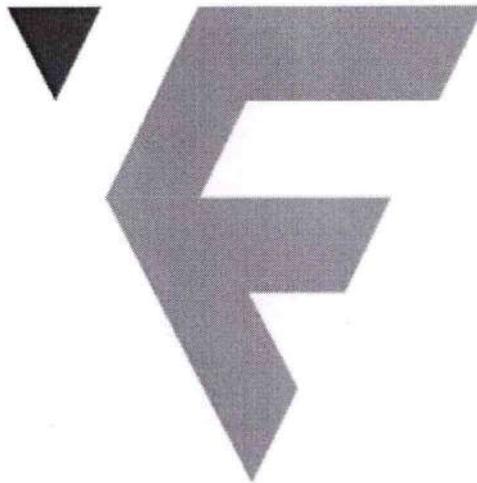# FABTECH EDUCATION SOCIETY'S
FABTECH TECHNICAL CAMPUS COLLEGE OF ENGINEERING & RESEARCH, SANGOLA
(An Autonomous Institute)
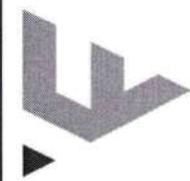### Affiliated to Dr. Babasaheb Ambedkar Technological University (BATU), Lonere

In line with the

National Education Policy (NEP) 2020 Compliant

Curriculum

For

UNDER-GRADUATE PROGRAMME

First Year B. Tech. (Sem.-I & II)
(w.e.f. A.Y. 2025-26

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FABTECH TECHNICAL CAMPUS COLLEGE OF ENGINEERING & RESEARCH
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Curriculum for First Year B. Tech. with effect from A.Y. 2025-26

Semester I

Scheme- C (E&TC and EE)

Course Type	Course Code	Name of the Course	Engagement Hours			Credits	In Semester Evaluation Scheme		End Semester Evaluation Scheme		Total Marks
			L	T	P		MSE M	ICA M	ESE M	OE/POE M	
BSC	25UGS11001	Applied Physics	3	-	-	3	30	10	60	-	100
	25UGS11002	Applied Physics Lab	-	-	2	1	-	25	-	-	25
	25UGS11004	Engineering Mathematics-I	3	1	-	4	30	10	60	-	100
	25UEE11001	Fundamentals of Electrical Engineering	2	-	-	2	30	10	60	-	100
	25UEE11002	Fundamentals of Electrical Engineering Lab	-	-	2	1	-	25	-	-	25
ESC	25UET11003	Electrical and Electronics Components	2	-	-	2	30	10	60	-	100
	25UCS11011	Foundations of Programming and Problem Solving	2		-	2	30	10	60	-	100
	25UCS11012	Foundations of Programming and Problem Solving Lab	-		2	1	-	25	-	25	50
VSEC	25UGS11102	Computer Tools and Applications Lab	-	-	4	2	-	50	-	-	50
AEC	25UGS11401	Communication Skills	1	-	-	1	-	25	-	-	25
	25UGS11402	Communication Skills Lab	-	-	2	1	-	25	-	-	25
CC	25UGS11301	NSS	-	-	4	2	-	50	-	-	50
		Total	**13**	**1**	**16**	**22**	**150**	**275**	**300**	**25**	**750**

Abbreviations: L= Lecture, T= Tutorial, P= Practical, M= Marks

*Students must complete a student induction program at the start of the first semester to ease their transition into the academic environment.

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Curriculum for First Year B. Tech. with effect from A.Y. 2025-26
Semester II
Scheme- C (E&TC and EE)

Course Type	Course Code	Name of the Course	Engagement Hours			Credits	In Semester Evaluation Scheme		End Semester Evaluation Scheme		Total Marks
			L	T	P		MSE M	ICA M	ESE M	OE/POE M	
BSC	25UGS11003	Solid state physics	3	-	-	3	30	10	60	-	100
	25UGS12008	Transforms and matrices	3	1	-	4	30	10	60	-	100
ESC	25UET12004	Basic Electronics Engineering	2	-	-	2	30	10	60	-	100
	25UET12005	Basic Electronics Engineering Lab	-	-	2	1	-	25	-	25	50
	25UET12006	Digital Techniques	3	-	-	3	30	10	60	-	100
	25UET12007	Digital Techniques Lab	-	-	2	1	-	50	-	-	50
PCC	25UEE12101	Electrical and Electronics Measurements	1	-	-	1	-	25	-	-	25
	25UEE12102	Electrical and Electronics Measurements Lab	-	-	2	1	-	25	-	50	75
VSEC	25UGS12104	CPP & OOPs Lab	-	-	4	2	-	50	-	-	50
IKS	25UGS11201	IKS- Vedic Mathematics	2	-	-	2	-	50	-	-	50
CC	25UGS11302	Yoga/ Sports	-	-	4	2	-	50	-	-	50
		Total	14	1	14	22	120	315	240	75	750

Abbreviations: L= Lecture, T= Tutorial, P= Practical, M= Marks

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Instructions:

□
- Students of respective branches will undergo for Scheme A (For Civil &Mech), Scheme B (for AIDS & CSE) and Scheme C (for Electrical & E&TC)

Ⱥ **Guidelines for the Student Induction Program:**

- New entrants in an engineering program come with different backgrounds, perspectives, and experiences- social, economic, regional, and cultural. It is essential to help them to transition smoothly into this new environment and instill in them the ethics of the institution with a broader sense of purpose.
- To facilitate this transition, an *Induction Program* for newly admitted undergraduate students will be conducted at the beginning of the first semester.
- The Induction Program aims to:

  - Help students acclimate to their new surroundings.
  - Foster openness and interpersonal connections.
  - Establish a healthy daily routine.
  - Build peer-to-peer and faculty-student relationships.
  - Enhance self-awareness and sensitivity toward others, society, and nature.

- The program includes the following activities that promote personal growth, social awareness, and academic readiness, and to help them integrate into their new environment

  - Physical activities for well-being.
  - Creative arts for expression.
  - Literary activities for intellectual development.
  - Universal human values to encourage ethical awareness and social responsibility
  - Proficiency modules to strengthen foundational academic skills.
  - Lectures by experts and eminent persons for valuable insights.
  - Visits to local establishments such as hospitals and social NGOs to connect with the community.
  - Familiarization with the institute and various departments

- While the Induction Program does not carry any marks or credits, student participation will be assessed at the institute level based on the following mandatory criteria:

  - Attendance
  - Active Participation

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Course Nomenclature Format:

Courses are assigned unique 10-character codes following the structure below:

- **First two numeric characters** – Indicate the academic inception year of curriculum implementation, e.g., 25 for 2025.
- **Next one characters** – Represent the education level, e.g. U- for Undergraduate and P- for Postgraduate
- **Following two characters** – Discipline code, e.g., GS- for General Science Engineering, AI- Artificial Intelligence and Data Science, CE- Civil Engineering, CS- Computer Science and Engineering, EE- Electrical Engineering, ET- Electronics and Telecommunications Engineering, ME- Mechanical Engineering.
- **One numeric character** – Years of study within a degree or program, e.g., 1 for F.Y. B. Tech, 2 for S.Y. B. Tech. 3 for T.Y. B. Tech and 4 for Final Year
- **One numeric character** – Semester numbers range from 1 to 2.
- **Next three numeric characters** – Department-assigned course number e.g. 001 to 999 under different course categories

Course Type Descriptions:

Type of Course	Description	Course Code	Responsible Department
BSC	Basic Science Course	001-100	General Science Department (FE)
VSEC	Vocational and Skill Enhancement Course	101-200	
IKS	Indian Knowledge System	201-300	
CC	Co-curricular Courses	301-400	
AEC	Ability Enhancement Course	401-500	
ESC	Engineering Science Course	001-100	Respective Departments
PCC	Program Core Course	101-200	
PCE	Program Core Elective	201-300	
HON	Honors	301-400	
MDM	Multidisciplinary Minor	401-500	
OE	Open Electives	501-600	

➢ **Courses and Credits offered in Semesters I & II as per NEP-2020:**

Course Type	Course Code	Name of the Course	Credits	Actual Total Credits Utilized in Sem. I & II	Total Credits Range Required as per NEP-2020 in Sem. I & II
BSC	25UGS11001	Applied Physics	3	15	14-18
	25UGS11002	Applied Physics Lab	1		
	25UGS11003	Solid State Physics	3		
	25UGS11004	Engineering Mathematics-I	4		
	25UGS12008	Transforms and matrices	4		
	25UEE11001	Fundamentals of Electrical Engineering	2	15	12-16
	25UEE11002	Fundamentals of Electrical Engineering Lab	1		
	25UET11003	Electrical and Electronics Components	2		
	25UET12004	Basic Electronics Engineering	2		
	25UET12005	Basic Electronics Engineering Lab	1		
ESC	25UET12006	Digital Techniques	3		
	25UET12007	Digital Techniques Lab	1		
	25UCS11011	Foundations of Programming and Problem Solving	2		
	25UCS11012	Foundations of Programming and Problem Solving Lab	1		
PCC	25UEE12101	Electrical and Electronics Measurements	1	2	2
	25UEE12102	Electrical and Electronics Measurements Lab	1		
VSEC	25UGS11102	Computer Tools & Applications	2	4	4
	25UGS12104	CPP & OOPs Lab	2		
AEC	25UGS12401	Communication Skill	1	2	2
	25UGS12402	Communication Skill Lab	1		
IKS	25UGS11201	IKS-Vedic Mathematics	2	2	2
CC	25UGS11302	Yoga/Sports/Cultural	2	4	4
	25UGS11301	NSS	2		
		Total Credits	**44**	**44**	**40-48**

First Year B. Tech.

Semester-I (w.e.f. A.Y. 2025-26)

Applied Physics (25UGS11001)

Teaching Scheme:

	No. of Hrs./week	No. of Credits	**Evaluation Scheme:**	
Lectures:	3	3	MSE:	30 Marks
Tutorials:	-	-	ICA:	10 Marks
Practical:	-	-	ESE:	60 Marks
Total:	3	3	OE/POE:	-

Course Outcomes: At the end of this course, students shall be able to	
CO 1	Apply the concept of acoustics and calculate absorption coefficients and reverberation time.
CO 2	Describe the production of ultrasonic waves and identify various types of defects in materials.
CO 3	Use interference, diffraction and polarisation phenomena to design optical instruments.
CO 4	Describe the concepts of nuclear physics and Quantum Mechanics.
CO 5	Explain nanomaterials, their production techniques and synthesis methods.

Unit	*Course Contents*	*No. of lectures (hrs.)*
Unit 1	**Acoustics** Acoustics: Introduction, Architectural acoustics, Reverberation time, Sabine's formula, Absorption coefficient, Factors affecting on architectural acoustics of buildings, Acoustic planning of buildings (remedies) and numericals.	8
Unit 2	**Ultrasonics** Ultrasonics: Ultrasonic waves, Production of ultrasonics (Piezoelectric effect, Magnetostriction effect) and its applications and numericals. Non-Destructive Testing (NDT): Types of defects, Method of NDT, Visual Inspection, Liquid/Dye penetrant testing.	8
Unit 3	**Wave Optics** Interference: Interference in thin film due to reflected light, Wedge shaped film, Newton's Rings, Polarization of light: Methods for production of polarized light (Reflection, Refraction & Double refraction), Specific rotation and optical activity, Diffraction of light: Definition and difference between diffraction and interference. Introduction of diffraction grating, Resolving power of diffraction grating.	8

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Unit 4	**Nuclear Physics & Quantum Mechanics**	
	Nuclear Physics: Mass Defect, Nuclear reaction, Q values of nuclear reaction, GM Counter, Quantum Mechanics: de Broglie's Concept of matter wave, Heisenberg's uncertainty principle, Schrodinger's time dependent and time independent wave equations, Introduction to quantum computing (bits & qubits, difference between classical and quantum computers).	8
Unit 5	**Nano Technology**	
	Nano-materials: Nanomaterial, Production techniques (Top down and bottom up), Carbon, Nano Tubes (CNTs), Ball milling and spay pyrolysis methods for synthesis of nano particles.	7

Text Books:

1)	Engineering Physics - R.K. Gaur and S. L. Gupta. DhanpatRai Publications Pvt. Ltd.- New Delhi.
2)	Fundamental of Physics - Halliday and Resnik. Willey Eastern Limited.
3)	Applied Physics I: R. J. Gawade, G. M. Kharmate, Dr. A. Chakrabarti, Synergy Knowledgeware Publication.

Reference Books:

1)	Engineering Physics – M.N. Avadhanulu and P.G. Kshirsagar, S. Chand and Company Ltd.
2)	Nanotechnology: An Introduction To Synthesis, Properties And Applications of Nanomaterials – Thomas Varghese, K. M. Balakrishna.
3)	Optics –AjoyGhatak. MacGraw-Hill Education (India) Pvt. Ltd.
4)	"Concepts of Modern Physics" by Arthur Beiser.
5)	"Introduction to Quantum Mechanics" by David J. Griffith.

First Year B. Tech.

Semester-II (w.e.f. A.Y. 2025-26)

Applied Physics Lab (25UGS11002)

Teaching Scheme:

	No. of Hrs./week	No. of Credits	**Evaluation Scheme:**	
Lectures:	-	-	MSE:	-
Tutorials:	-	-	ICA:	25 Marks
Practical:	2	1	ESE:	-
Total:	2	1	OE/POE:	-

	Course Outcomes: At the end of this course, students shall be able to	
CO 1	Determine the velocity of ultrasonic waves in liquids and thickness of thin wire by using wedge shaped thin film.	
CO 2	Determine the radius of curvature of a plano-convex lens by analyzing the fringe pattern formed by Newton's rings.	
CO 3	Measure the specific rotation of optically active substances using a half-shade polarimeter and understand the principles of optical activity and study crystal Plane.	
CO 4	Calculate wavelength of a laser source using diffraction principles.	
CO 5	Demonstrate the synthesis, characterization and analysis of nanomaterials.	

Ex.	*Experiment Details*	No. of Ex. Sessions (hrs.)
Ex. 1	Determination of velocity of ultrasonic wave in given liquid using ultrasonic interferometer.	2
Ex. 2	Measurement of absorption coefficient of given sound absorbing materials.	2
Ex. 3	Determination of wavelength of monochromatic light by using Newton's rings.	2
Ex. 4	Measurement of radius of curvature of Plano convex lens by using Newton's rings.	2
Ex. 5	Determination of wavelength of He-Ne laser using diffraction grating.	2
Ex. 6	Determination of the thickness of a thin film by measurement by wedge shaped air film.	2
Ex. 7	Determination of the resolving power of a plane diffraction grating using a spectrometer.	2
Ex. 8	Determination of specific rotation of optically active material.	2
Ex. 9	Demonstrate the scales of nanotechnology.	2
Ex. 10	Demonstration of Geiger-Muller tube.	2

Text Books:

1)	Engineering Physics - R.K. Gaur and S. L. Gupta. Dhanpat Rai Publications Pvt. Ltd.- New Delhi.

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2)	Fundamental of Physics - Halliday and Resnik. Willey Eastern Limited.
Reference Books:	
1)	Engineering Physics – M.N. Avadhanulu and P.G. Kshirsagar.S.Chand and Company Ltd.
2)	Nanotechnology: An Introduction To Synthesis, Properties And Applications of Nanomaterials– Thomas Varghese, K. M. Balakrishna.
3)	Optics –AjoyGhatak. MacGraw Hill Education (India) Pvt. Ltd.
4)	"Concepts of Modern Physics" by Arthur Beiser.
5)	"Introduction to Quantum Mechanics" by David J. Griffith.

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First Year B. Tech.
Semester-I (w.e.f. A.Y. 2025-26)
Engineering Mathematics-I (25UGS11004)

Teaching Scheme:

	No. of Hrs./week	No. of Credits	Evaluation Scheme:	
Lectures:	3	3	MSE:	30 Marks
Tutorials:	1	1	ICA:	10 Marks
Practical:	-	-	ESE:	60 Marks
Total:	4	4	OE/POE:	-

	Course Outcomes: At the end of this course, students shall be able to	
CO 1	Illustrate the applications of De Moivre's theorem, and establish relationships between circular and hyperbolic functions.	
CO 2	Demonstrate the concept of partial derivatives and their applications in engineering.	
CO 3	Compute Jacobians, errors, approximations, and maxima and minima of functions using partial derivatives.	
CO 4	Solve first-order differential equations with applications to various engineering problems.	
CO 5	Apply vector differentiation techniques to analyze the physical and geometrical properties of vectors.	

Unit	Course Contents	No. of lectures (hrs.)
Unit 1	**Complex Numbers,** Review of complex numbers, De Moivre's theorem, applications of De Moivre'stheorem : roots of complex numbers, circular functions of a complex variable and hyperbolic functions, relation between circular and hyperbolic functions, separation of real and imaginary parts, logarithm of complex numbers.	8
Unit 2	**Partial Differentiation** Partial derivatives of first and higher orders, variable to be treated as constant, total derivative, change of variables, partial differentiation of composite functions, Homogeneous functions – Euler's theorem and their deductions for functions containing two variables (without proof), applications to various engineering problems.	7
Unit 3	**Applications of Partial Differentiation** Jacobians, properties of Jacobian: JJ'=1, errors and approximations, maxima and minima of functions of two variables, Lagrange's method of undetermined multipliers with single constraint.	7

Unit 4	**Ordinary Differential Equations and Their Applications** Order and degree of ordinary differential equations, ordinary differential equations of first order and first degree: Exact differential equations and Equations reducible to exact differential equations, linear differential equations, reducible to linear differential equations, Applications to orthogonal trajectories, Newton's law of cooling, Electrical and Electronics engineering applications.	9
Unit 5	**Vector Differentiation** Velocity vector, acceleration vector, tangential and normal component of acceleration, vector differential operator, gradient, directional derivatives, angle between surfaces, divergence and curl, solenoidal and irrotational field.	8

Text Books:	
1)	Higher Engineering Mathematics (42nd Edition), B. S. Grewal, Khanna Publications, Delhi.
2)	Advanced Engineering Mathematics, E. Kreyzig's, John Wiley & Sons, INC.

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)	Engineering Mathematics, Srimanta Pal and Subodh C. Bhunia, Oxford University Press India.
5)	Mathematics for Engineering Applications, Kuldip S. Rattan and Naathan W. Klingbeil Wiley. (Modeling and Core Engineering Application).
6)	Engineering Mathematics Through Applications, Kuldeep Singh, PalgraveMacmilan.
7)	Advanced Engineering Mathematics, H. K. Dass, S. Chand Publications, Delhi.
8)	A Textbook of Engineering Mathematics, N. P. Bali and Manish Goyal, Laxmi Publications, 2008.
9)	A Textbook of Applied Mathematics, P. N. and J. N. Wartikar, Vol.1, Pune VidyarthiGrihaPrakashan.
10)	A Course in Engineering Mathematics (Vol I) by Dr. B. B. Singh, Synergy Knowledgeware, Mumbai.

Sr. No.	Name of Tutorial / Assignment
1)	Solve numericals to find roots of algebraic equations.
2)	Solve numericals to find logarithms of complex numbers.
3)	Solve numericals on partial differentiation of composite functions.
4)	Solve numericals on Euler's theorem on homogeneous functions.
5)	Solve numericals of errors and approximations.
6)	Solve numericals to find maxima and minima of functions of two variables.
7)	Solve numericals of reducible exact and reducible to linear differential equations
8)	Solve numericals of orthogonal trajectories and Newton's law of cooling.
9)	Solve numericals of electrical and electronics engineering applications.
10)	Solve numericals to find directional derivatives of vectors.
11)	Solve numericals to check whether a given function is irrotational or not, if irrotational then find its scalar potential.

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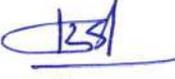Fabtech Technical Campus
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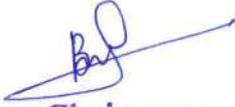### Fundamentals of Electrical Engineering(25UEE11001)

Teaching Scheme:

Evaluation Scheme:

	No. of Hrs./week	No. of Credits		
Lectures:	2	2	MSE:	30 Marks
Tutorials:	-	-	ICA:	10 Marks
Practical:	-	-	ESE:	60 Marks
Total:	2	2	OE/POE:	-

	Course Outcomes: At the end of this course, students shall be able to	
CO 1	Apply fundamental laws and methods to analyze electrical circuits.	
CO 2	Solve single-phase AC circuits using phasor and impedance methods.	
CO 3	Explain magnetic circuit concepts and electromagnetic laws.	
CO 4	Describe the construction and working principles of machines and transformers.	
CO 5	Describe modern electrical technologies and their societal relevance.	

Unit	*Course Contents*	No. of lectures (hrs.)
Unit 1	**Basic Concepts of Electrical Circuits** Fundamental Electrical Quantities, Introduction to electrical elements: Resistance, Capacitance, Inductance, Types of Electric Circuits, Ohm's Law, Kirchhoff's Laws (KVL & KCL),Mesh and nodal analysis ,Source transformation ,Star and delta conversion.	5
Unit 2	**AC Circuits and Phasor Analysis** Sinusoidal signals: RMS, Average, Peak values ,Phasor representation of sinusoids, Impedance and admittance, Series and parallel RLC circuits ,Power in AC circuits: real, reactive, apparent power, and power factor.	5
Unit 3	**Magnetic Circuits and Electromagnetism** Magnetic field, flux, MMF, reluctance, permeability, Magnetic circuits – Series and parallel, Analogy between electric and magnetic circuits, Hysteresis and eddy current losses, Faraday's laws and Lenz's law.	5
Unit 4	**Transformers and Electrical Machines** Basic working principle of a transformer, EMF equation, efficiency ,DC machines: types, working, applications, AC machines: single-phase induction motor, three- phase induction motor (Construction and Working),Applications in daily life and industry.	5

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Unit 5	**Electrical Applications and Recent Technologies**	
	Concept of grid and interconnected systems ,Electrical safety and earthing, Introduction to Renewable Energy sources: Solar PV, Wind, Hydro, Energy conservation , Smart grid and renewable integration,Basics of IoT in Electrical Systems.	5

Text Books:	
1)	"Fundamentals of Electrical Engineering"– Rajendra Prasad.
2)	"Fundamentals of Electrical Engineering and Electronics"–B.L.Theraja.

Reference Books:	
1)	Electrical Engineering Fundamentals by Vincent Del Toro,PHI Learning,2nd Edition.
2)	Basic Electrical Engineering by D.P. Kothariand, I.J. Nagrath, McGraw Hill Education, Latest Revised Edition.
3)	Principles of Electrical Engineering and Electronics by V.K. Mehta and Rohit Mehta, S. Chand Publishing, Latest Edition.
4)	Basic Electrical Engineering by J.B. Gupta, S.K. Kataria & Sons, Latest Edition.
5)	Electrical Technology(Vol.1)by B.L.Theraja and A.K.Theraja, S.Chand Publishing, 24th Revised Edition.
6)	Introduction to Electrical Engineering by M.S. Naidu and S. Kamakshaiah, Tata McGraw Hill Education,1st Edition.
7)	Fundamentals of Electrical Engineering by Rajendra Prasad, PHI Learning, Latest Edition.

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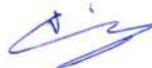FTCCOER, Sangola
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First Year B. Tech.
Semester-I (w.e.f. A.Y. 2025-26)
Fundamental of Electrical Engineering Lab (25UEE11002)

Teaching Scheme:			Evaluation Scheme:	
	No. of Hrs./week	No. of Credits		
Lectures:	-	-	MSE:	-
Tutorials:	-	-	ICA:	25 Marks
Practical:	2	1	ESE:	-
Total:	2	1	OE/POE:	-

Course Outcomes: At the end of this course, students shall be able to		
CO 1	Verify Ohm's Law experimentally and calculate/compare current for different applied voltages in a resistive circuit.	
CO 2	Determine resistance values from color codes and validate selected resistors using a digital multimeter.	
CO 3	Apply KVL and KCL to analyze resistive networks and validate the theoretical node/mesh solutions experimentally.	
CO 4	Measure DC/AC voltage, current, and resistance using a digital multimeter and interpret instrument limitations and error sources.	
CO 5	Demonstrate the construction and operating principle of a Electric motor and perform a basic test on it.	

Ex.	Experiment Details	No. of lectures (hrs.)
Ex. 1	Verify Ohm's Law using a simple resistive circuit and calculate current for varying voltages.	2
Ex. 2	Determination of Resistance Value Using Resistor Color Code.	2
Ex. 3	Apply KVL and KCL in a resistive network and validate theoretical vs. measured values.	2
Ex. 4	To Measure Voltage, Current, and Resistance Using a Digital Multimeter.	2
Ex. 5	To Measure Power and Power Factor in a Single-Phase AC Circuit.	2
Ex. 6	To Study Basic Electrical Tools and Safety Measures.	2
Ex. 7	Demonstrate construction and working of DC motor.	2
Ex. 8	Demonstrate working of single-phase induction motor and identify various parts.	2
Ex. 9	Demonstrate working of single-phase induction motor and identify various parts.	2
Ex. 10	Setup and analyze a solar PV module to measure voltage, current, and power under different Light conditions.	2

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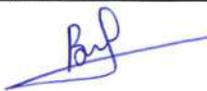COLLEGE OF ENGINEERING
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Text Books:	
1)	"Fundamentals of Electrical Engineering"– Rajendra Prasad.
2)	"Fundamentals of Electrical Engineering and Electronics"–B.L.Theraja.

| Reference Books:	
1)	Electrical Engineering Fundamentals by Vincent Del Toro,PHI Learning,2nd Edition.
2)	Basic Electrical Engineering by D.P. Kothariand, I.J. Nagrath, McGraw Hill Education, Latest Revised Edition.
3)	Principles of Electrical Engineering and Electronics by V.K. Mehta and Rohit Mehta, S. Chand Publishing, Latest Edition.
4)	Basic Electrical Engineering by J.B. Gupta, S.K. Kataria & Sons, Latest Edition.
5)	Electrical Technology(Vol.1)by B.L.Theraja and A.K.Theraja, S.Chand Publishing, 24th Revised Edition.
6)	Introduction to Electrical Engineering by M.S. Naidu and S. Kamakshaiah, Tata McGraw Hill Education,1st Edition
7)	Fundamentals of Electrical Engineering by Rajendra Prasad, PHI Learning, Latest Edition.

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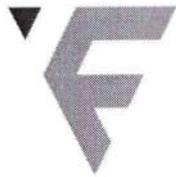
First Year B. Tech.

Semester-I (w.e.f. A.Y. 2025-26)

Electrical and Electronics Components (25UET11003)

Teaching Scheme:			Evaluation Scheme:	
	No. of Hrs./week	No. of Credits		
Lectures:	2	2	MSE:	30 Marks
Tutorials:	-	-	ICA:	10 Marks
Practical:	-	-	ESE:	60 Marks
Total:	2	2	OE/POE:	-

Course Outcomes: At the end of this course, students shall be able to

CO 1	Enlist the basic electrical and electronic components.
CO 2	Summaries different cables, Transformers, switches, and relays.
CO 3	Identify the different semiconductor components.
CO 4	Enlist and Different Types of Transistors.
CO 5	Compare various IC's and SMD components.

Unit	*Course Contents*	No. of lectures (Hors.)
Unit 1	**Basic Electrical and Electronics components** : Resistors, Inductors ,Capacitors-Properties, Types and Applications.	6
Unit 2	**Magnetic Components and Switches:** Transformers, Relays, Switches, Connectors, Transmission Lines and Cables.	4
Unit 3	**Semiconductor Component** Diode, Zener diode, Scotty diodes-Properties and Applications Optocouplers: phototransistor, TRIAC, DIAC, SCR- Properties and Applications ,Optoelectronic Devices:LED, LCD- Properties and Applications.	4
Unit 4	**Transistors** Bipolar Junction Transistor(BJT): NPN and PNP, applications of BJT ,Field Effect Transistors (FET)-JFET, MOSFET, FET applications.	4
Unit 5	**Introduction to IC and SMD** Basics of IC,IC fabrication, IC Technology ,IC classification ,IC packages. SMD Concept of SMT & SMD, advantages & disadvantages of SMD. SMD resistor, capacitor, IC, transistor, land pattern of SMD resistor, capacitor, transistor & IC's SMD packages (SOT, PLCC).	6

Text Books:	
1)	Electronic Components and Materials Madhuri Joshi Shroff Publishers & Distributors Private Ltd.
2)	Electrical & Electronics Engineering Materials Component ,S.K. Bhattacharya ,Khanna
Reference Books:	
1)	Basic Electronics Debashis De Pearson
2)	Electronic Components and Materials Grover & Jamwal Dhanpat Rai & Sons.
3)	Electronic Components and Materials Dhir Tata McGraw Hill
4)	Handbook of components for electronics Charles A. Harper Laxmi Enterprise
5)	Electrical Engineering Materials M.L. Gupta Dhanpat Rai & Sons
6)	Text book of Applied Electronics R.S. Sedha S. Chand

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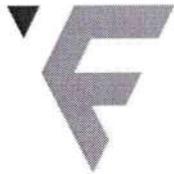FABTECH TECHNICAL CAMPUS
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First Year B. Tech.
Semester-I(w.e.f. A.Y. 2025-26)
Foundations of Programming and Problem Solving (25UCS11011)

Teaching Scheme:

	No. of Hrs./week	No. of Credits	Evaluation Scheme:	
Lectures:	2	2	MSE:	30 Marks
Tutorials:	-	-	ICA:	10 Marks
Practical:	-	-	ESE:	60 Marks
Total:	2	2	OE/POE:	-

Course Outcomes: At the end of this course, students shall be able to

CO 1	Examine the fundamental concepts of the C language to construct basic programs.
CO 2	Use control structures such as conditional statements and loops to develop logic-driven solutions.
CO 3	Demonstrate effective use of arrays, strings, and pointers, including dynamic memory allocation, to solve data processing tasks.
CO 4	Illustrate problem-solving strategies and algorithm design techniques for efficient program development.
CO 5	Use C language to model and solve real-world problems and applications.

Unit	*Course Contents*	No. of lectures (hrs.)
Unit 1	**Basics of C Programming** Introduction to Programming Languages ,Structure of a C Program, Data Types and Variables, Constants, Identifiers, Operators and Expressions, Input and Output Functions , Algorithms , ,Flowcharts.	5
Unit 2	**Control Structures** Conditional Statements, if, if-else, nested if, switch-case, Loops and Iteration-for while, do-while loops, Nested loops, Break, continue, goto statements.	5
Unit 3	**Arrays and Strings , Pointers & Dynamic Memory** One-dimensional and Two-dimensional Arrays, Array Initialization and Memory Representation ,String Handling: Input/output, string functions (strlen, strcpy, strcmp, etc.) , Basics of Functions, Types of Functions, Pointer basics, pointer arithmetic.	6

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	Introduction to Problem Solving	
Unit 4	Definition of a problem and solution, Steps in problem solving, Problem solving strategies (Trial and Error, Divide and Conquer, Greedy Approach, etc.) , Top-down vs Bottom-up design.	5
	Application Development Project	
Unit 5	Build a small-scale application using C such as: Student management system, Bank record system, Inventory or billing system, Quiz game, Focus on modular code.	5

Text Books:

1)	Computer Fundamentals and Programming in C" by E. Balagurusamy
2)	Programming and Problem Solving with C" by Ashok N. Kamthane and AmitKamthane

Reference Books:

1)	Let Us C by Yashavant Kanetkar
2)	Programming in ANSI C by E. Balagurusamy
3)	How to Solve It by Computer by R.G. Dromey
4)	The C Programming Language by Brian W. Kernighan and Dennis M. Ritchie
5)	Computer Programming and Problem Solving by A.N. Kamthane and Amit Ashok Kamthane

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(An Autonomous Institute)
First Year B. Tech.
Semester-I (w.e.f. A.Y. 2025-26)
Foundations of Programming and Problem Solving Lab (25UCS11012)

Teaching Scheme:			Evaluation Scheme:	
	No. of Hrs./week	No. of Credits		
Lectures:	-	-	MSE:	-
Tutorials:	-	-	ICA:	25 Marks
Practical:	2	1	ESE:	-
Total:	2	1	OE/POE:	25 Marks

Course Outcomes: At the end of this course, students shall be able to

CO 1	Apply control structures and data types to develop programs using C.
CO 2	Solve computational problems using appropriate algorithms and data structures.
CO 3	Use arrays, strings, and dynamic memory allocation to perform data processing tasks.
CO 4	Apply C programming concepts to design and implement solutions for real-world applications.

Ex.	*Experiment Details*	No. of Ex. Sessions (hrs.)
Ex. 1	Write an algorithm for the area of a rectangle and the area of a circle.	2
Ex. 2	Write a program in C that calculates the sum of the first N natural numbers (1, 2, 3, ..., N), where N is a positive integer entered by the user.	2
Ex. 3	Write a program in C that checks if a given string is a palindrome	2
Ex. 4	Write a program in C that checks whether a given integer is even or odd using an if-else control structure.	2
Ex. 5	Write a program in C that reverses a given integer using a while loop	2
Ex. 6	Write a program in C that reverses the elements of a given array.	2
Ex. 7	Write a program in C that calculates the length of a string without using the strlen() function by iterating through the string.	2
Ex. 8	Write a C program to implement Binary Search using the divide and conquer technique	2
Ex. 9	Write a C program to sort an array using the Merge Sort algorithm (Divide and Conquer).	2
Ex. 10	Write a program for 5 students having data members roll no, name.	2

Text Books:

1)	Computer Fundamentals and Programming in C" by E. Balagurusamy.
2)	Programming and Problem Solving with C" by Ashok N. Kamthane and Amit Kamthane.

Reference Books:

1)	Let Us C by Yashavant Kanetkar.
2)	Programming in ANSI C by E. Balagurusamy.
3)	How to Solve It by Computer by R.G. Dromey.
4)	The C Programming Language by Brian W. Kernighan and Dennis M. Ritchie.
5)	Computer Programming and Problem Solving by A.N. Kamthane and Amit Ashok Kamthane.

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First Year B. Tech.
Semester-I & Semester-II (w.e.f. A.Y. 2025-26)
Computer Tools & Applications Lab (25UGS11102)

Teaching Scheme:

	No. of Hrs./week	No. of Credits	Evaluation Scheme:	
Lectures:	-	-	MSE:	-
Tutorials:			ICA:	50 Marks
Practical:	4	2	ESE:	-
Total:	4	2	OE/POE:	

Course Outcomes: At the end of this course, students shall be able to

CO 1	Demonstrate a clear understanding of basic computer concepts and effectively operate operating system environments (Windows/Linux) for daily office tasks.	
CO 2	Illustrate word format, and manage professional documents using word processing tools like MS Word or Google Docs, including mail merge and print setup.	
CO 3	Use spreadsheet software to organize, analyze, and present data using formulas, functions, charts, and formatting techniques.	
CO 4	Design engaging presentations and communicate effectively using email, internet tools, and virtual meeting platforms.	
CO 5	Operate common office equipment, manage digital files securely, use cloud storage, and apply basic cyber security practices to protect data.	

Ex.	*Experiment Details*	No. of Ex. Sessions (hrs.)
Ex. 1	Create a formatted document with headings, bullet lists, page setup, header/footer, and page numbers.	2
Ex. 2	Perform a Mail Merge to generate multiple invitation letters or certificates using a contact list.	2
Ex. 3	Insert tables, images, symbols, and use spelling/grammar tools in a professional document.	2
Ex. 4	Enter data in a spreadsheet and apply basic formatting and functions like SUM, AVERAGE, and IF.	2
Ex. 5	Create charts (bar, pie, line) from data and apply sorting, filtering, and conditional formatting.	2
Ex. 6	Demonstrate use of cell referencing (relative/absolute), data validation, and password protection in sheets.	2

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Ex. 7	Design a PowerPoint presentation with text, images, transitions, animations, and audio/video using the Canva tool.	2
Ex. 8	Use Gmail to compose and send an email with CC/BCC, attach files, and organize emails into folders/labels.	2
Ex. 9	Demonstrate use of cloud storage (Google Drive/One Drive) – upload, organize, share, and download files.	2
Ex. 10	Practice basic cybersecurity: set strong passwords, identify phishing emails, and explore antivirus/firewall tools.	2
Ex. 11	Create a virtual meeting for effective communication using Zoom or Google Meet platform.	2
Ex.12	Case Study: How to use AI tools and common software like Word, Excel, PowerPoint, Gmail, and cloud storage to create documents, manage data, design presentations, send emails, and ensure cybersecurity.	2

Note:
1. For the 12th practical, assign a list of case studies based on all 11 previous practicals. Each group of 4 students should select one case study, create a detailed report in a Word file, upload the file to Google Drive, and share the link via email.

Text Books:

1)	A Textbook of Computer Applications" by P. K. Sinha & Priti Sinha

Reference Books:

1)	"Fundamentals of Computers" by V. Rajaraman
2)	"Computer Applications" by Niranjan Shrivastava
3)	Computer Applications in Business" by R. Parameswaran

First Year B. Tech.

Semester-I (w.e.f. A.Y. 2025-26)

Communication Skills (25UGS11401)

Teaching Scheme:

Evaluation Scheme:

	No. of Hrs./week	No. of Credits		
Lectures:	1	1	MSE:	-
Tutorials:	-	-	ICA:	25 Marks
Practical:	-	-	ESE:	-
Total:	1	1	OE/POE:	-

Course Outcomes: At the end of this course, students shall be able to

CO 1	Use correct grammar, vocabulary, articles and tenses in speaking and writing.
CO 2	Explain the communication process, types, barriers of communication and ways to overcome them.
CO 3	Apply interview skills, group discussion techniques and teamwork for career success.
CO 4	Show communication through effective listening, speaking, reading, and writing.
CO 5	Developing professional business letters, resumes and emails clearly and correctly.

Unit	*Course Contents*	No. of lectures (hrs.)
Unit 1	**Grammar and Vocabulary for Communication** Articles, Parts of Speech, Tenses, Vocabulary- Prefix, Suffix, Antonyms and Synonyms.	3
Unit 2	**Fundamentals of Communication** Definition, Meaning & Importance of Communication, Process of Communication, Types of Communication: Verbal, Non-verbal, Written, Visual, Barriers to Effective Communication & Ways to Overcome.	3
Unit 3	**Professional Communication and Career Skills** Interview Techniques: Preparation, FAQs, Do's and Don'ts, Group Discussions: Do's and Don'ts, Participation, Evaluation, Time Management and Teamwork in Communication.	3
Unit 4	**Oral Communication & Presentation Skills** Effective Use of L, S, R,W, Listening Skills: Types and Barriers, Public Speaking.	2
Unit 5	**Written Communication Skills** Business Letters, Resume and Cover Letter Writing, Email Writing.	2

Text Books:

1)	Technical Communication: Principles and Practice By Meenakshi Raman & Sangeeta Sharma

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	Publisher: Oxford University Press
2)	Communication Skills By Sanjay Kumar & Pushp Lata Publisher: Oxford University Press
Reference Books:	
1)	Effective Technical Communication By M. Ashraf Rizvi
2)	Developing Communication Skills By Krishna Mohan & Meera Banerji Publisher: Macmillan India
3)	Business and Managerial Communication By Sailesh Sengupta Publisher: PHI Learning
4)	Objective English By Hari Mohan Prasad & Uma Rani Sinha Publisher: McGraw Hill Education
5)	English for Engineers and Technologists By Dr. Dhanavel S.P. Publisher: Orient BlackSwa
6)	Business Communication By M.J. Mathew Publisher: RBSA Publishers
7)	A Course in English Communication By Kiranmai Dutt, Geetha Rajeevan, C.L. Prakash Publisher: Foundation Books / Cambridge University Press India

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First Year B. Tech.

Semester-I (w.e.f. A.Y. 2025-26)

Communication Skills Lab (25UGS11402)

Teaching Scheme:

	No. of Hrs./week	No. of Credits	**Evaluation Scheme:**	
Lectures:	-	-	MSE:	-
Tutorials:	-	-	ICA:	25 Marks
Practical:	2	1	ESE:	-
Total:	2	1	OE/POE:	-

Course Outcomes: At the end of this course, students shall be able to	
CO 1	Explain common errors in English grammar and rectify them.
CO 2	Exhibit writing & speaking skills through controlled and guided activities.
CO 3	Describe effective presentations aided by ICT tools.
CO 4	Provide communication skills which enhances their employability skills.
CO 5	Demonstrate interpersonal and soft skills to participate actively in interviews and group discussions.

Ex.	Experiment Details	No. of Ex. Sessions (hrs.)
Ex. 1	Self Introduction& Role Plays	2
Ex. 2	SWOT Analysis and Stress Management	2
Ex. 3	PPT Presentation and Non- Verbal Communication	2
Ex. 4	Group Discussion on Technical Topics	2
Ex. 5	Debate Session	2
Ex. 6	LSRW Activities: Storytelling & Listening Circles	2
Ex. 7	Newspaper Reading & Vocabulary Building	2
Ex. 8	News Presentation & Event Narration	2
Ex. 9	Extempore Speaking	2
Ex. 10	Mock Interview Practice	2

Text Books:	
1)	Technical Communication: Principles and Practice By Meenakshi Raman & Sangeeta Sharma Publisher: Oxford University Press
2)	Communication Skills By Sanjay Kumar & Pushp Lata Publisher: Oxford University Press.

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	Reference Books:
1)	Effective Technical Communication By M. Ashraf Rizvi
2)	Developing Communication Skills By Krishna Mohan & Meera Banerji Publisher: Macmillan India
3)	Business and Managerial Communication By Sailesh Sengupta Publisher: PHI Learning
4)	Objective English By Hari Mohan Prasad & Uma Rani Sinha Publisher: McGraw Hill Education
5)	English for Engineers and Technologists By Dr. Dhanavel S.P. Publisher: Orient BlackSwa
6)	Business Communication By M.J. Mathew Publisher: RBSA Publishers
7)	A Course in English Communication By Kiranmai Dutt, Geetha Rajeevan, C.L. Prakash Publisher: Foundation Books / Cambridge University Press India

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First Year B. Tech.	
Semester-I & Semester-II (w.e.f. A.Y. 2025-26)	
NSS (25UGS11301)	

Teaching Scheme:

	No. of Hrs./week	No. of Credits
Lectures:	-	-
Tutorials:	-	-
Practical:	4	2
Total:	4	2

Evaluation Scheme:

MSE:	-
ICA:	50 Marks
ESE:	-
OE/POE:	-

Course Outcomes: At the end of this course, students shall be able to

CO 1	Explain the aims, objectives, and structure of NSS and its role in nation-building.
CO 2	Demonstrate social awareness and the ability to identify community problems through participation in regular and special camping activities.
CO 3	Apply the principles of volunteerism in organizing and participating in community service activities.
CO 4	Use leadership qualities, teamwork, and communication skills through group activities and social work.

Ex.	*Experiment Details*	No. of Ex. Sessions (hrs.)
Ex. 1	**Introduction to NSS** Historical background of NSS in India and its development, Aims and Objectives of NSS Organizational structures, roles & responsibilities. Emblem sign, NSS badge, Flag, Clap, NSS Songs: Lakshya Geet, Sadbhavana Geet, RashtriyaYuva Geet.	12
Ex. 2	**NSS Programmes and Activities and Role of Youth** Concept of NSS activities, Regular activities, Special camp, Day Camps, Financial pattern of the scheme, Role of Youth, Understanding Youth, Understanding the community, Youth a subagents of social change, Issues, challenges and opportunities for youth, Youth-adult partnership, Voluntarism need and importance.	14
Ex. 3	**Activity Based Programmes** Awareness Programmes – Seminar, workshops, celebration of National and International days, Personality Development programmes, group activities, etc., Yoga day celebration Rally, Campus Cleaning, Tree plantation, Blood donation, Medical checkup, Health Awareness camp, etc.	14
Ex. 4	**NSS Programmes** Implementation of Central, State Govt. and Local governing bodies and NGO Program Activities or Directed by University, Yuva Portal, Voter awareness, Skill Development, Entrepreneurship and Rural development, Youth exchange events, Women Empowerment.	12

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Text Books:	
1)	NSS and Youth Development" by Dr. Sunita Agarwalla
2)	Text Book of National Service Scheme (Volume –I)
Reference Books:	
1)	National Service Scheme (NSS) (Mumbai University)

First Year B. Tech.

Semester-II(w.e.f. A.Y. 2025-26)

Solid State Physics (25UGS11003)

Teaching Scheme:

	No. of Hrs./week	No. of Credits	Evaluation Scheme:	
Lectures:	3	3	MSE:	30 Marks
Tutorials:	-	-	ICA:	10 Marks
Practical:	-	-	ESE:	60 Marks
Total:	3	3	OE/POE:	-

Course Outcomes: At the end of this course, students shall be able to

CO 1	Explain the basic concepts of crystal structure and X-ray diffraction
CO 2	Describe the working principle of laser, process of recording and reconstructing a hologram and its applications
CO 3	Summarize the band theory of solid and conductivity of semiconducting materials.
CO 4	Explain the principle and structure of optical fibres and understand the different types of dielectric polarization
CO 5	Describe the concept of superconductivity and classify magnetic materials

Unit	Course Contents	No. of lectures (hrs.)
Unit 1	**Crystallography and X-ray Diffraction** Crystal Structure : unit cell- primitive and non- primitive, lattice parameters, seven crystal systems, properties of unit cell: number of atoms per unit cell, coordination number, atomic radius, packing density, Relation between lattice constant and density, Miller indices, X-rays : X-ray diffraction, line and continuous Spectrum of X-ray, Bragg's law for X-ray diffraction.	8
Unit 2	**Photonics and Holography** Laser: interaction of energy and matter: stimulated absorption, spontaneous emission and stimulated emission of radiation, population inversion, pumping, characteristics of laser, types of laser – Ruby and He-Ne laser, applications of laser. holography: comparison between holography and photography, principle of holography, recording of hologram, reconstruction of image, applications of holography.	8
Unit 3	**Semiconductor** Introduction, band theory of solid, classification of solids, conductivity of intrinsic and extrinsic semiconductors, Hall effect, derivation of Hall voltage and Hall coefficient, numericals.	8

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Unit 4	**Optical fibre and Dielectrics** Fibre optics: principle and structure of optical fibre, acceptance angle, acceptance cone, numerical aperture, advantages of optical fibre, applications of optical fibre, numericals, dielectrics: difference between polar and non-polar dielectrics, polarization, types of dielectric polarization : ionic, electronic, orientation and space charged.	8
Unit 5	**Physics of advanced Materials** Superconducting materials: superconductivity, type-i and type-ii superconductors, meissner effect, properties of superconductor, applications of superconductor, magnetic materials: types of magnetic materials : diamagnetic, paramagnetic and ferromagnetic, B-H curve.	7

Text Books:		
1)	Engineering Physics - R.K. Gaur and S. L. Gupta. DhanpatRai Publications Pvt. Ltd.- New Delhi.	
2)	Fundamental of Physics - Halliday and Resnik. Willey Eastern Limited.	

Reference Books:		
1)	Solid State Physics – O. S. Pillai. New age international limited	
2)	Solid State Physics – A.J. Dekker. McMillan India –Limited.	
3)	Solid State Physics – B. L. Theraja. . S. Chand Publication	
4)	Introduction to Solid State Physics – Charles Kittel. John Willey and Sons	
5)	Optics –AjoyGhatak. MacGraw Hill Education (India) Pvt. Ltd	
6)	Engineering Physics – M.N. Avadhanulu and P.G. Kshirsagar.S.Chand and Company LTD.	

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First Year B. Tech.

Semester-II (w.e.f. A.Y. 2025-26)

Transforms and Matrices (25UGS12008)

Teaching Scheme:

	No. of Hrs./week	No. of Credits	Evaluation Scheme:	
Lectures:	3	3	MSE:	30 Marks
Tutorials:	1	1	ICA:	10 Marks
Practical:	-	-	ESE:	60 Marks
Total:	4	4	OE/POE:	-

Course Outcomes: At the end of this course, students shall be able to	
CO 1	Use matrix algebra to solve systems of linear equations in engineering applications.
CO 2	Apply the concepts of matrix to find eigenvalues, eigenvectors, and use the Cayley-Hamilton theorem with applications.
CO 3	Predict system responses using Laplace transform and their properties.
CO 4	Illustrate the applications of Z- transform in engineering.
CO 5	Compute Fourier transforms of given functions using standard techniques.

Unit	*Course Contents*	No. of lectures (hrs.)
Unit 1	**Matrix Algebra** Rank of a matrix, normal form of a matrix, consistency of systems of linear equations, system of homogeneous equations and non – homogeneous equations, linear dependence and independence of vectors, applications to diverse engineering problems: Electrical and Electronics engineering applications, balancing the chemical reactions.	8
Unit 2	**Eigen Values and Eigen Vectors** Eigen values, eigen vectors, properties of eigen values and eigen vectors, Cayley-Hamilton Theorem (without Proof), applications of Cayley-Hamilton theorem, applications to various engineering problems: stability in control systems.	8
Unit 3	**Laplace Transform** Definition, Laplace Transform of standard functions, Properties: First shifting, change of scale, multiplication of powers of t and division by t, Laplace Transform of derivative and integral, Inverse Laplace Transform, Inverse Laplace Transform of standard functions, Inverse Laplace transform by convolution theorem only.	8

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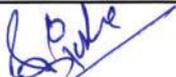Fabtech Technical Campus
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Unit 4	**Z-transform** Z-transform, region of convergence, Z-transform of standard functions, properties of Z-transform: linearity, Change of scale, shifting property, multiplication by k, convolution theorem, Inverse Z-Transform, Inverse Z-transform by partial fraction method only.	8
Unit 5	**Fourier transform** Fourier transform, inverse Fourier transform, Fourier sine and cosine transform, inverse Fourier sine and cosine transform, finite Fourier sine and cosine transform.	7

Text Books:	
1)	Higher Engineering Mathematics (42nd Edition), B. S. Grewal, Khanna Publications, Delhi.
2)	Advanced Engineering Mathematics, E. Kreyzig's, John Wiley & Sons, INC.

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)	Engineering Mathematics, Srimanta Pal and Subodh C. Bhunia, Oxford University Press India.
5)	Mathematics for Engineering Applications, Kuldip S. Rattan and Naathan W. Klingbeil, Wiley. (Modeling and Core Engineering Application).
6)	Engineering Mathematics Through Applications, Kuldeep Singh, PalgraveMacmilan.
7)	Fundamentals of Statistics, S. C. Gupta, Himalaya House Publication.
8)	Advanced Engineering Mathematics, H. K. Dass, S. Chand Publications, Delhi.
9)	A Textbook of Applied Mathematics, P. N. and J. N. Wartikar, Vol.1, Pune VidyarthiGrihaPrakashan.
10)	A Course in Engineering Mathematics (Vol I) by Dr. B. B. Singh, Synergy Knowledgeware, Mumbai.

Sr. No.	Name of Tutorial / Assignment
1)	Solve numericals on the rank of a matrix using the normal form.
2)	Solve numericals on a system of simultaneous linear equations by the matrix method.
3)	Solve numericals to find eigen values and eigen vectors of the matrix.
4)	Solve numericals on the Cayley-Hamilton theorem.
5)	Solve numericals to find Laplace transforms by using multiplication by powers of t and division by t properties.
6)	Solve numericals to find Laplace transforms of derivative and integral properties.
7)	Solve numericals on inverse Laplace transforms by convolution theorem.
8)	Solve numericals to find z-transform of standard functions
9)	Solve numericals on inverse z-transforms.
10)	Solve numericals on fourier transforms.

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First Year B. Tech.

Semester-II (w.e.f. A.Y. 2025-26)

Basic Electronics Engineering (25UET12004)

Teaching Scheme:			Evaluation Scheme:	
	No. of Hrs./week	No. of Credits		
Lectures:	2	2	MSE:	30 Marks
Tutorials:	-	-	ICA:	10 Marks
Practical:	2	1	ESE:	60 Marks
Total:	4	3	OE/POE:	-

Course Outcomes: At the end of this course, students shall be able to		
CO 1	Illustrate the operating principles and defining characteristics of Basic semiconductor devices.	
CO 2	Demonstrate the applications of diodes in various electronic systems.	
CO 3	Examine basic amplifiers and switching circuits using bipolar junction transistors.	
CO 4	Apply the characteristics and behavior of JFETs and MOSFETs under different biasing conditions	
CO 5	Determine the performance of power supply circuits using parameters such as line regulation, load regulation.	

Unit	Course Contents	No. of lectures (hrs.)
Unit 1	**Semiconductor Diodes** Introduction to Semiconductors Intrinsic and extrinsic semiconductors (N-type, P-type), P-N Junction: Construction, Symbol, working principle,V-I characteristics, forward and reverse bias, Zener diode: working principle, characteristics, and voltage regulation.	5
Unit 2	**Applications of Diodes** Types of Rectifier: Half-wave, Full-wave (center-tapped and bridge) rectifiers. Ripple factor, Efficiency, working principle of Capacitor filter, LC filter.	5
Unit 3	**Bipolar Junction Transistors (BJTs)** Introduction to BJT (NPN and PNP), construction, working principle, Transistor Configurations, Common Base (CB), Common Emitter (CE), Common Collector (CC) configurations, Relation between alpha, beta, gama, Types of biasing, Transistor as a Switch.	5
Unit 4	**Field Effect Transistor** Voltage operating device, Construction of JFET (N channel and P- channel), symbol, working principle and characteristics (Drain and Transfer characteristics) Application of FET, MOSFET: Construction, working principle and characteristics of MOSFET.	5

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Unit 5	**Regulators and Power supply** Need of Regulated power supply . Basic block diagram of DC regulated power supply and function of each block, Load and Line regulation, Need of SMPS , block diagram and functions of blocks.	5

Text Books:	
1)	Kothari DP and I.J Nagrath, —Basic Electrical and Electronics Engineering, Second Edition, McGraw Hill Education, 2020
2)	Boylstad, Electronics Devices and Circuits Theory, Pearson Education

Reference Books:	
1)	Millman Halkias: Electronic Devices and Circuits, McGraw-Hill Publication, 2000.
2)	Donald Neaman, Electronic Circuit Analysis and Design, McGraw-Hill Publication, 3rd Edition
3)	B. L. Theraja, Fundamentals of ElectronicEngineering , S. Chand, 2006

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First Year B. Tech.

Semester-II (w.e.f. A.Y. 2025-26)

Basic Electronics Engineering Lab (25UET12005)

Teaching Scheme:			Evaluation Scheme:	
	No. of Hrs./week	No. of Credits		
Lectures:	-	-	MSE:	-
Tutorials:	-	-	ICA:	25 Marks
Practical:	2	1	ESE:	-
Total:	2	1	OE/POE:	25 Marks

Course Outcomes: At the end of this course, students shall be able to		
CO 1	Illustrate the operating principles and defining characteristics of Basic semiconductor devices.	
CO 2	Demonstrate the applications of diodes in various electronic systems.	
CO 3	Examine basic amplifiers and switching circuits using bipolar junction transistors.	
CO 4	Apply the characteristics and behavior of JFETs and MOSFETs under different biasing conditions	
CO 5	Determine the performance of power supply circuits using parameters such as line regulation, load regulation.	

Ex.	Experiment Details	No. of Ex. Sessions (hrs.)
Ex. 1	Familiarization with basic electronic components (Resistors, Capacitors, Inductors, Diodes, Transistors, ICs	2
Ex. 2	Exploration and Use of Essential Lab Equipment: Multimeter, Oscilloscope, Function Generator, and Power Supply	2
Ex. 3	Analysis of the VI Characteristics of a PN Junction Diode	2
Ex. 4	Experimental Study of a Zener Diode Used for Voltage Regulation	2
Ex. 5	Analysis of a FullWave Rectifier Circuit Employing PN Junction Diodes	2
Ex. 6	Analysis of BJT Input and Output Characteristics	2
Ex. 7	Prepare and Test the performance of BJT working in CE mode	2
Ex. 8	Test the performance of FET drain characteristics	2
Ex. 9	Study the Characteristics of an Enhancement-type MOSFET (N-channel).	2
Ex. 10	Test the various blocks of regulated dc power supply.	2

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Text Books:	
1)	Kothari DP and I.J Nagrath, ―Basic Electrical and Electronics Engineering, Second Edition, McGraw Hill Education, 2020
2)	Boylstad, Electronics Devices and Circuits Theory, Pearson Education
	Reference Books:
1)	Millman Halkias: Electronic Devices and Circuits, McGraw-Hill Publication, 2000.
2)	Donald Neaman, Electronic Circuit Analysis and Design, McGraw-Hill Publication, 3rd Edition
3)	B. L. Theraja, Fundamentals of ElectronicEngineering , S. Chand, 2006

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Semester-II (w.e.f. A.Y. 2025-26)

Digital Techniques (25UET12006)

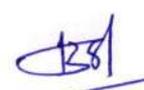| Teaching Scheme:			Evaluation Scheme:	
	No. of Hrs./week	No. of Credits		
Lectures:	3	3	MSE:	30 Marks
Tutorials:	-	-	ICA:	10 Marks
Practical:	-	-	ESE:	60 Marks
Total:	3	3	OE/POE:	-

Course Outcomes: At the end of this course, students shall be able to

CO 1	Discuss the number system and perform arithmetic operation on given binary number
CO 2	Explain functionality of any gate with the help of its truth table.
CO 3	Use of Boolean expressions to realize logic circuits.
CO 4	Illustrate combinational circuits using logic gates.
CO 5	Model sequential circuits using Flip Flops.

Unit	Course Contents	No. of lectures (hrs.)
Unit 1	**Number systems and Logic Gates:** Decimal, Binary, Octal and Hexadecimal, Binary arithmetic Operation: addition, subtraction, multiplication and division, Compliments: 1's and 2's complements, subtraction by 1's and 2's complement method, Conversion: Binary to decimal, octal, hexadecimal conversion and vice versa, Basic and Universal Logic gates Equivalent electrical circuits, truth table and functional operation of each gates.	8
Unit 2	**Boolean Algebra:** Laws of Boolean algebra, Duality Theorem Standard Boolean representation: Sum of Product (SOP) and Product of Sum(POS), Min-term and Max-term, conversion between SOP and POS forms, realization using NAND /NOR gates Karnaugh map method for simplification of Boolean expression.	8
Unit 3	**Combinational Logic Circuits:** Arithmetic Circuits: Half adder, full adder, half and full, subtractor, 1's and 2's complement subtractor circuit, 2's complement subtractor/adder, circuit using K Map Multiplexer and Demultiplexer.	8

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Unit 4	**Sequential Logic Circuits:** Flip-Flops: S-R, J-K, T and D. Truth table and logic circuits of each flip-flop Shift Registers: Series and parallel, shift, Serial in serial out, Shift Register. Counters: Ripple counter, Mod counter, up – down counter, synchronous and asynchronous counters.	8
Unit 5	**Memories:** Types- Primary memory, Secondary Memory, Organization, Dimension, Memory Bank, Features, Applications: RAM (SRAM, DRAM), ROM (PROM, EPROM, EEPROM), Programmable Arrays : PLA, PAL.	7

Text Books:	
1)	Modern Digital Electronics by R.P. Jain, McGraw-Hill Publishing, New Delhi.
2)	Fundamentals of Digital Circuits by Anand Kumar ,PHI learning Private limited.

Reference Books:	
1)	Digital Fundamentals by Floyd, Thomas Pearson Education India, Delhi.
2)	Digital Techniques by Godse ,A.P. Technical publications.
3)	Principles of digital electronics by Malvino and Leach, TMH, New Delhi.
4)	Digital Design by Mano ,M. Morris Pearson, New Delhi.
5)	Digital electronics :Principles, devices and applications by A.K. Maini John Willy and Sons.

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First Year B. Tech.

Semester-II (w.e.f. A.Y. 2025-26)

Digital Techniques Lab (25UET12007)

Teaching Scheme:

	No. of Hrs./week	No. of Credits
Lectures:	-	-
Tutorials:	-	-
Practical:	2	1
Total:	2	1

Evaluation Scheme:

MSE:	-
ICA:	50 Marks
ESE:	-
OE/POE:	-

Course Outcomes: At the end of this course, students shall be able to

CO 1	Demonstrate the ability to design, implement, and test combinational circuits.
CO 2	Illustrate the ability to design, implement, and test sequential circuits.

Ex.	Experiment Details	No. of Ex. Sessions (hrs.)
Ex. 1	Test the functionality of basic logic gates.	2
Ex. 2	Verification of Boolean Identities and Laws using Logic Gates.	2
Ex. 3	Design and Implement Full Adder circuit.	2
Ex. 4	Design and Implement Full Subtractor circuit.	2
Ex. 5	To verify the truth tables of SR, JK, T and D flip flops.	2
Ex. 6	Conversion of flip flop.	2
Ex. 7	Design and Implementation of Multiplexer and Demultiplexer.	2
Ex. 8	Design and verify the 4 Bit Synchronous counter.	2
Ex. 9	Design and verify the 4 Bit Asynchronous counter.	2
Ex. 10	To verify operation of Shift Registers.	2

Text Books:

1)	Modern Digital Electronics by R.P. Jain, McGraw-Hill Publishing, New Delhi.
2)	Fundamentals of Digital Circuits by Anand Kumar ,PHI learning Private limited.

Reference Books:

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1)	Digital Fundamentals by Floyd, Thomas Pearson Education India, Delhi.
2)	Digital Techniques by Godse ,A.P. Technical publications.
3)	Principles of digital electronics by Malvino and Leach, TMH, New Delhi.
4)	Digital Design by Mano, M. Morris Pearson, New Delhi.
5)	Digital electronics :Principles, devices and applications by A.K. Maini, John Willy and Sons.

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First Year B. Tech.

Semester-II (w.e.f. A.Y. 2025-26)

Electrical and Electronics Measurement(25UEE12101)

Teaching Scheme:

	No. of Hrs./week	No. of Credits	Evaluation Scheme:	
Lectures:	1	1	MSE:	25 Marks
Tutorials:	-	-	ICA:	-
Practical:	2	1	ESE:	-
Total:	3	2	OE/POE:	-

Course Outcomes: At the end of this course, students shall be able to

CO 1	Apply measurement system concepts to identify errors and perform basic calibration.
CO 2	Use the working principles of analog instruments for electrical measurements.
CO 3	Illustrate suitable methods to measure power, energy, and resistance in electrical systems.
CO 4	Demonstrate electronic instruments to measure and analyze electrical signals.
CO 5	Describe appropriate transducers for measuring physical quantities.

Unit	Course Contents	No. of lectures (hrs.)
Unit 1	**Fundamentals of Measurement** Introduction to Measurement Systems, Definition, Significance of measurement, Types of Errors – Gross, Systematic, Calibration and standards of Instrument.	3
Unit 2	**Analog Instruments** Classification of Instruments: Absolute & Secondary, Indicating, Recording, Integrating. PMMC, Moving Iron, Dynamometer type instruments.	3
Unit 3	**Measurement of Power, Energy and Resistance** Single and Three-phase Power Measurement using Wattmeter, Energy Meters: Induction Type Single-phase, 3-phase Energy Meters.Measurement of resistance.	3
Unit 4	**Electronic Instruments** Digital Voltmeters and Multimeters, Cathod Ray Oscilloscope(CRO), Digital Storage Oscilloscope (DSO), Function Generator and Frequency Counter.	3
Unit 5	**Transducers** Classification of Transducers – Active & Passive, Analog & Digital, Strain Gauge, LVDT, Thermocouple, RTD, Piezoelectric sensors.	3

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Text Books:		
1)	A.K. Sawhney, "A Course in Electrical and Electronic Measurements and Instrumentation", Dhanpat Rai & Co.	
2)	R.K. Rajput, *Electrical and Electronic Measurements and Instrumentation*", S. Chand Publications.	
Reference Books:		
1)	U.A. Bakshi& A.V. Bakshi, "Electrical and Electronic Measurement", Technical Publications, Pune	
2)	J.B. Gupta, "A Course in Electronic and Electrical Measurement and Instrumentation", S.K. Kataria& Sons	
3)	N.K. Sinha& D.C. Bhattacharya, "Electrical Measurements and Measuring Instruments", Tech India Publications.	
4)	S.K. Bhattacharya &RenuVig, "Electrical and Electronic Measurements", Pearson Education India	

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First Year B. Tech.

Semester-II (w.e.f. A.Y. 2025-26)

Electrical and Electronics Measurement Lab (25UEE12102)

Teaching Scheme:			Evaluation Scheme:	
	No. of Hrs./week	No. of Credits		
Lectures:	-	-	MSE:	-
Tutorials:	-	-	ICA:	25 Marks
Practical:	2	1	ESE:	-
Total:	2	1	OE/POE:	50 Marks

	Course Outcomes: At the end of this course, students shall be able to	
CO 1	Apply measurement system concepts to identify errors and perform basic calibration.	
CO 2	Use the working principles of analog instruments for electrical measurements.	
CO 3	Illustrate suitable methods to measure power, energy, and resistance in electrical systems.	
CO 4	Demonstrate electronic instruments to measure and analyze electrical signals.	
CO 5	Describe appropriate transducers for measuring physical quantities.	

Ex.	*Experiment Details*	No. of Ex. Sessions (hrs.)
Ex. 1	Measurement of voltage & Current using analog meters	2
Ex. 2	Extension range of Ammeter and voltmeter using shunt and series resistance	2
Ex. 3	Measurement of power in a Single-phase circuit using voltmeter- ammeter method	2
Ex. 4	Measurement of power in a Single-phase circuit using wattmeter method	2
Ex. 5	Measurement of unknown resistance using Wheatstone bridge	2
Ex. 6	Use of Function Generator & CRO for Different waveform analysis.	2
Ex. 7	Measurement of Displacement using LVDT	2
Ex. 8	Measurement of Temperature using RTD	2
Ex. 9	Measurement of Temperature using Thermocouple	2
Ex. 10	Kelvin's double bridge for low resistance measurement	2

Text Books:

1)	A.K. Sawhney, "A Course in Electrical and Electronic Measurements and Instrumentation", Dhanpat Rai & Co.
2)	R.K. Rajput, *"Electrical and Electronic Measurements and Instrumentation"*, S. Chand Publications.

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Reference Books:	
1)	U.A. Bakshi & A.V. Bakshi, "Electrical and Electronic Measurement", Technical Publications, Pune
2)	J.B. Gupta, "A Course in Electronic and Electrical Measurement and Instrumentation", S.K. Kataria& Sons
3)	N.K. Sinha & D.C. Bhattacharya, "Electrical Measurements and Measuring Instruments", Tech India Publications.
4)	S.K. Bhattacharya & RenuVig, "Electrical and Electronic Measurements", Pearson Education India

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First Year B. Tech.

Semester-II (w.e.f. A.Y. 2025-26)

CPP & Object Oriented Programming Lab (25UGS12104)

Teaching Scheme:			Evaluation Scheme:	
	No. of Hrs./week	No. of Credits		
Lectures:	-	-	MSE:	-
Tutorials:			ICA:	50 Marks
Practical:	4	2	ESE:	-
Total:	4	2	OE/POE:	-

Course Outcomes: At the end of this course, students shall be able to		
CO 1	Differentiate between procedural and object-oriented programming paradigms, and identify the features and structure of a basic C++ program.	
CO 2	Apply fundamental concepts of C++ such as control structures, functions, arrays, and strings to develop basic programs..	
CO 3	Demonstrate the use of classes, objects, constructors, destructors, and OOP concepts like encapsulation, abstraction, and polymorphism.	
CO 4	Illustrate inheritance, including its types, use of virtual base classes, and constructor implementation in derived classes.	
CO 5	Demonstrate programs using file handling mechanisms and handle exceptions with try, catch, and user-defined blocks.	

Ex.	Experiment Details	No. of Ex. Sessions (hrs.)
Ex. 1	Develop a program using Constants, Variables, arithmetic expression, operators.	2
Ex. 2	Develop a program to implement decision making statements (if-else, switch).	2
Ex. 3	Develop a program to demonstrate control structures (for, while, do-while).	2
Ex. 4	A) Develop a program to implement 1-dimension array. B) Develop a program to perform matrix operations using multi-dimensional array.	2
Ex. 5	Write a Program to create a class Student with data members: name, roll number, marks. Accept and display using member functions.	2
Ex. 6	Write a program to implement all types of constructors.	2
Ex. 7	Write a program to demonstrate Compile time and Run-time Polymorphism.	2
Ex. 8	Write a program for implementing Single inheritance.	2
Ex. 9	Write a program to create a file, write student data, and read it back using ofstream and if stream.	2
Ex. 10	Case Study: Student Result Management System (in C++)	2

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Text Books:		
1)	E. Balagurusamy, Object Oriented Programming with C++, McGraw-Hill Publication, 6th Edition, 2013.	
2)	Robert Lafore Object Oriented Programming in C++ Pearson Education India	
Reference Books:		
1)	P. J. Deitel, H. M. Deitel, C++ How to Program, PHI Publication, 9th Edition, 2012.	
2)	Let Us C++ – Yashavant Kanetkar	
3)	Bjarne Stroustrup, The C++ Programming Language, Addison-Wesley Publication, 4th Edition, 2013.	

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	First Year B. Tech.	
	Semester-II (w.e.f. A.Y. 2025-26)	
	IKS-Vedic Mathematics (25UGS11201)	

Teaching Scheme:

	No. of Hrs./week	No. of Credits	**Evaluation Scheme:**	
Lectures:	2	2	MSE:	-
Tutorials:	-	-	ICA:	50 Marks
Practical:	-	-	ESE:	-
Total:	2	2	OE/POE:	-

Course Outcomes: At the end of this course, students shall be able to	
CO 1	Explain the concept of IKS and the overview of vedic mathematics.
CO 2	Solve problems on vinculum numbers, beejank methods, and straight division using Paravartya and Dhwajank.
CO 3	Demonstrate Dwandvayoga, Vilokanam, and traditional methods for square roots, cube roots, and extended operations.
CO 4	Predict recurring decimal patterns and verify divisibility using osculators like Ekadhikena and Ekanyunena.
CO 5	Determine advantages of simultaneous operations in mixed arithmetic calculations.

Unit	*Course Contents*	*No. of lectures (hrs.)*
Unit 1	**Indian Knowledge System and Vedic Mathematics** IKS Foundational concepts and characteristics of Indian philosophical and scientific traditions; Significance of Ancient Knowledge, Overview of Indian mathematics, works by Indian Mathematicians, Vedic Mathematics, aims and objectives of vedic mathematics, Sutras and Up-sutras of Vedic Mathematics.	5
Unit 2	**Fundamental Operations in Arithmetic** Vinculum Numbers and their Applications in Tables, Addition, Multiplication and Division, Multiplication, by Nikhilam, Ekadhikena, Ekanyunena&Urdhvatiryagbhyam, Beejank and their Applications in Addition, Subtraction, Multiplication, Square and Division, Straight Division by Nikhilam, Paravartya&Dhwajank.	6
Unit 3	**Extended Operations** Square and Square root by Dwandvayoga, Addition and Difference of Square, Square root by Vilokanam&Dwandva yoga, Cube and Cube root, MeruPrastar in Higher Powers.	5
Unit 4	**Osculators** Recurring Decimals by Ekadhikena and Ekanyunena, Divisibility Test and Quotient by Ekadhikena and Ekanyunena.	5

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Unit 5	**Mixed Operations** Mixed Operations of Addition, Subtraction Multiplication and Square by Simultaneous Operations.	5

Text Books:

1)	Introduction to Indian Knowledge System: Concepts and Applications, Mahadevan B., BhatVinayakRajat, NagendraPavana R.N. (2022), PHI Learning Private Ltd. Delhi.
2)	Vedic Mathematics, S.B. K. Tirthaji, Agrawala (editor), Motilal Banarsidas, New Delhi

Reference Books:

1)	Vedic Ganit Nirdeshika Bhag-2, Vidya Bharti Akhil Bhartiya Shiksha Sansthan Kurushetra
2)	Vedic Ganit Vihangam Drishti 1, Shiksha Sanskriti Uthhan Nyas Delhi
3)	Lilavati of Bhaskracarya: A Treatise of Mathematics of Vedic Tradition
4)	History of Science in India Volume-1, Part-I, Part-II, Volume VIII, SibajiRaha, et al. National Academy of Sciences, India and The Ramkrishan Mission Institute of Culture, Kolkata (2014).
5)	Indian Knowledge Systems Vol – I & II, Kapoor Kapil, Singh Avadhesh (2021), Indian Institute of Advanced Study, Shimla, H. P..
6)	Mathematics in Ancient and Medieval India, Bag, A. K. (1979). Chaukhamba Orientalia, New Delhi.
7)	Textbook on The Knowledge System of Bhārata, Bhag Chand Chauhan, Garuda Prakashan.

FABTECH EDUCATION SOCIETY'S
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First Year B. Tech.
Semester-II (w.e.f. A.Y. 2025-26)
Yoga/Sports (25UGS11302)

Teaching Scheme:

	No. of Hrs./week	No. of Credits
Lectures:	-	-
Tutorials:	-	-
Practical:	4	2
Total:	4	2

Evaluation Scheme:

MSE:	-
ICA:	50 Marks
ESE:	-
OE/POE:	-

Course Outcomes: At the end of this course, students shall be able to

CO 1	Demonstrate the forms of yoga.
CO 2	Demonstrate the practices of pranayama.
CO 3	Apply the fundamental ideas and methods of physical education.
CO 4	Apply knowledge of sports for physical and mental wellness.
CO 5	Illustrate the use of yoga, pranayama, and sports activities to promote physical fitness and mental well-being.

Ex.	*Experiment Details*	No. of Ex. Sessions (hrs.)
Ex. 1	**Yoga** History and philosophy of yoga, different styles of yoga (Hatha, Vinyasa, Ashtanga, Basic yoga postures (asanas) and their benefits, Principles of alignment and balance, Shitalikarna, Vyayama, Suryanamaskara.	12
Ex. 2	**Pranayama and Breath Control** Pranayama, importance of pranayama, types of pranayama (e.g., AnulomVilom, Kapalabhati, Bhramari), Benefits of breath control for physical and mental health.	12
Ex. 3	**Physical Education** Meaning, Definition and Importance of Physical Education, Aim and Objective, Conditioning exercises, warming up and cooling down.	8
Ex. 4	**Fundamentals of Sports for Wellness** Types of sports and their health benefits, Indoor and outdoor sports. Basic principles of physical fitness and conditioning, developing a personalized fitness plan, safety measures and injury prevention.	12
Ex. 5	**Sports, Yoga, and Pranayama** Synergistic benefits of combining sports, yoga, and pranayama, pranayama to enhance sports performance and recovery.	12

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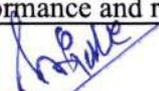Fabtech Technical Campus
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Text Books:

1)	Fundamentals of Track and Field, P. N. Dharma, KhelSahitya Kendra, New Delhi.
2)	Asanas- Swami Kuvalyananda Pioneer in Scientific Yoga, Swami Kuvalayananda, Kaivalyadhama SamitiLonavla.

Reference Books:

1)	History of Indian Theatre, Manohar Laxman Varadpande (1987).
2)	Indian Music (The Magic of the Raga), Raghava R. Menon
3)	Modern Music: A Concise History (World of Art S.).
4)	Modern Trends and Physical Education, A. Singh.
5)	OP: Asana Why and How, Tiwari.
6)	Light on Yoga, B. K. S. Iyengar.
7)	Indian Art and Culture, Nitin Singhania, McGraw Hill Edge

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