Vivekanand Education Society's

Institute of Technology

(An Autonomous Institute Affiliated to University of Mumbai, Approved by AICTE & Recognized by Govt. of Maharashtra)

Syllabus Approved By:

Academic Council of V.E.S. Institute of Technology

First year Bachelor of Technology

Preamble

Engineering education forms the cornerstone of technological innovation, industrial advancement, and societal transformation. As the world navigates an era of rapid change driven by automation, artificial intelligence, sustainable technologies, and global connectivity, VESIT positions itself as a catalyst for cultivating a dynamic learning ecosystem.

At VESIT, we strive to foster critical thinking, technical expertise, academic excellence, and holistic development among aspiring engineers. We are committed to shaping professionals who are adaptable, collaborative and are also deeply conscious of their social and environmental responsibilities.

Leveraging its autonomous status and affiliation with the University of Mumbai, VESIT designs a forward- thinking, outcome-based curriculum that emphasizes industry relevance and experiential learning.

The syllabus at VESIT has been structured in alignment with the principles of the National Education Policy (NEP) 2020, focusing on flexibility and multidisciplinary learning. The key thrust areas of education at VESIT include:-

Student-Centric Approach:

The programme is designed to offer students greater autonomy in shaping their academic journey. The syllabus comprises Core **(Major) and Minor courses** from Diverse Disciplines as well as a wide range of **Open Electives**. Students can tailor their learning paths based on their interests and career aspirations. The curriculum also integrates mentored field projects and on the job training, providing valuable hands- on experience. Additionally, students with a research inclination can also explore **research-based projects** or pursue **Honours by Research.**

First year Bachelor of Technology

Multidisciplinary Approach:

VESIT's curriculum reflects a strong interdisciplinary focus, incorporating emerging fields and cutting-edge technologies. Courses are designed to bridge various domains with offerings such as **Machine learning, Artificial Intelligence & Data Science, Cyber Security, Geographic Information Systems (GIS), Internet of Things (IoT), Register transfer level VLSI, Robotics, Quantum Technologies, Mobile application development, Industrial Automation, Edge Computing and Embedded Intelligence and Information Security.**

This approach encourages broader thinking and prepares students for diverse career paths.

Emphasis on Conceptual Clarity:

The curriculum lays stress also on a strong theoretical foundation, ensuring that students gain deep conceptual understanding, which is essential for mastering advanced topics and solving real-world problems.

Fostering Creativity and Critical Thinking:

Courses are designed to nurture a critical and creative mindset, promoting analytical reasoning, problem- solving, and innovation. Students are encouraged to question, explore, and think beyond conventional solutions.

Comprehensive Evaluation and Assessment:

Student performance is assessed through a number of assessment tools that includes the Mid-term Tests, Continuous Assessments, End-Semester Examinations. These evaluation tools are designed to measure the knowledge retention of students as well as their ability to apply concepts effectively in practical situations.

Guided by a vision of excellence and inclusivity, and supported by a passionate faculty, VESIT aspires to be a hub where ideas flourish, startups emerge, and industry-academia partnerships thrive. Our goal is to transform students into innovators, entrepreneurs, researchers and responsible leaders poised to drive sustainable growth and meaningful change in society.

Dr. J M Nair	Dr. M Vijayalakshmi	Dr. Mrs. Gresha S Bhatia
Principal, VESIT	Vice Principal, VESIT	Academic Coordinator, VESIT

VIVEKANAND EDUCATION SOCIETY'S
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First year Bachelor of Technology

Summary

2026-27								
R26 (A.Y. 2026-27)	Credit	Examination Marks	Credit	Examination Marks	Credit	Examination Marks	Credit	Examination Marks
	Group A	Group A	Group B	Group B	Group B	Group B	Group B	Group B
	CMPN, INFT	CMPN ,INFT	AI &DS	AI &DS	EXTC	EXTC	ECS & AURO	ECS & AURO
Sem 1	22	545	18	440	18	440	21	540
Sem 2	20	540	24	645	24	645	21	545

Change/ Update in R26 syllabus (A.Y. 2026-27 Batch)

- For A.Y 2026-27 , Mathematics syllabus is designed as per branch requirement and will be different for all branches.Credit for Mathematics course is increased from 3 Credit (2Th+1Tut) to 4 Credit (3Th+1Tut)
- For A.Y 2026-27 ,"Engineering Physics"(3 Credit -2T+1P) and "Engineering Chemistry" (3 Credit-2T+1P) has been combined under the subject " Engineering Sciences" (5 Credit-4T+1P)
- For A.Y 2026-27 ," Biology for Engineers" (2 credit-2T) subject has been removed from all the branches and some contents has been included in the subject" Engineering Sciences" for CMPN, INFT, AI & DS and AURO branches.
- For A.Y 2026-27 ," Engineering Mechanics"(3 Credit-3T) has been removed from CMPN, INFT and AI &DS branches and will be replaced by subject " Programming in C" (3 Credit -2T+1P)(CMPN and INFT) and " Problem Solving with Python"(3 Credit -2T+1P) (AI & DS)and kept for EXTC, ECS and AURO Branches with 3Credit-3T.
- For A.Y 2026-27 ," Fundamentals of Vedic Mathematics (FVM) which was taught to both groups in single semester , will be now taught in Sem 1 (Group B) and Sem 2 (Group A)
- For A.Y 2026-27 ,"Engineering Drawing" (2 DH+2 AutoCAD) which was placed under the Engineering Sciences Course bucket has been changed to the Vocational/Skill

First year Bachelor of Technology

	Enhancement Course bucket under the new name " Engineering Visualization Lab"(2 DH+2 AutoCAD). • **Nomenclature has been changed for the following subjects :-**

Sem 1	**All Branches**	**Fundamentals of Engineering Mathematics-1 (FEM-1)**	**Mathematics-1 (M-1)**
Sem 2	**All Branches**	**Fundamentals of Engineering Mathematics-2 (FEM-2)**	**Mathematics-2 (M-2)**
Sem 1 & 2	**All Branches**	**Fundamentals of Programming(Java)**	**Fundamentals of Programming: Object Oriented Programming Methodology - Java Programming**
Sem 1 & 2	**All Branches**	**Engineering Drawing**	**Engineering Visualization Lab**
Sem 1 & 2	**All Branches**	**Engineering Physics & Engineering Chemistry**	**Engineering Sciences**

2025-26				
R24 (A.Y. 2025-26)	**Credit**	**Credit**	**Examination Marks**	**Examination Marks**
	Group A	**Group B**	**Group A**	**Group B**
	CMPN, INFT	**EXTC,ETCS AU & RO,AI & DS**	**CMPN ,INFT**	**EXTC,ETCS, AU & RO,AI & DS**
Sem 1	**20**	**22**	**565**	**665**
Sem 2	**22**	**20**	**745**	**645**
Change/ Update in R24 syllabus (A.Y. 2025-26 Batch)	• **No change** • **Same syllabus and scheme of R24 is continued for A.Y. 2025-26 Batch**			
2024-25				
R24 (A.Y. 2024-25)	**Credit**	**Credit**	**Examination Marks**	**Examination Marks**
	Group A	**Group B**	**Group A**	**Group B**
	CMPN, INFT	**EXTC,ETCS AU & RO,AI & DS**	**CMPN ,INFT**	**EXTC,ETCS, AU & RO,AI & DS**
Sem 1	**20**	**22**	**565**	**665**
Sem 2	**22**	**20**	**745**	**645**
Change/ Update in R24 syllabus (	• **Syllabus updation for Vedic Mathematics (Sem 1), Biology for Engineers(Sem 1 & Sem 2), Mathematics(Sem1 & Sem 2), Physics (Sem 1 & Sem 2)**			

First year Bachelor of Technology

A.Y. 2024-25 Batch)

- **Nomenclature has been changed for the following subjects :-**

Sem 1	**Matrices and Differential Calculus (MDC)**	**Fundamentals of Engineering Mathematics-1 (FEM-1)**
Sem 2	**Integral Calculus and Complex Numbers(ICC)**	**Fundamentals of Engineering Mathematics-2 (FEM-2)**
Sem 1 & 2	**C-Programming**	**Fundamentals of Programming(C /Java)**

- **Programme Core course(PCC) scheme has been changed from (1Th+2 hr Pr) to (02+02*) with the same credit of 2 and Instructions should be conducted for the entire class.Due to this change, 25 marks of Teamwork of PCC from the total weightage of Group B (Sem 1) and Group A(Sem 2) will be deducted.**
- **Python Programming Lab is shifted from first year to second year, due to this change 25 marks of Termwork of subject from the total weightage of Group B (Sem 1) and Group A(Sem 2) will be deducted.**

First Year Bachelor of Technology
(F.Y. B. Tech)
Syllabus

NEP Scheme

2026-27

Group B

Branch: Electronics &

Telecommunication Engineering

Semester: I & II

First year Bachelor of Technology

INDEX

First year Bachelor of Technology

Group B
Branch: Electronics and Telecommunication Engineering(EXTC)
Teaching & Credit Scheme for Autonomous Programme 2026-27

Semester I - Teaching Scheme									
Course Type	Course code	Course Name	Teaching Scheme (Contact hrs)			Credits Assigned			
			Th	Pr	Tut	Th	Pr	Tut	Total
Basic Science Course (BS)	26ETBS11	Mathematics-1	03	--	01	03	--	01	04*
Engineering Science Course (ES)	26ETES11	Fundamentals of Programming -C	03	02	–	03	01	--	04*
Programme Core Course (PC)	26ETPC11	Programme Core Course- Digital System	02	–	–	02	–	–	02*
Indian Knowledge System (IK)	26ETIK11	Fundamentals of Vedic Mathematics	02	--	–	02	--	--	02
Value Education (VE)	26VE11	Universal Human Values-1	02	--	--	02	--	--	02
Vocational/Skill Enhancement course (VS)	26ETVS11	Basic Workshop Practice	–	04	–	–	02	–	02
Co curricular Activity (CC)	26CC11	Co curricular Course -I	--	04	--	–	02	--	02
Total Credit									18

26ETPC11- Programme Core Course for EXTC-Digital System

Note: * indicates theory paper

Total credits sem I =18

Semester I -Examination Scheme								
Course Type	Course Code	Course Name	Theory			TW	Pr/Oral	Total
			MT	CA	ESE			
Basic Science Course (BS)	26ETBS11	Mathematics-1	20	20	60	–	–	100
Engineering Science Course (ES)	26ETES11	Fundamentals of Programming -C	20	20	60	25	–	125
Programme Core Course (PC)	26ETPC11	Programme Core Course- Digital System	20	20	60	–	–	100
Indian Knowledge System (IK)	26ETIK11	Fundamentals of Vedic Mathematics	–	20	–	–	–	20
Value Education (VE)	26VE11	Universal Human Values-1	–	20	–	–	–	20
Vocational/Skill Enhancement course (VS)	26ETVS11	Basic Workshop Practice	–	–	–	50	–	50
Co curricular Activity (CC)	26CC11	Co curricular Course -I	–	–	–	–	25	25
Total								440

First year Bachelor of Technology

Detailed Syllabus

Semester I

First year Bachelor of Technology

Subject :Mathematics-I

Teaching Scheme								
Course Code	Course Name	(Teaching Hours)			Credits Assigned			
		Th	Pr	Tut	Th	Pr	Tut	Total
26ETBS11	Mathematics-I	3	-	1*	3	-	1*	4

Mathematics-I (Theory)

Teaching Scheme								
Course Code	Course Name	(Teaching Hours)			Credits Assigned			
		Th	Pr	Tut	Th	Pr	Tut	Total
26ETBS11	Mathematics-I	3	-	1*	3	-	1*	4

Examination Scheme								
Course Code	Course Name	Theory			Exam Duration (in Hrs)	Term Work	Practical & Oral	Total
		Internal Assessment		ESE				
		MT	CA					
26ETBS11	Mathematics-I	20	20	60	2	-	-	100

***Tutorial is conducted batch-wise**.

Course Objectives:

The course aims to develop mathematical and computational skills in linear algebra, calculus, discrete mathematics, numerical methods, differential equations, and graph theory for AI and Data Science applications. It enables students to apply these concepts in data representation, dimensionality reduction, optimization, machine learning, network analysis, and computational problem solving.

Course Outcomes:

After successful completion of the course, students will be able to:

CO 1 Apply matrix operations and solve systems of linear equations using linear algebra techniques.

CO 2 Analyze vector spaces and compute eigenvalues and eigenvectors for mathematical and data science applications.

CO 3 Use differential and multivariable calculus techniques for optimization and function analysis.

CO 4 Apply logic, set theory, and algebraic structures in computational problem solving.

CO 5 To understand logic, sets, functions, binary operations, semigroups, and groups and apply them to solve problems.

CO 6 Analyze relations, graphs, and recurrence models for discrete structures and algorithmic applications.

First year Bachelor of Technology

Module	Content	CO	Hrs.
Prerequisite:	Algebraic manipulation, Coordinate geometry, Basic vector algebra, Exponential and logarithmic functions, Trigonometric identities, Infinite series, Complex numbers, Set theory, Differential calculus, Integral calculus, Matrices.		
1	**Complex Number and Functions**	**CO1**	**06**
	1.1 Complex numbers, polar and exponential form, DeMovire's theorem, roots of complex numbers. **1.2** Functions of complex variables, exponential, hyperbolic, circular, logarithmic and inverse.		
2	**Vector Algebra and Functions**	**CO2**	**05**
	2.1 Scalars and vectors, Addition and subtraction of vectors, Dot product (scalar product), Cross product (vector product). **2.2** Vector-valued functions, Limits and continuity, Differentiation of vector functions, Tangent and normal vectors.		
3	**Partial Differentiation**	**CO 3**	**07**
	3.1 Functions of several variables, Partial derivatives, Total derivatives, Chain rule **3.2** Gradient, Divergence, and Curl: Gradient of a scalar field, Directional derivative, Surface normal, Divergence of a vector field, Curl of a vector field, Physical interpretation, Solenoidal and irrotational fields.		
4	**Coordinate Systems**	**CO 4**	**08**
	4.1 Introduction to coordinate systems, Cartesian coordinate system in two and three dimensions, Polar coordinate system, Cylindrical coordinate system, Spherical coordinate system, Conversion between Cartesian, polar, cylindrical, and spherical coordinates, Coordinate surfaces and curves. **4.2** Distance formula and direction cosines, Representation of points and vectors in different coordinate systems, Unit vectors in Cartesian, cylindrical, and spherical coordinates, Jacobians and coordinate transformations, Applications of coordinate systems in geometry and vector calculus.		
5	**Differential Equations -I**	**CO 5**	**06**
	5.1 First order equations (linear and nonlinear) **5.2** Exact differential equation **5.3** Solution of non-exact equations by integrating factors **5.4** Equations reducible to linear.		
6	**Differential Equations -II**	**CO 6**	**07**
	6.1 Higher order linear differential equations with constant coefficients **6.2** Homogeneous and Non homogeneous Differential Equation **6.3** Solution by operator D **6.4** Method of variation of parameters.		
	Total No. of Hours		**39**

First year Bachelor of Technology

Textbooks

1. B. S. Grewal, Higher Engineering Mathematics, 45th Edition, 2024, Khanna Publishers.
2. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 6th Edition, Narosa Publishing House.

Reference Books

1. Erwin Kreyszig, Advanced Engineering Mathematics, 11th Edition (Indian Adaptation), Wiley India, 2025
2. H.K. Dass – Engineering MathematicsH. K. Dass, Engineering Mathematics, 23rd Edition, S. Chand Publishing, 2024.
3. N. P. Bali and Manish Goyal, A Textbook of Engineering Mathematics, 14th Edition, Laxmi Publications.
4. N. P. Bali and Manish Goyal, A Textbook of Engineering Mathematics, 14th Edition, Laxmi Publications.

Useful Links:

- https://nptel.ac.in/courses/1.com
- https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_ma133

MIT OpenCourseWare

- https://ocw.mit.edu/courses/18-06-linear-algebra-spring-2010/?utm.com
- https://ocw.mit.edu/courses/18-03sc-differential-equations-fall-2011/?utm.com

Internal Assessment

Assessment consists of one Mid Term Test of 20 marks and Continuous Assessment of 20 marks.

The Mid Term Test is to be conducted when approximately 50% syllabus is completed and its duration will be one hour.

Continuous Assessment:

The assessment rubrics will be finalized with the approval of the subject teacher. Three rubrics will be selected from the list below, and the best two scores will be considered for the final assessment.

Sr.No	Rubrics	Marks
1	Multiple Choice Questions/ Quiz	5 Marks
2	Problem-solving assignments	10 Marks
3	Case Study / Presentation	10 Marks
4	Statistical Data Analysis	10 Marks

First year Bachelor of Technology

5	Tutorials/ Class tests	10 Marks
6	MOOC / NPTEL Certification	10 Marks
7	Peer Review and Participation	5/10 Marks
8	GATE Based Assignments / Tutorials	10 Marks
9	Group problem-solving activities	10 Marks

End Semester Theory Examination:

- The question paper will be of 60 marks.
- There will be a total of five questions.
- All questions have equal weightage and carry 20 marks each.
- Any three questions out of five need to be solved.
- The duration of the **ESE** will be **two hours**.

First year Bachelor of Technology

Subject : Fundamentals of Programming: C

Teaching Scheme								
Course Code	Course Name	(Teaching Hours)			Credits Assigned			
		Th	Pr	Tut	Th	Pr	Tut	Total
26ETES11	Fundamentals of Programming: C	3	2	-	3	1	-	4

Fundamentals of Programming: C
(Theory)

Teaching Scheme								
Course Code	Course Name	(Teaching Hours)			Credits Assigned			
		Th	Pr	Tut	Th	Pr	Tut	Total
26ETES11	Fundamentals of Programming: C	3	-	-	3	-	-	3

Examination Scheme								
Course Code	Course Name	Theory			Exam Duration (in Hrs)	Term Work	Practical & Oral	Total
		Internal Assessment		ESE				
		MT	CA					
26ETES11	Fundamentals of Programming: C	20	20	60	2	-	-	100

Course Objectives:

1. To learn the fundamentals of computers and algorithms.
2. To understand various steps in program development and control structures.
3. To understand the concept of functions in C programming.
4. To understand usage of arrays and strings in C language.
5. To understand usage of Structures and Union in C language.
6. To understand the concept of pointers and dynamic memory allocation

Course Outcomes:

After successful completion of the course students will be able to:

CO1 To formulate simple algorithms for arithmetic and logical problems and translate them into programs in C language.
CO2 To implement conditional branching and iteration
CO3 To decompose problem into functions and synthesize complete program
CO4 To implement usage of arrays and strings in C language.
CO5 To implement usage of Structures and Union in C language.
CO6 To comprehend pointer concepts and dynamic memory allocation

First year Bachelor of Technology

Module	Contents	CO's	Hrs
Prerequisite	Fundamentals of programming language		
1	**Introduction, Fundamental of C Programming.** Introduction to components of a Computer System. Introduction to Algorithm and Flowchart ● Keywords, Identifiers, Constants and Variables. ● Expression and In-built functions. ● Datatype and Operators in C. ● Expressions and Precedence of Operators. ● In- built Functions, Pre-processor Directives, library, Header Files.	**CO 1**	**6**
2	**Control Structure, Branching and looping structures.** Introduction to Control Structures. ● If statement, If-else statement, Nested if-else, else-if Ladder. ● Switch statement ● For loop, while loop, do while loop ● Break, continue and go to statements	**CO 2**	**7**
3	**Functions** ● Introduction to functions. ● Function prototype, Function definition, accessing a function and parameter passing: Call by Value and Call by reference. ● Recursive function.	**CO3**	**5**
4	**Array and Strings** ● Introduction to Arrays. ● Declaration and initialization of one. dimensional and two- dimensional arrays. ● Definition and initialization of String. ● String functions.	**CO 4**	**7**
5	**Structure and Union** ● Concept of Structure and Union. ● Declaration and Initialization of structure and union. ● Nested structures. ● Array of Structures .	**CO 5**	**6**
6	**Pointers** ● Fundamentals of pointers ● Declaration, initialization and dereferencing of pointers. ● Concept of dynamic memory allocation.	**CO 6**	**8**
Total			**39**

First year Bachelor of Technology

Textbooks

- E. Balaguruswamy, Programming in ANSI C, McGraw-Hill - 9th Edition
- Kernighan , Ritchie, "The C programming Language", Prentice Hall of India- 2nd Edition
- Sumitabha Das, Computer Fundamentals and C Programming, McGraw-Hill - 1st Edition
- Pradeep Day and ManasGosh ,"Programming in C", Oxford University Press. - 2nd Edition

Reference books

- Byron Gottfried, "Programming with C", McGraw Hill (Schaum"s outline series)
- KanetkarYashwant," "Let Us C", BPB Publication.

Internal Assessment:

Assessment consists of one Mid Term Test of 20 marks Mid Term test is to be conducted when approx. 50% syllabus is completed Duration of the midterm test shall be one hour.

Continuous Assessment:

Continuous Assessment **is of 20 marks.** The rubrics for assessment will be considered on approval by the subject teachers. -

Sr. No.	Rubrics	Marks
1	Certificate course for 4 weeks or more: NPTEL/ Coursera/ Udemy/any MOOC	10 marks
2	Wins in the event/competition/hackathon	10 marks
3	Content beyond syllabus presentation	10 marks
4	Creating Proof of concept	10 marks
5	Mini Project / Extra Experiments/ Virtual Lab	10 marks
6	Certificate course for 4 weeks or more: NPTEL/ Coursera/ Udemy/any MOOC	10 marks
7	Wins in the event/competition/hackathon	10 marks
8	GATE Based Assignment test/Tutorials etc	10 marks
9	Participation in event/workshop/talk / competition followed by small report and certificate of participation relevant to the subject (in other institutes)	05 marks
10	Multiple Choice Questions (Quiz)	05 marks
11	Peer Review and participation the marks can be left blank (with discretion of faculty)	05 Marks

End Semester Theory Examination

- The question paper will be of 60 marks.
- The question paper will have a total of five questions.
- All questions have equal weightage and carry 20 marks each.
- Any three questions out of five need to be solved.

First year Bachelor of Technology

Fundamentals of Programming: C (Laboratory)

Teaching Scheme								
Course Code	Course Name	(Teaching Hours)			Credits Assigned			
		Th	Pr	Tut	Th	Pr	Tut	Total
26ETES11	Fundamentals of Programming: C	-	2	-	-	1	-	1

Examination Scheme								
Course Code	Course Name	Theory			Exam Duration (in Hrs)	Term Work	Practical & Oral	Total
		Internal Assessment		ESE				
		MT	CA					
26ETES11	Fundamentals of Programming: C	-	-	-	-	25	-	25

Lab Objectives: The course aims:

1	To learn the fundamentals of computers and algorithms.
2	To understand various steps in program development and control structures.
3	To understand the concept of functions in C programming.
4	To understand usage of arrays and strings in C language.
5	To understand usage of Structures and Union in C language.
6	To understand the concept of pointers and dynamic memory allocation

Lab Outcomes: Students will be to

LO1	To formulate simple algorithms for arithmetic and logical problems and translate them into programs in C language.
LO2	To implement conditional branching and iteration
LO3	To decompose problem into functions and synthesize complete program
LO4	To implement usage of arrays and strings in C language.
LO5	To implement usage of Structures and Union in C language.
LO6	To comprehend pointer concepts and dynamic memory allocation

Suggested Experiments Students are required to complete at least 10 experiments.		**LO's**
Sr.No.	**Name of the Experiment**	
1	Implementation of Basic C Programs using Data Types, Operators and Expressions	**LO 1**
2	implementation of C Programs using Standard Input/Output and In-built Functions .	**LO 1**
3	Implementation of Decision-Making Programs using if, if-else, Nested if and else-if Ladder	**LO 2**
4	Implementation of Menu-Driven Programs using switch-case	**LO 2**

First year Bachelor of Technology

5	Implementation of Iterative Programs using for, while and do-while Loops	**LO 2**
6	Implementation of Programs using break, continue and goto Statements	**LO 2**
7	Implementation of User-Defined Functions with Different Parameter Passing Techniques	**LO 3**
8	Implementation of Recursive Functions for Solving Computational Problems	**LO 3**
9	Implementation of One-Dimensional and Two-Dimensional Array Operations	**LO 4**
10	Implementation of String Manipulation Programs using Standard String Functions	**LO 4**
11	Implementation of Programs using Structures and Array of Structure	**LO 5**
12	Implementation of Programs using Union and Comparison with Structure	**LO 5**
13	Implementation of Programs using Pointers and Pointer Arithmetic	**LO 6**
14	Implementation of Dynamic Memory Allocation using Pointers	**LO 6**

Note: Suggested List of Experiments is indicative. However, flexibility lies with individual course instructors to design and introduce new, innovative and challenging experiments, (limited to maximum 30% variation to the suggested list) from within the curriculum, so that the fundamentals and applications can be explored to give greater clarity to the students and they can be motivated to think differently.

Term Work:

1. Term work should consist of at least 10 experiments.(targeting all CO's)
2. The final certification and acceptance of term work ensures satisfactory performance of laboratory work and minimum passing marks in term work.
3. **Total 25 Marks**
   - 15 Marks- Program Execution
     - The Program must be successfully executed and demonstrated on the scheduled laboratory day.
     - If the program is *** not demonstrated on the scheduled day, it will be evaluated in the next lab session for a maximum of 10 marks.**
   - Write-up Quality and Content - 4 Marks
   - Timely Submission - 2 Marks
   - Viva- 4 Marks

First year Bachelor of Technology

Subject : Programme Core Course- Digital System

Teaching Scheme								
Course Code	Course Name	(Teaching Hours)			Credits Assigned			
		Th	Pr	Tut	Th	Pr	Tut	Total
26ETPC11	Programme Core Course- Digital System	02	-	-	02	-	-	02

Programme Core Course- Digital System (Theory)

Teaching Scheme								
Course Code	Course Name	(Teaching Hours)			Credits Assigned			
		Th	Pr	Tut	Th	Pr	Tut	Total
26ETPC11	Programme Core Course- Digital System	02	-	-	02	-	-	02

Examination Scheme								
Course Code	Course Name	Theory			Exam Duration (in Hrs)	Term Work	Practical & Oral	Total
		Internal Assessment		ESE				
		MT	CA					
26ETPC11	Programme Core Course- Digital System	20	20	60	2	-	-	100

Course Objectives:

1 To understand number system representations and their inter-conversions used in digital electronic circuits.

2 To analyze digital logic processes and to implement logical operations using various combinational logic circuits.

3 To analyze, design and implement logical operations using various sequential logic circuits.

Course Outcomes:

CO1 To understand types of number systems, digital logic, digital circuits and logic families.

CO2 To analyze, design and implement combinational logic circuits.

CO3 To analyze, design and implement sequential logic circuits.

CO4 To develop a digital logic and apply it to solve real life problems.

First year Bachelor of Technology

Module		Content	COs	Hrs
1		**Number Systems and Codes**	**CO1**	**4**
	1.1	Review of Binary, Octal and Hexadecimal Number Systems, their inter-conversion, Binary code, Gray code and BCD code		
2		**Logic Family and Logic Gates**	**CO2**	**4**
	2.1	Digital logic gates, Universal gates, Realization using NAND and NOR gates, Boolean Algebra, De Morgan's Theorem		
3		**Combinational Logic Circuits**	**CO3**	**10**
	3.1	SOP and POS representation, K-Map up to four variables for minimization of logic expressions		
	3.2	Arithmetic Circuits: Half adder, Full adder, Half Subtractor, Full Subtractor, Carry Look ahead adder and BCD adder		
	3.3	Multiplexer and Demultiplexer: Multiplexer operations, Boolean function implementation using MUX, DEMUX and basic gates, Decoder		
4		**Sequential Logic Circuits**	**CO4**	**8**
	4.1	Flip flops: RS, JK, Master slave flip flops; T & D flip flops with various triggering methods, Conversion of flip flops		
	4.2	Counters: Asynchronous and Synchronous counters with State transition diagram		
		Total		**26**

Textbooks:

1 John F. Warkerly, *"Digital Design Principles and Practices"*, Pearson Education, Fifth Edition (2018).

2 Morris Mano, Michael D. Ciletti, *"Digital Design"*, Pearson Education, Fifth Edition (2013).

3 R. P. Jain, *"Modern Digital Electronics''*, Tata McGraw Hill Education, Fourth Edition (2010).

4 A. Anand Kumar, *"Fundamentals of Digital Circuits"*, PHI, Fourth Edition (2016).

5 Volnei A. Pedroni, *"Digital Electronics and Design with VHDL",* Morgan Kaufmann Publisher, First Edition (2008).

6 Stephen Brown & Zvonko Vranesic, *"Fundamentals of Digital Logic with Verilog Design*", Third Edition, MGH (2014).

Reference Books:

1 Thomas L. Floyd, *"Digital Fundamentals"*, Pearson Prentice Hall, Eleventh Global Edition (2015).

First year Bachelor of Technology

2 Mandal, *"Digital Electronics Principles and Applications"*, McGraw Hill Education, First Edition (2010).

3 Ronald J. Tocci, Neal S. Widmer, Gregory L. Moss, *"Digital Systems Principles and Applications"*, Ninth Edition, PHI (2009).

4 Donald P. Leach, Albert Paul Malvino, Gautam Saha, *"Digital Principles and Applications"*, The McGraw Hill, Eight Edition (2015).

5 Stephen Brown & Zvonko Vranesic, *"Fundamentals of Digital Logic Design with VHDL"*, Second Edition, TMH (2009).

Internal Assessment:
Assessment consists of one Mid Term Test of 20 marks Mid Term test is to be conducted when approx. 50% syllabus is completed Duration of the midterm test shall be one hour.

Continuous Assessment:
Continuous Assessment **is of 20 marks.** The rubrics for assessment will be considered on approval by the subject teachers. The assessment tools can be any 2 or max 4 out of the following:

Sr. No	Rubrics	Marks
1	Certificate course for 4 weeks or more: NPTEL/ Coursera/ Udemy/any MOOC	10 marks
2	Wins in the event/competition/hackathon	10 marks
3	Content beyond syllabus presentation	10 marks
4	Creating Proof of concept	10 marks
5	Mini Project / Extra Experiments/ Virtual Lab	10 marks
6	GATE Based Assignment test/Tutorials etc	10 marks
7	Participation in event/workshop/talk / competition followed by small report and certificate of participation relevant to the subject (in other institutes)	05 marks
8.	Multiple Choice Questions (Quiz)	05 marks

End Semester Theory Examination

- The question paper will be of 60 marks.
- The question paper will have a total of five questions.
- All questions have equal weightage and carry 20 marks each.
- Any three questions out of five need to be solved.

First year Bachelor of Technology

Subject : Fundamentals of Vedic Mathematics

Teaching Scheme								
Course Code	Course Name	(Teaching Hours)			Credits Assigned			
		Th	Pr	Tut	Th	Pr	Tut	Total
26ETIK11	Fundamentals of Vedic Mathematics	02	-	-	02	-	-	02

Fundamentals of Vedic Mathematics
(Theory)

Teaching Scheme								
Course Code	Course Name	(Teaching Hours)			Credits Assigned			
		Th	Pr	Tut	Th	Pr	Tut	Total
26ETIK11	Fundamentals of Vedic Mathematics	02	-	-	02	-	-	02

Examination Scheme								
Course Code	Course Name	Theory			Practical Exam Duration (in Hrs)	Term Work	Practical & Oral	Total
		Internal Assessment		ESE				
		MT	CA					
26ETIK11	Fundamentals of Vedic Mathematics	-	20	-	-	-	-	20

Course Objectives

1. Students will gain an understanding of the origins, history, and philosophy behind Vedic Mathematics, which is based on ancient Indian mathematical techniques found in the Vedas.
2. They will develop skills to perform arithmetic operations such as addition and subtraction quickly and efficiently.
3. They will learn various techniques to perform multiplication with any number of digits using Vedic Sutras and also learn to perform multiplication in algebra to solve equations.
4. They will learn various techniques to find squares and square roots of any number of digits using Vedic Sutras.
5. They will learn various techniques to find cubes, fourth powers, cube roots and fourth roots of any number of digits using Vedic Sutras.

Course Outcomes

CO 1 Students will develop the ability to perform mathematical calculations mentally and quickly using Vedic techniques.

CO 2 Students will enhance their mental math skills and perform arithmetic operations such as addition, subtraction, multiplication and division mentally.

CO 3 They will learn to apply Vedic Sutras and methods to solve a wide range of mathematical problems, including algebraic equations.

CO 4 They will be able to break down complex problems into simpler steps and apply Vedic techniques to arrive at solutions more easily.

CO 5 They will learn alternative approaches and multiple methods to solve mathematical problems, fostering creativity and adaptability in problem-solving.

First year Bachelor of Technology

Module		Content	CO's	Hrs
1		**History and evolution of Vedic Mathematics**	**CO 1**	**1**
	1.1	Historical facts about Vedic Mathematics		
	1.2	Sutras and sub sutras of Vedic Mathematics		
2		**Vedic sutras for addition and subtraction**	**CO 2**	**4**
	2.1	Addition using dot method **(Vedic sutras:Ekadhikenpurvena)**		
	2.2	Addition without carrying **(Vedic sutras: Purnapurnabhyam,sankalan vyavkalanabhyam)**		
	2.3	Subtractions using all from 9 last from 10 **(Vedic sutras:Nikhilam Navatascaramam dasatah, Vinculum method)**		
	2.4	Subtraction using digit separator method (general Method)		
3		**Vedic sutras for multiplication**	**CO 3**	**9**
	3.1	Multiplication by dot and stick method(General Method) **(Vedic sutras:Urdhva triyang [Vertically and crosswise])**		
	3.2	Multiplication when numbers are very close to base (all cases) **(Vedic sutras:Nikhilam Navatashcaramam dashatah)**		
	3.3	Multiplication based on **vedic sutra Antyayordashakepi and Antyayoshatakepi**		
	3.4	Multiplication when numbers are very far from the base (all cases) **(Vedic sutras:Anurupyena)**		
	3.5	Multiplication of three and four numbers		
	3.6	Multiplication by series of 9 and series of 1		
	3.7	Multiplication by observation		
	3.8	Multiplication of binomial equation		
	3.9	Multiplication of algebraic polynomials		
4		**Square and Square Root**	**CO 4**	**6**
	4.1	Vedic Methods of finding squares:- 1. Ekadhikena Purvena 2. Yavadunam Tavduni kritya vargena Yojayet 3. Urdhva Tiryagbhyam 4. Duplex method		
	4.2	Vilokanam and Duplex Vedic Method of finding square root		
5		**Cube ,Cube root, Fourth Power of a number and Fourth root of a number**	**CO 5**	**6**
	5.1	Vedic Methods of finding cubes:- Yavadunam,Anurupyena,Nikhilam		

First year Bachelor of Technology

	5.2	Vilokanam and Beejank for finding the cube root of any number		
	5.3	Pascal triangle, the method of finding the fourth power of a number		
	5.4	Vilokanam method for finding out the fourth root of a number .		
		Total		**26**

Text Books

1. Vedic Mathematics by Jagadguru Sankracharya Bharti Krishna Tirthaji Maharaj
2. The Essentials of Vedic Mathematics by Rajesh Kumar Thakur, Rupa Publication

Reference Books

- Advanced Vedic Mathematics by Rajesh Kumar Thakur, Rupa Publication
- Vedic Mathematics Made Easy by Dhaval Bhatia, Jaico Publishing House
- Vedic Mathematics: Sixteen Simple Mathematical Formulae from the Vedas by Bharti Krishna Tirthaji Maharaj, Motilal Banarsidass Publishers Pvt. Ltd.

Continuous Assessment:

Continuous Assessment is of **20 marks**. The rubrics for assessment will be considered on approval by the subject teachers. The rubrics can be any 2 or max 4 of the following:

Sr. No	Rubrics	Marks
1.	Certificate course for 4 weeks or more: NPTEL/ Coursera/ Udemy/any MOOC	10 marks
2.	Mathematical Puzzle/Problem-Solving Activity – Use of observation and logical thinking	10 marks
3.	Content beyond syllabus presentation	10 marks
4.	Sutra Identification Activity – Selection of appropriate Sutra for a given problem	10 marks
5.	Sutra Based Assignment test/Tutorials etc	10 marks
6.	Participation in event/workshop/talk / competition followed by small report and certificate of participation relevant to the subject (in other institutes)	10 marks
7.	Multiple Choice Questions (Quiz)	10 marks
8.	Comparative Assignment – Vedic method versus conventional method	10 marks
9.	Sutra-Based Assignment – Application of Vedic Sutras	10 marks

First year Bachelor of Technology

Subject : Universal Human Values-I

Teaching Scheme								
Course Code	Course Name	(Teaching Hours)			Credits Assigned			
		Th	Pr	Tut	Th	Pr	Tut	Total
26VE11	Universal Human Values-1 (Theory)	02	-	-	02	-	-	02

Universal Human Values-I (Theory)

Teaching Scheme								
Course Code	Course Name	(Teaching Hours)			Credits Assigned			
		Th	Pr	Tut	Th	Pr	Tut	Total
26VE11	Universal Human Values-1	02	-	---	02	---	---	02
Examination Scheme								
Course Code	Course Name	Theory			Practical Exam Duration (in Hrs)	Term Work	Practical & Oral	Total
		Internal Assessment		ESE				
		MT	CA					
26VE11	Universal Human Values-1	---	20	---	---	---	---	20

Course Objectives

1. Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
2. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence.
3. Strengthening of self-reflection.
4. Development of commitment and courage to act.

Course Outcomes

CO1 Understand self-exploration, natural acceptance, happiness, prosperity and human aspirations.
CO2 Understand the harmony between the Self ('I') and Body, including Sanyam, health and prosperity.
CO3 Understand the Constitution of India, Fundamental Rights, Directive Principles and constitutional remedies.

First year Bachelor of Technology

Module		Content	CO's	Hrs
1	**Course Introduction - Need, Basic Guidelines, Content and Process for Value Education**		CO 1	06
	1.1	Purpose and motivation for the course, recapitulation from Universal Human Values-I		
	1.2	Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' Continuous Happiness and Prosperity-Right understanding		
	1.3	Continuous Happiness and Prosperity-Right understanding		
	1.4	Relationship and Physical Facility		
	1.5	Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario		
	1.6	Method to fulfill the above human aspirations: understanding and living in harmony at various levels.		
2	**Understanding Harmony in the Human Being - Harmony in Myself!**		CO 2	04
	2.1	Understanding human being as a co-existence of the sentient 'I' and the material 'Body'		
	2.2	Understanding the needs of Self ('I') and 'Body' - happiness and physical facility		
	2.3	Understanding the Body as an instrument of 'I' ,Understanding the characteristics and activities of 'I' and harmony in 'I'		
	2.4	Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail		
3	**Introduction : The Constitution of India and Fundamental Rights (NPTEL Video Lecture)**		CO 3	06
	3.1	Introduction to Constitution and Constitutional Law Constitution, Constitutionalism and Constitutional Law Difference between Constitutional law and other laws Types of Constitution Salient Features of the Constitution of India Preamble to the Constitution of India: Its Role, Vision, Interpretation and Amendment		
	3.2	Fundamental Rights and Directive Principles of State Policy 1. Concept of Fundamental Rights vis a vis Directive Principles of State Policy 2. Definition of State and Instrumentalities of State 3. Enumerated Fundamental Rights 4. Enforceability of Fundamental Rights vis -a -vis Directive Principles of State Policy 5. Primacy of Fundamental Rights and Directive Principles of State Policy 6. Constitutional Remedies to derogation of Fundamental Rights		
		Total		**26**

First year Bachelor of Technology

Mode of Conduction

1. Lecture hours are to be used for interactive discussion, placing the proposals about the topics at hand and motivating students to reflect, explore and verify them.
2. practice sessions for analyzing and discussing the topic, help the students explore the important or critical elements.

Continuous Assessment:

Continuous Assessment is of **20 marks**. The rubrics for assessment will be considered on approval by the subject teachers. The rubrics can be any 2 or max 4 of the following:

Sr. No	Rubrics	Marks
1.	Certificate course for 4 weeks or more: NPTEL/ Coursera/ Udemy/any MOOC	10 marks
2.	Case study analysis and presentation	10 marks
3.	Constitutional awareness programme	10 marks
4.	Group discussion/debate on social and ethical issues	10 marks
5.	Poster Presentation on UHV content theme	10 marks
6.	Book Review on UHV content theme	10 marks
7.	Community/social outreach activity with report	10 marks
8.	Case Study Analysis & Presentation	10 marks
9.	Survey/interview on values, happiness, prosperity or social harmony	10 marks

First year Bachelor of Technology

Subject : Basic Workshop Practice

Teaching Scheme								
Course Code	Course Name	(Teaching Hours)			Credits Assigned			
		Th	Pr	Tut	Th	Pr	Tut	Total
26ETVS11	Basic Workshop Practice	-	04	-	-	02	-	02

Basic Workshop Practice

Teaching Scheme								
Course Code	Course Name	(Teaching Hours)			Credits Assigned			
		Th	Pr	Tut	Th	Pr	Tut	Total
26ETVS11	Basic Workshop Practice	-	04	-	-	02	-	02

Examination Scheme								
Course Code	Course Name	Theory			Practical Exam Duration (in Hrs)	Term Work	Practical & Oral	Total
		Internal Assessment		ESE				
		MT	CA					
26ETVS11	Basic Workshop Practice	-	-	-	-	50	-	50

Lab Objectives:

1. To impart training to help the students develop engineering skill sets.
2. To inculcate respect for physical work and hard labor.
3. To get exposure to interdisciplinary engineering domain.

Lab Outcomes:

Students will be able to…

LO 1 Develop the necessary skill required to handle/use different fitting tools.

LO 2 Develop the necessary skill required to handle/use different carpentry tools.

LO 3 Identify and understand the safe practices to adopt in the electrical environment, demonstrate the wiring practices for the connection of simple electrical load/equipment and design, fabricate and assemble PCB.

LO 4 Develop skills required for hardware maintenance, able to install an operating system and system drives and able to identify the network components and perform basic networking and crimping.

First year Bachelor of Technology

Sr No.	Topic	LO's	Hrs.
Trade-1	**Fitting :** Use and setting of fitting tools for chipping, cutting, filing, marking, center punching, drilling, tapping. Term work to include one job involving following operations : filing to size, one simple male-female joint, drilling and tapping.	**LO1**	**14**
Trade-2	**Carpentry :** Use and setting of hand tools like hacksaws, jack planes, chisels and gauges for construction of various joints. Term work to include one carpentry job involving a joint.	**LO2**	**14**
Trade-3	**Basic Electrical workshop:** **House Wiring** Electrical safety in the workplace. Protective equipment and tools. Different types of cables, electrical wiring diagrams, types of circuits, types of switches. Different wiring methods: Godown wiring, Staircase wiring, House wiring, Extension board. **PCB** Design, Layout drawing, Positive and negative film making, PCB etching and drilling, Tinning and soldering technique, component mounting and circuit testing.	**LO3**	**12**
Trade-4	**Hardware and Networking :** Dismantling of a Personal Computer (PC), Identification of Components of a PC such as power supply, motherboard (Chipset), processor, hard disk, memory (RAM, ROM), CMOS battery, CD drive, monitor, keyboard, mouse, printer, scanner, Pen drives disk drives etc. Assembling a Personal Computer. Installation of Operating System (any one), Boot-up sequence and Device drivers. Installation of application software's, Basic Troubleshooting and Maintenance. Identification of network components LAN card, wireless card, switch, hub, router, different types of network cables (straight cables, crossover cables and rollover cables), Basic networking (LAN, WAN, configure IP address etc) and crimping.	**LO4**	**12**
	Total Engagement Hours		**52**

First year Bachelor of Technology

Text Books:

1 Engineering Workshop Practice, Dr. A.K. Sarathe, Khanna Book Publishing, 2021

Reference Books:

1 Elements Of Workshop Technology (Vol. 1: Manufacturing Processes), S. K. Hajra Choudhury, A. K. Hajra Choudhury, and Nirjhar Roy, 17th Edition, Media Promoters & Publishers, 2026

2 Electrical Wiring, Estimating and Costing, Dr. S. L. Uppal and G. C. Garg, Khanna Publishers, 2025

3 The Complete PC Upgrade and Maintenance Guide, Mark Minasi, 16th Edition, Wiley / SybexPublication Year, 2008

Assessment Tool	Rubrics with Marks	Total Marks
Term Work	**Mechanical Workshop:** Fitting Job Submission & Job Sheet Submission - 13 Marks Carpentry Job Submission & Job Sheet Submission - 13 Marks **Basic Electrical workshop:** PCB & House Wiring : 12 Marks **Hardware and Networking :** Oral along with journal submission - 12 Marks	**50 Marks**

First year Bachelor of Technology

Subject : Co-Curricular Course-I

Teaching Scheme								
Course Code	Course Name	(Teaching Hours)			Credits Assigned			
		Th	Pr	Tut	Th	Pr	Tut	Total
26CC11	Co-Curricular Course-I	---	04	---	---	02	---	02

Co-Curricular Course-I
(Practical Activity)

Teaching Scheme								
Course Code	Course Name	(Teaching Hours)			Credits Assigned			
		Th	Pr	Tut	Th	Pr	Tut	Total
26CC11	Co-Curricular Course-I	---	04	---	---	02	---	02
Examination Scheme								
Course Code	Course Name	Theory			Practical Exam Duration (in Hrs)	Term Work	Practical & Oral	Total
		Internal Assessment		ESE				
		MT	CA					
26CC11	Co-Curricular Course-I	---	---	---	---	---	25	25

Social Responsibility, Community Engagement and Student Well-Being

As part of the **First Year curriculum**, students are allotted **25 marks in each semester** for participation in structured social responsibility and community engagement activities. The initiative is designed to extend learning beyond the classroom and encourage students to become responsible, empathetic and socially conscious citizens.

Students participate in a diverse range of activities, including **cleanliness drives on college premises, awareness rallies, tree plantation drives, beach-cleaning campaigns, environmental awareness initiatives, cultural programmes, community outreach activities and other socially relevant projects**. These activities provide students with opportunities to work collaboratively, engage with the community and contribute meaningfully to society.

The programme also incorporates **student well-being and personal development activities**, including courses and workshops on **Yoga, stress management, emotional well-being, mindfulness, self-awareness and healthy lifestyle practices**. Such activities enable students to develop effective coping strategies, emotional balance, self-discipline and a positive approach towards academic and personal challenges.

First year Bachelor of Technology

Through this integrated approach, the initiative promotes **social responsibility, civic engagement, environmental consciousness, teamwork, empathy, self-awareness and holistic well-being**. It supports the institution's commitment to developing well-rounded graduates who are not only technically competent but also socially responsible, emotionally resilient and actively engaged with their community.

Assessment Rubrics:

Sessions from eminent persons on important themes like cyber bullying, cancer awareness,organ donation etc. (5 Marks)

Yoga Course (15 Marks)

https://www.kdhamstudy.com/courses/cyp-course

Mental well being course(5 Marks)

https://www.skillindiadigital.gov.in/courses/detail/482c484d-b0fb-494a-bcfc-838b87abc948?utm

First year Bachelor of Technology

Group B
Branch: Electronics and Telecommunication Engineering(EXTC)
Teaching & Credit Scheme for Autonomous Programme 2026-27

Semester II - Teaching Scheme

Course Type	Course code	Course Name	Teaching Scheme (Contact hrs)			Credits Assigned			
			Th	Pr	Tut	Th	Pr	Tut	Total
Basic Science Course (BS)	26ETBS21	Mathematics-2	03	--	01	03	--	01	04*
Basic Science Course (BS)	26ETBS22	Engineering Sciences	04	02		04	01		05*
Engineering Science Course (ES)	26ETES21	Basic Electrical Engineering	03	02	–	03	01	--	04*
Engineering Science Course (ES)	26ETES22	Engineering Mechanics	03	--	–	03	--	--	03*
Vocational and skill enhancement course (VSEC)	26ETVS21	Engineering visualization lab	–	*02 + 02	–	–	02	--	02
Ability Enhancement Course (AE)	26AE21	Professional Communications and Ethics-I	01	02	--	01	01	--	02
Value Education (VE)	26VE21	Universal Human Values-II	02	--	--	02	--	--	02
Co curricular Activity (CC)	26CC21	Co curricular Course -II	--	04	--	–	02	--	02
Total Credits									24

For Engineering visualization lab 02 (DH)+ *02(AutoCAD) Batchwise
Note: * indicates theory paper
Total credits sem II =24

Semester II -Examination Scheme

Course Type	Course Code	Course Name	Theory			TW	Pr/Oral	Total
			MT	CA	ESE			
Basic Science Course (BS)	26ETBS21	Mathematics-2	20	20	60	–	–	100
Basic Science Course (BS)	26ETBS22	Engineering Sciences	20	20	60	25	–	125
Engineering Science Course (ES)	26ETES21	Basic Electrical Engineering	20	20	60	25	–	125
Engineering Science Course (ES)	26ETES22	Engineering Mechanics	20	20	60	–	–	100
Vocational and skill enhancement course (VSEC)	26ETVS21	Engineering visualization lab	–	–	–	25	25	50
Ability Enhancement Course (AE)	26AE21	Professional Communications and Ethics-I	20	80	–	–	–	100
Value Education (VE)	26VE21	Universal Human Values-II	–	20	–	–	–	20
Co curricular Activity (CC)	26CC21	Co curricular Course -II	–	–	–	–	25	25

First year Bachelor of Technology

Total	**645**

Detailed Syllabus

Semester II

First year Bachelor of Technology

Subject : Mathematics-II

Teaching Scheme								
Course Code	Course Name	(Teaching Hours)			Credits Assigned			
		Th	Pr	Tut	Th	Pr	Tut	Total
26ETBS21	Mathematics-II	3	-	1*	3	-	1*	4

Mathematics-II (Theory)

Teaching Scheme								
Course Code	Course Name	(Teaching Hours)			Credits Assigned			
		Th	Pr	Tut	Th	Pr	Tut	Total
26ETBS21	Mathematics-II	3	-	1*	3	-	1*	4

Examination Scheme								
Course Code	Course Name	Theory			Exam Duration (in Hrs)	Term Work	Practical & Oral	Total
		Internal Assessment		ESE				
		MT	CA					
26ETBS21	Mathematics-II	20	20	60	2	-	-	100

***Tutorial is conducted batch-wise.**

Course Objectives:

To equip students with the mathematical concepts and computational techniques of discrete and integral transforms, and probability and statistics for modeling, analysis, and engineering problem-solving.

Course Outcomes:

After successful completion of the course, students will be able to:

CO 1 Apply Multiple integration techniques in Cartesian, and polar, coordinate systems to solve multivariable integration problems.

CO 2 Apply Laplace transform properties, shifting theorems, differentiation, integration and convolution to transform functions and evaluate engineering problems.

CO 3 Apply inverse Laplace transform techniques, including partial fractions, derivative and convolution properties, to solve initial-value and boundary-value problems involving ordinary differential equations.

CO 4 Analyze periodic continuous-time signals using Fourier series by determining Fourier coefficients, frequency spectra, and applying Fourier series properties to engineering problems.

CO 5 Apply Fourier transform techniques to analyze Aperiodic continuous-time signals, determine their frequency spectra.

CO 6 Analyze discrete-time signals and systems using Z-transform techniques, including ROC, pole-zero analysis, inverse Z-transform methods.

First year Bachelor of Technology

Module	Content	COs	Hrs
1	**Double Integral**	**CO1**	**06**
	1.1 Evaluation of Double integral in cartesian and polar coordinates, Double integral in rectangular and non rectangular region **1.2** Change of order of integration, Change of coordinates from Cartesian to Polar coordinates, Jacobian.		
2	**Laplace Transform-I**	**CO2**	**06**
	2.1 Definition of Laplace transform, unilateral, bilateral, concept of Region of Convergence (ROC), Laplace transform of Heaviside (Unit step) signal, elementary signals (causal, anti-causal, non-causal). Properties–Linearity, scaling, shifting property, multiplication by t, division by t, differentiation in the t-domain, convolution. **2.2** Laplace Transforms of periodic functions, square wave, saw-tooth wave, triangular wave, full and half wave rectifier.		
3	**Laplace Transform-II**	**CO3**	**04**
	3.1 Inverse Laplace transform; Definition and Properties **3.2** Evaluation of inverse Laplace transforms using different methods **3.3** Applications inverse Laplace transform to solve ordinary differential equations.		
4	**Fourier Series**	**CO4**	**07**
	4.1 Definition Of Fourier Series, Conditions for Existence of Fourier Series, Types-Trigonometric Form, Exponential Form **4.2** Fourier series of even and odd functions, Properties of Fourier Series, Relation Between Fourier Coefficients of Trigonometric and Exponential Form.		
5	**Fourier Transform**	**CO5**	**08**
	5.1 Definition Fourier Transform, Fourier Transform of Standard Signals, Frequency Spectrum using Fourier Transform, Properties of Fourier Transform. **5.2** Fourier Transform of aPeriodic Signal, Relation Between Fourier & Laplace Transform.		
6	**Z-Transform**	**CO6**	**08**
	6.1 Definition of Z-transform, Region of Convergence (ROC) , Properties of Z-Transform, Poles and Zeros of Rational Function of z, Representation of Poles and Zeros in z-plane, ROC of Rational Function of z. **6.2** Inverse Z-Transform- Residue Method, Inverse Z-Transform by Partial Fraction Expansion Method, Inverse Z-Transform by Power Series Expansion Method, Relation Between Laplace Transform and Z-Transform.		
	Total No. of Hours		**39**

First year Bachelor of Technology

Textbooks

1. A. Nagoor Kani, *Signals and Systems*, 2nd Edition, McGraw Hill Education (India), 2018.
2. R. K. Jain and S. R. K. Iyengar, *Advanced Engineering Mathematics*, 5th Edition, Narosa Publishing House, 2019.

Reference Books

1. Hwei P. Hsu, *Schaum's Outline of Signals and Systems*, 4th Edition, McGraw-Hill Education, 2020.
2. Herbert Taub, Donald L. Schilling and Goutam Saha, *Taub's Principles of Communication Systems*, 4th Edition, McGraw-Hill Education, 2013.

Useful Links

NPTEL Courses

- https://nptel.ac.in/courses.com
- https://nptel.ac.in/courses/11.com
- https://nptel.ac.in/courses.com

MIT OpenCourseWare

- https://ocw.mit.edu/courses/18-02sc-multivariable-calculus-f.com
- https://ocw.mit.edu/courses/6-041sc-probabilistic-systems-analysis-and-applied-probability-fall-2013.com

Internal Assessment

Assessment consists of one Mid Term Test of 20 marks and Continuous Assessment of 20 marks.
The Mid Term Test is to be conducted when approximately 50% syllabus is completed and its duration will be one hour.

Continuous Assessment:

The assessment rubrics will be finalized with the approval of the subject teacher. Three rubrics will be selected from the list below, and the best two scores will be considered for the final assessment.

Sr.No	Rubrics	Marks
1	Multiple Choice Questions/ Quiz	5 Marks
2	Problem-solving assignments	10 Marks
3	Case Study / Presentation	10 Marks

First year Bachelor of Technology

4	Statistical Data Analysis	10 Marks
5	Tutorials/ Class tests	10 Marks
6	MOOC / NPTEL Certification	10 Marks
7	Peer Review and Participation	5/10 Marks
8	GATE Based Assignments / Tutorials	10 Marks
9	Group problem-solving activities	10 Marks

End Semester Theory Examination:

- The question paper will be of 60 marks.
- There will be a total of five questions.
- All questions have equal weightage and carry 20 marks each.
- Any three questions out of five need to be solved.
- The duration of the **ESE** will be **two hours**.

First year Bachelor of Technology

Subject :Engineering Science

Teaching Scheme								
Course Code	Course Name	(Teaching Hours)			Credits Assigned			
		Th	Pr	Tut	Th	Pr	Tut	Total
26ETBS22	Engineering Science	4	2	–	4	1	–	5

Engineering Sciences (Theory)

Teaching Scheme								
Course Code	Course Name	(Teaching Hours)			Credits Assigned			
		Th	Pr	Tut	Th	Pr	Tut	Total
26ETBS22	Engineering Science	4	–	–	4	–	–	4

Examination Scheme								
Course Code	Course Name	Theory			Exam Duration (in Hrs)	Term Work	Practical & Oral	Total
		Internal Assessment		ESE				
		MT	CA					
26ETBS22	Engineering Science	20	20	60	2	–	–	100

Course Objectives:

To enhance fundamental knowledge in Engineering Sciences for its applications relevant to various streams of Engineering and Technology for solving problems in the engineering field and venturing into the research field.

Course Outcomes:

CO1 Learners will be able to understand the foundation of Maxwell's equations

CO2 Learners will be able to understand the fundamentals of quantum mechanics, semiconductors, and their applications in modern technology and sensing.

CO3 Learners will be able to understand the foundation of fiber optics and their applications in the areas of communication, medical science and instrumentation.

CO4 Learners will be able to understand the wafer fabrication process.

CO5 Learners will be able to understand oxidation, diffusion and implantation processes.

CO6 Learners will be able to understand the thin film deposition, etching and photolithography processes.

First year Bachelor of Technology

Module	Content	COs	No. of Hrs.
1	**Electrodynamics**: Coulomb's law; divergence and curl of electrostatic field; continuous charge distribution; application of Gauss' law for spherical symmetry Divergence of magnetic induction, Biot–Savart law; Ampere's circuit law; Faraday's law of emf, Maxwell's equations	**CO1**	**10**
2	**Semiconductors & Quantum Mechanics**: Band formation and band theory; drift, mobility and conductivity; intrinsic and extrinsic semiconductors; Fermi level concept; Hall effect and applications; P-N junction diode; half-wave and full-wave rectifiers; Bipolar Junction Transistor Introduction to quantum mechanics; wave-particle duality; de Broglie wavelength; wave packet; group velocity and phase velocity; Heisenberg's uncertainty principle; electron diffraction experiment	**CO2**	**12**
3	**Fibre Optics:** Principle of Total Internal Reflection, Construction and basic structure of optical fiber, Types of optical fibers, Numerical Aperture and Acceptance Angle. Basic Optical Fiber Communication Link Biomedical applications of optical fibers and semiconductors.	**CO3**	**4**
4	**Crystal Structure and Wafer Technology:** Crystal structure and growth methods: CZ process and Float zone method, introduction to wafer cleaning.	**CO4**	**7**
5	**Semiconductor fabrication process** Oxidation: Thermal oxidation, dry and wet oxidation, thin and thick film oxide growth, Epitaxial process, Dopant diffusion, ion implantation: electron beam.	**CO5**	**8**
6	**Thin film technology and photolithography:** Thin film deposition-manufacturing methods, Positive and Negative, Photoresists : Working principle, Etching :dry and wet. Introduction to Photolithography, Basic Photolithography Process. Overview of E-beam lithography, X-ray lithography.	**CO6**	**11**
		Total	**52**

Text Book

- Avadhanulu, M. N.; Kshirsagar, P. G.; Murthy, T. V. S. Arun. A Textbook of Engineering Physics, 11th ed.; S. Chand Publishing, New Delhi, 2018.
- Malik, H. K.; Singh, A. K. Engineering Physics, 2nd ed.; McGraw Hill Education, New Delhi, 2017.
- Griffiths, D. J. Introduction to Electrodynamics, 5th ed.; Cambridge University Press, Cambridge, 2023. The 5th edition is the current edition; the 4th edition was published in 2017.
- Plummer, J. D.; Deal, M. D.; Griffin, P. B. Silicon VLSI Technology: Fundamentals, Practice, and Modeling, 1st ed.; Prentice Hall, 2000.

First year Bachelor of Technology

- Schroder, D. K. Semiconductor Material and Device Characterization, 3rd ed.; Wiley-IEEE Press, 2006. Wiley confirms that the 3rd edition was published in 2006.
- May, G. S.; Sze, S. M. Fundamentals of Semiconductor Fabrication, 1st ed.; Wiley, 2007. Wiley identifies it as the 1st edition, August 2007.
- Morris, J. E.; Iniewski, K., Eds. Nanoelectronic Device Applications Handbook, 1st ed.; CRC Press, 2013.

Reference Book

- Beiser, A.; Mahajan, S.; Choudhury, S. R., Concepts of Modern Physics, 8th ed., Tata McGraw Hill Education, New Delhi, 2026.
- Bhattacharya, D. K.; Tandon, P., Engineering Physics, 2nd ed., Oxford University Press, New Delhi, 2015.
- Kittel, C.; McEuen, P., Introduction to Solid State Physics, 9th ed., John Wiley & Sons, 2018.
- Gandhi, S. K., VLSI Fabrication Principles: Silicon and Gallium Arsenide, 2nd ed., John Wiley & Sons, 1994.
- Campbell, S. A., The Science and Engineering of Microelectronic Fabrication, 2nd ed., Oxford University Press, 2001.

Internal Assessment:

1.**Continuous assessments** will be conducted throughout the semester using different evaluation techniques.

2.**Mid Term test** is to be conducted when approx. 50% syllabus is completed. Duration of the midterm test shall be one hour

Continuous Assessment

Continuous Assessment is of 20 marks. The rubrics for assessment will be considered on approval by the subject teachers.

Sr.No	Rubrics	Marks
1	Multiple Choice Questions (Quiz)	5 Marks
2	Tutorial Assignments	10 Marks
3	Case Study / Presentation/POGIL	10 Marks
4	Statistical Data Analysis	10 Marks
5	Mini Project / AI Mathematical Modeling	10 Marks
6	MOOC / NPTEL Certification	10 Marks
7	Peer Review and Participation	5/10 Marks
8	GATE Based Assignments / Tutorials	10 Marks

End Semester Theory Examination:

1. The question paper will be of 60 marks.
2. The question paper will have a total of five questions.
3. All questions have equal weightage and carry 20 marks each.
4. Any three questions out of five need to be solved.

First year Bachelor of Technology

Subject :Engineering Sciences Laboratory

Teaching Scheme								
Course Code	Course Name	(Teaching Hours)			Credits Assigned			
		Th	Pr	Tut	Th	Pr	Tut	Total
26ETBS22	Engineering Science	–	2	–	–	1	–	1

Examination Scheme								
Course Code	Course Name	Theory			Exam Duration (in Hrs)	Term Work	Practical & Oral	Total
		Internal Assessment		ESE				
		MT	CA					
26ETBS22	Engineering Science	-	-	-	-	25	–	25

Lab Objectives

1 To get practical knowledge of the theory learnt and develop experimental skills.
2 To comprehend the importance of precision, accuracy, errors and analyze experimental results.

Course Outcomes:

CO 1 Learners will be able to understand the foundation of Maxwell's equations

CO 2 Learners will be able to understand the fundamentals of quantum mechanics, semiconductors, and their applications in modern technology and sensing.

CO 3 Learners will be able to understand the foundation of fiber optics and their applications in the areas of communication, medical science and instrumentation.

CO 4 Learners will be able to understand the wafer fabrication process.

CO 5 Learners will be able to understand oxidation, diffusion and implantation processes.

CO 6 Learners will be able to understand the thin film deposition, etching and photolithography processes.

Experiments:		**COs**
1	Determination of 'h' using Photo cell.	CO2
2	Determination of energy band gap of a given semiconductor	CO2
3	Determination of Hall coefficient and charge carrier density of a given semiconductor	CO2
4	Study of variation of magnetic field using Helmholtz coil	CO1
5	Determination of Numerical Aperture of a given optical fibre.	CO3

First year Bachelor of Technology

6	Study of variation of reverse current with changing light intensity of given photo diode.	CO2
7	Verification of electromagnetic induction: Faraday's law	CO1
Virtual Lab		
8	Simulation and Study of the Crystal Structure of Silicon	CO4
9	Simulation of Atomic Arrangement in an FCC Crystal Lattice	CO4
10	Simulation of Diffusion.	CO5
11	Simulation on effect of Doping on Semiconductor Properties	CO5
12	Simulation and Study of Electron Beam Lithography for Nanofabrication	CO6
13	Investigation of Lithography Techniques for Nanofabrication	CO6
14	Simulation of Charge Carrier Transport by Drift and Diffusion	CO5
15	Simulation and Study of Thin-Film Growth Using Chemical Vapor Deposition (CVD)	CO6
16	Simulation and Study of Semiconductor Doping and Its Effect on Electrical Properties	CO5
17	Investigation of Semiconductor devices -MOS Simulator	CO5

Term Work:

1 Term work should consist of a minimum of 6 experiments.

2 The final certification and acceptance of term work ensures satisfactory performance of laboratory work and minimum passing marks in term work

First year Bachelor of Technology

Subject :Basic Electrical Engineering

Teaching Scheme								
Course Code	Course Name	(Teaching Hours)			Credits Assigned			
		Th	Pr	Tut	Th	Pr	Tut	Total
26ETES21	Basic Electrical Engineering	3	2	–	3	1	–	4

Basic Electrical Engineering (Theory)

Teaching Scheme								
Course Code	Course Name	(Teaching Hours)			Credits Assigned			
		Th	Pr	Tut	Th	Pr	Tut	Total
26ETES21	Basic Electrical Engineering	3	–	–	3	–	–	3
Examination Scheme								
Course Code	Course Name	Theory			Exam Duration (in Hrs)	Term Work	Practical & Oral	Total
		Internal Assessment		ESE				
		MT	CA					
26ETES21	Basic Electrical Engineering	20	20	60	2	–	–	100

Course Objectives:

1 To provide knowledge on fundamentals of DC circuits and single phase AC circuits and its applications.
2 To inculcate knowledge on the basic operation and performance of 1-Φ transformers.
3 To provide knowledge on fundamentals of DC and AC machines and batteries.

Course Outcomes:

CO 1 Apply various network theorems to determine the circuit response / behaviour.

CO 2 Evaluate and analyse 1-Φ circuits.

CO 3 Understand the constructional features and operation of 1-Φ transformer

CO 4 Illustrate the working principle of a DC machine.

CO 5 Illustrate the working principles and applications of AC machines and stepper motors.

CO 6 Explain the types, construction, working and applications of batteries, including lead-acid batteries

First year Bachelor of Technology

Module		Contents	CO's	Hrs.
Prerequisite		Resistance, inductance, capacitance, series and parallel connections of resistance, concepts of voltage, current, power and energy and its units. Working of wattmeter, Magnetic circuits, MMF, Magnetic field strength, reluctance, series and parallel magnetic circuits, BH Curve, Time domain analysis of first order RL and RC circuits		
1		**DC Circuits**	**CO1**	**08**
	1.1	Ideal and Practical Sources: Independent voltage and current sources; source transformation; Kirchhoff's Current Law (KCL) and Kirchhoff's Voltage Law (KVL); Star-Delta and Delta-Star transformations.		
	1.2	Network Theorems:: Superposition, Thevenin's Theorem, Norton's Theorem and Maximum Power Transfer Theorem.		
2		**AC Circuits**	**CO2**	**08**
	2.1	Alternating Quantities: Generation of alternating voltage; sinusoidal waveform; average value; RMS value; form factor; crest factor; AC circuits containing pure resistance, inductance and capacitance.		
	2.2	Single-Phase AC Circuits: R-L, R-C and R-L-C series and parallel circuits; impedance and admittance; real (active), reactive and apparent power; power factor; series and parallel resonance; resonant frequency; Q-factor and bandwidth.		
3		**Transformers**	**CO3**	**09**
	3.1	Single-Phase Transformer: Working principle of single-phase transformer, EMF equation of a transformer, Transformer losses Construction and working principle; electromagnetic induction; EMF equation of a transformer; transformer losses — core losses and copper losses.		
	3.2	Performance of Transformer: Ideal and practical transformer; phasor diagrams for resistive, inductive and capacitive loads considering winding resistance and magnetic leakage; equivalent circuit; voltage regulation.		
	3.3	Testing and Efficiency: Open-circuit (no-load) test; short-circuit test; determination of equivalent circuit parameters; transformer efficiency and condition for maximum efficiency.		
4		**DC Machines**	**CO4**	**05**
	4.1	Principle of operation of DC motors and DC generators, constructional details, and classification of DC machines, emf equation of motor/ generator, applications. Principle of operation of DC generator and DC motor; constructional details and classification of DC machines; EMF equation of DC generator; back EMF and torque equation of DC motor; applications of DC motors and generators.		
5		**AC Machines**	**CO5**	**05**
	5.1	Single phase induction motor: Construction and working principle; double revolving field theory; starting of single-phase induction motors; split-phase induction motor and other types of single-phase induction motors; applications.		
	5.2	Stepper Motor: Construction, working principle, types of stepper motors and applications.		

First year Bachelor of Technology

6		**Batteries and Electrical Safety**	**CO6**	**04**
	6.1	Batteries: Introduction and types of batteries; primary and secondary batteries; battery rating and capacity; charging and discharging of batteries; battery efficiency; series and parallel connection of batteries.		
	6.2	Lead-Acid and Lithium-Ion Batteries: Construction, working principle and characteristics of lead-acid battery; basic construction and working principle of lithium-ion battery; comparison and applications of lead-acid and lithium-ion batteries.		
	6.3	Applications and Electrical Safety: Applications of batteries in automotive, UPS, inverter, portable and renewable-energy systems; basic electrical safety practices; electrical hazards; importance of earthing and its applications.		
		Total		**39**

Textbooks:

1 V. N. Mittal and Arvind Mittal "Basic Electrical Engineering" Tata McGraw Hill, (Revised Edition)
2 Vincent Del Toro "Electrical Engineering Fundamentals", PHI Second edition, 2011
3 Edward Hughes "Hughes Electrical and Electronic Technology", Pearson Education (Tenth edition)
4 D P Kothari and I J Nagrath, "Theory and Problems of Basic Electrical Engineering", PHI 13th edition 2011.
5 M. Naidu, S. Kamakshaiah "Introduction to Electrical Engineering" McGraw-Hill Education, 2004
6 B.R Patil "Basic Electrical Engineering" Oxford Higher Education

Reference Books:

1 B. L. Theraja "Electrical Engineering " Vol-I and II.
2 S. N. Singh, "Basic Electrical Engineering" PHI , 2011Book
3 I. J. Nagrath and D. P. Kothari, *Electrical Machines*, McGraw-Hill Education.
4 David Linden and Thomas B. Reddy, *Handbook of Batteries*, McGraw-Hill

Internal Assessment:
Assessment consists of one Mid Term Test of 20 marks and Continuous Assessment of 20 marks.
Mid Term test is to be conducted when approx. 50% syllabus is completed Duration of the midterm test shall be one hour.

Continuous Assessment:-
Continuous Assessment **is of 20 marks.** The rubrics for assessment will be considered on approval by the subject teachers.

Sr.no	Rubrics	Marks
1.	*Certificate course for 4 weeks or more:- NPTEL/ Coursera/ Udemy/any MOOC	10 marks
2.	Wins in the event/competition/hackathon	10 marks

First year Bachelor of Technology

3.	Content beyond syllabus presentation	10 marks
4.	Creating Proof of concept	10 marks
5.	Mini Project / Extra Experiments/ Virtual Lab	10 marks
6.	GATE Based Assignment test/Tutorials etc	10 marks
7.	Participation in event/workshop/talk / competition followed by small report and certificate of participation relevant to the subject(in other institutes)	5 marks
8.	Multiple Choice Questions (Quiz)	5 marks

End Semester Theory Examination:

1 Question paper will be of 60 marks
2 Question paper will have a total of five questions
3 All questions have equal weightage and carry 20 marks each
4 Any three questions out of five need to be solved.

Subject :Basic Electrical Engineering Laboratory

Teaching Scheme								
Course Code	Course Name	(Teaching Hours)			Credits Assigned			
		Th	Pr	Tut	Th	Pr	Tut	Total
26ETES21	Basic Electrical Engineering	-	2	–	-	1	–	1

Examination Scheme								
Course Code	Course Name	Theory			Exam Duration (in Hrs)	Term Work	Practical & Oral	Total
		Internal Assessment		ESE				
		MT	CA					
26ETES21	Basic Electrical Engineering	-	-	-	-	25	–	25

Lab Objectives:

1 To impart the basic concept of network analysis and its application.
2 To provide the basic concept of ac circuits analysis and its application.
3 To illustrate the operation of machines and transformers.

Lab Outcomes:

LO 1 Interpret and analyze the behavior of DC circuits using network theorems.
LO 2 Perform and infer experiment on single phase AC circuits.
LO 3 Demonstrate experiment on three phase AC circuits.
LO 4 Illustrate the performance of single-phase transformers and machines.

First year Bachelor of Technology

Suggested Experiments: Students are required to complete at least 8 experiments.		
Sr. No.	**Name of the Experiment**	**LOs**
1	Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Resistors, capacitors, and inductors.	LO1, 2,3,4
2	Verification of Superposition Theorem.	LO1
3	Verification of Thevenin's Theorem.	LO1
4	Verification of Norton's Theorem.	LO1
5	Verification of Maximum Power Transfer Theorem.	LO1
6	To find resonance conditions in a R-L-C series resonance circuit	LO2
7	To find resonance conditions in a R-L-C parallel resonance circuit.	LO2
8	To find the equivalent circuit parameters by conducting OC and SC tests on single phase transformers.	LO3
9	To determine the efficiency of a single-phase transformer at different loads.	LO3
10	To demonstrate cut-out sections of the DC machine.	LO4
11	To examine the characteristics of AC machines.	LO4
12	To investigate the construction and working of primary and secondary batteries.	LO4

Term Work:

1 Term work should consist of 8 experiments.

2 Journal must include at least 2 assignments.

3 The final certification and acceptance of term work ensures satisfactory performance of laboratory work and minimum passing marks in term work.

4 Term Work – 25 Marks.
Term work will be assessed based on the students' performance in the laboratory.

Continuous assessment exam

1 Based on the BEE theory and related lab.

First year Bachelor of Technology

Subject : Engineering Mechanics

Teaching Scheme								
Course Code	Course Name	(Teaching Hours)			Credits Assigned			
		Th	Pr	Tut	Th	Pr	Tut	Total
26ETES22	Engineering Mechanics	03	---	---	03	---	---	03

Engineering Mechanics (Theory)

Teaching Scheme								
Course Code	Course Name	(Teaching Hours)			Credits Assigned			
		Th	Pr	Tut	Th	Pr	Tut	Total
26ETES22	Engineering Mechanics	3	–	–	3	–	–	3
Examination Scheme								
Course Code	Course Name	Theory			Exam Duration (in Hrs)	Term Work	Practical & Oral	Total
		Internal Assessment		ESE				
		MT	CA					
26ETES22	Engineering Mechanics	20	20	60	2	–	–	100

Course Objectives:

1 To create a strong foundation in basic principles of statics and to apply the knowledge to analyze and solve engineering problems involving different systems of forces, static equilibrium etc.

2 To understand the principles and methods used to analyze the motion and behavior of particles and rigid bodies without the influence of forces.

Course Outcomes:

CO 1 Understand and analyze the behavior of multiple forces acting in a single plane.

CO 2 Understand the conditions for a body to be in a state of equilibrium and to analyze and solve problems related to the equilibrium.

CO 3 Understand and predict motion, analyze velocity and acceleration, characterize different types of motion without consideration of mass of the body.

CO 4 Do kinematic analysis of linkages and mechanisms by locating instantaneous center of rotation.

First year Bachelor of Technology

Module	Content	COs	Hrs
1	**System of Coplanar Forces:** Classification of force systems, Principle of transmissibility, composition and resolution of forces. Resultant of coplanar force system (Concurrent forces, parallel forces and non-concurrent Non-parallel system of forces). Moment of force about a point, Couples, Varignon's Theorem. Force couple system. Distributed Forces in plane.	CO1	06
2	**Equilibrium of System of Coplanar Forces:** Equilibrium concept, Conditions of equilibrium for concurrent forces, parallel forces and non-concurrent non- parallel general forces and Couples. Free body diagrams. Equilibrium of rigid bodies. Types of beams, simple and compound beams, type of supports and reaction. Determination of reactions at supports for various types of loads on beams. (Excluding problems on internal hinges)	CO2	08
3	**Kinematics of Particle:** Motion of particles with variable acceleration. Motion curves. Application of concepts of projectile motion and related numerical. Motion under gravity.	CO3	06
4	**Kinematics of Rigid Body (Instantaneous center of rotation):** Translation, Rotation and General Plane motion of Rigid body. The concept of Instantaneous center of rotation (ICR) for the velocity. Location of ICR for up to 3 links mechanisms. Velocity analysis of rigid bodies using ICR.	CO4	04
	Total		24

Text Books:

1 Engineering Mechanics by M.D. Dayal, 18 th edition2025

Reference Books:

1 Engineering Mechanics by R. C.Hibbeler, Pearson Education, 15 th edition 2024

2 Engineering Mechanics by Beer &Johnston, Tata McGrawHill, 12 th edition 2019

3 Engineering Mechanics by E W Nelson, Charles L Best, Merle C Poller, Mc-Graw Hill, 7 th edition 2022

4 Engineering Mechanics by A K Tayal, UmeshPublication 14th edition, 2025

Internal Assessment:

- Assessment consists of one Mid Term Test of 20 marks and Continuous Assessment of 20 marks.
- Mid Term test is to be conducted when approx. 50% syllabus is completed.
- Duration of the midterm test shall be one hour.

Continuous Assessment:

Continuous Assessment is of **20 marks**. The rubrics for assessment will be considered on approval by the subject teachers. The rubrics can be any 2 or max 4 of the following:

First year Bachelor of Technology

Sr. No	Rubrics	Marks
1	Certificate course for 4 weeks or more: NPTEL/ Coursera/ Udemy/any MOOC	10 marks
2	Wins in the event/competition/hackathon	10 marks
3	Content beyond syllabus presentation	10 marks
4	Creating Proof of concept	10 marks
5	Mini Project / Extra Experiments/ Virtual Lab	10 marks
6	GATE Based Assignment test/Tutorials etc	10 marks
7	Participation in event/workshop/talk / competition followed by small report and certificate of participation relevant to the subject (in other institutes)	05 marks
8.	Multiple Choice Questions (Quiz)	05 marks
9.	Peer Review and participation the marks can be left blank (with discretion of faculty)	05 Marks

End Semester Theory Examination:

1 Question paper will be of 60 marks

2 Question paper will have a total of five questions

3 All questions have equal weightage and carry 20 marks each

4 Any three questions out of five need to be solved.

First year Bachelor of Technology

Subject :Engineering Visualization Lab

Teaching Scheme								
Course Code	Course Name	(Teaching Hours)			Credits Assigned			
		Th	Pr	Tut	Th	Pr	Tut	Total
26ETVS21	Engineering Visualization Lab	-	02+*02	-	-	2	-	2

Engineering Visualization Lab (Drawing Hall)

Teaching Scheme								
Course Code	Course Name	(Teaching Hours)			Credits Assigned			
		Th	Pr	Tut	Th	Pr	Tut	Total
26ETVS21	Engineering Visualization Lab	-	2	-	-	2	-	2

2 Hrs Drawing Hall & 2 Hrs AutoCAD Practical Batchwise

Lab Objectives:

To impart and inculcate proper understanding of the theory of projection, the knowledge of reading a drawing and to improve the visualization skill.

Lab Outcomes

1 Apply the basic principles of projections in converting 3-D view to 2-D drawing with and without section.

2 Read a given drawing and visualize a 3-D object from the given two or three views.

Sr No.	Topic	LO's	Hrs.
1	**Orthographic Projections:** Fundamentals of orthographic projections. Different views of a simple machine part as per the first angle projection method recommended by I.S.	LO1	08
2	**Sectional Orthographic Projections:** Basic concept and significance of sectional orthographic projections. Full sectional view of simple machine parts (Excluding half section).	LO1	08
3	**Isometric Views:** Isometric Views, Conversion of Orthographic Views to Isometric Views (Excluding Sphere and circle on an inclined plane).	LO2	08
	Total Hours		24

First year Bachelor of Technology

Engineering Visualization Lab
Auto CAD (Lab)

Teaching Scheme								
Course Code	Course Name	(Teaching Hours)			Credits Assigned			
		Th	Pr	Tut	Th	Pr	Tut	Total
26ETVS21	Engineering Visualization Lab	-	2	-	-	2	-	2

Examination Scheme								
Course Code	Course Name	Theory			Practical Exam Duration (in Hrs)	Term Work	Practical & Oral	Total
		Internal Assessment		ESE				
		MT	CA					
26ETVS21	Engineering Visualization Lab	-	-	-	2	25	25	50

Lab Objectives:

1 To inculcate the skill of drawing with the basic concepts.

2 To Use AutoCAD for daily working processes.

3 To teach basic utility of Computer Aided drafting (CAD) tool

Lab Outcomes: Students will be able to...

LO 1 Apply the basic principles of projections in 2D drawings using CAD software.

LO 2 Create, Annotate, Edit and Plot drawings using basic AutoCAD commands and features.

LO 3 Apply basic AutoCAD skills to draw different views of a 3D object.

LO4 Apply basic AutoCAD skills to draw the isometric view and 3-D models from the given two views.

Sr No.	Topic	LO's	Hrs.
1	**Overview of Computer Graphics Covering:** Listing the computer technologies that impact on graphical communication, demonstrating knowledge of the theory of CAD software such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.	LO1,3,4	08
2	**Customization & CAD Drawing:**	LO2,3,4	08

First year Bachelor of Technology

	Consisting of set up of the drawing page and the printer including scale settings, Setting up of units and drawing limits, ISO and ANSI standards for coordinate dimensioning.		
3	**Annotations and other Functions Covering:** Applying dimensions to objects, applying annotations to drawings, Changing line lengths through modifying existing lines (extend/lengthen), Printing documents to paper using the print command, orthographic projection techniques, Drawing sectional views of objects (simple machine parts), Drawing isometric views by using Isometric drafting. Visualizing and drawing 3-D models by using AutoCAD 3-D software.	**LO2,3,4**	**08** **04**
	Total Practical Hours		**28**

Text Books:

1. N.D. Bhatt, "Engineering Drawing (Plane and solid geometry)", Charotar Publishing House Pvt. Ltd. 5 th Edition, 2025
2. N.D. Bhatt & V.M. Panchal, "Machine Drawing", Charotar Publishing House Pvt. Ltd., 20 th edition 2025

Reference Books:

1. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publisher, 4 th edition 2020
2. Prof. Sham Tickoo (Purdue University) Gaurav Verma, "(CAD Soft Technologies) :Auto CAD 2024/2025 (For engineers and Designers)", Dreamtech Press NewDelhi.
3. Dhananjay A Jolhe, "Engineering Drawing" Tata McGraw Hill, 1 st edition 2007

Examination Scheme :		
Assessment Tool	**Way to Conduct**	**Marks**
Term Work	1. Engineering Drawing A3 size Assignment Sheets -**10 Marks** 2. AutoCAD assignments to be printed on A4 size sheets - **15 Marks**	**25 Marks**
Practical Examination	1. Solve 2 compulsory questions. 2.Question on Orthographic Projection / Sectional Orthographic Projection - 15 Marks 3. Question on Isometric Projection- 10 Marks 4. Should be conducted for 2 Hours.	**25 Marks**

First year Bachelor of Technology

Subject : Professional Communication and Ethics-I

Teaching Scheme								
Course Code	Course Name	(Teaching Hours)			Credits Assigned			
		Th	Pr	Tut	Th	Pr	Tut	Total
26AE21	Professional Communication and Ethics-I	1	-	2*	1	-	1*	2

Professional Communication and Ethics-I (Theory)

Teaching Scheme								
Course Code	Course Name	(Teaching Hours)			Credits Assigned			
		Th	Pr	Tut	Th	Pr	Tut	Total
26AE21	Professional Communication and Ethics-I	1	-	2*	1	-	1*	2
Examination Scheme								
Course Code	Course Name	Theory			Exam Duration (in Hrs)	Term Work	Practical & Oral	Total
		Internal Assessment		ESE				
		MT	CA					
26AE21	Professional Communication and Ethics-I	20	80	-	-	-	-	100

***The two-hour tutorial is divided into batches of 20 - 30 students.**

Course Objectives:

1 To demonstrate the fundamental concepts of interpersonal and professional communication.

2 To encourage active listening with focus on content, purpose, ideas and tone.

3 To facilitate fluent speaking skills in social, academic and professional situations

4 To train in reading strategies for comprehending academic and business correspondence.

5 To promote effective writing skills in business, technology and academic arenas.

6 To inculcate confident personality traits along with grooming and social etiquettes.

Course Outcomes:

CO 1 Eliminate barriers and use verbal/non-verbal cues at social and workplace situations.

CO 2 Employ listening strategies to comprehend wide-ranging vocabulary, grammatical structures, tone and pronunciation.

CO 3 Prepare effectively for speaking at social, academic and business situations.

CO 4 Use reading strategies for faster comprehension, summarization and evaluation of texts.

First year Bachelor of Technology

CO 5 Acquire effective writing skills for drafting academic, business and technical documents.

CO 6 Successfully interact in all kinds of settings, displaying refined grooming and social skills

Module	Content	CO	Hrs.
1	**Fundamentals of Communication: -**	**CO1**	**04**
	1.1 Introduction to Theory of Communication • Definition • Objectives • The Process of Communication • Organizational Communication **1.2**. Methods of Communication		
2	**Vocabulary Building**	**CO2**	**02**
	2.1 Vocabulary Building ■ Meaning of Words in Context ■ Synonyms & Antonyms ■ Collocations ■ Prefixes & Suffixes **2.2**. Grammar ● Identifying Common Errors ● Subject - Verb Agreement ● Misplaced Modifiers ● Articles ● Prepositions ● Tautologies ● Pleonasms (Redundancies) ● Idioms		
3	**Business Correspondence**	**CO3**	**03**
	3.1 Seven Cs of Business Correspondence ■ Completeness ■ Conciseness ■ Consideration ■ Concreteness ■ Clarity ■ Courtesy ■ Correctness **3.2**. Parts of a Formal Letter and Formats ● Parts/Elements of a Formal Letter ● Letterheads and/or Sender's Address ● Dateline ● Inside Address		

First year Bachelor of Technology

	• Reference Line (Optional) • Attention Line (Optional) • Salutation • Subject Line • Body • Complimentary Close • Signature Block • Enclosures/Attachments • Complete/Full Block Format **3.3**. Emails • Format of Emails • Features of Effective Emails • Language and style of Emails **3.4.** Types of Letters in Both Formal Letter Format and Emails • Claim and Adjustment Letters • Request/Permission Letters • Sales Letters		
4	**Personality Development and Social Etiquettes**	**CO4**	**02**
	4.1 Personality Development • Introducing Self and/or a Classmate • Formal Dress Code **4.2**. Social Étiquettes • Formal Dining Étiquettes • Cubicle Étiquettes • Responsibility in Using Social Media • Showing Empathy and Respect • Learning Accountability and Accepting Criticism • Demonstrating Flexibility and Cooperation • Selecting Effective Communication Channels		
5	**Book Review**	**CO5**	**02**
	• Review of a book.: Students have to read and analyze the book given and should be able to write a two page review on it. • Book review presentation		
	Total Engagement Hours		**13**

First year Bachelor of Technology

List of Tutorials:

S.No	Details of Assignment	Details of Activity	Hours	Marks
1	Personal Branding & SWOT Analysis	Written SWOT analysis along with a 2-minute elevator pitch video recording.	2	5
2	Transcription of the public speech along with on the spot writing of speech/Extempore	Public speech/On-the-spot 1-minute Extempore presentation.	2	10
3	Case Studies/Role plays on types of communication, Barriers to effective Communication and its consequences.	Role Play/Case Study	4	10
4	Written record of reading activities/	Advanced level reading comprehension with MCQs/Video analysis, structured note-taking (Cornell Method), comprehension assessment, and oral reflection.	2	5
5	Listening Skill Activity TED Talk Active Listening & Speech Analysis	Video analysis, structured note-taking (Cornell Method), comprehension assessment, and oral reflection.	2	5
6	Aptitude test	Aptitude test on vocabulary and grammar for Engineers	4	5
7	2 types of letters in complete block format/Email	Request/ Permission; Adjustment / claim; Sales letters	4	10
8	Understanding of Social Etiquettes	Mini Project	2	10
9	Presentation on Book Review	Exploration and Analysis of perception related to global environment presented in the Book	4	20
10	Wins in the event/competition related to soft skills /language/literature	Providing certificate as proof/Geo Tagged Photographs	During the current semester	10
11	Participation in event/workshop/talk / competition followed by small report and certificate of participation relevant to the subject (in other institutes)	Providing certificate as proof/Geo Tagged Photographs	During the current semester	5

First year Bachelor of Technology

12	Beyond the Headlines: 15-Day Newspaper Analysis Project	Background research → multiple perspectives → evidence → ideation → critical analysis → personal position → conclusion. Report plus presentation.	Self Paced	10
13	Certificate course for 4 weeks or more: NPTEL/ Coursera/ Udemy/any MOOC	Any course related to soft skills and personality development	During the current semester	10
(List of books for book review will be scrutinised by the respective teachers.)				

Textbooks:

1 Sanjay Kumar & Pushp Lata (2018). Communication Skills with CD. New Delhi:Oxford University Press.

2 Hemphill, P.D., McCormick, D. W., & Hemphill, R. D. (2001). Business Communication with writing improvement exercises. Upper Saddle River, NJ:Prentice Hall.

3 Locker, Kitty O. Kaczmarek, Stephen Kyo. (2019). Business Communication: Building Critical Skills. Place of publication not identified: Mcgraw-hill.

4 Murphy, H. (1999). Effective Business Communication. Place of publication not identified: Mcgraw-Hill.

5 Raman, M., & amp; Sharma, S. (2016). Technical Communication: Principles and practice. New Delhi:Oxford University Press.University of Mumbai, First Year Engineering, (Common for all Branches of Engineering) REV2019 'C' Scheme 51/61

6 Kaul, A. (2015). Effective Business Communication. Place of publication not identified: Prentice-Hall of India.

7 Rizvi, A. M. (2010). Effective Technical Communication: A guide for Scientists and Engineers. New Delhi: Tata McGraw Hill.

8 Lewis, N. (2014). Word power made it easy. Random House USA.

Internal Assessment:

1) Assessment consists of one Mid Term Test of 20 marks and Continuous Assessment of 80 marks.
2) Mid Term test is to be conducted when approx. 60% syllabus is completed.
3) Duration of the midterm test shall be one hour.

Continuous Assessment:

Continuous Assessment is of **80 marks**. The rubrics for assessment will be considered on approval by the subject teachers.

First year Bachelor of Technology

Sr. No	Rubrics	Marks
1.	Evaluation of self-awareness, establishes a distinctive professional identity, and communicates personal strengths with confidence and clarity.	5 Marks
2.	Accurate transcription, clear structure of ideas, relevant content, fluent expression, appropriate vocabulary, and confident extempore delivery.	10 marks
3.	Conceptual Understanding – Case Analysis – Communication Effectiveness – Role Play – Problem Resolution	10 marks
4.	Certificate course for 4 weeks or more: NPTEL/ Coursera/ Udemy/any MOOC	10 marks
5.	Wins in the event/competition/hackathon	10 marks
6.	Content beyond syllabus presentation	10 marks
7.	Creating Proof of concept	10 marks
8.	Mini Project	10 marks
9.	Participation in event/workshop/talk / competition followed by small report and certificate of participation relevant to the subject (in other institutes)	05 marks
10.	Multiple Choice Questions (Quiz)	15 marks
11.	Examination of correct format, clarity of content, professional tone, language accuracy, and appropriate vocabulary.	10 marks
12.	Evaluation of understanding of the book, critical analysis, interpretation of themes, independent perspective, and effective presentation.	20 marks

First year Bachelor of Technology

Subject : Universal Human Values-II

Teaching Scheme								
Course Code	Course Name	(Teaching Hours)			Credits Assigned			
		Th	Pr	Tut	Th	Pr	Tut	Total
26VE21	Universal Human Values-II	02	-	-	02	-	-	02

Universal Human Values-II
(Theory)

Teaching Scheme								
Course Code	Course Name	(Teaching Hours)			Credits Assigned			
		Th	Pr	Tut	Th	Pr	Tut	Total
26VE21	Universal Human Values-II	02	---	---	02	---	---	02

Examination Scheme								
Course Code	Course Name	Theory			Exam Duration (in Hrs)	Term Work	Practical & Oral	Total
		Internal Assessment		ESE				
		MT	CA					
26VE21	Universal Human Values-II	-	20	-	-	-	-	20

Course Objectives

1. Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
2. Understanding of the harmony in the human being, family, society and nature/existence.
3. Strengthening of self-reflection.
4. Development of commitment and courage to act.

Course Outcomes:

CO 1 Understand values, trust, respect and mutual happiness in human relationships and family.

CO 2 Understand harmony in society, comprehensive human goals and the concept of universal human order.

CO 3 Understand harmony in nature, coexistence and the interconnectedness of all existence.

CO 4 Develop understanding of human values, ethical conduct and professional ethics for a harmonious society.

First year Bachelor of Technology

Module		Content	CO's	Hrs
1		**Understanding Harmony in the Family - Harmony in Human-Human Relationship**	**CO 1**	
	1.1	Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and its fulfillment to ensure mutual happiness		2
	1.2	Understanding the meaning of Trust; Difference between intention and competence		2
	1.3	Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship		2
2		**Understanding Harmony in Society**		
	2.1	Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals	**CO 2**	3
	2.2	Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family		2
3		**Understanding Harmony in the Nature and Existence - Whole existence as Coexistence**		
	3.1	Understanding the harmony in the Nature	**CO 3**	2
	3.2	Understanding Existence as Coexistence of mutually interacting units in all-pervasive space		2
	3.3	Holistic perception of harmony at all levels of existence.		2
4		**Implications of the above Holistic Understanding of Harmony on Professional Ethics**		
	4.1	Natural acceptance of human values	**CO 4**	2
	4.2	Definitiveness of Ethical Human Conduct		2
	4.3	Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order		3
	4.4	Competence in professional ethics		2
		Total		**26**

First year Bachelor of Technology

Mode of Conduction

1. Lecture hours are to be used for interactive discussion, placing the proposals about the topics at hand and motivating students to reflect, explore and verify them.
2. practice sessions for analyzing and discussing the topic, help the students explore the important or critical elements.

Continuous Assessment:

Continuous Assessment is of **20 marks**. The rubrics for assessment will be considered on approval by the subject teachers. The rubrics can be any 2 or max 4 of the following:

Sr. No	Rubrics	Marks
1.	Certificate course for 4 weeks or more: NPTEL/ Coursera/ Udemy/any MOOC	10 marks
2.	Case study analysis and presentation	10 marks
3.	Constitutional awareness programme	10 marks
4.	Group discussion/debate on social and ethical issues	10 marks
5.	Poster Presentation on UHV content theme	10 marks
6.	Book Review on UHV content theme	10 marks
7.	Community/social outreach activity with report	10 marks
8.	Case Study Analysis & Presentation	10 marks
9.	Survey/interview on values, happiness, prosperity or social harmony	10 marks

First year Bachelor of Technology

Subject : Co-Curricular Course-II

Teaching Scheme								
Course Code	Course Name	(Teaching Hours)			Credits Assigned			
		Th	Pr	Tut	Th	Pr	Tut	Total
26CC21	Co-Curricular Course-II	---	04	---	---	02	---	02

Co-Curricular Course-II
(Practical Activity)

Teaching Scheme								
Course Code	Course Name	(Teaching Hours)			Credits Assigned			
		Th	Pr	Tut	Th	Pr	Tut	Total
26CC21	Co-Curricular Course-II	---	04	---	---	02	---	02
Examination Scheme								
Course Code	Course Name	Theory			Practical Exam Duration (in Hrs)	Term Work	Practical & Oral	Total
		Internal Assessment		ESE				
		MT	CA					
26CC21	Co-Curricular Course-II	---	---	---	---	---	25	25

Social Responsibility, Community Engagement and Student Well-Being

As part of the **First Year curriculum**, students are allotted **25 marks in each semester** for participation in structured social responsibility and community engagement activities. The initiative is designed to extend learning beyond the classroom and encourage students to become responsible, empathetic and socially conscious citizens.

Students participate in a diverse range of activities, including **cleanliness drives on college premises, awareness rallies, tree plantation drives, beach-cleaning campaigns, environmental awareness initiatives, cultural programmes, community outreach activities and other socially relevant projects**. These activities provide students with opportunities to work collaboratively, engage with the community and contribute meaningfully to society.

The programme also incorporates **student well-being and personal development activities**, including courses and workshops on **Yoga, stress management, emotional well-being, mindfulness, self-awareness and healthy lifestyle practices**. Such activities enable students to

develop effective coping strategies, emotional balance, self-discipline and a positive approach towards academic and personal challenges.

Through this integrated approach, the initiative promotes **social responsibility, civic engagement, environmental consciousness, teamwork, empathy, self-awareness and holistic well-being**. It supports the institution's commitment to developing well-rounded graduates who are not only technically competent but also socially responsible, emotionally resilient and actively engaged with their community.

Assessment Rubrics:

Sessions from eminent persons on important themes like cyber bullying, cancer awareness,organ donation etc. (5 Marks)

MYCA Course (15 Marks)

https://www.mahayouthnet.in/courses/English-MYCA-Climate-Change-Water-Management-6400473ce4b097c33f49d542

Open University Courses(5 Marks)

https://www.open.edu/openlearn/health-sports-psychology/health/emotions-and-emotional-disorders/content-section-0?