

SYLLABUS FOR FIRST YEAR

BACHELOR OF TECHNOLOGY *(All Branches)*

2024 ONWARDS

Semester I		B.Tech Biotech Engineering- (I Semester)							w.e.f 2024-28 Batch				
S.No	Course Code	Course Name	Component NEP	Component AICTE Nomenclature	Credit	L	T	P	Contact Hr.	CIE	MSE	ESE	Total
1	THU101	Professional Communication	AEC	HSMC	2	2	0	0	2	25	25	50	100
2	TCH101	Engineering Chemistry	DSC	BSC	3	3	0	0	3	25	25	50	100
3	TBT101	Fundamental of Medical Biotechnology	SEC	BSC	3	2	1	0	3	25	25	50	100
4	TCS101	Fundamental of Computer & Introduction to Programming	DSC	ESC	3	3	0	0	2	25	25	50	100
5	EEC101	Basic Electrical and Electronics Engineering	DSC	ESC	4	3	1	0	4	25	25	50	100
6	PCH151	Chemistry Lab	DSC	LC	1	0	0	2	2	25	25	50	100
7	PME153	Engineering Graphics and Design Lab	SEC	LC	2	0	0	4	4	25	25	50	100
8	PCS151	Computer Lab - I	DSC	LC	2	0	0	4	4	25	25	50	100
9	EEC151	Basic Electrical and Electronics Engineering Lab	DSC	LC	1	0	0	2	2	25	25	50	100
Total					21	13	2	12	26	225	225	450	900

MNG Course

1	TEV101/201	Environmental Science	VAC	MNG	2	2	0	0	2	Qualified/ NoN Qualified			
---	------------	-----------------------	-----	-----	---	---	---	---	---	--------------------------	--	--	--

B.Tech B.Tech Biotech Engineering (II Semester)

S.No	Course Code	Course Name	Component NEP	Component AICTE Nomenclature	Credit	L	T	P	Contact Hr.	CIE	MSE	ESE	Total
1	THU201	Advanced Professional Communication	AEC	HSMC	2	2	0	0	2	25	25	50	100
2	TPH201	Engineering Physics	DSC	BSC	3	3	0	0	3	25	25	50	100
3	TMA202	Engineering Mathematics	DSC	BSC	3	3	0	0	3	25	25	50	100
4	TCH202	Advanced Organic Chemistry	DSC	ESC	3	3	0	0	3	25	25	50	100
5	TCS201	Programing for problem solving	DSC	ESC	3	3	0	0	3	25	25	50	100
6	HSMC201	Design Thinking	VAC	ESC	1	0	0	2	2	25	25	50	100
7	PPH251	Physics Lab	DSC	LC	1	0	0	2	2	25	25	50	100
8	PCS251	Computer Lab-II	DSC	LC	2	0	0	4	4	25	25	50	100
9	GP201	General Proficiency-I	SEC	SEC	1	-	-	-	-	100	-	-	100
Total					19	14	0	8	22	300	200	400	900

MNG Course

1	THF101/201	Healthy Living & Fitness	VAC	MNG	2	2	0	0	2	Qualified/ NoN Qualified			
---	------------	--------------------------	-----	-----	---	---	---	---	---	--------------------------	--	--	--

Common to all B.Tech Engineering Program (Other than Biotech Engg)

Semester I		B.Tech B.Tech Engineering (I Semester) (Other than Biotech Engg)											
S.No	Course Code	Course Name	Component NEP	Component AICTE Nomenclature	Credit	L	T	P	Contact Hr.	CIE	MSE	ESE	Total
1	THU101	Professional Communication	AEC	HSMC	2	2	0	0	2	25	25	50	100
2	TPH101/201	Engineering Physics	DSC	BSC	3	3	0	0	3	25	25	50	100
3	TMA101	Engineering Mathematics-I	DSC	BSC	3	2	1	0	3	25	25	50	100
4	TEE101/201	Basic Electrical Engineering	DSC	ESC	2	2	0	0	2	25	25	50	100
5	TCS101	Fundamental of Computer & Introduction to Programming	DSC	ESC	3	3	0	0	3	25	25	50	100
6	HSMC 101/201	Design Thinking	VAC	ESC	1	0	0	2	2	25	25	50	100
7	PEE151/251	Basic Electrical Engineering Lab	DSC	LC	1	0	0	2	2	25	25	50	100
8	PPH151/251	Physics Lab	DSC	LC	1	0	0	2	2	25	25	50	100
9	PME151/251	Workshop And Manufacturing Practices	SEC	LC	2	0	0	4	4	25	25	50	100
10	PCS151	Computer Lab-I	DSC	LC	2	0	0	4	4	25	25	50	100
Total					20	12	1	14	27	250	250	500	1000

MNG Course

1	THF101/201	Healthy Living & Fitness	VAC	MNG	2	2	0	0	2	Qualified/ NoN Qualified			
---	------------	--------------------------	-----	-----	---	---	---	---	---	--------------------------	--	--	--

Semester II		B.Tech Engineering- (II Semester) (Other than Biotech Engg)											
S.No	Course Code	Course Name	Component NEP	Component AICTE Nomenclature	Credit	L	T	P	Contact Hr.	CIE	MSE	ESE	Total
1	THU201	Advanced Professional Communication	AEC	HSMC	2	2	0	0	2	25	25	50	100
2	TCH101/201	Engineering Chemistry	DSC	BSC	3	3	0	0	3	25	25	50	100
3	TMA201	Engineering Mathematics-II	DSC	BSC	3	2	1	0	3	25	25	50	100
4	TCS201	Programing for problem solving	DSC	ESC	3	3	0	0	3	25	25	50	100
5	TEC101/201	Basic Electronics Engineering	DSC	ESC	2	2	0	0	2	25	25	50	100
6	PCH151/251	Chemistry Lab	DSC	LC	1	0	0	2	2	25	25	50	100
7	PME153/253	Engineering Graphics and Design Lab	SEC	LC	2	0	0	4	4	25	25	50	100
8	PCS251	Computer Lab - II	DSC	LC	2	0	0	4	4	25	25	50	100
9	PEC151/251	Basic Electronics Engineering Lab	DSC	LC	1	0	0	2	2	25	25	50	100
10	PCE151/251	Basic Civil Engg Lab	DSC	LC	1	0	0	2	2	25	25	50	100
11	GP201	General Proficiency-I	SEC	SEC	1	-	-	-	-	100	-	-	100
Total					21	12	1	14	27	350	250	500	1100

MNG Course

1	TEV101/201	Environmental Science	VAC	MNG	2	2	0	0	2	Qualified/ NoN Qualified			
---	------------	-----------------------	-----	-----	---	---	---	---	---	--------------------------	--	--	--

DEPARTMENT OF PROFESSIONAL COMMUNICATION						
Program: - Bachelor of Technology (I year)						
Semester	Course Title		Professional Communication		Code	THU101
Course Components	Credits		Contact Hours	L	T	P
Ability Enhancement Course	02			Contact Hours	02	00
Examination Duration (Hrs)	Theory	Practical	WEIGHTAGE: EVALUATION	CIE	MSE	ESE
	02	00		CIE	25	25
Course Outcomes						
CO1	Comprehend grammatical rules so that it is easier to converse and write in correct English.					
CO2	Enhance the speaking skills and develop an understanding of effective verbal and nonverbal expressions to instil the confidence of a good speaker in the students.					
CO3	Employ the skills and knowledge of communication in the professional life and in career building exercise					
Pre-requisite	Functional Grammar, Basic writing skills					
Unit No.	Content					Contact Hours
Unit -1	FUNCTIONAL GRAMMAR: Sentence correction based on Nouns, Pronoun, Adjective, Verb, Adverb, Preposition, Conjunction, Modals, Tenses and Subject-Verb Agreement					10
Unit -2	EFFECTIVE COMMUNICATION: Introduction to effective communication, Evolution, Principles, Barriers, Communication based on Formality, Media and Party. Oral and Written Communication, Non-verbal communication Characteristics, Components: Paralanguage, Kinesics and Proxemics					10
Unit -3	CORPORATE COMMUNICATION: Memo writing, Notice and Report writing, Agenda and Minutes of the meeting					10
	Total Hours					30

Textbooks:

Authors Name	Title	Edition	Publisher, Country	Year
Wren & Martin Revised by: Dr. N.D.V Prasad Rao	English Grammar and Composition	6 th	S. Chand, India	2023
Kumar S. and Lata P.	Communication Skills	2 nd , (13 th Impression)	Oxford University Press, India	2022

Reference Books:

Authors Name	Title	Edition	Publisher, Country	Year
Singh C.	English is Easy	4 th	BSC Publishing Co. Pvt. Ltd., India	2020
Raman M. and Sharma S.	Technical Communication	4 th	Oxford University Press	2022

<i>Department of Allied Sciences (Mathematics)</i>							
<i>Program: - B.Tech. (All Branches Except Bio Tech.)</i>							
<i>Semester</i>	One	<i>Course Title</i>		ENGINEERING MATHEMATICS -I	<i>Code</i>	TMA 101	
<i>Course Components</i>		<i>Credits</i>		<i>Contact Hours</i>	<i>L</i>	<i>T</i>	<i>P</i>
Discipline Specific Course (DSC)		03			02	01	00
<i>Examination Duration (Hrs)</i>		<i>Theory</i>	<i>Practical</i>	<i>WEIGHTAGE: EVALUATION</i>	<i>CWA</i>	<i>MSE</i>	<i>ESE</i>
		03	00		25	25	50
<i>Pre-requisite</i>	Basic Knowledge of Mathematics						
<i>Course Outcomes</i>							
CO1	Understand the concept of Matrices.						
CO2	Solve the system of linear equations.						
CO3	Implement the concept of differential calculus in various discipline of Engineering.						
CO4	Analyze the maxima / minima values of function of two or more variables with its application to Engineering.						
CO5	Apply the multiple integrals to find the area and volume.						
CO6	Utilize the vector calculus in different Engineering systems.						
<i>Unit No.</i>	<i>Content</i>					<i>Contact Hours</i>	
Unit -1	Matrices: Elementary transformations, Linear dependency and independency of vectors, Determinants, Inverse of a matrix, Symmetric, Skew-symmetric, Hermitian, Skew-Hermitian and orthogonal matrices; Rank of a Matrix; Rank-Nullity theorem; System of linear equations; Characteristic equation, Eigenvalues and Eigenvectors; Orthogonal transformation; Diagonalization of matrices; Cayley-Hamilton Theorem.					11	
Unit -2	Basic Calculus: Rolle's Theorem, Mean value theorem and its applications; Extreme value of functions, Indeterminate forms and L'Hospital's rule, Linear approximation, Taylor's and Maclaurin's theorems with remainders.					8	
Unit -3	Multivariable Calculus-I: Successive differentiation, Leibnitz's theorem, Limits, continuity and differentiability of function of two variables, Partial Differentiation, Total derivative; Homogeneous function, Euler's theorem. Directional derivatives, Gradient, Tangent plane and normal line; Curvature, Evolutes and involutes; Extrema (Maxima/ Minima) of functions of several variables and saddle points; Method of Lagrange's multipliers; Introduction of Jacobian and its properties.					8	
Unit -4	Multivariable Calculus-II: Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Double integrals (Cartesian), Change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes, Center of mass and gravity (constant and variable densities); Triple integrals (Cartesian), Orthogonal curvilinear coordinates, Simple applications involving cubes, sphere and rectangular parallelepipeds.					10	

Unit -5	Vector Calculus: Introduction to vectors; Scalar line integrals, Vector line integrals, Scalar surface integrals, Vector surface integrals; Gradient, Curl and divergence, Green, Gauss and Stokes theorems (without proof).	8
	Total Hours	45

Text Books:

Authors Name	Title	Edition	Publisher, Country	Year
C. B. Gupta, S. R. Singh and Mukesh Kumar	Engineering Mathematics for Semesters I and II	1 st	McGraw Hill Education	2015
N.P. Bali and Manish Goyal	A text book of Engineering Mathematics	9 th	Laxmi Publications, Reprint, 2008	2016
Gorakh Prasad and Chandrika Prasad	Textbook of differential calculus	11 th	Pothishala Pvt Ltd, Allahabad	1968
R. K. Jain and S. R. K. Iyengar	Advanced Engineering Mathematics	5 th	Narosa Publication	2019
Erwin Kreyszig	Advanced Engineering Mathematics	9 th	Wiley Publications	2014
G. B. Thomas and R. L. Finney	Calculus and Analytic geometry	9 th	Addison-Wesley Publishing Company	2010

Reference Books:

Authors Name	Title	Edition	Publisher, Country	Year
B. V. Ramana	Higher Engineering Mathematics	6 th	Tata McGraw Hill publications	2006
B. S. Grewal	Higher Engineering Mathematics	44 th	Khanna Publications, India	2022
Tom M. Apostol	Calculus-Volume 2	2 nd	Wiley Publications	2022
Reena Garg	Advanced Engineering Mathematics	1 st	Khanna Book Publishing Company 2021	2022
T. Veerarajan	Engineering Mathematics (for First Year)	5 th	Tata McGraw-Hill, New Delhi	2008

<i>Department of Electrical Engineering</i>							
<i>Program: - Bachelor of Technology (Common to all the Programs)</i>							
<i>Semester</i>	<i>I/II</i>	<i>Course Title</i>		<i>Basic Electrical Engineering</i>	<i>Code</i>	TEE 101/201	
<i>Course Components</i>		<i>Credits</i>		<i>Contact Hours</i>	<i>L</i>	<i>T</i>	
DSC		02			02	00	00
<i>Examination Duration (Hrs)</i>		<i>Theory</i>	<i>Practical</i>	<i>WEIGHTAGE: EVALUATION</i>	<i>CWA</i>	<i>MSE</i>	<i>ESE</i>
		03	00		25	25	50
<i>Pre-requisite</i>		Basic Knowledge of Physics and Mathematics					
<i>Course Outcomes</i>							
CO1	Recall the concept of voltage, current, resistance and laws related to electricity with reference to the electrical circuits/systems.						
CO2	Understanding of fundamental laws and theorems used in the electrical circuits.						
CO3	Application of network theorems/laws in electrical circuit.						
CO4	Understanding of various electrical safety components and electrical wiring.						
CO5	Application of earthing/grounding.						
<i>Unit No.</i>	<i>Content</i>					<i>Contact Hours</i>	
Unit -1	DC Circuit: Concepts of current, resistance, E.M.F., potential difference, Ohm's law, Simplifications of networks using series and parallel combinations and star-delta conversions, Kirchhoff's law, Superposition, Thevenin, Norton, Maximum Power Transfer theorem and their applications for network solutions.					10	
Unit -2	Single Phase AC: Introduction of Single-Phase AC, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Single phase AC through R, L, C, and series combination of RLC.					10	
Unit -3	Electrical Installations and Illumination: Wire and cables for internal wiring, switches, and circuits (Two-way switch, staircase wiring, go down wiring, double pole double throw switch), type of electrical wiring, Switch Fuse Unit (SFU), MCB, MCCB, Earthing concept and methods of earthing.					4	
Total Hours					24		

Text Books:

Authors Name	Title	Edition	Publisher, Country	Year
D.P. Kothari and I. J. Nagrath	Basic Electrical Engineering	4 th	Tata McGraw Hill,	2019
D.C. Kulshreshtha	Basic Electrical Engineering	2 nd	McGraw Hill	2019
V. N Mittle and Arvind Mittle	Basic Electrical Engineering	2 nd	Tata McGraw-Hill	2017

Reference Books:

Authors Name	Title	Edition	Publisher, Country	Year
L.S. Bobrow	Fundamentals of Electrical Engineering	12 th	Oxford University Press	2003
V.D. Toro	Electrical Engineering Fundamentals	2 nd	Prentice Hall India	2015
E. Hughes	Electrical and Electronics Technology	10 th	Pearson	2010

DEPARTMENT OF ELECTRICAL ENGINEERING

Course: - Bachelor of Technology

Semester	First/Second	Subject Title	Basic Electrical Engineering Lab		Code	PEE 151/251	
Course Components		Credits		Contact Hours	L	T	P
DSC		01			00	00	02
Examination Duration (Hrs)		Theory	Practical	WEIGHTAGE: EVALUATION	CWA	MSE	ESE
		00	03		25	25	50

Course Objectives

CO1	Understanding of basic electrical concepts i.e. voltage, current, power, energy etc.
CO2	Development of basic electrical circuit model for the verification of networks and theorems.
CO3	Analysis of various AC circuit parameters.
CO4	Understanding of basic concept of house wiring and measurement of electrical energy consumption.

Exp No.	Name of the Experiment
1.	To verify the Kirchhoff's Voltage Law (KVL) in DC circuit.
2.	To verify the Kirchhoff's Current Law (KCL) in DC circuit
3.	To verify Superposition theorem in DC circuit.
4.	To verify Thevenin's theorem in DC circuit.
5.	To verify Norton's theorem in DC circuit.
6.	To verify Maximum Power Transfer theorem in DC circuit.
7.	To find out the meter constant of a single-phase energy meter
8.	To wire for a Stair-case arrangement using a two-way switch.
9.	To measure power and power factor in a single-phase ac circuit with resistive load by using wattmeter.
10.	To draw the current versus frequency characteristics in RLC series circuit.
11.	To study various electrical accessories and machines parts (cut set model).

Name of Department: - **Mechanical Engineering**

1. Subject Code: Course Title:
2. Contact Hours: L: T: P:
3. Examination Duration (Hrs.): Theory Practical
4. Relative Weight: CWA PRS MSE ESE PRE
5. Credits:
6. Semester:
7. Subject Area:
8. Pre-requisite:

9. Course Outcome:	<p>CO1: To identify various conventional, non-conventional and automated manufacturing techniques.</p> <p>CO2: To explain various manufacturing practices used for the production of work-pieces in different shops like carpentry, welding, sheet metal etc.</p> <p>CO3: To apply the principles of manufacturing in fabrication of jobs.</p> <p>CO4: To analyses the properties of different materials used for fabrication of jobs.</p>
---------------------------	--

10. Details of the Course:

Sl. No.	Contents	Contact Hours	Course Outcome
1	Introduction to Manufacturing: Theory: Introduction to manufacturing, 3M's of manufacturing-man, machine and material, Types of manufacturing processes, Manufacturing shops-machine shop, fitting shop, carpentry shop, welding shop, sheet metal shop, black smithy shop, foundry shop, Introduction to advance manufacturing, Safety and precaution in workshop.	1	
	Practical: Introduction to Shop Facilities in different Shop .	4	

2	Machine Shop: Theory: Introduction to machining process, Measuring & marking tools used in machine shop, Parts of lathe and drilling machine, working principle of lathe and drilling, Tools used in lathe, Materials.	8	CO1 CO2
	Practical: I. To make a work piece using facing and turning operation. II. To make a work piece using step turning and thread making operation.	2	
3	Foundry Shop: Theory: Introduction to foundry; Pattern material-wood, cast iron, brass, aluminum, waxes etc., Types of patterns, Types of tools, Moulding sands-green sand, dry sand, loam sand, facing sand etc., Casting- Sand preparation, mould making, melting, pouring, and cleaning.	8	CO1 CO2
	Practical: I. To prepare a mould for casting using a single piece pattern. II. To prepare a mould for casting using a split pattern.	2	
4	Sheet Metal Shop: Theory: Introduction to sheet metal shop, Tools used in sheet metal shop, Types of Operations, Fabrication of daily use item such as funnel, tray, etc.	8	CO2
	Practical: I. To make a funnel using sheet metal forming (Material: 24 SWG) of given dimensions. II. To make a square tray using sheet metal forming (Material: 24 SWG) of given dimensions.	2	
5	Fitting Shop: Theory: Introduction to fitting, Types of tools used in fitting shop for measuring, marking, cutting, etc., calipers and Vernier caliper, material used in tools.	8	CO4
	Practical: I. To make a square piece of mild steel of given dimensions. II. To make a fitting job of given profile and dimensions.	2	
6	Welding Shop: Theory: Introduction to welding, Classifications of joining processes, Arc welding processes-power source, electrodes, edge preparation, Different types of joints. Electric arc welding, Metal inert gas welding, Tungsten inert gas welding.	8	CO2 CO3
	Practical: I. To prepare a butt (Single-V)/ fillet joint through electric arc welding. II. To prepare a butt (Single-V)/ fillet joint through TIG/MIG welding.	2	

7	Carpentry Shop: Theory: Introduction to carpentry shop, Wood and its type, Classification of timber, Seasoning and preservation of wood, Description and applications of the various tools used in carpentry, Different joints and their practical uses.	8	CO2
	Practical: I. To make corner-lap/ Centre - lap joint. II. To make Mortise and Tenon joint.	2	
8	Black smithy Shop: Theory: Introduction to black smithy shop, Tools used in black smithy shop, Types of Operations, Properties of metal- ductility, malleability, strength, etc.	8	CO1
	Practical: I. To make a square of round mild steel bar. II. To make a mild steel chisel/ nail.	2	
9	Non-conventional and Automated Manufacturing Techniques: Theory: Demonstration of Non-conventional fabrication techniques- 3D Printing, Laser Cutting.	1	CO1
	Practical: Demonstration of Automated manufacturing techniques-CNC, MasterCAM Software, Application of Industrial Robot, Assembly Line in Manufacturing Execution System.	4	
Total		80	

11. Suggested Books:

SL. No.	Name of Authors/Books/Publishers
Reference Books	
1.	Raghuwanshi B.S., Workshop Technology Vol. I & II, Dhanpath Rai & Sons.
2.	Mehta R.C.S., Narank D., Chaudhary A.K., Introduction to Engineering Workshops, Spire Publications.
3.	Choudhury S.K.H., Choudhury A.K.H., Roy N., Elements of Workshop Technology Vol. I & II, Media Promoters & Publishers Pvt. Ltd.

12.	Mode of Evaluation	Viva / Mid Term Lab Exam / End Term Lab Exam
-----	---------------------------	--

<i>Department of Allied Sciences (Chemistry)</i>							
<i>Program: - Bachelor of Technology (Common to all the Programs)</i>							
<i>Semester</i>	One	<i>Course Title</i>		<i>Engineering Chemistry</i>		<i>Code</i>	TCH101/201
<i>Course Components</i>		<i>Credits</i>		<i>Contact Hours</i>	<i>L</i>	<i>T</i>	<i>P</i>
Core Course (CC)		03			03	00	00
<i>Examination Duration (Hrs)</i>		<i>Theory</i>	<i>Practical</i>	<i>WEIGHTAGE: EVALUATION</i>	<i>CWA</i>	<i>MSE</i>	<i>ESE</i>
		03	00		25	25	50
<i>Pre-requisite</i>		TCH101/201: Basic Knowledge of Chemistry					
<i>Course Outcomes</i>							
CO1	acquire knowledge of structure and properties of molecules based on bonding and spectroscopic techniques						
CO2	understand the chemistry of purification of water and its industrial and domestic application						
CO3	classify various types of polymers and their applications						
CO4	Interpret and distinguish between the different types of conventional and non-conventional fuels						
CO5	apply the basic principles of electrochemistry in different electrochemical cells, corrosion control, fuel cells and industrial applications						
CO6	acquire knowledge of structure and properties of molecules based on bonding and spectroscopic techniques						
<i>Unit No.</i>	<i>Content</i>						<i>Contact Hours</i>
Unit -1	MOLECULAR STRUCTURE AND SPECTROSCOPIC TECHNIQUES Molecular Orbital Theory, Formation of homo and heteronuclear diatomic molecules Hydrogen Bonding and its application Metallic Bonding (Band theory) and application to conductors, semiconductors and insulators Nanoscale Materials - Properties and applications Basic Principles of spectroscopy and its applications for molecular structure						8
Unit -2	WATER TECHNOLOGY Hardness of water: Causes, Types, Measurement, Boiler troubles: Sludges, Scales and Caustic Embrittlement Softening of water by L-S Process, Zeolite Process and Reverse Osmosis Process, Ion Exchange Process, Calgon Process Numerical Problems based on L-S Process, Zeolite Process and hardness of water. Introduction to the membrane concept for the treatment of microplastics from water						8
Unit -3	POLYMERS Polymers: Definition, degree of polymerization, functionality of monomer, Classification of polymers with examples, Types of polymerizations – addition and condensation polymerization with examples. Mechanism of addition polymerization. Plastics: Definition and characteristics- thermoplastic and thermosetting						8

	<p>plastics, preparation, properties, and applications of PVC and Bakelite Fibers: Characteristics of fibers – preparation, properties and applications of Nylon and Dacron.</p> <p>Conducting polymers: Characteristics and Classification of conducting polymers with examples.</p> <p>Biodegradable polymers: Concept and advantages – Preparation of Polylactic acid and poly vinyl alcohol and their applications.</p> <p>Liquid Crystalline Polymers: Characteristics, classification with examples and their applications.</p>	
Unit -4	<p>FUELS AND RENEWABLE SOURCE OF ENERGY</p> <p>Fuels Definition, Classification and Characteristics of a good fuel, Calorific value and its determination by Bomb Calorimeter, Numerical problems on Bomb Calorimeter, Composition and uses of Natural gas, CNG, LPG.</p> <p>Renewable Energy Sources: Solar energy, wind energy, hydroelectric and geothermal. Biofuels as alternative sources of energy (biomass, biogas).</p>	8
Unit -5	<p>ELECTROCHEMISTRY & ITS APPLICATIONS</p> <p>Electrode potential, standard electrode potential, factors affecting the electrode potential of a cell.</p> <p>Nernst equation: Electrochemical series and its application, Electrochemical cell: Daniel cell, Concentration cells, electrolyte concentration cell</p> <p>Numerical problems based on electrode potential and emf of a cell. Fuel Cells: Introduction, Principles, Classification, and application Corrosion its causes and effects, Theories of corrosion – Chemical & Electrochemical corrosion</p>	10
	Total Hours	42

Text Books:

Authors Name	Title	Edition	Publisher, Country	Year
Sunita Rattan	Comprehensive Engineering Chemistry	2 nd	S.K. Kataria & Sons Delhi	2009
Shashi Chawala	Theory and Practical's of Engineering Chemistry	3 rd	Dhanpat Rai and Company, (Pvt) Ltd	2012
Jain & Jain	A text book of Engineering Chemistry	15 th	Dhanpat Rai Publishing Company	2008

Reference Books:

Authors Name	Title	Edition	Publisher, Country	Year
J.D. Lee	Concise Inorganic Chemistry	5 th edition		1996
K. L. Kapoor	A text book of Physical Chemistry, Vol 5	1 st edition	Macmillan India	2004
Prof.K.N. Jayaveera, Dr.G.V.Subba Reddy and Dr.C. Ramachandraiah	Chemistry for Engineers		McGraw Hill Higher Education Hyd	2009
William Kemp	Organic Spectroscopy		Palgrave Foundations	1991
L.E.Foster	Nanotechnology, Science Innovation & Opportunity		PearsonEducation	2007
Y.R. Sharma	Elementary Organic Spectroscopy: Principles and Chemical Applications	1 st edition		
F.W.Bill, Meyer	A Text book of Polymer Chemistry	3 rd Edition		2009
Thirumala Chary and Laxminarayana	Engineering Chemistry		Scitech Publishers, Chennai	2016

<i>Department of Allied Sciences (Chemistry)</i>							
<i>Program: - Bachelor of Technology (Common to all the Programs)</i>							
<i>Semester</i>	One	<i>Course Title</i>		<i>Chemistry Lab</i>	<i>Code</i>	PCH151/251	
<i>Course Components</i>		<i>Credits</i>		<i>Contact Hours</i>	<i>L</i>	<i>T</i>	<i>P</i>
Discipline Specific Core (DSC)		01			00	00	03
<i>Examination Duration (Hrs)</i>		<i>Theory</i>	<i>Practical</i>	<i>WEIGHTAGE: EVALUATION</i>	<i>CWA</i>	<i>MSE</i>	<i>ESE</i>
		00	02		25	25	50
Pre-requisite	PCH 151/251: Basic Knowledge of Experiments in Chemistry						
Course Outcomes							
CO1	• Analyze the water and oil quality parameter						
CO2	• Understand the concept of viscosity, surface tension and their applications						
CO3	• Analyze the ores and bleaching powder sample						
CO4	• Knowledge of pH metric and calorimetry and their application in industry						
<i>Unit No.</i>	<i>Content</i>					<i>Contact Hours</i>	
Exp-1	To determine the alkalinity of the given water sample containing carbonate (CO_3^{2-}) ions and bicarbonate (HCO_3^-) ions by titrating it against standard HCl solution [N/10] using phenolphthalein and methyl orange as indicators.					2	
Exp-2	To determine the chloride ion (Cl^-) content in the given water sample by Argentometric method (Mohr's method) using N/50 AgNO_3 as a standard solution and potassium chromate (K_2CrO_4) as an internal indicator					2	
Exp-3	To determine the temporary and permanent hardness of given water sample by titrating it against standard solution of M/100 Ethylene Diamine Tetracetic Acid (EDTA) using Eriochrome black-T (EBT) as an internal indicator.					2	
Exp-4	To determine the coefficient of viscosity of the given sample solution by Ostwald's viscometer (Viscosity of water = 0.0101 Poise).					2	
Exp-5	To determine the ferrous ion (Fe^{+2}) content in given sample solution of Mohr's salt ($\text{FeSO}_4 \cdot (\text{NH}_4)_2\text{SO}_4 \cdot 6\text{H}_2\text{O}$) by titrating it against standard N/30 potassium dichromate ($\text{K}_2\text{Cr}_2\text{O}_7$) solution by using potassium ferricyanide $\text{K}_3[\text{Fe}(\text{CN})_6]$ as an external indicator.					2	
Exp-6	To determine the surface tension of the given sample solution by drop number method					2	
Exp-7	To determine the acid value of oil					2	
Exp-8	To determine the strength of unknown HCl solution by titrating it against N/10 NaOH solution with the help of pH meter.					2	
Exp-9	Synthesis of phenol-formaldehyde resin					2	
Exp-10	To determine the alkalinity of the given water sample containing carbonate (CO_3^{2-} and hydroxide (OH^-) by titrating it against standard HCl solution [N/10] using phenolphthalein and methyl orange as indicators					2	
Exp-11	To determine the rate constant of a reaction					2	

Exp-12	To determine the Copper (Cu ²⁺) ion content in the given sample of copper ore (blue vitriol) by titrating it against standard N/30 sodium thiosulphate solution using starch as indicator by Iodometric titration.	2
Exp-13	Determination of adsorption isotherm of acetic acid on activated charcoal	2

Text Books:

Authors Name	Title	Edition	Publisher, Country	Year
Sunita Rattan	Comprehensive Engineering Chemistry	2 nd edition	S.K. Kataria & Sons Delhi, India	2009
Shashi Chawala	Theory and Practicals of Engineering Chemistry	3 rd edition	Dhanpat Rai and Company, India	2012

DEPARTMENT OF BIOTECHNOLOGY							
Program: - Bachelor of Technology (Common to all Programs)							
Semester	I	Course Title:		Fundamentals of Medical Biotechnology		Code	TBT101
Course Components		Credits:3		Contact Hours	L	T	P
BSC/ SEC		03			02	01	00
Examination Duration (Hrs)		Theory	Practical	WEIGHTAGE: EVALUATION	CIE	MSE	ESE
		03	00		25	25	50
Course Outcomes							
CO1	Learn about human microflora and understand basic mechanism of action of various medically important bacterial microbes						
CO2	Know basic mechanism of action of various medically important fungal and Viral infections and their diagnostic procedures.						
CO3	Understanding the concept of immune system and their correlation with Microbes.						
CO4	Utilize biotechnology tools in medical therapeutic and summarize the diagnostic techniques for common human diseases.						
CO5	Understanding of good laboratory practices followed in medical biotechnology laboratory.						
Pre-requisite	Basic Biology						
Unit No.	Content					Contact Hours	
Unit -1	Commensal & Pathogenic Bacteria Normal microflora of human body: Skin, Respiratory system and Genitourinary tracts. Source of infection, mode of spread and portals of entry. Common pathogenic bacteria: Introduction of morphology, characterization, pathogenicity, lab diagnosis, prophylaxis of Staphylococcus, Streptococcus, Neisseria, Corynebacterium, Bacillus, Clostridium, Mycobacteria, Hemophilus, Escherichia coli, Pseudomonas.					9	
Unit -2	Introduction to Pathogenic Fungi & Viruses Fungi: Introduction to morphology, symptoms, lab diagnosis and prevention of Mycoses. Viruses: Morphology, Pathogenicity, prophylaxis, Diagnosis of viruses: Pox viruses, Herpes, viruses, Orthomyxovirus, Polio viruses, Hepatitis viruses; Rabies viruses, Human immunodeficiency viruses, COVID -19 viruses.					9	
Unit -3	Immunology Components of Immune system: Types of Immunity, barriers of natural immunity, cells and organs of Immune system, properties of antigen and antibody, interaction of antigens with various immune cells and organs, Types of antibodies and their significance in host-pathogen interaction.					9	
Unit -4	Management and Quality Control of Medical Biotechnology Laboratory Specimen Collection: Collection of clinical specimens from patients, clinics, hospitals, for diagnosis and processing, training of medical biotechnologist to handle epidemics. Quality Control: Selective cultural media, identification by special tests, biochemical reactions and sero-typing of pathogenic bacteria. Antibiotic susceptibility testing, its interpretation and reporting. Hospital infection control: Quality control in diagnostic microbiology, National programmer for control of infectious diseases.					9	
Unit -5	Applications of Medical Biotechnology Tools and techniques: Hybridoma technology, biopharming-subunit vaccines, DNA vaccines, recombinant vaccines, therapeutic enzymes, basic biomedical tools in diagnosis, treatment, prevention of diabetes (Insulin production), cancer					9	

	(Detection of cancer antigens), transplantation.	
	Total Hours	45

Text Books:

Authors Name	Title	Edition	Publisher, Country	Year
Prescott, L.M.; Harley, J.P. and Klein, D.A.	Microbiology	10 th Edition	McGraw-Hill Education; USA	2017
GK Suraiashkumar	Biology for Engineers		Oxford Higher Education, Oxford University Press.	2019
R. Khandpur	Biomedical instrumentation, Technology and applications,		McGraw Hill Professional	2004

Reference Books:

Authors Name	Title	Edition	Publisher, Country	Year
Thomas J. Kindt, Barbara A. Osborne, Richard Goldsby. W. H. Freeman	Kuby Immunology	8 th Edition	WH Freeman, USA	2018

Name of Department: - **Computer Science and Engineering**

- | | | | | | | | |
|----|------------------------------|--------------------------------|---------------|--|-----------|------------|-----------|
| 1. | Subject Code: | TCS 101 | Course Title: | Fundamental of computer and Introduction to Programming | | | |
| 2. | Contact Hours: | L: 3 | T: 0 | P: 0 | | | |
| 3. | Examination Duration (Hrs.): | Theory | 3 | Practical | 0 | | |
| 4. | Relative Weight: | CIE | 25 | MSE | 25 | ESE | 50 |
| 5. | Credits: | 3 | | | | | |
| 6. | Semester: | I | | | | | |
| 7. | Category of Course: | DSC | | | | | |
| 8. | Pre-requisite: | Basic Knowledge of Mathematics | | | | | |

9.Course Outcome:	CO1: Learn the concepts of IT and understand the fundamentals of basic building blocks of computer science. CO2: Understand basic data types and syntax of C programming. CO3: Propose solution to problem by using tools like algorithm and flowcharts. CO4: Analyze and select the best possible solution for decision-based problems using decision making skills and develop the aptitude to solve iterative problems using different types of looping statements. CO5: Implement complex problems as a collection of sub problems by applying modularization in applications using functions. CO6: Apply and implement the concept arrays for providing solution to homogenous collection of data types.
--------------------------	--

10. **Details of the Course:**

Sl. No.	Contents	Contact Hours
1	<p>UNIT- I Generation of computers, Computer system memory hierarchy, Input/Output, RAM/ROM, Software & Hardware, Understand bit, byte, KB, MB, GB and their relations to each other, Operating System overview, Computer Networks Overview</p> <p>Algorithms and Flow Charts – Examples of Flow charts for loops and conditional statements</p>	8
2	<p>UNIT- 2 First C program - Hello world, How to open a command prompt on Windows or Linux. How to read and print on screen - printf(),scanf(),getchar(), putchar()</p> <p>Variables and Data types - Variables, Identifiers, data types and sizes, type conversions, difference between declaration and definition of a variable, Constants</p> <p>Life of a C program (Preprocessing, Compilation, Assembly, Linking, Loading, Execution), Compiling from the command line, Macros,</p> <p>Operators – equality and assignment, Compound assignment operators, Increment and decrement operators, Performance comparison between pre and post increment/decrement operators, bitwise operators, Logical Operators, comma operator, precedence and associativity.</p>	10
3	<p>UNIT- III Conditional statements: if statement, if-else statement, ternary statement or ternary operator, nested if-else statement, switch statement, Difference between performance of if else and switch, Advantages of if else and switch over each other</p> <p>Loops: ‘for’ loops, ‘while’ loops, ‘do while’ loops, entry control and exit control, break and continue, nested loops</p>	8
	<p>UNIT- IV Functions: Function prototype, function return type, signature of a function, function arguments, call by value, Function call stack,</p>	

4	Recursion v/s Iteration, passing arrays to functions, Storage classes: Automatic, Static, Register, External, Static and Dynamic linking implementation, C program memory (show different areas of C program memory and where different type of variables are stored), scope rules.	9
5	UNIT- V Arrays: Single-dimensional arrays, initializing arrays, computing address of an element in array, character arrays, segmentation fault, bound checking, Searching and Sorting.	10
	Total	45

Text Books:

Authors Name	Title	Edition	Publisher, Country	Year
Peter Prinz, Tony Crawford	C in a Nutshell	1 st	O,Reilly Publishers,USA	2011
Peter Norton	Introduction to computers	6 th	TMH Publication, India	2009
E.Balagurusamy	Programming in ANSI C	6 th	McGraw Hill Education, American	2015

Reference Books:

Authors Name	Title	Edition	Publisher, Country	Year
Steve Oualline	Practical C programming	3 rd	O,Reilly Publishers,USA	2011
Brian W Kernighan, Dennis M Ritcie	"The C Programming Language	2 nd	Prentice Hall, India	2000
Yashwant Kanetkar	Let Us C	8 th	BPB Publication, India	2007

<i>Department of Electrical Engineering</i>								
<i>Program: - Bachelor of Technology (Biotech)</i>								
<i>Semester</i>	I	<i>Course Title</i>			Basic Electrical & Electronics Engineering	<i>Code</i>	EEC 101	
<i>Course Components</i>		<i>Credits</i>		<i>Contact Hours</i>	<i>L</i>	<i>T</i>	<i>P</i>	
DSC		04			<i>WEIGHTAGE: EVALUATION</i>	03	01	00
<i>Examination Duration (Hrs)</i>		<i>Theory</i>	<i>Practical</i>	<i>CWA</i>		<i>MSE</i>	<i>ESE</i>	
		03	00		25	25	50	
<i>Pre-requisite</i>		Basic Knowledge of Physics and Mathematics						
<i>Course Outcomes</i>								
CO1	Recalling the concepts of basic electric circuits and remembering the theorems to solve DC Circuits							
CO2	Summarize the various characteristics of AC Circuits.							
CO3	Applying the concepts of magnetic circuits to understand the basic characteristics of single-phase Transformer.							
CO4	Analysing the basics of semiconductor devices used for electronic components.							
CO5	Evaluating the basic concept of PN junction diode and its applications in rectifier circuits and DC power supply.							
CO6	Compiling Bipolar Junction Transistor (BJT) from its basic concepts and various biasing circuits.							
<i>Unit No.</i>	<i>Content</i>					<i>Contact Hours</i>		
Unit -1	D.C. Network Theory: Circuit theory concepts-KCL, KVL, mesh and node analysis, Network Theorems- Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem, Star Delta transformation.					07		
Unit -2	A.C. Circuit Analysis: Sinusoidal and phasor representation of voltage and current, single phase a.c. circuit behavior of resistance, inductance and capacitance and their combination in series & parallel, power factor, series parallel resonance and quality factor.					07		
Unit -3	Magnetic Circuits: Introduction, series-parallel magnetic circuits comparison, Eddy currents and Hysteresis losses. Single Phase Transformer: Principle of operation, classification, phasor diagram at no load, efficiency, and all-day efficiency of transformer.					06		
Unit -4	Semiconductor Basics: Insulators, semiconductors and metals, Mobility and conductivity, Intrinsic and extrinsic semiconductors and charge densities in semiconductors, Fermi Level, current components in semiconductors, continuity equation. Junction Diode and Its Applications: PN Junction diode – characteristic and analysis, Diode Models, Rectifiers, and filter circuit: Half wave, full wave and Bridge rectifier circuits and their analysis, L, C and Pi filters, Zener Diode, Basic regulator supply using Zener diode, Design of Regulator circuits.					10		

Unit –5	TRANSISTORS: Construction and characteristics of bipolar junction, transistors (BJT's)- Comm. Base, Comm. emitter, Comm. Collector configuration, Transistor biasing and bias stabilization: - the operating point, stability factor, analysis of fixed base bias, collector to base bias, Emitter resistance bias circuit and self-bias circuit.	8
	Total Hours	38

Text Books:

Authors Name	Title	Edition	Publisher, Country	Year
D.P. Kothari and I. J. Nagrath	Basic Electrical Engineering	4 th	Tata McGraw Hill,	2019
D.C. Kulshreshtha	Basic Electrical Engineering	2 nd	McGraw Hill	2019
V. N Mittle and Arvind Mittle	Basic Electrical Engineering	2 nd	Tata McGraw-Hill	2017
Jacob Millmann & Halkias	Integrated Electronics	2 nd	Tata McGraw-Hill	2010
Boylestad and L. Robert and Nashelsky Louis	Electronics Devices and Circuits Theory	9 th	PHI/Pearson Education.	2010

Reference Books:

Authors Name	Title	Edition	Publisher, Country	Year
L.S. Bobrow	Fundamentals of Electrical Engineering	12 th	Oxford University Press	2003
V.D. Toro	Electrical Engineering Fundamentals	2 nd	Prentice Hall India	2015
E. Hughes	Electrical and Electronics Technology	10 th	Pearson	2010

DEPARTMENT OF ELECTRICAL ENGINEERING							
Course: - Bachelor of Technology							
Semester	First	Subject Title		Basic Electrical & Electronics Engineering Lab	Code	EEC 151	
Course Components		Credits		Contact Hours	L	T	P
DSC		01			00	00	02
Examination Duration (Hrs)		Theory	Practical	WEIGHTAGE: EVALUATION	CWA	MSE	ESE
		00	03		25	25	50
Course Objectives							
CO1	Illustrate and Verification of various laws in DC circuit						
CO2	Illustrate and Verification of various theorems in DC circuit						
CO3	Demonstrate various types of diodes and their characteristics						
CO4	Analysis of various types of analog and digital electronic circuits						
Exp No.	Name of the Experiment						
12.	To verify Kirchoff's voltage law (KVL) in D.C. circuits						
13.	To verify Kirchoff's current law (KCL) in D.C. circuits						
14.	To verify Superposition theorem in DC circuits.						
15.	To verify Thevenin's theorem in DC circuits						
16.	To verify Norton's theorem in DC circuits ‘						
17.	To verify Maximum Power Transfer theorem in DC circuits.						
18.	Study of PN junction diode and its characteristics						
19.	Study of ZENER junction diode and its characteristics						
20.	Study of half wave rectifier with and without capacitive filter						
21.	Study of full wave rectifier with and without capacitive filter						
22.	Study of BJT in CB /CE configuration						
23.	Verification of basic and derived gates.						
24.	Realization of basic gates through universal gates.						

Department of Mechanical Engineering							
Program: - Bachelor of Technology (Common to all the Programs)							
Semester	I / II	Course Title		Engineering Graphics and Design Lab	Code	PME 153/253	
Course Components		Credits		Contact Hours	L	T	P
Core Course (CC)		02				00	00
Examination Duration (Hrs)		Theory	Practical	WEIGHTAGE: EVALUATION	CWA	MSE	ESE
		00	03			25	25
Pre-requisite		NIL					
Course Outcomes							
CO1	Construct Engineering Drawings as per BIS conventions manually and using CAD software to prepare Orthographic Projections of Points and Lines.						
CO2	Use the knowledge of Orthographic Projections to represent Engineering concepts of Planes.						
CO3	Develop Projections of Solids and Lateral Surfaces of Solids by analysing the given problems.						
CO4	Construct Isometric Drawings after analysing the combination of simple solids.						
Unit No.	Content					Contact Hours	
Unit -1	Introduction to Computer Aided Sketching: Introduction, Drawing Instruments and their uses, BIS conventions, lettering, Dimensioning and free hand practicing. Computer screen, layout of the software, standard tool bar, and description of most commonly used tool bars, navigational tools. Coordinate system and reference planes. Definitions of HP, VP, RPP& LPP. Creation of 2D/3D environment. Selection of drawing size and scale. Commands and creation of lines, Co- ordinate points, axes, poly-lines, square, rectangle, polygons, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints viz. tangency, parallelism, inclination and perpendicularity. Dimensioning, line convention, material conventions and lettering. Computer Aided Design(CAD) software: Modelling of parts and Assemblies.					8	
Unit -2	Orthographic projections of Points, Lines and Planes: Introduction, Definitions - Planes of projection, reference line and conventions employed. First angle and Third angle projection. Projections of Points in all the four quadrants. Projection of Lines (located in first quadrant/first angle only), True and apparent lengths, True and apparent inclinations to reference planes (No application problems) Projection of Planes: triangle, square, rectangle, pentagon, hexagon, and circle, Planes in different positions by change of position method only (No problems on punched plates and composite plates.)					20	

Unit -3	Projections of Solids: Projections of right regular Prisms, Pyramids and Cones with axis inclined to both the planes. (Solids resting on HP only)	8
Unit -4	Development of Lateral Surfaces of Solids: Sections of right regular prisms, Pyramids, Cylinders and Cones resting with base on HP. Development of lateral surfaces of above solids, their truncations.	8
Unit -5	Isometric Projections: Principles of Isometric projection - Isometric Scale, Isometric Views, Conventions, Isometric views of Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice - Versa.	8
Unit -6	Demonstration of a Simple Team Design Project that Illustrates: Geometry and topology of Engineered components: creation of Engineering models and their presentation in standard 2D blueprint form and as 3D wire- frame and shaded solids; meshed topologies for Engineering analysis and tool-path generation for component manufacture; Geometric Dimensioning and Tolerancing; Use of Solid-Modelling software for creating associative models at the component and assembly levels.	8
	Total Hours	60

CAD Softwares:	1. AUTOCAD 2. CREO
-----------------------	-------------------------------------

Text Books:

Authors Name	Title	Edition	Publisher, Country	Year
K.R. Gopalakrishna	Engineering Graphics	32nd edition	Subash Publishers, Bangalore.	2005
S.Trymbaka Murthy	Computer Aided Engineering Drawing	3 rd revised edition.	International Publishing house Pvt. Ltd., New Delhi,	2006

Reference Books:

Authors Name	Title	Edition	Publisher, Country	Year
N.D. Bhatt and V.M. Panchal	Engineering Drawing	48th edition	Charotar publishing House, Gujarat.	2005

Department of Environmental Science						
Program: B.Tech. (Common to all) // <i>All other courses in University</i>						
Semester	First/ Second		Subject Title	Environmental Science	Code	TEV 101 /TEV 201
Course Components			Credits	Contact Hours		
VAC/ MNG			02	L	T	P
				2	0	0
Examination Duration	Theory	Practical	Weightage Evaluation	Qualified / Non Qualified		
	03	00				
Course Objectives						
CO1	To create environmental awareness and knowledge					
CO2	To encourage participation in environmental conservation practices					
CO3	To develop critical thinking and apply those to the analysis of a problem or question related to the environment					
CO4	To evaluate impact of various human induced activities on the environment					
CO5	To design possible solutions to the real environmental problems.					
CO6	To create interest in research and innovation related with different aspects of environmental science.					

Unit No.	Contents	Hours
1.	<p>Environmental Science and Ecosystem</p> <p>a. Definition of Environmental Science, Multidisciplinary nature, Objective, Scope and Importance.</p> <p>b. Concept of an ecosystem, structure and function, energy flow, ecological succession, food chains, food webs, ecological pyramids.</p> <p>c. Introduction, types, characteristic features, structure and function of the following ecosystem:</p> <ul style="list-style-type: none"> • Forest ecosystem • Grassland ecosystem • Desert ecosystem • Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) 	6

	<p>Natural Resources and Biodiversity</p> <p>a. Renewable and non-renewable resources.</p> <p>b. Natural resources and associated problems:</p> <ul style="list-style-type: none"> • Forest resources: Use and over-exploitation, deforestation, case studies, Timber extraction, mining, dams and their effects on forests and tribal people. • Water Resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams – benefits and problems, water conservation, rainwater harvesting, watershed management. • Mineral Resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. • Food Resources: World food problems, Changes in land use by agriculture and grazing, Effects of modern agriculture, Fertilizer/pesticide problems, Water logging and salinity • Energy Resources: Increasing energy needs, Renewable/ non-renewable, Use of Alternate energy sources, urban problems related to energy, Case studies • Land resources: Land as a resource, land degradation, man-induced land-slides, soil erosion and desertification, wasteland reclamation <p>c. Role of an individual in conservation of natural resources, equitable use of resources for sustainable lifestyles.</p> <p>d. Definition of biodiversity, levels of biodiversity, value of biodiversity, threats to biodiversity (habitat loss, poaching of wildlife, man-wildlife conflicts).</p>	10
--	--	----

	<p>e. Biodiversity at global, national and local levels, India as a biodiversity nation, biogeographical classification of India, hotspots of biodiversity.</p> <p>f. Endangered and endemic species of India.</p> <p>g. Conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.</p>	
3.	<p>Environmental Pollution</p> <p>a. Definition, causes, effects and control measures of Air Pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution, nuclear hazards.</p> <p>b. Solid waste Management: causes, effects and control measures of urban and industrial wastes.</p> <p>c. Role of an individual in prevention of pollution, pollution case studies, pollution case studies.</p>	6

4.	<p>Important Environmental and Social Issues, Management and Legislation</p> <ul style="list-style-type: none"> a. Climate change, global warming, acid rain, Ozone layer depletion, nuclear accidents and holocaust, Case studies. b. Sustainable development, Resettlement and rehabilitation of people (its problems and concerns, case studies), Environmental ethics (issues and possible solutions), consumerism and waste products. c. Disaster management: floods, earthquake, cyclone and landslides. d. Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act. e. Issues involved in enforcement of environmental legislation, Public Awareness f. Population growth (variation among nation), Population explosion (family welfare programme), Environment and human health, human rights, value education, HIV/ AIDS, Women and Child Welfare, Role of Information Technology in Environment and human health, case studies. 	8
----	--	---

Text Books:

1. G. M. Wagh, Environmental Studies, Savera Publishing House, 2022.
2. Deswal, S. & Deswal A.: A Basic Course In Environmental Studies; Dhanpat Rai & Co., 2018.

References:

1. Bharucha, Erach for University Grants Commission – Textbook for Environmental Studies for Undergraduate Courses of all Branches of Higher Education, University Grants Commission, New Delhi, 2004.
 2. Kaushi, Anubha and Kaushik, C.P. – Perspectives in Environmental Studies, 2nd Edition, New Age International (P) Ltd, 2004.
-

DEPARTMENT OF PROFESSIONAL COMMUNICATION								
Program: - Bachelor of Technology (I year)								
Semester	II	Course Title	Advanced Professional Communication			Code	THU201	
Course Components		Credits	Contact Hours		L	T	P	
Ability Enhancement Course		02			02	00	00	
Examination Duration (Hrs)		Theory	Practical	WEIGHTAGE:		CIE	MSE	ESE
		02	00	EVALUATION		25	25	50
Course Outcomes								
CO1	Understand the significance of impressive and word limited writing and to apply the writing skills into writing for employment and for corporate communication.							
CO2	Evaluate and assess the speaking patterns of self and others to excel in interviews and extemporaneous speaking and to analyse the impact of interpersonal skills in communication.							
CO3	Create a distinctive idea of listening and negotiating by applying the oral and verbal communication skills.							
Pre-requisite	Basic communication skills							
Unit No.	Content						Contact Hours	
Unit -1	WRITING SKILLS: Transitive/linking words, Précis writing: Do's and don'ts, Paragraph Writing –Descriptive, Imaginative, Analytical and informative (150 words), CV/Resume, Job Application Letter, E-mails,						10	
Unit -2	SOFT SKILLS-I: Interviews- definition, purpose, preparation, types, dos and don'ts. Extempore speaking, JAM delivery. Group discussion: definition, purpose, dos and don'ts, qualities judged, types of topics. Presentation skills: process, components, principles, effective skills, methods of speaking, audience analysis.						10	
Unit -3	SOFT SKILLS-II: Listening Skills: Importance, barriers to effective listening, approaches, being better listeners. Negotiation Skills: Importance, approaches, preparations, role plays (Laboratory component)						10	
Total Hours						30		

Textbooks:

Authors Name	Title	Edition	Publisher, Country	Year
Raman M. and Sharma S.	Technical Communication	4 th	Oxford University Press	2022
Kumar S. and Lata P.	Communication Skills	2 nd , (13 th Impression)	Oxford University Press, India	2022

Reference Books:

Authors Name	Title	Edition	Publisher, Country	Year
Richards J.C., Hull J. and Proctor S.	Interchange	5 th	Cambridge University Press, (Officenow India Pvt. Ltd.) India	2022
Agarwal M.	Technical Communication	2 nd	Krishna Prakashan Media (P)m Ltd., India	2019

<i>Department of Allied Sciences (Mathematics)</i>							
<i>Program: - B.Tech. (All Branches Except Bio Tech.)</i>							
<i>Semester</i>	Two	<i>Course Title</i>		ENGINEERING MATHEMATICS -II	<i>Code</i>	TMA 201	
<i>Course Components</i>		<i>Credits</i>		<i>Contact Hours</i>	<i>L</i>	<i>T</i>	<i>P</i>
Discipline Specific Course (DSC)		03			02	01	00
<i>Examination Duration (Hrs)</i>		<i>Theory</i>	<i>Practical</i>	WEIGHTAGE: EVALUATION	<i>CWA</i>	<i>MSE</i>	<i>ESE</i>
		03	00		25	25	50
<i>Pre-requisite</i>	Basic Knowledge of Mathematics						
<i>Course Outcomes</i>							
CO1	Understand the concept of limit of sequence and convergence of infinite series.						
CO2	Apply the methods in solving the ordinary differential equations.						
CO3	Implement the series solution for finding the solution of ordinary differential equations.						
CO4	Utilize the concept of series solution and special functions.						
CO5	Illustrate the concept of complex analytic functions and its applications in Engineering fields.						
CO6	Solve real integration using the concept of complex integration.						
<i>Unit No.</i>	<i>Content</i>					<i>Contact Hours</i>	
Unit -1	Sequences and series: Limits of sequence of numbers, Calculation of limits; Infinite series; Tests for convergence; Power series, Taylor and Maclaurin series, Convergence of Taylor series, Error estimates.					8	
Unit -2	Ordinary differential equations: Ordinary differential equation of first order (Exact, linear and Bernoulli's equations), Equations of first order but not of first degree: equations solvable for p , equations solvable for y and equations solvable for x , Clairaut's type; Linear differential equations of n^{th} order with constant coefficients, Complementary functions and particular integrals, Cauchy-Euler differential equation, Second order linear differential equations with variable coefficients; Method of variation of parameters and applications of ODE.					12	
Unit -3	Series solution and special function: Power series solutions: Legendre's equations and Legendre polynomials, Frobenius method, Bessel's equation and Bessel's functions of the first kind and their properties.					8	
Unit -4	Complex variable (Differentiation): Introduction of complex numbers; Differentiation, Cauchy-Riemann equations, Analytic functions, Harmonic functions, Finding harmonic conjugate; Elementary analytic functions (exponential, trigonometric, logarithmic) and their properties; Conformal mappings, Mobius transformations and their properties.					8	
Unit -5	Complex variable (Integration): Contour integrals, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof), Liouville's theorem and Maximum-Modulus theorem (without proof); Taylor's series, Zeros of analytic functions, Singularities, Laurent's series; Residues, Cauchy-Residue theorem (without					9	

	proof), Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals using the Bromwich contour.	
	Total Hours	45

Text Books:

Authors Name	Title	Edition	Publisher, Country	Year
Erwin Kreyszig	Advanced Engineering Mathematics	9 th	Wiley India	2014
C. B. Gupta, S. R. Singh and Mukesh Kumar	Engineering Mathematics for Semesters I and II	1 st	McGraw Hill Education	2015
C. B. Gupta, S. R. Singh and Mukesh Kumar	Engineering Mathematics for Semesters III and IV	1 st	McGraw Hill Education	2016
B. S. Grewal	Higher Engineering Mathematics	44 th	Khanna Publications	2022
S. L. Ross	Differential Equations, Ed.	3 rd	Wiley India	1984
J. W. Brown and R. V. Churchill	Complex Variables and Applications, Ed.	7 th	Mc-Graw Hill	2004

Reference Books:

Authors Name	Title	Edition	Publisher, Country	Year
Reena Garg	Advanced Engineering Mathematics	1 st	Khanna Book Publishing Company	2022
Tom M. Apostol	'Calculus' Volume 2	2 nd	Wiley Publications	2022
T. Veerarajan	Engineering Mathematics for first year	5 th	Tata McGraw-Hill, New Delhi, 2008	2008
W. E. Boyce and R. C. DiPrima	Elementary Differential Equations and Boundary Value Problems	9 th	Wiley India	2009
E. A. Coddington	An Introduction to Ordinary Differential Equations	1 st	Prentice Hall India	1995
E. L. Ince	Ordinary Differential Equations	1 st	Dover Publications	1958
J. W. Brown and R. V. Churchill	Complex Variables and Applications, Ed.	7 th	Mc-Graw Hill	2004
R. K. Jain and S. R. K. Iyengar	Advanced Engineering Mathematics	5 th	Narosa Publication	2009

<i>Sr. No.</i>		<i>Department of Electronics and Communication Engineering</i>					
<i>1.</i>	<i>Subject Code</i>	<i>TEC 101/201</i>		<i>Course Title</i>		<i>Basic Electronics Engineering</i>	
<i>2.</i>	<i>Contact Hours</i>	<i>L</i>	<i>3</i>	<i>T</i>	<i>0</i>	<i>P</i>	<i>0</i>
<i>3.</i>	<i>Examination Duration</i>	<i>Theory</i>		<i>3</i>		<i>Practical</i>	
<i>4.</i>	<i>Relative Weight</i>	<i>CIE</i>	<i>25</i>	<i>MSE</i>	<i>25</i>	<i>ESE</i>	<i>50</i>
<i>6.</i>	<i>Credit</i>	<i>03</i>					
<i>6.</i>	<i>Semester</i>	<i>First/Second</i>					
<i>7.</i>	<i>Category of Course</i>	<i>DSC/ESC</i>					
<i>8.</i>	<i>Pre-requisite</i>	<i>Physics</i>					

<i>9.</i>	<i>Course Outcomes</i>	<p><i>After completion of the course the students will be able to:</i></p> <p><i>CO1: Remember operations on number systems and understand concepts of digital circuits.</i></p> <p><i>CO2: Understand the basics of semiconductor materials and devices like, PN junction diode as well as Bipolar Junction Transistor (BJT).</i></p> <p><i>CO3: Apply and Analyze the basics of PN junction diode in rectifier circuits and BJT in Amplifier.</i></p> <p><i>CO4: Design and develop various basic electronic circuits.</i></p>
-----------	------------------------	--

10. Details of the Course

<i>Sl. No.</i>	<i>Contents</i>	<i>Contact Hours</i>
<i>1.</i>	<p><i>Unit 1: Number Systems & Boolean Algebra:</i> <i>Number systems and their conversion, Logic gates, Boolean algebra, Implementation of basic gates using universal gates, Implementation of logic functions using basic gates & universal gates, SOP & POS form of logic expression, Canonical form, Conversion from SOP & POS form to canonical form, Simplification of Boolean function: Algebraic method, Karnaugh map method (two, three & four variable K-map with don't care condition).</i></p>	<i>10</i>
<i>2.</i>	<p><i>Unit 2: Basics of Semiconductor Devices: P-N junction diode and BJT</i> <i>Energy band theory: Classification of solids based on energy band diagram, Semiconductors; Intrinsic semiconductors, Extrinsic semiconductors– P-type and N-type, Mobility and conductivity, Mass action law, Charge densities in semiconductors, P-N Junction; Formation of depletion region, V-I characteristics of P-N junction diode, and Zener diode.</i></p>	<i>10</i>

	Construction of bipolar junction transistors (BJT), NPN and PNP type transistor; Characteristics; Common base and Common emitter configuration.	
3.	Unit 3: AC to DC Conversion and Introduction of Operational amplifier: Introduction to DC power supply, Rectifiers circuit: Half wave, Center tapped full wave and Bridge rectifier circuits. Rectifier performance parameter analysis (with and without capacitor filter) Introduction of Operational Amplifier: Inverting and non-Inverting Op-amp, Summing amplifier, Difference amplifier.	10
	Total	30

11. Suggested Books

Sr. No.	Name of Authors/Books/Publishers	Edition	Year of Publication / Reprint
	Textbooks		
1.	Jacob Millmann & Halkias, " Integrated Electronics ", TMH.	2 nd	2009
2.	M. Morris Mano, Michael D. Ciletti, " Digital Design ", Pearson Education.	5 th	2012
	Reference Books		
1.	Boylestad and L. Robert and Nashelsky Louis, " Electronics Devices and Circuits Theory ", Pearson Education,	10 th	2009
2.	S. Salivahanan and S. Arivazhagan, " Digital Circuits and Design ", Oxford University Press,	5 th	2008

12.	Mode of Evaluation	Test / Quiz / Assignment / Mid Term Exam / End Term Exam
-----	---------------------------	--

Sr. No.	Department of Electronics and Communication Engineering						
1.	Subject Code	PEC151/251		Course Title	Basic Electronics Engineering Lab		
2.	Contact Hours	L	0	T	0	P	2
3.	Examination Duration	Theory		0	Practical		3
4.	Relative Weight	CIE	25	MSE	25	ESE	50
6.	Credit	01					
6.	Semester	First/Second					
7.	Category of Course	DSC/LC					
8.	Pre-requisite	Physics					

9.	Course Outcomes	<p>After completion of the course the students will be able to:</p> <p>CO1: Identify and understand active & passive components along with various measuring instruments.</p> <p>CO2: Verify truth table of logic gates.</p> <p>CO3: Analyse the characteristics of diodes and transistors.</p> <p>CO4: Implement different electronics circuits using operational amplifier and logic gates</p>
----	-----------------	---

10. Details of the Course

Sr. No.	List of problems for which student should develop program and execute in the Laboratory	Contact Hours
1.	Familiarization of electronics measuring instrument and components.	2
2.	Measure the voltage and frequency using a DSO.	2
3.	Study and verification of the truth table for logic gates.	2
4.	To design and verify the truth table for logic gates using NOR gate.	2
5.	To design and verify the truth table for logic gates using NAND gate.	2
6.	Study V-I characteristics of PN junction diode and determine the static and dynamic resistance from the characteristic curve.	2
7.	Study of a Half wave rectifier circuit with and without capacitor filter.	2
8.	Study of a Centre tapped full wave rectifier circuit with and without capacitor filter.	2

9.	<i>Study of a bridge full wave rectifier circuit with and without capacitor filter.</i>	2
10.	<i>Study V-I characteristics of Zener diode.</i>	2
11.	<i>Study the input and output characteristics of common base (CB) transistor.</i>	2
12.	<i>Study the input and output characteristics of common emitter (CE) transistor.</i>	2
	Total	24
Innovative Experiments		
13.	<i>Study the input and output characteristics of common collector (CC) transistor.</i>	02
14	<i>Design and verification of Inverting and non-inverting amplifier using Op-Amp IC.</i>	02
15.	<i>As suggested by the concerned faculty/lab in charge.</i>	02
	Total	06

Sr. No.	Name of Authors/Books/Publishers	Edition	Year of Publication / Reprint
	Textbooks		
1.	<i>Jacob Millmann & Halkias, "Integrated Electronics", TMH.</i>	2 nd	2009
2.	<i>M. Morris Mano, Michael D. Ciletti, "Digital Design", Pearson Education.</i>	5 th	2012
	Reference Books		
1.	<i>Boylestad and L. Robert and Nashelsky Louis, "Electronics Devices and Circuits Theory", Pearson Education,</i>	10 th	2009
2.	<i>S. Salivahanan and S. Arivazhagan, "Digital Circuits and Design", Oxford University Press,</i>	5 th	2008

11.	Mode of Evaluation	<i>Test / Quiz / Assignment / Mid Term Exam / End Term Exam</i>
------------	-----------------------------------	---

Name of Department: - Civil Engineering

1. Subject Code: **PCE 151/251** Course Title: **Basic Civil Engineering Laboratory**
2. Contact Hours: L: **0** T: **0** P: **2**
3. Examination Duration (Hrs): **0** **Practical** **2**
4. Relative Weight: CIE **25** **Theory** **0** **MSE** **25** **SEE** **50** **PRE** **0**
5. Credits: **1** **PRS** **0**
6. Semester: **I/II**
7. Category of Course: **DSC**
8. Pre-requisite: **Basic Sciences**

9. Course Outcome**:	<p>After completion of the course the students will be able to:</p> <p>CO1: Examine the suitability of various construction materials.</p> <p>CO2: Execute angular and directional measurement.</p> <p>CO3: Distinguish various modern tools and techniques for field survey.</p> <p>CO4: Execute setting out of a building plan as per byelaws.</p>
-----------------------------	--

10. Details of the Course:

Sl. No.	Contents	Contact Hours
1	<p>Construction materials and components of a building Introduction to basic construction materials like bricks, cement and its type, sand and mortar.</p> <ol style="list-style-type: none"> 1. Field tests on Brick, Cement, sand and compression strength test on Mortar. 2. Construct a wall of height 50 cm and wall thickness 1½ bricks using English and Flemish bond (No mortar required) 3. Casting and testing of plain cement concrete 	6

2	<p>Introduction to linear measurements (Chain and Tape survey): Different methods of linear measurement and their accuracy; Measurement by chain and tape; Sources of errors and precautions; Corrections to linear measurements.</p> <ol style="list-style-type: none"> 4. Chaining of a line using chain and tape, measurements of area by cross staff survey. 5. Measurement of distance between two points when there is an obstacle for both chaining and ranging. <p>Measurements of angles and directions (Compass & Theodolite survey): Demonstration of different types of compasses and theodolites; Concept of bearings; Magnetic declination; Traverse survey.</p> <ol style="list-style-type: none"> 6. To measure the angles between the lines with prismatic Compass. 7. Traversing with compass and chain by included angles and measurement of area -Plotting the points (at scale) on a graph sheet. 8. To measure the horizontal and vertical angles with Theodolite <p>Modern tools and instruments for surveying and mapping: Introduction to Remote Sensing, GPS and GIS.</p> <ol style="list-style-type: none"> 9. Demonstration of distance and angle measurements using an EDM and Total Station Using Handheld GPS and mobile GIS for data collection 	12
3	<p>Building Bye Laws and NBC 2016 Regulations Introduction- terminology- objectives of building byelaws- floor area ratio- principles of building byelaws- classification of buildings- open space requirements – built up area limitations- height of buildings- wall thickness – lighting and ventilation requirements.</p> <ol style="list-style-type: none"> 10. Preparation of a preliminary drawing for a building adjacent to a road (representing the centre line, building line, open space, height of the building as per the building byelaws). 11. Setting out a building (single room only) as per the given building plan. 	4

Name of Department: - **Allied Sciences (Physics)**

1. Subject Code: Course Title:
2. Contact Hours: L: T: P:
3. Examination Duration (Hrs): Theory Practical
4. Relative Weight: CIE PRS MSE SEE PRE
5. Credits:
6. Semester:
7. Category of Course:
8. **Pre-requisite:** Basic Knowledge of Physics

9. Course Outcome:	<p>After completion of the course the students will be able to:</p> <p>CO1: Define the wave nature of light through different phenomenon.</p> <p>CO2: Extend the knowledge of Laser, fiber optics and polarization in engineering problems.</p> <p>CO3: Understand the concept of theory of relativity.</p> <p>CO4: Discuss quantum theory of radiation and applications of Schrodinger wave equations.</p> <p>CO5: Examine the behavior of superconductors and quantum computers.</p> <p>CO6: Explain the Maxwell's equations and nanomaterials.</p>
---------------------------	---

10. Details of the Course:

UNIT	CONTENTS	Contact Hrs
Unit/Module-I	<p>Interference: Conditions of interference, Spatial and temporal coherence, Bi-prism, interference in wedge shaped film, Newton's rings.</p> <p>Diffraction: Fraunhofer diffraction at single slit and n-slits (Diffraction Grating). Rayleigh's criteria of resolution. Resolving power of grating.</p>	9
Unit/Module- II	<p>Polarization: Basic theory of double refraction, Malus law, Ordinary and Extra-ordinary ray, Production, and detection of plane, elliptically and circularly polarized light, specific rotation and polarimeters.</p> <p>Laser: Spontaneous and Stimulated emission of radiation, Einstein Coefficients, Principle of laser action. Construction and working of Ruby and He-Ne laser photovoltaic effect.</p> <p>Fiber Optics: Introduction to fiber optics; types of fiber, acceptance angle and cone angle, numerical aperture.</p>	9
Unit/Module-III	<p>Special theory of relativity: Inertial and non-inertial frames, Galilean transformation, Michelson-Morley experiment (qualitatively), Einstein postulates of special theory of relativity, Lorentz transformation equations, length contraction, time dilation, variation of mass with velocity, mass-energy relation.</p>	8
Unit/ Module-IV	<p>Quantum Mechanics: Quantum concept and radiation, Wave particle duality (de-Broglie concept of matter waves), Heisenberg's uncertainty principle, wave function and its significance, Schrodinger's equations, Schrodinger's wave function for a particle confined in one dimensional infinite potential box (rigid box), Eigen values and Eigen functions.</p> <p>Quantum computers: Introduction to quantum computing, Principle, Nanocomputing, prospects and challenges.</p>	8

Unit/ Module-V	Superconductivity: Essential properties of superconductors, zero resistivity, Type I, Type II superconductors and their properties. Electromagnetism: Displacement current, Maxwell's Equations in differential form. Nano Physics: Density of states, Nanostructures, fabrication, and characterization techniques (qualitatively).	8
	Total	42

Text Books:

S.No.	Name of Authors/Books/Publishers/Place of Publication	Edition	Year of Publication/ Reprint
1.	Ajoy Ghatak, "Optics", Tata Mc Graw Hill.	4 th Edition	2009
2.	N. Subrahmanyam Brijlal& M. N. Avadhanulu, "Optics:", S. Chand.	24 th Edition	2010
3.	A. Beiser, "Concepts of Modern Physics", Tata Mc Graw Hill.	1 st Edition	
4.	Resnick, Krane, Halliday, "Physics (vol I&II)", Wiley.	5 th Edition	2007
5.	Robert Resnick, "Introduction to Special Relativity", Wiley Publishers.	1 st Edition	2007
6.	N. David Mermin, Quantum computer Science, Cambridge University Press.	1 st Edition	2007
7.	Adam Smith, "The Beginner's guide to quantum computing & mechanics", A. Smith Media.	1 st Edition	2022
	Reference Books	1 st Edition	
1.	John R. Taylor, Chris D. Zafiratos, Michael A. Dubson, "Modern Physics", Pearson Education.	1 st Edition	2007
2.	Gerd Keiser, "Optic Fiber Communication", Tata Mc. Graw Hill.	5 th Edition	2017
3.	Alastair I M Rae, Jim Napolitano, "Quantum Mechanics" Wiley.	6 th Edition	2015
4.	David J. Griffiths, "Introduction to Electrodynamics", Prentice.	3 rd Edition	2011
5.	Charles P. Poole, Jr. Frank J. Owens, "Introduction to Nanotechnology", Wiley.		2017
6.	Hug D. Young & Roger A. Freedman, "University Physics", Edition, Pearson Publication.	12 th Edition	2008
7.	Alan Giambattista, Betty Mc. Carthy Richardson, Robert C Richardson, "Fundamentals of Physics", Tata Mc Graw Hill.	1 st Edition	2009
8.	Parag Lala, "Quantum computing", Tata Mc Graw Hill.	1 st Edition	2019
9.	Nielsen, "Quantum computation and quantum information" "Cambridge University Press.	1 st Edition	2007

Name of Department: - **Allied Sciences (Physics)**

1. Subject Code: Course Title:
2. Contact Hours: L: T: P:
3. Examination Duration (Hrs): Theory Practical
4. Relative Weight: CIE PRS MSE SEE PRE
5. Credits:
6. Semester:
7. Category of Course:
8. Pre-requisite: Basic Knowledge of Experiments in Physics

9. Course Outcome:	<p>After completion of the course the students will be able to:</p> <p>CO1: Find the electrical and magnetic properties of materials and extend the knowledge of nanotechnology using electroplating.</p> <p>CO2: Understand the principle and characteristics of photo devices and optical fiber.</p> <p>CO3: Apply the methods of calibration to analog instruments.</p> <p>CO4: Determine the refractive index of liquid, wavelength of light and specific rotation of optically active substance through experiments based on phenomena of optics.</p>
---------------------------	--

10. Details of the Course:

Sl. No.	Contents	Contact Hours
	<p>Students have to perform any twelve experiments:</p> <ol style="list-style-type: none"> 1. To determine the wavelength of monochromatic light by Newton's ring experiment. 2. To determine refractive index of transparent liquid by Newton's ring experiment. 3. To determine the specific resistance of the constantan wire using Carey- Foster's bridge. 4. To determine the wavelength of monochromatic light using Fresnel Biprism experiment 5. To determine the energy band gap of given semiconductor by Four-probe method. 	2

	<p>6. (a) To determine the wavelengths of spectral line of Mercury light using plane transmission grating.</p> <p>(b) To determine the wavelengths of given Laser light using plane transmission grating.</p> <p>7. To study the variation of magnetic field with distance along the axis of circular coil carrying current and to determine the radius of coil.</p> <p>8. To determine the magnetic susceptibility of a paramagnetic substance by Quincke's method.</p> <p>9. To determine the specific rotation of Sugar Solution using Half Shade Polarimeter.</p> <p>10. To study the characteristics of Solar Cell</p> <p>11. a) To calibrate Voltmeter by using potentiometer.</p> <p>b) To calibrate Ammeter by using potentiometer.</p> <p>12. To determine Planck's constant by photoelectric method and study the variation of intensity with distance.</p> <p>13. To determine the electro chemical equivalent of Copper.</p> <p>14. To Verify Law of Malus.</p> <p>15. To study Hall Effect and determine the hall voltage, hall coefficient, current density and carrier mobility of a given semiconductor.</p> <p>16. To determine the numerical aperture and acceptance angle of an optical fiber.</p> <p>17. To measure the refractive index of transparent liquid using Laser.</p> <p>18. To determine the dielectric constant of air.</p> <p>19. To determine wavelength of monochromatic light using Michelson interferometer.</p>	
--	---	--

<i>Department of Allied Sciences (Mathematics)</i>							
<i>Program: - B.Tech. (Biotechnology)</i>							
<i>Semester</i>	Two	<i>Course Title</i>		ENGINEERING MATHEMATICS	<i>Code</i>	TMA 202	
<i>Course Components</i>		<i>Credits</i>		<i>Contact Hours</i>	<i>L</i>	<i>T</i>	<i>P</i>
Discipline Specific Course (DSC)		03			03	00	00
<i>Examination Duration (Hrs)</i>		<i>Theory</i>	<i>Practical</i>	<i>WEIGHTAGE: EVALUATION</i>	<i>CWA</i>	<i>MSE</i>	<i>ESE</i>
		03	00		25	25	50
<i>Pre-requisite</i>	Basic Knowledge of Mathematics						
<i>Course Outcomes</i>							
CO1	Understand the concept of Matrices and determinants.						
CO2	Solve the system of linear equations.						
CO3	Identify the significance of differentiation.						
CO4	Utilize the applications of derivatives in Biotechnology.						
CO5	Illustrate the concept of definite Integrals and its applications in finding areas and volumes.						
CO6	Analyze the concept of sequence and series.						
<i>Unit No.</i>	<i>Content</i>					<i>Contact Hours</i>	
Unit -1	Matrices: Introduction to matrices: Symmetric, Skew-symmetric and orthogonal matrices; Determinants; Inverse and rank of a matrix, Rank-Nullity theorem; System of linear equations; Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton theorem and Orthogonal transformation.					11	
Unit -2	Calculus I (Multivariable Calculus): Limit, Continuity, Derivatives and partial derivatives, Directional derivatives, Total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange's multipliers; Gradient, curl and divergence.					8	
Unit -3	Calculus II: Rolle's theorem, Mean value theorems, Taylor's and MacLaurin's theorems with remainders; Indeterminate forms and L-Hospital's rule.					8	
Unit -4	Definite Integrals and its applications in area and volumes: Evolutes and involutes; Integrals, Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volume of revolutions.					10	
Unit -5	Sequences and Series: Convergence of sequences and series, Tests for convergence; Power series, Taylor's series, Series for (exponential, trigonometric and logarithmic functions); Fourier series: Half range sine and cosine series, Parseval's theorem.					8	
	Total Hours					45	

Text Books:

Authors Name	Title	Edition	Publisher, Country	Year
C. B. Gupta, S. R. Singh and Mukesh Kumar	Engineering Mathematics for Semesters I and II	1 st	McGraw Hill Education	2015
G.B. Thomas and R.L. Finney	Calculus and Analytic geometry	9 th	Pearson	2002
Erwin Kreyszig	Advanced Engineering Mathematics	9 th	John Wiley & Sons	2014
B.V. Ramana	Higher Engineering Mathematics	11 th	Tata McGraw-Hill, New Delhi	2010
N.P. Bali and Manish Goyal	A textbook of Engineering Mathematics	9 th	Laxmi Publications	2016

Reference Books:

Authors Name	Title	Edition	Publisher, Country	Year
T. Veerarajan	Engineering Mathematics (for First Year)	5 th	Tata McGraw-Hill, New Delhi, 2008	2008
Reena Garg and Chandrika Prasad	Advanced Engineering Mathematics	1 st	Khanna Book Publishing Company	2022
D. Poole	Linear Algebra: A Modern Introduction	2 nd	Brooks/Cole	2005
B. S. Grewal	Higher Engineering Mathematics	36 th	Khanna Publications	2010

<i>Department of Allied Sciences (Chemistry)</i>							
<i>Program: - Bachelor of Technology (Common to all the Programs)</i>							
<i>Semester</i>	One	<i>Course Title</i>		Advanced Organic Chemistry		<i>Code</i>	TCH202
<i>Course Components</i>		<i>Credits</i>		<i>Contact Hours</i>	<i>L</i>	<i>T</i>	<i>P</i>
Core Course (CC)		03			03	00	00
<i>Examination Duration (Hrs)</i>		<i>Theory</i>	<i>Practical</i>	WEIGHTAGE: EVALUATION	CWA	MSE	ESE
		03	00		25	25	50
Pre-requisite		TCH202: Basic and Advanced knowledge of Organic Chemistry					
<i>Course Outcomes</i>							
CO1	understand the basic knowledge of different techniques of purification of organic compound						
CO2	explain the reaction mechanism in organic chemistry.						
CO3	illustrate						
CO4	Learn and apply the concepts of analytical chemistry for sample analysis						
CO5	discuss the knowledge of carbohydrates and their practical application to biotechnology and engineering.						
CO6	understand the basic knowledge of different techniques of purification of organic compound						
<i>Unit No.</i>	<i>Content</i>					<i>Contact Hours</i>	
Unit -1	PURIFICATION OF ORGANIC COMPOUNDS Crystallization, sublimation, Distillation, Fractional distillation, distillation under reduced pressure, Steam distillation, Extraction with solvent, chromatography					2	
Unit -2	(a) STRUCTURE OF ORGANIC COMPOUNDS Nature of covalent bond and its orbital representation. Hybridization, bond energy, polarity of bond & dipole moment of molecules, Isomerism (b) ORGANIC REACTIONS AND THEIR MECHANISM Bond fission, Inductive effect, hyperconjugation, electromeric, resonance effects and their significance; Types of reagents: electrophiles & nucleophiles, Reaction intermediates: carbocation, carbanion, carbenes, and free radicals- generation, properties and stability, (c) Addition reactions, Substitution reactions, Elimination reactions in organic chemistry. Orientation in aromatic substitution reactions					5+7+7	
Unit -3	(a) NANOMATERIALS Introduction, Green nanotechnology, Synthesis of nanoparticles and its applications (b) GREEN CHEMISTRY Introduction, Twelve Principles of Green Chemistry, Adverse effects of chemicals, Practice of Green Chemistry					3+3	
Unit -4	Analytical Chemistry: Basics and its applications a. Definition of Qualitative and quantitative analysis, volumetric and gravimetric analysis. b. Principle of volumetric analysis. Concept of pH, buffer solution and Henderson equation. Concept of strength and concentration of solution,					8	

	<p>Normality, Molarity, Molality and interconversion of strength, c. Types of volumetric analysis: Acid-base, Complexometric, redox and precipitation titration (Principle and examples). d. Principle and applications of the following methods:</p> <p>Chromatography: Introduction, principle & application of chromatography. Paper chromatography, thin layer chromatography, column chromatography: silica and gel filtration. Thermoanalytical methods: Thermogravimetric Analysis, Thermometric Titrations Electroanalytical techniques: Electrogravimetry, Polarography and Voltametric Methods. Atomic Spectroscopy: Principle and application of atomic absorption spectroscopy and flame photometry.</p>	
Unit -5	<p>CARBOHYDRATES</p> <p>Definition, Classification, General Properties. Preparation of Glucose, its physical and chemical properties, Killiani Fischer synthesis, Ruff degradation</p>	5
	Total Hours	42

Text Books:

Authors Name	Title	Edition	Publisher, Country	Year
Morrison & Boyd	Organic Chemistry	6 th	Pearson education	2009
I.L.Finar	Organic Chemistry (Vol 1 and II)	5 th edition	Pearson Publication	2009
Bahl and Bahl	Advanced Organic Chemistry	15 th	S. Chand & Company Ltd	2009

Reference Books:

Authors Name	Title	Edition	Publisher, Country	Year
William Kemp	Organic Spectroscopy		Palgrave Foundations	1991
L.E.Foster	Nanotechnology, Science Innovation & Opportunity		Pearson Education	2007
Y.R. Sharma	Elementary Organic Spectroscopy: Principles and Chemical Applications	1 st edition		
F.W.Bill, Meyer	A Text book of Polymer Chemistry	3 rd Edition		2009

Name of Department: - **Computer Science and Engineering**

1. Subject Code: **TCS201** Course Title: **Programming for Problem Solving**
2. Contact Hours: L: **3** T: **0** P: **0**
3. Examination Duration (Hrs): Theory **3** Practical **0**
4. Relative Weight: CIE **25** MSE **25** ESE **50**
5. Credits: **3**
6. Semester: **II**
7. Category of Course: **DSC**
8. Pre-requisite: TCS 332 Fundamental of Information Security and Blockchain.

9. Course Outcome:	<p>After completion of the course the students will be able to:</p> <p>CO1: Learn and apply concepts of strings and multi-dimensional array for providing solutions to homogenous collection of data types</p> <p>CO2: Propose solution to problem by using tools like algorithm and flowcharts.</p> <p>CO3: Apply the concept of pointers to optimize memory management by overcoming the limitations of arrays.</p> <p>CO4: Process and analyze problems based on heterogeneous collection of data using structures.</p> <p>CO5: Apply concepts of file handling to implement data storage and retrieval tasks.</p> <p>CO6: Implement the basic real life problems using python</p>
---------------------------	---

10. **Details of the Course:**

Sl. No.	Contents	Contact Hours
1	<p>UNIT- I</p> <p>Multi-Dimensional Arrays- Initializing arrays , row major and column major form of an array, character strings and arrays, Strings – Declaration of strings, Initialization of strings using arrays and pointers, Standard library functions of string.</p>	7
2	<p>UNIT- 2</p> <p>Pointers –Basic of pointers and addresses, Pointers and arrays, Pointer arithmetic, passing pointers to functions, call by reference. Accessing string through pointers.</p> <p>Dynamic memory management in C - malloc(), calloc(), realloc(), free(), memory leak,Dangling, Void, Null and Wild pointers</p> <p>Structures - Structures, array of structures, structure within structure, union, typedef, self-referential structure, pointer to structure</p>	10
3	<p>UNIT- III</p> <p>File Handling - Opening or creating a file, closing a file, File modes, Reading and writing a text file using getc(), putc(), fprintf() ,fscanf(),fgets(), fputs(), Reading and writing in a binary file, counting lines in a text file, Search in a text file, Random file accessing methods- feof(), fseek(), ftell() and rewind() functions.</p>	8
4	<p>UNIT- IV</p> <p>Introduction to Python-</p> <p>History of Python, Need of Python Programming, Python features, First Python Program, Running python Scripts, Variables, Reserved words, Lines and indentation, Quotations, Comments, Input output.</p> <p>Data Types, Operators and Expressions: Standard Data Types – Numbers, strings, Boolean, Operators – Arithmetic Operators, comparison Operators, assignment Operators, logical Operators, Bitwise Operators.</p>	10
5	<p>UNIT- V</p> <p>Control flow – if, if-elif-else, for, while, break, continue, pass, range(), nested loops.</p> <p>Functions – Handling functions in Python</p>	10

	File Handling – Reading text file, writing text file, copying one file to another	
	Total	45

Text Books:

Authors Name	Title	Edition	Publisher, Country	Year
Peter Prinz, Tony Crawford	C in a Nutshell	1 st	O'Reilly, United Kingdom	2011
Yashwant Kanetkar	Let Us C	8 th	BPB Publication, India	2007

Reference Books:

Authors Name	Title	Edition	Publisher, Country	Year
Steve Oualline	Practical C programming	3 rd	O'Reilly, United Kingdom	2011
Brian W Kernighan, Dennis M Ritchie	The C Programming Language	2 nd	Prentice Hall, American	2000
E. Balagurusamy	Programming in ANSI C	6 th	McGraw Hill Education, American	2015

Department of Mechanical Engineering						
Program: - Bachelor of Technology (Common to all the Programs)						
Semester	I / II	Course Title	Design Thinking			Code
						HSMC101/201
Course Components		Credits	Contact Hours		L	T
Core Course (CC)		01			00	00
						02
Examination Duration (Hrs)		Theory	Practical	WEIGHTAGE: EVALUATION		CWA
		00	02			25
						25
						50
Pre-requisite	NIL					
<p>COURSE OBJECTIVE(S): The objective of this Course is to provide the new ways of creative thinking and Learn the innovation cycle of Design Thinking process for developing innovative products which useful for a student in preparing for an engineering career.</p>						
Course Outcomes						
CO1	Analyze emotional experience and inspect emotional expressions to better understand users while designing innovative products					
CO2	Develop new ways of creative thinking and Learn the innovation cycle of Design Thinking process for developing innovative products					
CO3	Propose real-time innovative engineering product designs and Choose appropriate frameworks, strategies, techniques during prototype development					
CO4	Implementing design thinking in the real world and create a better customer experience.					
Unit No.	Content					Contact Hours
Unit -1	Introduction to Design thinking Understanding the Learning Process, Kolb's Learning Styles, Assessing and Interpreting, Understanding the Memory process, Problems in retention, Memory enhancement techniques Emotions: Experience & Expression					4
Unit -2	Basics of Design Thinking Definition of Design Thinking, Need for Design Thinking, Objective of Design Thinking, Concepts & Brainstorming, Stages of Design Thinking Process (explain with examples) – Empathize, Define, Ideate, Prototype, Test					10
Unit -3	Process of Product Design Understanding Creative thinking process, Understanding Problem Solving, Testing Creative Problem-Solving, Process of Engineering Product Design, Design Thinking Approach, Stages of Product Design, Examples of best product designs and functions, Assignment – Engineering Product Design					4
Unit -4	Celebrating the Difference Understanding Individual differences & Uniqueness, Group Discussion and Activities to encourage the understanding, acceptance and appreciation of Individual differences					2
Unit -5	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

Unit -6	Project Focus on User Experience, Address “ergonomic challenges, User focused design, rapid prototyping & testing, final product, Final Presentation – “Solving Practical Engineering Problem through Innovative Product Design & Creative Solution”. This will be a Group activity and the project will be assigned by mentor.	8
	Total Hours	30

Text Books:

Authors Name	Title	Edition	Publisher, Country	Year
E Balaguruswamy	Developing Thinking Skills (The way to Success)	32nd edition	Khanna Book Publishing Company, India	2022

Reference Books:

Authors Name	Title	Edition	Publisher, Country	Year
Jeanne Liedtka (Author), Andrew King (Author), Kevin Bennett (Author).	Solving Problems with Design Thinking Ten Stories of What Works		(Columbia Business School Publishing)	2013
Yousef Haik and Tamer M.Shahin	Engineering Design Process	2 nd	Cengage Learning	2011

Department of Nursing							
Program: - Bachelor of Technology (Common to all the Programs)							
Semester	Two	Course Title	Healthy Living and Fitness			Code	THF101/201
Course Components	Credits	Contact Hours		L	T	P	
Core Course (CC)	02			02	00	00	
Examination Duration (Hrs)	Theory	Practical	WEIGHTAGE: EVALUATION	CWA	MSE	ESE	
	03	00		-	-	100	
Pre-requisite	NIL						
9.Course Outcome:	<p>After completion of the course the students will be able to:</p> <p>CO1: Explain the importance of balanced food and proper diet in daily life.</p> <p>CO2: Recognize the benefits of healthy lifestyle, lifestyle management, and related diseases.</p> <p>CO3: State the problems related to addiction and benefits of routine exercises.</p> <p>CO4: Describe the significance of mental health and keys to stress management.</p> <p>CO5: Express the benefits of yoga and meditation.</p>						

10. **Details of the Course:**

Sl. No.	Contents	Contact Hours
1	<p>Unit 1:</p> <p>Human Body: Awareness of important body organs, their location, and broad functions.</p> <p>Diet and Health: Importance of breakfast, fruits, whole grains</p> <p>Knowledge about constituents of diet.</p> <p>Importance of fiber. Harmful effects of junk/processed foods</p>	10
2	<p>Unit 2:</p> <p>Lifestyle Diseases and management:</p> <p>Dangers of obesity, Diseases ensuing because of lifestyle e.g., Diabetes- Hypertension - Obesity- CHD.</p> <p>Addictions and treatments: Chewing/unhealthy harmful products, Drinking, Smoking: lethality's and management</p>	10

3	<p>Unit 3:</p> <p>Importance of Mental Health: Stress management, Anxiety and depression, Awareness of commonly encountered diseases/ailments.</p> <p>Yoga and Stress Management: Benefits of yogic exercises and meditation for physical and mental fitness, stress management and relaxation techniques</p>	10
Total		30

Textbooks:

Authors Name	Title	Edition	Publisher, Country	Year
Darshan Sohi	A Comprehensive Textbook of Applied Nutrition and Dietetics for BSc Nursing Students	Third	Jaypee, India	2022
Leon Beach	Yoga and Meditation: Alternative Medicine	First	Larsen and Keller Education (21 April 2017)	2017
Tim Spector	Food for Life: The New Science of Eating Well	First	Jonathan Cape	2022

Reference Books:

Authors Name	Title	Edition	Publisher, Country	Year
Mr. Rahul Kushwah, Mr. Shrikant & Mr. Yogendra Kushwah	Fundamental of Yogic Practices (A Complete Guide of Yoga)	First	Khel Sahitya Kendra (1 January 2021)	2021
Anita Jatana	Apollo Clinical Nutrition Handbook	First	Jaypee brothers' medical publishers	2022
N. Shakuntala Manay & M. Shadaksharaswamy	New Age Foods Facts and Principles	Fifth	New age international publishers	2023