K	BASICS OF ELECTRICAL ENGINEERING B	ESC	1	0	2	0	2

i) COURSE OVERVIEW

This course aims to equip the students with an understanding of the fundamental principles of electrical engineering.

ii) COURSE OUTCOMES

After the completion of the course, the student will be able to:

CO1	Apply fundamental circuit laws and principles of electromagnetism to solve simple DC electric circuits and magnetic circuits respectively.	Apply
CO2	Solve simple AC circuits using the alternating current fundamentals.	Apply
CO3	Build a simple lighting circuit for domestic buildings using suitable accessories and materials.	Apply
CO4	Make use of an electronic energy meter to measure various parameters of an electric circuit.	Apply
CO5	Explain the working of power generating stations and various protective devices used in domestic wiring.	Understand

iii) SYLLABUS

Basic concepts of DC circuits: Kirchhoff's laws, Star-delta conversion, Analysis of DC circuits, Mesh analysis, Node analysis.

Magnetic Circuits: Basic Terminology, Simple Magnetic circuits, Electromagnetic Induction, Faraday's laws, Lenz's law, Self-inductance and mutual inductance.

Alternating Current fundamentals: Basic definitions, Average, RMS values, AC Circuits, Phasor representation, Analysis of simple AC circuits (R, L, C, RL, RC, RLC Series circuits).

Three phase AC systems, Generation of three phase voltages, star and delta connections.

iv) a) TEXT BOOKS

1) William H. Hayt, Jr., Jack E. Kemmerly, Steven M. Durbin, Engineering Circuit Analysis, 8th Edition, McGraw-Hill, 2012.

2) D. P. Kothari and I. J. Nagrath, Basic Electrical Engineering, 4th Edition, Tata McGraw Hill, 2019.
3) A.E. Fitzgerald, David E. Higginbotham and Arvin Grabel, Basic Electrical Engineering, 5th Edition, Tata McGraw Hill, 2009.
4) Ashfaq Husain and Harroon Ashfaq, Fundamentals of Electrical Engineering, 4th Edition, Dhanpat Rai & Co., 2016.

b) REFERENCES

1) Paul Breeze, Power Generation Technologies, 3rd Edition, Newnes, 2019.
2) Allan R. Hambley, Electrical Engineering: Principles & Applications, 7th Edition, Pearson Education, 2018.
3) V. N. Mittle and Arvind Mittal, Basic Electrical Engineering, 2nd Edition, McGraw Hill, 2006.
4) B L Theraja, A. K. Thereja, A Textbook of Electrical Technology - Volume I (Basic Electrical Engineering), S. Chand Publishing, 2007.

Course Code	Course Name	Category	L	T	P	J	Credit
23ESL10M	BASICS OF MECHANICAL ENGINEERING	ESC	2	0	0	0	2

i) COURSE OVERVIEW:

The goal of this course is to provide insight into the essentials of Mechanical Engineering discipline to the students of Engineering and to provide the students an illustration of the significance of the Mechanical Engineering profession in satisfying societal needs.

ii) COURSE OUTCOMES

After the completion of the course, the student will be able to:

CO 1	Analyse thermodynamic cycles and illustrate the working and features of IC Engines	Understand
CO 2	Explain the basic principles of Refrigeration and Air Conditioning and working of hydraulic machines	Understand
CO 3	Explain the basic manufacturing, metal joining and machining processes	Understand

iii) SYLLABUS

Fundamentals of thermodynamics- System, surroundings, process, cycle. Laws of thermodynamics. Analysis of thermodynamic cycles: Derivation of expression for efficiency of Otto and Diesel cycles. Concept of hybrid engines. Introduction to basic modes of heat transfer- Conduction, convection, and radiation.

Refrigeration: Unit of refrigeration, COP, Vapour compression cycle, Definitions of dry, wet & dew point temperatures, specific humidity, and relative humidity. Layout of unit and central air conditioning systems. Hydraulic machines: Working principle of Reciprocating pump, Centrifugal pump, Pelton turbine, and Francis turbine.

Manufacturing Process: Basic description of the manufacturing processes – Sand Casting, Forging, Rolling, Extrusion. Metal Joining Processes: Description with sketches of Arc Welding, Soldering, and Brazing. Basic Working and Operations: Lathe, Drilling machine. Computer-Aided Machining: CNC Machine. Principle of CAD/CAM, Rapid, and Additive Manufacturing.

iv) a) TEXT BOOKS

1) Pravin Kumar, Basic Mechanical Engineering, 2nd Edition, Pearson India, 2013.
2) Michael Clifford, Kathy Simmons, Philip Shipway, An Introduction to Mechanical Engineering: Part 1, 1st Edition, CRC Press, 2012.

3) Dr. P. Balachandran and Dr. Mohan, Basics of Mechanical Engineering, Owl publications, 2015.
4) J. Benjamin, Basic Mechanical Engineering, 10th Edition, Pentex Publications, 2022.

b) REFERENCES

1) G. S. Sawhney, Fundamentals of Mechanical Engineering, 3rd Edition, PHI Learning, 2015.
2) Wylen, G. J. V., Sonntag, R. and Borgnakke, C., Fundamentals of Classical Thermodynamics, John Wiley & Sons, 2012.

Course Code	Course Name	Category	L	T	P	J	Credit
23ESL10N	BASICS OF CIVIL ENGINEERING	ESC	2	0	0	0	2

i) COURSE OVERVIEW

Goal of this course is to provide an insight on the essentials of Civil Engineering discipline to the students of all branches of Engineering and to provide the students an illustration of the significance of the Civil Engineering Profession in satisfying the societal needs.

ii) COURSE OUTCOMES

After the completion of the course, the student will be able to:

CO 1	Explain different types of buildings, their components, building rules, materials and basic infrastructure services.	Understand
CO 2	Estimate plinth area and carpet area from a given plan of a residential building.	Apply
CO 3	Apply the principles of levelling to find the level difference between points.	Apply
CO 4	Explain the concepts of surveying, geotechnical engineering, transportation engineering, environmental and water resources engineering.	Understand
CO 5	Explain the various materials and systems in the context of green buildings and smart infrastructure	Understand

iii) SYLLABUS

General Introduction to Civil Engineering, Introduction to buildings, building rules and regulations, Building area.

Surveying- Classification, Objectives and principles, Instruments used, Leveling.

Building Construction- Load bearing and framed structures, Brick masonry, Basic infrastructure services, Energy efficient buildings, Smart buildings, green buildings.

Basic concepts of Geotechnical Engineering, Transportation Engineering, Environmental and Water Resources Engineering.

Novel Areas in Civil Engineering.

iv) a) TEXTBOOKS

1) Michael S. Mamlouk and John P. Zaniewski, Materials for Civil and Construction Engineering, 4th edition, Pearson Publishers,2017.
2) B. C. Punmia, Ashok K. Jain and Arun K. Jain, Surveying (Vol. I and II), Laxmi Publications (P) Ltd.,16th Edition, New Delhi, 2017.

3) Rangwala, Essentials of Civil Engineering, 1st edition, Charotar Publishing House, 2012.
4) Rangwala, Building Construction, 34th edition, Charotar Publishers, 2022.

b) CODES OF PRACTICE

1) Kerala Municipality Building Rules (2019), Local Self-Government (RD) Department, Government of Kerala.
2) Kerala Panchayat Building Rules (2019), Local Self-Government (RD) Department, Government of Kerala.
3) SP 7: 2016, National Building Code of India 2016 (NBC 2016), Bureau of Indian Standards, New Delhi.
4) Coastal Regulation Zone Rules (CRZ rules) (2019), Ministry of Environment, Forest, and Climate Change (MoEFCC), Government of India.

c) REFERENCES

1) W. F. Chen and J. Y. Richard Liew, The Civil Engineering Handbook, 2nd edition, CRC Press (Taylor and Francis), 2003.
2) W. R. Mckay, Building Construction, Volumes 1 to 4, 5th edition, Pearson India Education Services, 2013.
3) S. K. Khanna, C. E. G. Justo and A. Veeraragavan, Highway Engineering, 10th edition, Nem Chand and Bros., 2018.
4) Gopal Ranjan and A.S.R. Rao, Basic and Applied Soil Mechanics, 3rd edition, New Age International (P) Limited, New Delhi, 2016.
5) Howard S. Peavy, Donald R. Rowe and George Tchobanoglous, Environmental Engineering, McGraw Hill Education, 2017.
6) Eva Kultermann and William P. Spence, Construction Materials, Methods, and Techniques, Building for a Sustainable Future, Cengage, 2022.

Course Code	Course Name	Category	L	T	P	J	Credit
23ESL1NA	ENVIRONMENTAL SCIENCE	ESC	2	0	0	0	1

i) COURSE OVERVIEW

The goal of this course is to expose the students to the significance of natural resource management, ecosystem restoration and biodiversity conservation. The course also details the various problems related to environmental pollution, the concept of sustainability, and the role of engineering within sustainable development.

ii) COURSE OUTCOMES

After the completion of the course, the student will be able to:

CO 1	Identify the problems associated with the overutilization of natural resources and the role of engineers in natural resource management.	Apply
CO 2	Explain the concepts related to the ecosystem and the significance of ecosystem restoration and biodiversity conservation.	Understand
CO 3	Explain the causes, impacts and control measures of various types of environmental pollution.	Understand
CO 4	Summarise the various legal provisions for environmental protection.	Understand
CO 5	Discuss the concepts of sustainability and sustainable practices by utilizing engineering knowledge and principles.	Apply

iii) SYLLABUS

Interdisciplinary nature of environmental science : Scope and importance

Natural resources and associated problems: Water resources, Energy resources, Food resources, Land resources

Ecosystems: concept, Types, Functions, Productivity, Energy flow and Food chains of ecosystems. Characteristic features and functions of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystem, Ecosystem Services.

Biodiversity and its conservation: Species and ecosystem diversity, Value of biodiversity, Hotspots of biodiversity, Threats to biodiversity, Conservation of biodiversity.

Environmental Pollution: Air, Water and Soil pollution. Solid and Hazardous Waste Management, Role of individuals in prevention of pollution.

Social issues and the environment: Environmental ethics, Contemporary Environmental issues, Water conservation- rainwater harvesting, watershed management, conservation of wetlands, Legal provisions for environmental protection.

Sustainability: Concept, Sustainable Development Goals. Sustainability Practices-Green engineering, Sustainable habitat-Green buildings, Sustainable Urbanisation, Industrial Ecology, Circular Economy- Case studies.

iv) a) TEXT BOOKS

1) Erach Bharucha, Textbook for Environmental Studies, 3rd edition, UGC, New Delhi, 2021.
2) D. D. Mishra, Fundamental Concepts in Environmental Studies, 4th edition, S. Chand & Co. Ltd, 2014.
3) Kurian Joseph and R. Nagendran, Essentials of Environmental Studies, Pearson Education Pvt. Ltd, India, 2017.
4) David Allen and David R. Shonnard, Sustainable Engineering: Concepts, Design and Case Studies, 1st edition, Pearson, 2011.

b) REFERENCES

1) Suresh K. Dhameja, Environmental Engineering and Management, 4th edition, S.K. Kataria & Sons, 2021.
2) Bradley Striebig, Adebayo A. Ogundipe and Maria Papadakis, Engineering Applications in Sustainable Design and Development, 1st edition, Cengage Learning EMEA, 2015.

Course Code	Course Name	Category	L	T	P	J	Credit
23CYP10A	ENGINEERING CHEMISTRY LAB	BSC	0	0	2	0	1

i) COURSE OVERVIEW

This course is designed to familiarize with the basic experiments in industrial chemistry and to accustom the students with the handling and analyzing of chemicals and standard laboratory equipment.

ii) COURSE OUTCOMES

After the completion of the course, the student will be able to:

CO 1	Use volumetric titration techniques for quantitative analysis of water.	Apply
CO 2	Use spectroscopic techniques for analyzing and interpreting the IR spectra and NMR spectra of some organic compounds.	Apply
CO 3	Use instrumental techniques for quantitative chemical analysis.	Apply
CO 4	Organize scientific experiments as a team to analyze the results of such experiments.	Analyze
CO 5	Interpret experimental data by themselves to apply them to real world problems.	Analyze

iii) SYLLABUS

1) Estimation of total hardness of water by EDTA method.
2) Analysis of IR and ^{1}H NMR spectra of organic compounds.
3) Determination of wavelength of absorption maximum and colorimetric estimation of Fe^{3+} in solution.
4) Determination of molar absorptivity of a compound.
5) Estimation of chloride in water by argentometric method.
6) Calibration of pH meter and determination of pH of a solution.
7) Potentiometric titration: Acid – base titration.
8) Estimation of dissolved oxygen in water by Winkler's method.

iv) a) REFERENCES

1) R. K. Mohapatra, Engineering Chemistry with Laboratory Experiments, 2015, 1st edition, PHI Learning, New Delhi.
2) S. C. George, R. Jose, Lab Manual of Engineering Chemistry, 1st edition, S. Chand & Company Pvt Ltd, New Delhi, 2019.
3) E. Slowinski, W. C. Wolsey, Chemical Principles in the Laboratory, 11th edition, Cengage Learning, New Delhi, 2008.

Course Code	Course Name	Category	L	T	P	J	Credit
23ESP10A	MANUFACTURING AND CONSTRUCTION PRACTICES A	ESC	0	0	2	0	1

i) COURSE OVERVIEW

This subject is for exposing the students to the various practical aspects of manufacturing processes and familiarizing various tools, measuring devices, practices and machines used in the workshop section. The goal of this course is also to introduce the students to the field of Civil Engineering and its importance in the development of the Country. The course is designed to workshop sessions on various construction-related activities including surveying and levelling.

ii) COURSE OUTCOMES

After the completion of the course the student will be able to:

CO 1	Demonstrate general safety precautions in different mechanical workshop trades.	Understand
CO 2	Prepare simple models using fitting, carpentry, sheet metal, welding and 3D printing Techniques.	Apply
CO 3	Identify the tools and equipment used in fitting, carpentry, sheet, welding and various machine tools.	Apply
CO 4	Apply engineering principles and tools to set-out a plan, estimate the area and profile of plots, and construct masonry wall.	Apply
CO 5	Examine the quality of different building blocks.	Apply
CO 6	Make use of plumbing tools to install fixtures like tap, T-Joint, elbow, bend, etc.	Apply

iii) SYLLABUS

Part I – Mechanical Engineering

1) General: Introduction to workshop practice, Safety precautions, Shop floor ethics, Basic First Aid knowledge, Study of mechanical tools

2) Carpentry.

4) Sheet metal

5) Fitting

6) Welding

8) Machine Tools: Demonstration of various machines like shaping and slotting machine, milling machine, Grinding Machine, Lathe, Drilling Machine, CNC Machines, Power Tools.

9) 3D Printer.

Part II – Civil Engineering

1) Compute area of a given plot using tape, EDM etc.
2) Levelling – Plot the longitudinal section of a road.
3) Setting out of a building: Set out a building as per the given building plan. Each group can set out one or two rooms of the building.
4) Construct a wall of height 50 cm and wall thickness 1½ bricks using English bond (No mortar required) – corner portion – length of side walls 60 cm
5) Cast paver blocks using mortar and test for strength (Include sustainable materials also)
6) Tests for strength of various types of building blocks
7) Study on plumbing and install plumbing fixtures like Tap, T-Joint, Elbow, Bend, Threading etc.
8) Plan a rainwater harvesting system (Expert talk)
9) Site visit to a building construction site and prepare a report on the various safety features, Personal protective equipment (PPE) and its proper use.

iv) a) TEXTBOOKS

1) AICTE's Prescribed Textbook: Workshop / Manufacturing Practices (with Lab Manual) ISBN: 978-93-91505-332
2) Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., Elements of Workshop Technology, Vol. I 2008 and Vol. II 2010, 14th edition, Media promoters and publishers private limited, Mumbai.
3) Kalpakjian S. And Steven S. Schmid, Manufacturing Engineering and Technology, 7th Edition, Pearson Education India Edition, 2018.

b) REFERENCES

1) S. Gowri P. Hariharan and A. Suresh Babu, Manufacturing Technology – I, Pearson Education, 2008.
2) Roy A. Lindberg, Processes and Materials of Manufacture, 4th Edition, Prentice Hall India, 1998.
3) Rao P.N., Manufacturing Technology, Vol. I and Vol. II, 4th Edition, Tata McGraw Hill House, 2017.
4) B.C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, Basic Civil Engineering, 1st Edition, 2003, Laxmi Publications.
5) Rangwala, Essentials of Civil Engineering, 1st Edition, Charotar Publishing House, 2012.
6) W. B. McKay, Building Construction- Volumes 1 to 4, 4 th /5 th Edition, 2013, Pearson Education India.
7) B.C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, Surveying – Volume I, 17th Edition, Laxmi Publications, 2016.
8) W.F. Chen and J.Y. Richard Liew (Eds.), The Civil Engineering Handbook, 2nd Edition, CRC Press (Taylor and Francis), 2002.

SEMESTER 2

Course Code	Course Name	Category	L	T	P	J	Credit
23MAL10B	VECTOR CALCULUS, DIFFERENTIAL EQUATIONS AND TRANSFORMS	BSC	3	1	0	0	4

i) COURSE OVERVIEW

The objective of this course is to familiarize the prospective engineers with some advanced concepts and methods in Mathematics which include the Calculus of vector valued functions, ordinary differential equations and basic transforms such as Laplace and Fourier Transforms which are invaluable for any engineer's mathematical tool box. The topics treated in this course have applications in all branches of engineering.

ii) COURSE OUTCOMES

After the completion of the course, the student will be able to:

CO 1	Compute the derivatives and line integrals of vector functions and learn their applications.	Apply
CO 2	Evaluate surface and volume integrals and learn their inter- relations and applications.	Apply
CO 3	Solve linear ordinary differential equations.	Apply
CO 4	Apply Laplace transform to solve ODEs arising in engineering.	Apply
CO 5	Apply Fourier transforms of functions to solve problems arising in engineering.	Apply

iii) SYLLABUS

Vector Calculus – Derivative of vector function, Gradient, Divergence, Curl, Line integral, conservative fields.

Green's theorem, surface integral, Gauss divergence theorem, Stokes' theorem.

Ordinary Differential Equations – Homogeneous and Non-Homogeneous linear differential Equations, Euler-Cauchy equations. Method of undetermined coefficients and Method of variation of parameters.

Laplace transforms – Laplace Transform and its inverse, shifting theorems, Laplace transform of derivatives and integrals, solution of differential equations using Laplace

transform, Unit step function. Dirac delta function. Convolution theorem and its applications.

Fourier Transforms – Fourier integral representation, Fourier sine and cosine integrals. Fourier transform and inverse Fourier transform. Fourier sine and cosine transforms, inverse sine and cosine transform. Convolution theorem

iv) a) TEXTBOOKS

1) Anton, Biven, Davis, Calculus,10th edition, Wiley, 2012.
2) Erwin Kreyszig, Advanced Engineering Mathematics, 10th edition, John Wiley and Sons, 2016.

b) REFERENCES

1) George F Simmons: Differential Equation with Applications and its historical Notes, 3rd edition, CRC Press, 2017.
2) Hemen Dutta, Mathematical Methods for Science and Engineering, CRC Press, 1st edition, 2020.
3) H. Anton, I. Biven, S. Davis, Calculus, 10th Edition, Wiley, 2015.
4) B.S. Grewal, Higher Engineering Mathematics, 44th Edition, Khanna Publishers, 2018.

Course Code	Course Name	Category	L	T	P	J	Credit
23PYL10A	ENGINEERING PHYSICS	BSC	3	1	0	0	4

i) COURSE OVERVIEW

The aim of the course is to develop scientific attitude in students and offer them an understanding of physical concepts behind various engineering applications. It creates an urge in students to think creatively in emerging areas of Physics.

ii) COURSE OUTCOMES

After the completion of the course, the student will be able to:

CO 1	Describe the characteristics of different types of oscillations and waves.	Understand
CO 2	Explain natural physical processes and related technological advances using principles of optics	Understand
CO 3	Generalise the principles of quantum mechanics to explain the behaviour of matter in the atomic and subatomic level	Understand
CO 4	Describe the fundamentals of lasers and the principles behind various solid state lighting devices and fibre optic communication system.	Understand
CO 5	Explain the fundamental ideas of Ultrasonic and acoustics in order to facilitate technological advancement.	Understand

iii) SYLLABUS

Oscillations and Waves: Harmonic oscillations – Damped harmonic oscillations, Forced harmonic oscillations, Q- factor, Amplitude resonance, comparison of electrical and mechanical oscillators. Wave motion – Longitudinal waves and Transverse waves, One dimensional wave equation and solution, three-dimensional wave equations, Transverse vibrations along a stretched string.

Wave Optics: Interference of light – Cosine law, Wedge shaped films - Air wedge, Newton's rings, Antireflection coating. Diffraction- comparison of Fresnel and Fraunhofer diffraction, Fraunhofer diffraction due to double slit, grating equation, Rayleigh's criterion, resolving power and dispersive power of grating.

Quantum Mechanics & Nano technology: Wave function, Uncertainty principle, Time dependent and time independent Schrodinger wave equations, Applications of Schrodinger wave equation - particle in one-dimensional potential well, quantum mechanical tunneling.

Introduction to nanoscience and technology, significance of surface to volume.

ratio, Quantum confinement, Characterization techniques – XRD, UV-Visible Spectroscopy, Applications of nanomaterials.

Laser and Photonics: Principles of Laser, Properties of laser, Ruby laser and Helium neon laser, Applications of Laser. Holography-construction of hologram, reconstruction of hologram, Applications. Introduction to photonics - photonic devices - Light Emitting Diode, Solar cells, Optical fibre – Principle of OFC, Numerical aperture, Types of fibers – step index fibre, Graded index fibre, Fibre Optic Communication System, Applications of Optical fibre, Fibre optic sensors.

Acoustics & Ultrasonic: Acoustics - characteristics of musical sounds, absorption coefficient, reverberation time- Sabine's formula (no derivation), significance, factors affecting architectural acoustics and their remedies.

Ultrasonics - production by magnetostriction oscillator and piezoelectric oscillator, detection of ultrasonic waves - thermal and piezoelectric methods, ultrasonic diffractometer-, applications of ultrasonic waves -SONAR, NDT, medical applications.

iv) a) TEXTBOOKS

1) M.N. Avadhanulu, P.G. Kshirsagar, T.V.S Arun Murthy, A Textbook of Engineering Physics, 11th Edition, S. Chand & Co., 2018
2) H.K. Malik, A.K. Singh, Engineering Physics, 2nd Edition, McGraw Hill Education, 2017.

b) REFERENCES

1) Arthur Beiser, Concepts of Modern Physics, 7th Edition, Tata McGraw Hill Publications, 2017.
2) Aruldhas G., Engineering Physics, 11th Edition, Prentice Hall of India Pvt Ltd., 2015.
3) Ajoy Ghatak, Optics, 7th Edition, McGraw Hill Education, 2020.
4) David J. Griffiths, Introduction to Electrodynamics, 4th Edition, Addison-Wesley publishing, 1999.
5) Choudhary, Nityanand, K. R. Deepak, S. H. Abdi, Perspective of Engineering: Physics: I, Acme Learning Pvt Ltd, first edition, 2009.
6) A. S. Vasudeva, A TextBook of Engineering Physics, S. Chand &Co., 2nd Edition: 2011.
7) Premlet B., Advanced Engineering Physics, 10th Edition, Phasor Books, 2017.

Course Code	Course Name	Category	L	T	P	J	Credit
23ESL10B	APPLIED MECHANICS	ESC	2	1	0	0	3

i) COURSE OVERVIEW

Goal of this course is to expose the students to the fundamental concepts of mechanics and enhance their problem-solving skills. It introduces students to the influence of the applied force system and the geometrical properties of rigid bodies while stationary or in motion. Also, stress, strain and strain energy concepts of deformable bodies have been introduced. After this course, students will be able to recognize similar problems in real-world situations and respond accordingly.

ii) COURSE OUTCOMES

After the completion of the course, the student will be able to:

CO 1	Explain the Principles, Theorems and Force systems related to Rigid and Deformable Body Mechanics.	Understand
CO 2	Apply the Resultant and Equilibrium Conditions to solve Rigid Body Static problems	Apply
CO 3	Compute the internal member forces acting on Trusses	Apply
CO 4	Solve problems related with Rectilinear, Circular and Rotational motion using Kinetic principles of Mechanics.	Apply
CO 5	Apply the concepts of Stress, Strain and Strain Energy for Deformable Bodies	Apply

iii) SYLLABUS

Introduction on Statics and Dynamics- Classification of Force Systems, Basic Principles of Statics- Laws-Composition and Resolution of Forces - Resultant of Coplanar Force Systems- Moment- Couple -Introduction to forces in space- Vectorial representation of Forces- Moments -Resultant of concurrent forces in space

Equilibrium of Coplanar Force System – Types of Loadings- Support Reactions of Statically determinate beams subjected to various types of loads. Friction-Introduction- Sliding Friction- Coulomb's Laws of Friction-Wedge Friction- Analysis of Single Bodies- Analysis of Connected Bodies

Analysis of Trusses-Introduction- Analysis of Plane Perfect Trusses by the Method of Joints and by the Method of Sections -Properties of Surfaces- -Centroid of Regular Geometrical Shapes, Composite Areas- Moment of Inertia – Parallel Axis, Perpendicular Axis Theorem, Theorem of Pappus Guldinus

Kinematics- Rectilinear Translation- Curvilinear Translation- Rotation (Concepts only)- Kinetics - D'Alembert's Principle- Impulse Momentum and Work Energy Principle- Applications to Rectilinear, Curvilinear and Rotation

Concept of stress and strain – Stress - strain relation - Hooke's law. Stress-strain diagram of mild steel -Axially loaded bars with uniform cross section– Deformation of axially loaded bars with varying cross section and bars with varying axial loads -Temperature stress in composite bars- Elastic constants and their relationships- Strain energy – concept- Strain energy due to normal stress - Strain energy due to shear stress.

iv) a) TEXTBOOKS

1) S. Timoshenko, D.H. Young, J.V. Rao and Sukumar Pati, Engineering Mechanics,5th edition, McGraw Hill Publishers, 2017.
2) Beer, Mazurek, Johnston, Cornwell, Self and Sanghi, Vector Mechanics for Engineers: Statics and Dynamics, 12th Edition, Tata Mc-Graw Hill Publishing Company Limited, New Delhi, 2019.
3) R.C. Hibbeler, Engineering Mechanics- Statics and Dynamics, 7th edition, Pearson Education Ltd., 2017.
4) Meriam J.L. and Kraige G., Engineering Mechanics - Dynamics, 14th edition, John Wiley & Sons, 2013.
5) Dr. H. J Shah, S B Junnarkar, Mechanics of Structures, 32nd Edition, Charotar Publishers, 2016.
6) Dr. R K Bansal, Strength of Materials, 6th Edition, Laxmi Publications(P) Ltd, 2015.

b) REFERENCES

1) Bhavikkatti, S. S., Engineering Mechanics, New Age International Publishers, 2016.
2) Shames, I. H., Engineering Mechanics Statics and Dynamics, 4th Edition, Prentice Hall of India, 2005
3) Bansal, R. K., A Textbook of Engineering Mechanics, 8th Edition, Laxmi Publications, 2016.
4) Sharma, D. P., Hibbeler, R. C. and Shames, I. H., Engineering Mechanics, Pearson Publishers, 2011.

Course Code	Course Name	Category	L	T	P	J	Credit
23ESB10F	PROBLEM SOLVING AND PROGRAMMING	ESC	2	0	2	0	3

i) COURSE OVERVIEW

The objective of the course is to introduce Python programming and develop programming skills to manage the development of software systems. It covers data processing in Python and introduces Machine Learning and Artificial Intelligence- based applications and tools, Data Science and Data Visualization applications.

ii) COURSE OUTCOMES

After the completion of the course, the student will be able to:

CO 1	Explain the fundamental concepts of programming languages and problem-solving strategies	Understand
CO 2	Make use of the fundamental concepts, conditional statements and iterative statements in Python	Apply
CO 3	Develop programs by utilizing the modules Lists, Tuples, Sets and Dictionaries in Python	Apply
CO 4	Develop programs by using function	Apply
CO 5	Implement programs in Python to process data stored in files by utilizing the modules NumPy, Matplotlib, and Pandas	Apply

iii) SYLLABUS

Basics of computer architecture — Von Neumann concept — A simple model of computer, acquisition of data, storage of data, processing of data, output of processed data. Details of functional units of a computer. Storage— primary storage and secondary storage.

Introduction to programming languages- types of programming languages - high level language, assembly language and machine language, System software - Operating systems — objectives of operating systems, compiler, assembler and interpreter.

Problem Solving strategies — Problem analysis — formal definition of problem — Solution — top- down design — breaking a problem into subproblems- overview of the solution to the sub problems by writing step by step procedure (algorithm) - representation of procedure by flowchart

Basic coding skills - Working with data types, Numeric data types and Character sets, Keywords, Variables and Assignment statement, Operators, Expressions, Working with

numeric data, Type conversions, Comments in the program. Input, Processing, and Output. Formatting output. Detecting and correcting syntax errors.

Control statements - Selection structure (if-else, switch-case). Iteration structure (for, while), Testing the control statements.

Lists - Basic List Operations and Methods, List of lists, Slicing, Searching and sorting list. Work with tuples. Sets. Dictionaries – Dictionary Methods, dictionary literals, adding and removing keys, accessing and replacing values, traversing dictionaries.

Functions - Hiding redundancy and complexity, Arguments and return values, Variable scopes and parameter passing, named arguments, Main function, Working with recursion, Lambda functions. Strings and number systems - String function, Handling numbers in various formats.

NumPy - Basics, creating arrays, Arithmetic, Slicing, Matrix Operations, Random numbers.

Visualization: using Matplotlib - Basic plot, Ticks, Labels, and Legends. Working with CSV files with Pandas - Reading, Manipulating, and Processing Data.

iv) a) TEXTBOOKS

1) Kenneth A Lambert., Fundamentals of Python: First Programs, 2nd edition, Cengage Publishing, 2016.
2) Wes McKinney, Python for Data Analysis, 2nd edition, Shroff / O'Reilly Publishers, 2017.

b) REFERENCES

1) Allen B. Downey, Think Python: How to Think Like a Computer Scientist, 2nd edition, Schroff, 2016
2) Michael Urban and Joel Murach, Python Programming, Shroff/Murach, 2016
3) David M.Baezly, Python Essential Reference. Addison-Wesley Professional;4th edition,2009.
4) Charles Severance. Python for Informatics: Exploring Information, http://swcarpentry.github.io/python-novice-gapminder/

Course Code	Course Name	Category	L	T	P	J	Credit
23ESL10R	BUILDING MATERIALS AND CONSTRUCTION TECHNOLOGY	ESC	3	0	0	0	3

i) COURSE OVERVIEW

Goal of this course is to provide an insight on construction materials to the students of Civil Engineering and to provide a detailed insight into the construction techniques and equipment used in Civil Engineering practices.

ii) COURSE OUTCOMES

After the completion of the course, the student will be able to:

CO 1	Explain the properties, characteristics, test procedures and behavior of conventional building materials used in construction.	Understand
CO 2	Explain the properties, characteristics, test procedures and behavior of modern building materials used in construction.	Understand
CO 3	Identify cost effective and site-specific construction techniques.	Apply
CO 4	Select the equipment for various types of construction practices.	Apply

iii) SYLLABUS

Timber and wood-based products, Bricks, Aggregates, Steel- Classification, properties, characteristics, test procedures.

Cement and admixtures, Cement mortars and concrete.

Types, properties and uses of modern construction materials, Smart construction materials and its applications in civil engineering.

Construction techniques: Scaffolding, Formwork, Slip form construction, Plastering, Pointing, Painting, Segmental construction of bridges/flyovers, Box pushing technology for tunnelling, Trenchless technology, Pile construction, Underwater construction.

Prefabricated construction, Construction 3D printing, Cost-effective construction, Construction Equipment.

iv) a) TEXTBOOKS

1) Rangwala, Building Construction, 34th edition, Charotar Publishers, 2022.
2) Michael S. Mamlouk and John P. Zaniewski, Materials for Civil and Construction Engineering, 4th edition, Pearson Publishers, 2017.

3) P. Purushothama Raj, Building Construction Materials and Technique, Pearson Publishers, 1st edition, Pearson Education India, 2017.
4) M.S. Shetty and A. K. Jain, Concrete Technology: Theory and Practice, 8th edition, S. Chand & Company Pvt. Ltd, 2019.

b) CODES OF PRACTICE

1) IS 383: 2016 Coarse and fine aggregates for concrete- specification, 2nd revision, Bureau of Indian Standards, New Delhi.
2) IS: 4031 - Indian Standard for Methods of physical tests for hydraulic cement, latest revision, Bureau of Indian Standards, New Delhi.

c) REFERENCES

1) David Madsen, Commercial Building Construction: Materials and Methods, McGraw Hill LLC, 2021.
2) S.C. Sharma and S.V. Deodhar, Construction Engineering & Management, 1st edition, Khanna Book Publishing Co. (P) Ltd,2019.
3) Edward Allen and Joseph Iano, Fundamentals of Building Construction: Materials and Methods,Seventh Edition,7th edition, Wiley Publications, 2019.
4) B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Building Construction, 11th edition, Laxmi Publications (P) Ltd, 2016.
5) Eva Kultermann and William P. Spence, Construction Materials, Methods, and Techniques, Building for a Sustainable Future, Cengage, 2022.

Course Code	Course Name	Category	L	T	P	J	Credit
23HSJ1NB	PROFESSIONAL COMMUNICATION	HSC	2	0	0	2	1

i) COURSE OVERVIEW

The objective of this course is to equip students with the necessary skills to listen, read,write, and speak so as to comprehend and successfully convey any idea, technical or otherwise, as well as give them the necessary polish to become persuasive communicators. The course aims to enhance the employability and career Skills of students and orient the students towards grooming as a professional.

ii) COURSE OUTCOMES

After the completion of the course, the student will be able to:

CO 1	Demonstrate effective language skills relevant to Engineering through writing and making presentations.	Apply
CO 2	Analyze a variety of textual and audio content for specific needs	Analyze
CO 3	Evaluate a given technical/non-technical topic.	Evaluate
CO 4	Create professional and technical documents.	Create
CO 5	Communicate proficiently in interviews and exam situations and all social situations.	Apply

iii) SYLLABUS

Communication Skills: Introducing yourself and others professionally, elevator pitch, recommendation letter, e-mails, netiquettes, telephone etiquettes, demi-official letters.

Business Communication and Technical writing: Product description, narrating an incident, report writing, agenda and minutes, memo, asking for information and giving information, explaining processes and products, giving instructions, planning a course of action.

Creative Thinking, Critical Thinking Skills and problem solving: Expressing opinion, GD, Arguing, reading critical texts (general and academic) and summarizing, listening and responding, Negotiation strategies and decision-making skills.

Presentation Skills: Oral Presentation Skills (Proposal presentation), PowerPoint presentation (Projects).

Interviews: CVs and Resumes LinkedIn, Job application, Types of interviews, successful interviews, interview etiquette, dress code, body language, telephone/online interviews, one-to-one interview & panel interview, FAQs related to job interviews.

iv) a) TEXTBOOKS

1) Meenakshi Raman and Sangeetha Sharma, Professional Communication, 3rd edition, Oxford University Press, 2018
2) Meenakshi Raman and Sangeetha Sharma, Technical Communication: Principles and Practice, 2nd Edition, Oxford University Press, 2011
3) M. Ashraf Rizvi, Effective Technical Communication, New Delhi: Tata McGraw Hill Publications, 2007.

b) REFERENCES

1) English for Engineers and Technologists (Combined edition, Vol. 1 and 2), Orient Blackswan 2010.
2) Stephen E. Lucas, The Art of Public Speaking, 10th Edition; McGraw Hill Education, 2012.
3) William Strunk Jr. & E.B. White, The Elements of Style, 4th Edition, Pearson, 1999.
4) David F. Beer and David McMurrey, Guide to writing as an Engineer, John Willey. New York, 2004.
5) Goodheart-Willcox, Professional Communication, 1st Edition, 2017.
6) Training in Interpersonal Skills: Tips for Managing People at Work,6th edition, Pearson Education, India, 2015.
7) The Ace of Soft Skills: Attitude, Communication and Etiquette for Success, 1st edition, Pearson Education, 2013.
8) Anand Ganguly, Success in Interview, 5th Edition, RPH, 2016.
9) Raman Sharma, Technical Communications, 3rd edition, Oxford Publication, London, 2004.

Course Code	Course Name	Category	L	T	P	J	Credit
23PYP10A	ENGINEERING PHYSICS LAB	BSC	0	0	2	0	1

i) COURSE OVERVIEW

The aim of this course is to enable the students to gain practical knowledge in Physics to correlate with the theoretical studies. It equips the students to utilize the acquired skills in an appropriate way to explore the prospects of modern technology. It brings more confidence in students and develops the ability to fabricate engineering and technical tools.

ii) COURSE OUTCOMES

After the completion of the course, the student will be able to:

CO 1	Determine the frequency of tuning fork using a Melde's string apparatus by setting up a wave pattern in a stretched string.	Apply
CO 2	Determine the Numerical aperture and acceptance angle of optical fiber.	Apply
CO 3	Determine the wavelength of a monochromatic beam of light and thickness of thin wire using principle of interference	Apply
CO 4	Demonstrate diffraction of light using plane transmission grating.	Apply
CO 5	Draw the I-V characteristics of non ohmic devices.	Apply

iii) SYLLABUS

1) Melde's string apparatus- Measurement of frequency in the transverse mode.
2) Wavelength measurement of a monochromatic source of light using Newton's Rings method.
3) Determination of diameter of a thin wire or thickness of a thin strip of paper using air wedge method.
4) Measurement of wavelength of a source of light using grating.
5) Determination of dispersive power and resolving power of a plane transmission grating.
6) Determination of the wavelength of any standard laser using diffraction grating
7) I-V characteristics of solar cells.

8) To measure the Numerical aperture and acceptance angle of an optical fibre

iv) a) REFERENCES

1) S.L. Gupta and V. Kumar, *Practical physics with viva voce*, Pragati Prakashan Publishers, Revised Edition, 2009.
2) M.N. Avadhanulu, A.A. Dani and Pokely P.M., *Experiments in Engineering Physics*, S. Chand &Co, 2008.
3) S. K. Gupta, *Engineering Physics practicals*, Krishna Prakashan Pvt. Ltd., 2014 4) P. R. Sasikumar, *Practical Physics*, PHI Ltd., 2011.

Course Code	Course Name	Category	L	T	P	J	Credit
23ESP10C	Design Studio I	ESC	0	0	2		1

i) COURSE OVERVIEW

The course is designed to introduce the fundamentals of Civil Engineering drawing and understand the principles of planning. The students will be able to learn the drafting of buildings manually and use drafting software such as AutoCAD. The course also includes 3D modelling and rendering of buildings.

ii) COURSE OUTCOMES

After the completion of the course, the student will be able to:

CO 1	Develop engineering drawings of building components.	Apply
CO 2	Develop engineering drawings of buildings.	Apply
CO 3	Develop site plan and service plan as per the latest building rules.	Apply
CO 4	Develop a 3D model of a residential building and render it using relevant modelling software.	Apply

iii) SYLLABUS

List of exercises/experiments

1. Introduction class: Draw sectional details and elevation of building components.
2. Draw plan, section, and elevation of single-storied residential buildings with flat roofs.
3. Draw plan, section, and elevation of single-storied residential buildings with pitched roofs using AutoCAD.
4. Draft the plan, section, and elevation of a double storied residential building in AutoCAD.
5. Prepare a site plan as per latest building rules (KPBR or KMBR) using AutoCAD.
6. Prepare a service plan as per latest building rules (KPBR or KMBR) using AutoCAD.
7. Draft the plan, section, and elevation of any public building using AutoCAD.
8. Introduction to 3D modelling- Develop a 3D model of a two storied residential building.
9. Render the 3D model of a residential building and develop a report.

iv) a) TEXTBOOKS

1. Shah, M.G., Kale, C. M. and Patki, S. Y. Building Drawing with an Integrated Approach to Built Environment, Tata McGraw Hill Publishing Company Limited, New Delhi, 2012.
2. Balagopal, T. S. Prabhu, Building Drawing and Detailing, Spades Publishers, Calicut, 2022.
3. Kumar Swamy N and Kameswara Rao, Building Planning and Drawing, 9th Revision, Charotar Publication, 2023.
4. AutoCAD Essentials, Autodesk official Press, John Wiley & Sons, USA.

b) CODES OF PRACTICE

1. SP 7: 2016: National Building Code of India 2016 (NBC 2016).
2. Kerala Panchayat Building Rules, 2019, Government of Kerala, Local Self-Government (RD) Department.
3. Kerala Municipal Building Rules, 2019, Government of Kerala, Local Self-Government (RD) Department.