

ARMY INSTITUTE OF TECHNOLOGY, PUNE Autonomous Institute Affiliated to Savitribai Phule Pune University, Maharashtra, India





National Education Policy (NEP)-2020 Compliant Curriculum

First Year B Tech in Electronics & Telecommunication Engineering (2025 Pattern)

(With effect from Academic Year 2025-26)

www.aitpune.com

VISION OF THE INSTITUTE

To become a "Globally Recognised" technical institute providing world class education and research facilities to the wards of Defence personnel.

MISSION OF THE INSTITUTE

(a) Provide the right environment, to the wards of Defence personnel, for development of physical, intellectual, emotional and spiritual quotients, with a view to produce total quality engineers.

(b) Create an ecosystem which can foster the culture of research, innovation, creative thinking and higher studies.

(c) Develop an education system which creates entrepreneurs and technology leaders who are committed towards sustainable development of society and nation building.

CORE VALUES OF THE INSTITUTE

Excellence, Honesty, Integrity, Team Work, Continuous Learning and Innovation.

VISION OF THE DEPARTMENT

To become "Internationally Recognized" center of excellence providing electronics & telecommunication engineering education & research facilities to the wards of defence personnel.

MISSION OF THE DEPARTMENT

M1. Provide state-of-art facility, modern infrastructure and learning environment to the students and faculty in the department to meet growing challenges of electronics & allied industry.

M2. Equip students with fundamental knowledge & practical skills in electronics, communication & allied areas to excel in professional career & lifelong learning.

M3. Foster research and innovation in electronics & telecommunication engineering by collaborating with industry and R&D organizations.

M4. Develop intellectuals, entrepreneurs and technology leaders committed to contribute to the development of society and welfare of humanity.

PROGRAM EDUCATIONAL OBJECTIVES (PEOS)

PEO1. Graduates will excel in technical and professional career in E&TC engineering with entrepreneurial abilities exhibiting global competitiveness.

PEO2. Graduates will pursue lifelong learning to enhance and utilize their technical domain knowledge for sustainable development and their professional growth.

PEO3. Graduates will utilize their communication skills, teamwork, professional ethics and integrity in their assigned leadership roles.

PEO4. Graduates will have skills and abilities for transition into other professions such as management, defense, entrepreneurship, etc.

PREFACE

The National Education Policy (NEP) 2020 has shown pathway to make India a global knowledge superpower. Army Institute of Technology (AIT) with its new Vision has already started working in that direction. As an important milestone, it has been conferred academic autonomy by UGC and SPPU and has prepared first ever curriculum under autonomy.

The Department of Electronics & Telecommunication Engineering at AIT Pune is committed to the effective and fruitful implementation of NEP 2020 in its true spirits emphasizing holistic and multidisciplinary education as per the directives of Maharashtra government. It emphasizes a multidisciplinary approach, aiming to develop critical thinking and creativity, thereby contributing to the holistic development of individuals.

We are delighted to present the first-year engineering syllabus -2025 pattern, which has been meticulously designed in alignment with the NEP 2020 with effect from academic year 2025-26. This curriculum aims to provide students with a holistic approach to engineering education ensuring a strong foundation in Mathematics and Science courses. This curriculum also includes components of vocational and skill enhancement courses, Indian Knowledge System and Co-curricular courses to shape well-rounded engineers who can adapt to global demands. Also, this document provides information on the credit system, course contents, and examination and evaluation scheme along with guidelines to make best use of the curriculum designed.

The syllabus encourages experiential learning, where theoretical concepts are supported by practical laboratory sessions. It also promotes research and innovation, encouraging students to engage in projects from the early stages of their academic journey. I wish to thank all the Board of Studies members who contributed in designing this curriculum.

We believe that this syllabus, crafted with the essence of the NEP 2020, will equip our students with the necessary skills and knowledge to excel in their future endeavors. We look forward to embarking on this exciting academic journey with our students.

KNOWLEDGE AND ATTITUDE PROFILE (WK)

WK1: A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.

WK2: Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.

WK3: A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.

WK4: Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.

WK5: Knowledge, including efficient resource use, environmental impacts, whole-life cost, re- use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.

WK6: Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.

WK7: Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development. **WK8:** Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.

WK9: Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

PROGRAM OUTCOMES

PO1	Engineering knowledge	Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
PO2	Problem analysis	Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)
PO3	Design/developme nt of solutions	Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)
PO4	Conduct investigations of complex problems	Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).
PO5	Engineering Tool Usage	Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)
PO6	The Engineer and The World	Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).
PO7	Ethics	Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)
PO8	Individual and Collaborative Team work	Function effectively as an individual, and as a member or leader in diverse/multi- disciplinary teams.
PO9	Communication	Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences
PO10	Project management and finance	Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
PO11	Life-long learning	Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)
PSO1	Program Specific Skill	Apply the knowledge of semiconductor technology, software & hardware tools, signal processing, embedded and telecommunication to arrive at solutions to real world problems.
PSO2	Program Specific Skill	work in the areas involving Industry 4.0 technologies such as robotics, Internet of Things, cyber-physical systems etc.

- ABC : Academic Bank of Credit
- AEC : Ability Enhancement Course
- AI : Artificial Intelligence
- AIT : Army Institute of Technology
- AWES : Army Welfare Education Society
- BSC : Basic Science Course
- CBCS : Choice Based Credit System
- CC : Co-Curricular Courses
- CEP : Common Engineering Project
- CIE : Continuous Internal Evaluation
- CO : Course Outcome
- CP : Credit Points
- ELC : Experiential Learning Courses
- ESC : Engineering Science Course
- ESE : End Semester Examination
- FP : Field Project
- HEI : Higher Education Institutions
- HSSM : Humanities, Social Science & Management
- INT : Internship
- IKS : Indian Knowledge System
- IQAC : Internal Quality Assurance Cell
- MDM : Multidisciplinary Minor
- MOOC : Massive Open Online Courses
- MPUA : Maharashtra Public Universities Act, 2016
- NEP : National Education Policy
- NSDC : National Skill Development Corporation
- NSQF : National Skills Qualification Framework
- NSS : National Service Scheme
- OE : Open Elective
- OJT : On Job Training

- PCC : Program Core Course
- PEC : Programme Elective Course
- PO : Program Outcomes
- PR : Practical
- PRN : Permanent Registration Number
- PRJ : Project
- PSO : Program Specific Outcome
- RM : Research Methodology
- SPPU : Savitribai Phule Pune University
- SSCs : Sector Skill Councils
- TH : Theory
- TU : Tutorials
- VEC : Value Education Course
- VSEC : Vocational and Skill Enhancement Course

NEP 2020 Compliant Curriculum Structure FIRST YEAR BTECH (ELECTRONICS AND TELECOMMUNICATION ENGG)

SEMESTER I

(WEF AY 2025-26)

	Level 4.5															
r		Tea	ching (Hrs.)	g Scl /weel	heme _{x)}	Examination Scheme and Marks			Cre	Credits						
Course Code	Course Type	CourseName	Lecture	Practical	Tutorial	Total	CIE	ESE	Term work	Practical	Oral	Total	Theory	Practical	Tutorial	Total
BCC25211A0A	BSC	Engineering Mathematics-I	3	-	-	3	50	50	-	-	-	100	3	-	-	3
BEC25212A0A	BSC	Applied Sciences For Electronics-I	3	-	-	3	50	50	-	-	-	100	3	-	-	3
BME25213A0A	ESC	Basic Mechanical Engineering & CAD	3	-	-	3	50	50	-	-	I	100	3	-	-	3
BEC25214A0A	ESC	Basic Electrical Engineering	3	-	-	3	50	50	-	-	-	100	3	-	-	3
BCC25211A0B	BSC	Engineering Mathematics-I Tutorial	-	-	1	1	-	-	25	-	I	25	-	-	1	1
BEC25212A0B	BSC	Applied Sciences For Electronics-I Lab	-	2	-	2	-	-	25	-	-	25	-	1	-	1
BME25213A0B	ESC	Basic Mechanical Engineering & CAD Lab	-	2	-	2	-	-	25	-	-	25	-	1	-	1
BEC25214A0B	ESC	Basic Electrical Engineering Lab	-	2	-	2	-	-	25	-	-	25	-	1	-	1
BCC25215A0X	VSEC & FP	Design Thinking & Ideation	1	2	-	3	50	-	25	-	-	75	1	1	-	2
BCC25216A0X	IKS	Indian Knowledge System	2	-	-	2	50	-	-	-	-	50	2	-	-	2
BCC25217A0X	VEC	Communication Skills & Human Values	1	-	1	2	50	-	25	-	I	75	1	-	1	2
BCC25218A0X	AC	Environmental Science	1	-	-	1	-	-	-	-	-	-	-	-	-	-
	Total				02	27	350	200	150	-	-	700	16	04	02	22

NEP 2020 Compliant Curriculum Structure

FIRST YEAR BTECH (ELECTRONICS AND TELECOMMUNICATION ENGG)

SEMESTER II

(WEF AY 2025-26)

	Level 4.5															
			Tea (chin (Hrs.	g Scl /weel	heme k)	Exa	mina	tion S Mar	Sche ks	eme	and	Credits			
Course Code	Course Type	CourseName	Lecture	Practical	Tutorial	Total	CIE	ESE	Term work	Practical	Oral	Total	Theory	Practical	Tutorial	Total
BEC25221A0A	BSC	Engineering Mathematics-II	3	-	-	3	50	50	-	-	-	100	3	-	-	3
BEC25222A0A	BSC	Applied Sciences For Electronics-II	3	-	-	3	50	50	-	-	-	100	3	-	-	3
BEC25223A0A	ESC	Programming For Problem Solving Techniques	3	-	-	3	50	50	-	-	-	100	3	-	-	3
BEC25224A0A	ESC	Basic Electronics Engineering	3	-	-	3	50	50	-	-	-	100	3	-	-	3
BEC25221A0B	BSC	Engineering Mathematics-II Tutorial	-	-	1	1	-	-	25	-	-	25	-	-	1	1
BEC25222A0B	BSC	Applied Sciences For Electronics-II Lab	-	2	-	2	-	-	25	-	-	25	-	1	-	1
BEC25223A0B	ESC	Programming For Problem Solving Techniques Lab	-	2	-	2	-	-	25	-	-	25	-	1	-	1
BEC25224A0B	ESC	Basic Electronics Engineering Lab	-	2	-	2	-	-	25	-	-	25	-	1	-	1
BCC25225A0X	VSEC & PRJ	Design Thinking, Innovation & Prototyping	1	2	-	3	50	-	25	-	-	75	1	1	-	2
BCC25226A0X	HSSM	Entrepreneurship Skills And Professional Ethics	2	-	1	3	50	-	50	-	-	100	2	-	1	3
BCC25227A0X	CC	Life Skills & Liberal Learning	-	2	-	2	-	-	25	-	-	25	-	1	-	1
BCC25228A0X	AC	The Constitution of India	1	-	-	1	-	-	-	-	-	-	-	-	-	-
	Total		16	10	2	28	300	200	200	-	-	700	15	05	02	22

Particulars	Page No.
Engineering Mathematics-I	11
Engineering Mathematics-I Tutorial	13
Applied Sciences For Electronics-I	15
Applied Sciences For Electronics-I Lab	17
Basic Mechanical Engineering & CAD	19
Basic Mechanical Engineering & CAD Lab	21
Basic Electrical Engineering	22
Basic Electrical Engineering Lab	24
Design Thinking & Ideation	25
Indian Knowledge System	28
Communication Skills & Human Values	30
Environmental Science	33
Engineering Mathematics II	38
Engineering Mathematics II Tutorial	38
Applied Sciences For Electronics-II	40
Applied Sciences For Electronics-II Lab	43
Programming For Problem Solving Techniques	44
Programming For Problem Solving Techniques Lab	46
Basic Electronics Engineering	48
Basic Electronics Engineering Lab	50
Design Thinking, Innovation & Prototyping	53
Entrepreneurship Skills And Professional Ethics	55
Life Skills & Liberal Learning	58
The Constitution of India (AC)	59



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National Education Policy (NEP) Compliant Curriculum

Semester – I



First Year Engineering (2025 Pattern)

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Cou	Course Code: BCC25211	AOA hematics-I							
Teaching Scheme:	Credit	Examination Scheme:							
Theory: 03 Hrs/Week	03	CIF. (Theory): 50 Marks							
	05	ESE (Theory): 50 Marks							
Prerequisite Courses, if any: 1. Elen	nentary Mathematics 2. Elementa	ary Calculus (Level 4.0)							
Companion Course, if any: Enginee	ering Mathematics-I Tutorial	• · · · · ·							
Course Objectives:									
This course aims at enabling students,	This course aims at enabling students,								
1. To strengthen the concept of univa	riate calculus and mathematical	modeling of physical syste	ems using ordinary						
differential equations									
2. To get acquainted with advanced	techniques for solving problems	s related to calculus and on	rdinary differential						
equation									
Course Outcomes: On completion of	the course, learner will be able	e to -							
COI: Apply the concept of rank for the	e solution of the system of equation	ons, linear dependence/indep	pendence of vectors						
CO2 : Representation of a function in	ciois.	sive differentiation Taylor	's and McI aurin's						
theorems	i an infinite series using succes	sive unificientiation, Taylor	s and wiellaurin s						
CO3: Solve higher order linear different	ential equation using appropriate	techniques							
CO4: Perform vector differentiation a	and analyze the vector fields.	teeninques.							
CO5: Perform vector integration and	apply to electromagnetic fields &	x wave theory.							
Course Contents:									
U	nit I: Linear Algebra		(08 - Hrs)						
Rank, System of linear equations with	applications, Linear dependence	and independence of vector	rs, Linear						
Mapping of Course Outcomes with	POs & PSOs	DO1 DO2 DO3 DO11							
Imapping of Course Outcomes with 105 & 1505 101,102,103,1011 Unit II. Coloulus (00 II)									
Successive Differentiation and Leibnit	theorem Date and Common fun	ations differentiation and a	(UO - HIS)						
(DUIS) Taylor's series McLaurin's se	z theorem, Beta and Gamma Iun	cuons, differentiation under	integral sign						
Manning of Course Outcomes with	POs & PSOs	PO1 PO2 PO3 PO11							
The second secon	L. Differential Equations	101,102,103,1011	(00 Hms)						
	II: Differential Equations		(09 - HIS)						
Ordinary Differential Equations: Lin	near Differential Equations, Exac	t differential equations, Dif	terential equations						
reducible to Exact form.	of ath order with constant con	ffisionts Comulantants T	Annation Doutionlan						
Integral Ganaral mathad short mat	the Mothed of variation of	noremeters, Complementary F	d Lagandra's DE						
Simultaneous and Symmetric simultan	aous DE	parameters, Cauchy's and	u Legendre's DE,						
Simultaneous and Symmetric Simultan	cous DE.								
Mapping of Course Outcomes with 1	POs & PSOs	PO1, PO2, PO3, PO11							
Unit I	V: Vector Differentiation		(07 - Hrs)						
Physical interpretation of Vector di	fferentiation. Vector differentia	l operator, Gradient, Dive	ergence and Curl.						
Directional derivative, Solenoidal, Irro	tational and Conservative fields,	Scalar potential, Vector ide	entities.						
Mapping of Course Outcomes with l	POs & PSOs	PO1, PO2, PO3, PO11							
Uni	t V: Vector Integration		(08 - Hrs)						
Line, Surface and Volume integra	ls. Work-done. Green's Lem	ma. Gauss's Divergence	theorem. Stokes						
theorem. Applications to problems	in Electro-magnetic fields.	, ~ ,	, <i>20000</i>						
Mapping of Course Outcomes with I	rUs & PSUs	r01, r02, r03, r011							

Text Books:

- 1. "Higher Engineering Mathematics" B.S. Grewal ,Khanna Publication,2012.
- 2."Advanced Engineering Mathematics" Erwin Kreyszig. Wiley Publications, 2016.
- **3. "Engineering Mathematics"** K.A. Stroud and Dexter J. Booth, Bloomsbury Publications, 2020
- 4."Linear Algebra and Its Applications" David C. Lay, Steven R. Lay, and Judi J. McDonald, Pearson.2020.20
- 5."Calculus: Early Transcendentals" James Stewart, Brooks/Cole Publications, 2015

Reference Books:

- 1."Introduction to Linear Algebra" Gilbert Strang, Wellesley-Cambridge Press, U.S Publications, 2023.
- 2."Ordinary Differential Equations" William E. Boyce and Richard C. DiPrima, Wiley Publications, 2017.
- 3."Vector Calculus" Jerrold E. Marsden and Anthony J. Tromba, W. H. Freeman Publications, 2003
- 4."Applied Mathematics for Engineers and Physicists" Louis A. Pipes, Dover Publications Inc, 2014

5.''Mathematical Methods for Physics and Engineering'' K.F. Riley, M.P. Hobson, and S.J. Bence, Cambridge University Press, 2006

MOOC / NPTEL Courses/Other Resources:

- 1. https://youtu.be/9MCjyQSRmR8?si=yfRXb19etScRK9uX
- 2. <u>https://youtu.be/ksS_vOK1vtk?si=_chdsGTOqaNK29mn</u>
- 3. https://youtu.be/Ld9AtgPmyvM?si=mN-9wCHjHwWmkVf-
- 4. https://youtu.be/ClvFwUpi3ZA?si=pya65bW4F-zhMHaw
- 5. <u>https://youtu.be/ksS_yOK1vtk?si=chuBHr8IST-qCRqp</u>
- 6. https://people.math.sc.edu/meade/PROJECT/DRAFTS/SMch18.pdf

Tutorial and Term Work:

1. Tutorial for the subject shall be engaged in minimum three batches (batch size of 22 students maximum) per division.

2. Term work shall consist of five assignments each on unit-I to unit-V and is based on performance and continuous internal assessment.

	(Course Code: BCC25	211A0B	
	Course Nan	e: Engineering Math	nematics-I	Tutorial
Teaching Schen	ne:	Credits		Examination Scheme:
Tutorial: 01 Hr	s./Week	01		TermWork: 25 Marks
Prerequisite Co	urses, if any: 1. Elementa	ry Mathematics 2. Elem	entary Calc	ulus (Level 4.0)
Companion Co	urse, if any: Engineering	Mathematics -I Theory		
Course Outcom	es: On completion of the	course, students will be	able to:	
COI: Apply	basic mathematical c	oncepts of Linear A	Algebra an	id Calculus with applications in
electromagnetic	c fields and wave theory			
CO2. To work i	r taams to solve methemet	ical problems, explore k	av conconte	collaborate on tutorials and affectively
document and pr	resent solutions	icai problems, explore ke	ey concepts,	conadorate on tutoriais, and effectively
PO Mapping: I	PO1. PO2. PO3. PO8. PO)9. PO11		
	01,101,100,100,100	Guidelines for TW Ass	essment	
For TW assessm	nent - weightage given to)		
• Attendance				
• Completion of	of Assignments(at least on	e assignment per unit)		
• In time Subm	iission			
		List of Assignmen	nts	<u> </u>
	.	Unit I - Linear Alg	ebra	
1	Assignment containing	questions on Rank, Sy	ystem of lin	lear equations with applications,
1.	Linear dependence and	independence of vecto	ors, Linear	transformations, Eigenvalues,
	Eigen vectors, applicati	Unit II Coloub	10	
	Assignment containing	questions on Succes	us ssive Differ	centiation and Leibnitz theorem
2	Reta and Gamma funct	ions differentiation ur	der integra	al sign (DUIS) Taylor's series
۷.	McLaurin's series Tim	e Series Functions	luci integra	u sign (DOIS), Tayloi s series,
	Wie Laarm 5 Series. This	Unit III- Differential E	quations	
	Assignment containing	questions on Linear I	Differential	Equations, Exact differential
	equations. Differential	equations reducible to	o Exact for	rm . LDE of nth order with
3.	constant coefficients. C	Complementary Function	on. Particul	lar Integral, General method.
	short methods. Method	d of variation of para	meters. Ca	uchy's and Legendre's DE.
	Simultaneous and Sym	metric simultaneous D	E.	,
		Unit IV- Vector Differe	entiation	
	Assignment containing	questions on Physical	interpretat	ion of Vector differentiation,
4.	Vector differential oper	ator, Gradient, Diverg	gence and C	Curl, Directional derivative,
	Solenoidal, Irrotational	and Conservative field	ds, Scalar p	ootential, Vector identities.
		Unit V- Vector Integ	ration	
	Assignment containing	questions on Line, Su	rface and V	/olume integrals, Work-done,
5.	Green's Lemma, Gauss	s's Divergence theoren	n, Stokes th	eorem. Applications to problems in
	Electro-magnetic fields	•		
		Learning Resource	ces	
Text Books:	• • • • • • •		11	12
1. "Higher Engi	ineering Mathematics"	B.S. Grewal, Khanna Pu	Distion,20	12.
2. Auvanced El	Mathematics" K A Stro	ciwiii Nieyszig. Wiley	Rloomsburg	18, 2010. V Publications 2020
Engineering	manus K.A. SIIO	au and Derici J. Doolli,	Junioning	1 uonoanono, 2020

4."Linear Algebra and Its Applications" David C. Lay, Steven R. Lay, and Judi J. McDonald, Pearson.2020.20

5."Calculus: Early Transcendentals" James Stewart, Brooks/Cole Publications,2015

Reference Books:

- 1."Introduction to Linear Algebra" Gilbert Strang, Wellesley-Cambridge Press, U.S Publications, 2023.
- **2."Ordinary Differential Equations"** William E. Boyce and Richard C. DiPrima, Wiley Publications, 2017.
- 3."Vector Calculus" Jerrold E. Marsden and Anthony J. Tromba, W. H. Freeman Publications, 2003

4."Applied Mathematics for Engineers and Physicists" Louis A. Pipes, Dover Publications Inc, 2014

5.''Mathematical Methods for Physics and Engineering'' K.F. Riley, M.P. Hobson, and S.J. Bence, Cambridge University Press, 2006.

MOOC / NPTEL Courses/Other Resources:

- 1. https://youtu.be/9MCjyQSRmR8?si=yfRXb19etScRK9uX
- 2. <u>https://youtu.be/ksS_yOK1vtk?si=_chdsGTOqaNK29mn</u>
- 3. https://youtu.be/Ld9AtgPmyvM?si=mN-9wCHjHwWmkVf-
- 4. <u>https://youtu.be/ClvFwUpi3ZA?si=pya65bW4F-zhMHaw</u>
- 5. https://youtu.be/ksS_yOK1vtk?si=chuBHr8IST-qCRqp
- 6. https://people.math.sc.edu/meade/PROJECT/DRAFTS/SMch18.pdf

Course Code Course Name: Applied	: BEC25212A0A Sciences For Electro	nics-I			
Teaching Scheme:	Credit	Examination Schem	e:		
Theory: 03 Hrs / Week	03	CIE (Theory): 50 N	Iarks		
		ESE (Theory): 50 N	Marks		
Prerequisite Courses, if any: Physics, Chemistry, Math	ematics (Level 4.0)				
Companion Course, if any: Applied Science For Electr	onics-I Lab				
Course Objectives: To impart the knowledge of fundam	nentals of physics throug	h hands-on experimen	ts and extend		
it to relevant engineering applications.					
Course Outcomes: On completion of the course, the lea CO1: Explain optical phenomena of interference and po Coating, and LCD. CO2: Understand the basic concepts of Quantum mech	rner will be able to - plarization, for engineerinanics and the wave equ	ing applications like A ations to relate them t	Anti-Reflection		
quantum computers.					
CO3: Comprehend the Fermi level and Fermi energy to t CO4: Relate the understanding of Fermi level and Fermi devices.	energy in semiconducto	properties of semiconors to the working of se	emiconducting		
CO5: Develop an understanding of the basics of nanopa applications.	articles and superconduc	tivity and relate them	to engineering		
Cours	e Contents				
Unit I: Lasers and Fi	bre Optics		(8 Hrs)		
Threshold condition for Lasing, Characteristics of lasers, Types of Laser: Semiconductor and CO2 Laser, Application of Lasers Optical fibres: Introduction, Principle, Structure, Propagation of light through Optical fibre, Critical angle, acceptance angle, acceptance cone, numerical aperture. Classification of optical fibres (Single mode & multimode), step-index & graded index, Losses in Optical fibre, Bandwidth, Applications, Fibre Optic Communication System (block diagram), Merits of Fibre Optic Communication System, numerical problems Mapping of Course Outcomes with POS & PSOs PO1, PO2, PO6, PO11, PSO1 Introduction to Quantum Mechanics, de Broglie Hypothesis, Properties of matter waves, Heisenberg Uncertainty Principle, Applications of Uncertainty Principle, Wave Function and Probability Interpretation, Schrödinger Wave Equation (Time-dependent and time-independent), the significance of Schrödinger Wave Equations, Energy and Wave function of a particle enclosed in a rigid box, numerical problems; Quantum mechanical tunneling, tunnel diode. Mapping of Course Outcomes with POs & PSOs PO1, PO2, PO6, PO11, PSO1 Mapping of Course Outcomes with POs & PSOs PO1, PO2, PO6, PO11, PSO1 Mapping of Course Outcomes with POs & PSOs PO1, PO2, PO6, PO11, PSO1 Mapping of Course Outcomes with POs & PSOs PO1, PO2, PO6, PO11, PSO1 Mapping of Course Outcomes with POs & PSOs PO1, PO2, PO6, PO11, PSO1 Mapping of Course Outcomes with POs & PSOs PO1, PO2, PO6, PO11, PSO1 Mapping of Course Outcomes with POs & PSOs PO1,					
semiconductor, Intrinsic Semiconductors, Fermi level, Fermi Dirac distribution function, Fermi Level in Intrinsic Semiconductor, Conductivity in conductor and semiconductor, Extrinsic Semiconductors, Fermi Level in Extrinsic Semiconductors, Variation of Fermi Level with Impurity Concentration, Drift and Diffusion Currents, Compound Semiconductors, Hall Effect, Numerical problems Mapping of Course Outcomes with POS & PSOS PO1, PO2,PO11, PSO1					
Unit IV: Semiconduc	tor Devices		(8 Hrs)		
Unit IV: Semiconductor Devices(8 Hrs)Semiconductor Diodes: P-N Junction Diode (Biased and unbiased), Diode Equation, I-V Characteristics, Energy Band Diagram (biased and unbiased) Types of diodes: Zener Diode, Varactor Diode, Light Emitting Diode, Photodiodes.Solar Cell: Principle and Construction, I-V characteristics, efficiency and fill factor, measures to improve the efficiency of solar cell, advantages and applications in environmental sustainability, numerical problemsBipolar Junction Transistor: Transistor Structure and Schematic Representation, Formation of Depletion Regions, Energy Band Diagram (biased and unbiased), Biasing the Transistor: potential divider (potential divider configuration), Transistor Action, numerical problems					
mapping of Course Outcomes with 1 05 & 1 505	1 01, 1 02, 1 00, 1 011	,1501			

Unit V: Nanotechnology and Sup	erconductors	(8 Hrs)				
Introduction to Nanoscale, Nanomaterials and properties, S	Synthesis methods- Colloidal method, Ph	nysical Vapor				
Deposition and Electric Arc deposition, Nanolithography, App	lications of nanotechnology: in Electronics	s (GMR effect				
and its application in read-write head of HDD).						
Superconductors: Superconductivity and Properties, BCS	Theory, Josephson Effect, SQUIDS (I	Principle and				
working), Applications in electronics, Concept of Magnetic le	evitation					
Mapping of Course Outcomes with POs & PSOs PO1	, PO2, PO6, PO11, PSO1					
Learning Res	sources					
Text Books:						
1. "A Textbook of Engineering Physics", M. N. Avadhanu	lu, P. G. Kshirsagar & TVS Arun Murthy,	S. Chand				
Publications. 2018						
2. "Engineering Physics", R. K. Gaur and S. L. Gupta, Dhar	pat Rai Publications.2012					
Reference Books:						
1. "Optics", Ajoy Ghatak, Tata Mc Graw Hill,2024						
2. "Introduction to Solid State Physics", C. Kittel, Wiley a	2. "Introduction to Solid State Physics", C. Kittel, Wiley and Sons Publication, 2019.					
3. "Quantum Mechanics", A. K. Ghatak, S. Lokanathan, Laxmi Publications, 2022.						
4. "Nanotechnology: Principles and Practices", Dr. S. K. Kulkarni, Capital Publishing, 2024.						
5. "Physics for Scientists and Engineers with Modern Physics", Serway and Jewett, Cengage Publications, 2023.						
e-Books:						
1. Feynman Lecture series: https://www.feynmanlectures.caltec	:h.edu/					
2.Concepts of Modern Physics, Arthur Beiser: https://nitsri.ac	.in/Department/PHYSICS/Beiser Modern Phy	<u>ysics.pdf</u>				
MOOC / NPTEL Courses/Other Resources:						
7. Lectures by Walter Lewin: https://www.youtube.com/channed	l/UCiEHVhv0SBMpP75JbzJShqw					
2. Quantum Maghaniag Lasturg Series by Prof. H.C. Varmay						

2. Quantum Mechanics Lecture Series by Prof. H. C. Verma: <u>https://www.youtube.com/playlist?list=PLWweJWdB_GuISnGkAafMpzzDBvTHg02At</u>

Course	Course Code :BEC25212A0B	enies II ab						
Course	Crodit	Offics-1 Lab Examination Scheme:						
Prostical: 02 Hrs /Wook		Torm Work: 25 Morks						
Practical: 02 HFS./ Week	UI	Term work: 25 Warks						
Companion Courses, if any: Appli	A Science For Electronics I Theory							
Course Outcomes:	a science for Electronics-1 Theory							
On completion of the course, learned	r will be able to–							
CO1: Gain practical knowledge	CO1: Gain practical knowledge of principles of semiconductor physics and nano-physics and demonstrate							
characteristics and operation of electronic	tronic devices.							
PO Mapping: PO1, PO2, PO11,	PSO1							
CO2: To work in teams to carry out experimental study of principles of applied physics, document and present the								
Same. PO Mapping: PO1.PO2, PO6, PO8, PO11, PSO1								
	Guidelines for Student's Lab Jour	nal						
1. Draw the diagram on the left s	de of the first page, in front of aim in per	ncil, on a blank page.						
2. The observations will be writte	n on blank age with a pencil, followed by	y the calculations on the same page.						
3. The graph will face the observation	tion table. Show the slope and any relate	ed calculations on the graph, in pencil.						
4. Write the precautions.	are taken in the laboratory will be signed	d by the teacher and attached to the file						
as rough readings	s are taken in the faboratory will be signe	a by the teacher and attached to the me						
us rough rough go.								
Guidelines for Lab /TW Assessment								
1. 15 marks for the lab/journal we	rk, which includes 05 marks for timely s	ubmission/practical completion, 05						
interests shown while, perform	the practical and 05 marks for file writin	g, calculations etc.						
2. 05 marks for theory attendance								
3. 05 marks for class seminars/vi	a.							
1 Come with completed file in th	Guidelines for Laboratory Conduc	ction						
2 Ensure the file is checked regu	arly							
3. Get the circuit verified before s	witching on the apparatus/circuit.							
4. Do not enter the lab/work in th	a lab without instructor.							
	List of Laboratory Experiments							
	Group A (Any two)							
1. To determine the band ga	energy of a semiconductor sample							
2. An experiment on Laser (letermining the wavelength of laser or nu	umber of lines on a grating)						
3. To determine the numeric	al aperture or attenuation coefficient or a	any experiment to calculate parameters						
	Croup B (Any two)							
1. To plot I-V characteristic	and determine fill factor and efficiency	of a given solar cell						
2. To determine the divergen	ce of a laser beam							
3 To determine the diamete	of a thin wire using a laser or to perform	heam profile analysis of a laser beam						
	Group C (Any three)	i beam prome anarysis of a faser beam.						
1 Tunnel diode characterist								
2 Planck's constant determi	nation							
3 Synthesis of silver nanon	rticles							
4 An experiment on superce	nductivity							
	Group D (Any three)							
1 Transistor characteristics								
2 Diode characteristics								
3 To determine Hall coeffic	ent and charge carrier density of a given	semiconductor sample						
	tent and charge carrier density of a given	semiconductor sumple						

|--|

Useful Links/Resources:

1. https://vlab.amrita.edu/?sub=1&brch=282&sim=1512&cnt=1

2. https://virtuallabs.merlot.org/vl_physics.html

3. https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html

	Course Cod	e : BME25213A0A						
Course	Name : Basic Me	chanical Engineeri	ing and CAD					
Teaching Scheme:	Cr	edit	Examination Scheme:					
Theory: 03 Hrs./ Week		03	CIE (Theory): 50 Ma	arks				
			ESE (Theory): 50 Ma	arks				
Prerequisites: Physics, Chemistry	, Mathematics (Lev	el 4.0)						
Course Objectives:		· · · · · · · · · · · · · · · · · · ·	F ' ' 1'' 1'	. , .				
1. To know the principle, methods, possibilities and limitations of Thermal Engineering and its applications.								
2. To understand the importance of 3. To be familiar with the character	2. To understand the importance of products, their Design considerations with respect to the applications.							
the machine tools used	instices of the unitere	int materials those are	used in Manufacturing t	cennologies and				
4. To explore the potential of Con	nputer Aided Desigr	and Drafting (CADE) and its applications.					
Course Outcomes: On completio	n of the course the le	earner will be able to;						
CO1. Understand the fundamenta	ls of thermodynamic	es and Heat transfer						
CO2. Understand the applications	of Thermal Enginee	ering.						
CO3. Understand the Design Eng	ineering and its appl	ications.						
CO4 . Understand the Production	Engineering and its a	applications.	11					
CO5 . Understand the Computer A	aded Design and Dra	afting (CADD) and its	s applications.					
	Сош	rse Contents						
Unit 1: Com	outer Aided Design	and Drafting (CAD	ח)	10 Hrs				
Sketching of engineering object	s and interpretation	of drawings as a	visualization and comm	unication tool				
Introduction to Computer aided G	raphics. Introduction	to Computer Aided 1	Drafting (CAD) packages	s application for				
both 2D and 3D computer-aided	d design (CAD) ar	nd drafting, Basic O	perations/Commands, P	rincipal Views,				
Dimensioning, Editing, Modifyin	g, Printing/Plotting	CAD entities/Drawin	g sheets, Introduction to	o 3D primitives,				
Creating 3D components through	the use of a CAD pa	ckage. Simple assemb	olies, generation of assen	nbly views from				
part drawings, animation of simple	e assemblies.							
Mapping of Course Outcomes w	ith POs & PSOs	PO1, PO2, PO3, PO	04, PO5, PO11, PSO1					
1	Unit 2: Thermal En	gineering		6 Hrs				
Thermodynamics: Laws of therm	odynamics, Heat en	gine, Heat pump and	Refrigerator					
Heat Transfer: Modes of heat tran	sfer with application	ns, Fourier's law, New	ton's law of cooling, Stef	fan Boltzmann's				
law								
Transportation : Two stroke and I	Four stroke engines (Petrol, Diesel and CN	G engines), Electric and l	Hybrid Vehicles				
Mapping of Course Outcomes w	ith POs & PSOs	PO1, PO2, PO3, P	O4, PO5, PO10, PO11,	PSO1				
Unit 3: A	Applications of The	rmal Engineering		8 Hrs				
Energy Sources: Thermal energy	, Hydropower ener	gy, Nuclear energy, S	Solar energy, Geotherma	al energy, Wind				
energy, Hydrogen energy, Biomas	s energy and Tidal e	nergy. Grades of Ener	rgy					
Energy Conversion Devices: Bo	oiler, Pump, Compre	essor, Turbine, I.C. e	engines, Fans, Blowers,	HVAC System,				
Household Refrigerator, Window	Air Conditioner							
Power Plants: Thermal, Hydroel	ectric, Nuclear, Sola	ar, Geothermal, Wind	, Hydrogen, Tidal, Biom	nass and Hybrid				
Power Plants.								
Mapping of Course Outcomes w	ith POs & PSOs	PO1, PO2, PO3, PO	04, PO5, PO10, PO11, I	PSO1				
Unit 4: Design Engineering 9 Hrs								
Machine elements: Power transm	ission elements (sha	afts, axies, keys, bush	and ball bearings, Joint,	, universal joint,				
Springs and Dampers, Valves, Lev	rers), Flywneel and (Jovernors						
Power Transmission Devices: B	elts drives, Chain di	rive, Gears, Coupling	s, Clutch, Brakes, Appli	cations of these				
devices			· · · · -	. .				
Mechanisms: Slider crank/ IC Eng	gine mechanism, Fou	ir bar chain mechanisi	m and its inversions, Gen	eva mechanism,				
Katchet and Paul mechanism, Mot	http://lransportation	Niechanisms						
wapping of Course Outcomes w		r01, r02, r03, r	04, r05, r010, r011, l	1301				

Unit 5: Production Engineering	9 Hrs						
Material Science: Materials used in Engineering and their applications, Metals (Ferrous and	Non-Ferrous),						
Nonmetallic materials, Material selection criteria							
Manufacturing Science: Introduction to manufacturing processes and their applications, Carpentry,	Casting, Sheet						
metal work, Forging, Metal Forming, Metal Joining, Machining	U,						
Machine Tools: Working principle and types of operations of Lathe Machine. Milling Machine Dri	Iling Machine						
Power saw, Grinding machine, NC and CNC machines, 3D Printers	, in the second s						
Mapping of Course Outcomes with POs & PSOs PO1, PO2, PO3, PO4, PO5, PO10, PO11, PS	SO1						
Books and other resources							
Text Books:							
1. "Engineering Thermodynamics", Nag, P. K, Tata McGraw-Hill Publisher Co. Ltd, 2017.							
2. "Elements of Workshop Technology", Chaudhari and Hajra, Volume I and II, Media H	Promoters and						
Publishers,2008.							
3. "Basics of Mechanical Engineering", Agrawal, Basant and Agrawal, C. M., John Wiley and Sons, 2	2008						
4. "Basic Mechanical Engineering", Rajput, R.K, Laxmi Publications Pvt. Ltd,2007.							
5. "Basic Mechanical Engineering, Pravin Kumar, Pearson (India) Ltd,2018							
"Fundamentals of Engineering Thermodynamics", Moran, M. J., Shapiro, H. N., Boettner, D. D.,	and Bailey, M						
Whey Publications. 2024. 6 "Design of Machanical Engineering" Surinder Kumer And Dealth But 1 to 2011	Wiley Publications. 2024.						
0. Basic of Mechanical Engineering, Sufficient Kumar, Ane Books PVI. Ltd, 2011.							
7. Engineering Oraphics with AutoCAD, Bethune, J.D., Frencice Hall, Englewood Chills, 1995.							
1 "Non Conventional Energy Sources Khan B H Tata McGraw-Hill Publications 2016							
2. "Renewable Energy". Boyle. Godfrey.Oxford University Press.2012							
3. "A Textbook of Thermal Engineering", Khurmi, R.S. and Gupta, J. K.S. Chand & Sons Publicati	ons.						
4. "Fundamentals of Heat and Mass Transfer", Incropera, F. P. and Dewitt, D.P, John Wiley and So	ons,2007.						
5. "Fundamentals of Modern Manufacturing: Materials, Processes, and Systems" Groover, Mikell P. Prentice							
Hall,1996.							
6. "Kinematics and Dynamics of Machinery", Norton, Robert L, Tata McGrawHill,2009	6. "Kinematics and Dynamics of Machinery", Norton, Robert L, Tata McGrawHill,2009						
7. "Mechanisms of Machines", Cleghorn, W. L., Oxford University Press, 2005.							
8. "Fundamentals of Machine Component Design", Juvinal, R. C, John Wiley and Sons, 1994.							
9. "Internal Combustion Engines", Ganeshan, V,McGraw Hill Publications, 2018.							
10. "Electric and Hybrid Cars: A History", 2nd Ed., McFarland							
11. Jolhe, D. A., (2015), "Engineering Drawing with introduction to AutoCAD", Anderson, Cur	rtis Darrel and						
Anderson, Judy, Tata McGraw Hill Publications. 2010							
12. "Mastering Modern CAD Drawings with SOLIDWORKS 2024: Applying ASME Standards t	to Engineering						
Drawings, Lam Tran, SDC Publications, 2024.							

	Course Code: BME252	13A0B			
Course Na	ne – Basic Mechanical Engi	neering and CAD Lab			
Teaching Scheme:	ne: Credit Examination Scheme:				
Practical : 02 Hrs./ Week	rs./ Week 01 Term work: 25 Marks				
Prerequisite Courses, if any: Physic	s, Chemistry, Mathematics (le	evel 4.0)			
Course Objectives: 1. To know the principle, methods, po	ssibilities and limitations of T	hermal Engineering and its applications.			
2. To understand the importance of pro	oducts, their Design considera	tions with respect to the applications.			
3. To be familiar with the characteristi	cs of the different materials th	ose are used in Manufacturing technologies and			
the machine tools used.					
4. To explore the potential of Compute	er Aided Design and Drafting	(CADD) and its applications.			
Course Outcomes:					
On completion of the course the learned	er will be able to;				
COI: Gain practical knowledge of model	odeling and drafting of electric	ical and electronic components using CADD and			
demonstrate principles of Thermal, Design and Production Engineering					
CO2: Work in teams to carry out experimental study of manufacturing systems and machines document and present					
the same.					
PO Mapping: PO4, PO8, PO9, PO11, PSO1					
Term Work					
The student shall complete any 10 o	f the following activity as a f	erm work.			
1. 2D Drafting of Electronic Compone	1. 2D Drafting of Electronic Components, Power & Connectors (Capacitors, Semiconductors, Resistors,				
Inductors, Diodes, LED, Transistors) any two components.					
2. 3D Modeling of Electronic Components, Power & Connectors (Capacitors, Semiconductors, Resistors,					
Inductors, Diodes, LED, Transistors).					
3. 2D Drafting of PCB / Heat Sinks / Switchgears / any Electrical/Electronic components.					
4. 3D Modeling of PCB / Heat Sinks / / Switchgears / any Electrical/Electronic components.					
5. 2D Dratting of Electric Motor / Actuator / transformers with all of the components.					
6. 3D Modeling of Electric Motor / Actuator / transformers with all of the components.					
/. Study of Energy sources (Minimum one Conventional and one Nonconventional sources).					
8. Study and demonstration of energy	8. Study and demonstration of energy conversion devices.				

9. Study and demonstration of Electric and Conventional IC engine vehicles, their specifications and systems

10. Study and demonstration of Power Plants.

11. Study and demonstration of Domestic appliances viz. refrigerator, air-conditioner, washing machine, cold storage.

12. Study and demonstration of power train/gear box system in the vehicle or machine tool.

13. Study and demonstration of Power Transmission Devices.

14. Study and demonstration of vehicle systems (automobile chassis, steering system, suspension system, braking system - Any Two

15. Study and demonstration of additive manufacturing / rapid prototyping techniques and machines.

16. Study and demonstration of CNC machines. 17. Visit to any Manufacturing Industry.

18. Visit to any Service Industry.

Course Code: BEC25214A0A Course Name – Basic Electrical Engineering				
Teaching Scheme:	Credit	Examination Scheme:		
Theory: 03 Hrs./ Week	03	CIE (Theory): 50 Marks		
		ESE (Theory): 50 Marks		
Prerequisite Courses, if any: Ph	ysics, Chemistry, Mathematics (I	Level 4.0)		
Companion Course, if any: Bas	ic Electrical Engineering Lab			
Course Objectives:				
• To impart the fundame electrical engineering to	ental knowledge of various letter the students of various discip	aws-principles and theorems associated with lines.		
• To give comprehensive	idea about AC and DC circuit	analysis.		
To provide knowledge of the second seco	of the concepts of transformer,	different energy conversions techniques.		
CO1: Apply Kirchhoff's Laws and CO2: Analyze the magnetic circuit CO3: Calculate AC quantities usin CO4: Compute the voltage, curren CO5: Understand the working prin	I different network simplification parameters, self-Inductance, mu ng mathematical equations, wave nt and power of the given 1-phase nciple of 1-Phase Transformer, D	techniques for DC circuit analysis. tual Inductance and Electromotive Forces (EMF's). forms and phasor diagrams. e and 3-phase AC circuits. C motor, batteries and their practical applications.		
	Course Contents	6		
	Unit I: DC Circuits	(08 Hrs)		
DC Circuits: Classification of electrical networks, simplifications of networks using series-parallel combinations and star delta transformation technique, Independent and dependent sources, source transformation, Kirchhoff's current and voltage Law, mesh and node analysis, Superposition theorem, Thevenin's Theorem, Norton's theorem, maximum power transfer theorem.				
Unit II	Electromagnetism and	AC Fundamentals (08 Hrs)		
Electromagnetic Induction : statically and dynamically induced emf, self and mutual inductance, coefficient of coupling. AC Fundamentals: Generation of single-phase sinusoidal voltages and currents, their mathematical and graphical representation, Concept of cycle, period, frequency, instantaneous, peak, average and RMS values, peak factor and form factor. Phase, Phase difference, lagging, leading in phase quantities and their phasor representation. Study of AC circuits consisting of pure resistance, pure inductance, pure capacitance.				
Mapping of Course Outcomes w	ith POs & PSOs PO1, PO	2, PO4, PO11, PSO1		
Unit III AC and DC Analysis of RL, RC and RLC Circuits (08 Hrs)				
Single Phase AC Circuits: Series R-L, R-C and R-L-C circuits, concept of impedance, power factor, phasor diagrams, Voltage, current and power waveforms. Concept of active, reactive and apparent power. Resonance in RLC series circuits. DC analysis: Initial conditions, Driven RL and RC circuits, source free RL and RC circuits, properties of exponential				
response, Natural and Forced response	onse of RL and RC circuits.			
Mapping of Course Outcomes w	ith POs & PSOs PO1, PO	D2, PO3, PO5, PO11, PSO1		
Unit IV	Three phase AC Circui	ts and Transformer (08 Hrs)		
 Incernase AC Circuits: Concept of three-phase AC symmetrical system, phase sequence, balanced and unbalanced load. Voltage, current and power relations in three phase balanced star and delta connected loads along with phasor diagrams. Single phase Transformer: Construction, operating principle, emf equation, voltage and current ratios. Losses, Efficiency and regulation, Auto-transformer. Load test on transformer. 				
Mapping of Course Outcomes with POs & PSOs PO1, PO2, PO4, PO11,PSO1				
Dept of E&TC, AIT Pune, FY BTec	h E&TC 2025 Pattern Syllabus	Page 22		

Unit V	Introduction to I	Electric Machines and Batteries	(07 Hrs)	
DC Machines: Construction,	working principle of D.C.	Motor, types of D.C. motor (series and shu	int), Voltage and	
Speed equation of DC motor,	Industrial applications.			
AC Machines: Three phase in	nduction motor: Construction	on, working principle, types, concept of slip,	applications	
Batteries: Different types of	batteries (Lead Acid and I	Lithium Ion), construction, working princip	ole, applications,	
ratings, charging and discharg	ging, series -parallel connect	tion of batteries		
Mapping of Course Outcom	es with POs & PSOs	PO1, PO2, PO6, PO11, PSO1		
	Learning	g Resources		
Text Books:				
1 "ABC of Electrical Engineer	ring", B.L. Theraja, A K Th	neraja, S Chand Publications,2012		
2 "Basic Electrical Engineerin	ıg", D. C. Kulshreshtha, Mo	Graw Hill Education, 2nd edition 2019.		
Reference Books:				
1. "Theory and problems	1. "Theory and problems of Basic Electrical Engineering" I. J. Nagrath and Kothari, PHI learning Pvt.Ltd, 2016.			
2. "Basic Electrical Engineering" V. N. Mittal and Arvind Mittal, McGrawHill,2011.				
3. "Basic Electrical Eng	3. "Basic Electrical Engineering", C. L. Wadhwa, New Age International (P) Limited, 2024.			
4. "Electrical Machines", S K Bhattacharya, McGraw Hill Education, 2008.				
MOOC / NPTEL Courses/O	ther Resources:			
1. Fundamentals of Electrical Engineering				
https://nptel.ac.in/courses/108105112				
2. Electrical Machine				
https://nptel.ac.in/courses/108105155				

Course Code: BEC25214A0B				
Course Name : Basic Electrical Engineering Lab				
Teaching Scheme:	aching Scheme: Credit Examination Scheme:			
Practical: 02 Hrs./ Week	cal: 02 Hrs./ Week 01 Term Work: 25 Marks			
Prerequisite Courses, if any: Physic	cs, Chemistry, Mathematics (Level 4.0)			
Companion Course, if any: Basic E	lectrical Engineering Lab			
Course Outcomes:				
On completion of the course, learner	will be able to-			
Course Outcomes: On completion	on of the course, learner will be able to)		
CO1: Verify circuit theorems, and de	emonstrate the operation of AC and DC c	ircuits and machines by		
experimentation.				
PO Mapping: PO1,PO2, PO4, PO	11, PSO1			
CO2: Work in teams to carry out exp	perimentation or mini project, communica	ate with peers and document the work		
done and present it.	N11 DSO1			
PO Mapping: PO4, PO8, PO9, PO	Cuidelines for Student's Leb Journe			
The students Lab Journal should a	Guidennes for Student's Lab Journa	l iment		
1 Title of the experiment	ontain following related to every exper	iment –		
2. Objective				
3. Apparatus with their detailed spec	ifications			
4. Brief theory related to the experim	ent			
5. Connection diagram /circuit diagra	ım			
6. Observation table				
7. Sample calculations for one/two re	eading			
8. Result table				
9. Graph and Conclusions				
1 Continue of the second	Guidelines for Lab / I w Assessment			
1. Continuous assessment of laboratory work is to be done based on overall performance and Laboratory performance				
 Fach Laboratory assignment assess 	ment should assign grade/marks based on	parameters with appropriate weightage		
3. Suggested parameters for overall	assessment as well as each Laboratory a	signment include- timely completion.		
performance, efficiency, punctuality,	and neatness.			
	Guidelines for Laboratory Conduction	n		
	List of Laboratory Experiments			
1 To study safety precautions	while working on electrical systems, ha	ndling of various equipment's such as		
¹ . rheostat, multi-meter, ammet	ters, voltmeters, wattmeter's etc.			
2. Study of wiring materials, sv	2. Study of wiring materials, switch board and different wiring schemes. (Simple wiring & staircase wiring).			
3. To verify Kirchhoff's laws e	To verify Kirchhoff's laws experimentally			
4. To verify Thevenin's theorem	To verify Thevenin's theorem experimentally.			
5. To verify Superposition The	. To verify Superposition Theorem experimentally.			
6. To measure steady state resp	6. To measure steady state response of series RL and RC circuits on AC supply and observations of voltage and			
Current waverorms on storage oscinoscope 7 To derive resonance frequency and analyze resonance in sories DLC sirguit				
To verify the relation between phase and line quantities in three phase belanced star dalta connections of load				
8. experimentally	experimentally			
9 To determine efficiency and regulation of transformer by using direct loading test experimentally				
10. Study of cut view section of DC Motor.				
11. Speed control of DC Motor.				
12 Study of battery for Electric vehicles.				
13 Miniproject				
Useful Links/Resources:				
1. https://www.vlab.co.in/broad-ar	ea-electrical-engineering 2. https://np	tel.ac.in/courses/108105155		

Course Code: BCC25215A0X				
Course Name – Design Thinking & Ideation				
Teaching Scheme:	Credit	t	Examination Scheme:	
Theory: 01 Hrs. / week	01		CIE: 50 Marks	
Practical: 02 Hrs./ Week	01		Term Work : 25 Marl	(S
Prerequisite Courses, if any: NIL				
Companion Course, if any: NIL				
Course Objectives:		.1	•	
• Understand the core principles of design	gn thinking and its r	ole in engineer	ing.	
• Apply knowledge of design timking to • Develop creative and user centered solu	utions to real world	challenges		
• Demonstrate effective communication	and collaboration in	multidisciplir	arv teams	
• Evaluate and analyze design concepts	and prototypes	i munuaiserpin	lary teams.	
• Develop a mindset for continuous inno	vation and improver	nent		
Course Outcomes:		liciti		
On completion of the course, learner will	be able to –			
CO1: Apply empathy and observation to	gain insights into us	ser needs and b	ehaviors.	
CO2: Generate innovative ideas and solu	tions through brains	torming and id	leation.	
CO3: Carry out primary and secondary re	esearch for better ins	sights.		
CO4: Present and communicate design ic	leas effectively.	-		
CO5: Collaborate with peers and industry	y professionals to ad	dress real-wor	ld design challenges.	
	Course Con	ntents		
Unit I: Introduction	n to Design Thinki	ng (CO1&CO	2)	(02 Hrs)
Introduction to Design Thinking, Underst	anding what is desi	gn, Who is a c	lesign thinker, What is a	ι design thinking
process. Brain Storming, Decide the top	pic for Brain-Storm	ning, generate	keywords or ideas. 17	UN Sustainable
Development Goals.				
Mapping of Course Outcomes with POs	s & PSOs	PO3, PO6		
Unit I.	l: Case Studies (CC)1)		(03 Hrs)
Case studies to understand the design thin	king process and fie	ld visit to valio	late: Refer Annexure I a	nd II
Mapping of Course Outcomes with POs	s & PSOs	PO2, PO3, PO	D6, PO7, PO9, PO10	1
Unit III: Ide	ea Generation (CO)	1&CO4)		(03 Hrs)
Techniques for idea generation and brai	nstorming, key wor	ds, sorting, li	nkages. Mind mapping.	Introduction to
primary and secondary research methods.	0.000			
Mapping of Course Outcomes with POs	; & PSOs	PO1, PO2, P PO11	O3, PO4, PO5, PO6, P	'07, PO8, PO9,
Unit IV: Resea	rch Methodology (CO3&CO5)		(03 Hrs)
Sources of secondary research – 5W/11	H tool, Publications,	, Events: Confe	erence Papers, Workshop	ps, Symposiums,
Information gathered from the Internet, Web resources: Websites, Blogs, Web Magazines, Web Journals, etc., Data				
Sets, Survey Results, Census Data, Records and Standards. Sources of primary research- talking to experts,				
questionnaires, Cue-cards, surveys, visits, interviews, focus group discussions etc. Application of primary and				
Monning of Course Outcomes with POs & PSOs PO3 PO3 PO4 PO7 PO8 PO0 PO11				
Unit V. Idention (CO2 2-CO4)				
Durin stamping familestian divergent thinking (CCAMDED latent thinking 11 al. (11)				
Dram storning for ideation, divergent thinking, SCAWIPER, lateral thinking, idea sketching.				
Mapping of Course Outcomes with POs & PSOs PO2, PO3, PO4, PO5, PO6, PO10				
Group structure:				, ,••, •••
1. working in faculty monitored groups.	i ne students plan,	manage and c	omplete a task / project	/ activity which
2 There should be a of term (aroun of 2)	1 students			
2. There should be a of tealling group of 5 -				

Reference Books:

1. "Design Thinking: Understanding How Designers Think and Work", Nigel Cross, Bloomsbury Publishing, 2011.

2. "Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation" Tim Brown, Harper Collins Publications, 2009

3. "Design Thinking for Visual Communication", Ranjan Nayar and Jaidip Subedi,

4. "The Design of Everyday Things", Don Norman, Basic books publications, 2013 and "Design Thinking: Creativity and Innovation" by S. Balaram, Sage Publications, 2011

5. "Sprint: How to Solve Big Problems and Test New Ideas in Just Five Days", Jake Knapp,

6. "Creative Confidence: Unleashing the Creative Potential Within Us All", Tom Kelley and David Kelley (with a foreword by Ratan Tata), HarperCollins UK Publications, 2013.

MOOC / NPTEL Courses/Other Resources:

1. <u>https://swayam-plus.swayam2.ac.in/courses</u>

2. https://swayam.gov.in/explorer

3. <u>https://nptel.ac.in/courses</u>

List of Laboratory Experiments

Course Outcomes:

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

CO1: Think out of box with the solid foundation of Design thinking and ideation.

CO2: Present Solutions to problems

Guidelines for Student's Lab Journal

1. Draw the diagram on blank pages. You can use coloured pencils/sketch pens etc. to make your work clear and presentable.

2. The content will be written on one side ruled pages.

The pictures can be pasted on the blank side.

Guidelines for TW Assessment (25)

1. 15 marks for the lab / journal work, which includes 5 marks for timely submission / task completion, 05 interests shown in the classroom and laboratory and 05 marks for file writing.

2. 05 marks is for theory attendance.

3. 05 marks class presentations.

Guidelines for CIE (50)

1. First evaluation based on presentation to be conducted around midterm for 10 marks.

2. Second presentation to be conducted at the time of submission for 10 marks.

3. The evaluation of the submitted report for 10 marks.

4. The final hard prototype will be evaluated for 20 marks.

[Creativity and originality (05), Clarity and completeness (05), Justification of prototype features (05), Quality (05)]

Guidelines for Laboratory Conduction

1. Come with a completed file.

2. Ensure the file is checked regularly.

3. Participate in class/lab activities.

4. Complete your tasks on time.

	List of Assignments and Submission
1.	Explain design thinking process in 200 words
c	Draw a flow chart of the steps involved in brainstorming and generation of key words to select your project of
۷.	design thinking. Submit a list of brainstormed ideas along with justification for the selected one.
3.	Explain the topic selected for the project in 300 words, with the relevant diagrams/flow charts/pictures if any
1	Write a report of 200 words on any one of the case studies discussed with the relevant diagrams/flow
4.	charts/pictures if any
5.	Write a 300 words report on the site visit with the relevant diagrams/flow charts/pictures if any
6.	Create a mind map of your idea. It should have at least 3 branches. Colour code it for ease of understanding.
7.	Write a 500 words report on Primary research with conclusions, acknowledgements and references.
0	Write a 300 words report on Secondary research with conclusions drawn, along with the relevant diagrams /
0.	flow charts / pictures

9	Use Scamper to fine tune the selected idea and redefine the problem statement with the help of meaningful
).	actionable statements for creative idea solving.
10.	Make rough sketches of the idea and explain them in 200 words.

Course Code: BCC25216A0X					
Course Name: Indian Knowledge System					
Teaching Scheme:		Credit	Examination Scheme	•	
Theory: 02 Hrs./ Week	Theory: 02 Hrs./ Week02CIE: 50 Marks				
Prerequisite Courses, if any: NA					
Companion Course, if any: NA					
 Course Objectives: 1. To understand the nature of knowledge. 2. To understand the evolution of the scientific approach in the Indian subcontinent. 3. To study contributions made by different people to the various branches of knowledge before modernity evolved in India. 					
Course Outcomes: On completion of	the course, lear	mer will be able to -			
CO1: Understand the significance and	l historical cont	ext of Indian knowled	lge systems	1	
CO ₂ : Recognize the role of engineerin	g in ancient Inc	lia and its impact on a	inchitecture and materia	ls	
aspects	ig principles in	modern practices wh	the considering cultural	and environmental	
	Со	irse Contents			
Unit I: Introdu	ction to Indiar	n Knowledge System		(06 Hrs.)	
 Definition, Scope and importance of knowledge Nature of Indian Knowledge System Evolution of scientific approach 					
Mapping of Course Outcomes with I	POs & PSOs	P08, PO9, PO11			
Unit II: Development of Sciences (12Hrs)					
 a. Astronomy- Aryabhatta, Varahamihira, Sawai Jaisingh b. Medicine- Ayurveda and Yunani c. Metallurgy- Copper, Iron, Bronze & alloys 					
Mapping of Course Outcomes with I	POs & PSOs	PO2, PO8, PO11			
Unit III: Role of Ancient Ind	lian Engineerii	ng principles in Mod	ern Practices	(12 Hrs)	
 Language - Prakrit, Sanskrit, Farsee Philosophy- Vedic, Lokayat, Buddhist, Jaina Education system in ancient India – Takshashila, Nalanda, Valabhi University Architecture 					
Mapping of Course Outcomes with I	POs & PSOs	103.108,1011			
Learning Resources					
 "Science and Technology in Medieval India: A Bibliography of Source Materials in Sanskrit, Arabic, and Persian", Abdur Rahman, Indian National Science Academy, New Delhi, 1982. "History of Technology in India(Vol I) (From Antiquity to C. 1200 A.D.)", Bag A. K. (ed), Indian National Science Academy, Delhi, 1997. "History of science and technology in ancient India: the beginnings", Chattopadhyaya, Debiprasad, Firma KLM Pvt. Ltd, 1986. 					

- 4. "A History of Indian Philosophy", Dasgupta Surendranath, Cambridge University press, 1922.
- 5. "History of Agriculture in India (Upto 1200 A. D.)", Gopal L. and V. C. Shrivastava, Concept Publishing, New Delhi, 2008.
- 6. "People's History of India Vol 20:Technology in Medieval India", Irfan Habib, Aligarh Historians Society and Tulika Books, 2016.
- 7. "A History of Indian Literature", Jan Gonda, Otto Harrassowitz, Wiesbaden, 1975.
- 8. "Astronomy in India: A Historical Perspective", PadmanabhaThanu, Indian National Science Academy, Springer, New Delhi. 2014.
- 9. "Introduction to the History of Architecture in India", Sohoni Pushkar, IISER, Pune, 2020.

10. "Vāda in theory and practice : studies in debates, dialogues and discussions in Indian intellectual discourses", Tripathi Radhavallabh, IIAS, Shimla, 2016.

Course Code: BCC25217A0X				
Course Name : Communication Skills & Human Values				
Teaching Scheme: Credit Examination Scheme:				
Theory: 01 Hrs. / Week	01	CIE: 50 Marks		
Futorial : 01 Hrs. / Week01Term Work: 25 Marks				
Prerequisite Courses, if any: Nil				
Companion Course, if any: Nil				

Course Outcomes:

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

CO1: Understand, analyze and interpret the essentiality of grammar, vocabulary and phonetics and their proper usage facilitated by professors and a Language Laboratory.

CO2: To encourage students to reflect on their beliefs, values, strengths, and weaknesses to create a career plan, identifying skill gaps and activities to develop the required skills.

CO3: To teach professional skills like communication skills, presentation skills, technical writing skills, paper reading, networking skills through instruction, knowledge acquisition, and demonstration.

CO4: To train future engineers to prepare for interviews and adapt to a diverse socio-economic arena while functioning effectively in multi-disciplinary and heterogeneous teams through the knowledge of teamwork, interpersonal relationships, conflict management and leadership quality.

CO5: Understand the significance of universal human values in promoting harmony, compassion, and mutual respect in society and to cultivate mindfulness practices for personal well-being and societal harmony.

Guidelines for Student's Lab Journal

The student must prepare a file that will include all the assignments performed in the class. Continuous assessment of laboratory work is to be done based on overall performance and laboratory assignment's performance of student. Each Laboratory assignment assessment will be assigned grade/marks based on parameters with appropriate weightage.

Guidelines for Lab /TW Assessment

Each laboratory assignment assessment includes timely completion, performance, punctuality, neatness, enthusiasm, participation and contribution in various activities. Attendance of the student will also be considered while granting term work.

Guidelines for Laboratory Conduction

The instructor may frame assignments to enhance skills supporting career aspects. Multiple set of activity based assignments can be prepared and distributed among batches. Every student must be given opportunity to participate actively in each activity. The assignments must aim to enhance language skills, communications skills, personal skills, professional skills and human values.

Unit 1:

Language Skills

(3 Hrs.)

Articles, Tenses, Prepositions, Adverbs, Adjectives, Pronunciation Guide, and Exposure to technical terms related to the field of technology and phrases, idioms, proverbs, significant abbreviations, formal (business) vocabulary

Mapping of Course Outcomes with POs & PSOs		P08, PO9, PO11		
Unit 2:	Personal Skills	(3 Hrs.)		
Introduction to Soft-Skills, Self-Awareness, Stress Management, Taking Criticism, Self Confidence, Adaptability,				
Assertiveness, Self-Assessment, Motivational Skills, Organization, Planning				

Mapping of Course Outco	omes		P08, PO9, PO11		
with POs & PSOs					
Unit 3:		Communication Skills	(3 Hrs.)		
Concept, Methods and Mode	Concept, Methods and Models of Communication, Verbal Communication, Body Language, Listening Barriers, Listening				
Ethics, Creative Writing, Sto	orytelli	ng, Visual Communication, Listening Skills, Reac	ling Skills, Public Speaking.		
Mapping of Course			P08, PO9, PO11		
Outcomes with POs & PS	Os				
Unit 4:		Professional Skills	(3 Hrs.)		
Interview Skills, Email Wi	riting, 1	Note Writing, Summarization, CV Writing, Co-	ver-Letter, Minute Writing, Report		
Writing, Writing effective	Propos Nego	sals, Meeting Management, Entrepreneurial Thi	nking, Decision Making, Problem		
Monning of Course Outeo	n, nego	tiation Skins, Team Dunding Strategies,			
with POs & PSOs	mes		P08, P09, P011		
Unit 5:		Human Values	(3 Hrs.)		
Work Ethics, Universal Hur	nan Va	lues, Time Management, Goal Setting, Value bas	ed action plan, Community Service,		
Ethics in Innovation, How to	o avoid	Plagiarism	1 2 2		
Mapping of Course Outco	mes		P08, PO9, PO11		
with POs & PSOs			,		
		List of Laboratory Experiments			
		Group A- Language Skills			
1.	Gram	mar Test			
2.	2. Vocabulary Test				
3.	Comp	prehension			
		Group B- Personal Skills			
1.	Flag	~			
2.	SWOC				
3.	3. Self-Awareness Questionnaire				
4.	Jonar	I WINDOW			
5.	Time	Crown C. Communication Skills			
1	Exten	apore			
2	Inner	Monologue			
3.	Role	Play			
4.	GD				
5.	Creat	ive Writing			
6.	Artic	e Reading			
Group D- Professional Skills					
1.	Mock	Interview			
2.	CV				
3.	Cover	r Letter			
4.	Report Writing				
5.	Paper Summarising				
6.	Probl	em Solving			
		Group E- Human Values			
	Time	Management			
2.	Prese	ntation			
3.	GD	rol & Conser Cool actting Object to and 0 I			
<u> </u>	Perso	nai & Career Goal setting – Short term & Long te	rm		
Э.	гарег	winning			

Useful Links/Resources

- 1. "Idioms and proverbs are fun", Wilco books(author) Soft Skills An Integrated Approach to Maximize Personality by Gajendra Singh Chauha and Sangeeta Sharma
- 2. "An Approach to Communication Skills"Indrajit Bhattacharya, 2018
- 3. "Communication Skill, Oxford University Press", Sanjay Kumar and Pushpa Lata, Oxford University
- 4. "Creative English for Communication"Krishnaswami N. and T.Sriraman,2018
- 5. "Soft skills Training A workbook to develop skills for employment", Fredrick H. Wentz
- 6. "Personality Development and Soft skills", Barun K. Mitra ,OxfordUniversity Press,2018
- 7. "The Time Trap : The Classic book on Time Management"R. Alec Mackenzie, Priyadarshani Patnaik, "Group Discussion and Interview Skills", Foundation Books
- 8. "Strategies for improving your business communication", M.S. Rao, SPD
- 9. "Organisational Behaviour", Aswalthapa, K Himalayan Publication, Mumbai. 1991
- 10. "Modern Business Correspondence and Minute Writing". Bahl, J.C. and Nagamia, S.M., 1974.
- 11. "Effective Communication", Balan, K.R. and Rayudu C.S. Beacon, New Delhi, 1996
- 12. "How to Write First Class Business Correspondence", Bangh, L Sue, Fryar, Maridell and Thomas David A. N.T.C. Publishing Group USA.1998
- 13. "Business Communication Today", BoveeCourtland, L and Thrill, John V, 1989
- 14. "Effective Communication Made Simple", Eyre, E.C Rupa and Co.Calcutta, 1985
- 15. "Communication Skills for Effective Management", Ghanekar, Ghanekar, A, Everest Publishing House, Pune.1996
- 16. "The Essence of Effective Communication", Ludlow, Ron, Prentice, 1995
- 17. "The Craft of Business Letter Writing", Monippalli, M.M, T.M.H. New Delhi.1997
- 18. "Technical Communication: Principles and Practice", Raman, Meenakshi and Sharma, Sangeeta, 2004
- 19. "Communication skills for Technical Communication", Rutherford A. J, Pearson Education
- 20. "Developing Communications Skills", Kishna Mohan, MacMillan Publishers, 2nd Edition
- 21. "Essential English Grammar", Murphy, Cambridge.
- 22. "A course in Communication Skills", Duttet.al, Foundation Books
- 23. "English Phonetics and Phonology", Peter Roach, 4th Edition, Cambridge

Co	Course Code: BCC25218A0X urse Name – Environmental Sci	ence	
Teaching Scheme:	Credit	Examination Scheme	e:
Online Learning, Presentations, MOOC courses, Guest lectures, Hands-on Assignments, Team Activities etc.	(Mandatory Non-Credit Course)	Audit Course	
Prerequisite Courses, if any: Environ	mental Science basic knowledge (Le	vel 4.0)	
Companion Course, if any: NIL			
Audit course for Environmental Science end of Semester for award of grade at co point & CGPA.	e is mandatory but non-credit course. ollege level. Grade awarded for audit	Assessment has to be course shall not be cal	conducted at the lculated for grade
Course Objectives:			
 To explain the concepts related to su To provide a comprehensive overvise the monitoring and control. To gain an understanding of the val local level. To examine a range of environmenta using tachnology. 	Istainable development and various c ew of environmental pollution and th ue of biodiversity and current effort al issues in the field, and relate these t	omponents of environi e science and technolo s to conserve biodivers o scientific theory and	ment. ogy associated with sity at national and find their solutions
using technology.			
 CO1: Demonstrate an integrative approach to environmental issues with a focus on sustainability. CO2: To provide a comprehensive overview of environmental pollution and the science and technology associated with the monitoring and control. CO3: Identify key threats to biodiversity and develop technological options for conserving biodiversity in different settings CO4: Learn skills required to research and analyze environmental issues scientifically and these skills in applied situations such as careers that may involve environmental issues. 		bgy associated with versity in different se skills in applied	
	Course Contents		
Unit I:Introdu	ction to Environmental Science		(02 Hrs)
Multidisciplinary nature of subject envi- to protect and improve the environment. and ethical environmental practices. UN	ronmental science; study of natural s Scope and importance; Concept of s I sustainable development goals.	ystems and the applica ustainability and sustai	ation of technology nable development
Mapping of Course Outcomes with P	Os & PSOs PO1, PO3, PO4, P	O6, PO11	
Unit II: Enviro	onmental Pollution and Control		(04 Hrs)
Environmental pollution: types, causes, hazards and human health risks, solid w technology in controlling pollution.	effects and controls; Air, water, soil, aste management. Control measures	chemical and noise po for urban and industria	ollution, nuclear al waste,
Mapping of Course Outcomes with P	Os & PSOs PO1, PO3, PO4, P	06, PO11	
Unit III: Bi	odiversity and Conservation	1	(04Hrs)
Levels of biological diversity: genetic, patterns and global biodiversity hot spo India. Threats to biodiversity: habitat los solutions for conservation of biodiversit	species and ecosystem diversity; Bi ots. India as a mega-biodiversity nat ss, poaching of wildlife, man-wildlife y; In-situ and Ex-situ conservation o	ogeography zones of ion; Endangered and e conflicts, biological in f biodiversity.	India; Biodiversity endemic species of ivasions; emerging
Mapping of Course Outcomes with Po	Os & PSOs PO1, PO4, PO6, 1	PO11	

Unit IV: Field Work	(06Hrs)
• Visit to an area to document environmental assets; river / forest / flora / fauna, etc.	
• Visit to a local polluted site – urban / rural / industrial /agricultural.	
• Study of common plants, insects, birds and basic principles of identification.	
• Site visit for emerging solution for environmental issues.	
Mapping of Course Outcomes with POs & PSOs PO1, PO4, PO6, PO11	
Learning Resources	
Text Books:	
1. "Air Pollution: H. V. N", Rao and M. N. Rao, TMH Publications, 2001	
2. "Environmental Engineering", Peavy and Rowe, McGraw Hill Publications, 1985	
3. "Biodiversity Conservation: Present Scenario and Future Prospects", Dr. Amar Nath Singh and I	Dr. Awadh
Kishore Roy, Walnut publication,2023	
4. "Environment Pollution Control and Environmental Engineering", C. S. Rao, Tata McGraw Hill,	, New Delhi.2021
Reference Books:	
1. "Principals of Conservation Biology", Groom, Martha J. Gary K. Meffe, and Carl Ronald carroll.Sunderland:	
Sinauer Associates.	
2. "Global Ethics and Environment", Gleeson, B. and Low, N. (eds.) London, Routledge. 1995	
3. "Something New Under the Sun: An Environmental History of the Twentieth Century", McNeil, J	John R.
4. "Environmental Science", S. C. Santra; New Central Book Agency (P) Ltd.; 2nd Edtn.2011	
MOOC / NPTEL Courses/Other Resources:	
1. https://swayam-plus.swayam2.ac.in/courses	
2. <u>https://swayam.gov.in/explorer</u>	
3. <u>https://nptel.ac.in/courses</u>	



ARMY INSTITUTE OF TECHNOLOGY, PUNE Autonomous Institute Affiliated to Savitribai Phule Pune University, Maharashtra, India

National Education Policy (NEP) Compliant Curriculum

Semester - II



First Year Engineering (2025 Pattern)

www.aitpune.com

Course	Course Code: BEC252 Name – Engineering	221A0A Mathematics II	
Teaching Scheme:	Credit	Examination Scheme:	:
Theory: 03 Hrs. / Week	03	CIE (Theory): 50 Mar ESE (Theory): 50 Mar	rks rks
Prerequisite Courses, if any: 1. Elemen	tary Mathematics 2. Eleme	entary Calculus (Level 4.0)	
Companion Course, if any: Engineering	g Mathematics II Tutorial	•	
Course Objectives: The objective of the	nis course is to introduce s	tudents to advanced calculus, d	liscrete
mathematics, probability, and statistics, p in engineering and scientific fields. Stude discrete mathematics, probability, and sta principles to practical scenarios, data mod	providing them with essent ents will develop skills in r atistical analysis. These ski deling, and problem-solvir	ial analytical tools for solving on nultiple integration, partial diff lls will enable them to apply m	complex problems erentiation, nathematical
Course Outcomes: On completion of the	e course, learners will be a	ble to:	
CO1: Apply concepts of multiple integra	tion in real-world applicat	ions.	
CO2: Understand and utilize partial deriv	vatives and optimization.		
CO3: Apply discrete mathematical struct	tures to model computation	nal problems.	
CO4: Analyze and apply probability dist	ributions in data-driven ap	plications.	
CO5: Utilize statistical methods to interp	oret and analyse data.		
	Comme Constants		
Tin:4 I	Course Contents	<u> </u>	(09 II mg)
Unit 1: Double Integrations Double integrals of	Multiple integration	anala ayan nagiona, ahanga of a	(U8 - HFS)
Double Integration: Double integrals of	for two variables double line	grais over regions, change of o	ba Coussian
integral and applications of double integral	role: area of a plana lamin	megrais in polar coordinates, in	
Triple Integration: Triple integrals over	a box triple integrals by i	terated integration, change of x	variables
cylindrical and spherical coordinates the	Lacobian determinant for a	three variables evaluation of the	integrals and
applications of triple integrals: volume at	ad mass of a solid		ipie integrais, and
Mapping of Course Outcomes with PO	s & PSOs P	01.P02.P03.P05.P011	
Unit I	: Partial Derivatives		(08 - Hrs)
Functions of several variables, limits and directional derivatives and gradient vector Lagrange multipliers, partial derivatives	continuity in higher dimensions, tangent planes and diffusion with constrained variables,	nsions, partial derivatives, the operations, partial derivatives, the operation of the second s	chain rule, addle points, variables.
Mapping of Course Outcomes with PO	s & PSOs PO	D1, PO2, PO3, PO5, PO11	
Unit III:	Discrete Mathematics		(09 - Hrs)
Set theory, logic and propositional c	alculus, functions and 1	elations, graph theory, com	binatorics,
Boolean algebra, recursion and recurr	ence relations, probabili	ty, and statistics.	
Mapping of Course Outcomes with PO	s & PSOs PO	1, PO2, PO4, PO5,PO11	
Un	it IV: Probability		(07 - Hrs)
Probability: Joint, conditional, and marg	inal probability; Bayes' th	eorem; independence; theorem	of total probability;
expectation and variance; random variable	es.		
Probability Distributions: Binomial, Pc	isson, geometric, uniform,	exponential, gamma, normal,	and chi-square.
Mapping of Course Outcomes with PO	s & PSOs PO	D1, PO2, PO4, PO5	
U	nit V: Statistics		(08 - Hrs)
Measures of Central Tendency: Mean	, median, and mode.		
Measures of Variability and Dispersion	on: Standard deviation, s	tandard error, variance, and	range.
Measures of Shape: Skewness and ku	rtosis.		U
Statistical Diagrams: Scatter diagram.	histogram, and pie char	ts.	
Measure of Association Between Two	Variables:		
Correlation: Karl Pearson's coefficient of correlation and its mathematical properties			
Snearman's rank correlation and its interpretations			
Monping of Course Outcomes with DO			
wapping of Course Outcomes with PO	rs a rous Po	J1, FU2, FU4, FU5, FUII	

Learning Resources

Text Books:

- 1. ."Advanced Engineering Mathematics" Erwin Kreyszig. Wiley Publications, 2016
- 2. "Calculus: Early Transcendentals" James Stewart, Brooks/Cole Publications, 2015
- 3. "Discrete Mathematics and Its Applications" Kenneth H. Rosen, Tata Mcgrawhill Publications, 2021
- **4. "Probability and Statistics for Engineers and Scientists"**Ronald E. Walpole and Raymond H. Myers.Pearson,2016.
- **5.''Applied Statistics and Probability for Engineers''** Douglas C. Montgomery and George C. Runger, Wiley Publications, 2018

Reference Books:

- 1."Thomas' Calculus" George B. Thomas and Maurice D.Weir, Pearson Education, 2015
- 2."Discrete and Combinatorial Mathematics" Ralph P.Grimaldi, Pearson Education, 2006
- 3."A First Course in Probability" Sheldon Ross, Pearson Prentice Hall, 2010
- 4. "Mathematical Analysis" by S. C. Malik and Savita Arora, New Age International Private Limited, 2017.
- 5."Introduction to Graph Theory" by Douglas B.West, Pearson Education, 2000

MOOC / NPTEL Courses/Other Resources:

- 1. https://archive.nptel.ac.in/courses/111/105/111105121/
- 2. https://archive.nptel.ac.in/courses/111/104/111104125/
- 3. https://archive.nptel.ac.in/courses/111/104/111104125/
- 4. <u>https://ocw.mit.edu/courses/18-02sc-multivariable-calculus-fall-2010/pages/2.-partial-derivatives/part-c-lagrange-multipliers-and-constrained-differentials/session-44-example/</u>
- 5. https://ocw.mit.edu/courses/18-02sc-multivariable-calculus-fall-2010/pages/2.-partial-derivatives/
- 6. <u>https://ocw.mit.edu/courses/18-02sc-multivariable-calculus-fall-2010/pages/2.-partial-derivatives/</u>
- 7. <u>https://nptelvideos.com/course.php?id=713</u>
- 8. https://srmuniv.digimat.in/nptel/courses/video/111106086/L01.html
- 9. https://onlinecourses.nptel.ac.in/noc23_ma35/preview
- 10. https://archive.nptel.ac.in/content/syllabus_pdf/111105041.pdf
- 11. https://online.stat.psu.edu/stat505/lesson/1
- 12. https://online.stat.psu.edu/stat505/lesson/1

13. <u>https://teachpsychscience.org/index.php/category/research-methods/7-correlational-survey-research/</u>

Tutorial and Term Work :

1. Tutorial for the subject shall be engaged in minimum three batches(batch size of 22 students maximum) per division

2.Term work shall be consist of five assignments each on Unit-I to Unit-V and is based on performance and continuous internal assessment.

	Course N	Course Code: BE	C25221A0B	II Tutorial
Teaching Sch	eme•	ame. Engmeeting w Credit	Tamematics	Examination Scheme:
Tutorial · 01	Hrs / wook	01		Term Work: 25 Marks
Dronoquisito (Courses if once 1 Flore	ontory Mathematics	2 Elementer	r Calculus (loval 4.0)
Community C		ring Mathematics I	$\frac{1}{2}$. Elementary	Calculus (level 4.0)
Companion C	ourse, if any: Enginee	ring Mathematics II	I neory	a ta.
CO1: Apply o analyze PO Mapping: CO2: To worl concep PO Mapping:	concepts of multiple int e data using statistical n PO1, PO2, PO3, PO5, k in teams to utilize discre- ts, collaborate on tutorial PO1, PO2, PO5, PO8,	regration and partial c nethods and apply pr PO11 ete mathematical struct s, and effectively docu PO9, PO11	derivatives fo obability dist tures to model ment and pres	r real world applications, interpret and ributions in data driven applications. computational problems, explore key ent solutions.
		Guidelines for TW	Assessment	
For TW assesAttendanceCompletionIn time Sub	sment - weightage given of Assignments(at least pmission	to one assignment per un	it)	
		List of Assign	nments	
	A · · · · · ·	Unit I - Multiple	Integration	
1.	Assignment containing I change of order of integr integrals in polar coordin plane lamina, mass of a iterated integration, char determinant for three van volume and mass of a so	Example on Double in ration, introduction to to nates, the Gaussian inte- plane lamina, and surfa- nge of variables, cylind riables, evaluation of to lid.	tegrals over a the Jacobian d egral, and appl ace area. Tripl lrical and sphe riple integrals,	rectangle, double integrals over regions, eterminant for two variables, double lications of double integrals: area of a e integrals over a box, triple integrals by rical coordinates, the Jacobian and applications of triple integrals:
		Unit II - Partial	Derivatives	
2.	Assignment containing I dimensions, partial deriv planes and differentials, with constrained variable	Example on Functions vatives, the chain rule, of extreme values and sac es, and Taylor's formu	of several vari directional der ddle points, La la for two vari	ables, limits and continuity in higher ivatives and gradient vectors, tangent agrange multipliers, partial derivatives ables.
	A	Unit III- Discrete	Mathematics	
3.	relations, graph theory, probability, and statistics	combinatorics, Booles s.	an algebra, re	cursion and recurrence relations,
	A · · · · · ·	Unit IV- Pro	bability	
4.	Assignment containing independence; theorem Poisson, geometric, unif	of total probability; e orm, exponential, gam	onditional, and expectation and ma, normal, and	d marginal probability; Bayes' theorem; d variance; random variables. Binomial, nd chi-square.
	Assignment containing I	Example on Measures	s of Central Te	ndency: Mean, median, and mode.
5.	Measures of Variability Measures of Shape: Sker Statistical Diagrams: Sca Measure of Association Correlation: Karl Pearso Spearman's rank correla	and Dispersion: Standa wness and kurtosis. atter diagram, histogram Between Two Variable n's coefficient of correction and its interpretation	ard deviation, m, and pie cha es: elation and its ions.	standard error, variance, and range. rts. mathematical properties.

Learning Resources

Text Books:

- 1."Advanced Engineering Mathematics" Erwin Kreyszig. Wiley Publications, 2016
- 2. "Calculus: Early Transcendentals" James Stewart, Brooks/Cole Publications, 2015
- 3. "Discrete Mathematics and Its Applications" Kenneth H. Rosen, Tata Mcgrawhill Publications, 2021
- **4.** "**Probability and Statistics for Engineers and Scientists**" Ronald E. Walpole and Raymond H. Myers.Pearson,2016.

5."Applied Statistics and Probability for Engineers' Douglas C. Montgomery and George C. Runger, Wiley Publications, 2018

Reference Books:

1."Thomas' Calculus" George B. Thomas and Maurice D.Weir, Pearson Education, 2015

2."Discrete and Combinatorial Mathematics" Ralph P.Grimaldi, Pearson Education, 2006

3."A First Course in Probability" Sheldon Ross, Pearson Prentice Hall, 2010

4. "Mathematical Analysis" by S. C. Malik and Savita Arora, New Age International Private Limited, 2017.

5."Introduction to Graph Theory" by Douglas B.West, Pearson Education, 2000

MOOC / NPTEL Courses/Other Resources:

1. https://archive.nptel.ac.in/courses/111/105/111105121/

2. https://archive.nptel.ac.in/courses/111/104/111104125/

3. https://archive.nptel.ac.in/courses/111/104/111104125/

4. https://ocw.mit.edu/courses/18-02sc-multivariable-calculus-fall-2010/pages/2.-partial-derivatives/part-c-lagrange-multipliers-and-constrained-differentials/session-44-example/

5. https://ocw.mit.edu/courses/18-02sc-multivariable-calculus-fall-2010/pages/2.-partial-derivatives/

6. https://ocw.mit.edu/courses/18-02sc-multivariable-calculus-fall-2010/pages/2.-partial-derivatives/

7. https://nptelvideos.com/course.php?id=713

8. https://srmuniv.digimat.in/nptel/courses/video/111106086/L01.html

9. https://onlinecourses.nptel.ac.in/noc23_ma35/preview

1. https://archive.nptel.ac.in/content/syllabus_pdf/111105041.pdf

2. <u>https://online.stat.psu.edu/stat505/lesson/1</u>

3. <u>https://online.stat.psu.edu/stat505/lesson/1</u>

4. https://teachpsychscience.org/index.php/category/research-methods/7-correlational-survey-research/

Course Code: BEC25222A0A				
Course Name: Applied Science for Electronics-II				
Teaching Scheme:	Credit Examination Scheme:			
Theory: 03 Hrs. / Week	03	CIE (Theory): 50 Marks		
		ESE (Theory): 50 Marks		
Prerequisite Courses, if any: Basics of Physics & Chemistry (level 4.0)				
Companion Course, if any: Applied Science for Electronics –II Lab				
Course Objectives:				

- To provide an in-depth understanding of advanced engineering materials used in electronics and display systems, focusing on their properties, fabrication techniques, and applications in modern technology.
- To provide fundamental knowledge of chemical processes involved in the fabrication of printed circuit boards (PCBs), including surface preparation, etching, plating, and finishing techniques, with an emphasis on material compatibility and process optimization.
- To provide students with an understanding of Printed Circuit Board (PCB) fabrication processes, including material selection, design considerations, and manufacturing techniques, while emphasizing sustainable practices to minimize environmental impact.
- To introduce the fundamental principles of sensors and energy sources, focusing on their working principles, types, and applications in engineering and technological advancements.
- To understand the fundamental properties, selection criteria, and applications of materials used in communication technologies, including optical fibers, semiconductors, and dielectric materials

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

- **CO1:** Compare and classify the use of appropriate advanced materials for electronic and display applications based on their electrical, optical, and mechanical properties.
- **CO2:** Understand the chemical processing techniques for PCB manufacturing, ensuring reliability, efficiency, and environmental compliance.
- **CO3:** Apply to design and fabricate a functional PCB while evaluating and implementing eco-friendly methods to reduce electronic waste and hazardous material usage.
- **CO4:** Analyze characteristics and performance of different sensors and energy sources for their effective utilization in real-world applications.
- **CO5:** Evaluate appropriate materials for various communication components based on their electrical, optical, and thermal properties.

Course Contents

Unit I: Advanced Engineering Materials in Electronics & Display Systems (08 Hrs)

Advanced Materials in Electronics: Introduction, classification, and applications; Semiconductor Materials, Conducting Materials, Insulating & Dielectric Materials, and Emerging 2D Materials.

Display Systems: Liquid Crystal Displays (LCD's), Properties and application of Organic Light Emitting Diodes (OLED's) Properties and application of Quantum Light emitting diodes (QLED's). Organic LED Applications of Fabricated Electronic Devices

Mapping of Course Outcomes with POs & PSOs PO1, PO2, PSO1

Unit II: Chemical Processes in Printed Circuit Boards

(08 Hrs)

Introduction to Printed Circuit Boards: Components, Classification of PCBS: Single-sided, Doublesided, Multi-layer, Rigid and Flexible PCBs. Advantages of Printed Circuit Boards, challenges in modern PCB design and manufacture.

PCB Manufacturing Process: Plating Techniques- Electroplating, Special Plating Techniques, Solder Mask, Conformal Coatings.

Mapping of Course Outcomes with POs & PSOs PO1, PO2, PSO1

1. "Sensors and Transducers Detailed exploration of sensor technologies and materials", Ian R. Sinclair,

- Newnes (an imprint of Butterworth),2000
- 2. "Materials Science and Engineering: An Introduction covers fundamental and advanced materials science concepts", William D. Callister and David G. Rethwisch, Wiley Publications, 2020
- **3.** "Electronic Materials Science A focus on materials used in the fabrication of electronic devices", James W. Mayer and S.S. Lau, Macmillan USA.1990
- **4.** "Advanced Electrical and Electronics Materials: Processes and Applications"K.M. Gupta, Nishu Gupta, Wiley-Scrivener Publications, 2015

Fabrication Techniques for PCBs: Steps in fabrication for single and double-sided PCBs, Multi-layer Boards, and Flexible Boards.

Etching: Etching Solutions and Chemistry, Etching Parameters, Equipment and Techniques, Optimizing Etchant Economy

Environmental Concerns: Pollution Control in PCB Industry, Polluting Agents, Recycling of Water, Recovery Techniques, Air Pollution, Toxic Chemicals in PCB Fabrication, Recycling of PCBs, and Environmental Standards.

Mapping of Course Outcomes with POs & PSOs PO1, PO2, PO3, PO6

Unit IV: Sensors and Energy Sources

Unit III: Fabrication of PCB and Environmental Concerns

Sensors: Introduction, general working principle (schematic diagram and explanation), and applications of conduct metric sensors, the brief working principle, and applications of electrochemical sensors, biosensors optical sensors.

Energy Sources: Batteries, Construction, working and applications, solid-state batteries. Fuel Cells, Introduction, construction, working and applications of methanol–oxygen fuel cell and polymer electrolyte membrane (PEM) Fuel Cell.

Mapping of Course Outcomes with POs & PSOs PO1, PO2, PO3, PO6, PSO1

Unit V: Communication Components and Materials

(08 Hrs)

(08 Hrs)

(08 Hrs)

Dielectrics: Introduction, Types of dielectric materials with tailorable properties, examples, and applications (capacitors, supercapacitors, and transmission lines.)

Piezoelectric Materials: Introduction, Principal, Classification, properties and applications.

Smart material: Introduction, shape memory alloys, Electrochromic & Thermochromic Materials, Self-Healing Materials and their applications.

Mapping of Course Outcomes with POs & PSOs PO1, PO2, PSO1

Learning Resources

Text Books:

- 1. "Electronic Materials: Science and Technology" Y. Waseda, A,
- 2. "Introduction to Electronic Materials and Devices "Sergio M. Rezende, Springer Cham, Springer Nature, 2022.
- 3. "Printed circuit boards: Design, Fabrication, Assembly and Testing" R.S.Khandpur, McGraw Hill Education, 2006
- 4. "Principles of Electronic Communication Systems Focuses on communication technology and associated materials", Louis Frenzel, McGraw Hill Education, 2023
- 5. "Engineering Materials: Properties and Selection Discusses material properties and their applications", Kenneth G. Budinski and Michael K. Budinski, Pearson. 1998
- 6. "Electronic Communication Systems A comprehensive guide covering communication principles, components, and materials used in communication systems" George Kennedy and Bernard Davis, McGraw Hill Education,2011

Reference Books:

MOOC / NPTEL Courses/Other Resources:

- 1. Sensors and Actuators https://onlinecourses.nptel.ac.in/noc25_ee76/preview
- 2. Fundamentals of semiconductor devices https://onlinecourses.nptel.ac.in/noc25_ee39/preview

	Correct	Course Code: BEC25222A0B	2 TT T
Teech	Course N	ame- Applied Science for Electron	IICS -II LAD
Teach	ing Scheme:	Crean	Examination Scheme:
Practi	cal: 02 Hrs. / Week	01	Term Work: 25 Marks
Prere	quisite Courses, if any: Basics	of Physics & Chemistry (level 4.0)	
Comp	anion Course, if any: Applied	Science for Electronics (Theory)	
Cours On con CO1: PO M CO2: same.	npletion of the course, the learn Understand and apply chemistry apping: PO1, PO2, PO11 Work in teams to simulate and t	er will be able to– principles in electronics and complex est various fundamentals of applied che	engineering problems. emistry, document and present the
PO M	apping: PO1,PO2, PO5, PO8,	PO9, PO11, PSO1	-
1 D		Guidelines for Student's Lab Journa	
1. Dra	w the diagram on the left side of	the first page, in front of the aim in pe	ncil, on a blank page.
2. The	graph will face the observation	table. Show the slope and any related c	alculations on the graph in pencil
5. The	graph will face the observation	Guidelines for Lab /TW Assessment	t
1. 10 r	narks for the lab/journal work, w	which includes 5 marks for timely subm	ission/practical completion, 05 marks
for the	interest shown while performin	g the practical, calculations, etc.	1 1 7
2. 05 r	narks for file writing.		
3. 05 r	narks for theory attendance.		
4. 05 r	narks for class seminars/viva.		
1. Car	(Juidelines for Laboratory Conduction	on
1. COM	the with a completed file in the la	idoratory.	
2. Ens 3. Do	not enter the lab/work in the lab	without an instructor.	
		List of Laboratory Experiments	
		Group A (Any two)	
1.	Synthesis of Quantum dots r	anoparticles (2-6 or 3-5 semicondu	ctor).
2.	Characterization of the Optic	cal Properties of Nanomaterial Usin	g UV-Vis Spectroscopy
3.	Study of OLED (Organic Li	ght Emitting Diode) Characteristics.	
		Group B (Any two)	
1.	PCB Fabrication Using Etch	ing Method.	
2.	Environmental Impact Analy	vsis of PCB Waste	
3.	Visit to PCB-making unit.		
		Group C (Any three)	
1	Calibration and Response Ti	me of a Temperature Sensor.	
2	pH Sensor Measurement of	Communication Materials (e.g., Electronic Section 2017)	ctrolytes).
3	Exploring the Impact of Elec	ctrode Material on Battery Performa	nce
4	Visit to Li-Ion battery unit p	lant.	
		Group D (Any three)	
1	Study of Piezoelectric and N	lagnetostrictive Materials in Sensing	g Applications
2	Study of Dielectric Constant	and Breakdown Voltage of Differe	nt Dielectric Materials
3	Conductivity Measurements	or Engineering Materials.	
4	Performance Testing of a So	lar Cell as an Energy Source	
USEIU	1 LIIIKS/Kesources: RI OT Virtual Labe: Chamietry		
2. httr	s://nptel.ac.in/courses/10310720)6	
3. http	os://nptel.ac.in/courses/10310720)7	

	Course Code	e : BEC25223A0A		
Course N	ame: Programming	g for Problem Sol	lving Techniqu	es
Teaching Scheme:	Crea		Examination So	cneme:
Theory: 03 Hrs. / Week	03		CIE (Theory):	50 Marks
Bronoquisite Courses if only Pa	sias of Mathamatics (1	$\frac{1}{2}$	LSE (Theory):	50 WIAFKS
Companion Courses, if any: Bas	sics of Mathematics (I	evel 4.0) m Solving Technicu	ua Lab	
Course Objectives:	granning and Froble	in solving rechniqu		
 Primary objectives. Primary objectives. Primary objectives. Primary objective of the course is to give students a basic introduction to programming and problem solving using C++ language and to introduce students not merely to the coding, but to computational thinking, the methodology of computer programming, and the principles of good program design including modularity and encapsulation. 1. To understand methods of problem solving, its aspects, and basics of programming. 2. To learn basics of C++ programming, its features and syntax. 3. To acquaint with data types, input output statements, decision making statements, iterative constructs and functions in C++ 4. To learn principles of Object Oriented Programming using C++ 5. To understands significance of Inheritance, Polymorphism and Abstraction. Course Outcomes: On completion of the course, learner will be able to - CO1: Inculcate and apply skills in problem solving. CO2: Choose most appropriate programming constructs and features such as looping, arrays, structures etc. to solve the problems in different domains. CO3: Exhibit the programming ekills for the problems those require the writing of well documented programming. 				
CO4: Use the object oriented prog in C++ for solving problems.	gs in C++. ramming concepts suc	ch as data encapsula	tion, abstractions	and operator overloading hism in C^{++} for solving
problems.	ogramming concepts	such as inferitation	e, and polymorph	insin in C++ for solving
	Cours	se Contents		
Unit I: Problem Solving and	Programming – An	Overview using C-	++ Programming	g (8 Hrs)
General Problem Solving Concepts- top down design. Problem Solving Strategies – Divide and Conquer, Merge Solutions, Building Block Approach, Algorithmic Problem Solving Program Solving Tools: Algorithms, Flowcharts and Pseudo-codes, implementation of algorithms. Basics of C++ Programming: Features of C++, History of C++ and its significance for Application Development, Writing and executing C++ program, Constants, Variables and Identifiers, Data Types, Input / Output statements, Comments, Reserved words, Indentation, Operators and Expressions, Precedence and Associativity, Scope Resolution Operator, Type casting (Implicit / Explicit) Conditional Branching / Decision Making Statements – simple, nested ifelse-if, switch-case.				
Mapping of Course Outcomes w	rith POs & PSOs	PO 1, 2, 3 and 5 I	PSO1, PSO2	
Unit II: Iterative	e Constructs, Arrays	and Structures in	C++	(7 Hrs)
Iterative statements: Do-while / while loop, for loop, selecting appropriate loop. Nested loops, <i>break, continue</i> statements used with loops. Arrays: Advantage of using Arrays, Array Handling (SDA, DDA), Sorting/Searching/Matrix Operations Structures – Array vs Structure, Its advantage, defining structures, creating its variables and accessing its data members and methods				
Mapping of Course Outcomes w	rith POs & PSOs	PO 2, 3, 5 PSO1,	PSO2	
Unit	II: Functions and St	rings in C++		7 (Hrs)
Functions Need for functions, def reference, scope of a variable and	inition, Function Prot its lifetime, the return	otyping, significanc statement, Inline Fu	e of Modular Pro unction, Math Lib	bgraming, Call by value / brary Functions

String Operations – Declaring string with "string" keyword – string class, string vs character arra	y, reading string
from keyboard (cin/getline), string methods, passing string to function as argument	
Mapping of Course Outcomes with POs & PSOs PO 2, 3, 5 PSO1, PSO2	
Unit IV: Introduction to Object Oriented Programming in C++	7 (Hrs)
Principles of Object Oriented Programming-classes, objects, methods, inheritance, polymorphis	sm, reusability,
data abstraction and encapsulation.	
Classes and Objects : classes and objects, class variables and object variables, public and private n	nembers, Static
members, class methods, Constructors, Destructors, Constructor Overloading, Method Overloading	g, Operator
Werning of Course Outcomes with DOs & DSOs DO 2 2 5 DSO1 DSO2	
Mapping of Course Outcomes with POS & PSOS PO 2, 3, 5 PSOI. PSO2	
Unit V: Inheritance and Abstraction in C++	7 (Hrs)
Inheritance, Types – Single Level, Multilevel, Multiple, Hierarchical, Hybrid., Behavior of Access	Specifiers in
inheritance, Method Overriding, Pointers, Pointers to derived Classes, Virtual Function, Abstractio	n, Abstract Class
Mapping of Course Outcomes with POs & PSOsPO 2, 3, 5 PSO1. PSO2	
Learning Resources	
Text Books:	
1."Object Oriented Programming with C++", E. Balagurusamy, McGraw Hill, 2023.	
2."Mastering C++", K. R. Venugopal and R. Bhuyya, McGraw Hill, 2023.	
Reference Books:	
1. "The C++ Programming Language", B. Stroustrup, Pearson Education, 2023.	
 "Fundamentals of C++ Programming", R. Halterman, School of Computing, Southern Adventis 2023. 	st University,
3. "Programming and Problem Solving with C++", N. Dale and C. Weems, Jones & Bartlett Learn	ning, 2023.
Programming in Club A Hands on Introduction Specialization	
https://www.ecumena.eng/magiclipations/hands.en_eng2.etics_eng2.	
nttps://www.coursera.org/specializations/nands-on-cpp:action=enroll	
Learn C++ Programming -Beginner to Advance- Deep Dive in C++	

https://www.udemy.com/course/cpp-deep-dive/

Course Code : BEC25223A0B		Tachniques I ab
Course Maine: FTO	Credit	Fyamination Scheme
Practical: 02 Hrs / Week	01	Torm Work · 25 Marks
Provensi i ta Company i forma Davia a fi		
Prerequisite Courses, if any: Basics of R	Viathematics (level 4.0)	771
Companion Course, if any: Programm	ing and Problem Solving Technique	Theory
On completion of the course learner will	he able to-	
CO1: Apply principles of problem solvin	g to arrive at a solution of given pro	blem statement and implement, test and
analyses the same using C++ programmin	ig tools	1 /
PO Mapping: PO1, PO2, PO3, PO5, P	SO1,PSO2	
CO2: Work in team, communicate with p	eers and write report of the work do	ne.
PO Mapping: PO8, PO9		
G	udalinas for Student's Lab Journa	1
• Every Experiment is to be written and	completed using given template by	faculty
• Every experiment should include – Tit	le. Algorithm. Source Code and Out	
G	uidelines for Lab /TW Assessment	t
For TW assessment - weightage given t	0	
• Attendance		
• Understanding of Logic		
Hands On Completion of Exercise		
• In time Submission		
Gui	delines for Laboratory Conduction	on
Minimum 12 experiments to be comp	leted	
 Programming exercises to be conduct Each program to be tested / validated 	voing windows based v SCode /	CodeBlocks of any other IDE
 Each program to be tested / valuated MiniProject to be completed in group 	of $3/4$ students	
• While roject to be completed in group	List of Laboratory Experiments	
Group A - Basic C++ Programming	g – Operators, Expressions, Input	Output, Iterative Loops, Decision
Manu drivan programs Calculator	Making	mbars Methometical expressions like
1 Area/Volume of a shape Compound	I Interest To find maximum of tw	o numbers. To find maximum of three
numbers. Grade letter based on marks	s. Roots of Ouadratic equations.	o numbers, 10 mile maximum of thee
Activity- Create a Github account an	d store your program which you feel	l is unique.
Grou	1p B - Iterative Constructs, Functi	ions
1 Sum of series, Factorial of a number,	Whether a number is prime, Whether	r number is palindrome, Fibonacci series
of N terms, Display Patterns such as	Floyd's triangle, Pyramid, Diamond	l, etc.
Group C (Any	Three programs) Arrays, Matri	x, Structures
1 Searching Techniques, Sorting Algor	itinms (Selection, Bubble), Searching	Ig Algorithms (Linear, Binary), Sum of
Mini-Projects on Database manageme	ent	15
Group D	(Any two programs) – Functions &	& Strings
Writing menu driven, modular progra	ums.	· · · · · · · · · · · · · · · · · · ·
¹ Write functions for Traversing a stri	ng, String operations such as - co	mputing length, concatenate, substring,
reverse a string		
	Group E (Any three) OOP	
1 Write program to compute area / volu	ume of different shapes using all the	learnt concepts and validate the same.
2 Write a program to implement variou	s operations on Complex numbers	
5 write a program to implement variou	s operations on matrices	sing operator overloading
4 write a program to implement variou	operations on Complex numbers u	ising operator overloading.
s write a program to implement String	operations	

- 6 Write a program to implement Vector operations.
 Group F (Any two) OOP
 1 Write a program to implement all types of inheritance and validate concepts. Also, create abstract class, method
- and validate the same.

2 Write a program to implement run time polymorphism concepts and validate the same.

3 Mini project on Database management using run-time polymorphism

Useful Links/Resources:

1. LearnCPP -https://www.learncpp.com/

2. Programiz - https://www.programiz.com/cpp-programming/

	Course Code:	BEC25224A0A			
Course	e Name – Basic I	Electronics Engi	neerin	g	
Teaching Scheme:	Cre	dit	Exam	ination Schem	ne:
Theory: 03 Hrs. / Week	03	3	CIE:	50 Marks	
			ESE:	50 Marks	
Prerequisite Courses, if any: Applied	Physics-I, Basic El	ectrical Engineering	ng		
Companion Course, if any: Basic Ele	ectronics Engineeri	ng Lab.			
Course Objectives: To make students	understand				
• The applications of PN junction diod	le and zener diode.				
• The functioning of bipolar junction t	ransistor and its ap	plication.			
• The operation of field effect transiste	ors, including JFET	's and MOSFETs.			
• The working principle and application	ons of operational a	mplifiers.			
• Basics of various logic gates, digital	circuits and their a	pplications			
Course Outcomes: On completion of the	he course, learner v	vill be able to -			
CO1: Understand, Explain, Design & A	Analyze basic diode	circuits.			
CO2: Understand, Explain, Design & A	Analyze basic BJT o	circuits.			
CO3: Understand, Explain, Design & A	Analyze basic FET	circuits.			
CO4: Understand, Explain, Design & A	Analyze basic OPA	MP circuits.			
CO5: Understand, Explain, Design & A	Analyze basic Digi	tal circuits.			
	Course	Contents			
Unit	I: Diode Applicat	ions	4 01		(08 Hrs)
Load-Line Analysis, Series Diode Conf	igurations, Parallel	and Series-Paralle	el confi	gurations, Half	wave rectification,
Full wave rectification, Clippers, Clamp	pers, voltage-multip	olier circuits, Zene	r diode	, Zener diode a	is a regulator.
Mapping of Course Outcomes with P	Os & PSOs	PO1, PO2, PO3	, PO4,	PSOI	
Unit II: B	ipolar Junction Tr	ansistors			(08 Hrs)
Transistor construction, Transistor ope	ration, Common b	ase configuration,	, Transi	stor amplifyin	g action, Common
emitter configuration and Common col	lector configuratio	n. DC operating p	oont, V	oltage divider	bias configuration,
Common emitter amplifier, Transistor s	witching network.	DO1 DO0 DO0	DO 4 1		
Mapping of Course Outcomes with P	Us & PSUs	PO1, PO2, PO3,	PO4, I	2801	
	: Field-Effect Trai	nsistors	· · ·	MOGEET	(08 Hrs)
Construction and characteristics of JF	Els, Transfer cha	racteristics, Deple	etion-ty	pe MOSFET,	Enhancement-type
MOSFET, Fixed bias, Self-Bias and Vo	oltage divider blas c	configurations, DC	Analy	SIS OF EMOSFI	EI.
Mapping of Course Outcomes with P	Os & PSOs	PO1, PO2, PO3,	PO4, 1	PSO1	
Unit IV	: Operational Am	plifiers			(08 Hrs)
Op-Amp basics, Op-Amp specification	s-DC Offset param	eters and Frequen	cy para	meters, Differe	ential and Common
mode operation, Practical Op-Amp c	ircuits: Inverting	Amplifier, Noning	verting	Amplifier, Su	umming Amplifier,
Integrator and Differentiator.			DO (1		
Mapping of Course Outcomes with P	Os & PSOs	PO1, PO2, PO3,	PO4, I	2801	(
Unit V: Numbe	r System and Digi	tal Electronics	· ,		(08 Hrs)
Number System-Binary, Octal, Decima	I, Hexadecimal, BC	D and their conve	ersion.	De-Morgan's t	heorem.
Digital Electronics- Logic gates, Boole	an algebra, Introdu	ction to combinat	ional ci	rcuits: Half ad	der, Full adder and
sequential circuits, SR Latch and Flip-Il			DO ()		
Mapping of Course Outcomes with P		PO1, PO2, PO3,	PO4, I	2801	
	Learning	Resources			
Text Books:		(1 1 1 NT 1	11 D	2022	
1. Electronic Devices and Circuit	t Theory", K. Boyle	estad and L. Nashe	eisky, P	earson, 2023.	
2. Digital Fundamentals", 1. L. F	rioya, Pearson, 202	э.			
1 "Electronics Daviass" Thomas	I Floyd Dearcon	2023			
2. "Fundamental of Digital Circui	ts", A. Anand Kur	nar, PHI, 2023.			

MOOC / NPTEL Courses/Other Resources:

- <u>https://archive.nptel.ac.in/courses/108/101/108101091/</u>
 <u>https://www.coursera.org/learn/electronics#modules</u>

C	Course Code	: BEC25224A0B	Lob
Teaching Scheme:	Credit	Fyoming	Lan Scheme:
Prostical: 02 Hrs. / Wook			only 25 Monly
Proroquisite Courses if any: A	polied Physics-L Basic	Flectrical Engineering	OIK :25 MAIKS
Companion Course if any: Ba	sic Electronics Engineer	ring Theory	
Course Outcomes:	sie Electronics Elignee	ing meory	
On completion of the course lea	rner will be able to-		
CO1: Understand, Explain, Veri	fv & Analyze experime	ntal results of basic electro	nics circuits.
PO Mapping: PO1, PO2, PO3	, PO5, PSO1		
CO2: Work in teams to carry ou	it experiment or mini p	oject, Communicate with p	beers and document the work do
and present it.			
PO Mapping: PO8, PO9, PO1	<u> </u>		
	Guidelines for S	tudent's Lab Journal	
The laboratory assignments/expe	riments are to be submi	tted by student in the form	of journal.
Journal consists of Certificate, ta	ble of contents, and har	idwritten write-up for each	experiment.
Each experiment should consist	-: to		
• Title			
• Objectives			
• Problem Statement, Outcor	nes		
Hardware / Software (If an	y) requirements.		
• Concept.	1 . 4		
• Experimental procedure / S	setup.		
Conclusion			
• Conclusion	Cuidalinas fa	n Lah /TW/ Aggagement	
Continuous assessment of la	boratory work is condu	cted based on overall perfo	rmance
• Each lab assignment/ experience	iment assessment will	assign grade / marks base	ed on parameters with appropria
weightage.			Fuller
• Suggested rubrics for overal	l assessment as well as	each lab assignment / expe	riment assessment:-
Parameter	(2)	(1)	(0)
Attendance	Attended on time	Attended in makeup sessi	on Attended late
Performance/Participation	Performed with full	Performed with partial	No participation
Terrormance/Tarticipation	participation	participation	
Understanding (Viva)	Could answer Satisfactorily	Could Answer Partially	Could not Answer
Timely Submission	Submitted on time	Submitted within one wee	ek Submitted Late
	Very Good and neat	Good & original	Poor/Copied
Documentation	and original	Documentation	Documentation
	documentation		
	Guidelines for La	boratory Conduction	
• All the experiments mentio	ned in the syllabus are o	compulsory.	
Use of open source softwar	e and recent version is t	o be encouraged.	
	List of Labor	atory Experiments	
	G	roup A	
Electronic Components:			
Study of Active and Passi	ve components		
a) Resistors (Fixed & Var	able), Calculation of re	sistor value using color cod	e.
1. D) Capacitors (Fixed & Va	1. b) Capacitors (Fixed & Variable)		
c) Inductors, Calculation of inductor value using color code.			
e) Switches & Relays	1, WOSFEIS, Various	ic packages	

-	
	Measurements using various measuring equipment:
	a) Set up CRO and function generator for measurement of voltage, frequency
2.	b) Obtain the phase shift between to signals using CRO with the help of Lissagous
	Pattern.
	c) Measure voltage, resistance using digital multimeter. Also use multimeter to check
	diode, BJI
	v-1 characteristics of (Hardware and Simulation):
	a) P-N Junction Diode (Study the datasheet of typical PN Junction diode 1N 400A)
3.	D) Zener Diode (Study the datasheet of typical Zener diode 110 4148)
	c) To build and test polarity detector using diodes and LED's
	Mini Project: Diode protection for an RL circuit square wave generator
	Rectifier circuits (Hardware and Simulation):
	a) Implement half wave full wave and bridge rectifier using diodes
4.	b) Observe the effect of capacitor filter on rectifier output
	c) To study the internal construction of Battery charger.
	Group B
	V-I characteristics of BJT:
	a) Analysis of BJT characteristics in Common Emitter Configuration (Hardware and Simulation).
1.	Practical Application:
	b) To build and test relay driver with and without protective device.
	Mini Project: Transistor switch, Alarm system with constant current source, BJT logic gates.
	DC Biasing Circuit:
2.	a) Analysis of voltage divider biasing for BJT (Hardware and Simulation).
	Practical Application:
	b) To build and test voltage level indicator.
	Frequency response of MOSFET:
3	b) To plot frequency response of MOSEET amplifier (Hardware and Simulation)
5.	Practical Application:
	c) To build and test IFET timer network
	Group C
	Parameters of Op-amp:
	To measure following Op- amp parameters & compare with specifications given in data sheet.
1	1. Input bias current
1	2. Input offset current
	3. Input offset voltage
	4. Slew rate
	Linear applications of Op-amp:
	a) Build inverting and non-inverting amplifier using op-amp (Study the datasheet of typical
2	Op-Amp 741)
	Practical Applications:
	b) To build and test Voltage summing amplifier and voltage subtractor (Hardware and Software).
	c) To simulate and analyse response of Op-am Integrator and Differentiator using multisim software
	(Software).
	Test and verify the truth tables of:
	a) Basic and Universal Gates (Study the data sheet of respective IC's)
	Combinational Circuit Applications:
1	b) To test and verify truth table of Half adder and Full adder circuit.
	c) To build and test 2-bit comparator.
	Mini Project: Alarm system using logic gates
2	Sequential Circuits:

a) To test and verify truth table of SR flip flop.Practical Application:b) To build and test LED control circuit with SR flip flop.

Useful Links/Resources:

- 1. https://be-iitkgp.vlabs.ac.in/
- 2. https://dec-iitkgp.vlabs.ac.in/List%20of%20experiments.html

Course Code: BCC25225A0X Course Name: Design Thinking, Innovation and Prototyping				
Teaching Scheme:		Credit	Examination Sche	eme:
Theory: 01 Hrs. / Week		01	CIE: 50 Marks	
Practical: 02 Hrs./ Week		01	Term Work: 25	Marks
Prerequisite Courses, if any: Design Thi	inking & Idea	tion		
Companion Course, if any: Nil	0			
Course Objectives:				
• Understand the core principles of desi	gn thinking a	nd its role in er	ngineering.	
• Apply knowledge of design thinking to	analyze and	solve complex	problems.	
• Develop creative and user-centered solution	utions to real-	world challeng	ges.	
• Demonstrat e effective communication	and collaboration	ation in multid	isciplinary teams.	
• Evaluate and analyse design concepts a	and prototype	s.		
• Develop a mindset for continuous inno	vation and im	provement.		
Course Outcomes:				
On completion of the course, the learner v	vill be able to	_		
CO1: Generate innovative ideas and solut	tions through	brainstorming	and ideation.	
CO2: Conceptualize a product based	on design	requirements	and evaluate prototypes	to validate design
specifications.				
CO3: Prototype and test design solutions	to refine and	improve them.		
CO4: Present and communicate design id	eas effectivel	у		
CO5: Collaborate with peers and industry	professionals	s to address rea	al-world design challenges.	
	Cour	se Contents		
Unit I: Re	defining Pro	blem CO1		(03 Hrs)
OIOR tool, redefining problem statement,	Storyboardin	ig, visual repre	esentation of how the prototy	pe will function in
real world scenarios, user journey/interact	ion with prod	uct, Persona c	reation	
Mapping of Course Outcomes with POs & PSOsPO: 03, 05, 06				
Unit II: Conce	ot Evaluation	n (CO2 & CO)	3)	(03 Hrs)
Ideation: Synectics, Analogical thinking,	Metaphors, In	nspiration from	n nature, Concept evaluation	, Concept maps.
Introduction to Process of Prototyping, ro	ugh sketches,	wireframes, di	raft layouts, paper prototype	s, Mockups with
clay, paper, wood, etc.				
Mapping of Course Outcomes with POs	s a PSUs	PO: 04, 08, 1	10	
	ototyping (C	<u>02 & CO3)</u>		(03 Hrs)
Minimum Viable Product, Proof of Conce	pts (PoC) (to	of final prote	turing: Human Easters / E	ncept in order to get
Mapping, Hi fidelity prototyping, Hord prototyping. Process of final prototyping: Human Factors / Ergonomics, Systems				
Mapping of Course Outcomes with POs & PSOs PO: 03.04.05				
Unit IV. User F	eedback (CO	3 CO4 & CO)5)	(02 Hrs)
Usability Studies and User Feedback: Use	r feedback or	product befor	e during and after usage C)bservation of
product usage in Natural settings and Observation in Laboratory/Workshop settings. User feedback evaluation.				
Mapping of Course Outcomes with POs	s & PSOs	PO: 08, 09	1	
Unit V: Busines	s Model (CO	3, CO4 & CO	05)	(03 Hrs)
Innovative Business Model (Key resources, Revenue streams, Cost structure, Customer segment, Channels to reach				
Manning of Course Outcomes with POs & PSOs PO: 06 to 11				
Croup Structure:				
1 Working in faculty monitored groups. The students plan manage and complete a task / project / activity which				
address the stated problem.				
2. There should be a of team / group of $3 - 4$ students				
2. There should be a of team / group	JIJ T SIUU	viito		

Reference Books:

1. "Design Thinking: Understanding How Designers Think and Work", Nigel Cross, Bloomsbury Publishing, 2011.

2. "Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation" Tim Brown, Harper Collins Publications, 2009

3. "Design Thinking for Visual Communication", Ranjan Nayar and Jaidip Subedi,

4. "The Design of Everyday Things", Don Norman, Basic books publications, 2013 and "Design Thinking: Creativity and Innovation" by S. Balaram, Sage Publications, 2011

5. "Sprint: How to Solve Big Problems and Test New Ideas in Just Five Days", Jake Knapp,

6. "Creative Confidence: Unleashing the Creative Potential Within Us All", Tom Kelley and David Kelley (with a foreword by Ratan Tata), HarperCollins UK Publications, 2013.

MOOC / NPTEL Courses/Other Resources:

1. https://swayam-plus.swayam2.ac.in/courses

2. https://swayam.gov.in/explorer

3. <u>https://nptel.ac.in/courses</u>

Design Thinking, Innovation and Prototyping Practical

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

CO1: Work in team to think out of box with the solid foundation of Design thinking and ideation concepts.

CO2: Create Prototype of Problem present and document the same.

Guidelines for Student's Lab Journal

- 1. Draw the diagram on blank pages. You can use colored pencils/sketch pens etc to make your work clear and presentable
- 2. The content will be written on one side ruled pages.
- **3.** The pictures can be pasted on the blank side.

Guidelines for TW Assessment (25)

- 1. 15 marks for the lab / journal work, which includes 5 marks for timely submission/task completion, 05 interest shown in the classroom and laboratory and 05 marks for file writing.
- 2. 05 marks is for theory attendance.
- **3.** 05 marks class presentations.

Guidelines for CIE (50)

1. First evaluation based on presentation to be conducted around midterm for 10 marks.

- 2. Second presentation to be conducted at the time of submission for 10 marks.
- 3. The evaluation of the submitted report for 10 marks.
- 4. The final hard prototype will be evaluated for 20 marks.

[Creativity and originality (05), Clarity and completeness (05), Justification of prototype features (05), Quality (05)]

Guidelines for Laboratory Conduction

1. Come with a completed file. 2. Ensure the file is checked regularly. 3. Participate in class/lab activities..

List of Assignments and Submission

1.	Using OIOR or some other appropriate tool redefine the problem statement
2.	Submit a completed storyboard outlining the user experience with your prototype. (both in graphical form
	and in text of 200 words) Use the relevant diagrams/flow charts/pictures.
3.	Design a function map for the persona using your product. Use the relevant diagrams/flow charts/pictures.
4.	Draw a concept Evaluation map along with a text of 200 words describing it.
5.	Write a 200 words report on the soft prototype created with the relevant diagrams/flow charts/pictures, with
	a list of features to be included in the prototype.
6.	Create a mind map for proof of concept of your idea. Explain it in 200 words.
7.	Write a detailed report of 300 words on the hard prototype created, along with the relevant diagrams/flow
	charts/pictures.
8.	Discuss user feedback on your prototype in 300 words along with the relevant diagrams/flow charts/pictures.
9.	Draw an evaluation matrix and a map of user feedback and the actions taken in 200 words.
10.	Make a Business model of your idea, giving it a title, mission etc along with its SWOT and SWOR analysis
	and the pitch.

Course Code: BCC25226AUX			
Course Name	Credit	Examination Sahar	m
The same 02 has done al		Examination Scher	
Theory: 02 hrs. / week	02	CIE: 50 Marks Torm Work : 25 M	arlza
Prerequisite Courses if any: Nil	01		laiks
Companion Course if any: Nil			
Course Objectives:			
Primary objective of the course is to g	ive students a basic understan	ding and awareness about "Fr	ntrenreneurshin" its
significance and skills required to purs	ue the same. The course also	gives an overview of process of	of building a startup
1. To introduce fundamental concep	ts of entrepreneurship		i ounding a startap.
2. To develop basic entrepreneurial	skills		
3. To foster financial and marketing	literacy for startups		
4. To understand of professional and	d ethical responsibility		
5. To acquaint with leadership and to	eamwork skills		
Course Outcomes: On completion of	the course, learner will be ab	e to -	
CO1: Identify various types of entrepr	eneurship, discuss its econom	ic impact, and outline the entr	epreneurial mindset
and characteristics of successful entrep	oreneurs		
CO2: Perform basic ideation, identify	viable opportunities, and creat	te a simple business plan, inclu	iding understanding
Key elements of a business model	options and markating strate	gios relevant to now business	a and identify wave
to reach and satisfy customers	options, and marketing strate	gies relevant to new businesse	es and identify ways
CO4 • Understand and apply ethical	principles resolve ethical d	ilemmas responsibly and red	cognize the role of
corporate social responsibility in mode	ern business.	ine interime responsibility, and rec	cognize the role of
CO5: Exhibit essential leadership qu	alities, work effectively in te	eams, manage conflicts, and r	nake sound, ethical
decisions in diverse professional settin	igs.		,
	Course Contents		
Unit I: Introduction to Entre	Unit I: Introduction to Entrepreneurship and the Entrepreneurial Mindset.(8 Hrs)		
To provide students with foundationa	l knowledge of entrepreneurs	ship, covering its role in econ	omic development,
types of entrepreneurship, and the entr	epreneurial mindset.		
Basics of Entrepreneurship: Defin	ition, characteristics, and type	es of entrepreneurship.	
• Role in Economy and Society: H	ow entrepreneurship drives in	novation and growth. Differe	ent models – Micro,
Small, and Medium Enterprises	Small, and Medium Enterprises		
• Developing an Entrepreneurial M	indset: Characteristics, and sk	ills like risk-taking, creativity	, and resilience.
• Understanding Different Domains Entrepreneurship – Techno, Social, Women, Healthcare, Education,			
Manufacturing, Defense, Agriculture, Intrapreneurship etc.			
Activities :			
2. Role play scenarios focusing on d	logision making and risk taking		
2. Role-play scenarios locusing on decision-making and risk-laking.			
Case study - Women entrepreneurs' success story / A Successful MSME			
Mapping of Course Outcomes with POs & PSOs PO6, PO7			
Unit II: The Entre	preneurial Process and Busi	ness Models	(7 Hrs)
To enable students to identify business	s opportunities, understand the	e entrepreneurial process, and	create simple
business models.			
Ideation and Opportunity Recognition	ition: Generating and evaluati	ng business ideas.	
• Feasibility and Business Planning	: Basics of market research an	nd planning.	
Business Models: Overview of va	rious models (B2B, B2C, sub	scription, etc.).	
Components of a Business Plan: H	Key elements of a simple busi	ness plan.	

Activities:

- 1. Group ideation exercise to generate start-up ideas.
- 2. Workshop on creating a simple business plan.
- 3. Role-play exercise to explain different business models to a layperson.
- 4. Interactive session on key business plan components.

Mapping of Course Outcomes with POs & PSOsPO6 – PO11Unit III: Financial and Marketing Basics for Startups7 (Hrs)

To introduce essential financial and marketing skills, including budgeting, funding sources, customer analysis, and promotional strategies tailored for startups.

- Funding Sources: Personal finance, loans, venture capital, crowdfunding.
- Financial Basics: Cash flow, budgeting, profit margins.
- Legal Basics for Entrepreneurs: Overview of business structures, contracts, and intellectual property.
- Marketing Essentials: Basics of digital marketing, social media, and branding.
- Customer Focus: Understanding and validating customer needs.
- Government e-Market Place (GeM)- Introduction, Functionality & Benefits.

Activities/ Tutorial

- 1. Simulation of a crowd funding campaign pitch.
- 2. Workshop on budgeting basics for a start-up.
- 3. Analyze a case study on profit margins.
- 4. Guest lecture on business structures and contracts.

Mapping of Course Outcomes with POs & PSOs	PO6 – PO11		
Unit IV: Professional Ethics and Corporate Social	Responsibility (CSR)	7 (Hrs)	
To help students recognize the importance of ethics in engineering and business, promoting integrity, accountability,			
and social responsibility in their professional behavior.			
• Introduction to Ethics: Importance and principles of ethics	in personal and professional life.		
• Professional and Engineering Ethics: - Ethics in management, organizational Ethics, Ethical aspects of			
Marketing, Intellectual property and Ethics			
Corporate Social Responsibility (CSR): Basics and examples.			
Common Ethical Dilemmas in Engineering and Business: Case Studies			
Activities/ Tutorial			
1. Group activity to identify unethical practices in real-world case studies.			
2. Case study analysis on ethical issues in engineering and management.			
3. Workshop on integrating CSR into business strategies.			
4. Role-play scenarios depicting ethical dilemmas.			
Mapping of Course Outcomes with POs & PSOs	PO6 – PO11		
Unit V: Leadership and Team W	ork	7 (Hrs)	
• Leadership and Team Skills: Effective communication, teamwork, and conflict resolution.			
 Compliance and Social Responsibility: Environmental and societal obligations. 			
Human Resource Management, Customer Care			
• Trends and Future Opportunities in Entrepreneurship: Emerging fields like green tech and digital transformation			
Activities/ Tutorial			

- 1. Conduct a role-play simulating leadership challenges. 2. Case study Environmental compliance in businesses.
- 3. Guest lecture / Workshop on effective customer service techniques. 4. Role-play customer service scenarios

Course Name : Entrepreneurship Skills and professional Ethics Tutorial

Course Outcomes: On completion of the course, -

CO1: Student will have awareness about each component of business.

CO2: Student will be able to define a minimum viable product for an innovative idea

Ma	Mapping of Course Outcomes with POs & PSOs : PO6 – PO11			
	Guidelines for Student's Lab Journal			
• 1	Every Experiment is to be written and completed using given template by faculty.			
	Guidelines for Lab /TW Assessment			
For	TW assessment - weightage given to			
• /	Attendance, Participation in each activity, Completion of Assignment, In time Submission			
	Guidelines for Conduction			
• 1	Minimum 10 assignments to be completed			
	List of Assignments			
	UNIT I			
1.	Create a comparative chart / info graphic poster highlighting key features of each domain (e.g., social vs. tech entrepreneurship).			
2.	Case study : Successful Women Entrepreneur / Social Entrepreneur / Any other			
	UNIT II			
1.	Conduct a group ideation exercise to generate start-up ideas. Create a mind map connecting various business opportunities in a given sector.			
2.	Conduct Market research for the initiated idea and analyse the same.			
	UNIT III			
1	Develop a mini business plan or a business model canvas for a new idea.			
2	Create a simple marketing strategy or pitch deck for a business idea.			
	UNIT IV			
1	Enlist various funding resources for a startup and create a comparative chart of advantages and disadvantages of funding sources.			
2	Study of different types of companies with significance of each. Register your hypothetical company for any suitable type. Complete hypothetically the registration process			
3	Study and Analyse different categories of IPR relevant to your business.			
	UNIT V			
1	Analyze a case study on an ethical dilemma in engineering or business. And create a visual representation			
1	(poster/video) of ethical principles.			
2	Write a report on best HR practices in startups.			
	Learning Resources			
Te	xt Books:			
1.	"Entrepreneurship Development and Management", S. S. Khanka, S. Chand Publishing, 2023.			
2.	"Fundamentals of Entrepreneurship", H. Nandan, PHI Learning, 2023.			
3. D	Engineering Etnics', C. B. Fleddermann, Pearson Education, 2023.			
Re	Ierence Books: "Innovation and Entropronounshin" D. E. Drucker, Horner Dusiness, 2022			
1.	"The Lean Startur: How Today's Entrepreneurs Use Continuous Innovation to Create Padically Successful			
۷.	Businesses" E Ries Penguin Random House 2023			
3.	"Ethics in Engineering", M. W. Martin and R. Schinzinger, McGraw-Hill Education, 2023.			
4. "Entrepreneurship", R. D. Hisrich, M. P. Peters, and D. A. Shepherd, McGraw-Hill Education, 2023.				
5. "Corporate Social Responsibility in India", S. K. Agarwal, SAGE Publications, 2023.				
MOOC / NPTEL Courses/Other Resources:				
1. "Wharton Entrepreneurship Specialization", University of Pennsylvania, Coursera, 2023.				
2. "Global Impact: Business Ethics", University of Illinois, Coursera, 2023.				
3. "Entrepreneurship Development Program (EDP)", Thought Power, YouTube, 2023. Available:				
https://www.youtube.com/watch?v=pseWtIpC5ko&t=3s.				

Course code: BCC25227A0X			
Course Name - LIFE SKILLS & LIBERAL LEARNING			
Teaching Scheme:	Credit	Examination Scheme:	
Practical: 02 Hrs. / Week	01	Term Work: 25 Marks	
Prerequisite Courses, if any: NIL			
Companion Course, if any: NIL			
		110 114	

Course Objectives: Students are required to go through the list of following Co-curricular Courses and select any one of their interests. They will be allocated one course from the list. Experts from respective course will conduct classes on campus / online through activities, discussions, presentations, and lecture methods.

Students are required to submit hard copy of a report on the activities performed related to topics of opted Co-curricular Course. If student is doing course online on Swayam, NPTEL platform, submission of completion / grade certificate is mandatory. Evaluation will be done based on the report of activities submitted by student. Faculty members will be allotted for mentoring the activities related to Co-curricular Courses. They will frame the activities list to be performed by students with the help of experts in respective course. Continuous evaluation will be done for term work marks.

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

CO1: Understand basic concept of the selected course.

CO2: Learn co-curricular course that aligns his / her interest.

CO3: Enrich educational experience.

CO4: Explore strengths and talents outside of academics

PO Mapped : PO8, PO9

Basket of Co-curricular Course:

- 1. Yoga and Meditation
- 2. Dancing
- 3. Singing
- 4. Basics of Music Composition
- 5. Painting
- 6. Photography
- 7. Short Film making / Cinematography
- 8. Green Initiatives
- 9. Applied Arts
- 10. Applied Writing Skills
- 11. NCC
- 12. NSS

Here are some tips and ideas to help you choose the right courses

Consider Your Interests and Hobbies. Think about what you enjoy doing in your free time or what activities you have always wanted to try. Co-curricular courses can be a great opportunity to pursue passions outside your major.
 Explore Different Fields. Choosing courses from different areas can provide a well-rounded experience.

3. Balance Your Schedule Ensure that the co-curricular courses fit well with your academic schedule and personal commitments. Avoid overloading yourself, as these courses should enhance your experience, not add undue stress.

4. Look at Course Benefits Some co-curricular courses offer skills that can be beneficial in your future career or personal development.

5. Consult with Advisors or Seniors Talking to academic advisors, professors, or senior students can give you insights into which courses are popular, have good instructors, or offer valuable experience

- MOOC / NPTEL Courses/Other Resources:
- 1. https://swayam-plus.swayam2.ac.in/courses
- 2. https://swayam.gov.in/explorer
- 3. <u>https://nptel.ac.in/courses</u>

Course Code: BCC25228A0X			
Course Name: The Constitution of India			
Teaching Scheme:	Credits	Examination Scheme:	
Online Learning, Presentations,	(Mandatory Non-Credit Course)	Audit Course	
MOOC courses, Guest lectures,			
Hands-on Assignments, Team			
Activities etc			
Prerequisite Courses, if any: Nil			
Companion Course, if any: Nil			
Course Objectives:			
1. To learn and understand the democra	acy and its advantages.		
2. To learn and understand parliamenta	ry system and its working		
3. To learn and understand provisions r	nade in Constitution of India.		
4. To learn and understand constitution	s of other Countries and global perspe	ective.	
Course Outcomes: On completion of th	e course, learner will be able to –		
CO1: Explain various aspects of democr	acy and parliamentary system		
CO2: Understand and explain various as	pects of constitution of India		
CO3: Apply the concepts of Sustainable	Development Goals in his life and we	ork.	
	UNIT 1: Democracy		
Society, Nation and its constitution, Vari	ous Definitions of democracy, Definit	tion of Democracy in Indian context,	
Dimensions of Democracy- Social, Econ	omic, and Political		
Necessary conditions for successful work	king of democracy		
	UNIT 2: Parliamentary system		
Parliamentary system of democracy, Pill	ars of Indian democracy,		
Separation of power, Elections: Politic	cal party- Registration, Rules for Re	ecognition, Delimitation Commission:	
	UNIT 3: The Constitution of India		
Preamble, Overview of The Constitution	of India (COI). Definition of State. F	undamental rights, Fundamental duties,	
Directive Principles of state policies, The	emes for understanding our Constitution	on, Constitutional morality	
UN	IT 4: Amendment of The Constitution	on	
Basic structure doctrine, Power of Parliament to amend the Constitution and procedure therefor, Procedure for			
Amendment of The Constitution before and after 42 nd Amendment			
Case studies: Self case study of 24 th and 42 nd Amendment.			
UNIT 5: Comparative studies			
Constituent Assembly of India and Const	tituent assembly of Pakiston		
Constitution and situations in neighboring countries like Pakistan, Bangladesh Nenal etc.			
UNIT 6: Global perspective			
Human and Sustainable Development, Global goals for Sustainable development and The Constitution of India.			
Challenges for India and its solutions within constitutional framework. COI & PESTLE analysis			
Hands-on Assignments:			
Group-A Assignments			
Assignment 1. Translate the Preamble of The Constitution of India in any Indian language.			
Assignment 2. Visit: https://secure.mygov.in/read-the-preamble-india			
Get the online GOI Certificate			
Inform. Motivate, help your friends and relatives for getting certificate			
Email copy of certificate to: HOD and Fa	aculty in-charge		
L			
Dept of E&TC, AIT Pune, FY BTech E&T	FC 2025 Pattern Syllabus	Page 60	

Assignment 3. Download the copy of The Constitution of India from Union Govt. web site.

https://legislative.gov.in/constitution-of-india

Read titles of articles, Prepare Hand-written or Softcopy of only titles of all articles and Schedules.

Find which article is repeated in which parts of our Constitution. Read and translate this article in any Indian language

Group B Assignments (Any one)

1. Prepare Street play script and perform Street play for enlightenment on the subjects related to The Constitution of India (Minimum. 5 Min., Max. 15 Min.) [Team work]

2. Making movie for enlightenment on the subjects related to The Constitution of India (Minimum. 5 Min., Max. 15 Min.) [Team work]

3. Prepare and deliver written speech on The Constitution of India (Minimum. 5 Min., Max. 15 Min.)

Group C Assignments (Optional Extra Co-curricular)

Create/Join AIT_FE Constitution Club2025 WhatsApp group of your class

Create/Join AIT_FE Constitution Club2025 Facebook/twitter/social media group/page of your class

Regularly read/write posts about COI

References:

- 1. "The Constitution of India", Gov. of India, Government of India, 2023.
- 2. "Introduction to the Constitution of India", D. D. Basu, Prentice Hall of India, 2023.
- 3. "Debate and Discussion in the Constituent Assembly", Gov. of India, Different Volumes, Government of India, 2023.

4. "Democracy and Constitutionalism in India", S. Krishnaswamy, Oxford University Press, 2023.

- 5. "You Must Know Your Constitution", F. S. Nariman, [Publisher Name], 2023.
- 6. "Sustainable Development Goals", United Nations, Available: https://sdgs.un.org/, 2023.
- 7. "www.constitutionofindia.net", Constitution of India, Available: https://www.constitutionofindia.net, 2023.
- 8 "Recommended MOOC Courses on the Subject by Board of Studies, Available: [Course Platform if applicable]