Shri Vile Parle Kelavani Mandal's

NMIMS Global University, Dhule

School of Technology, Management & Engineering

Survey No. 499, Plot No. 02, Behind Gurudwara,
Mumbai Agra National Highway,
Dhule- 424 001, Maharashtra, India

Curriculum Structure and Syllabus Of

First Year B. Tech. (Common to all branches)

(Regulation 2025)

Effective from Academic Year 2025-26

Vision

"SVKM NMIMS Global University aspires to be a world-renowned institution of higher learning, dedicated to fostering excellence in education, research and innovation with social responsibility"

Mission

1. To foster a dynamic and inclusive learning environment that nurtures the educational and research aspirations of students from diverse backgrounds.
2. To deliver state-of-the-art pedagogy, emphasizing interdisciplinary collaboration and innovation.
3. To uphold the values of ethics and community engagement to cultivate global citizens and leaders who actively contribute to the advancement of society and the world.

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CURRICULUM FRAMEWORK

LIST OF ABBREVIATIONS

Sr. No.	Abbreviation	Type of Course
1	BSC	Basic Science Course
2	ESC	Engineering Science Course
3	PCC	Programme Core Course
4	PEC	Programme Elective Course
5	MDM	Multidisciplinary Minor
6	OEC	Open Elective Course
7	VSEC	Vocational and Skill Enhancement Course
8	AEC	Ability Enhancement Course
9	EEM	Entrepreneurship/Economics/Management Course
10	IKS	Indian Knowledge System
11	VEC	Value Education Course
12	ELC	Experiential Learning Courses
13	LLC	Liberal Learning Courses
14	HSSM	Humanities Social Science and Management

SEMESTER-WISE COURSE DISTRIBUTION (GROUP A)

Sr. No.	Type of Course	Course Distribution: Semester Wise			Credit Distribution: Semester Wise		
		No. of Courses / Semester			No. of Credits / Semester		
		I	II	Total	I	II	Total
1.	Basic Science Course (BSC)	4	4	**8**	8	8	**16**
2.	Engineering Core Course (ECC)	7	5	**12**	9	6	**15**
3.	Programme Core Course (PCC)						
4.	Programme Elective Course (PEC)						
5.	Multidisciplinary Minor (MDM)						
6.	Open Elective Course (OEC)						
7.	Vocational and Skill Enhancement Course (VSEC)	1	1	**2**	2	2	**4**
8.	Ability Enhancement Course (AEC)		2	**2**		3	**3**
9.	Entrepreneurship/ Economics/ Management Course (HSSM)						
10.	Indian Knowledge System (IKS)	1		**1**	2		**2**
11.	Value Education Course (VEC)						
12.	Experiential Learning Courses (ELC)						
13.	Liberal Learning Courses (LLC)	1	1	**2**	2	2	**4**
Total		**14**	**13**	**27**	**23**	**21**	**44**

SEMESTER-WISE CREDIT DISTRIBUTION (GROUP B)

Sr. No.	Type of Course	Course Distribution: Semester Wise			Credit Distribution: Semester Wise		
		No. of Courses / Semester			No. of Credits / Semester		
		I	II	Total	I	II	Total
1.	Basic Science Course (BSC)	4	4	**8**	8	8	**16**
2.	Engineering Core Course (ECC)	5	7	**12**	9	6	**15**
3.	Programme Core Course (PCC)						
4.	Programme Elective Course (PEC)						
5.	Multidisciplinary Minor (MDM)						
6.	Open Elective Course (OEC)						
7.	Vocational and Skill Enhancement Course (VSEC)	1	1	**2**	2	2	**4**
8.	Ability Enhancement Course (AEC)	2		**2**		3	**3**
9.	Entrepreneurship/ Economics/ Management Course (HSSM)						
10.	Indian Knowledge System (IKS)		1	**1**	2		**2**
11.	Value Education Course (VEC)						
12.	Experiential Learning Courses (ELC)						
13.	Liberal Learning Courses (LLC)	1	1	**2**	2	2	**4**
Total		**13**	**14**	**27**	**21**	**23**	**44**

Curriculum Structure

B. Tech.

First Year Engineering

(Common to all branches)

CURRICULUM STRUCTURE

First Year B. Tech. (Common to all branches) Semester – I

Group A (AIML, IT, ELECTRICAL, CIVIL, MECH)

First Year Engineering (Regulations 2025) (With effect from Academic Year 2025-26)																
Semester I (Credits = 23)																
Course Code	Course Name	Credit Scheme				Teaching Scheme (Hours/Week)			Evaluation Scheme and Marks							
									Continuous Assessment			Semester End Assessment			Total
		L	P	T	Total	L	P	T	Term Test 1 (TT1)	Term Test 2 (TT2)	Internal Assessment	SEE	TW	PR/OR	
T25AEM101	Engineering Mathematics-I	3	-	-	3	3	-	-	15	15	10	60	-	-	100
T25AEM101T	Engineering Mathematics-I Tutorial	-	-	1	1	-	-	1	-	-	-	-	25	-	25
T25AEP102	Engineering Physics	3	-	-	3	3	-	-	15	15	10	60	-	-	100
T25AEP102L	Engineering Physics Lab	-	1	-	1	-	2	-	-	-	-	-	25	25	50
T25ACP103	Structured Programming using C	2	-	-	2	2	-	-	15	15	10	60	-	-	100
T25ACP103L	Structured Programming using C Lab	-	1	-	1	-	2	-	-	-	-	-	25	25	50
T25ACM104	Computational Engineering Mechanics	2	-	-	2	2	-	-	15	15	10	60	-	-	100
T25ACM104L	Computational Engineering Mechanics Lab	-	1	-	1	-	2	-	-	-	-	-	25	25	50
T25AEE105	Basic Electrical Engineering & Digital Electronics	2	-	-	2	2	-	-	15	15	10	60	-	-	100
T25AEE105L	Basic Electrical Engineering & Digital Electronics Lab	-	1	-	1	-	2	-	-	-	-	-	25	25	50
T25AIK106	IKS-Indian Intellectual Heritage	2	-	-	2	2	-	-	-	-	-	-	50	-	50
T25ADT107	Design Thinking	2	-	-	2	2	-	-	-	-	-	-	50	-	50
T25AYE108	Yoga Education	1	1	-	2	1	2	-	-	-	-	-	50	-	50
T25ACE109	Basic Civil and Environmental Engineering	-	-	-	AU	2	-	-	-	-	-	-	50*	-	50*
Total		**17**	**5**	**1**	**23**	**19**	**10**	**1**	**75**	**75**	**50**	**300**	**275**	**100**	**875**

First Year B. Tech. (Common to all branches) Semester – II
Group A (AIML, IT, ELECTRICAL, CIVIL, MECH)

First Year Engineering (Regulations 2025) (With effect from Academic Year 2025-26) Semester II (Credits=21)																
Course Code	**Course Name**	**Credit Scheme**				**Teaching Scheme (Hours/Week)**			**Evaluation Scheme and Marks**							
									Continuous Assessment			**Semester End Assessment**				
		L	**P**	**T**	**Total**	**L**	**P**	**T**	**Term Test 1 (TT1)**	**Term Test 2 (TT2)**	**Internal Assessment**	**SEE**	**TW**	**PR/ OR**	**Total**
T25AEM151	Engineering Mathematics-II	3	-	-	3	3	-	-	15	15	10	60	-	-	100
T25AEM151T	Engineering Mathematics-II Tutorial	-	-	1	1	-	-	1	-	-	-	-	25	-	25
T25AEC152	Engineering Chemistry	3	-	-	3	3	-	-	15	15	10	60	-	-	100
T25AEC152L	Engineering Chemistry Lab	-	1	-	1	-	2	-	-	-	-	-	25	25	50
T25AJP153	Object Oriented Programming using Java	2	-	-	2	2	-	-	15	15	10	60	-	-	100
T25AJP153L	Object Oriented Programming using Java Lab	-	1	-	1	-	2	-	-	-	-	-	25	25	50
T25AEG154	Engineering Graphics	2	-	-	2	2	-	-	15	15	10	60	-	-	100
T25AEG154L	Engineering Graphics Lab	-	1	-	1	-	2	-	-	-	-	-	25	25	50
T25ACS155	Effective Communication Skills	2	-	-	2	2	-	-	15	15	10	60	-	-	100
T25ACS155L	Effective Communication Skills Lab	-	1	-	1	-	2	-	-	-	-	-	25	25	50
T25AWP156	Workshop Practices	-	2	-	2	-	4	-	-	-	-	-	50	50	100
T25APD157	Integrated Personality Development Course	1	1	-	2	1	2	-	-	-	-	-	50	-	50
T25AME158	Basic Mechanical and Energy Engineering	-	-	-	AU	2	-	-	-	-	-	-	50*	-	50*
Total		**13**	**7**	**1**	**21**	**15**	**14**	**1**	**75**	**75**	**50**	**300**	**225**	**150**	**875**

L-Lecture, **P**-Practical, **T**-Tutorial, **TT1**–Term Test 1, **TT2**-Term Test 2, **SEE** –Semester End Examination, **TW**-Term Work, **PR**-Practical, **OR**-Oral.

Internal Assessment: Assignment/Group Discussion/Course Project/Quiz/Presentation/Any Other.

***Marks are not considered for calculation of SGPA/CGPA.**

First Year B. Tech. (Common to all branches) Semester – I
Group B (COMPUTER, DATA SCIENCE)

First Year Engineering (Regulations 2025) (With effect from Academic Year 2025-26) Semester I (Credits=21)																
Course Code	Course Name	Credit Scheme				Teaching Scheme (Hours/Week)			Evaluation Scheme and Marks							
									Continuous Assessment			Semester End Assessment			Total
		L	P	T	Total	L	P	T	Term Test 1 (TT1)	Term Test 2 (TT2)	Internal Assessment	SEE	TW	PR/OR	
T25CEM101	Engineering Mathematics-I	3	-	-	3	3	-	-	15	15	10	60	-	-	100
T25CEM101T	Engineering Mathematics-I Tutorial	-	-	1	1	-	-	1	-	-	-	-	25	-	25
T25CEC102	Engineering Chemistry	3	-	-	3	3	-	-	15	15	10	60	-	-	100
T25CEC102L	Engineering Chemistry Lab	-	1	-	1	-	2	-	-	-	-	-	25	25	50
T25CCP103	Structured Programming using C	2	-	-	2	2	-	-	15	15	10	60	-	-	100
T25CCP103L	Structured Programming using C Lab	-	1	-	1	-	2	-	-	-	-	-	25	25	50
T25CEG104	Engineering Graphics	2	-	-	2	2	-	-	15	15	10	60	-	-	100
T25CEG104L	Engineering Graphics Lab	-	1	-	1	-	2	-	-	-	-	-	25	25	50
T25CCS105	Effective Communication Skills	2	-	-	2	2	-	-	15	15	10	60	-	-	100
T25CCS105L	Effective Communication Skills Lab	-	1	-	1	-	2	-	-	-	-	-	25	25	50
T25CWP106	Workshop Practices	-	2	-	2	-	4	-	-	-	-	-	50	50	100
T25CPD107	Integrated Personality Development Course	1	1	-	2	1	2	-	-	-	-	-	50	-	50
T25CME108	Basic Mechanical and Energy Engineering	-	-	-	AU	2	-	-	-	-	-	-	50*	-	50*
Total		**13**	**7**	**1**	**21**	**15**	**14**	**1**	**75**	**75**	**50**	**300**	**225**	**150**	**875**

First Year B. Tech. (Common to all branches) Semester – II
Group B (COMPUTER, DATA SCIENCE)

First Year Engineering (Regulations 2025) (With effect from Academic Year 2025-26) Semester II (Credits = 23)																
Course Code	Course Name	Credit Scheme				Teaching Scheme (Hours/Week)			Evaluation Scheme and Marks							
									Continuous Assessment			Semester End Assessment				
		L	P	T	Total	L	P	T	Term Test 1 (TT1)	Term Test 2 (TT2)	Internal Assessment	SEE	TW	PR/OR	Total	
T25CEM151	Engineering Mathematics-II	3	-	-	3	3	-	-	15	15	10	60	-	-	100	
T25CEM151T	Engineering Mathematics-II Tutorial	-	-	1	1	-	-	1	-	-	-	-	25	-	25	
T25CEP152	Engineering Physics	3	-	-	3	3	-	-	15	15	10	60	-	-	100	
T25CEP152L	Engineering Physics Lab	-	1	-	1	-	2	-	-	-	-	-	25	25	50	
T25CJP153	Object Oriented Programming using Java	2	-	-	2	2	-	-	15	15	10	60	-	-	100	
T25CJP153L	Object Oriented Programming using Java Lab	-	1	-	1	-	2	-	-	-	-	-	25	25	50	
T25CCM154	Computational Engineering Mechanics	2	-	-	2	2	-	-	15	15	10	60	-	-	100	
T25CCM154L	Computational Engineering Mechanics Lab	-	1	-	1	-	2	-	-	-	-	-	25	25	50	
T25CEE155	Basic Electrical Engineering & Digital Electronics	2	-	-	2	2	-	-	15	15	10	60	-	-	100	
T25CEE155L	Basic Electrical Engineering & Digital Electronics Lab	-	1	-	1	-	2	-	-	-	-	-	25	25	50	
T25CIK156	IKS-Indian Intellectual Heritage	2	-	-	2	2	-	-	-	-	-	-	50	-	50	
T25CDT157	Design Thinking	2	-	-	2	2	-	-	-	-	-	-	50	-	50	
T25CYE158	Yoga Education	1	1	-	2	1	2	-	-	-	-	-	50	-	50	
T25CCE159	Basic Civil and Environmental Engineering	-	-	-	AU	2	-	-	-	-	-	-	50*	-	50*	
Total		**17**	**5**	**1**	**23**	**19**	**10**	**0**	**75**	**75**	**50**	**300**	**275**	**100**	**875**	

L-Lecture, **P**-Practical, **T**-Tutorial, **TT1**–Term Test 1, **TT2**-Term Test 2, **SEE** –Semester End Examination, **TW**-Term Work, **PR**-Practical, **OR**-Oral.

Internal Assessment: Assignment/Group Discussion/Course Project/Quiz/Presentation/Any Other.

***Marks are not considered for calculation of SGPA/CGPA.**

Program:	First Year B. Tech. (Common to all branches)						Semester: I	
Course:	Engineering Mathematics-I						Code:	
Credit	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks				
	Lecture	Practical	Tutorial	Continuous Assessment			SEE	Total
				TT1	TT2	Internal Assessment		
03	03	-	-	15	15	10	60	100

Prerequisite:

Knowledge of

1. Inverse of a matrix, addition, multiplication and transpose of a matrix.
2. Introduction of complex number.
3. Derivatives.

Objectives:

To develop the basic Mathematical & Statistical skills of engineering students that are imperative for effective understanding of engineering subjects. The topics introduced will serve as basic tools for specialized studies in many fields of engineering and technology.

Course Outcomes:

On completion of the course, the learner will be able to:

1. Apply principles of basic operations of matrices to find rank and echelon form of matrices to solve system of simultaneous equations.
2. Illustrate the basic concepts of Complex numbers and apply the knowledge of complex numbers to solve problems in hyperbolic functions and logarithmic functions.
3. Illustrate the basic principles of Partial differentiation.
4. Apply knowledge of Partial differentiation to find maxima and minima, Jacobian and Expansion of two variable functions.
5. Apply Numerical Methods to find the solution of linear and simultaneous algebraic equations and fit the curve for given data.

Detailed Syllabus

Unit	Description	Duration (Hrs.)
I	**Matrices:** 1.1. Types of Matrices: Symmetric, Skew- Symmetric, Hermitian, Skew-Hermitian, Unitary, Orthogonal Matrices. Rank of a matrix using Echelon form. 1.2. System of homogeneous and non–homogeneous equations, their consistency and solutions. Linear dependent and independent vectors.	8
II	**Complex Numbers, Hyperbolic function and Logarithm of Complex Numbers:** 2.1. Algebra of Complex Numbers. Cartesian, polar and exponential form of complex numbers & D'Moivre's Theorem (Statement only). 2.2 Roots of complex number. 2.3. Circular functions of complex number and Hyperbolic functions. Inverse Circular and Inverse Hyperbolic functions. 2.4. Separation of real and imaginary parts of all types of functions. 2.5. Logarithmic of Complex number, Separation of real and Imaginary parts of Logarithmic functions.	10

III	**Partial Differentiation:** 3.1. Partial Differentiation: Function of several variables, Partial derivatives of first and higher order, Differentiation of composite function, Partial derivatives of Implicit functions. 3.2. Euler's Theorem on Homogeneous functions with two and three independent variables (with proof). Deductions from Euler's theorem.	9
IV	**Applications of Partial differentiation** 4.1. Maxima and Minima of a function of two independent variables. 4.2. Jacobian's of two and three independent variables. 4.3. Taylor's series and Maclaurin's series (Statement only). Expansion of standard functions.	6
V	**Numerical Solutions of Transcendental Equations, System of Linear Algebraic Equations, Curve fitting:** 5.1 Solution of Algebraic and Transcendental Equations by: Bisection Method, Newton-Raphson Method. 5.2 Solution of system of linear algebraic equations by Jacobi's Method and Gauss-Seidel Iteration Method. 5.3 Curve fitting: Fitting a straight line, Quadratic curve.	6
Total		**39**

Text Books

1. Higher Engineering Mathematics by B. S. Grewal, Khanna Publishers, New Delhi.
2. Advanced Engineering Mathematics, Dennis G. Zill, Warren S. Wright.
3. Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons, NewYork.
4. Higher Engineering Mathematics by H. K. Das and Er. Rajnish Verma, S. Chand & CO. Pvt. Ltd., New Delhi.

Reference Books:

1. Higher Engineering Mathematics by B. V. Ramana, Tata McGraw-Hill Publications, New Delhi.
2. A Text Book of Engineering Mathematics by Peter O‟ Neil, Thomson Asia Pte Ltd., Singapore.
3. Advanced Engineering Mathematics by C. R. Wylie & L. C. Barrett, Tata McGraw-Hill Publishing Company Ltd., New Delhi.
4. Introductory Methods of Numerical Analysis, S.S. Sastry, Eastern Economy Edition.
5. Numerical Methods, M. K. Jain, R. K. Jain, S. R. K. Iyengar, New Age International Publishers.
6. Matrices, Shanti Narayan, S. Chand publication.
7. Applied Numerical Methods with MATLAB for Engineers and Scientists by Steven Chapra, McGraw Hill.

Prepared by **Verified by** **Academic Coordinator** **HOD** **Dean**

Program:	First Year B. Tech. (Common to all branches)				Semester: I	
Course:	Engineering Mathematics-I Tutorial				Code:	
Credit	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks		
	Lecture	Practical	Tutorial	TW	SEE	Total
01	-	-	01	25	-	25

Engineering Mathematics-I	
Sr. No.	**Suggested List of Tutorials**
1	Types of Matrices
2	Rank of Matrix
3	System of equations
4	Cartesian, polar and exponential form of complex numbers
5	Roots of complex number
6	Separation of real and imaginary parts
7	Logarithmic functions
8	Partial derivatives of first and higher order
9	Partial derivative of Composite and Implicit function
10	Euler's Theorem on Homogeneous functions with two and three independent variables
11	Maxima and Minima of a function of two independent variables
12	Jacobian's of two and three independent variables
13	Taylor's series and Maclaurin's series
14	Bisection Method, Newton-Raphson Method.
15	Jacobi's Method, Gauss-Seidel Iteration Method.
16	Fitting of straight line & quadratic curve.

Prepared by **Verified by** **Academic Coordinator** **HOD** **Dean**

Program:	First Year B. Tech. (Common to all branches)						Semester: I / II	
Course:	Engineering Physics						Code:	
Credit	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks				
	Lecture	Practical	Tutorial	Continuous Assessment			SEE	Total
				TT1	TT2	Internal Assessment		
03	03	-	-	15	15	10	60	100

Prior knowledge of

Basic concept of applied physics, scalar and vector product, optics, quantum mechanics connects **is essential**

Course Objectives:

This course aims at enabling students:

1. To impart the knowledge of Physics in the area of Engineering and Technology.
2. To capable the student to explain the importance and application of physics in various fields of Engineering.
3. To identify the concept the fundamental physical principles underlying engineering technologies become successful engineering.

Course Outcomes:

On completion of the course, the learner will be able to:

CO1. Relate the scope and foundation of quantum mechanics & quantum computing and its role in development of modern technology.

CO2. Apply the foundations of Optics and Photonics in precision measurements indispensable for the development of modern communication technology.

CO3. Assimilate the concepts of Electrodynamics, which are prerequisite in modern developments for signal communications, Antenna Theory etc.

CO4. Explore basic sensing techniques for physical measurements in modern instrumentation.

Detailed Syllabus

Unit	Description	Duration (H)
I	**Quantum Physics & Computing** Introduction (Matter waves, De Broglie hypothesis, Wave Packet). Heisenberg Uncertainty Principle, Application of Heisenberg Uncertainty Principle (Non-existence of electron inside nucleus), Wave function; Physical interpretation of wave function. Schrodinger's time dependent wave equation; time independent wave equation, Particle trapped in one dimensional infinite potential well. Fundamentals of Quantum Computing (Difference between classical computing & quantum computing, Qubits, Quantum Superposition theorem, Quantum Entanglement theorem)	8
II	**Optics for Engineers** Thin Film Interference: Introduction (division of amplitude & Stoke's relation) Interference in thin film of constant thickness in reflected light, Formation of colors in thin film (point source & extended source); Interference in Wedge shaped film in reflected light; Formation of Newton's rings; Applications (Antireflecting & High reflecting films) Diffraction: Introduction (distinguish between interference & diffraction), Fresnel & Fraunhofer diffraction, Fraunhofer diffraction at single slit & double slit (qualitative), Diffraction Grating, Absent spectra, Resolving power & Dispersive power of a grating (qualitative), Applications.	8
III	**Photonics & Fiber Optics** Laser: Spontaneous emission and Stimulated emission, Metastable state, Resonant cavity, Population inversion, three & four level lasers, types of pumping, Helium Neon laser; Nd:YAG laser, Applications. Holography Fiber optics: Structure of an optical fiber, Types: Single mode & Multimode, Step index & Graded index, Numerical Aperture for step index fiber, Modes of	8

	propagation, V number, Attenuation, Applications (Optical fibre Transmission).	
IV	**Electrodynamics** Scalar and Vector fields, Physical significance of gradient, divergence, and curl in Cartesian coordinate system. Statement of Stokes and Divergence theorem, Basic laws of Electricity & Magnetism. Displacement Current Maxwell's equations (Free space and time varying fields) & Significance	6
V	**Physics of Sensors** Ultrasonic sensors: Concept of inverse piezoelectricity, Ultrasonic transducer as distance meter, Magnetostriction oscillator & Piezoelectric oscillator, Applications of ultrasonic waves. Light sensors: Photodiode & LDR (Principle, working & Applications) Types of semiconductors, Concept of Fermi level, Effect of doping, conductivity in semiconductors. Hall sensor: (Principle of Hall effect, working & Applications) IR sensor: (Principle, working & Applications)	10
Total		**40**

References:

Text Books:

1. Engineering Physics – M.N. Avadhanulu and P.G. Kshirsagar.S. Chand and Company LTD.
2. Engineering Physics by K. Thiyagarajan McGraw Hill Education (India) Private Limited.
3. Engineering Physics, V. Rajendran, Tata Mc Graw Hill Book Publishers
4. Modern Engineering Physics- A.S. Vasudeva S. Chand and Company LTD.

Textbook of Engineering Physics- Dr. P. S. Aithal and Dr. H. J. Ravindra Acme Learning Private Limited New Delhi.

Reference Books:

1. Concept of Modern Physics – Arthur Beizer. Tata McGraw-Hill Publishing Company Limited.
2. Engineering Physics - R.K. Gaur andS. L. Gupta. Dhanpat Rai Publications Pvt. Ltd.- New Delhi.
3. Optics –Ajoy Ghatak. MacGraw Hill Education (India) Pvt. Ltd.
4. Science of Engineering Materials- C.M. Srivastava and C. Srinivasan. New Age International Pvt. Ltd.
5. Introduction to Solid State Physics – Charles Kittel. John Willey and Sons
6. Fundamental of Physics - Halliday and Resnik. Willey Eastern Limited.

Nanotechnology: An Introduction to Synthesis, Properties and Applications of Nanomaterials – Thomas Varghese, K. M. Balakrishna.

Prepared by **Verified by** **Academic Coordinator** **HOD** **Dean**

Program:	First Year B. Tech. (Common to all branches)				Semester: I / II	
Course:	Engineering Physics Lab				Code:	
Credit	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks		
	Lecture	Practical	Tutorial	TW	PR & OR	Total
01	-	02	-	25	25	50

Course Objectives:

This course aims at enabling students:

1. To Understand the Fundamental Principles of Optics.
2. To provide some introduction to the laser, fiber optic communication
3. To provide knowledge of semiconductor physics.
4. To provide practical experience with advanced Experimental Techniques in Physics.

Course Outcomes:

After learning the course, the students will be able to:

1. Determine the Optical properties of material.
2. Determine the wavelength of He-Ne Laser and numerical aperture of optical fibre.
3. Determine the various properties of semiconducting materials.
4. Demonstrate with advanced experimental techniques in Physics.

Guidelines for Students:

The laboratory practical is to be submitted by students in the form of a journal.

1. Journal consists of prologue, Certificate, table of contents, and handwritten write-up of each practical.
2. Each assignment write-up should have Title, Objectives, out comes, Theory- Concept in brief, and Conclusion.

Guidelines for Laboratory/Term Work Assessment:

1. Continuous assessment of laboratory work is based on overall performance and Laboratory practical performance of student.
2. Each Laboratory practical assessment will assign grade/marks based on parameters with appropriate weightage.
3. Suggested parameters for overall assessment as well as each Laboratory practical assessment include- timely completion, performance, innovation, efficient codes, punctuality, and neatness**.**

Guidelines for Laboratory Conduction

1. Understand the Theory Behind the Experiment.
2. Ensure Proper Setup and Calibration of Equipment.
3. Follow Safety Protocols and Best Practices
4. Collect data systematically, ensuring accuracy in measurements.
5. Record all observations and results promptly and clearly in the lab notebook.

Detailed Syllabus

Suggested List of Experiments

(Minimum 13 experiments are to be performed based on contents from syllabus)

Experiment No.	Experiment Title
1.	Determination of Planck's constant using LED.
2.	Laser - Determination of wavelength of He-Ne laser light.
3.	Study of I-V characteristics of P-N junction diode
4.	Study of I-V characteristics of Zener Diode
5.	Study of I-V characteristics of LED.
6.	To find out the numerical aperture of a given optical fiber
7.	Determination of radius of curvature of a lens using Newton's ring set up.
8.	Measurement of Energy Band gap energy of Semiconductors
9.	Hall Effect - Determination of Hall Coefficient
10.	Study of Half shade Polarimeter
11.	Simulation experiments on sensors.

12.	Determination of grating element & no. of lines/cm using CD.
13.	G.M. Counter - Determination of operating voltage of G.M. tube
14.	Study of ultrasonic distance meter/ interferometer.
15.	Determination of grating element & no. of lines/cm using Ruler.
	References: **Text Books**: 1. A Manual on Experiments in Physics, R Srinivasan, K R Premolar and T G Ramesh 2. Engineering Physics - Laboratory Manual, Dr. D. Zarena, Nitya Publications, Bhopal **Reference Books:** 1. Engineering Physics Laboratory Experiments (For all discipline engineering students) by Supriya Subramani, Scholars Press

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Program:	First Year B. Tech. (Common to all branches)						Semester: I / II	
Course:	Engineering Chemistry						Code:	
Credit	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks				
				Continuous Assessment			SEE	Total
	Lecture	Practical	Tutorial	TT1	TT2	Internal Assessment		
03	03	-	-	15	15	10	60	100

Prior knowledge of

Fundamental knowledge of chemistry, Knowledge of chemical reactions & properties of matter is essential.

Course Objectives:

This course aims at enabling students:

1. To obtain a strong hold on basic concepts of Chemistry that form fundamental principles of technology.
2. To give exposure to recent material development in the field of engineering.

Course Outcomes:

After learning the course, the students will be able to:

1. Identify the parameters responsible for water pollution using suitable methods of water treatment.
2. Recognize properties of materials and alloys with phase transformation.
3. Analyze the quality of fuel for energy efficiency.
4. Describe applications based on nanomaterials and modern polymers in engineering techniques.
5. Recognize new approaches of chemical analysis, which are more convenient, less hazardous and sustainable to perform.

Detailed Syllabus

Unit	Description	Duration (Hrs.)
I	**Water Technology** • Introduction, Various impurities in water. • Hard and soft water, Disadvantages of hard water: In Domestic & Industrial use. • Water characteristics- Hardness: Temporary and Permanent, Units of hardness. • Hardness determination by EDTA method. • Alkalinity of water. • Softening of water: (i) Zeolite process, (ii) Ion exchange process (iii) Hot Lime-Soda process. • Desalination of Brackish water by Reverse osmosis (RO). • Dissolved oxygen (DO) and its determination by Winkler's method.	9
II	**Phase Rule and Applications** • Introduction, Explanation of the terms with suitable examples – Phase, Components, Degrees of freedom. • Statement of Gibb's phase rule with equation. • Phase diagram of One component system: Water & Sulphur system. • Statement of Reduced phase rule with equation. • Two components system- Eutectic system: Applications: Phase diagram of Silver-Lead alloy system. • Advantages and Limitations of phase rule.	7
III	**Fuels** • Introduction, classification, characteristics of a good fuel. • Calorific value: Definition, Units, Gross & Net calorific value and Relation between them. • Bomb and Boy's calorimeter & numerical for calculations of Gross and Net calorific values. • Solid fuels: Coal, Various types of Coal, Analysis of coal: Proximate and Ultimate (C, H, N, S, O).	9

	• Liquid fuels: Mining and Refining of Petroleum. • Gaseous fuels: Natural gas, CNG, LPG • Power alcohol • Green fuel: Biodiesel (Synthesis and advantages).	
IV	**Engineering Materials** **(A) Nanomaterials:** • Introduction to nanomaterials. • Allotropes of Carbon: Diamond, Graphite, Fullerenes, Amorphous carbon: Properties and Applications. • Carbon nanotubes (CNT): Types, Properties, Method of preparation (Laser, CVD) and applications. **(B) Polymers:** • Compounding of plastic, Fabrication of plastic by Compression, Injection, Transfer and Extrusion moulding. • Effect of heat on polymers (glass transition temperature), Viscoelasticity. • Conducting Polymers and applications.	8
V	**Sustainable approach to Chemistry** **(A) Green Chemistry:** • Introduction: Definition, significance. Twelve Principles of green chemistry. • Conventional and green synthesis of: (i) Adipic acid (ii) Polycarbonate (iii) Indigo dye • Green solvent: Supercritical CO_2 **(B) Spectroscopic Techniques and Applications:** • Introduction: Electromagnetic spectrum, its origin, properties and applications. • Spectroscopy: Principle, classification and types, Relation between electromagnetic spectrum, spectroscopy types and energy changes. • Flame Photometry: Principle, Instrumentation, working, applications, interferences, advantages and disadvantages. • Introduction to florescence and phosphorescence. Applications of fluorescence.	9
Total		**41**

References:

Text Books:

1. Jain P.C & Jain Monica, Engineering Chemistry, Dhanpat Rai & Sons, Delhi, 1992.
2. Bhal &Tuli, Text book of Physical Chemistry, S. Chand & Company, New Delhi.
3. Elementary Organic Spectroscopy-Y.R. Sharma (S Chand)
4. Shikha Agarwal, Engineering Chemistry- Fundamentals and applications, Cambridge Publishers - 2015.
5. An introductory text on green chemistry: for undergraduate students/Indu Tucker Sidhwani, Rakesh Kumar Sharma (Wiley)
6. Nanomaterials/ A.K. Bandyopadhyay (New Age Publishers).

Reference Books:

1. O. G. Palanna, Engineering Chemistry, Tata McGraw-Hill Publication, New Delhi.
2. WILEY, Engineering Chemistry, Wiley India, New Delhi 2014.
3. S. S. Dara, Engineering Chemistry, McGraw Hill Publication, New Delhi.
4. Willard, Hobart H.; Merritt, Lynne L., Jr.; Dean, John A. Instrumental Methods of Analysis, American Chemical Society.
5. Fundamentals of molecular spectroscopy- Colin N. Banwell (Tata McGraw-Hill Publications).
6. Green Chemistry-V.K. Ahluwalia (Narosa Publications).
7. Basic Atomic and Molecular Spectroscopy/J. Michael Hollas (Royal Society of Chemistry).
8. Nanotechnology: An Introduction to Synthesis, Properties and Applications of Nanomaterials/ Thomas Varghese & K.M. Balakrishna (Atlantic).

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Program:	First Year B. Tech. (Common to all branches)				Semester: I / II	
Course:	Engineering Chemistry Lab				Code:	
Credit	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks		
	Lecture	Practical	Tutorial	TW	PR & OR	Total
01	-	02	-	25	25	50

Course Objectives:

This course aims at enabling students:

1. Students can apply the theoretical concepts they learn in the classroom to real-world situations.
2. Students can learn how to measure, analyse, and differentiate between chemical processes.
3. Students can learn how to use laboratory equipment and techniques for analysis and purification.
4. Students can learn how to safely work in a laboratory environment.

Course Outcomes:

After learning the course, the students will be able to:

1. Determine water quality parameters using standard analytical techniques.
2. Apply titrimetric and instrumental methods for quantitative chemical analysis.
3. Perform experiments to evaluate properties of oils, coal, and industrial samples.
4. Demonstrate synthesis and analytical skills through preparation and characterization experiments.

Guidelines for Students:

1. The laboratory assignments are to be submitted by students in the form of a journal.
2. Journal consists of prologue, Certificate, table of contents, and handwritten write-up of each assignment.
3. Each experiment write-up should have Aim, Theory- Concept in brief, Observation, Observation Table, Calculations and Result.

Guidelines for Laboratory/Term Work Assessment:

1. Continuous assessment of laboratory work is based on overall performance and Laboratory experiments performance of student.
2. Each Laboratory experiment assessment will assign grade/marks based on parameters with appropriate weightage.
3. Suggested parameters for overall assessment as well as each Laboratory experiment assessment include- timely completion, performance, viva, and neatness.

Suggested List of Experiments

(Minimum 13 experiments are to be performed based on contents from syllabus)

Experiment No.	Experiment Title
1.	To determine Acidity of water sample.
2.	To determine Alkalinity of water sample.
3.	Determination of Hardness of water sample by EDTA method.
4.	Determination of Dissolve oxygen in water by Winkler's (Iodometric) method.
5.	Determination of Percent purity of Bleaching Powder.
6.	Determination of Acid value of an oil sample.
7.	Determination of Chloride content in water sample by Mohr's method.
8.	P^H-metric Titration (Acid Base titration)
9.	Conductometric Titration (Acid Base titration)
10.	Determination of Viscosity liquid sample.
11.	Determination of surface Tension of a given liquid using Stalgmometer by drop number method.
12.	Determination of Saponification value of an oil sample.
13.	To determine strength of $KMnO_4$ solution using Standard Mohr's salt solution
14.	Preparation of Phenol formaldehyde (PF) / Urea formaldehyde (UF) resin.
15.	Preparation of biodiesel from vegetable oil.
16.	Determination of Moisture content of coal.
17.	To validate Beer-Lambert law using UV Spectrophotometer/ colorimeter.
18.	To determine metal ion concentration using colorimeter.

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Program:	First Year B. Tech. (Common to all branches)						Semester: I	
Course:	Structured Programming using C						Code:	
Credit	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks				
	Lecture	Practical	Tutorial	Continuous Assessment			SEE	Total
				TT1	TT2	Internal Assessment		
02	02	-	-	15	15	10	60	100

Prior knowledge of: Problem Solving

Course Objectives:

This course aims at enabling students:

1. To introduce fundamental computer concepts, algorithms, flowcharts, and the basic building blocks of C programming.
2. To develop logical thinking through the use of decision-making and looping control structures in C.
3. To enable modular programming by using user-defined functions, recursion, and different storage classes.
4. To impart knowledge of arrays, strings, and structures for organizing and manipulating data efficiently.
5. To understand the concept and usage of pointers for dynamic memory access and advanced parameter passing techniques.

Course Outcomes:

On completion of the course, the learner will be able to:

1. Understand the architecture of computers and apply basic C programming concepts to write structured programs using variables, operators, and I/O functions.
2. Apply branching and looping constructs to solve real-life problems using structured programming in C.
3. Design reusable code using functions, recursion, and effectively manage memory using appropriate storage classes.
4. Implement programs using arrays, strings, and structures for handling and processing collections of data.
5. Use pointers for accessing memory directly and implement both call by value and call by reference in functions.

Detailed Syllabus

Unit	Description	Duration (H)
I	**INTRODUCTION TO COMPUTER, ALGORITHM AND FLOWCHART:** 1.1 The turing machine architecture, the von Neumann architecture, Number system 1.2 Introduction to operating sytsem components 1.3 System and application software 1.4 Algorithm & Flowchart: Three constructs of Algorithm and flowchart: Sequence, Decision (Selection) and Repetition, Compilation process: Syntax and semantic errors, **FUNDAMENTALS OF C-PROGRAMMING:** 1.1 Character Set, Identifiers and keywords, Data types, Constants, Variables. 1.2 Operators-Arithmetic, Relational and logical, Assignment, Unary, Conditional, Bitwise, Comma, and other operators. Expression, statements, Library Functions, Preprocessor. 1.3 Data Input and Output – getchar (), putchar (), scanf (), printf (), gets (), puts (), Structure of C program.	7

II	**CONTROL STRUCTURES:** 2.1 Decision making with Branching - If statement, If-else Statement, Switch case statement 2.2 Looping – while, do-while, for 2.3 Nested control structure 2.4 Continue statement, Break statement, goto statement.	5
III	**FUNCTIONS AND PARAMETER:** 3.1 Function -Introduction of Function, defining a Function, accessing a Function, Function Prototype, Passing Arguments to a Function, Designing Recursive function 3.2 Storage Classes –Auto, Extern, Static, Register	3
IV	**ARRAYS, STRING, STRUCTURE:** 4.1 Array-Concepts, Declaration, Definition, accessing array element, One-dimensional and Multidimensional array, Passing Arrays to Function 4.2 String- Basics of String, Functions in string.h, user defined function for string handling 4.3 Structure- Declaration, Initialization, structure within structure, Operation on structures, Array of Structure, Structure padding.	7
V	**POINTERS:** 5.1 Introduction, Definition and uses of Pointers, Address Operator, Pointer Variables 5.2 Pointer Arithmetic 5.3 Call by value, call by Reference	4
	Total	**26**

Text Books:

5. MASTERING C" by K.R.Venugopal and Sudeep R.Prasad , Tata McGraw-Hill Publications.
6. "A Computer Science –Structure Programming Approaches using C", by Behrouz Forouzan, Cengage Learning.
7. Schaum's outlines "Programming with C", by Byron S. Gottfried, Tata McGraw- Hill Publications.

Reference Books:

1. "Basics of Computer Science", by BehrouzForouzan , Cengage Learning.
2. "Programming Techniques through C", by M. G. Venkateshmurthy, Pearson Publication.
3. "Programming in ANSI C", by E. Balaguruswamy, Tata McGraw-Hill Education.
4. "Programming in C", by Pradeep Day and Manas Gosh, Oxford University Press.
5. "Let Us C", by Yashwant Kanetkar, BPB Publication. Dr. Guruprasad Nagraj, "C Programming for Problem Solving", Himalaya Publishing House. ISBN-978-93-5299-361-1.
6. K R Venugopal, Sudeep R Prasad, Mastering C, McGraw-Hill Education, 2019 ISBN 9332901287, 9789332901285

e-sources: NPTEL/SWAYAM Course

1. Introduction to programming in C by Prof. Satyadev Nandakumar, IIT Kanpur.
2. Problem solving through programming in C by Prof. Anupam Basu, IIT Kharagpur.

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Program:	First Year B. Tech. (Common to all branches)				Semester: I	
Course:	Structured Programming using C Lab				Code:	
	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks		
Credit	Lecture	Practical	Tutorial	TW	PR	Total
01	-	02	-	25	25	50

Prior knowledge of Basic computer, mathematical fundamentals, logical thinking, problem-solving skills, understanding of algorithms, and familiarity with loops, functions, and a text editor/IDE.

Course Objectives:

This course aims at enabling students:

1. To understand the fundamentals of computer architecture, algorithm design, flowchart construction, and basic C syntax including variables, data types, and input/output functions.
2. To develop problem-solving skills using branching and looping constructs to control program flow effectively.
3. To promote modular programming using functions, recursion, and appropriate storage classes.
4. To provide skills for effective data handling using arrays, strings, and structured data types.
5. To develop an understanding of pointers for direct memory access and implementing advanced data manipulation techniques.

Course Outcomes:

After learning the course, the students will be able to:

1. Apply fundamental concepts of algorithms and flowcharts to design and implement basic C programs using variables, expressions, and input/output functions.
2. Use conditional and looping control structures like if, switch, while, for, and do-while to solve mathematical and pattern-based problems.
3. Design modular code using user-defined and recursive functions with both call-by-value and call-by-reference parameter passing.
4. Manipulate collections of data using arrays, strings, and structures, including operations like searching, sorting, modification, and analysis.
5. Demonstrate proficiency in using pointers for operations like string comparison, array manipulation, and accessing data efficiently.

Guidelines for Laboratory Conduction:

1. Assignments should be implemented, recommended on coding platforms such as Hacker Rank, CodeChef.
2. Encourage students for appropriate use of Hungarian notation, proper indentation and comments.
3. Use of open-source software is to be encouraged.
4. Operating System recommended: - 64-bit Open-source Linux or its derivative.
5. Programming tools recommended: -GCC, Turbo C/C++, Eclipse.

Expt. No.	Suggested List of Experiments
1	Write a program to swap two variables' values with and without using third variables. Write algorithm and draw flowchart for the same.
2	Write a program to check odd or even number: (a) using modulus operator (b) using conditional operator.
3	Design and develop a C program to read a year as an input and find whether it is leap year or not. Also consider the end of the centuries. Write algorithm and draw flowchart for the same.
4	Write a C program to find the sum of individual digits of a 3-digit number.
5	Design and develop a flowchart or an algorithm that takes three coefficients (a, b, and c) of a Quadratic equation (ax2 +bx+c=0) as input and compute all possible roots. Implement a C program for the developed flowchart/algorithm and execute the same to output the possible roots for a given set of coefficients with appropriate messages.
6	Write a program to count the number of digits in a given integer.
7	Write a menu driven program to perform simple arithmetic operations based on the user's choice. The user will indicate the operation to be performed using the signs e.g., + for addition, etc. Write an algorithm and draw flowchart for same.
8	Write a program to read a number of more than one digit, reverse the number and display the sum of digits of numbers. Write algorithm and draw flowchart for the same.
9	Write programs to display each of the following patterns.

	A)1 2 1 3 2 1 4 3 2 1 5 4 3 2 1 B) A ABA ABCBA ABCDCBA ABCDEDCBA
10	Write a C program to find maximum and minimum between two numbers using functions. Write algorithm and draw flowchart for the same.
11	Write C program to find GCD of two integers by using recursive function.
12	Write a C program to find both the largest and smallest number in a list of integers. Write algorithm and draw flowchart for the same.
13	Develop, implement and execute a C program that reads two matrices A (m x n) and B (p x q) and Compute product of matrices A and B. Read matrix A and matrix B in row major order and in column 14 15 16 17 18 19 20 major order respectively. Print both the input matrices and resultant matrix with suitable headings and output should be in matrix format only.
14	Write a Program for deletion of an element from the specified location from Array.
15	Write a C program using user defined functions to determine whether the given string is palindrome or not.
16	Write C program to count the number of lines, words and characters in a given text.
17	Write a program to swap two numbers using a function. Pass the values to be swapped to this function using the call-by-value method and call-by-reference method.
18	Write a C program to find the length of the string using Pointer.
19	Write a program to copy one array to another using pointer.
20	Write a program to compare two strings using Pointer.

Text Books:

1. MASTERING C" by K.R.Venugopal and Sudeep R.Prasad , Tata McGraw-Hill Publications.
2. "A Computer Science –Structure Programming Approaches using C", by Behrouz Forouzan, Cengage Learning.
3. Schaum's outlines "Programming with C", by Byron S. Gottfried, Tata McGraw- Hill Publications.

Reference Books:

1. "Basics of Computer Science", by BehrouzForouzan , Cengage Learning.
2. "Programming Techniques through C", by M. G. Venkateshmurthy, Pearson Publication.
3. "Programming in ANSI C", by E. Balaguruswamy, Tata McGraw-Hill Education.
4. "Programming in C", by Pradeep Day and Manas Gosh, Oxford University Press.
5. "Let Us C", by Yashwant Kanetkar, BPB Publication. Dr. Guruprasad Nagraj, "C Programming for Problem Solving", Himalaya Publishing House. ISBN-978-93-5299-361-1.
6. K R Venugopal, Sudeep R Prasad, Mastering C, McGraw-Hill Education, 2019 ISBN 9332901287, 9789332901285

e-sources: NPTEL/SWAYAM Course

1. Introduction to programming in C by Prof. Satyadev Nandakumar, IIT Kanpur.
2. Problem solving through programming in C by Prof. Anupam Basu, IIT Kharagpur.

Minimum 13-15 experiments from the above suggested list or any other experiment based on syllabus will be included, which would help the learner to apply the concept learnt.

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Program:	First Year B. Tech. (Common to all branches)						Semester: I / II	
Course:	Computational Engineering Mechanics						Code:	
Credit	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks				
	Lecture	Practical	Tutorial	Continuous Assessment			SEE	Total
				TT1	TT2	Internal Assessment		
02	02	-	-	15	15	10	60	100

Prior knowledge of

1. Basics of Trigonometry and Matrices.
2. Newton's Laws of motion.

Course Objectives:

This course aims at enabling students:

1. To acquaint learners with the concept of equilibrium.
2. To familiarize learners to analyze the motion of moving objects/bodies.

Course Outcomes:

After learning the course, the students will be able to:

1. Illustrate the effect of force and moment to determine the resultant of force system
2. Apply the concept of equilibrium systems with the help of free body diagram.
3. Analyze and solve problems on friction and centroid of composite sections using principles of engineering mechanics.
4. Apply kinematic principles and laws of motion to analyze rectilinear motion of particles under various acceleration conditions, including gravity.
5. Analyze general plane motion of rigid bodies.

Guidelines For Assessment

** The marked content in the syllabus will be completed through computer-based assessment in the college premises and shall not be considered for the theory examination.

Detailed Syllabus

Unit	Description	Duration (H)
I	**Computation and analysis of System of Forces (Co-planar):** Concept of force, Principle of transmissibility, Composition and resolution of forces. Moment of force about a point, Varignon's Theorem. Various systems of forces. Couples. Force couple system, Resultant of coplanar force system. **Introduction to programming software packages (Python/MATLAB/Scilab or any other suitable software), Application of software packages for determination of Resultant.	6
II	**Computation and analysis of Equilibrium Systems:** Conditions of static equilibrium. Free body diagram. Various types of supports and support reactions. Equilibrium of Connected Bodies. Types of Beams and various types of loads. Determination of reactions at supports for beams. ** Application of software packages for analysis of bodies in equilibrium.	6
III	**Computation and analysis of Frictional force and Centroid:** Concept of Static Friction and Dynamic/ Kinetic Friction, Laws of dry friction, Coefficient of Friction, Angle of Friction, Concept of Cone of friction. Angle of Repose, Numerical on block friction, (Numerical on Wedge and Ladder friction excluded), Centroid of Composite Section. ** Application of software packages to find centroid of irregular shaped bodies	6
IV	**Kinematics: Linear motion & Motion Under Gravity** Types of motion, laws of motion, kinematics of particles, rectilinear motion, constant and variable acceleration, study of motion diagrams, motion under gravity ** Programming for Plotting of Motion Curves.	6

V	**Robot Kinematics:** General Plane motion of Rigid body. The concept of instantaneous center of rotation (ICR) for the velocity. Velocity analysis of rigid body using ICR. Applications of Mechanics in Robotics, Machine Learning and AI. ** Application of software packages for simulating Kinematics of Rigid Body.	6
Total		**30**

References:

Text Books:

1. Bhavikatti S. S., Rajashekarappa K., Engineering Mechanics, New Age International Publications, 7th Edition.
2. A. K. Tayal, Engineering Mechanics, 14th Edn., Umesh Publication, 2011.
3. S. Ramamrutham, Engineering Mechanics, Dhanpat Rai Publishing company, 2016.
4. R. S. Khurmi, Engineering Mechanics, S. Chand Publication, 20th Edition

Reference Books:

1. R. C. Hibbeler, Enginering Mechanics, Pearson education, 12th Edn., 2010.
2. Rajasekaran S and Sankarasubramanian G., "Engineering Mechanics Statics and Dynamics", 3rd Edn., Vikas Publishing House Pvt. Ltd., 2005.
3. Beer, F. P. & Johnston, E. R., Vector Mechanics for Engineers - Statics and Dynamics, 3rd Edn., Tata McGraw Hill Publishing Company, 2001.
4. Bhattacharya B., Engineering Mechanics, 3rd Edn., Oxford University press, 2008.
5. Ramkumar Agarwal, Engineering Mechanics, 1 st Edn., Agarwal Education Centre: Self Publication, 2021.
6. Nelson and Mc Lean, Engineering Mechanics, 5th Edn., Tata McGraw Hill, 1997.
7. Harsh Bhasin, Python for Beginners, 1st Edn., New Age International Publishers, 2018.
8. M. Groover, CAD/CAM: Computer-Aided Design and Manufacturing, 1st Edn., Pearson Education India, 2013.
9. Rudra Pratap, Getting Started with MATLAB: A Quick Introduction for Scientists & Engineers, 1st Edn., Oxford University Press, 2010.

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Program:	First Year B. Tech. (Common to all branches)				Semester: I / II	
Course:	Computational Engineering Mechanics Lab				Code:	
Credit	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks		
	Lecture	Practical	Tutorial	TW	PR & OR	Total
01	-	02	-	25	25	50

Course Objectives:

This course aims at enabling students:

1. To develop fundamental understanding of mechanics principles through physical and virtual experimentation.
2. To enhance analytical and computational skills using practical applications and programming in mechanics.

Course Outcomes:

After learning the course, the students will be able to:

1. Verify fundamental laws of mechanics like force equilibrium, friction, and momentum through laboratory experiments.
2. Determine support reactions and moments using graphical and analytical methods.
3. Develop and execute simple programs to solve mechanics problems using appropriate software tools.
4. Demonstrate motion simulation and analyze rigid body kinematics using 2D transformations and motion curves.

Guidelines for Students:

1. The laboratory assignments are to be submitted by students in the form of a journal.
2. Journal consists of prologue, Certificate, table of contents, and handwritten write-up of each assignment.
3. Each experiment write-up should have Aim, Theory- Concept in brief, Observation, Observation Table, Calculations and Result.

Guidelines for Laboratory/Term Work Assessment:

1. Continuous assessment of laboratory work is based on overall performance and Laboratory experiments performance of student.
2. Each Laboratory experiment assessment will assign grade/marks based on parameters with appropriate weightage.
3. Suggested parameters for overall assessment as well as each Laboratory experiment assessment include- timely completion, performance, viva, and neatness.

Detailed Syllabus

Suggested List of Experiments

(Minimum 13 experiments are to be performed based on contents from syllabus)

Experiment No.	Experiment Title
1.	Verification of Polygon law of coplanar forces.
2.	Verification of law of Moment using Bell crank lever.
3.	Determination of Support reaction for beam.
4.	Determination of coefficient of friction using Inclined plane.
5.	Verification of Lami's theorem using Jib crane.
6.	Resultant of non-concurrent non-parallel coplanar force system
7.	Determination of coefficient of restitution for Collision of elastic bodies (Law of conservation of momentum).

8.	Verification of law of Machine using Screw jack
9.	Verification of law of Machine using Single and Double Gear Crab
10.	Moment of Inertia of fly wheel.
11.	Problems on beam reaction by graphics statics method
12.	Programming exercises on determination of Resultant of Coplanar Force System.
13.	Programming exercises on determination of Support Reaction.
14.	Programming exercises on Friction
15.	Plotting of Motion Curves
16.	Programming exercises on transformations of basic geometric 2D elements
17.	Simulating Kinematics of Rigid Body
18.	Any other innovative experiment relevant to Engineering Mechanics.

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Program:	First Year B. Tech. (Common to all branches)						Semester: I / II	
Course:	Engineering Graphics						Code:	
Credit	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks				
				Continuous Assessment			SEE	Total
	Lecture	Practical	Tutorial	TT1	TT2	Internal Assessment		
02	02	-	-	15	15	10	60	100

Prior knowledge of

Basic concepts of geometry, spatial visualization, engineering tools, and basic drawing instruments is essential

Course Objectives:

This course aims at enabling students:

1. To understand the fundamentals of engineering graphics and develop skills in graphical representation and visualization.
2. To interpret and construct technical drawings relevant to various engineering applications.
3. To apply the principles of projection and drawing techniques as a foundation for advanced studies in design and manufacturing.

Course Outcomes:

After learning the course, the students will be able to:

CO1-*Explain* the fundamental principles of engineering graphics, types of lines and dimensions, and *demonstrate* projections of points using standard drawing conventions.

CO2 – *Construct* projections of lines and planes in various orientations and *calculate* their true lengths and inclinations using auxiliary views.

CO3 – *Draw* projections of regular solids placed in different positions with respect to reference planes using appropriate projection techniques.

CO4 – *Analyze* the sectional views of solids and *develop* the lateral surfaces of geometric solids for fabrication-related applications.

CO5 – *Interpret* orthographic views and *construct* corresponding isometric drawings to represent 3D objects pictorially.

Detailed Syllabus

Unit	Description	Duration (H)
I	**Unit 1: Basics of Engineering Graphics and Projections of Points** • Introduction to Engineering Graphics • Drawing instruments • Types of Line • Types of dimensioning, • Geometrical shapes • Theory of Projection • Methods of projection (1st and 3rd angle method) • Projection of points in all four quadrants	04
II	**Projection of Lines and Planes** • Projection of lines inclined to one or both reference planes • Determination of true length and true inclination • Traces of lines • Projection of planes (perpendicular, inclined, and oblique) • Auxiliary plane	06

III	**Projection of Solids** • Introduction to solids: Prisms, Pyramids, Cones, Cylinders • Position of solids: Axis perpendicular/inclined to HP/VP • Use of auxiliary views to draw the projections of solids	06
IV	**Sections and Development of Solids** • Sectioning of solids using different cutting planes • True shape of section • Development of lateral surfaces of solids like prisms, cylinders, pyramids, and cones	04
V	**Orthographic and Isometric Views** • Principles of orthographic projection: First-angle and third-angle • Interpretation of given orthographic views • Isometric scale, axes • Isometric drawing or Isometric Views	06
Total		**26**

References:

Text Books:

1. N.D. Bhatt, *Engineering Drawing*, Charotar Publishing House, Anand, 53rd Edition, 2016.
2. P.S. Gill, *Engineering Drawing*, S.K. Kataria & Sons, New Delhi, Latest Edition.
3. K.R. Gopalakrishna, *Engineering Drawing (Vol I & II)*, Subhas Publications, Bangalore.
4. Dhananjay A. Jolhe, *Engineering Drawing with an Introduction to AutoCAD*, Tata McGraw Hill, New Delhi.
5. Shah M.B. & Rana B.C., *Engineering Drawing*, Pearson Education, New Delhi, 2nd Edition.

Reference Books:

1. French T.E. & Vierck C.J., *Engineering Drawing and Graphic Technology*, McGraw-Hill Book Co.
2. Luzzader W.J. & Duff J.M., *Fundamentals of Engineering Drawing*, Prentice Hall of India.
3. Venugopal K. & Prabhu Raja V., *Engineering Graphics*, New Age International Publishers, New Delhi.
4. Basant Agrawal & C.M. Agrawal, *Engineering Drawing*, Tata McGraw Hill Publishing Company Ltd.
5. Narayanan K.L. & Kannaiah P., *Engineering Graphics*, Scitech Publications, Chennai.

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Program:	First Year B. Tech. (Common to all branches)				Semester: I / II	
Course:	Engineering Graphics Lab				Code:	
Credit	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks		
	Lecture	Practical	Tutorial	TW	PR & OR	Total
01	-	02	-	25	25	50

Course Objectives:

This course aims at enabling students:

To acquire hands-on experience in engineering drawing by practicing various projection methods and geometric constructions used in technical design and drafting

Course Outcomes:

After learning the course, the students will be able to:

CO1: Draw basic elements of engineering graphics such as lines, lettering, and dimensioning with accuracy.
CO2: Construct standard geometrical figures and perform orthographic projections of points, lines, and planes.
CO3: Create projections and sectional views of solids using first-angle projection techniques.
CO4: Develop isometric views of simple and combined objects from orthographic views.

Guidelines for Students:

1. Students must bring the required drawing instruments, sheets, and completed previous work to each practical session.
2. All drawings should be done with neatness, proper lettering, and correct dimensioning, following the instructions given.
3. Attendance, timely submission of sheets, and active participation during lab sessions are mandatory.

Guidelines for Laboratory/Term Work Assessment:

1. Assessment shall be based on accuracy, completeness, and neatness of each drawing sheet submitted.
2. Continuous evaluation will be done through regular viva voce, timely submissions, and understanding of drawing concepts.
3. Final term work marks will consider performance in all sheets, attendance, and overall lab discipline.

Detailed Syllabus

Suggested List of Experiments

Experiment No.	Experiment Title
1.	Lines, lettering and dimensioning
2.	Projections of points
3.	Projections straight lines
4.	Projections of planes
5.	Projections of solids- Sheet 1
6.	Projections of solids- Sheet 2
7.	Section of solids
8.	Development of Lateral Surfaces
9.	Orthographic Projections- Sheet 1
10.	Orthographic Projections- Sheet 2
11.	Isometric View- Sheet 1
12.	Isometric View- Sheet 2
13.	Introduction to AUTOCAD

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Program:	First Year B. Tech. (Common to all branches)						Semester: I / II	
Course:	Basic Electrical Engineering & Digital Electronics						Code:	
Credit	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks				
	Lecture	Practical	Tutorial	Continuous Assessment			SEE	Total
				TT1	TT2	Internal Assessment		
02	02	-	-	15	15	10	60	100

Pre-requisite:
1. Knowledge of basic physics.
2. Knowledge of basic mathematics

Course Objectives:
1. To develop basic understanding of concepts of DC and AC circuits and analyse their operations using various techniques.
2. To get an insight of digital electronics.

Course Outcomes:
On completion of the course, the learner will be able to:
1. Apply the knowledge of theorems/laws to analyse the DC circuits.
2. Analyse single phase AC circuits.
3. Demonstrate knowledge of basic number system, logic gates and sequential circuits.

Detailed Syllabus

Unit	Description	Duration (H)
I	**DC Circuits** • Introduction to ideal and practical voltage and current sources • Kirchhoff's current and voltage laws • Mesh and Nodal analysis •Super node and Super mesh analysis.	5
II	**DC Network Theorems** • Source Transformation • Star – Delta Transformation • Superposition Theorem • Thevenin's Theorem • Maximum Power Transfer Theorem	6
III	**AC Circuits** • Generation and representation of alternating voltage and currents • RMS and Average value • Phasor representation • AC through resistance, inductance and capacitance • R-L-C series, parallel circuits • Calculation of power and power factor	10
IV	**Number Systems and Logic Gates** • Review of number system • Decimal, Binary, Binary coded decimal, Octal, and Hexadecimal number systems and conversions • Basic gates • Universal gates • Boolean algebra • De Morgan's Laws	5
V	**Latches and Flip flops** • Introduction to Latches • Flip-flops: RS, JK, T, D flip-flops	4
Total		**30**

Text Books:

1. B. R. Patil, “Basic Electrical Engineering”, Oxford Higher Education, 2016.
2. R. R. Singh, “Network Analysis and Synthesis”, McGraw Hill, 2nd Edition, 2019.
3. R. S. Sedha, “A textbook of Electronic Devices and Circuits”, S. Chand, 2002.
4. R. P. Jain, “Modern Digital Electronics”, McGraw Hill, 2011.

Reference Books:

1. D. P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 2010.
2. D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009.
3. E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010.
4. V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989.
5. M. Morris Mano, “Digital design”, Prentice Hall India.

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Program:	First Year B. Tech. (Common to all branches)				Semester: I / II	
Course:	Basic Electrical Engineering & Digital Electronics Lab				Code:	
Credit	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks		
	Lecture	Practical	Tutorial	TW	PR & OR	Total
01	-	02	-	25	25	50

Prior knowledge of
Basic physics, chemistry, and mathematics up to the intermediate level.

Course Objectives:
By the end of this course, students will be able to
1. To measure the electrical parameters for different types of DC circuits using conventional approach.
2. To understand the characteristics and applications of basic electronic devices.

Course Outcomes:
After completion of this course, student will be able to:
1. Analyze and Apply Circuit Analysis Techniques
2. Understand and Implement Basic Electronic Circuits
3. Design and Verify Digital Logic Circuits
4. Characterize Semiconductor Devices and Their Applications.

Detailed Syllabus

Suggested List of Experiments
(Minimum 13 experiments are to be performed based on contents from syllabus)

Experiment No.	Experiment Title
1.	Study of basic laboratory instruments. (compulsory)
2.	Verification of KCL and KVL
3.	Mesh and Nodal analysis.
4.	Verification of Superposition Theorem.
5.	Verification of Thevenin / Maximum Power Transfer Theorem.
6.	Study of R-L and R-C series circuits.
7.	R-L-C series resonance circuit.
8.	Verification of truth table for gates.
9.	Implementing a given logic function using basic gates/SSI ICs.
10.	Implementation of basic gates using universal gates.
11.	Calculate RMS, average and peak value of the signal using multi-meter and DSO.
12.	Study of V-I characteristics of PN junction diode.
13.	Study of Full wave rectifier using PN junction diode.
14.	Study of Zener diode as a voltage regulator.
15.	Mini Project

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Program:	First Year B. Tech. (Common to all branches)					Semester: I/ II		
Course:	Effective Communication Skills					Code:		
Credit	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks				
	Lecture	Practical	Tutorial	Continuous Assessment			SEE	Total
				TT1	TT2	Internal Assessment		
02	02	-	-	15	15	10	60	100

Pre-requisite: Basics of English.

Course Objectives:

1. To acquaint learners with the basics of communication with a focus on LSRW.
2. To develop the learners' proficiency in public speaking.
3. To enable learners to use business writing for effective communication.
4. To impart strategies for personal development.

Course Outcomes:

On completion of the course, the learner will be able to:

1. Apply fundamentals of communication to identify/overcome barriers in communication.
2. Develop LSRW to be effective in communicative situations.
3. Apply business writing for effective communication.
4. Employ personal development strategies and maintain a professional persona online.

Detailed Syllabus

Unit	Description	Duration (Hrs)
I	**FUNDAMENTALS OF COMMUNICATION** Introduction to Theory of Communication • Definition • Objectives • The Process of Communication Methods of Communication • Verbal Communication • Non-verbal Communication Barriers to Communication • Physical/Environmental • Mechanical • Linguistic • Psychological • Socio-Cultural Channels of communication in an organization • Formal (Upward, Downward and Horizontal) • Informal (Grapevine)	9
II	**SPEAKING SKILLS** Developing Verbal Aptitude • Synonyms & Antonyms • Identifying Common Errors • One Word Substitution • Pairs of Confused Words • Articles • Prepositions Public Speaking • Planning of speech • Delivery of speech (Non-verbal) • Dealing with stage fear	4

III	**READING SKILLS** • Mechanics of Reading • Types of Reading • Improving Reading Skills • Reading Comprehension • Summarization Techniques **LISTENING SKILLS** • Purpose of Listening • Process of Listening • Barriers to Listening • Techniques for Improving Listening Skills	4
IV	**WRITING SKILLS** Professional Letter writing • Seven Cs of Business Correspondence • Parts of a Formal Letter • Complete and Modified Block Formats • Types of Letters (Enquiry, Grievance and Sales) Email communication • Drafting effective Email • Email etiquette	6
V	**PERSONAL DEVELOPMENT PLANNING** • Self- Assessment strategies (SWOT Analysis) • Digital Footprints - Maintaining a Professional Persona • Goal Setting	3
Total		26

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Program:	First Year B. Tech. (Common to all branches)				Semester: I/ II		
Course:	Effective Communication Skills Lab				Code:		
Credit	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	TW	OR	PR	Total
01	-	02	-	25	-	25	50

Course Objectives:

1. To learn speaking effectively in formal and informal situations with proper articulation.
2. To help students to participate efficiently in Public Speaking, GDs and interviews.

Course Outcomes:

After learning the course, the students will be able to:

1. Speak effectively in formal and informal situations with proper articulation.
2. Participate efficiently in Public Speaking, GDs and interviews.

Guidelines for Students:

1. The laboratory assignments are to be submitted by students in a journal.
2. Journal consists of Certificate, table of contents and handwritten write-up of each assignment.

Guidelines for Laboratory/Term Work Assessment:

1. CA of laboratory is based on performance in activity and assignments of student.
2. Marks will be awarded to Assignment based on the parameters with appropriate weightage.
3. Suggested parameters for overall assessment include- timely completion, performance, innovation, punctuality and neatness.

Guidelines for Laboratory Conduction

1. Following activities to be conducted with the help of Wordsworth Language Laboratory.

Suggested List of Activities

Sr No.	**Following activities can be conducted for minimum 26 Hrs.** (Each activity should be conducted for 4Hrs)
1.	Introducing self and others
2.	Vocabulary development
3.	Introduction to IPA and Speech Organs
4.	Public Speaking
5.	Group Discussion
6.	Mock Interviews
7.	Drafting Business Letters

Note: Students will submit assignments on the above listed Activities (Any Five).

Text Books:

Rizvi, M.A. Effective Technical Communication. Tata MC Graw Hill, 2016

Reference Books:

Name of the Book	Author	Publisher	Edition	Year of Publication
Soft Skills: An Integrated Approach to Maximize Personality	Gajendra Singh Chauhan & Sngeeta Sharma	Wiley	2019 Edition	2016
English Grammar and Composition	Rajendra Pal, P. Suri et al	S. Chand	2024 Edition	2018

Practical English Usage	Michael Swan	OUP	4th Edition	1995
Remedial English Grammar	F. T. Wood	Macmillan	2014 Edition	2007
Communication Skills	Sanjay Kumar and Pushpa Lata	OUP	1st Edition	2011
Organizational Behaviour	K Ashwathappa	Himalaya Publishing House	12th Edition	2019
Professional Communication	Koneru, A.	McGraw Hill	-	2018
Word Power Made Easy	Lewis, N.	Random House USA.	-	2014
Effective Business Communication	Murphy, H.	McGraw-Hill	-	1999

Web Resources:

1. Wordsworth Language Laboratory
2. https://onlinecourses.nptel.ac.in/
3. https://swayam.gov.in/
4. https://www.coursera.org/
5. https://www.duolingo.com/

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Program:	First Year B. Tech. (Common to all branches)						Semester: II	
Course:	Engineering Mathematics-II						Code:	
Credit	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks				
	Lecture	Practical	Tutorial	Continuous Assessment			SEE	Total
				TT1	TT2	Internal Assessment		
03	03	-	-	15	15	10	60	100

Prior knowledge of

1. Methods of integration.
2. Methods of differentiation.
3. Basics of differential equations.

Course Objectives:

The course is aimed to develop the Mathematical and basic Statistical skills of engineering students that are imperative for effective understanding of engineering subjects. The topics introduced will serve as basic tools for specialized studies in many fields of engineering and technology.

Course Outcomes:

On completion of the course, the learner will be able to:

1. Solve various types of First Order and Higher Order Linear Differential Equations.
2. Apply the principles of Numerical Method for solving differential equation and numerical integration
3. Illustrate the concepts of Beta and Gamma function, DUIS and tracing of plane curves.
4. Solve Multiple integrals. Apply the concepts of Multiple Integrals to find Area and Volume

Detailed Syllabus

Unit	Description	Duration (Hrs.)
I	**Differential Equations of First Order and First Degree:** 1.1 Exact differential Equations, Equations reducible to exact form by using four rules of integrating factors. 1.2 Linear differential equations (Review), equation reducible to linear form, Bernoulli's equation.	7
II	**Higher Order Linear Differential Equations with Constant Coefficients and Variable Coefficients:** 2.1. Linear Differential Equation with constant coefficient: complementary function, particular integrals of differential equation of the type $f(D)y = X$, where X is e^{ax}, $\sin(ax+b)$, $\cos(ax+b)$, x^m, $e^{ax}V$ 2.2. Method of variation of parameters (2^{nd} order only). 2.3. Cauchy's homogeneous linear differential equation.	8
III	**Numerical solution of ordinary differential equations of first order and first degree, Numerical Integration:** 3.1. Numerical solution of ordinary differential equation using: (a) Taylor series Method (b) Euler's Method (c) Runge-Kutta method of order four. 3.2. Numerical integration by (a) Trapezoidal rule (b) Simpson's 1/3rd rule (c) Simpson's 3/8th rule (all without proof).	6

IV	**Beta and Gamma Function, Differentiation under Integral Sign and Curve Tracing:** 4.1 Beta and Gamma functions and its properties. 4.2 Differentiation under integral sign with constant limits of integration. 4.3. Tracing of curves in Cartesian and polar form (Semi cubical parabola, cissoids of Diocles, Lemniscate of Bernoulli, cardioid, rose curve $r = asinn\theta, r = cosn\theta$)	8
V	**Multiple Integrals &** Applications **of Multiple Integrals** Double Integration: 5.1. Introduction, Evaluation of double Integrals. (Cartesian & Polar). 5.2. Evaluation of double integrals over the given region (Cartesian & Polar). 5.3. Evaluation of double integrals by changing the order of integration. 5.4. Evaluation of double integrals by changing to polar coordinates (using Jacobian). Triple Integration: 5.5. Introduction and evaluation of Triple Integrals using Cartesian coordinate System, cylindrical and spherical coordinate Systems. Applications of Multiple Integrals. 5.6. Application of double integrals to compute Area. 5.7 Application of triple integrals to compute Volume.	10
	Total	**39**

Text Books:

1. Higher Engineering Mathematics, Dr. B. S. Grewal, Khanna Publication.
2. Advanced Engineering Mathematics, Dennis G. Zill, Warren S. Wright.

Reference Books:

1. Calculus, Thomas and Finney, Pearson Education.
2. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley Eastern Limited, 9th Ed.
3. Advanced Engineering Mathematics by H. K. Dass, 28th edition, S. Chand 2010.
4. Applied Numerical Methods with MATLAB for Engineers and Scientists by Steven Chapra, McGraw Hill.
5. A First Course in Differential Equations with Modelling Applications, Dennis G. Zill.

e-sources:

1. https://www.youtube.com/playlist?list=PLbRMhDVUMngeVrxtbBz-n8HvP8KAWBpI5

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Program:	First Year B. Tech. (Common to all branches)				Semester: II	
Course:	Engineering Mathematics-II Tutorial				Code:	
Credit	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks		
	Lecture	Practical	Tutorial	TW	SEE	Total
01	-	-	01	25	-	25

Engineering Mathematics-II	
Sr. No.	**Suggested List of Tutorials**
1	Exact differential Equations
2	Equations reducible to exact form.
3	Linear differential equations, equation reducible to linear form.
4	Linear Differential Equation with constant coefficient.
5	Method of variation of parameters.
6	Cauchy's homogeneous linear differential equation.
7	Numerical Solution of Ordinary Differential Equations
8	Numerical Integration by Simpson's $1/3^{rd}$ and $3/8^{th}$ rule.
9	Beta and Gamma Functions.
10	DUIS Rule.
11	Curve Tracing.
12	Double Integration.
13	Double Integration.
14	Triple Integration.
15	Applications of Multiple Integration.

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Program:	First Year B. Tech. (Common to all branches)						Semester: II	
Course:	Object Oriented Programming using Java						Code:	
Credit	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks				
	Lecture	Practical	Tutorial	Continuous Assessment			SEE	Total
				TT1	TT2	Internal Assessment		
02	02	-	-	15	15	10	60	100

Prerequisites

- Basics of Programming.

Course Objectives:

This course aims at enabling students:

1. To introduce the fundamentals of Java programming and object-oriented concepts, including Java syntax, data types, operators, and input/output handling.
2. To enable students to design and develop Java classes and objects using constructors, method overloading, and recursion.
3. To impart knowledge of inheritance, interfaces, and packages to promote reusability and modularity in Java applications.
4. To teach students how to implement robust and concurrent applications using Java's exception handling and multithreading features.
5. To develop the ability to design graphical user interfaces using Java Swing and handle interactive events.

Course Outcomes:

After learning the course, the students will be able to:

1. Understand and apply object-oriented programming principles and Java constructs for building simple Java applications.
2. Create Java classes and objects using constructors and method overloading to implement modular and reusable code.
3. Implement inheritance and interface concepts to build well-structured and extensible Java programs.
4. Develop robust and thread-safe Java applications using exception handling and multithreading.
5. Design and implement user-friendly GUI applications using Java Swing components and event-handling mechanisms.

Detailed Syllabus

Unit	Description	Duration (H)
I	**INTRODUCTION TO JAVA AS OBJECT ORIENTED PROGRAMMING LANGUAGE** Fundamentals of Java Programming: Overview of procedure and object-oriented programming, Features of Java, Java Virtual Machine Principles of OOP: Object, Class, Encapsulation, Abstraction, Inheritance, Polymorphism Basic Constructs: Constants, variables and data types, Wrapper classes, Operators and Expressions Input & Output in Java: command line arguments, BufferedReader class and Scanner class **BRANCHING AND LOOPING BRANCHING AND LOOPING:** if, if-else, nested if-else, if-else-if ladder, switch-case, break, continue, for loop, while loop, and do-while loop Arrays, Strings and Collection Types Arrays, Strings (String and StringBuffer classes) Collections: ArrayList, Vectors	8

II	**CLASSES AND OBJECTS** Access specifiers, static and non-static members, Passing and returning variables and references, Method Overloading, Recursion, Array of Objects Constructors Constructors: Default, Parameterized Constructors, copy constructor and Constructor overloading	6
III	**INHERITANCE, INTERFACES AND PACKAGES** Inheritance and its types, Role of Constructors in inheritance, Method Overriding, super keyword, abstract class and abstract method, final keyword, Static and dynamic binding in Java, finalize method. Interfaces: Implementing multiple inheritance and extending interfaces Packages: explore predefined packages, creating user defined packages and importing the same	6
IV	**EXCEPTION HANDLING AND MULTITHREADING (ROBUSTNESS AND CONCURRENCY)** Error vs Exception, try, catch, finally, throw, throws, creating custom exceptions Multithreading: Need of Multithreading, Thread lifecycle, methods of Thread class, creating threads using Runnable interface and Thread class, Thread synchronization	4
V	**GUI programming in JAVA SWING Programming:** Swing Components and Containers, Swing Packages, A Simple Swing Application, Designing Swing GUI Application and Event handling	2
	Total	**26**

Textbook Books:

1. Herbert Schildt, "Java-The Complete Reference", 11th Edition, Tata McGraw Hill Publication, 2018.
2. E. Balguruswamy, "Programming with Java: A Primer", Fifth edition, Tata McGraw Hill Publication, 2017.
3. Sachin Malhotra and Saurabh Chaudhary, "Programming in Java", Oxford University Press, 2010.

Reference Books:

1. D.T. Editorial Services, "Java 8 Programming Black Book", Dreamtech Press, 2015.
2. H. M. Deitel, P. J. Deitel, S. E. Santry, "Advanced Java 2 Platform How to Program", 11th Edition, Prentice Hall, 2017.
3. ScriptDemics, "Learn to Master JAVA", from Star EDU solutions, 2017.
4. Ivor Horton, "Beginning JAVA", Wiley India.

Digital Material:

1. www.nptelvideos.in
2. www.w3schools.com
3. http://spoken-tutorial.org
4. www.staredusolutions.org

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Program:	First Year B. Tech. (Common to all branches)				Semester: II	
Course:	Object Oriented Programming using Java Lab				Code:	
Credit	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks		
	Lecture	Practical	Tutorial	TW	PR & OR	Total
01	-	02	-	25	25	50

Prior knowledge of

Course Objectives:

This course aims at enabling students:

1. To familiarize students with Java input mechanisms and decision-making constructs for building interactive console-based applications.
2. To develop proficiency in handling arrays, strings, and collection frameworks for effective data manipulation in Java.
3. To understand the concept of object-oriented programming by implementing classes, objects, constructors, method overloading, and recursion.
4. To apply the principles of inheritance, interfaces, and abstraction for designing modular and reusable object-oriented code.
5. To build robust and responsive Java applications using exception handling, multithreading, and GUI components with event handling.

Course Outcomes:

Upon successful completion of this lab, students will be able to:

CO1 Use Java input methods and decision-making statements to solve logical problems.

CO2: Work with arrays, strings, and collections for data processing in Java.

CO3: Develop Java classes using constructors, methods, and object-oriented features.

CO4: Implement inheritance, interfaces, and abstraction to build modular Java programs.

CO5: Handle exceptions, multithreading, and create GUI applications using Swing.

Guidelines for Laboratory Conduction:

1. Assignments should be implemented, recommended on coding platforms such as Leetcode, Hacker Rank, CodeChef, Google Colab, Jupyter Notebook.
2. Encourage students for appropriate use of Hungarian notation, proper indentation and comments.
3. Use of open-source software is to be encouraged.
4. Operating System recommended: - 64-bit Open-source Linux or its derivative.
5. Programming tools recommended: -Code block, Eclipse, Anaconda Cloud

Suggested List of Experiments

1. Program to demonstrate input using Scanner, BufferedReader and command line arguments.
2. Programs to demonstrate different decision-making statements.
3. Program to implement Arrays (1D, 2D).
4. Program on String and String Buffer.
5. Program on Collections (ArrayList/ Vectors)
6. Program to create class with members and methods.
7. Programs on static, non-static, recursive and overloaded methods.
8. Program on constructor and constructor overloading.
9. Program on passing and returning object as argument.
10. Program on creating user defined package.
11. Programs on single, multilevel, and hierarchical inheritance.
12. Program to demonstrate multiple inheritance using interfaces (Use super keyword).
13. Program on abstract class
14. Program on dynamic method dispatch using base class and interface reference.
15. Program to demonstrate try, catch, throw, throws and finally.
16. Program to implement user defined exception.
17. Program to demonstrate concept of multithreading.
18. Java programs to understand GUI designing and event handling.

Textbook Books:

1. Herbert Schildt, “Java-The Complete Reference”, 11th Edition, Tata McGraw Hill Publication, 2018.
2. E. Balguruswamy, “Programming with Java: A Primer”, Fifth edition, Tata McGraw Hill Publication, 2017.
3. Sachin Malhotra and Saurabh Chaudhary, “Programming in Java”, Oxford University Press, 2010.

Reference Books:

1. D.T. Editorial Services, “Java 8 Programming Black Book”, Dreamtech Press, 2015.
2. H. M. Deitel, P. J. Deitel, S. E. Santry, “Advanced Java 2 Platform How to Program”, 11th Edition, Prentice Hall, 2017.
3. ScriptDemics, “Learn to Master JAVA”, from Star EDU solutions, 2017.
4. Ivor Horton, “Beginning JAVA“, Wiley India.

Digital Material:

1. www.nptelvideos.in
2. www.w3schools.com
3. http://spoken-tutorial.org
4. www.staredusolutions.org

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Program:	First Year B. Tech. (Common to all branches)			Semester: I/ II	
Course:	IKS-Indian Intellectual Heritage			Code:	
Credit	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks	
	Lecture	Practical	Tutorial	TW	Total
02	02	-	-	50	50

Course Objectives:

This course will:

1. Introduce the basic concepts and structure of Indian Knowledge Systems (IKS) and its significance in various fields such as science, law, governance and health.
2. Develop an appreciation for the multi-dimensional nature of IKS and its relevance in contemporary society.
3. Aanalyse the interdisciplinary nature of IKS by integrating perspectives from science, engineering, technology, humanities and social sciences.

Course Outcomes:

After learning the course, the students will:

1. Apply key components of IKS and their historical importance in shaping knowledge and society.
2. Apply traditional Indian Knowledge to Science Engineering and Technology.
3. Identify the role of IKS in different fields viz. Science, Engineering, Technology, Humanities and Social sciences.

Detailed Syllabus

Unit	Description	Duration (H)
I	Introduction to Indian Knowledge Systems. Understanding Indianness (Bhāratīyata) and IKS	9
II	Foundational Concepts in IKS for Science, Engineering & Technology	9
III	Foundational Concepts in IKS for Humanities & Social Sciences	8
	Total	**26**

Text book:

Mahadevan, B., Bhat Vinayak Rajat, Nagendra Pavana R.N. (2022), "Introduction to Indian Knowledge System: Concepts and Applications", PHI Learning Private Ltd. Delhi. (Textbook for the course)

References/ Learning Resources:

1) Pride of India: A Glimpse into India's Scientific Heritage, Samskrita Bharati, New Delhi.
2) Sampad and Vijay (2011). "The Wonder that is Sanskrit", Sri Aurobindo Society, Puducherry.
3) Balasubramanian, R. (2000). "Introduction". In Chattopadhyana (Ed.). History of Science,
4) Philosophy and Culture in Indian Civilisation. Delhi: Centre for Studies in Civilisations.
5) Hiriyanna, M. (1994). Outlines of Indian Philosophy, Motilal Banarsidass, New Delhi.
6) Rajagopalachari, C. (2018). Ramayana, Bharatiya Vidya Bhavan, Mumbai.
7) Rajagopalachari, C. (2019). Mahabharata, Bharatiya Vidya Bhavan, Mumbai.
8) Bag, A.K. (1979). Mathematics in Ancient and Medieval India, Chaukhamba Orientalia, New Delhi.
9) Bhaduri, S. (1975). "Studies in Nyāya – Vaiśeṣika Metaphysics", Bhandarkar Oriental
10) Research Institute, Pune.
11) Datta, B. and Singh, A.N. (1962). History of Hindu Mathematics: Parts I and II, Asia Publishing House,

Mumbai.
12) Kak, S.C. (1987). “On Astronomy in Ancient India”, Indian Journal of History of Science,
13) 22(3), pp. 205–221.
14) Subbarayappa, B.V. and Sarma, K.V. (1985). Indian Astronomy: A Source Book, Nehru Centre, Mumbai.
15) Bag, A.K. (1997). History of Technology in India, Vol. I, Indian National Science Academy, New Delhi.
16) Acarya, P.K. (1996). Indian Architecture, Munshiram Manoharlal Publishers, New Delhi.
17) Rangarajan, L.N. (2000). The Arthashastra, Penguin Random House, Haryana, India.
18) Dominik, W. (2001). “The Roots of Ayurveda”, Penguin Classics, Haryana, India. ISBN:9780140436808.
19) Adhia, H., Nagendra, H.R. and Mahadevan, B. (2010). “Impact of Adoption of Yoga Way of Life on the Reduction of Job Burnout of Managers”, Vikalpa. 35(2), pp. 21–33.
20) Banerjea, P. (1916). Public Administration in Ancient India, Macmillan, London.
21) Kapoor Kapil, Singh Avadhesh (2021). “Indian Knowledge Systems Vol – I & II”, Indian Institute of Advanced Study, Shimla, H. P.

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Program:	First Year B. Tech. (Common to all branches)				Semester: I/ II	
Course:	Workshop Practices				Code:	
Credit	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks		
	Lecture	Practical	Tutorial	TW	PR & OR	Total
02	-	04	-	50	50	100

Course Objectives:

1. To impart knowledge and skills to use tools, machines, equipment and measuring instruments.
2. To develop general machining skills.
3. To educate about safe handling of machines and tools.
4. To develop a skill in dignity of labour, precision, safety at workplace, team working and development of right attitude.

Course Outcomes:

After learning the course, the students will be able to:

1. Prepare simple wooden joints and parts using wood working tools and machines
2. Apply the fitting skills and produce a job with specified dimensions.
3. Apply the plumbing skills and produce a job with various plumbing joints.
4. Practice sheet metal tools and machine to develop the sheet metal articles.
5. Practice edge preparation for simple Lap, Butt and T joints using Arc/Gas/Resistance welding equipments.
6. Demonstrate machining processes including turning, facing, step turning, drilling and parting.

Guidelines for Students:

1. The workshop practical related assignments and tasks are to be submitted by students in the form of a workshop books.
2. The workshop books consist of job drawing, operations performed, equipments/machines/tools/materials used, process sheet, safety precautions, table of content, index with certificate.
3. After the completion of each job, students are required to complete the related assignments in the workshop books and get it checked by the respective workshop instructor and supervisor.

Guidelines for Laboratory/Term Work Assessment:

1. Students are required to prepare one job using in each of the following shops:
   1. Carpentry. 2. Fitting. 3. Tin Smithy. 4. Plumbing. 5. Welding. 6. Machine Shop.
2. Students are required to submit all the completed jobs at the end of the semester.
3. Each student is required to submit the completed workshop book at the end of the semester.
4. The jobs and workshop books are to be checked and verified by the instructors and workshop superintendent.

Detailed Syllabus

List of Experiments
(Perform all the practicals as per the given list)

Experiment No.	Experiment Title
1.	Wood sizing exercises in planning, marking, sawing, chiseling and grooving to make half lap joint, cross lap joint, and dovetail joint.
2.	A job involving cutting, filing to saw cut, filing all sides and faces, corner rounding, drilling and tapping on M. S. flat
3.	A job on use of plumbing tools and preparation of plumbing line involving fixing of water tap and use of elbow, tee, union and coupling, etc.
4.	Making a job such as Tray, Funnel or similar articles, using GI sheet involving development of lateral surface, measuring, marking, cutting, bending, and brazing/soldering/rivetting operations.
5.	Exercise in Arc welding (MMAW) to make a butt joint OR Resistance (Spot) welding to make a lap joint
6.	To study the central lathe and perform any five operations such as plane turning, step turning, chamfering, taper turning, grooving, knurling, drilling, threading, etc.

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Program:	First Year B. Tech. (Common to all branches)				Semester: I/ II	
Course:	Design Thinking				Code:	
Credit	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks		
	Lecture	Practical	Tutorial	TW	SEE	Total
02	02	-	-	50	-	50

Prior knowledge of

Basic understanding of human psychology, creativity, and communication skills. Familiarity with fundamental engineering concepts and problem-solving approaches will be beneficial but not mandatory.

Course Objectives:

This course aims to enable students:

1. To develop a foundational understanding of learning and memory processes, emotional intelligence, and their application in enhancing personal and academic growth.
2. To cultivate creative problem-solving abilities and familiarize students with the principles and stages of design thinking and product design through real-world examples and assignments.
3. To develop an understanding of prototyping, testing, and customer-centric design by integrating empathy-driven innovation with user-focused solutions.

Course Outcomes:

After completion of this course, students will be able to:

1. Understand the learning process, learning styles, and memory mechanisms, and apply techniques to enhance memory and retention.

2. Understand emotional expression and empathy, and apply the design thinking process to address user needs and peer collaboration.

3. Explain the creative thinking and problem-solving process, and apply it to engineering product design using a design thinking approach.

4. Describe the purpose and process of prototyping, and apply rapid prototyping and testing methods to evaluate design effectiveness.

5. Understand customer expectations and product experience parameters, and apply design thinking to create customer-centric solutions.

Detailed Syllabus

Unit	Description	Duration (Hr)
I	**An Insight to Learning and Remembering** Learning: Understanding the Learning Process, Kolb's Learning Styles, Assessing and Interpreting, Understanding the Memory process: Problems in retention, Memory enhancement techniques.	4
II	**Emotions and Basics of Design Thinking** Understanding Emotions: Experience & Expression, Assessing Empathy, Application with Peers, Design Thinking Fundamentals: Definition and Need for Design Thinking, Objectives of Design Thinking, Concepts & Brainstorming, Stages of Design Thinking Process (with examples): Empathize, Define, Ideate, Prototype, Test.	7
III	**Problem Fixing and the Process of Product Design** Understanding the Creative thinking process, Understanding the Problem Solving, Creative Problem-Solving techniques, Process of Engineering Product Design: Design Thinking Approach, Stages of Product Design, Examples of best product designs and their functions, Assignment – Engineering Product Design.	7

IV	**Prototyping & Testing** What is a Prototype? Why Prototype? Rapid Prototype Development process, Testing and Sample Example, Test Group Marketing.	4
V	**Design Thinking & Customer Centricity** Practical Examples of Customer Challenges, Use of Design Thinking to Enhance Customer Experience, Parameters of Product Experience, Alignment of Customer Expectations with Product Design.	4
Total		**26**

References:

Text Books:

1. Karmic Design Thinking by Dr. Bala Ramadurai.
2. Experiential Learning: Experience as the Source of Learning and Development by David A. Kolb.
3. Muhammad Mashhood Alam, Transforming an Idea into a Business with Design Thinking, First Edition, Taylor and Francis Group, 2019.
4. S. Balaram, Thinking Design, Sage Publications, 2011.
5. Design Thinking Research: Translation, Prototyping, and Measurement" edited by Christoph Meinel and Larry Leifer.

Reference Books:

1. Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, HarperCollins
   e-books, 2009.
2. Michael Lewrick, Patrick Link, Larry Leifer, The Design Thinking Toolbox, John Wiley & Sons, 2020.
3. Michael Lewrick, Patrick Link, Larry Leifer, The Design Thinking Playbook, John Wiley & Sons, 2018.
4. Kristin Fontichiaro, Design Thinking, Cherry Lake Publishing, USA, 2015.
5. Walter Brenner-Falk Uebernickel, Design Thinking for Innovation - Research and Practice, Springer, 2016.
6. Gavin Ambrose, Paul Harris, Design Thinking, AVA Publishing, 2010.
7. The Learning Process by Stephen Sheldon Colvin.
8. Unlimited Memory by Grandmaster Kevin Horsley.
9. Rapid Prototyping: Principles and Applications by Rafiq Noorani.
10. Customer-Centricity: Focus on the Right Customers for Strategic Advantage by Peter Fader.

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Program:	First Year B. Tech. (Common to all branches)				Semester: I/ II	
Course:	Yoga Education				Code:	
Credit	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks		
	Lecture	Practical	Tutorial	TW	SEE	Total
02	01	02	-	50	-	50

Course Objectives:

1. To learn Four Streams of Yoga,
2. To introduce the eightfold path of ashtang yoga as framework for personal discipline, ethical living and spiritual development.
3. To Understand and learn the Pranayama techniques and their scientific impact on physical and mental health.
4. To understand and learn Anatomy and Physiology, Yoga and Exercise Physiology
5. To understand Yogic diet and its role in promoting holistic health and wellbeing.

Course Outcomes:

After completing this course, students will be able to:

1. To be able to Learn Four Streams of Yoga.
2. To be able to identify and explain the eight limbs of ashtang yoga and their relevance to holistic wellbeing the message of Vedas and Upanishads.
3. To be able to explain the types of pranayama and their scientifically proven benefits on body and mind. Learn the Four Streams of Yoga.
4. Understand Anatomy and Physiology, Yoga and Exercise Physiology.
5. To be able to describe Yogic dietary principles and apply them to support physical, Mental and spiritual wellness.

Detailed Syllabus

Unit	Description	Duration (H)
I	***Four Streams of Yoga*** • Concept and significance of Yoga • **Karma Yoga** – Yoga of action • **Bhakti Yoga** – Yoga of devotion • **Jnana Yoga** – Yoga of knowledge • **Raja Yoga** – Yoga of self-discipline and meditation	3
II	***Ashtang Yoga – Eight Limbs of Patanjali Yoga*** • **Yama** and **Niyama** – Ethical and personal disciplines • **Asana** – Postures for health and flexibility • **Pranayama** – Breath control and energy regulation • **Pratyahara**, **Dharana**, **Dhyana**, **Samadhi** – Internal practices leading to meditation and liberation.	3
III	***Pranayama and Its Scientific Approach*** • Types of Pranayama: Anulom-Vilom, Bhramari, Kapalbhati, etc. • Scientific and psychological effects of Pranayama • Guidelines and precautions for practice • Incorporating Pranayama into a daily routine.	2
IV	***Anatomy and Physiology for Yoga*** • Basics of human anatomy: skeletal, muscular, respiratory systems • Understanding body systems involved in Yoga practices • Effects of Yoga on cardiovascular and respiratory health • Exercise physiology: energy systems and Yoga's impact	2
V	*Aahara Shastra – Yogic Nutrition for Well-being*	3

	• **Introduction to Ahara Shastra.** • **Classification of Food.** • **Principles of a Yogic Diet.** • **Yogic Diet for Students.**	
Total		**13**

Assessment:

1. **Practical demonstrations** and regular Yoga practice
2. **Assignments and reflective journals** on Yoga philosophy and experience
3. **Quizzes and written tests** on theoretical concepts
4. **Final practical exam and viva** on Yoga techniques and understanding

Suggested List of Practical

(Minimum 13 experiments are to be performed based on contents from syllabus)

Sr. No.	Title
1.	Introduction to Ashtanga Yoga, Brief talk: History and Philosophy of Yoga
2.	Discussion: Concept of Yama (Ahimsa, Satya, Asteya, Brahmacharya, Aparigraha)
3.	Discussion: Shaucha, Santosha, Tapas, Swadhyaya, Ishwar Pranidhana Practice: Asanas for purification and discipline (Trikonasana, Bhujangasana, Paschimottanasana) Pranayama: Anulom-Vilom (Nadi Shodhana)
4.	Theoretical Input: Importance of Asana in physical and mental health. Practice: Vajrasana, Dhanurasana, Shalabhasana, Chakrasana. Pranayama: Ujjayi breathing
5.	Explanation of Pranayama, scientific approach.Practice: Nadi Shodhana, Bhramari, Kapalbhati
6.	Pratyahara – The Fifth Limb Explanation: Withdrawal of senses Activity: Silent walking meditation, Asana Practice: Forward bending poses (Padahastasana, Janu Sirsasana)
7.	Concept: One-pointed concentration Trataka (Candle gazing) practice,Asana: Balancing poses (Garudasana, Natarajasana)
8.	Dhyana – The Seventh Limb Concept: Meditation as a tool for emotional balance, Practice: Guided Meditation (Inner Peace)
9.	Explanation of Samadhi: Blissful state beyond ego, Practice: Silent group meditation (20 mins) Breathing: Ujjayi + Anulom-Vilom
10.	Yogic Diet – Introduction to Aaharshastra Talk: Concept of Sattvic, Rajasic, Tamasic food Practice: Asanas for digestion (Pavanmuktasana, Ardha Matsyendrasana) Yogic prayer and gratitude for food
11.	Talk: Detoxification benefits of Yoga,Practice: Laghu Shankhaprakshalana (simplified cleansing technique) Pranayama: Kapalbhati, Bhastrika, Aahar Guidance: Herbal teas and fasting discussion
12.	Session: Dinacharya (Yogic routine from waking to sleeping), Practice: Short dynamic series + cooling Pranayama,Meditation: Daily affirmation practice
13.	Managing Emotions through Yoga,Talk: Stress, anger, fear – Yogic control of emotions Practice: Relaxing poses (Supta Baddha Konasana, Shashankasana), Pranayama: Bhramari.
14.	Discussion: Mobile addiction, exam stress, sleep issues – Yogic responses Practice: Full yoga sequence: Warm-up + Asana + Pranayama
15.	Revision: Surya Namaskar,5 Major Asanas,3 Pranayamas Meditation: Silent sitting – 20 minutes

Unit-wise Recommended Books

Unit I: Four Streams of Yoga

- **The Bhagavad Gita** – Swami Sivananda / Eknath Easwaran
- **Four Yogas** – Swami Vivekananda

Unit II: Ashtanga Yoga – Eight Limbs

- **The Yoga Sutras of Patanjali** – Swami Satchidananda
- **Light on Yoga** – B.K.S. Iyengar

Unit III: Pranayama and Its Scientific Approach

- **The Science of Pranayama** – Swami Sivananda

- **Pranayama: The Breath of Yoga** – Gregor Maehle

Unit IV: Anatomy and Physiology for Yoga

- **Anatomy and Physiology of Yogic Practices** – Dr. M. M. Gore
- **Yoga Anatomy** – Leslie Kaminoff & Amy Matthews

Unit V: Ahara Shastra – Yogic Nutrition

- **The Science of Food and Nutrition in Yoga** – Dr. H. R. Nagendra
- **Yoga and Diet** – Dr. N. Ganesh Rao
- **The Sacred Tradition of Yoga** – Dr. Shankarananda
- Swami Sivananda – The Science of Diet and Nutrition
- The Bhagavad Gita – Chapter 17 (Verses on food types)
- Ministry of AYUSH – Yogic Diet guidelines
- Satyananda Saraswati – Asana Pranayama Mudra Bandha (section on Ahara)

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Program:	First Year B. Tech. (Common to all branches)				Semester: I/II	
Course:	Integrated Personality Development Course				Code:	
Credit	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks		
	Lecture	Practical	Tutorial	TW	SEE	Total
02	01	02	-	50	-	50

Course Introduction: The Need for Values
Students will learn about the need for values as part of their holistic development to become successful in their many roles - as ambitious students, reliable employees, caring family members, and considerate citizens.

Course Outcomes:
After completion of this course, students will be able to:
CO1. To provide students with soft skills that complement their hard skills, making them more marketable when entering the workforce.
CO2. To enhance awareness of India's glory and global values, and to create considerate citizens who strive for the betterment of their family, college, workforce, and nation.
CO3. To inspire students to strive for a higher sense of character by learning from role models who have lived principled, disciplined, and value-based lives.

Detailed Syllabus

Unit		Description	Duration (H)
I	**Module**: Remaking Yourself **Subject**: Begin with the End in Mind	Students will learn to visualize their future goals and will structure their lives through smart goals to give themselves direction and ultimately take them to where they want to go.	3
	Module: Remaking Yourself **Subject**: Being Addiction Free	Students will explore the detrimental effects of addictions on one's health, personal life, and family life. They will learn how to take control of their life by becoming addiction free.	3
	Module: Selfless Service **Subject**: Case Study: Disaster Relief	Students will apply previous lessons of seva to analyse the case study of the Bhuj earthquake: relief work.	3
	Module: Soft Skills **Subject**: Teamwork & Harmony	Students will learn the six steps of teamwork and harmony that are essential for students ': professional and daily life.	3
	Module: My India My Pride **Subject**: Present Scenario	To implement the transformation of India from a developing country into a developed country it is necessary to have a value-based citizen Students will see how the transformation to a greater India relies on the vision and efforts of themselves as a youth.	3
	Module: Learning from Legends **Subject**: Leading Without Leading	Students will explore a new approach to Leadership through humility.	3
	Module: My India My Pride **Subject**: An ideal Citizen -1	Students will learn that to become value-based citizens, they must first develop good values in their lives They start by exploring the values of responsibility and integrity	3

	Module: My India My Pride **Subject**: An ideal Citizen -2	Students will learn that by developing the values of loyalty, sincerity, and punctuality, they became indispensable and can leave a strong impression, they will start developing these values by trying to keep perfection in every small task and by looking at the bigger picture.	3
II	**Module**: Facing Failures **Subject**: Timeless Wisdom for Daily Life	Students will learn the role wisdom plays in finding long-term stability. They will use ancient wisdom to solve their modern-day challenges.	3
	Module: From House to Home **Subject**: Forgive & Forget	Students will understand the importance and benefits that forgiveness plays in their personal and professional life. They will learn to apply this knowledge in realistic situations	3
	Module: Remaking Yourself **Subject**: Stress Management	Students will learn to cope with current and future causes of stress.	3
	Module: Remaking Yourself **Subject:** Better Health Setter Future	A healthy body prevents disease and stress: increases positivity, productivity, and brainpower. Students will learn to maintain good health through regular exercise, healthy eating habits, and regular and sufficient sleep.	3
	Module: Learning from Legends **Subject:** Words of Wisdom	A panel of learned and experienced mentors will personally answer practical questions that students face in them daily life.	3
	Module: Soft Skits **Subject:** Financial Planning	Students will develop a variety of practical financial skills that prepare them to become financially stable throughout their future careers.	3
	Module: Remaking Yourself **Subject:** Impact of Company	Students will understand that the type of company that we keep, has a crucial rale in determining who we are and who we will become. They will develop the ability to create a positive environment around them.	3
	Life After IPDC	This concluding lecture encourages students to keep practising these priceless lessons and prepares them for the next steps in their lives.	3

(Minimum 13 modules are to be covered from above list)

Text Books:

COURSE MATERIAL / MAIN COURSE WORKBOOK –

There will be one workbook for each semester. Each workbook will be Presented and designed by BAPS IPDC Team. These official workbooks would be the course-material for study of IPDC. These workbooks will solve the purpose of study, submission and viva for students.

1. IPDC Workbook-2 (presented by B.A.P.S. Swaminarayan Sanstha.)

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Program:	First Year B. Tech. (Common to all branches)				Semester: I / II	
Course:	Basic Civil and Environmental Engineering				Code:	
Credit	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks		
	Lecture	Practical	Tutorial	TW	SEE	Total
Audit	02	-	-	50	-	50

Course Objectives:

This course objects at enabling students:

1. To identify various Civil Engineering materials and choose suitable material among various options.
2. To identify various Civil Engineering structural components and select appropriate structural system among various options
3. To know and apply principles of surveying to solve engineering problem
4. To understand the role of individual for the protection of Environment

Course Outcomes:

After learning the course, the students will be able to:

1. Identify various Civil Engineering materials and choose suitable material among various options.
2. Identify various Civil Engineering structural components and select appropriate structural system among various options
3. Apply principles of surveying to solve engineering problem.
4. Understand and explain various types of air pollution, their effects and control measures.
5. Know the various types of water pollution, sources, waste water treatment, effect of water pollution on health and soil pollution

Detailed Syllabus

Unit	Description	Duration (H)
I	**Introduction to Civil Engineering** Various Branches, role of civil engineer in various construction activities, basic engineering properties and uses of materials: earth, bricks, timber, stones, sand, aggregates, cement, mortar, concrete, steel, bitumen, glass, FRP, composite materials.	6
II	**Building Component and Building Planning** Foundation and superstructure, functions of foundation, types of shallow and deep foundations, suitability in different situation, plinth, walls, lintels, beams, columns, slabs, roofs, staircases, floors, doors, windows, sills, Study of Building plans, ventilation, basics of plumbing and sanitation	6
III	**Surveying** Principles of survey, elements of distance and angular measurements, plotting of area, base line and offsets, introduction to Plane table surveying, introduction to levelling, concept of bench marks, reduced level, contours.	6
IV	**Air Pollution** Introduction, Brief discussion on air pollutants, Sources of Air Pollution: Pollutants from Industry, Pollution by Automobiles, Effect of Air Pollutions: Acid rain, Green House Effect, Global warming; Brief discussion on Control of Air Pollution.	4
V	**Water and Soil Pollution** Introduction, Types of Water Pollutants, Sources of Water Pollution, Methods to remove impurities in water, Treatment of Industrial waste water: Activated Sludge Process, Impact of Water Pollution on Human Health, Water as a carrier for the transmission of diseases. Sources of Soil Pollution, Harmful effects of Soil Pollution, Control of Soil Pollution.	4

Total	26

Text Books:

1. Anurag Kandya, ―Elements of Civil Engineering‖, Charotar Publishing, Anand
2. M. G. Shah, C. M. Kale, and S. Y. Patki, ―Building Drawing‖, Tata McGraw Hill
3. Sushil Kumar, ―Building Construction‖, Standard Publishers Distributors
4. M. S. Palani Gamy, ―Basic Civil Engineering‖, Tata Mc-Graw Hill Publication
5. Kanetkar T. P. and Kulkarni S. V., ―Surveying and Levelling‖, Vols. I, II and III, Vidyarthi Gruh Prakashan, Pune
6. Punmia, ―Surveying‖, Vol.- I, Vol.-II, Vol.-III, Laxmi Publications
7. G. K. Hiraskar, ―Basic Civil Engineering‖, Dhanpat Rai Publications
8. Gopi Satheesh, ―Basic Civil Engineering‖, Pearson Education
9. Essential Environmental Studies, S. P. Mishra and S. N. Pandey.

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Program:	First Year B. Tech. (Common to all branches)				Semester: I / II	
Course:	Basic Mechanical and Energy Engineering				Code:	
Credit	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks		
	Lecture	Practical	Tutorial	TW	SEE	Total
Audit	02	-	-	50	-	50

***Marks are not considered for the calculation of SGPA/CGPA**

Prior knowledge of

Basic physics, chemistry and mathematics up to the intermediate level, along with school-level environmental science concepts, **are desirable.**

Course Objectives:

The course aims to:

1. Introduce the fundamental principles of thermodynamics, internal combustion engines and Automobile.
2. Introduce basic design principles, material selection, machine tools and fundamental manufacturing processes.
3. Introduce various conventional and non-conventional energy sources and their applications.
4. Develop understanding of power generation methods, their schematic arrangements and site selection criteria.
5. Emphasize the importance of energy conservation and methods to enhance energy efficiency in various systems.

Course Outcomes:

After learning the course, the students will be able to:

1. Understand the fundamental principles of thermodynamics, internal combustion engines and basic automobile systems.
2. Demonstrate knowledge of basic design principles, material selection, machine tools and fundamental manufacturing processes.
3. Identify and compare different energy sources and explain their advantages and limitations.
4. Explain schematic arrangements, working principles and site selection criteria of various power plants (conventional and non-conventional).
5. Analyze energy conservation techniques and apply basic principles to enhance efficiency in industrial and domestic equipment.

Detailed Syllabus

Unit	Description	Duration (H)
I	**Introduction to Mechanical Engineering** Overview of Mechanical Engineering fundamentals, Introduction to laws of thermodynamics with practical examples pertaining to respective branches. Internal Combustion Engine: Classification and Working of 2-stroke and 4-stroke IC engine, Introduction to Automobiles with key definitions and objectives.	5
II	**Engineering Design, Materials and Manufacturing Process** Design fundamentals and systematic steps involved in the design process. Overview of machines and mechanism. Engineering materials with their applications. Introduction to lathe, drilling and milling machines. Introduction to essential machining operations like turning, drilling, milling and casting.	5
III	**Conventional Power Generation** Introduction, Sources of Energy, Steam power station: Schematic arrangement, advantages and disadvantages, nuclear power plant: Schematic arrangement, advantages and disadvantages, Gas turbine power plant: Schematic arrangement, advantages and disadvantages, Hydro power station: Schematic arrangement, advantages and disadvantages, Site selection criteria for power plants.	6

IV	**Non-Conventional Power Generation** Schematic arrangement, advantages and disadvantages: Solar energy, Wind energy, Biogas and Biomass, Ocean Thermal energy conversion (OTEC), Tidal energy, Fuel cell and Geothermal energy.	5
V	**Energy conservation** Scope for energy conservation and its benefits, Energy conservation Principle– Maximum energy efficiency, Maximum cost effectiveness, Methods and techniques of energy conservation in ventilation and air conditioners, compressors, pumps, fans and blowers, electric furnaces, ovens, boilers and lighting techniques.	5
Total		**26**

References:

Text Books:

1. P. K. Nag "Engineering Thermodynamics", Tata McGraw Hill, New Delhi 3rd ed. 2005
2. A. Ghosh, A K Malik, "Theory of Mechanisms and Machines", Affiliated East West Press Pvt. Ltd. New Delhi.
3. Serope Kalpakaji and Steven R Schimd "A manufacturing Engineering and Technology" Addision Wsley Laongman India 6th Edition 2009
4. V. B. Bhandari, "Design of Machine Elements", Tata McGraw Hill Publications, New Delhi.
5. M.M. El-Wakil, Powerplant Technology, McGraw-Hill International.
6. A Chakrabarti, M. L Soni, P. V. Gupta, U. S. Bhatnagar, A Text book of Power System Engineering, Dhanpat Rai Publication.
7. Rai. G. D., Non-Conventional Energy Sources, Khanna Publishers, Delhi, 2006.
8. Rao S., Parulekar B.B., Energy Technology-Non conventional, Renewable and Conventional, Khanna Publishers, Delhi, 2005.

Reference Books:

1. Cengel, Boles, Kanoglu, Thermodynamics An Engineering Approach, McGraw Hill Education (India)Pvt Ltd. 9th Edition 2019.
2. V Ganesan, Internal Combustion Engine, Tata McGraw-Hill Publishing Company.
3. Michell P Groover, Fundamentals of Modern Manufacturing Materials, Processes and Systems John Wiley & Sons, Inc.
4. Glynn Henry J., Gary W. Heinke, Environmental Science and Engineering, Pearson Education, Inc, 2004.
5. J. M. Fowler, Energy and the Environment, McGraw-Hill, 2nd Edition, 1984.
6. Gilbert M. Masters, Introduction to Environmental Engineering and Science, 2nd Edition, Prentice Hall, 2003.
7. Guidebook for National Certification Examination for Energy Managers and Energy Auditors, Bureau of Energy Efficiency (BEE), Government of India.

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