

SIPNA COLLEGE OF ENGINEERING & TECHNOLOGY, AMRAVATI

An Autonomous Institute Affiliated to

Sant Gadge Baba Amravati University, Amravati, Maharashtra (India)

(Approved by AICTE, New Delhi and Recognized by DTE, Maharashtra)

(Accredited with 'A+' Grade by NAAC)



Bachelor of Technology (B. Tech.) Programme Scheme of Examination (SoE) and Syllabus

**Department of Artificial Intelligence (AI) and Data Science
(Semester Pattern)**

**B. Tech. Artificial Intelligence (AI) and Data Science with Multidisciplinary Minor
Effective from Academic Year 2024-25**

Prepared By: Boards of Studies - Artificial Intelligence (AI) and Data Science

Approved By: Academic Council - Sipna COET, Amravati



			31.08.2024	1.00
Chairman Board of Studies	Dean Academics	Chairman Academic Council	Date of Release	Version



Index

Sr. No	Content	Page No.
1.	About the Department	3
2.	Institute Vision & Mission	3
3.	Key Features of Curriculum	4
4.	Programme Outcomes	4
5.	General Course Structure and Scheme	6
6.	Vocational and Skill Enhancement Courses	8
7.	Humanities & Social Sciences Courses	8
8.	Scheme Semester - I	9
9.	Scheme Semester - II	10
10.	Syllabus Sem I	11
11.	Syllabus Sem II	30

APPROVED in.....

Academic Council Meeting

Dated:-...31.08.2024...



About the Department

The Department of Artificial Intelligence (AI) and Data Science is dedicated to exploring and applying cutting-edge principles in AI and data science. Within this department, students benefit from a strong focus on key areas like machine learning, natural language processing, and computer vision. These subjects teach students how to enable computers to learn, understand human language, and interpret visual information. Additionally, the curriculum covers data science techniques, including data mining and big data analytics, which are crucial for analyzing large datasets. These skills provide students with the tools to generate valuable insights and make informed decisions in various fields such as business, healthcare, finance, and Internet of Things (IoT) applications.

The department is established in 2024 with the intake capacity of the Undergraduate Course (B. Tech.) is 60. The department's emphasis on a modular learning approach reflects its commitment to integrating theoretical knowledge with practical applications in Artificial Intelligence (AI) and Data Science. This methodical approach ensures that students not only grasp foundational concepts but also gain hands-on experience in utilizing cutting-edge tools and techniques.

Through education and training programs, the department equips students with the skills needed to navigate and lead in this dynamic field, fostering collaborations with industry to bridge theory with real-world applications.

Institute Vision

- To provide quality professional education and conducive environment to students to emerge as a model proficient institute.

Institute Mission

- To create a scholarly and vibrant environment for professional excellence.
- To contribute to advancement of knowledge in basic and applied areas of Engineering and Technology.
- To be an institute of choice in the region by developing, managing and transferring contemporary technologies.
- To build mutually valuable terms with industry, society and alumni.

APPROVED in...
Academic Council Meeting
Dated: ...31.08.2024...



Key Features of Curriculum

1. Provision for Open Electives (OE), Vocational and Skill Enhancement Courses (VSE), Ability Enhancement Courses (AE), Indian Knowledge System (IKS), Value Education Courses (VE), Basic Science (BS), Engineering Science (ES), Co-Curricular Courses (CC) in addition to program core courses.
2. Mandatory internship of one semester (Sixth Months)
3. Credits for Value education courses, Ability Enhancement Courses, Co-Curricular and Extra Curricular Activities.
4. Interdisciplinary and multidisciplinary education through single and double minors and open electives.
5. Provision for learning in online mode through Swayam / MOOCS / NPTEL etc. courses.
6. Provision for B.Tech. degree with Honors/ Minors.
7. Opportunity for learners to choose courses of their interest in all disciplines.
8. Provision of Field project.
9. Multiple entry and exit option after every year.

Programme Outcomes (POs): Engineering Graduates will be able to:

PO 1: Engineering knowledge:

Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO 2: Problem analysis:

Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO 3: Design/development of solutions:

Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.

PO 4: Conduct investigations of complex problems:

Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

APPROVED in..... 18



PO 5: Modern tool usage:

Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO 6: The engineer and society:

Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO 7: Environment and sustainability:

Understand the impact of professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 8: Ethics:

Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.

PO 9: Individual and teamwork:

Function effectively as an individual, and as a member or leader in diverse teams, and in multi-disciplinary settings.

PO 10: Communication:

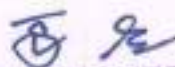
Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO 11: Project management and finance:

Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multi-disciplinary environments.

PO12: Life-long learning:

Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

 
APPROVED in.....
Academic Council Meeting
Dated:-...31.08.2024.



General Course Structure and Scheme

A. Definition of Credit

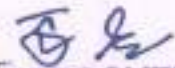
1 Hr. Lecture (L) per week	1 Credit
1 Hr. Tutorial (T) per week	1 Credit
2 Hours Practical (P) per week	1 Credit

B. Total Credits for the completion of B.Tech. in Artificial Intelligence (AI) and Data Science:

The total number of credits proposed for the four-year B.Tech. in Artificial Intelligence (AI) and Data Science with one Multidisciplinary minor (Compulsory) degree is 172 as per the structure given below:

Students can opt for any of the following as per the rules and regulations given by the institute:

1. B. Tech. Artificial Intelligence (AI) and Data Science with Multidisciplinary Minor = Total 172 Credits
2. B. Tech. Artificial Intelligence (AI) and Data Science with Multidisciplinary Minor and Honors Specialization = Total 190 Credits
3. B. Tech. Artificial Intelligence (AI) and Data Science with Multidisciplinary Minor and Honors with Research = Total 190 Credits
4. B. Tech. Artificial Intelligence (AI) and Data Science with Multidisciplinary Minor and additional specialization Minor (Double Minors) = Total 190 Credits


APPROVED in.....
Academic Council Meeting
Dated:- 31.08.2024..



C. Semester Wise Credit Distribution Structure for Four Year UG Program with One Multidisciplinary Minor.

Courses		No of Credits /Semester								Total Credits	% Credit Allotment
		1	2	3	4	5	6	7	8		
Basic Science Course	BSC/ESC	7	7		3					17	9.88
Engineering Science Course		7	9							16	9.30
Programme Core Course (PCC)	Program Courses		2	15	10	12	8	11		58	33.72
Programme Elective Course (PEC)						4	8	7		19	11.04
Multidisciplinary Minor (MD M)	Multidisciplinary Courses			3	3	3	3		2	14	8.13
Open Elective (OE) Other than a particular program				2	2	2				6	3.48
Vocational and Skill	Skill Courses										
Enhancement Course (VSEC)		2	1		2		2			7	4.06
Ability Enhancement Course (AEC -01, AEC-02)	Humanities Social Science and Management (HSSM)	2					1			3	6.97
Entrepreneurship/Economics/Management Courses				2	2					4	
Indian Knowledge System (IKS)			2							2	
Value Education Course (VEC)		3								3	
Research Methodology	Experiential Learning Courses								4	4	12.20
Comm. Engg. Project (CEP)/Field Project (FP)						1				1	
Project								4		4	
Internship/ OJT									12	12	
Co-curricular Courses (CC)	Liberal Learning Courses	1	1							2	1.16
Total Credits		22	22	22	22	22	22	22	18	172	100%

APPROVED in.....



1. Vocational and Skill Enhancement Courses (VSEC)

VSEC Courses include hands-on training corresponding to the Major and/or Minor Subject. Vocational courses include skills based advanced laboratory practical of Major. The following courses are offered as Vocational and skill Enhancement courses by the department of Artificial Intelligence (AI) and Data Science.

S.N.	Course Title	Semester	Credits
1	Web Technology Lab (Technical Deptt. Specific)	I	1
2	Design Thinking	I	1
3	Basics of Python Lab (Technical Deptt. Specific)	II	1
Total Credits			03

2. Humanities & Social Sciences Courses [HSSMC]

The following courses are offered as Humanities & Social Science Courses by department of Artificial Intelligence (AI) and Data Science.

S.N.	Category	Course Title	Semester	Credits
1	Ability Enhancement Course (AEC-I)	Professional Communication	I	2
2	Value Education Course (VEC-I)	Environmental Studies	I	1
3	Value Education Course (VEC-II)	Values and Ethics	I	2
4	Indian Knowledge System (IKS)	Indian Knowledge System	II	2
Total Credits				7

3. Multidisciplinary Minor Courses: 14 Credits

- Compulsory Multidisciplinary Minor Courses are offered from the different disciplines of the Engineering.
- Students once registered for the selected Course of Multidisciplinary Minors (MDM) in 3rd semester need to complete all credits assigned from 3rd to 8th semester for the specific selected MDM course only.

4. Open Elective Courses: 06 Credits

The open elective subjects offered from the faculty other than Engineering and Technology.

5. Honors/ Double Minors Degree Programs: 18 Credits

A student shall be eligible for the award of B.Tech. degree with Honors / Double Minors if he/she earns 18 credits in addition to the 172 credits of regular B.Tech. Programme within 4 years duration. It is not mandatory for any student to opt for the Honors /Double Minors Programme.

APPROVED in



Scheme Semester - I

Scheme for First Year B. Tech. in Artificial Intelligence (AI) & Data Science (Semester -I)

Sr. No.	Course Name	Code	Course Plan per Week (Hrs)				Credits	Theory Evaluation				Practical Evaluation		Total	ESE Time (Hrs)
			L	P	T	Hrs		MSE-I	MSE-II	TA	ESE	INT	EXT		
Basic Science Courses (BSC)															
1	Engineering Mathematics -I	BTALBS01SH1T	3	0	0	3	3	15	15	10	60			100	2.5
2	Engineering Chemistry	BTALBS02SH1T	3	0	0	3	3	15	15	10	60			100	2.5
3	Engineering Chemistry Lab	BTALBS03SH1P	0	2	0	2	1					30	20	50	
Engineering Science Courses (ESC)															
4	Engineering Graphics	BTALES01ME1T	3	0	0	3	3	15	15	10	60			100	3
5	Engineering Graphics Lab	BTALES02ME1P	0	2	0	2	1					30	20	50	
6	Foundation of Data Science	BTADES03AD1T	2	0	0	2	2	15	15	10	60			100	2.5
7	Foundation of Data Science Lab	BTADES04AD1P	0	2	0	2	1					30	20	50	
Vocational and Skill Enhancement Courses (VSEC)															
8	Web Technology Lab	BTADVS01AD1P	0	2	0	2	1					50		50	
9	Design Thinking	BTADVS02AD1T	1	0	0	1	1			50				50	
Ability Enhancement Courses (AEC)															
10	Professional Communication	BTALAE01SH1P	0	2	1	3	2					30	20	50	
Value Education Courses (VEC)															
11	Values and Ethics	BTALVE01SH1T	2	0	0	2	2	15	15	10	60			100	2.5
12	Environmental studies	BTALVE02SH1T	1	0	0	1	1			50				50	
Cocurricular Courses (CC)															
13	Co-curricular course (CC1)	BTALCC01SH1P	-	2	1	2	1					50		50	
TOTAL			15	12	1	28	22	75	75	150	300	220	80	900	
L: Lecture P: Practical T : Tutorial MSE: Mid Semester Exam ESE: End Semester Exam TA: Teacher Assessment INT: Internal EXT: External															

L: Lecture P: Practical T: Tutorial MSE: Mid Semester Exam ESE: End Semester Exam TA: Teacher Assessment INT: Internal EXT: External

List of Co-curricular Courses (CC1) Semester-I/II (Choose any one Course)

S. N.	Course Code Sem I	Co-curricular Courses	Course Code Sem II	S. N.	Course Code Sem I	Co-curricular Courses	Course Code Sem II
1	BTALCC01SH1P	Music Vocal -I	BTALCC01SH2P	8	BTALCC15SH1P	Human psychology -I	BTALCC15SH2P
2	BTALCC03SH1P	Music Instrumental (Guitar) -I	BTALCC03SH2P	9	BTALCC17SH1P	Drama/ Theater Activity -I	BTALCC17SH2P
3	BTALCC05SH1P	Dance -I	BTALCC05SH2P	10	BTALCC19SH1P	Mindfulness Meditation Program -I	BTALCC19SH2P
4	BTALCC07SH1P	Basketball -I	BTALCC07SH2P	11	BTALCC21SH1P	NSS -I	BTALCC21SH2P
5	BTALCC09SH1P	Cricket -I	BTALCC09SH2P	12	BTALCC23SH1P	Yoga -I	BTALCC23SH2P
6	BTALCC11SH1P	Volleyball -I	BTALCC11SH2P	13	BTALCC25SH1P	Film Making - I	BTALCC25SH2P
7	BTALCC13SH1P	Language Sanskrit -I	BTALCC13SH2P				

APPROVED in

Academic Council Meeting

Dated: 21.08.2024



Scheme Semester- II

Scheme for First Year B. Tech. in Artificial Intelligence (AI) & Data Science (Semester -II)

Sr. No.	Course Name	Code	Course Plan per Week (Hrs)				Credits	Theory Evaluation				Practical Evaluation		Total	ESE Time (Hrs)	
			L	P	T	Hrs		MSE - I	MSE -II	TA	ESE	INT	EXT			
Basic Science Courses (BSC)																
1	Engineering Mathematics -II	BTALBS04SH2T	3	0	0	3	3	15	15	10	60			100	2.5	
2	Engineering Physics	BTADBS05SH2T	3	0	0	3	3	15	15	10	60			100	2.5	
3	Engineering Physics Lab	BTADBS06SH2P	0	2	0	2	1					30	20	50		
Engineering Science Courses (ESC)																
4	Basic Electrical Engineering	BTALES05ET2T	3	0	0	3	3	15	15	10	60			100	2.5	
5	Basic Electrical Engineering Lab	BTALES06ET2P	0	2	0	2	1					30	20	50		
6	Programming for Problem Solving	BTADES07AD2T	3	0	0	3	3	15	15	10	60			100	2.5	
7	Programming for Problem Solving Lab	BTADES08AD2P	0	2	0	2	1					30	20	50		
8	Workshop Idea Lab /Fab Lab	BTALES09ME2P	0	2	0	2	1					30	20	50		
Vocational and Skill Enhancement Courses (VSEC)																
9	Basics of Python Lab	BTADVS03AD2P	0	2	0	2	1					50		50		
Program Core Courses (PCC)																
10	Basics of Python	BTADPC01AD2T	2	0	0	2	2	15	15	10	60			100	2.5	
Indian Knowledge System (IKS)																
11	Indian Knowledge System	BTALIK01SH2T	2	0	0	2	2			50				50		
Cocurricular Courses (CC)																
12	Co-curricular course (CC2)	BTALCC02SH2P	-	2	-	2	1					50		50		
TOTAL			16	12	0	28	22	75	75	100	300	220	80	850		
L: Lecture P: Practical T : Tutorial MSE: Mid Semester Exam ESE: End Semester Exam TA: Teacher Assessment INT: Internal EXT: External																

L: Lecture P: Practical T: Tutorial MSE: Mid Semester Exam ESE: End Semester Exam TA: Teacher Assessment INT: Internal EXT: External

List of Co-Curricular Courses (CC1/CC2) Semester-I/II (Choose any one Course)

S. N.	Course Code Sem I	Co-Curricular Courses	Course Code Sem II	S. N.	Course Code Sem I	Co-Curricular Courses	Course Code Sem II
1	BTALCC02SH1P	Music Vocal -II	BTALCC02SH2P	8	BTALCC16SH1P	Human psychology -II	BTALCC16SH2P
2	BTALCC04SH1P	Music Instrumental (Guitar)-II	BTALCC04SH2P	9	BTALCC18SH1P	Drama/ Theater Activity -II	BTALCC18SH2P
3	BTALCC06SH1P	Dance-II	BTALCC06SH2P	10	BTALCC20SH1P	Mindfulness Meditation Program -II	BTALCC20SH2P
4	BTALCC08SH1P	Basketball -II	BTALCC08SH2P	11	BTALCC22SH1P	NSS-II	BTALCC22SH2P
5	BTALCC10SH1P	Cricket -II	BTALCC10SH2P	12	BTALCC24SH1P	Yoga -II	BTALCC24SH2P
6	BTALCC12SH1P	Volleyball -II	BTALCC12SH2P	13	BTALCC26SH1P	Film Making - II	BTALCC26SH2P
7	BTALCC14SH1P	Language Sanskrit-II	BTALCC14SH2P				

Scheme for Multiple Entry and Exit

Exit option 1(L4.5): Award of UG Certificate in Major with 44 credits and an additional 8 credits.

Exit Courses

		Online certification Course	8 Credits
1	Eight Credit Online courses from Swayam/ NPTEL /ANY Other agency approved by BoS during corresponding academic year which provides certification/ Evaluation.		



Syllabus: Semester I

Program:	B.Tech. (All Branches)	Semester:	I
Course:	Engineering Mathematics-I	Code:	BTALBS01SH1T
Teaching Scheme			
Lecture	Tutorial	Hours	Credit
3	-	3	3
Evaluation Scheme			
TA	MSE-I	MSE-II	ESE
10	15	15	60
Total			100

Methods of Teacher Assessment (TA): Class Tests, Assignments, Quiz & Class Attendance

Course Objectives: To understand the basic concepts of Differential calculus and Complex numbers.

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

CO	Course Outcomes	BT Level
CO-1	Distinguish between various types of functions to find n^{th} derivative.	L4
CO-2	Explain the basic concepts of partial differentiation.	L5
CO-3	Classify different forms of complex number.	L4
CO-4	Distinguish between various forms of differential equations.	L4
CO-5	Solve higher order differential equations.	L3
CO-6	Apply differential equations to find orthogonal trajectories and in electrical field.	L3

Unit I: Differential Calculus I	(6 Hrs.)
Successive Differentiation, Leibnitz's theorem, Taylor's and Maclaurin's theorems.	
Unit II: Differential Calculus II	(6 Hrs.)
Partial differentiation, Euler's theorem on homogenous function. Maxima and Minima of a function of several connected independent variables (Lagrange's Multipliers).	
Unit III: Complex Number	(6 Hrs.)
De-Moivre's theorem, Separation of real and imaginary parts, Logarithm of complex numbers.	
Unit IV: Ordinary differential equation of first order and first degree	(6 Hrs.)
Ordinary differential equation of first order and first degree in variable separable, Linear differential equation, Exact differential equation, non-exact differential equation.	
Unit V: Differential equations of first order and higher degree	(6 Hrs.)
Solution of differential equations of first order and higher degree by various methods (Solvable for x, y and p). Clairaut's differential equation and reducible to Clairaut's differential equation.	
Unit VI: Applications of Differential Equation	(6 Hrs.)
Application to Orthogonal trajectories, Electrical circuits and Growth Problems.	
Total Lectures	36 Hours

Textbooks:

- Wartikar P. N., Wartikar J. N – A textbook of applied Mathematics. Volume I, II. V.G. Prakashan, Pune
- Grewal B. S. – Higher Engineering Mathematics, Khanna Publishers.
- Kreyszig E.K. - Advanced Engineering Mathematics, John Wiley.
- Singh R. R. & Bhatt M. - Engineering Mathematics.
- Ramana B.V. - Higher Engineering Mathematics.

APPROVED in.....
Academic Council Meeting
Dated: 31.08.2024

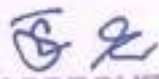


Reference Books:

1. N. P. Bali & Manish Goyal- A textbook of Engineering Mathematics, Laxmi Publications.
2. Veera Rajan T - Engineering Mathematics for first Year, (TMH)

MOOCs Links and additional reading, learning, video material

1. NPTEL : Mathematics - NOC: Engineering Mathematics - I
2. Differential Calculus - Course (swayam2.ac.in)
3. <https://www.mooc-list.com/tags/differential-equations>
4. Complex Number - Definition, Formula, Properties, Examples (cuemath.com)

 
APPROVED in.....
Academic Council Meeting
Dated:- 31.08.2024.



Program:	B. Tech. (All Branches)			Semester:	I			
Course:	Engineering Chemistry			Code:	BTALBS02SH1T			
Teaching Scheme				Evaluation Scheme				
Lecture	Tutorial	Hours	Credit	TA	MSE-I	MSE-II	ESE	Total
3	-	3	3	10	15	15	60	100

Methods of Teacher Assessment (TA): Assignments, Class Tests, Viva Voce, Case Study Report, Attendance

Course Objectives: To impart a sound knowledge of the fundamental concepts of chemistry, involved in the study of several Engineering materials and related applications.

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

CO	Course Outcomes	BT Level (L1 to L6)
CO-1	Apply the knowledge of chemistry for treatment of water	L5
CO-2	Understand the importance, need and applications of green technology for power generation by using renewable energy sources	L6
CO-3	Understand the construction, working and applications of advanced batteries.	L6
CO-4	Identify the application of various useful engineering materials such as nanomaterial, cement and lubricants, based on their properties	L3
CO-5	Understand the preparation, properties and uses of various polymeric materials.	L2
CO-6	Identify the need of reducing, reusing and recycling of E-waste to protect the environment.	L6

Unit I: Water Treatment

(6 Hrs.)

Hardness of water, Types of hardness- Temporary & Permanent Units of Hardness, Disadvantages of hard water, Softening of water, Softening methods like Ion-Exchange, Reverse Osmosis. Numerical Problem based on calculation of hardness of water.

Unit II: Green Technology

(6 Hrs.)

A) Solar Power System: Introduction to solar energy, need of solar energy, Utilization and conversion of solar energy, Photovoltaic cells- construction, working, advantages and disadvantages, Pannels and arrays.
B) Green Hydrogen: Introduction to hydrogen energy, various hydrogen production methods- hydrogen from fossil fuels, electrolysis of water, Storage and transportation, Use of green hydrogen as a fuel. Case study on green energy.

Unit III: Battery Technology

(6 Hrs.)

Introduction, classification of batteries- Primary and Secondary, Principle, construction, working and applications of Lead-Acid battery, Nickel-Cadmium battery, Lithium- ion battery. Fuel Cells, Classification of fuel cells, Principle, construction, working and application of H₂-O₂ fuel cell and DMFC.

Unit IV: Engineering Material

(6 Hrs.)

A) Nanomaterial: Definition and classification of Nanomaterial, Methos of preparation. Properties and Application of nanomaterials.
B) Cement: Introduction of cement, Ingredients of cement and their functions, Wet process of manufacturing of cement, Properties of cement- setting and hardening, heat of hydration, soundness of cement.
C) Lubricant: Introduction and Functions of lubricant, Classification of lubricant, Properties of liquid lubricant, Viscosity, Viscosity index, Flash point, Fire point, Cloud point and Pour point.

Unit V: Polymer Science

(6 Hrs.)

Introduction, Methods of Polymerization, Addition and Condensation Polymerization, Thermosoftening and Thermosetting polymers, Preparation, Properties & uses of PVC, TEFLON, Bakelite, Epoxy resins (Araldite), Polyurethane (Foam). Rubber: Natural Rubber, Vulcanization of natural rubber and its advantages Biodegradable Polymer: Introduction, Classification and application

APPROVED in.



Unit VI: E-Waste Management	(6 Hrs.)
Introduction, Sources of E-waste, Types of E-waste, Toxic materials in E-waste and their health hazards, Recycling of E-waste (Separation and direct recycling), Pyrometallurgy, Hydrometallurgy, Control of E-waste. Case study on E-waste management.	
Total Lectures	36 Hours

Textbooks:

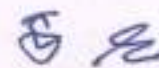
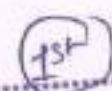
1. A Textbook of Engineering Chemistry by S.S.Dara, S. Chand & Company Ltd.
2. Engineering Chemistry by Jain & Jain, Dhanpat Rai Publishing Company (P) Ltd.
3. A Textbook of Engineering Chemistry by Shashi Chawla, Dhanpat Rai Publishing Company (P) Ltd.
4. An Introduction to Nano material & Nanoscience by A K.Das & M.Das (CBS Publisher & Distributor)
5. A Textbook on experiments & calculation in Engineering Chemistry by S.S. Dara, S. Chand & Company Ltd.
6. Advanced Practical in Physical Chemistry by J.B. Yadav, Krishna's Prakashan Media (P) Ltd.

Reference Books:

1. Chemistry in Engineering & Technology, Vol I & Vol II by J. Rajaram & J.C. Kuriacose, McGraw-Hill Education
2. A Textbook of Polymer Science & Tech by V. Gowarikar, New age International Publisher
3. Nanotechnology Fundamentals and Applications by Manasi Karkare, I K International Publisher
4. Solar energy: Principles of Thermal collection and storage, S.P. Sukhatne, Tata McGraw-Hill
5. Solar photovoltaic: Fundamental Technologies and Applications, Chetan Singh Solanki Prentice Hall
6. E-waste: Implications, regulations, and management in India and current global best practices, Johri R., TERI Press, New Delhi

MOOCs Links and additional reading, learning, video material

1. <https://nptel.ac.in/courses/105107207>
2. <https://archive.nptel.ac.in/courses/105/105/105105178/>
3. https://onlinecourses.nptel.ac.in/noc20_ph21/preview
4. https://onlinecourses.nptel.ac.in/noc22_ee71/preview
5. https://onlinecourses.nptel.ac.in/noc22_ch66/preview
6. https://onlinecourses.nptel.ac.in/noc21_mm34/preview
7. <https://archive.nptel.ac.in/courses/112/102/112102014/>
8. <https://archive.nptel.ac.in/courses/104/105/104105124/>
9. <https://archive.nptel.ac.in/courses/113/105/113105028/>
10. <https://archive.nptel.ac.in/courses/105/105/105105169/>



APPROVED in.....
Academic Council Meeting
Dated:- 31.08.2024



Program:	B. Tech. (All Branches)				Semester:	I	
Course:	Engineering Chemistry Lab				Code:	BTALBS03SH1P	
Teaching Scheme				Evaluation Scheme			
Practical	Tutorial	Hours	Credit	INT	EXT	Total	
1	-	2	1	30	20	50	

Course Objectives

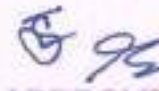
- To enable the students to get hands-on experience on the concepts discussed during theory classes.
- To provide practical knowledge of quantitative analysis of materials by volumetric and chemical methods.
- To impart knowledge about instrumental methods for developing experimental skills.

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

CO	Course Outcomes	BT Level (L1 to L6)
1	Determine the hardness and dissolved oxygen in water.	L5
2	Analyze, interpret & utilize the engineering materials in various engineering field.	L4
3	Determine important properties of lubricants like viscosity, flash point, by using suitable methods and instrumentation.	L5
4	Synthesize polymers by using suitable chemicals.	L6
5	Interpret data of conductivity change during acid base reaction as well as relate the cell potential (EMF) to the concentration of electrolyte	L5
6	Analyze the coal sample by proximate analysis.	L4

General Guidelines: Minimum 8 Experiments are to be conducted covering entire syllabus

Expt. No.	List of Experiments
1.	Determination of NaOH and Na ₂ CO ₃ in given alkali mixture.
2.	Determination of hardness of water by EDTA complexometric titration.
3.	Determination of Dissolved oxygen from water.
4.	Determination of % of Fe ₂ O ₃ from cement sample
5.	Determination of Acid value of lubricating oil.
6.	Study of variation in viscosity of lubricating oil on increase temperature by using Redwood viscometer No.1.
7.	Determination of Flash point of lubricating oil by using Abel's flash point apparatus.
8.	Preparation of Phenol and Urea formaldehyde polymer.
9.	To find out strength of acid by titrating it with dilute Alkali conductometrically.
10.	Study of EMF of a Daniel cell at varying concentration of electrolyte.
11.	To carry out proximate analysis of coal.


 APPROVED In.....^{1st}.....
 Academic Council Meeting
 Dated:- 31.08.2024.....



Program: B. Tech. (All Branches)				Semester:		I		
Course: Engineering Graphics				Code:		BTALES01ME1T		
Teaching Scheme				Evaluation Scheme				
Lecture	Tutorial	Hours	Credit	TA	MSE - I	MSE - II	ESE	Total
3	-	3	3	10	15	15	60	100
Methods of Teacher Assessment (TA): Attendance, Assignment, Viva								
Course Objectives: Inculcate knowledge and develop the essential skills among students to communicate technical information effectively & contribute to the design, manufacturing & analysis of engineering processes.								
Course Outcomes: After completion of the course, the students will be able to:								
CO	Course Outcomes							BT Level
CO-1	Read/Interpret/prepare the engineering drawings							L 2
CO-2	Show the projections of Lines in different possible positions							L 1
CO-3	Show the projections of 2D objects							L 1
CO-4	Interpret and draw the projections and sectional views of 3D objects							L 2
CO-5	Develop the orthographic views of 3D objects							L 3
CO-6	Develop the isometric views & projections of 3D objects							L 3
Unit I: Introduction to Engineering Graphics								(06 Hrs.)
Projections of points in all possible positions w.r.t. reference planes. Projections of lines when it is parallel to both reference planes, perpendicular to one of the reference planes, when line is inclined to one and parallel to other reference plane & when line is inclined to both reference planes.								
Unit II: Projection of Planes								(06 Hrs.)
Projection of planes parallel to one and perpendicular to other reference plane, inclined to one reference plane, inclined to both the reference planes.								
Unit III: Projection of Right Regular Solids								(06 Hrs.)
Projection of solid when axis is perpendicular to one of the reference planes and parallel to other reference plane, when axis is inclined to one and parallel to other reference plane, when axis is inclined to both the reference planes, Projection of cube, right regular prisms, right regular pyramids, right circular cylinder, right circular cone & Tetrahedron.								
Unit IV: Section of Solids								(06 Hrs.)
Section of right regular Solids including cube, right regular prisms, right regular pyramids, tetrahedron, right circular cylinder and right circular cone in simple position.								
Unit V: Orthographic Projection								(06 Hrs.)
Principles of Orthographic Projections, Conventions, Multi view orthographic projections for parts/patterns with isometric/ non-isometric surfaces and circular features and sectional views. Reading of orthographic.								
Unit VI: Isometric View and Projection								(06 Hrs.)
Principles of Isometric projection, Isometric Scale, Isometric Views, Isometric Views of Simple Solids; conversion of Orthographic views to Isometric views and Isometric Projection.								
Total Lectures								36 Hours

Textbooks:

1. Bhatt N. D., Panchai V.M. Engineering Drawing, Charotar Publishing House.
2. Jolhe D. A. Engineering Drawing with an Introduction to Auto CAD, Tata McGraw- Hill Publishing Co. Ltd., New Delhi.
3. Shah P. J., Engineering Drawing, S. Chand Publication

S. P.
APPROVED in.....

1st



Reference Books:

1. Naraynan K. L., Kannalal P. – Engineering Drawing, Scitech
2. Dhawan R. K. – Engineering Drawing, S. Chand Publication

MOOCs Links and additional reading, learning, video material

1. NPTEL Course: Engineering Drawing & Computer Graphics, Link: <https://nptel.ac.in/courses/112105294>

Program:	B. Tech. (All Branches)			Semester:	I	
Course:	Engineering Graphics Lab			Code:	BTALES02ME1P	
Teaching Scheme				Evaluation Scheme		
Practical	Tutorial	Hours	Credit	INT	EXT	Total
2	-	2	1	30	20	50
Course Objectives: Inculcate knowledge and develop the essential skills among students to communicate technical information effectively & contribute to the design, manufacturing & analysis of engineering processes.						
Course Outcomes: After completion of the course, the students will be able to:						
CO	Course Outcomes					BT Level
CO-1	Read/Interpret/prepare the engineering drawings					L 2
CO-2	Show the projections of Lines in different possible positions					L 1
CO-3	Show the projections of 2D objects					L 1
CO-4	Interpret and draw the projections and sectional views of 3D objects					L 2
CO-5	Develop the orthographic views of 3D objects					L 3
CO-6	Develop the isometric views & projections of 3D objects					L 3
General Guideline: Prepare any six drawing sheets out of seven listed below						
Sheet No.	List of Drawing Sheets					
1.	Projection of Lines					
2.	Projection of Planes					
3.	Projection of Solids					
4.	Section of Solids					
5.	Orthographic Projection					
6.	Isometric View & Projection					
7.	Free hand sketches of simple machine elements, like: (a) Screw threads ISI profile, (b) Types of nuts, bolts, studs, set screws, washers, locking arrangement of nuts & bolts (c) Foundation bolts – Rag, eye, lewis types					

[Signature]

APPROVED in.....

Academic Council Meeting

Dated:- 31.08.2024



Program:	B. Tech. (Artificial Intelligence (AI) & Data Science)	Semester:	I
Course:	Foundation of Data Science	Code:	BTADES03AD1T
Teaching Scheme			
Lecture	Tutorial	Hours	Credit
2	-	2	2

Evaluation Scheme

TA	MSE-I	MSE-II	ESE	Total
10	15	15	60	100

Methods of Teacher Assessment (TA): Assignment, Quiz, Test, Attendance

Course Objectives:

Throughout the course, students will be expected to demonstrate their understanding of foundation of Data Science by being able to do each of the following:

- To provide students with a basic understanding of data science, its history, and key terminologies.
- To introduce R language, covering data types, operators, functions, and data manipulation.
- To equip students with the skills to perform data preprocessing and exploratory data analysis using R
- To provide exposure to real-world applications of data science across different domains such as healthcare, etc.,

Course Outcomes:

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

CO	Course Outcomes	BT Level (L1 to L6)
CO-1	Describe data science concepts, history, and differentiate between analytics types and related terminologies.	L2
CO-2	Apply R programming skills to manipulate data using variables, data types, operators, functions, vectors, lists, and data frames.	L3
CO-3	Analyze and preprocess data by handling missing values, outliers, and performing data visualization using R.	L4
CO-4	Evaluate and apply data science methodologies to case studies in fields such as healthcare, agriculture, etc.,	L5

Unit I: Introduction to Data Science	(6 Hrs.)
History of data science, data science and related terminologies, types of analytics, applications of data science, data science process model	
Unit II: Introduction to R programming language	(6 Hrs.)
R and R studio environment, basics of R: variables, Data Types, Operators, Functions, Vectors, List, Data Frames and Packages	
Unit III: Exploratory Data Analysis using R	(6 Hrs.)
Steps in data preprocessing, visualizing data, dealing with outliers in data, dealing with missing values in data, standardizing data	
Unit IV: Applications of Analytics	(6 Hrs.)
Applications of Analytics with case studies in Healthcare, Agriculture, Business and Sports	
Total Lectures	24 Hours

APPROVED in.....



Textbooks:

1. "Introduction to Data Science – Practical Approach with R and Python", R. Uma Maheshwari, R. Sujatha, Wiley Emerging Technology Series.

Reference Books:

1. "Practical Statistics for Data Scientists, 50 Essential Concepts", Peter Bruce & Andrew Bruce, O'Reilly Media
2. "An Introduction to Statistical Learning with Applications in R", Gareth James, Daniela Witten, Trevor Hastie & Robert Tibshirani, Springer Press
3. "A Hands-On Introduction to Data Science", Chirag Shah, Cambridge: Cambridge University Press.

MOOCs Links and additional reading, learning, video material

1. <https://nptel.ac.in/courses/106106179>
2. <https://www.youtube.com/watch?v=wrivuzi56oQ>
3. <https://www.edx.org/learn/r-programming>

APPROVED in...

Academic Council Meeting

Dated:- 31.08.2024



Program:	B. Tech. (Artificial Intelligence (AI) and Data Science)			Semester:	I	
Course:	Foundation of Data Science - Lab			Code:	BTADES04AD1P	
Teaching Scheme				Evaluation Scheme		
Practical	Tutorial	Hours	Credit	INT	EXT	Total
2	-	2	1	30	20	50

Course Objectives:

Throughout the course, students will be expected to demonstrate their understanding of foundation of Data Science by being able to do each of the following:

- To understand basics of data science.
- To use R language for programming
- To visualize data using EDA in R
- To interpret the applications of data analytics

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

CO	Course Outcomes	BT Level (L1 to L6)
CO-1	Accurately define and articulate the objectives and scope of a data science.	L2
CO-2	Demonstrate proficiency in programming using R language.	L3
CO-3	Apply steps in data preprocessing and perform exploratory data analysis using R language.	L3
CO-4	Analyze and evaluate case studies where data analysis techniques are applied, articulating the implications and effectiveness of these applications.	L4

General Guidelines: Take any 1 or 2 programs from each section.

(Note: The programs are provided for reference. Course teacher can modify it as per his/her perspective)

Section 1

1. Write a R program to take input from the user (name and age) and display the values
2. Write a R program to create a sequence of numbers from 20 to 50 and find the mean of numbers from 20 to 60 and sum of numbers from 51 to 91.
3. Write a R program to find the factors of a given number.
4. Write a R program to get the details of the objects in memory.
5. Write a R program to get the first 10 Fibonacci numbers.

Section 2

1. Write a R program that creates a for loop to print numbers from 1 to 10.
2. Write a R program that creates while loop to calculate the factorial of a given number.
3. Write a R program function to check if a given number is prime using a while loop.
4. Write a R program function to find the GCD (Greatest Common Divisor) of two numbers using recursion
5. Write a R program to find the sum of all elements in an array using a for loop.

Section 3

1. Write a R program to create an array of two 3x3 matrices each with 3 rows and 3 columns from two given two vectors.
2. Write a R program to create a 3-dimensional array of 24 elements using the dim() function.
3. Write a R program to create an empty data frame.
4. Write a R program to extract specific column from a data frame using column name.
5. Write a R program to extract first two rows from a given data frame and add new row(s) to an existing data frame.

[Signature]
APPROVED In.....



Section 4

1. Write a R program to merge two given lists into one list.
2. Write a R program to convert a given list to vector.
3. Write a R program to count number of objects in a given list.
4. Write a R program to create a list containing a vector, a matrix and a list and give names to the elements in the list. Access the first and second element of the list.
5. Write a R program to select second element of a given nested list.

Section 5

1. One small Exploratory Data Analysis(EDA) project using R language.


APPROVED in.....
Academic Council Meeting
Dated: 31.08.2024



Program:	B. Tech. (Artificial Intelligence (AI) and Data Science)			Semester:	I	
Course:	Web Technology Lab			Code:	BTADV501AD1P	
Teaching Scheme				Evaluation Scheme		
Practical	Tutorial	Hours	Credit	INT	EXT	Total
2	-	2	1	30	20	50

Course Objectives:

- To gain the knowledge in constructing the anatomy of HTML syntax to structure your websites
- To teach how to implement HTML tables, forms and frames.
- To Learn the anatomy of CSS syntax and structure and implementing responsive web design.
- 4. To Build Dynamic Web pages with validation using JavaScript and by applying different event handling mechanism.

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

CO	Course Outcomes	BT Level (L1 to L6)
CO-1	Demonstrate the ability to structure websites effectively using HTML Elements.	L 2
CO-2	Gain a comprehensive understanding of HTML tables, forms, and frames, and be able to implement these elements effectively in web development projects.	L 6
CO-3	Showcase the ability to create responsive web designs that adapt to different screen sizes and devices.	L 6
CO-4	Develop the skills to build dynamic web pages using JavaScript, incorporating validation techniques and employing various event handling mechanisms to enhance user interactivity.	L 6

General Guidelines: Conduct at least one or two programs from each section.

(Note: The programs are provided for reference. Course teacher can modify it as per his/her perspective)

Section I

1

1. Study the Evolution of Internet and Its Application
2. Introduction to HTML and HTML tags.
3. Use the correct HTML tag to add a paragraph with the text "Hello World!".
4. Mark up the text with appropriate tags:
 "SIPNA" is the most important heading.
 "Web Development" is the next most important heading.
 "Software Developer" is the third most important heading.
 The last sentence is just a paragraph. Start with the most important heading (the largest) and end with the least important heading (the smallest).
5. Create a clickable link that redirects to the url : <https://www.google.com/>
6. You are given the rank list of few students, create an ordered HTML list to display the list given below:
 1. Deepak
 2. Epsita
 3. Lakshita
 4. Tanmay

APPROVED in 
Academic Council Meeting
Dated: 31.08.2024



5. Agrim

7. Reading about these topics on mdn:

Hr Tag in HTML

HTML Entities

8. Design web pages for your college containing a description of the courses, departments, faculties, library etc, use href, list tags.

Section-II

9. Create your class timetable using table tag.

10. Create user Student registration form (use textbox, text area, checkbox, radio button, select box etc.)

11. Create a basic frameset using the <frameset> tag with rows and cols attributes.

12. Create your resume using HTML tags also experiment with colours, text, link, size and also other tags you studied.

Section-III

13. Understand how to link an inline, internal and external CSS file to an HTML document.

14. Understand the use of class and ID selectors to target specific elements.

15. Create a program to illustrate the use of ID and Class

16. Explore the box model by setting different values for margin, padding, and borders. Observe how these properties affect the layout.

17. Explore various style sheet properties for fonts, text, boxes, colors, and backgrounds.

18. Implement background color and gradients in CSS.

19. Explore font and text-related CSS properties.

Section-IV

20. Create a simple program that outputs "Hello, World!" to the console.

21. Declare variables of different data types and Perform operations on variables

22. Perform Operation using arithmetic, comparison, logical, and assignment operators.

23. Write programs using if, else if, and else statements.

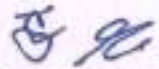
24. Implement a program using the ternary operator.

25. Write programs to print 1 to 100 using loops.

26. Manipulate strings using methods like toUpperCase(), toLowerCase(), charAt(), substring(), indexOf(), and split()

27. Define functions with parameters and return values

28. Create arrays, access elements, and modify array contents.


APPROVED in.....
Academic Council Meeting
Dated:- 31.08.2024



Program:	B.Tech. (Artificial Intelligence (AI) and Data Science)	Semester:	I
Course:	Design Thinking	Code:	BTADVS02AD1T
Teaching Scheme			
Lecture	Tutorial	Hours	Credit
1	--	1	1
Evaluation Scheme			
	TA	MSE-I	MSE-II
		ESE	Total
	50	--	--
		--	50

Methods of Teacher Assessment (TA): Quiz, Case Study, Group Activity, Attendance

Course Objectives:

- To introduce students to the fundamental principles and stages of design thinking, including empathy, ideation, and prototyping.
- To enhance students' ability to approach complex problems creatively and collaboratively, using design thinking methodologies.
- Show students how to use design thinking techniques in everyday situations to come up with innovative solutions.

CO	Course Outcomes	BT Level (L1 to L6)
CO-1	Know the steps of design thinking and how to use them to create new solutions for problems.	L3
CO-2	Better at understanding what people need, which helps in making designs that work well for users.	L5
CO-3	Make simple models and improve them by testing and getting feedback to find the best solutions.	L5

Unit I: An Overview & Applications of Design Thinking **(06 Hrs.)**

Introduction to Design Thinking, Creativity and Innovation- The Drivers of Design Thinking, Attributes of Design Thinking, Critical Success Factors, Principles of Design Thinking, Evolution of Design Thinking, 3Ps of Design Thinking, Design Thinking as a Business Strategy, Features and Applications of Design Thinking, Phases of Design Thinking, Applications of Design Thinking

Unit II: Double Diamond Design Thinking and Sustainability: Growth and Ethics **(06 Hrs.)**

Design Thinking Tools and Techniques, Double Diamond Design Thinking: Double Diamond Model, the 4 D's of Double Diamond, Designing for Business Growth, Ethics in Design Thinking, Design Thinking for Sustainability: Introduction, Pillars of Sustainability.

Total Lectures **12 Hours**

Textbooks:

1. E. Balagurusamy, Bindu Vijaykumar, "Design Thinking: A Beginner's Perspective", McGrawHill Publications.
2. E. Balagurusamy, Developing Thinking Skills.

Reference Books:

1. Anuja Agarwal, "Design Thinking: A Framework for Applying Design Thinking in Problem Solving", Cengage Publications.
2. Pavan Soni, "Design Your Thinking."

MOOCs Links and additional reading, learning, video material

1. https://onlinecourses.nptel.ac.in/noc22_mg32/ (Design Thinking - A Primer
By Prof. Ashwin Mahalingam, Prof. Bala Ramadurai | IIT Madras

JS
APPROVED in 1st
Academic Council Meeting
Dated:- 31.08.2024...



Program:		B. Tech. (All Branches)		Semester:	I	
Course:		Professional Communication		Code:	BTALAE01SH1P	
Teaching Scheme				Evaluation Scheme		
Practical	Tutorial	Hours	Credit	INT	EXT	Total
2	1	3	2	30	20	50

Course Objectives:

- To impart knowledge and orient students about:
- Communication, barriers to communication and non-verbal cues of communication
- Basic writing, oral communication, business communication, & computer proficiency skills
- Providing hands-on experience through group discussion, mock interview, group and individual presentation

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

CO	Course Outcomes	BT Level (L1 to L6)
1.	Understand the process of communication and overcome the barriers.	L3
2.	Prepare and present effective presentations aided by ICT tools.	L5
3.	Develop a comprehensive understanding of some specific forms of writing used in professional communication.	L6
4.	Demonstrate the formats, strategies and content of business communication at workplace.	L5
5.	Ability to communicate effectively in both formal and informal situations.	L6
6.	Ability to handle the interview process confidently.	L5

General Guidelines: All practical are mandatory

Expt. No.	List of Experiments
1	Types of communication: Formal, Informal
2	Understanding various barriers to communication
3	Introduction to body language: gestures, posture & facial expressions
4	Introduction to MS-Office: Word, Power-point & Excel
5	Creating Google Forms, arranging Google meet
6	Letter Writing
7	Email Writing
8	Vocabulary for business correspondence
9	Group Discussion
10	Presentation
11	Self-Introduction: Digital resume
12	Resume writing
13	Interview techniques
14	Creating LinkedIn profile

Introduction to Communication

Computing Skills

Business Communication

Team Building Skills

Job Readiness Skills

APPROVED in.....
Academic Council Meeting
Dated:- 31.08.2024.....



Program:	B.Tech. (All Branches)			Semester:	I			
Course:	Values & Ethics			Code:	BTALVE01SH1T			
Teaching Scheme				Evaluation Scheme				
Lecture	Tutorial	Hours	Credit	TA	MSE-I	MSE-II	ESE	Total
2	-	2	2	10	15	15	60	100
Methods of Teacher Assessment (TA): Assignment, Class Test, Attendance, Quiz								
Course Objectives: To understand universal human values & ethics.								
Course Outcomes:								
After completion of the course, the students will be able to:								
CO	Course Outcomes							BT Level (L1 to L6)
CO-1	Identify the need of value education							L3
CO-2	Understand harmony in human being and society							L2
CO-3	Outline the relationship and natural ethical justice							L2
CO-4	Evaluate the case studies of holistic systems.							L5

Unit I: Introduction to Value Education	(6 Hrs.)
Need Basic Guidelines, Content and Process for Value Education Purpose and motivation for the course, recapitulation from Universal Human Values-I, Self- Exploration-what is it? - Its content and process; 'Natural Acceptance' and Experiential Validations the process for self-exploration, Continuous Happiness and Prosperity- A look at basic Human Aspirations, Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority, Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario, Method to fulfill the above human aspirations: understanding and living in harmony at various levels.	
Unit II: Understanding Harmony in the Human Being and Society	(6 Hrs.)
Harmony in Myself Understanding human being as a co-existence of the sentient 'I' and the material 'Body', Understanding the needs of Self ('I') and 'Body' - happiness and physical facility, Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer), Understanding the characteristics and activities of 'I' and harmony in 'I', Understanding the harmony in the society (society being an extension of family)	
Unit III: Understanding Harmony in the Family and Nature	(6Hrs.)
Harmony in Human-Human Relationship, Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships), Understanding the meaning of Trust; Difference between intention and competence, Understanding the meaning of Respect, Difference between respect and differentiation. Understanding the harmony in the Nature, Interconnectedness, and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature.	
Unit IV: Holistic Development Towards Universal Human Orders	(6Hrs.)
Case studies of typical holistic technologies, management models and production systems, Strategy for transition from the present state to Universal Human Order: a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers b) At the level of society: as mutually enriching institutions and organizations.	
Total Lectures	24 Hours

[Signature]
APPROVED in... 14



Textbooks:

- | | |
|----|--|
| 1. | A Foundation Course in Human Values and Professional Ethics, R.R. Gaur, R. Asthana, G.P. Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1 |
| 2. | Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, R.R. Gaur, R. Asthana, G.P. Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2 |

Reference Books:

- | | |
|-----|---|
| 1. | JeevanVidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantal, 1999. |
| 2. | Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004. |
| 3. | The Story of Stuff website, https://www.storyofstuff.com/ |
| 4. | The Story of My Experiments with Truth - by Mohandas Karamch and Gandhi |
| 5. | Small is Beautiful - E. F Schumacher. |
| 6. | Slow is Beautiful - Cecile Andrews |
| 7. | Economy of Permanence - J C Kumarappa |
| 8. | Bharat Mein Angreji Raj - Pandit Sunderlal |
| 9. | Rediscovering India - by Dharampal |
| 10. | Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi |
| 11. | India Wins Freedom - Maulana Abdul Kalam Azad |
| 12. | Vivekananda - Romain Rolland (English) |
| 13. | Gandhi - Romain Rolland (English) |

MOOCs Links and additional reading, learning, video material

- | | |
|----|---|
| 1. | Universal Human Values website, http://www.uhv.org.in/ |
| 2. | https://aktu.ac.in |
| 3. | https://onlinecourses.nptel.ac.in/noc20_ee67/preview |

 
APPROVED in.....
Academic Council Meeting
Dated:-..31.08.2024



Program:	B.Tech. (All Branches)			Semester:			I	
Course:	Environmental Studies			Code:			BTALVE02SH1T	
Teaching Scheme				Evaluation Scheme				
Lecture	Tutorial	Hours	Credit	TA	MSE-I	MSE-II	ESE	Total
1	0	1	1	50	-	-	-	50

Methods of Teacher Assessment (TA): Assignment, Project work, Quiz, Attendance

Course Objectives:

- Comprehend Sustainable Development Goals for present generation
- Appreciate concepts and method from ecological and physical science and their application in environmental problem solving.
- Analyze the status of environment with respect to precautionary mechanisms and control measures.

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

CO	Course Outcomes	BT Level (L1 to L6)
CO-1	Understand and evaluate the concept of scope of environment and it's social issues.	L2
CO-2	Apply and analyze the concept of causes, effect and control of different types of environmental pollution.	L4

Unit I: The Multidisciplinary Approach In Environmental Studies and it's Ecosystem **(06 Hrs.)**

Definition, scope and importance, Need for public awareness. Unsustainable to Sustainable Development.

Natural Resources: Renewable and Non-Renewable resources:

Availability, Use, Over exploitation and associated environmental problems related to following Natural resources: Forest resources, Water resources, Mineral resource, Food resources, Energy resources, Land resources, Role of individual in conservation of natural resources, Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids, Introduction, types, characteristic features, structure and function of the following ecosystem: - Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

Unit II: Biodiversity Conservation and Environmental Pollution **(06 Hrs.)**

Introduction - Definition: genetic, species and ecosystem diversity, Bio geographical classification of India, Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values, Biodiversity at global, National and local levels, India as a mega diversity nation, Hot-spot of biodiversity, Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts, Endangered and endemic species of India, Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity. Case Studies: Visit to a local area to document environmental assets- river/ forest/grassland.

Study of local ecosystems - pond, lake, river, forest etc. Definition, Cause, effects and control measures of: -Air pollution, Water pollution (CETP,ETP), Soil pollution, Marine pollution, Noise pollution, Thermal pollution, nuclear hazards, Solid waste Management :Causes, effects and control measures of urban and industrial wastes, Role of an individual in prevention of pollution, Pollution case studies, Disaster management: floods, earthquake, cyclone and landslides. Case Studies: Visit to a local polluted site -industrial/agricultural/rural/urban.

Total Lectures **12 Hours**

Text Books:

1. Text Book of Environmental studies, Erach Bharucha, UGC
2. Miller T.G., Jr., Environmental Science. Wads worth Publications
3. Clark R.S., Marine Pollution, Clanderson Press Oxford
4. Mhaskar A.K., Matter Hazardous, Techno-Science Publications

Reference Books:

1. Agrawal, K.C., 2001, Environmental Biology, Nidi Publ. Ltd., Bikaner.
2. De A. K., Environmental Chemistry, Wiley Eastern Ltd.
3. Odum, E.P., 1971, Fundamentals of Ecology, W.B. Saunders CO., U.S.A., 574p.

APPROVED In.....
Academic Council Meeting
Dated: ...31.08.2023



- | | |
|----|---|
| 4. | Shrama B.K. 2001, Environmental Chemistry, Goel Publ. House, Meerut. |
| 5. | Fundamental concepts in Environmental Studies, D D Mishra, S. Chand & Co Ltd. |
| 6. | Ecology, M.P. Arora, Himalaya Publishing House. |
| 7. | Ecology and Environment, P. D. Shrama |

MOOCs Links and additional reading, learning, video material:

- | | |
|----|---|
| 1. | https://onlinecourses.swayam |
| 2. | https://www.ugc.gov.in |
| 3. | https://www.hzu.edu.in |
| 4. | https://www.researchgate.net |

  
APPROVED in.....
Academic Council Meeting
Dated: 31.08.2024



Syllabus: Semester II

Program:	B. Tech. (All Branches)			Semester:	II			
Course:	Engineering Mathematics - II			Code:	BTALBS04SH2T			
Teaching Scheme				Evaluation Scheme				
Lecture	Tutorial	Hours	Credit	TA	MSE-I	MSE-II	ESE	Total
3	-	3	3	10	15	15	60	100

Methods of Teacher Assessment (TA): Class Tests, Assignments, Quiz & Class Attendance

Course Objectives: To acquire the basic concepts of integral calculus, Matrix and Infinite Series.

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

CO	Course Outcome	BT Level
CO-1	Utilize concepts of matrix through different problems.	L2
CO-2	Find Fourier series for different functions	L1
CO-3	Explain the concepts of differential under integral sign, curve tracing	L5
CO-4	Apply the knowledge of double integration to find area.	L3
CO-5	Find volume by triple integration	L1
CO-6	Test convergence of series by various tests.	L4

Unit I: Matrix	(6 Hrs.)
Rank of a matrix, system of linear equations, Eigen values & Eigen vectors.	
Unit II: Fourier Series	(6 Hrs.)
Fourier expansion of periodic function in (C, C+2L), Half range Fourier series, Practical harmonic analysis.	
Unit III: Integral calculus & Curve tracing	(6 Hrs.)
Differentiation under integral sign, Tracing of curve in Cartesian form, polar form.	
Unit IV: Integral Calculus I	(6 Hrs.)
Double Integration, Transformation to polar coordinates, Evaluation of area by double integration.	
Unit V: Integral Calculus II	(6 Hrs.)
Triple Integration, Transformation to spherical polar coordinates, Volume by triple integration.	
Unit VI: Infinite Series	(6 Hrs.)
Test of convergence, Comparison test, Cauchy's Root test, D'Alembert's Ratio test.	
Total Lectures	36 Hours

Textbooks:

- Wartikar P. N., Wartikar J. N - A text book of applied Mathematics. Volume I, II. Vidyarthi Griha Prakashan, Pune
- Grewal B. S. - Higher Engineering Mathematics, Khanna Publishers.
- Kreyszig E.K. - Advanced Engineering Mathematics, John Wiley.
- Singh R. R. & Bhatt M. - Engineering Mathematics.
- Ramana B.V. - Higher Engineering Mathematics.

Reference Books:

- N. P. Bali & Manish Goyal- A text book of Engineering Mathematics, Laxmi Publications.
- Veera Rajan T - Engineering Mathematics for first Year, (TMH)

MOOCs Links and additional reading, learning, video material

- [NPTEL :: Mathematics - NOC: Engineering Mathematics - I](#)
- [leep203.pdf \(ncert.nic.in\)](#)
- [Integral Calculus Engineering Mathematics - YouTube](#)
- [Convergence tests - Wikipedia](#)
- [Summary of Convergence Tests - Mathematics LibreTexts](#)

APPROVED in
Academic Council Meeting
Dated:- 31.08.2024



Program:	B. Tech. (Artificial Intelligence (AI) and Data Science)			Semester:	II			
Course:	Engineering Physics			Code:	BTADBS05SH2T			
Teaching Scheme				Evaluation Scheme				
Lecture	Tutorial	Hours	Credits	TA	MSE-I	MSE-II	ESE	Total
3	-	3	3	10	15	15	60	100

Methods of Teacher Assessment (TA): Attendance, Assignment, Class Test, Quiz

Course Objectives:

To acquire the fundamental knowledge about

- Semiconducting materials.
- Physics of modern engineering and electromagnetic phenomenon.
- Study of optical phenomena.

Course Outcomes:

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

CO	Course Outcomes	BT Level (L1 to L6)
CO-1	Utilize the fundamental knowledge in Physics about the semiconducting materials, semiconducting devices & its applications	L3
CO-2	Explain electromagnetic phenomena and its applications.	L2
CO-3	Develop the knowledge about fiber optics and LASER and its applications.	L3
CO-4	Make use of theoretical principles and fundamentals of modern aspects in Physics.	L3
CO-5	Illustrate and distinguish the optical phenomena.	L4

Unit I: Fundamentals of semiconductors	(6 Hrs.)
Classification of solids on the basis of band theory, Types of semiconductors, Fermi level in intrinsic semiconductors & its derivation, Electrical conductivity of semiconductor, P-N junction diode, Zener diode, Light Emitting Diode.	
Unit II: Electric and magnetic Fields	(6Hrs.)
Motion of electron in uniform transverse electric field and transverse magnetic field, Motion of electron in cross fields, Positive rays & its properties, Bainbridge Mass Spectrographs, CRO (Block diagram of CRO)	
Unit III: Fiber optics	(6 Hrs.)
Propagation of light through optical fiber (Principle & construction of fiber optics), Acceptance angle & Acceptance cone, Numerical Aperture, Classification of optical fiber on the basis of R.I. profile, Attenuation & different mechanisms, Applications and advantages of optical fibers in engineering.	
Unit IV: Laser	(6 Hrs.)
Spontaneous & Stimulated emission of radiation, population inversion, characteristics of LASER beam, three level energy system, Ruby laser (Construction & Working), He-Ne Laser, Applications of Laser	
Unit V: Introduction to quantum physics	(6 Hrs.)
Planck's Hypothesis, Properties of photon, De-Broglie's concept of matter waves & its properties, Heisenberg's Uncertainty Principle, Application of uncertainty principle (electron cannot exist in the nucleus), Compton effect.	
Unit VI: Interference and diffraction	(6Hrs.)
Interference: Fundamental conditions of interference, thin film interference due to reflection of light, Newton's rings; equation for radius of bright and dark rings, determination of wavelength of sodium light using Newton's ring. Diffraction: Fresnel & Fraunhofer class of diffraction, plane diffraction grating, construction & determination of wavelength of light using grating.	
Total Lectures 36 Hours	



Textbooks:

- | | |
|----|--|
| 1. | M.N. Avadhanulu & P. G. Kshirsagar, TVS Arun Murthy: A Textbook of Engineering Physics, S. Chand and company limited, 2022 |
|----|--|

Reference Books:

- | | |
|----|---|
| 1. | R. K. Gaur & S. L. Gupta: Engineering Physics, Dhanpat Rai & Sons. |
| 2. | Hitendra K. Malik & A. K. Singh: Engineering Physics, Tata McGraw Hill |
| 3. | Mani & Mehta: Modern Physics, Affiliated East- West Press |
| 4. | N. Subrahmanyam, Brijlal, M. N. Avadhanulu: A Textbook of Optics, S. Chand & Company. |
| 5. | A.J. Dekkar, Solid State Physics, Mc Millan Publishers. |

MOOCs Links and additional reading, learning, video material

- | | |
|----|---|
| 1. | https://archive.nptel.ac.in/courses/115/102/115102124/ |
| 2. | https://archive.nptel.ac.in/courses/115/107/115107095/ |
| 3. | https://archive.nptel.ac.in/courses/115/105/115105099/ |


APPROVED in..... 
Academic Council Meeting
Dated:- 31.08.2024.



Program:	B. Tech. (Artificial Intelligence (AI) and Data Science)			Semester:	II	
Course:	Engineering Physics Lab			Code:	BTADBS06SH2P	
Teaching Scheme				Evaluation Scheme		
Practical	Tutorial	Hours	Credit	INT	EXT	Total
2	-	2	1	30	20	50

Course Objectives:

At the end of the course students would be exposed to fundamental knowledge in

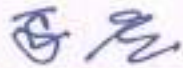
- Study of semiconducting devices.
- To enhance the basic knowledge about the cathode ray oscilloscope.
- To Study optical phenomenon.

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

CO	Course Outcomes	BT Level (L1 to L6)
CO-1	Apply and estimate the basic knowledge about semiconducting diode.	L3
CO-2	Acquire the knowledge of Cathode Ray Oscilloscope and its applications	L3
CO-3	Understand the diffraction phenomenon and its applications.	L2
CO-4	Make use of theoretical knowledge of interference and examine its application.	L3
CO-5	Relate the principles of optics with practical knowledge.	L2
CO-6	Interpret the knowledge of electric and magnetic fields and its applications.	L2

General Guidelines: Minimum 8 Experiments are to be conducted covering entire syllabus

Expt. No.	List of Experiments
1.	To Study the forward and reverse characteristics of P-N Junction Diode.
2.	To Study the reverse characteristics of Zener Diode
3.	To Study the forward characteristics of Light Emitting Diode.
4.	Study of CRO
5.	To determine unknown frequency with the help of CRO and also to measure Voltage across the resistance and current flowing through it.
6.	To determine resolving the Power of Telescope.
7.	To determine the wavelength of monochromatic light by Newton's ring method.
8.	Determination of wavelength of spectral lines using diffraction grating.
9.	Determination of grating element of a diffraction grating using LASER beam.
10.	Determination of specific charge (e/m) of electron by using Thomson's method (Beyond syllabus)


APPROVED in 
Academic Council Meeting
Dated: 31.08.2024



Program:	B.Tech. (All Branches)			Semester:			II	
Course:	Basic Electrical Engineering			Course Code:			BTALES05ET2T	
Teaching Scheme				Evaluation Scheme				
Lecture	Tutorial	Hours	Credit	TA	MSE-I	MSE-II	ESE	Total
3	-	3	3	10	15	15	60	100

Methods of Teacher Assessment (TA): Attendance, Assignment, Class Test, Viva Voce

Course Objectives:

- Understanding the fundamental concepts of electrical circuits, including AC and DC circuits.
- Gaining knowledge about different types of electrical components and their functions.
- Learning about the operation and working principles of electrical machines such as transformers, motors.
- Understanding the principles of electrical installation and safety procedures.
- Exploring various energy sources used in electrical engineering.

Course Outcomes:

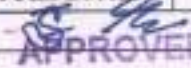
After completion of the course, the students will be able to:

CO	Course Outcomes	BT Level (L1 to L6)
CO-1	To establish fundamental terms in electrical engineering and outline essential electrical laws and various theorems.	L1
CO-2	To understand AC circuits and their applications, including star and delta three-phase AC circuits.	L2
CO-3	To explore magnetic circuits and their practical application in transformers.	L3
CO-4	To explain the operational knowledge and working principles of DC motors and their various types.	L2
CO-5	To understand the concepts of electrical installation and safety.	L2
CO-6	To understand the concept of energy sources in electrical engineering.	L2

Unit I: Basic Fundamentals	(8 Hrs.)
Basic concept of voltage, current, power and energy, Elementary calculation for energy consumption, Analysis of series and parallel circuit, Ohm's law, Current Division and voltage division, Kirchhoff's law, nodal and mesh analysis, Superposition theorem and Thevenin theorem.	
Unit II: AC Circuit	(8 Hrs.)
Representation of sinusoidal waveform, phasor representation, analysis of single-phase ac circuit consisting of R, L, C, RL, RC, RLC combination, Three phase balanced circuit, voltage and current relation in star and delta connection.	
Unit III: Electromagnetism & Transformer	(4 Hrs.)
Faraday law, Lenz law, Fleming rule, Statically and dynamically induced emf, Self and mutual induction, Construction and working principle of single-phase transformer, types of transformer, turns ratio.	
Unit IV: DC Motor	(6 Hrs.)
Introduction to DC motor, working principle, types and application, Introduction to Three phase induction motor, construction and working, speed control and application.	
Unit V: Electrical Installation and safety	(5 Hrs.)
Components of LT switchgear: Switch fuse unit (SFU), MCB, ELCB, MCCB, types of wire and cables, Electrical safety and precaution.	
Unit VI: Energy Sources	(5 Hrs.)
Sources of Electrical Power, Introduction to Wind, Solar, Fuel cell, Geothermal, Hydroelectric, Thermal-Steam, diesel, gas nuclear power generation.	
Total Lecture	36 Hours

Textbooks:

1. Principle of Electrical Engineering, 4th Edition, Del Toro V., PHI2005
2. Basic Electrical Engineering, First Ed., Kulshreshtha D.C., TMH-2008.
4. Fundamentals of Electric Circuits by Charles K. Alexander and Matthew N. O. Sadiku

APPROVED in 
Academic Council Meeting
Dated:- 31.08.2024

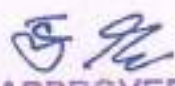


Reference Books:

1. D.P. Kothari and I.J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010
2. L.S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011

MOOCs (Massive Open Online Courses) Links and additional reading, learning, video material

- | | |
|----|---|
| 1. | Coursera <ul style="list-style-type: none">• Introduction to Electrical Engineering• Fundamentals of Electrical Engineering |
| 2. | Udemy <ul style="list-style-type: none">• Electrical Engineering Fundamentals |


APPROVED in.....
Academic Council Meeting
Dated: 31-08-2024..



Program:	B. Tech. (All Branches)			Semester:	II	
Course:	Basic Electrical Engineering Lab			Course Code:	BTALES06ET2P	
Teaching Scheme				Evaluation Scheme		
Practical	Tutorial	Hours	Credit	INT	EXT	Total
2	-	2	1	30	20	50

Course Objectives:

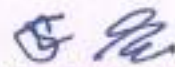
- Developing problem-solving skills related to electrical circuit analysis and design.
- Applying theoretical knowledge to practical applications through laboratory experiments.

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

CO	Course Outcomes	BT Level (L1 to L6)
CO-1	Utilize fundamental knowledge of current and voltage to verify Kirchhoff's Voltage Law (KVL) and Kirchhoff's Current Law (KCL).	L1
CO-2	Able to verify current and voltage using the superposition theorem and Thevenin's theorem.	L2
CO-3	To analyze the relationship between line voltage, phase voltage, line current, and phase current in star and delta three-phase connections.	L3
CO-4	Demonstrate the working principles and operations of DC motors and transformer through hands-on experiments.	L3
CO-5	Summarize overload and short-circuit conditions in order to observe the tripping mechanism of the MCB.	L3

General Guidelines: Minimum 8 experiments are to be conducted covering Entire syllabus

Expt. No.	List of Experiments
1.	To design and verify Kirchhoff's Current Law.
2.	To design and verify Kirchhoff's Voltage Law.
3.	To design and verify Superposition Theorem.
4.	To design and verify Thevenin's Theorem.
5.	To verify Vector relation between current and voltage in R-L-C Series circuit.
6.	To study the Line voltage and Phase voltage, line current and phase current relation for star three phase connection.
7.	To study the Line voltage and Phase voltage, line current and phase current relation for Delta three phase connection.
8.	To study working and construction of transformer.
9.	To verify relation between armature current and speed of DC motor.
10.	To demonstrate the overload and short-circuit conditions to observe the tripping mechanism of the MCB.


APPROVED in.....
Academic Council Meeting
Dated:- 31.08.2024



Program:	B. Tech. (All Branches)			Semester:	II			
Course:	Programming for Problem Solving			Code:	BTADES07AD2T			
Teaching Scheme				Evaluation Scheme				
Lecture	Tutorial	Hours	Credit	TA	MSE-I	MSE-II	ESE	Total
3	-	3	3	10	15	15	60	100

Methods of Teacher Assessment (TA): Assignments/Quizzes, Attendance, Viva VOCE

Course Objectives:

Throughout the course students will be expected to demonstrate their understanding of **Programming for Problem Solving** by being able to do each of the following:

- To express algorithms and draw flowcharts in a language independent manner.
- To demonstrate how to write modular, efficient and readable C programs.
- To gain knowledge in creating and using Control statements and Loops.
- To implement knowledge in creating and using Arrays of the C data types and Strings.
- To familiarize pointers, functions and recursive functions in C to efficiently solve problems.
- To demonstrate creation of derived data types and perform operations on files.

Course Outcomes: On completion of the course students will be able to

CO	Course Outcome	BT Level (L1 to L6)
CO-1	Write, compile and debug programs in C language.	L3
CO-2	Use different data types in a computer program.	L3
CO-3	Design programs involving decision structures, loops, arrays and functions.	L6
CO-4	Identify the difference between call by value and call by reference.	L2
CO-5	Use pointers to understand the dynamics of memory.	L3
CO-6	Create file and perform different operations on it.	L6

Unit I: Introduction to Problem Solving	(6 Hrs.)
Introduction to functional components of a computer system, Number System: Binary, Decimal, Octal and Hexadecimal, Conversion of numbers, binary arithmetic operations, Idea of Algorithm: Representation of Algorithm, Flowchart and its components, Pseudo code with examples	
Unit II: C Programming Basics	(6 Hrs.)
Structure of C program, C program execution lifecycle (preprocessor, assembler, compiler, interpreter, loader and linker), writing and executing the first C program. Components of C language: Identifiers, Data Types, Variables, Constants, Standard I/O in C (printf(), scanf() etc), Format Specifiers, Operators (Arithmetic, relational, logical, bitwise etc.), Expressions, Precedence and Associativity, Expression Evaluation, Type conversions.	
Unit III: Control Constructs	(6 Hrs.)
Control Statements: Decision making: if, if-else, nested if, if-else-if ladder and switch statements, ternary operator and its Examples Looping statements: for, while and do-while statements and its examples, Jump statements: go to, break, continue and its examples.	
Unit IV: Arrays & Strings	(6 Hrs.)
Arrays: Array notation and representation, manipulating array elements, multi-dimensional arrays. Searching & Basic Sorting Programs (Linear Search, Binary Search, Bubble Sort). Strings: Concepts of Strings, String Input / Output functions, string manipulation functions	
Unit V: Functions & Pointers	(6 Hrs.)
Functions: Introduction, types of functions, functions with array, passing parameters to functions, call by value, call by reference, recursive functions. Pointers: Introduction, declaration, pointer examples, pointer arithmetic, pointer to pointer. Introduction to dynamic memory allocation (malloc, calloc, realloc, free), Introduction to structures and unions	

APPROVED in  



Unit VI: File I/O	(6 Hrs.)
File I/O: Concept of a file, streams, text files and binary files, Differences between text and binary files, State of a file, Opening and Closing files, file input / output functions (standard library input / output functions for files), command-line arguments, introduction to macros.	
Total Lecture	36 Hours

Textbooks:

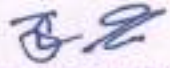
1. Computer Concepts and Programming in C, E Balaguruswami, McGraw Hill
2. Let Us C By Yashwant P. Kanetkar
3. Computer Fundamentals & Programming in C, Pradeep Day & Manas Ghosh

Reference Books:

1. Mastering in C, K R Venugopal and S R Prasad
2. Schaum's Outline of Programming with C by Byron Gottfried, McGraw-Hill
3. Computer Science: A Structured Programming Approach Using C, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
4. Computer Basics and C Programming by V.Rajaraman, PHI Learning Pvt. Limited, 2015

MOOCs Links and additional reading, learning, video material

1. C Programming | moocs.org | https://www.edx.org/learn/c-programming?hs_analytics_source=referrals
2. Swayam | https://onlinecourses.nptel.ac.in/noc22_cs40/preview
3. C Programming Tutorial for Beginners | freecodecamp.org | <https://www.youtube.com/watch?v=KJgsSFOSQv0>


 APPROVED in... (1st)
 Academic Council Meeting
 Dated:-... 31.08.2024...



Program:	B. Tech. (All Branches)			Semester:	II	
Course:	Programming for Problem Solving - Lab			Code:	BTADES08AD2P	
Teaching Scheme				Evaluation Scheme		
Practical	Tutorial	Hours	Credit	INT	EXT	Total
2	-	2	1	30	20	50

Course Objectives:

Throughout the course, students will be expected to demonstrate their understanding of **Programming for Problem Solving** by being able to do each of the following:

- To express algorithms and draw flowcharts in a language independent manner.
- To demonstrate how to write modular, efficient and readable C programs.
- To gain knowledge in creating and using Control statements and Loops.
- To implement knowledge in creating and using Arrays of the C data types and Strings.
- To familiarize pointers, functions and recursive functions in C to efficiently solve problems
- To demonstrate creation of derived data types and perform operations on files.

Course Outcomes: On completion of the course students will be able to

CO	Course Outcome	BT Le (L1 to L6)
CO-1	Write, compile and debug programs in C language.	L3
CO-2	Use different data types in a computer program.	L3
CO-3	Design programs involving decision structures, loops, arrays and functions.	L6
CO-4	Identify the difference between call by value and call by reference.	L2
CO-5	Use pointers to understand the dynamics of memory.	L3
CO-6	Create and perform different file operations.	L6

General Guidelines: Take any 2 or 3 programs from each section.

(Note: The programs are provided for reference. Course teacher can modify it as per his/her perspective)

Section 1

1. Write a c program that accepts the marks of 5 subjects and finds the sum and percentage marks obtained by the student.
2. Write a c program that calculates the simple interest and compound interest. The principal, amount, rate of interest and time are entered through the keyboard.
3. Write a c program to calculate the area and circumference of a circle.
4. Write a c program that accepts the temperature in centigrade and converts into Fahrenheit using the formula $c/5 = (f-32)/9$.
5. Write a c program that swap values of two variables using a third variable.
6. Write a c program that checks whether the two numbers entered by the user are equal or not.

Section 2

1. Write a c program to find the greatest of three numbers.
2. Write a c program that finds whether a given number is even or odd.
3. Write a c program that tells whether a given year is a leap year or not.
4. Write a c program that accepts marks of five subjects and finds percentage and prints grades according to the following
5. Criteria:
 - a. Between 90-100%-----print 'a'
 - b. 80-90%-----print 'b'
 - c. 60-80%-----print 'c'
 - d. Below 60%-----print 'd'
6. Write a c program that takes two operands and one operator from the user and perform the operation and prints the result by using switch statement.
7. Write a c program to print the sum of all numbers up to a given number.
8. Write a c program to find the factorial of a given number.
9. Write a c program to print sum of even and odd numbers from 1 to n numbers.

APPROVED in.....
 Academic Council Meeting
 31-08-2024



10. Write a c program to print the Fibonacci series.
11. Write a c program to check whether the entered number is prime or not.
12. Write a c program to find the sum of digits of the entered number.
13. Write a c program to find the reverse of a number.

Section 3

1. Write a c program that simply takes elements of the array from the user and finds the sum of these elements.
2. Write a c program that inputs two arrays and saves sum of corresponding elements of these arrays in a third array and Prints them.
3. Write a c program to find the minimum and maximum element of the array.
4. Write a c program to search an element in a array using linear search.
5. Write a c program to sort the elements of the array in ascending order using bubble sort technique.
6. Write a c program to add and multiply two matrices of order $n \times n$.
7. Write a c program that finds the sum of diagonal elements of a $m \times n$ matrix.

Section 4

1. Write a c program to find cube of any number using function.
2. Write a c program to find diameter, circumference and area of circle using functions.
3. Write a c program to find maximum and minimum between two numbers using functions.
4. Write a c program to check whether a number is even or odd using functions.
5. Write a c program to implement strlen(), strcat(), strcpy() using the concept of functions.
6. Write a c program to create, initialize, assign and access a pointer variable.
7. Write a c program to swap two numbers using pointers.
8. Write a c program to change the value of constant integer using pointers.
9. Write a c program to print a string using pointer.
10. Write a c program to count vowels and consonants in a string using pointer.

Section 5

1. Write a c program to read name and marks of n number of students and store them in a file.
2. Write a c program to read name and marks of n number of students from and store them in a file. If the file previously exists, add the information to the file.
3. Write a c program to write all the members of an array of structures to a file using fwrite(). Read the array from the file and display on the screen.
4. Write a c program to compare the contents of two files and determine whether they are same or not.
5. Write a c program to check whether a given word exists in a file or not. If yes then find the number of times it occurs.


APPROVED in.....^{1st}.....
Academic Council Meeting
Dated: 31.08.2024



Program:	B. Tech. (Artificial Intelligence (AI) and Data Science)			Semester:	II	
Course:	Workshop Practice Lab			Code:	BTALES09ME2P	
Teaching Scheme				Evaluation Scheme		
Practical	Tutorial	Hours	Credit	INT	EXT	Total
2	-	2	1	30	20	50

Course Objectives:

- To give students 'hands on experience' of craftsmanship which can boost confidence in their abilities and prepare them for future challenges & make students familiar with different work trades.
- To develop quality, safety consciousness & skill sets for creating entities from primitive engineering materials.
- This exercise aims at inculcating respect for physical work and hard labor.

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

CO	Course Outcomes	BT Level (L1 to L6)
CO-1	Explain concept of dimensional accuracy and tolerances and different manufacturing processes which are commonly employed in industry using various manufacturing techniques.	L 2
CO-2	Create/fabricate the components in Sheet metal shop	L 6
CO-3	Create/fabricate job using Taps & Dies	L 6
CO-4	Create/fabricate the components in Carpentry shop	L 6
CO-5	Explain the different operations in Smithy shop	L 2
CO-6	Explain the different types of welding	L 2

Sr. No.	Syllabus
1.	Introduction to Workshop Practice: Introduction to different shops, tools and equipment used in workshop, Safety measures to be followed.
2.	Sheet Metal shop: Introduction to tools and equipment, different operations like marking, cutting, bending, joining, etc. different sheet metal joints and their uses.
3.	Taps and Dies: Introduction to different Taps & Dies and their uses, Preparation of job involving External and Internal threads on plate or pipe, marking, centre punching, cutting, filing and drilling.
4.	Smithy shop: Introduction to different tools, equipment and Smithy operations like upsetting, drawing, bending, forming, flatter etc.
5.	Carpentry shop: Introduction to different wood working tools, equipment and machines used, types of joints and operations performed in Carpentry Shop.
6.	Welding shop: Introduction to Welding, welding tools and equipment, different welding joints and their uses. Introduction to different welding processes.

Job No.	List of Practical's
1.	Identify the different tools & equipment commonly employed in workshop along with prevailing safety practices.
2.	To prepare one job in Sheet Metal shop.
3.	To prepare one job in Taps and Dies shop.
4.	To prepare one job in Carpentry shop.
5.	Demonstration of preparation of job in Smithy shop.
6.	Demonstration of preparation of job in Welding shop.

APPROVED In.....
 Academic Council Meeting
 Dated:- 31.08.2024



Program:	B. Tech. (Artificial Intelligence (AI) and Data Science)	Semester:	II
Course:	Basics of Python	Code:	BTADPC01AD2T
Teaching Scheme			
Lecture	Tutorial	Hours	Credit
2	-	2	2
Evaluation Scheme			
	TA	MSE-I	MSE-II
	10	15	15
		ESE	Total
		60	100

Methods of Teacher Assessment (TA): Assignment, Quiz, Test, Attendance

Course Objectives:

Throughout the course, students will be expected to demonstrate their understanding of Basics of Python by being able to do each of the following:

- Gain a foundational understanding of Python programming, exploring its features and building blocks.
- Master the use of basic operators, control flow structures, and loops for effective program control in Python.
- Explore and manipulate essential data structures in Python, including lists, tuples, sets, and dictionaries.
- Develop modular and reusable code using functions, modules, and packages in Python.
- Embrace key Object-Oriented Programming (OOP) principles, such as class creation, method customization, and inheritance.
- Acquire proficiency in file handling operations and exception handling to ensure robust and error-tolerant Python programs.

Course Outcomes:

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

CO	Course Outcomes	BT Level (L1 to L6)
CO-1	Demonstrate a proficient understanding of Python programming fundamentals and features.	L2
CO-2	Apply basic operators, control flow structures, and loops to effectively control program flow in Python.	L3
CO-3	Manipulate essential Python data structures, including lists, tuples, sets, and dictionaries.	L3
CO-4	Create modular and reusable code using functions, modules, and packages in Python.	L6
CO-5	Implement Object-Oriented Programming (OOP) concepts, including class creation, method customization, and inheritance in Python.	L3
CO-6	Execute file handling operations and implement exception handling to ensure robust and error-tolerant Python programs.	L3

Unit I: Introduction to Python Programming	(6 Hrs.)
Overview of Programming and Python, Introduction to programming languages, Installation of Python and setting up the development environment, Basic Python Syntax, Variables and data types, Operators and expression, Input and output operations, Control Flow, Conditional statements (if, elif, else), Looping constructs (for, while), Functions, Defining functions, Built-in functions, Function arguments and return values.	

APPROVED in.....

Academic Council Meeting



Unit II: Data Structures in Python	(6 Hrs.)
Lists and Tuples: Creating and manipulating lists and tuples, Indexing and slicing List comprehensions, Dictionaries and Sets: Creating and using dictionaries and sets Operations on dictionaries and sets, Strings: String manipulation and formatting.	
Unit III: Object-Oriented Programming (OOP) in Python	(6 Hrs.)
Introduction to OOP: Concepts of classes and objects, Classes and Objects in Python: Defining classes Creating objects and instances, Class methods and attributes, Inheritance and Polymorphism: Extending classes Method overriding and overloading.	
Unit IV: Advanced Topics in Python	(6 Hrs.)
File Handling: Opening files in different modes, accessing file contents, reading and writing files, renaming and deleting files and understanding directories in Python. Exception Handling: Introduction, use of try: except: statements, raise statement, and user-defined exceptions. Modules and Packages, Creating and using modules Organizing code into packages.	
Total Lectures	24 Hours

Textbooks:

1.	Python Programming Rao, K. Nageswara, Shaikh Akbar, Scitech Publications (India) Pvt. Ltd. ISBN: 9789385983450
2.	Learning Python 5th Edition by Lutz & Mark, O'Reilly Publication ISBN-13: 978-1449355739

Reference Books:

1.	Python Essential Reference by Beazley & David 4th Edition, Addison-Wesley Professional, ISBN: 9780672329784
2.	Head First Python by Paul & Barry 2nd Edition O'Reilly Publication, 2 nd Edition, ISBN: 1491919531

MOOCs Links and additional reading, learning, video material

MOOC -	
Coursera: Python for Everybody Specialization	
1.	Instructor: Dr. Charles Severance (University of Michigan) Description: This specialization covers basics of Python programming, data structures, and more. It is ideal for beginners. Link - https://www.coursera.org/specializations/python
Reading Material -	
2.	"Automate the Boring Stuff with Python" by Al Sweigart Description: A great book for beginners that teaches Python through practical, real-world examples.
3.	Python Official Documentation - https://docs.python.org/3/
4.	YouTube - Corey Schafer's Python Tutorials - https://www.youtube.com/watch?v=YYXdXT2l-Gg&list=PLosiE80TeTt2d9bVvTtXIA-UThn6WwU

APPROVED in 134
 Academic Council Meeting
 Dated: 31.08.2024



Program:	B. Tech. (Artificial Intelligence (AI) and Data Science)			Semester:	II	
Course:	Basics of Python – Lab			Code:	BTADVS03AD2P	
Teaching Scheme				Evaluation Scheme		
Practical	Tutorial	Hours	Credit	INT	EXT	Total
1	-	2	1	30	20	50

Course Objectives:

- Install Python and set up an Integrated Development Environment (IDE) for efficient coding.
- Identify and explain the fundamental components of Python syntax.
- Implement conditional statements and loops to solve simple programming problems.
- Recognize the importance of data structures in programming and their role in problem-solving.
- Acknowledge the necessity of error handling in writing robust and reliable code.
- Understand advanced concepts like file handling, object-oriented programming (OOP), and the use of external libraries.

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

CO	Course Outcomes	BT Level (L1 to L6)
CO-1	Understand of the historical background and significance of Python in the context of programming languages.	L 2
CO-2	Write Python code using variables, data types, operators, and input/output operations effectively.	L 1
CO-3	Demonstrate proficiency in using conditional statements and loops to solve programming problems.	L 1
CO-4	Capable of utilizing lists, tuples, dictionaries, and sets for efficient data manipulation.	L 2
CO-5	Implementing error handling techniques using try-except blocks for writing reliable and robust code.	L 3
CO-6	Apply advanced concepts such as file handling, object-oriented programming (OOP), and external libraries to solve complex problems.	L 3

Note: Conduct at least one or two programs from each section. A minimum of 8 practical should be taken by the teacher in the lab.

Expt. No.	List of Experiments
1	Unit 1: Introduction to Python Programming a) Write a Python program that prompts the user for their name and displays a personalized greeting message. b) Write a program that takes two numbers and an operation as input and performs the corresponding calculation (addition, subtraction, multiplication, division). Display the result. c) Write a program to implement a login system using operators to validate username and password. d) Create a program that converts temperatures between Celsius and Fahrenheit. Allow the user to choose the conversion direction. Test the program with at least three temperature conversions. e) Define a function that calculates the Body Mass Index (BMI) based on user input for height and weight. Provide a category (e.g., Underweight, Normal, Overweight). f) Write a program to categorize a given number into ranges using nested if statement. g) Create a Python program that uses loops to generate a pattern or sequence. h) Implement a program to calculate the factorial of a given number using a 'while' loop. i) Write a program to print the Fibonacci sequence up to a specified number using a 'for' loop. j) Create a program to generate a pattern using nested loops.

APPROVED BY.....



- | | |
|---|--|
| 2 | Unit 2: Data Structures in Python
a) Write a program that creates a list of integers and prints the sum of all the elements.
b) Create a list of squares of numbers from 1 to 10 using list comprehension.
c) Write a program that compares two tuples element-wise and prints whether they are equal or not.
d) Create two sets of numbers and write a program to find and print the intersection of these two sets.
e) Write a program that removes duplicate elements from a list and converts it to a set.
f) Create a dictionary representing a person with keys name, age, and city; Print each key-value pair.
g) Create a nested dictionary representing a small book database. Include details such as title, author, and publication year for at least three books. |
| 3 | Unit 3: Object-Oriented Programming (OOP) in Python
a) Program demonstrating simple inheritance with a base class 'Animal' and derived classes 'Dog' and 'Cat.'
b) Program showcasing multiple inheritance by creating a class inheriting from two different parent classes.
c) Program demonstrating method overloading by creating a class with multiple methods accepting different parameter types.
d) Program illustrating method overriding in a derived class that customizes behavior inherited from a base class.
e) Create a function print_vehicle_info that can accept either a Car or an Electric Car object and call the display_info method. |
| 4 | Unit 4: Advanced Topics in Python
a) Program to read content from a text file, modify it, and save the changes.
b) Program to read data from a CSV file, perform data manipulation, and write the results to a new CSV file.
c) Program to read and write JSON data to demonstrate file handling with JSON files.
d) Create a program that handles a File Not Found Error when attempting to open a non-existent file.
e) Create a custom exception called Divide By Zero Error that raises an error if the user tries to divide a number by zero. Write a program that takes two numbers as input and performs division, handling the custom exception.
f) Demonstrate the use of the 'random' module to simulate a simple dice rolling game.
g) User-defined modules program: Create a program with a user-defined module containing a function for calculating the area of a rectangle. |

APPROVED in.....
Academic Council Meeting
Dated:- 31.08.2024



Program:	B. Tech. (All Branches)	Semester:	II
Course:	Indian Knowledge System	Code:	BTALIK01SH2T
Teaching Scheme			
Lecture	Tutorial	Hours	Credit
2	-	2	2

Evaluation Scheme			
TA	MSE-I	MSE-II	ESE
50	-	-	-
Total			
50			

Methods of Teacher Assessment (TA):

Quiz, Assignment & Viva, Case Study, Attendance

Course Objectives:

To create awareness amongst students of Engineering about Indian Knowledge System.

Course Outcomes:

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

CO	Course Outcomes	BT Level (L1 to L6)
CO-1	Understanding Indian Knowledge System through ancient history.	L2
CO-2	Recognize the role and importance of governance with public administration by the use of Viduraniti.	L1
CO-3	Analyze the Historical Number Systems and its features.	L4
CO-4	Aware with Indian Mathematics and Contributions of Indian Mathematicians	L2

Unit I: Overview of Indian Knowledge System	(6 Hrs.)
Importance of ancient knowledge, defining IKS, IKS classification framework, Historicity of IKS, Some unique aspects of IKS.	
Unit II: Governance and Public Administration	(6 Hrs.)
Ramayana on grate attributes, Dos and Don'ts of a King, Vidura niti-Advice to a King, The administrative set up, Public Administration perspectives from epics.	
Unit III: Number Systems and Units of Measurement	(6 Hrs.)
Number systems in India – Historical evidence, Salient features of the Indian Numeral System, Unique approaches to represent numbers, Measurements for time, distance, and weight, Pingala and the binary system.	
Unit IV: Mathematics	(6 Hrs.)
Unique aspects of Indian Mathematics, Great Mathematicians and their Contributions, Algebra, Geometry, Trigonometry, Binary mathematics and combinatorial problems in Chandah Sastra of Pingala, Magic squares in India.	
Total Lecture	24 Hours

Textbooks:
1. B. Mahadevan, Vinayak Rajat Bhar, Nagendra Pavana R. N.: Introduction to Indian Knowledge System: Concepts & Applications, PHI, 2022

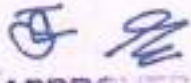
Reference Books:
1. Indian Knowledge System Introduction & Prospects, Acharya Shreyas Charudatta Kurhekar

MOOCs Links and additional reading, learning, video material
1. Swayam NPTEL: Indian Knowledge System (IKS)-Concepts and Applications in Science

APPROVED In.....
Academic Council Meeting
Dated:- 31.08.2024



1 st & 2 nd letter (Degree Programme)	3 rd & 4 th letter Applicable to which students	5 th & 6 th letter (Course category)	7 th & 8 th letter (Sr. no. of Subject)	9 th & 10 th Letters Teaching Dept.	11 th letter (Semester)	12 th letter (Theory or Practical)
BT: B. Tech. MT: M. Tech. MB: MBA	AL: All branches CS: Computer Science and Engineering IT: Information Technology ME: Mechanical Engineering ET: Electronics and Telecommunication Engineering CE: Civil Engineering AD: Artificial Intelligence (AI) and Data Science For MDM 'AL' excluding Teaching Department students	BS: Basic Science ES: Engineering Science VE: Value Education VS: Vocational and Skill Enhancement AE: Ability Enhancement IK: Indian Knowledge System CC: Cocurricular Course MD: Multidisciplinary Minor OE: Open Elective PC: Program Core PE: Program elective FP: Field Project H: Humanities N: Entrepreneurship E: Economics M: Management II: Industry Internship RI: Research Internship EI: Entrepreneurship Internship RM: Research Methodology PS: Project and Seminar RP: Research Project and seminar MH: Minors & Honors	Sr. no. of course in the particular Course category from 1 st to 8 th semester.	SH: Science and Humanities CS: Computer Science and Engineering IT: Information Technology ME: Mechanical Engineering ET: Electronics and Telecommunication Engineering CE: Civil Engineering AD: Artificial Intelligence (AI) and Data Science	1: First Semester 2: Second Semester 3: Third Semester 4: Fourth Semester 5: Fifth Semester 6: Sixth Semester 7: Seventh Semester 8: Eighth Semester	T: Theory P: Practical


 APPROVED in.....
 Academic Council Meeting
 Dated:- 31.08.2024

