

B.Tech.
Semester – I

CURRICULUM AND SYLLABUS
2026 REGULATION



A CMI INSTITUTION

CHRIST COLLEGE OF ENGINEERING
(AUTONOMOUS)

Irinjalakuda, Thrissur 680125



A CMI INSTITUTION

**CHRIST COLLEGE OF ENGINEERING
(AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE
AND ENGINEERING
SYLLABUS
2026 REGULATION**

Approved by BoS meeting held on: 19/06/2026

Approved by Academic Council meeting held on: 23/06/2026

BoS Chairperson

Dr. Sooraj T R

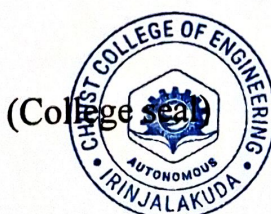
**CHAIRPERSON
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B.Tech Computer Science &
Engineering
Christ College of Engineering
(Autonomous)
Irinjalakuda, Kerala**

Director of Academics

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Dr. Soloman P.A



B.Tech. Computer Science and Engineering

SEMESTER I

FIRST SEMESTER: Computer Science and Engineering															
10 Days Compulsory Induction Program and Universal Human Values															
Sl. No.	Slot	Course Code	Course Type	Course Category	Course Title (Course Name)	Credit Structure				SS	Total Marks		Credits	Hrs./Week	
						L	T	P	R		CAE	ESE			
THEORY															
1	A	G26ACE101	BS	GC	Linear Algebra & Calculus with Simulation Lab	2	1	2	0	4.5	40	60	4	5	
2	B	G26CYE103	BS	GC	Advanced Engineering Chemistry	2	1	2	0	4.5	40	60	4	5	
3	C	G26GPT105	ES	GC	Engineering Graphics	2	0	2	0	4	40	60	3	4	
4	D	G26CMT106	ES	GC	Basics of Civil and Mechanical Engineering	4	0	0	0	6	40	60	4	4	
5	E	G26ATE110	ES	CC	Algorithmic thinking with Python	2	0	2	0	4	40	60	3	4	
PRACTICALS															
6	G	G26WSP111	ES	GC	Civil and Mechanical Workshop Practice	0	0	2	0	1	50	50	1	2	
7	H	A26AET115	HM	CC	Applied English for Communication	2	0	0	0	3	50	-	2	2	
8	I	A26EDR113	SE	CC	Engineering Design and Innovation Studio (EDIS-I)	0	0	0	2	2	50	-	1	2	
MANDATORY COURSES															
9	J	A26HWP114	MC	CC	Health and Wellness	1	0	1	0	2	50	-	Pass/Fail	2	
ACTIVITY POINT PROGRAMME															
10	-	A26APP115	MC	CC	Activity Point Programme ^s								0	-	
Total										33			22	30	

Sl. No:	Slot	Course Code	Course Type	Course Category	Course Title (Course Name)	Credit Structure				SS	Total Marks		Credits	Hrs./Week
						L	T	P	R		CAE	ESE		
PROGRAM ELECTIVE-I (SEMESTER I)														
1	D	R26CST114	PE	PE1	Object Oriented Software Engineering	3	0	0	0	4.5	40	60	3	3
2	D	R26CST124	PE	PE1	Advanced Data Mining	3	0	0	0	4.5	40	60	3	3
3	D	R26CST134	PE	PE1	Cloud Computing	3	0	0	0	4.5	40	60	3	3
4	D	R26CST144	PE	PE1	Web Services	3	0	0	0	4.5	40	60	3	3
5	D	R26CST154	PE	PE1	Computational Intelligence	3	0	0	0	4.5	40	60	3	3
6	D	R26CST164	PE	PE1	Automated Verification	3	0	0	0	4.5	40	60	3	3
PROGRAM ELECTIVE-II (SEMESTER I)														
1	E	R26CST115	PE	PE2	Advanced Computer Networks	3	0	0	0	4.5	40	60	3	3
2	E	R26CST125	PE	PE2	Pattern Recognition	3	0	0	0	4.5	40	60	3	3
3	E	R26CST135	PE	PE2	Advanced Computer Architecture	3	0	0	0	4.5	40	60	3	3
4	E	R26CST145	PE	PE2	Natural Language Processing & Text Mining	3	0	0	0	4.5	40	60	3	3
5	E	R26CST155	PE	PE2	Advanced Compiler Design	3	0	0	0	4.5	40	60	3	3
6	E	R26CST165	PE	PE2	Bioinformatics	3	0	0	0	4.5	40	60	3	3

SEMESTER 1

LINEAR ALGEBRA AND CALCULUS WITH SIMULATION LAB

Course Code	G26ACE101	CAE Marks	40
Teaching Hours/Week (L:T:P:R)	2:1:2:0	ESE Marks	60
Credits	4	Exam Hours	2 Hrs. and 30 Mins.
Prerequisites (if any)	None	Course Type	Theory + Lab

Course Objective:

- To equip students with a strong foundation in Linear Algebra and Calculus, enabling them to apply mathematical concepts in the context of engineering disciplines.
- To develop students' ability to use computational tools such as MATLAB for solving and visualising mathematical problems relevant to engineering.

SYLLABUS

Module	SYLLABUS DESCRIPTION	CONTACT HOURS
I	Linear Algebra Rank of a matrix, Solution of linear system of equations, Gauss Elimination, Eigen value and Eigen vectors, Diagonalization, Cayley Hamilton Theorem (without proof). Experiments: 1. Computation of the Rank of a Matrix and Solution of a System of Linear Equations Using Matrix Operations 2. Solution of Linear Systems Using the Gauss Elimination Method 3. Computation of Eigenvalues and Eigenvectors of a Matrix and Verification of the Eigenvalue Equation $Ax = \lambda x$ 4. Diagonalization of a Matrix Using Eigenvalue Decomposition and Verification of Matrix Reconstruction $A = PDP^{-1}$	12
II	Multivariable Calculus Partial derivatives, Partial derivatives of functions of two variables, Partial derivatives viewed as rates of change and slopes, The Chain rule, The Chain Rule of Partial derivatives, Maxima and Minima of functions of two variables (Finding relative extrema). Experiments:	12

	1. Computation and Evaluation of Partial Derivatives of Functions of Two Variables 2. Visualization of Functions of Two Variables Using Surface and Contour Plots 3. Verification of the Chain Rule for Composite Functions 4. Finding Critical Points and Classifying Relative Maxima and Minima Using the Second Derivative Test	
III	Multiple Integral Double integrals, Reversing the order of integration in double integrals, Evaluating areas using Double integrals, Finding volumes using double integration, Triple integrals, Volume calculated as triple integral. Experiments: 1. Evaluation and Verification of Double Integrals Using MATLAB 2. Calculation and Visualization of Area of Plane Regions Using Double Integrals 3. Calculation of Volume Under a Surface Using Double Integrals 4. Evaluation of Triple Integrals and Volume Computation of Solids with Visualization of Three-Dimensional Integration Regions	12
IV	Series representation of Functions Taylor Series (without proof), Maclaurin Series, Fourier series, Euler formulas, Fourier series of 2π periodic functions, Fourier series of $2l$ periodic functions, Half range sine series expansion, Half range cosine series expansion. Experiments: 1. Computation and Visualization of Taylor and Maclaurin Series Expansions of Functions 2. Visualization of Taylor/Maclaurin Series Approximations Using Different Numbers of Terms 3. Verification of Euler's Formula Using MATLAB 4. Computation and Visualization of Fourier Series of 2π-Periodic Functions 5. Half-Range Sine and Cosine Series Expansions and Analysis of Fourier Series Convergence	12

Course Assessment Method (CAE: 40 Marks, ESE: 60 Marks)

Continuous Assessment and Evaluation Marks (CAE):

Continuous Assessment	Continuous Evaluation Test-I (Written)	Continuous Evaluation Test-II (Written)	Continuous Evaluation Test-III (Written)	Internal Lab Examination	Total
10	30	30	30	10	40

	A total of 90 marks will be scaled to 20		
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End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions.

Part A	Part B	Total
2 questions from each module. - Total of 8 questions, each carrying 3 marks (8 x 3 = 24 Marks)	- Each question carries 9 marks. - Two questions will be given from each module, out of which 1 question should be answered. - Each question can have a maximum of 3 sub divisions. (4 x 9 = 36 Marks)	60

Course Outcomes (COs)

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

CO No.	Description	Blooms KL
CO1	Understand the concepts of rank, eigenvalues, eigenvectors, and diagonalization of matrices, and their role in solving systems of linear equations.	2
CO2	Understand the concepts of partial derivatives, chain rule, and conditions for maxima and minima of functions of two variables.	2
CO3	Understand the concept of double and triple integrals, including reversal of order of integration, for evaluating areas and volumes.	2
CO4	Apply double and triple integration techniques to compute areas of plane regions and volumes of solids.	3
CO5	Understand the concepts of Taylor, Maclaurin, and Fourier series representations of functions, including Euler's formulas and half-range expansions.	2
CO6	Apply Taylor, Maclaurin, and Fourier series techniques to represent and approximate periodic and non-periodic functions.	3

CO7	Apply MATLAB to solve, verify, and visualize problems in linear algebra, multivariable calculus, multiple integrals, and series expansions through laboratory experiments.	3
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Note: K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyse, K5 – Evaluate, and K6 – Create

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3			2									
CO2	3	3			2									
CO3	3	3			2									
CO4	3	3			2									
CO5	3	3			2									
CO6	3	3			2									
CO7	3	3			2	2		2	2		2			

Text Books

Sl. No.	Title of the Book	Name of the Author(s)	Publisher & Edition
1	Calculus	H. Anton, I. Biven, S. Davis	Wiley, 10th Edition, 2015
2	Advanced Engineering Mathematics	Erwin Kreyszig	John Wiley & Sons, 10th Edition, 2016

Reference Books

Sl. No.	Title of the Book	Name of the Author(s)	Publisher & Edition
1	Essential Calculus	J. Stewart	Cengage, 2nd Edition, 2017

2	Calculus and Analytic Geometry	G.B. Thomas and R.L. Finney	Pearson, 9th Edition, Reprint 2002
3	Advanced Engineering Mathematics	Peter V. O'Neil	Cengage, 7th Edition, 2012
4	Engineering Mathematics for first year	Veerarajan T.	Tata McGraw-Hill, New Delhi, 2008
5	Higher Engineering Mathematics	B.S. Grewal	Khanna Publishers, 36th Edition, 2010

Video Links (NPTEL, SWAYAM, etc.)

Module No.	Link
All	https://nptel.ac.in/courses/111104125 (Calculus of Several Real Variables – IIT Kanpur)
1	https://ocw.mit.edu/courses/18-06-linear-algebra-spring-2010/ (Linear Algebra – MIT OpenCourseWare)

Module 1

1. Computation of the Rank of a Matrix and Solution of a System of Linear Equations

- Compute the rank of a matrix.
- Determine the consistency of a system of equations.
- Solve linear systems using MATLAB matrix operations.

2. Solution of Linear Systems Using the Gauss Elimination Method

- Implement the Gauss Elimination algorithm.
- Solve systems of linear equations.
- Compare results with MATLAB built-in functions.

3. Computation of Eigenvalues and Eigenvectors and Verification of $Ax=\lambda x$

- Compute eigenvalues and eigenvectors.
- Verify the eigenvalue equation for each eigenpair.

4. Diagonalization of a Matrix Using Eigenvalue Decomposition

- Diagonalize a matrix.
- Verify matrix reconstruction using $A=PDP^{-1}$

5. Verification of the Cayley–Hamilton Theorem and LU Decomposition

- Verify the Cayley–Hamilton theorem for a given matrix.
- Perform LU decomposition and use it to solve linear systems.

Module 2

1. Computation and Evaluation of Partial Derivatives of Functions of Two Variables

- Compute first- and higher-order partial derivatives.
- Evaluate partial derivatives at specified points.

2. Visualization of Functions of Two Variables Using Surface and Contour Plots

- Generate 3D surface plots.
- Generate contour plots and interpret level curves.

3. Interpretation of Partial Derivatives and Determination of the Tangent Plane

- Interpret partial derivatives as slopes and rates of change.
- Determine and visualize the tangent plane (local linear approximation) to a surface.

4. Verification of the Chain Rule for Composite Functions

- Compute derivatives directly and using the chain rule.
- Verify the equivalence of the two results.

5. Finding and Classifying Critical Points of Functions of Two Variables

- Determine critical points.
- Find relative maxima and minima.
- Classify critical points using the second derivative test.

Module 3

1. Evaluation and Verification of Double Integrals

- Evaluate double integrals using MATLAB.
- Verify results by reversing the order of integration.

2. Calculation and Visualization of Area of Plane Regions Using Double Integrals

- Compute the area of a plane region.
- Visualize the integration region.

3. Calculation of Volume Under a Surface Using Double Integrals

- Evaluate volumes bounded by surfaces using double integrals.

4. Evaluation and Visualization of Triple Integrals for Volume Computation

- Evaluate triple integrals using MATLAB.
- Compute the volume of solids.
- Visualize three-dimensional integration regions.

5. Comparison of Analytical and Numerical Integration Results and Applications of Multiple Integrals

- Compare symbolic and numerical integration results.
- Apply double and triple integrals to practical area and volume computation problems.

Module 4

1. Computation and Visualization of Taylor and Maclaurin Series Expansions of Functions

- Compute Taylor and Maclaurin series of standard functions.
- Compare the original function with its series approximation.

2. Visualization of Taylor/Maclaurin Series Approximation Using Different Numbers of Terms

- Study the effect of increasing the number of terms on approximation accuracy.

3. Verification of Euler's Formula Using MATLAB

- Verify Euler's formula and explore its applications to complex exponentials.

4. Computation and Visualization of Fourier Series of Periodic Functions

- Compute Fourier series coefficients for 2π -periodic and $2l$ -periodic functions.
- Construct and visualize Fourier series approximations.

5. Half-Range Fourier Series Expansions and Convergence Analysis

- Compute half-range sine and cosine series expansions.
- Compare original functions with their Fourier series approximations.

Visualize Fourier series convergence using increasing numbers of terms

SEMESTER – S1

ENGINEERING GRAPHICS AND COMPUTER-AIDED DRAWING

	Course Code	G26GPT105	CIE Marks	40
	Teaching Hours/Week (L: T:P: R)	2- 0- 2- 0	ESE Marks	60
	Credits	3	Exam Hours	2.30
	Prerequisites (if any)	None	Course Type	Theory + Practical
	Course Objectives 1. Develop the ability to read, interpret, and communicate engineering information through standard graphical representations and drawing conventions. 2. Apply the principles of orthographic projection to represent points, lines, and solids accurately in different spatial orientations. 3. Construct sectional views and surface developments of engineering solids to support visualisation and manufacturing applications. 4. Enhance spatial visualisation and problem-solving skills through the preparation of isometric and perspective projections of engineering objects. 5. Utilise engineering graphics as a fundamental tool for design communication, analysis and visualisation in engineering practice.			
Syllabus				Contact Hours
Module - I	Introduction to Engineering Graphics: Principles of Engineering Graphics and their significance: use of drawing instruments, lettering and dimensioning. Projection of Points and Lines: Principles and conventions of orthographic projection; projection of points and lines inclined to both reference planes; traces of lines. (<i>First-quadrant problems only.</i>)			12 hrs
Module - II	Projection of Solids: Classification of solids; positions of solids with respect to the reference planes; methods of drawing orthographic projections of solids. Solids in simple positions and solids with their axes inclined to one of the reference planes.			12 hrs

	Computer Aided Drawing (CAD): Introduction, role of CAD, advantages, and 2D drawing with dimensions. CAD: The Menu System, Understanding the Workspace and User Interface. Drawing: Drawing lines, circles, rectangles, and other 2D objects. Editing: Using basic editing tools, modifying and editing entities, Dimensions: Adding text, dimensions, and leaders. (Internal Evaluation only)	
Module - III	Sections of Solids: Sections of prisms, pyramids, cones and cylinders with their axes in the vertical position, cut by different section planes. Determination of the true shape of sections (<i>excluding problems where the true shape is given</i>). Development of Surfaces: Development of the surfaces of the above solids and solids cut by different section planes (<i>excluding solids with through holes</i>). Determination of the shortest distance between two points on a surface.	12 hrs
Module - IV	Isometric Projection: Isometric views and projections of prisms, pyramids, cones, cylinders, frustums of pyramids, frustums of cones, spheres, hemispheres and their combinations. Perspective Projection: Principles and nomenclature of perspective projection; parallel perspective using the visual ray method. Objects with their axes perpendicular to the Picture Plane (PP) or Ground Plane (GP) only.	10 hrs

Course Assessment Method (CIE: 40 Marks, ESE: 60 Marks)

Continuous Assessment	Internal Examination-I (Written)	Internal Examination-II (Written)	Internal Examination-III (Written)	Total
20*	30	30	30	40
A total of 90 marks will be scaled to 20				

Note: A total of 90 marks obtained from the three internal examinations will be scaled down to 20 marks.

* Twenty marks for continuous assessment are allotted based on the drawings submitted for the assigned problems.

End Semester Examination Marks (ESE)

	Total
2 Questions from one module Total 8 Questions, each question carries 15 marks (15 x 4 = 60 Marks)	60

Course Outcomes (COs)

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

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

CO	Course Outcome	Bloom's Knowledge Level (KL)
CO1	Interpret and produce orthographic projections of points and lines, and determine true length and true inclination.	K3
CO2	Construct orthographic projections of solids in simple positions and with axes inclined to one reference plane.	K3
CO3	Generate sectional views, true shapes of sections, and surface developments of engineering solids.	K3
CO4	Create isometric and perspective projections of engineering objects for three-dimensional visualization.	K3

Course Articulation Matrix (Mapping of course outcomes with program outcomes):

COs	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	1	–	–	–	–	–	–	–	1
CO2	3	2	2	–	–	–	–	–	–	–	1
CO3	3	2	3	–	–	–	–	–	–	–	1
CO4	2	2	3	–	1	–	–	–	–	1	1

1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation

Textbooks

S I N o	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Engineering Graphics	K. C. John	Prentice Hall India Publishers	
2	Engineering Graphics	K Venugopal	New Age International Publishers.	
3	Engineering Graphics	P. I. Varghese	V.I.P Publishers	
4	Engineering Graphics using AutoCAD	T Jeyapoovan	Vikas Publishing House PVT LTD	
5	Engineering Graphics	Anilkumar K.N.	Adhyuth narayan Publishers	
6	Engineering Graphics	N.S Parthasarathy and Vela Murali	OXFORD University Press	

Reference Books

1	Engineering Drawing	N. D. Bhatt	Charotar Publishing House Pvt. Ltd.	54 th Edition, 2023
2	Engineering Graphics with AutoCAD	Kulkarni D.M., Rastogi A.P. and Sarkar A.K	PHI	
3	Engineering Design and Visualisation	Duff J.M. and Ross W.A.	Cengage Learning	
4	Fundamentals of Engineering Drawing	Luzaddff W.J. and Duff J.M	PHI	
5	Engineering Graphics	Agrawal B. And Agrawal C.M	Tata McGraw Hill Publishers	

Video Links (NPTEL, SWAYAM etc):
https://nptel.ac.in/courses/112103019
https://onlinecourses.swayam2.ac.in/aic22_ts42/preview
https://onlinecourses.nptel.ac.in/noc24_me140/preview



SEMESTER S1

BASICS OF CIVIL & MECHANICAL ENGINEERING

Course Code	G26CMT107	CIE Marks	40
Teaching Hours/Week (L:T:P:R)	4:0:0:0	ESE Marks	60
Credits	4	Exam Hours	2 Hrs. and 30 Mins.
Prerequisites (if any)	None	Course Type	Theory

Course Objective:

1. Understand thermodynamic cycles. IC engines and renewable energy systems.
2. Understand about Pumps, gears, different manufacturing processes, IoT, AI applications in smart manufacturing.
3. Understand the relevance of civil engineering and its various disciplines.
4. Describe the relevance of various building codes and types of buildings as per NBC.
5. Understand different building components and building materials.

SYLLABUS

Module No.	Description	Contact Hours
1	Energy, Mobility and Sustainable Engineering Introduction to Mechanical Engineering and thermodynamic engineering systems. Thermodynamic cycles: Carnot, Otto and Diesel cycles (concepts). Simple Numerical Problems. IC engines, hybrid vehicles, electric vehicles and hydrogen mobility. Refrigeration, air conditioning and thermal comfort. Renewable energy systems: solar, wind and bioenergy. Carbon footprint, energy efficiency and sustainable engineering.	11
2	Manufacturing, Automation, and Digital Engineering Pump schematic and working of centrifugal and reciprocating, Turbines, Power transmission, Types of belt and gear drives.	11

	Manufacturing and joining processes: casting, forging, rolling, and extrusion, and welding. CNC machining, additive manufacturing (3D printing), CAD, CAM and Digital Twin concepts. Artificial Intelligence and data analytics in smart factories.	
3	General Introduction to Civil Engineering: Relevance of Civil Engineering in the overall infrastructural development of the country. Brief introduction to major disciplines of Civil Engineering like Structural Engineering, Geo-technical Engineering, Transportation Engineering, Water Resources Engineering and Environmental Engineering. Introduction to buildings: Types of buildings according to character of occupancy as per NBC, Load bearing and non-load bearing building structures, components of a residential building and their functions (concept only). Selection of site for a residential building. Building Area Definitions: Built up area, Plinth area, Floor area, Carpet area and Floor area ratio of a building as per KBR. Building rules and regulations: Relevance of NBC, KBR & CRZ norms (brief discussion of relevance only).	11
4	Conventional construction materials: Brick, stone, sand, cement and timber- Classifications, Qualities, Tests and Uses of construction materials. Cement concrete: Constituent materials, properties and types. Steel: Structural steel sections and steel reinforcements – types and uses. Automation and robotics in construction-Applications, benefits & challenges Smart Cities and IoT in Civil Engineering- Role of IoT in Civil Engineering, Applications, benefits & challenges	11

Course
(CIE: 40 Marks, ESE: 60 Marks)

Assessment

Method

Continuous Internal Evaluation Marks (CIE):

Assignment (Activity based)	Assignment (Activity based)	Internal Examination-I (Written)	Internal Examination-II (Written)	Internal Examination-III (Written)	Total
10	10	30	30	30	
		Average of three examinations converted to 20			40

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions.

Part A	Part B	Total
• 2 questions from each module. • Total of 8 questions, each carrying 3 marks (8 x 3 = 24 Marks)	• Each question carries 9 marks. • Two questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 3 sub divisions. (4 x 9 = 36 Marks)	60

Course Outcomes (Cos)

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

CO No.	Description	Blooms Knowledge Level (KL)
CO1	Apply the concepts of thermodynamic cycles, internal combustion engines, refrigeration systems, and renewable energy systems to identify their role in promoting sustainable technologies	3
CO2	Analyse the working principles of pumps, turbines, mechanical systems, basic manufacturing processes, IoT and AI to assess their effectiveness in supporting energy-efficient applications.	4
CO3	Analyse the role of civil engineers, various disciplines in civil engineering, and types of buildings and regulations, to understand their impact on technological development.	4
CO4	Apply the knowledge of basic building components and construction materials to select appropriate combinations for safe and sustainable building practices.	3
CO5	Apply the concepts of basic Civil and Mechanical Engineering to develop a model showcasing sustainable technologies for real-world applications.	3

Note: K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyse, K5 – Evaluate, and K6 – Create

CO-PO Mapping Table:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2	3	2	-	-	-	2	-	2	-	-
CO2	3	3	2	-	-	-	2	-	2	2	-
CO3	2	2	-	-	-	-	2	-	2	2	-
CO4	3	2	2	-	-	-	3	-	-	-	-
CO5	2	2	3	2	2	2	3	-	2	2	2

Text Books

Sl. No.	Title of the Book	Name of the Author(s)	Name of the Publisher	Edition and Year
1	Basic Mechanical Engineering	Pravin Kumar	Pearson Education	1st Edition, 2013
2	A Textbook of Basic Mechanical Engineering	R.K. Rajput	Laxmi Publications	3 rd Edition, 2017
3	Elements of Mechanical Engineering	K.P. Roy, S.K. Hajra Choudhury, A.K. Hajra Choudhury	Media Promoters & Publishers Pvt. Ltd.	Revised Edition, 2012
4	Fundamentals of Mechanical Engineering	G.S. Sawhney	PHI Learning Pvt. Ltd.	1 st Edition, 2013
5	Essentials of Civil Engineering	Dalal K R	Charotar Publishing house	1 st Edition 2012
6	Engineering Materials (Material Science)	Rangwala S C	Charotar Publishing House Pvt Limited	43 rd Edition 2019
7	Building Materials	Duggal S K	New Age International	5 th Edition 2019

Reference Books

Sl. No.	Title of the Book	Name of the Author(s)	Name of the Publisher	Edition and Year
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1	Hybrid Electric Vehicles: Principles and Applications with Practical Perspectives	Chris Mi and M. Abul Masrur John	Wiley & Sons	2nd Edition, 2017
2	Automotive Engineering Fundamentals	Richard Stone and Jeffrey K. Ball	SAE International	1st Edition, 2004
3	Additive Manufacturing Technologies: 3D Printing, Rapid Prototyping, and Direct Digital Manufacturing	Ian Gibson, David W. Rosen, and Brent Stucker	Springer	2 nd Edition, 2015
4	Heating, Ventilating, and Air Conditioning Analysis and Design	Faye C. McQuiston, Jerald D. Parker, and Jeffrey D. Spitler John	Wiley & Sons	6 th Edition, 2005
5	Materials for Civil and Construction Engineering	Mamlouk, M.S., and Zaniewski, J.P	Pearson Publishers	4 th Edition, 2017
6	Building Construction	Rangwala, S.C and Dalal, KB	Charotar Publishing house	34 th Edition 2022
7	Construction Technology Vol.I to IV	Chudley, R	Longman group, England Course Plan	2 nd Edition 2014
8	Building Construction Volumes 1 to 4	Mckay, W.B. and Mckay, J.K	Pearson India Education Services	5 th Edition
9	Engineering Geology	Duggal S. K., Pandey H.K. and Rawat N,	Mcgraw Hill Education, New Delhi	1 st Edition 2017
10	Latest Building codes and related rules and regulations.			

Video Links (NPTEL, SWAYAM, etc.)

Module No.	Link
1	https://nptel.ac.in/courses/112/105/112105123/ https://nptel.ac.in/courses/112/106/112106133/ https://nptel.ac.in/courses/112/105/112105129/
2	https://nptel.ac.in/courses/112/105/112105171/ https://nptel.ac.in/courses/112/105/112105268/

	https://archive.nptel.ac.in/courses/112/107/112107145
3	https://archive.nptel.ac.in/courses/105/106/105106201/
4	https://archive.nptel.ac.in/courses/105/106/105106206/

SEMESTER S1/S2

ALGORITHMIC THINKING WITH PYTHON

Course Code	G26ATE110	CIE Marks	40
Teaching Hours/Week (L:T:P:R)	2:0:2:0	ESE Marks	60
Credits	3	Exam Hours	2 Hrs. and 30 Mins.
Prerequisites (if any)	None	Course Type	Theory + Lab

Course Objective:

1. To provide students with a thorough understanding of algorithmic thinking and its practical applications in solving real-world problems. To develop the ability to accurately interpret and understand engineering drawings.
2. To explore various algorithmic paradigms, including brute force, divide-and-conquer, dynamic programming, and heuristics, in addressing and solving complex problems.

SYLLABUS

Module No.	Description	Contact Hours
1	Problem-Solving Strategies: - Problem-solving strategies defined, Importance of understanding multiple problem-solving strategies, Trial and Error, Heuristics, Means-Ends Analysis, and Backtracking (Working backward). The Problem-Solving Process: - Understanding the problem, formulating a model, developing an algorithm, Writing the program, Testing the program, and evaluating the solution. Contemporary computational problem-solving applications.	7

	Essentials of Python Programming: - Creating and using variables in Python, Numeric and String data types in Python, Using the math module, Using the Python Standard Library for handling basic I/O - print, input, Python operators and their precedence.	
2	Algorithm and Pseudocode Representation: - Meaning and Definition of Pseudocode, Reasons for using pseudocode, The main constructs of pseudocode - Sequencing, selection (if-else structure, case structure) and repetition (for, while, repeat-until loops). Sample problems. Flowcharts: - Symbols used in creating a Flowchart - start and end, arithmetic calculations, input/output operation, decision (selection), module name (call), for loop (Hexagon), flow-lines, on-page connector, off-page connector.	9
3	Selection and Iteration Using Python: - if-else, elif, for loop, range, while loop. Sequence data types in Python - list, tuple, set, strings, dictionary, Creating and using Arrays in Python (using Numpy library). Decomposition and Modularization*: - Problem decomposition as a strategy for solving complex problems, Modularization, Motivation for modularization, Defining and using functions in Python, Functions with multiple return values Recursion: - Recursion Defined, Reasons for using Recursion, The Call Stack, Recursion and the Stack, Avoiding Circularity in Recursion, Sample problems.	10
4	Computational Approaches to Problem-Solving: Brute-force Approach, Divide-and-conquer Approach, Dynamic Programming Approach, Greedy Algorithm Approach, Randomized Approach.	10

Course Assessment Method
(CIE: 40 Marks, ESE: 60 Marks)

Continuous Internal Evaluation Marks (CIE):

Continuous Assessment	Internal Examination-I (Written)	Internal Examination-II (Written)	Internal Examination-III (Written)	Internal Lab Examination	Total
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10	30	30	30	10	
	Average of best two then convert to 20				40

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions.

Part A	Part B	Total
2 questions from each module. - Total of 8 questions, each carrying 3 marks (8 x 3 = 24 Marks)	- Each question carries 9 marks. - Two questions will be given from each module, out of which 1 question should be answered. - Each question can have a maximum of 3 sub divisions. (4 x 9 = 36 Marks)	60

Course Outcomes (Cos)

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

CO No.	Description	Blooms Knowledge Level (KL)
CO1	Utilize computing as a model for solving real-world problems.	2
CO2	Articulate a problem before attempting to solve it and prepare a clear and accurate model to represent the problem.	2, 3
CO3	Utilize effective algorithms to solve formulated models and translate algorithms into executable programs.	2, 3
CO4	Interpret problem-solving strategies, a systematic approach to solving computational problems, and essential Python programming skills.	2, 3
CO5	Design and implement a mini-project using algorithmic and problem-solving strategies to address real-world sustainability challenges.	2, 3

Note: K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyse, K5 – Evaluate, and K6 – Create

CO-PO Mapping Table

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PSO1	PSO 2
CO1	3	2									2	2	
CO2	2	3	2		1						2	2	1
CO3	2	3		2	2						2	2	2
CO4	2	2	3		2						2	2	2
CO5	2	3	2	2	2						2	2	2

Text Books

Sl. No.	Title of the Book	Name of the Author(s)	Name of the Publisher	Edition and Year
1	Problem solving & programming concepts	Maureen Sprankle, Jim Hubbard	Pearson	9 th Edition, 2011
2	Python for Everyone	Cay S. Horstmann, Rance D. Necaise	Wiley	3 rd Edition, 2024

Reference Books

Sl. No.	Title of the Book	Name of the Author(s)	Name of the Publisher	Edition and Year
1	How to Solve It: A New Aspect of Mathematical Method	George Pólya	Princeton University Press	2 nd Edition, 2015
2	Creative Problem Solving: An Introduction	Donald Treffinger., Scott Isaksen, Brian Stead-Doval	Prufrock Press	4 th Edition, 2005
3	Psychology (Sec. Problem Solving.)	Spielman, R. M., Dumper, K., Jenkins, W., Lacombe, A., Lovett, M., & Perlmutter, M	H5P Edition	1 st Edition, 2021
4	Computational Thinking: A Primer for Programmers and Data Scientists	G Venkatesh Madhavan Mukund	Mylspot Education Services Pvt Ltd	1 st Edition, 2020
5	Computer Arithmetic Algorithms	Koren, Israel	AK Peters/CRC Press	2 nd Edition, 2001

6	Introduction to Computation and Programming using Python	Guttag John V	PHI	2 nd Edition, 2016
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Video Links (NPTEL, SWAYAM, etc.)

Module No.	Link
1	https://opentextbc.ca/h5pppsychology/chapter/problem-solving/
2	https://onlinecourses.nptel.ac.in/noc21_cs32/preview

Continuous Assessment (10 Marks)

Accurate Execution of Programming Tasks

- Correctness and completeness of the program
- Efficient use of programming constructs
- Handling of errors.
- Proper testing and debugging

Evaluation Pattern for Lab Examination (10 Marks)

1. Algorithm (2 Marks)

Algorithm Development: Correctness and efficiency of the algorithm related to the question.

2. Programming (3 Marks)

Execution: Accurate execution of the programming task.

3. Result (3 Marks)

Accuracy of Results: Precision and correctness of the obtained results.

4. Viva Voce (2 Marks)

Proficiency in answering questions related to theoretical and practical aspects of the subject.

Laboratory Experiments

1. Simple desktop calculator using Python supporting the five basic arithmetic operators.
2. Program to create, concatenate, print a string, and access a substring from a given string.
3. Program to display time and date in various formats.
4. Program to create, append, and remove elements from lists in Python using NumPy.
5. Program to find the largest of three numbers.

6. Program to convert temperature values between Celsius (°C) and Fahrenheit (F).
Formula: $^{\circ}\text{C}/5 = (\text{F}-32)/9$
7. Program to construct star (*) patterns using nested for loops.
8. Program to print all prime numbers less than N.
9. Program to find the factorial of a number using recursion.
10. Recursive function to add two positive numbers.
11. Recursive function to multiply two positive numbers.
12. Recursive function to find the Greatest Common Divisor (GCD) of two positive numbers.
13. Program to determine whether a triangle is a right triangle using functions, based on the lengths of its three sides.
14. Program to define a module for generating Fibonacci numbers and import the module into another program.
15. Program to validate a mobile number using functions.
Validation Rules:
 - The number must contain exactly 10 digits.
 - The first digit must be 7, 8, or 9.
16. Program to merge two user-input lists into a third list such that:
 - All even numbers appear first in sorted order.
 - All odd numbers appear next in sorted order.
17. Program to implement the Sticks Game:
 - Initially, 16 sticks are available.
 - Two players take turns.
 - A player may pick 1, 2, or 3 sticks in a turn.
 - The player who picks the last stick loses.
18. Program to simulate the Monty Hall Problem and analyze whether switching doors increases the probability of winning.

SEMESTER S1

BASIC CIVIL AND MECHANICAL ENGINEERING WORKSHOP

(Common to All Branches)

Course Code	G26WSP111	CIE Marks	50
Teaching Hours/Week (L:T:P:R)	0:0:2:0	ESE Marks	50
Credits	2	Exam Hours	2 Hrs.
Prerequisites (if any)	None	Course Type	Lab

Course Objective:

1. To enable the student to familiarize various tools, measuring devices, practices and different methods employed in the industry.
2. To enable the students to apply this experience while developing product/project for the benefit of society.

Experiments

(Minimum 12 Exercises)

Module No.	Description
1	General: Introduction to workshop practice, Safety precautions, Shop floor ethics, and Basic First Aid knowledge. Study of mechanical and measurement tools, components and their applications: (a) Tools: screw drivers, spanners, Allen keys, cutting pliers etc. and accessories (b) bearings, seals, O-rings, circlips, keys etc.(c)Vernier Calipers, Height Gauge, Depth Gauge, Micrometers, Bevel Protractor etc.

2	Carpentry: Understanding carpentry tools and knowledge of at least one model 1. T –Lap joint 2. Cross lap joint 3. Dovetail joint 4. Mortise joints
3	Foundry: Understanding of foundry tools and knowledge of at least one model 1. Bench Moulding 2. Floor Moulding 3. Core making 4. Pattern making
4	Sheet Metal: Understanding sheet metal working tools and knowledge of at least one model 1. Cylindrical shape 2. Conical shape 3. Prismatic shaped job from sheet metal
5	Fitting: Understanding the tools used for fitting and knowledge of at least one model 1. Square Joint 2. V- Joint 3. Male and female fitting
6	Plumbing: - Understanding plumbing tools and pipe joints, along with practicing one exercise on joining pipes using a minimum of three types of pipe joints
7	Smithy: - Understanding the tools used in smithy. Demonstrating the forge ability of different materials (MS, Al, alloy steel and cast steels) in both cold and hot states. Observing the qualitative difference in the hardness of these materials. One exercise on smithy (Square prism).
8	Welding: Understanding welding equipment and practicing at least one welding technique, such as making joints using electric arc welding. Bead formation in horizontal, vertical and overhead positions
9	Rolling: - Objective of rolling, rolling process, practical on two high rolling mill
10	Electroplating: -Electroplating a given job
11	Metrology: Common measuring instruments used in workshop, experiments to find the angle of a dovetail, angle of a taper and the radius of a circular surface. Introduction to instruments Vernier Bevel Protractor, Vernier Depth Gauge, Vernier Height Gauge.
12	Assembly: Demonstration only Disassembling and assembling of 1. Cylinder and piston assembly 2. Tail stock assembly 3. Bicycle 4. Pump or any other machine
13	Machines: Demonstration of the following machines: Shaping and slotting machine; Milling machine; Grinding Machine; Lathe; Drilling Machine.
14	Modern manufacturing methods (Fab lab/IDEA Lab - Demonstration only): Power tools, CNC machine tools, 3D printing, Soft Materials cutting using special machines
15	Use of proper Personal Protective Equipment. Measurements using Tape, Ruler, Vernier calipers, screw gauge
16	Measuring the area of a plot with an irregular boundary using a chain and cross staff
17	Measuring the area of a building using Distomat

18	Finding the level difference between two points using dumpy level
19	Onsite quality assessment of brick, and cement
20	Construct a 1 and 1 ½ thick brick wall with a height of 50 cm and a minimum length of 60 cm using English bond. Check the verticality of the wall
21	Construct a 1 and 1 ½ thick brick wall with a height of 50 cm and a minimum length of 60 cm using Flemish bond. Check the verticality of the wall
22	Estimate the number of different types of building blocks needed to construct the walls of a room measuring 2m x 3m, accounting for standard-sized doors and windows.
23	Setting out of a two roomed building using thread, tape and water tube levelling.
24	Conduct a market study to understand the types, prices, and general specifications of at least three materials available in the market (such as bricks, cement, aggregates, steel, plumbing items, fixtures, welding rods, fasteners etc.).
Note: Minimum of 12 experiments from among the 24 experiments listed, is to be completed.	

End Semester Examination Marks (ESE)

Submission of Record: Students shall be allowed for the end semester examination only upon submitting the duly certified Lab record.

- A student must score a minimum of 50% overall, combining marks from both Continuous Internal Evaluation (CIE) and End Semester Examination (ESE).

Course Outcomes (Cos)

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

CO No.	Description	Blooms Knowledge Level (KL)
CO1	Understand safe and efficient use of mechanical workshop tools and machines while adhering to industrial safety standards.	2
CO2	Create simple mechanical components using traditional manufacturing processes such as fitting, welding, foundry, and smithy.	6
CO3	Perform basic civil engineering practices such as chain surveying, levelling, brick masonry, and estimation of materials.	3
CO4	Demonstrate familiarity with common construction materials and safety practices at construction sites	3
CO5	Integrate modern manufacturing practices CNC, 3D printing, sustainable material uses with conventional workshop methods to address real-world engineering challenges.	6
CO6	Conduct a market survey of sustainable construction materials and prepare a comparative report highlighting eco-friendly alternatives.	4

Note: K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyse, K5 – Evaluate, and K6 – Create

CO – PO Mapping Table

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3								2		2
CO2	3								2		2
CO3	3				2				2		3
CO4	3								2		3
CO5	3							2	3		3
CO6	3	3	3		2			2	3		3

Text Books

Sl. No.	Title of the Book	Name of the Author(s)	Name of the Publisher	Edition and Year
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1	Mechanical Workshop Practice	K C John	PHI Learning	2 nd Edition, 2010
2	Engineering Materials	S C Rangwala	Charotar Publishing House Pvt Limited	Edition 43, 2019
3	Building Materials	S K Duggal	New Age International	Edition 6, 2025
4	Indian Practical Civil Engineering Handbook	Khanna P.N,	UBS Publishers Distributers (P) Ltd.	Year 2012
5	Building Construction	Arora S.P and Bindra S.P	Dhanpat Rai Publications	Edition 5, 2022

Reference Books

Sl. No.	Title of the Book	Name of the Author(s)	Name of the Publisher	Edition and Year
1	Elements of Workshop Technology Vol-1 Manufacturing Processes	S K Hajra Choudhury A K Hajra Choudhury Nirjhar Roy	MPP Media Promoters and Publishers	2008

Video Links (NPTEL, SWAYAM, etc.)

Link
https://archive.nptel.ac.in/courses/105/106/105106206/ https://archive.nptel.ac.in/courses/105/106/105106201/ https://archive.nptel.ac.in/courses/105/104/105104101/ https://archive.nptel.ac.in/courses/117/106/117106108/

Continuous Assessment with Equal Weightage for Both Specialisations (50Marks)

- Preparation and Pre-Workshop Work – 10 Marks
 - Understanding of Procedure: Knowledge of the experiment/workshop activity, materials, tools, and equipment required.
- Conduct –15 Marks

- Workmanship & Technique: Proper handling of tools, equipment, and materials and correct execution of the assigned task.
3. Viva Voce –10 Marks
 - Technical Knowledge: Proficiency in answering questions related to the principles, procedures, materials, equipment, calculations, and practical applications of the workshop activity.
 4. Record – 10 marks
 - Completeness and neatness of the record.
 - Proper sketches, observations, calculations, and tabulation.
 - Correct recording of results and conclusions
 5. Attendance – 5 marks

Evaluation Pattern for End Semester Examination with equal weightage in both specializations (50 Marks)

1. Procedure/Preliminary Work (10 Marks)
 - Procedure Understanding and Description: Clarity in explaining the procedure and understanding each step involved.
2. Conduct of Experiment (20 Marks)
 - Setup and Preparation: Proper arrangement of apparatus, materials, tools, and equipment required for the experiment/work.
 - Procedure and Execution: Correct following of the prescribed procedure and proper execution of the experiment/practical work.
 - Measurements and Observations: Accurate measurement, recording of observations, and appropriate use of instruments.
3. Result (5 Marks)
 - Accuracy of Results: Precision and correctness of measurements, calculations, and obtained results.
 - Analysis and Interpretation: Appropriate analysis of observations/results and ability to draw valid conclusions.
 - Quality of Finished Work: Accuracy, neatness, and overall quality of the completed practical work/product.
4. Viva Voce (10 Marks)
 - Ability to explain the experiment, procedure results and answer related questions
 - Proficiency in answering questions related to theoretical and practical aspects of the subject.
5. Record (5 Marks)
 - Completeness, clarity, and accuracy of the lab record submitted

SEMESTER S1

APPLIED ENGLISH FOR COMMUNICATION

Course Code	A26AET115	CIE Marks	50
Teaching Hours/Week (L:T:P:R)	1:0:1:0	ESE Marks	0
Credits	1	Exam Hours	Nil
Prerequisites (if any)	None	Course Type	Theory and Practical

Course Objective:

6. Develop English language proficiency for academic, professional, and social contexts.
7. Adopt a task-based and application-oriented approach to learning.
8. Enhance listening, speaking, reading, and writing skills with emphasis on technical and professional communication.
9. Build communicative confidence and promote ethical academic practices.
10. Foster essential life skills required for higher education and employability.

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	Foundations of English, Technical Communication, and Academic Reading Core Topics • Significance of English in academic and professional environments. • Formal and informal communication; professional self-introduction. • Vocabulary development - technical vocabulary, formal emails, letters, and reports. • Paraphrasing, synonyms, sequence words, and commonly misused/misspelled words. • Effective email communication and introductory slide presentation skills. • Modern research and study skills with emphasis on academic integrity and plagiarism awareness.	17

	Academic Reading Skills • Reading styles: skimming, scanning, intensive reading, and critical reading. • Comprehending technical and non-technical texts — identifying main ideas, supporting details, and transitions. • Study strategies: SQ3R and PQRS methods. • Note-taking techniques: bullet points, mind maps, and simplified Cornell method. • Accurate and concise summarising of written and audio-visual content. Task-Based Activities • Professional self-introduction • Email drafting • Vocabulary exercises • Introductory slide preparation • Plagiarism awareness tasks • Reading comprehension exercises • Note-making tasks • Summary writing • Short reading-based discussions	
2	Grammar in Context, Language Accuracy, and Oral Communication Grammar Component • Sentence structure and word order. • Tenses used in academic and everyday communication. • Modals for requests and suggestions. • Subject-verb agreement. • Introduction to active and passive voice. • Vocabulary development through contextual usage, error correction, and rewriting informal language into academic/professional English. Oral Communication Component • Structuring short presentations and organising ideas logically. • Voice modulation, pace, body language, and eye contact. • Basic awareness of visual aids in presentations. • Speaking practice on current affairs, social issues, and introductory technical concepts. • Professional delivery and audience interaction. Task-Based Activities • Grammar-in-context exercises • Error correction tasks • Rewriting activities • Guided language practice	15

	• Micro-presentations • Peer feedback sessions • Time-bound speaking tasks • Reflective practice	
3	Listening Skills, Group Interaction, and Interview Preparation Listening Skills • Active and passive listening. • Listening for general and specific information — interviews, documentaries, talks, and short lectures. Interview Skills • Types of interviews: one-to-one, panel, telephonic, and online. • Interview etiquette and effective response strategies. Group Discussion Skills • Case-based activities encouraging collaborative communication. • Presenting collective ideas clearly as a group. Task-Based Activities • Listening comprehension exercises • Case-based group discussions • Group spokesperson summaries • Interview role-plays • Mock interviews	6
4	Professional Communication, Life Skills, and Digital Presence Key Topics • Interpersonal communication and impression management. • Time and stress management, adaptability, motivation, and goal setting. • Digital self-presentation and professional communication practices. • Development of a video resume. • Collaborative content creation. • Representing oneself effectively in digital and professional environments. Task-Based Activities • Professional role-plays • Self-reflection exercises • Video résumé preparation • Group-based podcast creation focusing on clarity, collaboration, and content organisation	5

**Course Assessment Method
(CIE: 50 Marks)**

Continuous Internal Evaluation Marks (CIE):

Assignments/Quiz/Micro-Project/Presentation	Activity Evaluation	Total
25	25	50

Course Outcomes (Cos)

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

CO No.	Description	Blooms Knowledge Level (KL)
CO1	Develop vocabulary and language skills relevant to academic, professional, and engineering contexts.	3
CO2	Analyse, interpret, and effectively summarize technical and non-technical textual content.	4
CO3	Apply appropriate grammatical structures and language accuracy in spoken and written communication.	3
CO4	Deliver structured oral presentations and participate effectively in group discussions and professional interactions.	3
CO5	Identify limitations in listening patterns and apply suitable listening strategies for academic and professional needs.	2
CO6	Create clear, well-structured professional and technical documents adhering to standard conventions and ethical practices.	6

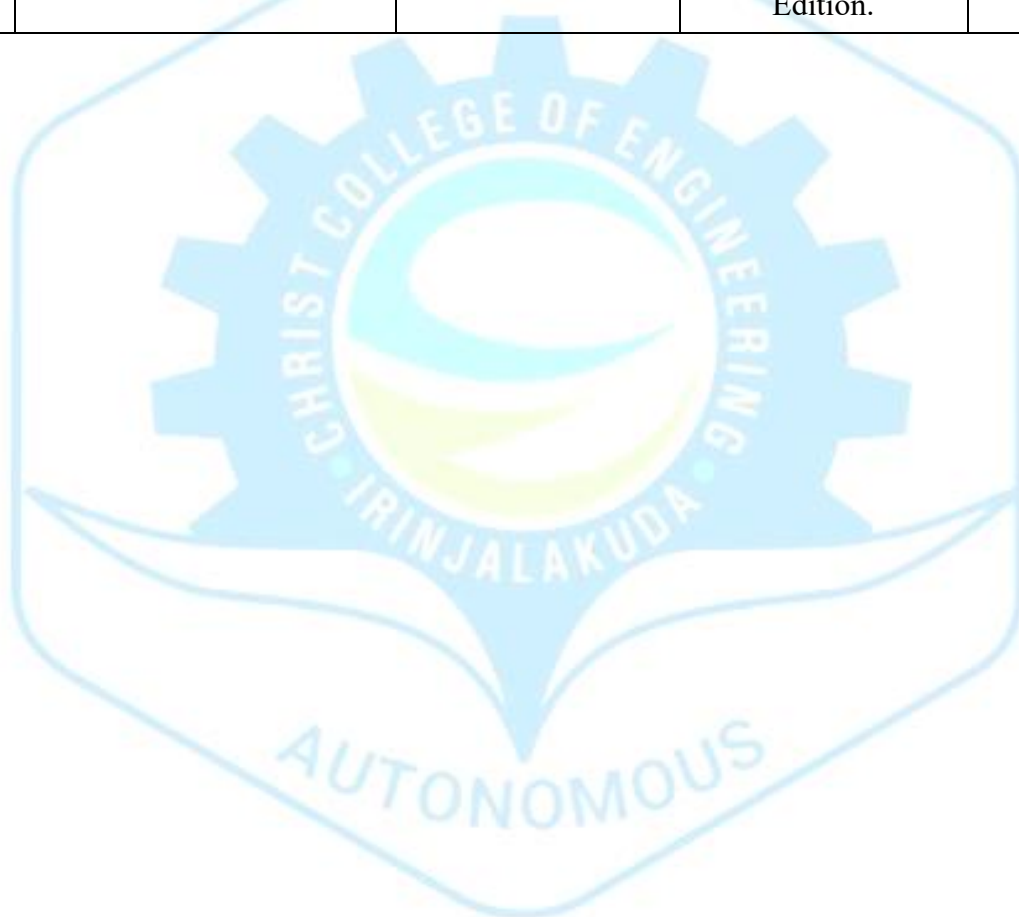
Note: K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyse, K5 – Evaluate, and K6 – Create

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	1								3		2
CO2	1			2					3		2
CO3	1								3		2
CO4	1							3	3	2	1
CO5	1							3	3	2	
CO6	1					2	3	2	3		2

Reference Books

Sl. No.	Title of the Book	Name of the Author(s)	Name of the Publisher	Edition and Year
1	English for Careers.,	-	Mahatma Gandhi University, Kottayam, Kerala.	-
2	Technical Communication: Principles and Practice.	Raman, Meenakshi & Sharma, Sangeeta.	Oxford University Press, New Delhi.	-
3	Practical English Usage.	Swan, Michael.	Oxford University Press, India Edition.	



SEMESTER S1

ENGINEERING DESIGN AND INNOVATION STUDIO - I

Course Code	A26EDR113	CIE Marks	50
Teaching Hours/Week (L:P)	0 : 2	ESE Marks	-
Credits	1	Exam Hours	2 Hrs (Lab Exam)
Prerequisites (if any)	NIL	Course Type	Project-Based / Skill Enhancement

Course Objectives:

- To develop structured problem-solving and idea communication skills through Design Thinking principles and pitch presentation.
- To introduce 3D digital modelling as a tool for visualising and prototyping design concepts using Autodesk Fusion 360.
- To provide hands-on experience in sensor/actuator interfacing using Arduino.
- To build individual and team competencies through project-based learning and live demonstrations.

SYLLABUS

Module No.	Description	Contact Hours
1	MODULE I (9 P): Design Thinking, Pitch Deck & 3D Modelling with Fusion 360 <u>A. Design Thinking & Problem Framing (4 P)</u> • Empathise – User interviews, Observation, pain-gain chart, journey mapping. • Define – How-Might-We (HMW) questions, Problem Statement Canvas. • Ideate – SCAMPER, Mind Mapping, Crazy 8s; convergent selection using a criteria matrix. • Pitch Deck – Anatomy of a pitch (Problem → Solution → Value Proposition → Ask); slide design principles; 5-minute group presentation with peer Q&A (SBI feedback framework). <u>B. 3D Modelling with Autodesk Fusion 360 (5 P)</u> • Lab 1 – Interface familiarisation; sketch a 2D profile; apply constraints and dimensions. • Lab 2 – Basic solid modelling: Extrude and Revolve to create a simple mechanical part. • Lab 3 – Advanced features: Fillet, Chamfer, Shell, Circular Pattern, Mirror. • Lab 4 – Assembly modelling: 2-part assembly (cap and body); joints and interference check. • Lab 5 – Idea Model Sprint: each student models their idea concept from the pitch exercise; render and export to STL. Assignment I: Individual submission – 300-word idea abstract (problem, HMW analysis, proposed solution) (10 Marks) Assignment II - Individual submission - Fusion 360 model file (.f3d) and STL export with 1-page design brief. (10 Marks)	9 P

2	MODULE II (9 P): Arduino – Sensors, Actuators. <u>A. Sensors & Actuator Interfacing (4 P)</u> • Lab 1 – Arduino IDE setup; digital I/O: LED control with digitalWrite(); PWM with analogWrite(); reading a push button. • Lab 2 – Analog sensing: LDR and potentiometer with analogRead(); ADC resolution; controlling LED brightness from sensor input. • Lab 3 – Environmental sensors: DHT11 (temperature & humidity); HC-SR04 ultrasonic distance sensor; display readings on 16x2 LCD (I2C). • Actuators –Relay module for load switching; RGB LED and passive buzzer for alert indication; servo motor position control with Servo library. <u>B. Communication Protocols & IoT (3 P)</u> • UART – Serial communication between Arduino and PC; Software Serial for multi-device messaging. • I2C – Two-wire protocol; addressing; interfacing OLED display and I2C temperature probe (LM75). • SPI – Four-wire protocol; interfacing SD card module; logging sensor data to file. <u>Micro-Project (2 P)</u> • Micro-Project – Teams of 3 design and build a functional Arduino based embedded system integrating at least one sensor, one actuator, one communication protocol to address a real-world problem. • Example themes – Smart room monitor (DHT11 + LCD + relay); automated irrigation (soil sensor + relay); visitor counter (IR sensor + OLED + I2C). • Deliverables – Working prototype + circuit schematic + commented code + 1-page report + 5-minute demo. Assignment III: Group lab task – implement a sensor-actuator circuit with one communication protocol (I2C or SPI); display output on Serial Monitor or OLED. Submit code and observations. (10 Marks) MicroProject: Micro-project group demonstration and report (group of 3). Evaluated on functionality, circuit design, code quality, and presentation. (10 Marks)	9 P
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Course Assessment Method

Continuous Internal Evaluation (CIE: 50 Marks)

Assignment I	Assignment II	Assignment III	Micro-Project	Lab Examination
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Idea Abstract + 3D Model	Sensor- Actuator / Protocol Lab Task	Micro-Project Demo & Report	Demo Report &	On-spot Arduino / Fusion 360 Task
10 Marks	10 Marks	10 Marks	15 Marks	15 Marks
Continuous Assessment (Avg. of A-I, A-II, A-III) convert it out of 20 Marks				
Total:	50 Marks (Continuous Assessment 20 + Micro-Project 15 + Lab Exam 15)			

Course Outcomes (COs)

On successful completion of this course, students will be able to:

CO No.	Description	Bloom's KL
CO1	Apply Design Thinking principles and Fusion 360 modelling to frame a real-world problem, generate a solution concept, and produce a 3D digital prototype communicated through a structured pitch.	K3 (Apply)
CO2	Interface sensors and actuators with Arduino and implement serial communication protocols (UART, I2C, SPI) to build responsive, data driven embedded systems.	K4 (Analyse)
CO3	Design, build, and demonstrate a functional Arduino based micro project that integrates sensing, actuation, communication, and real time data visualisation to address a real-world problem.	K5 (Evaluate)

CO-PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2	2	3	2	3	2	--	--	3	2	3
CO2	3	3	3	3	3	1	--	--	2	2	3

CO3	2	3	3	2	3	3	2	1	3	2	3
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Text Books

Sl. No.	Title of the Book	Name of the Author(s)/Editor(s)	Publisher	Edition & Year
1	Exploring Arduino: Tools and Techniques for Engineering Wizardry	Jeremy Blum	Wiley	2/e, 2020
2	Arduino Cookbook	Michael Margolis et al.	O'Reilly	3/e, 2020
3	Autodesk Fusion 360: A Tutorial Approach	Sham Tickoo	CADCIM Technologies	2023
4	Product Design and Development	Karl T. Ulrich & Steven D. Eppinger	McGraw-Hill	7/e, 2020

Reference Books

Sl. No.	Title of the Book	Name of the Author(s)/Editor(s)	Publisher	Edition & Year
1	Arduino: A Technical Reference	J. M. Hughes	O'Reilly	1/e, 2016
2	Change by Design: How Design Thinking Transforms Organizations	Tim Brown	HarperCollins	2/e, 2019
3	The Field Guide to Human Centered Design	IDEO.org	IDEO	1/e, 2015

4	Internet of Things: A Hands-On Approach	Bahga & Madiseti	Universities Press	1/e, 2015
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Video Links (NPTEL, SWAYAM, etc.)

Module	Resource	Link
I	Design Thinking: A Primer – NPTEL (IIT Bombay)	nptel.ac.in/courses/110106124
II	Autodesk Fusion 360 Official Tutorial Library	help.autodesk.com/view/fusion360
III	Stanford d.school Design Thinking Bootleg Deck	dschool.stanford.edu/resources
IV	Arduino Official Language Reference (Serial, I2C, SPI, Interrupts)	docs.arduino.cc/language-reference
V	Arduino by Prof Kannan Moudgalya - Principal Investigator of Spoken Tutorial Project (IIT Bombay)	https://onlinecourses.swayam2.ac.in/elearning/preview/aic20_sp04
VI	Arduino Project Hub – Community Reference Projects	https://projecthub.arduino.cc

SEMESTER S1

HEALTH AND WELLNESS

Course Code	A26HWP114	CIE Marks	50
Teaching Hours/Week (L:T:P:R)	1:0:1:0	ESE Marks	0
Credits	1	Exam Hours	Nil
Prerequisites (if any)	None	Course Type	Theory and Practical

Course Objective:

1. To provide essential knowledge on physical activity, health, and wellness.
2. To ensure students understand body systems, exercise principles, nutrition, mental health, and disease management.
3. To educate students on the benefits of yoga, the risks of substance abuse and basic first aid skills.
4. To equip students with the ability to lead healthier lifestyles.
5. To enable students to design effective and personalized exercise programs.

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	Human Body Systems related to Physical activity and its functions: Respiratory System - Cardiovascular System. Musculoskeletal System and the Major Muscle groups of the Human Body. Quantifying Physical Activity Energy Expenditure and Metabolic equivalent of task (MET) Exercise Continuum: Light-intensity physical activity, Moderate - intensity physical activity, Vigorous -intensity physical activity. Defining Physical Activity, Aerobic Physical Activity, Anaerobic Physical Activity, Exercise and Health-Related Physical Fitness. FITT principle to design an Exercise programme Components of Health-related Physical Fitness: - Cardiorespiratory Fitness- Muscular strength- Muscular endurance- Flexibility- Body composition.	4
2	Concept of Health and Wellness: Health and wellness differentiation, Factors affecting health and wellness. Mental health and Factors affecting mental health. Sports and Socialization: Sports and character building - Leadership through Physical Activity and Sports	2

	Diet and nutrition: Exploring Micro and Macronutrients: Concept of Balanced diet, Carbohydrate & the Glycemic Index Animal & Plant - based Proteins and their Effects on Human Health Dietary Fats & their Effects on Human Health Essential Vitamins and Minerals	
3	Lifestyle management strategies to prevent / manage common hypokinetic diseases and disorders - Obesity - cardiovascular diseases (e.g., coronary artery disease, hypertension) - Diabetes - Osteoporosis - Musculoskeletal disorders (e.g., osteoarthritis, Low back pain, Kyphosis, lordosis, flat foot, Knock knee) Meaning, Aims and objectives of yoga - Classification and importance of of Yogic Asanas (Sitting, Standing, lying) Pranayama and Its Types - Active Lifestyle and Stress Management Through Yoga Understanding on substance abuse and addiction - Psychoactive substances & its ill effects- Alcohol- Opioids- Cannabis -Sedative - Cocaine -Other stimulants, including caffeine -Hallucinogens - Tobacco -Volatile solvents.	4
4	First aid and principles of First Aid: Primary survey: ABC (Airway, Breathing, Circulation). Qualities of a Good First Aider First aid measures for: - Cuts and scrapes - Bruises - Sprains - Strains - Fractures - Burns - Nosebleeds. First Aid Procedures: Cardiopulmonary Resuscitation (CPR) - Heimlich Maneuver - Applying a sling Sports injuries: Classification (Soft Tissue Injuries - Abrasion, Contusion, Laceration, Incision, Sprain & Strain)	2

Additional Topics

- Need and Importance of Physical Education and its relevance in interdisciplinary context. Understanding of the Endocrine System
- Developing a fitness profile
- Healthy foods habits for prevention and progression of Lifestyle Diseases. Processed foods and unhealthy eating habits.
- Depression - Anxiety - Stress
- Different ways of carrying an injured person. Usage of Automated external defibrillator

Course Assessment Method (CIE: 40 Marks)

Continuous Internal Evaluation Marks (CIE):

Activity Evaluation	Case Study/Micro project/Presentation	Total
25	25	50

Course Outcomes (Cos)

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

CO No.	Description	Blooms Knowledge Level (KL)
CO1	Explain the different human body systems and describe various types of physical activities along with methods to measure and quantify these activities	2
CO2	Explain how to maintain or improve health and wellness through psychological practices, dietary habits, and sports activities.	2
CO3	Discuss about common hypokinetic disorders and musculoskeletal disorders, and describe the importance of leading a healthy lifestyle through the practice of yoga and abstaining from addictive substances.	2
CO4	Explain the basics of first aid and describe common sports injuries	2
CO5	Demonstrate endurance through physical activity	3

Note: K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyse, K5 – Evaluate, and K6 – Create

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1				2		3	3	3	2		2
CO2				2		3	2	2			2
CO3				0		3	3				2
CO4				2		3					2
CO5				2		3	3	3			2

Text Books

Sl. No.	Title of the Book	Name of the Author(s)	Name of the Publisher	Edition and Year
1	Foundations of Nutrition	Bhavana Sabarwal	Commonwealth Publishers	1999
2	Anatomy and physiology in health and illness.	Ross and Wilson	Waugh, A., & Grant, A.	2022

Reference Books

Sl. No.	Title of the Book	Name of the Author(s)	Name of the Publisher	Edition and Year
1	Fit to be Well Essential Concept	Thygerson, A. L., Thygerson, S. M., & Thygerson, J. S.	Jones & Bartlett Learning.	2018
2	Introduction to physical education, fitness, and sport	Siedentop, D., & Van der Mars, H.	Human kinetics.	2022
3	Substance Use Disorders. Manual for Physicians.	Lal, R., & Ambekar, A. (2005).	National Drug Dependence Treatment Centre, New Delhi	2005
4	The exercise health connection-how to reduce your risk of disease and other illnesses by making exercise your medicine.	Nieman, D. C., & White, J. A	Public Health	1998
5	ACSM's resource manual for guidelines for exercise testing and prescription.	Lippincott Williams & Wilkins.	American College of Sports Medicine.	2012
6	Exercise Physiology: energy, nutrition and human performance.	Katch, F. I., Katch, V. L., & McArdle, W. D.	Lippincott Williams & Wilkins	2010

Continuous Internal Evaluation Marks (CIE): for the Health and Wellness Course

Students will be evaluated as follows,

Title	Method of Evaluation
Activity Evaluation	It will be evaluated based on the Fitness Protocols and Guidelines for ages 18+ to 65 years, as set forth by FIT India. Measurements will be taken for all the tests of the FIT India Fitness Protocol and the evaluation will be based on the benchmark score received for the following tests: 1. V Sit Reach Test 2. Partial Curl Up - 30 seconds 3. Push Ups (Male) and Modified Push Up (Female) 4. Two (2) Km Run/Walk Students who achieve a total benchmark score of 8 across the aforementioned 4 tests will be awarded pass marks for activity evaluation. Students who score better will be awarded a maximum mark of 20.

Case Study/Micro project/Presentation	Case studies will be given to students to assess their understanding of the subjects taught. Students will be required to make presentations on the subjects taught in class, and their understanding of the subjects will be assessed. Based on the case studies, micro projects, and Presentations the students will be awarded marks out of 30.
Activity Evaluation – Special Circumstances	Physically challenged and medically unfit students can opt for an objective test to demonstrate their knowledge of the subjects taught. Based on their performance in the objective test, they will be awarded marks out of 20.
Activity Evaluation - Special Considerations - NCC	Students who enrolled themselves in the NCC during the course period (between the start and end dates of the program) and attended 5 college level parades will be awarded pass marks for activity evaluation. Students who attend more parades will be eligible for a maximum mark of 20 based on their parade attendance.

