Er. PERUMAL MANIMEKALAI COLLEGE OF ENGINEERING

(An Autonomous Institution – Affiliated to Anna University, Chennai)

Koneripalli, Hosur – 635117.

PMC TECH

INSPIRE TO INNOVATE

ACADEMIC REGULATIONS 2023 (R23)

Curriculum and Syllabi

(Version 1)

B.E. AERONAUTICAL ENGINEERING

(Applicable from 2023 -24 onwards)

REGULATIONS 2023 - AUTONOMOUS

CHOICE BASED CREDIT SYSTEM
B. E. AERONAUTICAL ENGINEERING

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO-1: Professional Knowledge:

Aeronautical Engineering Graduates will have the ability to apply knowledge and skills across the disciplines and in emerging areas of Aerospace Engineering for higher studies, research, employability and product development.

PEO-2: Leadership Skills:

Graduates possess academic excellence, managerial skills and leadership qualities & understand the need for lifelong learning for a successful professional career.

PEO-3: Attitude Development:

Graduates will have the communication skills, sense of responsibility to protect the environment and ethical conduct towards their profession and commitment to serve the society.

PROGRAM OUTCOMES (POs)

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering Problems.
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health, safety, cultural, societal and environmental considerations.
4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis, and interpretation of data and synthesis of the information to provide valid conclusions.

5. **Modern tool usage**: Create, select, apply appropriate techniques, resources, modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal, environmental contexts, demonstrate the knowledge and need for sustainable development.
8. **Ethics**: Apply ethical principles, commit to professional ethics, responsibilities and norms of the engineering practice.
9. **Individual and team work**: Function effectively as an individual, as a member or leader in diverse teams and in multidisciplinary settings.
10. **Communication**: Communicate effectively on complex engineering activities with the engineering community with society at large being able to comprehend, write effective reports, design documentation, make effective presentations and receive clear instructions.
11. **Project management and finance**: Demonstrate knowledge, understanding of the engineering and management and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning**: Recognize the need, ability to engage in independent and lifelong learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO 1: Professional Skills: An Engineer capable to exploit the knowledge of Aeronautical Engineering to provide solution to real world problems and passion for innovation towards design and development of new products.

PSO 2: Problem-solving skills:
Utilization of Computer-aided Engineering packages and simulation softwares to design, analyse and optimize the components of airworthiness for flight vehicles.

PEO's – PO's& PSO's MAPPING:

PEO	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
PEO1	3	3	3	3	3	1	2	2	2	2	1	2	3	2
PEO2	3	3	3	3	3	2	2	2	2	2	1	2	3	2
PEO3	3	3	3	2	3	1	2	2	2	2	1	2	3	2

REGULATIONS 2023 – AUTONOMOUS

CHOICE BASED CREDIT SYSTEM
DEPARTMENT OF AERONAUTICAL ENGINEERING
CURRICULUM FOR I TO VIII SEMESTERS

SEMESTER – I

S. NO.	COURSE CODE	COURSE NAME	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
0.		Induction Program – 2 Weeks	-	-	-	-	-	0
THEORY								
1.	PUCC1HM01	Professional English - I	HM	2	-	-	2	2
2.	PUCC1BS01	Matrices and Calculus	BS	3	1	-	4	4
3.	PUCC1BS02	Engineering Physics	BS	3	-	-	3	3
4.	PUCC1BS03	Engineering Chemistry	BS	3	-	-	3	3
5.	PUCC1BE01	Engineering Graphics	BE	2	4	-	6	4
6.	PUCC1HM02	Heritage of Tamils தமிழர்மரபு	HM	1	-	-	1	1
PRACTICALS								
7.	PUCC1PL01	Professional English - I	HM	-	-	4	4	2
8.	PUCC1PL02	Physics and Chemistry Laboratory	BS	-	-	4	4	2
9.	PUCC1HM03	Wellness	HM	-	-	1	1	0
Total				**14**	**5**	**9**	**28**	**21**

SEMESTER - II

S. NO.	COURSE CODE	COURSE NAME	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	PUCC2HM04	Professional English-II	HM	2	-	-	2	2
2.	PUCC2BS04	Statistics and Numerical Methods	BS	3	1	-	4	4
3.	PUCC2BS05	Engineering Materials	BS	3	-	-	3	3
4.	PUMT2BE02	Basic Concepts of Mechatronics	BE	3	-	-	3	3
5.	PUCC2BE03	Basic Electrical & Electronics Engineering	BE	3	-	-	3	3
6.	PUCC2BE04	Problem Solving using Python Programming	BE	2	-	-	2	2
7.	PUCC2HM05	Tamils and Technology தமிழரும் தொழில்நுட்பமும்	HM	1	-	-	1	1
PRACTICALS								
8.	PUCC2PL03	Professional English – II Laboratory	HM	-	-	4	4	2
9.	PUCC2PL04	Problem Solving using Python Programming Laboratory	BE	-	-	4	4	2
10.	PUCC2PL05	Civil and Mechanical Engineering Practices	BE	-	-	2	2	1
11.	PUCC2PL06	Electrical and Electronics Engineering Practices	BE	-	-	2	2	1
12.	PUCC2HM06	Wellness	HM	-	-	1	1	0
Total				**17**	**1**	**13**	**31**	**24**

SEMESTER - III

S.NO.	COURSE CODE	COURSE NAME	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	PUCC3BS06	Transforms and Partial Differential Equations	BS	3	1	-	4	4
2.	PUAE3PC01	Fundamentals of Aeronautical Engineering	PC	3	-	-	3	3
3.	PUAE3PC02	Aero Engineering Thermodynamics	PC	3	-	-	3	3
4.	PUCE3PC01	Fluid Mechanics and Machinery	BE	3	1	-	4	4
5.	PUCE3PC03	Strength of Materials	BE	3	1	-	4	4
6.	PUCC3MCXX	Mandatory Course – I (Non-Credit)	MC	2	-	-	2	0
PRACTICALS								
7.	PUAE3PL01	Thermodynamics and Strength of Materials Laboratory	PC	-	-	4	4	2
8.	PUCE3PL02	Fluid Mechanics and Machinery Laboratory	BE	-	-	4	4	2
9.	PUCC3HM07	Extension Activities	HM	-	-	1	1	0
Total				17	3	9	29	22

SEMESTER - IV

S.NO	COURSE CODE	COURSE NAME	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	PUCC4BS07	Environmental Science & Sustainability	BS	3	-	-	3	3
2.	PUAE4PC03	Aerodynamics - I	PC	3	-	-	3	3
3.	PUAE4PC04	Air Breathing Propulsion	PC	3	-	-	3	3
4.	PUAE4PC05	UAV Systems and Design	PC	3	-	-	3	3
5.	PUAE4PC06	Aircraft Systems and Instrumentation	PC	3	-	-	3	3
6.	PUCC4MCXX	Mandatory Course – II (Non-Credit)	MC	2	-	-	2	0
PRACTICALS								
7.	PUAE4PL02	Aerodynamics Laboratory	PC	-	-	4	4	2
8.	PUAE4PL03	Aircraft Propulsion Laboratory	PC	-	-	4	4	2
9.	PUCC4HM08	Extension Activities	HM	-	-	1	1	0
10.	PUAE4IP01	In-plant Training / Internship	SD	-	-	-	-	-
Total				17	-	9	26	19

- In-Plant-Training/Internship – 2 Weeks of training each during 4th/5th/6th Semester – During college hours or semester vacation
- Total 4 weeks of Training – 2 Credits

SEMESTER –V

S.NO.	COURSE CODE	COURSE NAME	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	PUCC5HM09	Universal Human Values & Ethics	HM	3	-	-	3	3
2.	PUAE5PC07	Rocket Propulsion	PC	3	-	-	3	3
3.	PUAE5PC08	Aerodynamics -II	PC	3	-	-	3	3
4.	PUAE5PC09	Aircraft Structures	PC	3	1	-	4	4
5.	PUAE5PEXX	Professional Elective – I	PE	3	-	-	3	3
6.	PUAE5IL01	Industry Lecture -I	SD	1	-	-	1	0
PRACTICALS								
7.	PUAE5PL04	Aircraft Structures Laboratory	PC	-	-	4	4	2
8.	PUAE5PL05	CAD Laboratory	PC	-	-	4	4	2
9.	PUCC5PD01	Professional Development - I	SD	-	-	2	2	1
10.	PUAE5IP02	In-plant Training / Internship	SD	-	-	-	-	-
		Total		16	1	10	27	21

- In-Plant Training/ Internship – 2 Weeks of training each during 4th/5th/6th Semester – During college hours or semester vacation, Total 4 weeks of Training – 2 Credits

SEMESTER - VI

S.NO.	COURSE CODE	COURSE NAME	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	PUAE6PC10	Flight Dynamics	PC	3	1	-	4	4
2.	PUAE6PC11	Aircraft Design	PC	3	-	2	5	4
3.	PUAE6PC12	Finite Element Analysis	PC	3	-	-	3	3
4.	PUAE6PEXX	Professional Elective – II	PE	3	-	-	3	3
5.		Open Elective – I / Management	OE	3	-	-	3	3
6.	PUAE6IL02	Industry Lecture -II	SD	1	-	-	1	0
PRACTICALS								
7.	PUAE6PL06	Aircraft Systems Laboratory	PC	-	-	4	4	2
8.	PUCC6PD02	Professional Development - II	SD	-	-	2	2	1
9.	PUAE6VA01	Technical Skill Development – I	SD	-	-	2	2	1
10.	PUAE6IT02	In-plant Training / Internship	SD	-	-	-	-	-
11.	PUAE6PL06	Aircraft Systems Laboratory	PC	-	-	4	4	2
		Total		**16**	**1**	**10**	**27**	**21**

- In-plant-Training / Internship – 2 Weeks of training each during 4th/5th/6th Semester – During college hours or semester vacation, Total 4 weeks of Training – 2 Credits.
- Open Elective-I has to be chosen from the Management verticals

SEMESTER - VII

S.NO.	COURSE CODE	COURSE NAME	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	PUAE7PC13	Aviation Management	PC	3	-	-	3	3
2.	PUAE7PC14	Avionics	PC	3	-	-	3	3
3.	PUAE7PC15	Computational Fluid Dynamics	PC	3	-	-	3	3
4.	PUAE7PEXX	Professional Elective – III	PE	3	-	-	3	3
5.	PUAE7PEXX	Professional Elective – IV	PE	3	-	-	3	3
6.		Open Elective – II	OE	3	-	-	3	3
PRACTICAL								
7.	PUAE7PL07	Avionics Lab	PC	-	-	4	4	2
8.	PUAE7PL08	Computational and simulation Laboratory	PC	-	-	4	4	2
9.	PUAE7VA02	Technical Skill Development - II	SD	-	-	2	2	1
10.	PUAE7PR01	Project Phase – I	PR	-	-	2	2	1
Total				**18**	**0**	**12**	**30**	**24**

SEMESTER – VIII

S.NO.	COURSE CODE	COURSE NAME	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	PUAE8PR02	Project Phase – II / Internship	PR	-	-	24	24	10
Total				**-**	**-**	**24**	**24**	**10**

- Project Phase – II – Mandatory
- Internship – Optional (Preferred) - 3 Months to 6 Months

MANDATORY COURSES – I (Semester-III)

S.NO.	COURSE CODE	COURSE NAME	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	PUCC3MC01	Women and Gender Studies	MC	3	0	0	3	0
2.	PUCC3MC02	Elements of Literature	MC	3	0	0	3	0
3.	PUCC3MC03	Film Appreciation	MC	3	0	0	3	0
4.	PUCC3MC04	The Constitution of India	MC	3	0	0	3	0

MANDATORY COURSES – II (Semester-IV)

S.NO.	COURSE CODE	COURSE NAME	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	PUCC4MC01	Practices For Well Being	MC	3	0	0	3	0
2.	PUCC4MC02	History of Science And Technology In India	MC	3	0	0	3	0
3.	PUCC4MC03	Political and Economic Thought For a Humane Society	MC	3	0	0	3	0
4.	PUCC4MC04	Sociology, Society And Culture	MC	3	0	0	3	0

SUMMARY

B.E. AERONAUTICAL ENGINEERING										
S.NO	Subject Area	I	II	III	IV	V	VI	VII	VIII	Total Credits
		Credits Per Semester								
1	HM	5	5	-	-	3	-	-	-	13
2	BS	12	7	4	3	-	-	-	-	26
3	BE	4	12	10	-	-	-	-	-	26
4	PC	-	-	8	16	14	13	13	-	64
5	PE	-	-	-	-	3	3	6	-	12
6	OE	-	-	-	-	-	3	3	-	6
7	PR	-	-	-	-	-	-	1	10	11
8	MC	-	-	0	0	-	-	-	-	0
9	SD	-	-	-	-	1	2	1	-	4
Total		21	24	22	22	21	21	19	12	162

TOTAL NUMBER OF CREDITS TO BE EARNED FOR AWARD OF THE DEGREE = 162

HM	Humanities, Management, Wellness & Extension
BS	Basic Science
BE	Basic Engineering
PC	Professional Core
PE	Professional Elective
OE	Open Elective, Industrial Lecture, Value added courses
MC	Mandatory Non-Credit
PR	Project
PD	Professional Development, In-plant Training/Internship, Industry Lecture, Value Added Courses

SEMESTER – I

S. NO.	COURSE CODE	COURSE NAME	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
0.		Induction Program – 2 Weeks	-	-	-	-	-	0
THEORY								
1.	PUCC1HM01	Professional English - I	HM	2	-	-	2	2
2.	PUCC1BS01	Matrices and Calculus	BS	3	1	-	4	4
3.	PUCC1BS02	Engineering Physics	BS	3	-	-	3	3
4.	PUCC1BS03	Engineering Chemistry	BS	3	-	-	3	3
5.	PUCC1BE01	Engineering Graphics	BE	2	4	-	6	4
6.	PUCC1HM02	Heritage of Tamils தமிழர்மரபு	HM	1	-	-	1	1
PRACTICALS								
7.	PUCC1PL01	Professional English - I	HM	-	-	4	4	2
8.	PUCC1PL02	Physics and Chemistry Laboratory	BS	-	-	4	4	2
9.	PUCC1HM03	Wellness	HM	-	-	1	1	0
Total				**14**	**5**	**9**	**28**	**21**

SYLLABUS FOR SEMESTER- I

PUCC1HM01	PROFESSIONAL ENGLISH I	L T P C
		2 0 0 2

COURSE OBJECTIVE

- Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Listening, Speaking, Reading and Writing skills.
- Equip students to study academic subjects more effectively by using the theoretical and practical components of English syllabus
- Develop communication skills in formal and informal situations.

UNIT I: INTRODUCTION TO COMMUNICATION 6

EFFECTIVE COMMUNICATION :
What is effective communication? (Explain using activities) What are the seven C's of effective communication? What are key language skills? What is LSRW? How does one develop language and communication skills?

FUNDAMENTALS OF COMMUNICATION :
Reading - Reading brochures (technical context), telephone messages / social media messages relevant to technical contexts and emails. Writing - Writing emails / letters introducing oneself. Grammar - Present Tense (simple and progressive); Question types: Wh/ Yes or No/ and Tags. Vocabulary - Synonyms and Antonyms, Abbreviations & Acronyms (as used in technical contexts).

UNIT II: NARRATION AND SUMMATION 6

Reading - Reading biographies, travelogues, newspaper reports, Excerpts from literature, and travel & technical blogs. Writing - Guided writing-- Paragraph writing Short Report on an event (field trip etc.) Grammar –Past tense (simple); Subject-Verb Agreement; and Prepositions. Vocabulary - Word forms (prefixes& suffixes); Phrasal verbs

UNIT III: DESCRIPTION OF A PROCESS / PRODUCT 6

Reading — Reading advertisements, gadget reviews; user manuals. Writing - Writing definitions; instructions; and Product /Process description. Grammar - Imperatives; Adjectives; Degrees of comparison; Present & Past Perfect Tenses. Vocabulary - Compound Nouns, Homonyms; and Homophones, discourse markers (connectives & sequence words).

UNIT IV: CLASSIFICATION AND RECOMMENDATIONS 6

Reading — Newspaper articles; Journal reports –and Non Verbal Communication (tables, pie charts etc...). Writing — Note-making / Note-taking (*Study skills to be taught, not tested); Writing recommendations; Transferring information from non-verbal (chart, graph etc, to verbal mode) Grammar — Articles; Pronouns - Possessive & Relative pronouns. Vocabulary - Collocations; Fixed / Semi fixed expressions.

UNIT V: EXPRESSION 6

Reading – Reading editorials; and Opinion Blogs; Writing – Essay Writing (Descriptive or narrative). Grammar – Future Tenses, Punctuation; Negation (Statements & Questions); and Simple, Compound & Complex Sentences. Vocabulary - Cause & Effect Expressions – Content vs Function words.

TOTAL: 30 PERIODS

AE 11

COURSE OUTCOMES:

COURSE OUTCOMES	Upon completion of this course, the student will be able to	Cognitive Level
CO1	Apply Elements of communication to LSRW on self-introduction and introduction of others	Apply
CO2	Comprehend Complex academic texts for narrating experience and events	Understand
CO3	Describe nonverbal process and products transferring into verbal texts	Understand
CO4	Prepare Journal reports and newspaper article	Apply
CO5	Write descriptive and narrative essay	Apply

CO – PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	-	-	-	-	-	3	-	2	3	3	1	3	-	-
2	-	-	-	-	-	2	-	1	3	3	-	3	-	-
3	-	-	-	-	-	2	-	2	3	3	-	3	-	-
4	-	-	-	-	-	2	-	1	3	3	1	3	-	-
5	-	-	-	-	-	1	-	1	2	2	-	1	-	-

1-low, 2-medium, 3-high, '-' - no correlation

TEXT BOOK:

1. Faculty, Department of English, Anna University, English for Engineers & Technologists, Orient Blackswan Private Ltd. 2020
2. Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Joevani Department of English, Anna University.,English for Science & Technology, Cambridge University Press, 2021.

REFERENCES:

1. Meenakshi Raman & Sangeeta Sharma ,Technical Communication – Principles And Practices , Oxford Univ. Press, New Delhi. 2016,
2. M. Ashraf Rizvi, Effective Technical Communication,Mc Graw Hill, 2017
3. Michael Swan, Practical English Usage, Oxford, 2016
4. N P Sudharshana , C Savitha),English for Engineers, Cambridge University Press,2018
5. Sajitha Jai Prakash, Sowmya JAyaprakash, Technical Communication English – I, Himalaya Publishing House, 2018

WEBSITE REFERENCE:

1. http://www.indiabix.com/group-discussion/topics-with-answers/
2. http://www.dailywriting **tips .com/**

NPTEL/ SWAYAM/ MOOC REFERENCE:

1. https://digimat.in/nptel/courses/video/109106067/L04.html (better Spoken English)
2. https://onlinecourses.nptel.ac.in/noc20_hs14/preview (speak effectively)

PUCC1BS01	MATRICES AND CALCULUS	L T P C
		3 1 0 4

COURSE OBJECTIVE

- To develop the use of matrix algebra techniques that are needed by engineers for practical applications.
- To familiarize the students with differential calculus.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To make the students understand various techniques of integration.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications.

UNIT I: MATRICES **9+3**

Types of matrices- Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors - Cayley - Hamilton theorem- Reduction of a quadratic form to canonical form by orthogonal transformation-Nature of quadratic-Application: Stretching of an elastic membrane.

UNIT II DIFFERENTIAL CALCULUS **9+3**

Representation of functions - Limit of a function-L-Hospital rule - Continuity - Derivatives - Differentiation rules (sum, product, quotient, chain rules) - Implicit differentiation - Logarithmic differentiation- Applications: Maxima and Minima of functions of one variable-production quantity for optimization technique-volume optimization of cone circumscribed around the sphere-rectangular fencing problems (Not for Examination).

UNIT III - FUNCTIONS OF SEVERAL VARIABLES **9+3**

Partial differentiation – Homogeneous functions and Euler's theorem – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables – Applications: Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers. Applications: Find the size of the rectangular prism which gives minimum surface area for fixed volume. Find the breadth and depth of the rectangular beam cut from a cylindrical rod for maximum strength.

UNIT IV - INTEGRAL CALCULUS **9+3**

Definite and Indefinite integrals - Substitution rule - Techniques of Integration: Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction - Improper integrals - Applications: Hydrostatic force and pressure, moments and centers of mass.

UNIT - V: MULTIPLE INTEGRALS **9+3**

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Applications: Moments and centres of mass, moment of inertia.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

COURSE OUTCOMES	Upon completion of this course, the student will be able to	Cognitive Level
CO1	Use the matrix algebra methods for solving practical problems	Apply
CO2	Apply differential calculus tools in solving various application problems	Apply
CO3	Able to analyze differential calculus ideas on several variable functions.	Analyze
CO4	Apply different methods of integration in solving practical problems.	Apply
CO5	Apply multiple integral ideas in solving areas, volumes and other practical problem	Apply

CO – PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	2	2	-	-	-	-	-	-	-	1	3	3
2	3	3	3	2	-	-	-	-	-	-	-	1	3	3
3	3	3	-	3	-	-	-	-	-	-	-	1	3	3
4	3	3	2	2	-	-	-	-	-	-	-	1	3	3
5	3	3	2	-	-	-	-	-	-	-	-	1	3	3

1-low, 2-medium, 3-high, '-' - no correlation

TEXT BOOK:

1. Kreyszig.E, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2016.

REFERENCES:

1. Anton. H, Bivens. I and Davis. S, "Calculus", Wiley, 10th Edition, 2016
2. Jain . R.K. and Iyengar. S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 5th Edition, 2016.
3. Ramana. B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi, 2016.
4. Thomas. G. B., Hass. J, and Weir. M.D, "Thomas Calculus", 14th Edition, Pearson India, 2018.

WEBSITE REFERENCE:

1. https://3lihandam69.files.wordpress.com/2018/10/calculus-10th-edition-anton.pdf - Calculus 10th Edition anton.pdf
2. https://www.hzu.edu.in/engineering/Higher%20Engineering%20Mathematics.pdf - Higher Engineering Mathematics, Sixth Edition
3. https://dl.konkur.in/post/Book/Paye/Thomas-Calculus-14th-Edition-%5Bkonkur.in%5D.pdf

https://archive.org/details/advanced-engneering-maths - High advanced Engineering Mathematics

NPTEL/ SWAYAM/ MOOC REFERENCE:

1. NPTEL: Matrix theory, Prof.Chandra, R. Murthy Indian institute of Science -Bangalore.
2. NPTEL: Basic Calculus, Prof. Arindama Singh Department of Mathematics -IIT Madras
3. SWAYAM: Online course – Integral and Vector Calculus, Prof.Hari Shankar Mahato, IIT -Kharagpur.

PUCC1BS02	ENGINEERING PHYSICS	L T P C
		3 0 0 3

COURSE OBJECTIVE

- To make the students effectively to achieve an understanding of mechanics.
- To enable the students to gain knowledge of electromagnetic waves and its applications.
- To introduce the basics of oscillations, optics and lasers.
- Equipping the students to be successfully understand the importance of quantum physics.
- To motivate the students towards the applications of quantum mechanics.

UNIT I MECHANICS 9

Multi-particle dynamics: Center of mass (CM) – CM of continuous bodies – motion of the CM – kinetic energy of system of particles. Rotation of rigid bodies: Rotational kinematics – rotational kinetic energy and moment of inertia - theorems of M .I – moment of inertia of continuous bodies – Radius of gyration – M.I of a diatomic molecule - rotational energy state of a rigid diatomic molecule - torque – conservation of angular momentum – gyroscope - torsional pendulum.

UNIT II ELECTROMAGNETIC WAVES 9

The Maxwell's equations - wave equation; Plane electromagnetic waves in vacuum, Conditions on the wave field - properties of electromagnetic waves: speed, amplitude, phase, orientation and waves in matter - Producing electromagnetic waves - Energy and momentum in EM waves: Intensity, momentum and radiation pressure - Cell-phone reception - Reflection and transmission of electromagnetic waves from a non-conducting medium-vacuum interface for normal incidence.

UNIT III OSCILLATIONS, OPTICS AND LASERS 9

Simple harmonic motion - resonance - waves on a string - standing waves - traveling waves – Energy transfer of a wave - sound waves - Doppler effect - reflection and refraction of light waves – total internal reflection - interference - interferometers - air wedge experiment. Theory of laser - characteristics - Spontaneous and stimulated emission - Einstein's coefficients – population inversion - Nd-YAG laser, CO_2 laser, semiconductor laser - Basic applications of lasers in industry.

UNIT IV BASIC QUANTUM MECHANICS 9

Photons and light waves - Electrons and matter waves –Compton effect - The Schrodinger equation (Time dependent and time independent forms) - meaning of wave function - Normalization –Free particle - particle in a infinite potential well: 1D,2D and 3D Boxes- Normalization, probabilities and the correspondence principle

UNIT V APPLIED QUANTUM MECHANICS 9

The harmonic oscillator(qualitative)- Barrier penetration and quantum tunneling(qualitative)- Tunneling microscope - Resonant diode - Finite potential wells (qualitative)- Bloch's theorem for particles in a periodic potential –Kronig-Penney model and origin of energy bands.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

COURSE OUTCOMES	Upon completion of this course, the student will be able to	Cognitive Level
CO1	Comprehend the basics and importance of mechanics	Understand
CO2	Illustrate the properties of electromagnetic waves and its propagation in vacuum and medium.	Understand
CO3	Demonstrate a strong foundational knowledge in oscillations, optics and lasers	Understand
CO4	Explain the concepts of quantum physics	Understand
CO5	Comprehend and apply quantum mechanical principles towards the formation of energy bands	Understand

CO – PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	2	-	-	-	-	-	-	-	--	1	3	2
2	3	3	1	1	1	1	-	-	-	-	-	-	3	3
3	3	2	2	-	1	1	-	-	-	-	-	1	3	2
4	3	3	1	1	-	-	-	-	-	-	-	-	3	3
5	3	3	2	-	2	-	-	-	-	-	-	-	3	3

1-low, 2-medium, 3-high, '-' - no correlation

NPTEL/ SWAYAM/ WEBSITE REFERENCE:

1. https://nptel.ac.in/courses/112104114 - Dynamics of Machines, IIT Kanpur, Prof. Amitabha Ghosh
2. https://onlinecourses.nptel.ac.in/noc19_ph08/preview - Introduction to Electromagnetic Theory by Dr. Manoj Kumar Harbola, IIT Kanpur
3. https://nptel.ac.in/courses/115105104, Modern Optics, IIT Kharagpur, Prof. Partha Roy Choudhury
4. https://archive.nptel.ac.in/courses/115/106/115106119/ - Waves & Oscillations, Coordinated by IIT Madras

PUCC1BS03	ENGINEERING CHEMISTRY	L T P C
		3 0 0 3

COURSE OBJECTIVE

- To inculcate sound understanding of water quality parameters and water treatment techniques.
- To impart knowledge on the basic principles and properties of polymers and composites
- To introduce the basic concepts of corrosion, alloys and corrosion preventive methods
- To facilitate the understanding of different type of fuels, their preparation, properties and combustion characteristics.
- To familiarize the students with the operating principles, working processes, applications of energy conversion and storage devices.

UNIT I WATER AND ITS TREATMENT **9**

Water: Sources and impurities, Water quality parameters: Definition and significance of - colour, odour, turbidity, pH, hardness, alkalinity, TDS, COD and BOD, fluoride and arsenic. Hardness – types: temporary and permanent – expression of hardness in terms of $CaCO_3$. Municipal water treatment: primary treatment and disinfection (UV, Ozonation, break-point chlorination). Boiler troubles: Scale and sludge, Boiler corrosion, Caustic embrittlement, Priming & foaming. Treatment of boiler feed water: Internal treatment (phosphate, colloidal, sodium aluminate and Calgon conditioning) and External treatment – Ion exchange demineralization and zeolite process. Desalination of brackish water: Reverse Osmosis.

UNIT II POLYMER CHEMISTRY AND COMPOSITES **9**

Polymers-definition-types: thermoplastics and thermosetting plastics, polymerization-types-addition and condensation polymerization-free radical polymerization mechanism-Plastics, classification-preparation, properties and uses of PVC, Teflon, polycarbonate, nylon 6,6, PET-Rubber- types- synthetic rubber-butyl rubber- vulcanization of rubber, Composites-definition, types polymer matrix composites-FRP only

UNIT III CORROSION AND ALLOYS **9**

CORROSION: causes- factors- types- chemical, electrochemical corrosion (galvanic, differential aeration), corrosion control - material selection and design aspects – electrochemical protection – sacrificial anode method and impressed current cathodic method.

ALLOYS: Introduction- Definition- Properties of alloys- Significance of alloying, Functions and effect of alloying elements- Ferrous alloys- Nichrome and Stainless steel – heat treatment of steel; Non-ferrous alloys – brass and bronze.

UNIT IV FUELS AND COMBUSTION **9**

FUELS: Introduction: Classification of fuels; Coal and coke: Analysis of coal (proximate and ultimate), Carbonization, Manufacture of metallurgical coke (Otto Hoffmann method). Petroleum and Diesel: Manufacture of synthetic petrol (Bergius process), Knocking - octane number, diesel oil – cetane number; Power alcohol and biodiesel.

COMBUSTION OF FUELS: Introduction: Calorific value - higher and lower calorific values, Ignition temperature: spontaneous ignition temperature, Explosive range; Flue gas analysis-ORSAT Method. CO_2 emission and carbon foot print.

UNIT V: ENERGY SOURCES AND STORAGE DEVICES **9**

NUCLEAR ENERGY: light water nuclear power plant, breeder reactor. Solar energy conversion: Principle, working and applications of solar cells; Recent developments in solar cell materials. Wind energy; Geothermal energy.

BATTERIES: Types of batteries, Primary battery- dry cell, Secondary battery-lead acid battery and lithium-ion- battery; Electric vehicles – working principles; Fuel cells: H2-O2 fuel cell, microbial fuel cell; Super capacitors: Storage principle, types and examples.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

COURSE OUTCOMES	Upon completion of this course, the student will be able to	Cognitive Level
CO1	Explain the types of water and water treatment techniques	Understand
CO2	Demonstrate the knowledge of polymers and composites	Understand
CO3	Apply the knowledge of corrosion and alloys	Understand
CO4	Explain the types of fuels and the manufacturing of secondary fuels	Understand
CO5	Illustrate the types of energy sources	Understand

CO – PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	1	1	1	1	1	1	-	1	-	2	3	2
2	3	2	1	1	1	1	1	1	-	1	-	2	3	2
3	3	2	1	1	1	1	1	1	-	1	-	2	3	2
4	3	2	2	1	1	1	2	1	-	1	-	2	3	2
5	3	2	2	1	1	1	2	1	-	1	-	2	3	2

1-low, 2-medium, 3-high, '-' - no correlation

TEXT BOOK:

1. P. C. Jain and Monica Jain, "Engineering Chemistry", 17th Edition, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 2018.
2. S.S. Dara, "A Text book of Engineering Chemistry", S. Chand Publishing, 12th Edition, 2018.

REFERENCES:

1. O.G. Palanna, "Engineering Chemistry" McGraw Hill Education (India) Private Limited, 2nd Edition, 2017.
2. Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi, 2014.
3. Shikha Agarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, Second Edition, 2019.
4. O.V. Roussak and H.D. Gesser, Applied Chemistry-A Text Book for Engineers and Technologists, Springer Science Business Media, New York, 2nd Edition, 2013.
5. Gowariker V.R., Viswanathan N.V. and Jayadev Sreedhar, "Polymer Science", New Age International P (Ltd.,), Chennai, 2009.

WEBSITE REFERENCE:

1. https://vlab.amrita.edu/?sub=2&brch=193&sim=1548&cnt=1 - Water analysis-Determination of Chemical parameters (Theory): Inorganic Chemistry Virtual Lab: Chemical Sciences: Amrita Vishwa Vidyapeetham Virtual Lab
2. https://www.chemistryviews.org/debating-the-everyday-impact-of-polymer-materials - Debating the Everyday Impact of Polymer Materials – Chemistry Views
3. https://batteryuniversity.com – Learn about batteries
4. https://wiseinternational.org/nuclear-energy -Nuclear Energy Wise international

NPTEL/ SWAYAM/ MOOC REFERENCE:

1. NPTEL: Basic courses-Sem 1 and 2 - Engineering Chemistry-I

PUCC1BE01	ENGINEERING GRAPHICS	L T P C
		2 4 0 4

COURSE OBJECTIVE

- Drawing engineering curves
- Drawing freehand sketch of simple objects
- Drawing orthographic projection of solids and section of solids.
- Drawing development of solids
- Drawing isometric and perspective projections of simple solids.

CONCEPTS AND CONVENTIONS (Not for Examination)

Importance of graphics in engineering applications - Use of drafting instruments - BIS conventions and specifications — Size, layout and folding of drawing sheets — Lettering and dimensioning.

UNIT - I PLANE CURVES AND FREEHAND SKETCHING **6+12**

Basic Geometrical constructions, Curves used in engineering practices: Conics — Construction of ellipse, parabola and hyperbola by eccentricity method — Construction of cycloid — construction of involutes of square and circle — Drawing of tangents and normal to the above curves. Visualization concepts and Free Hand sketching: Visualization principles Representation of Three-Dimensional objects – Layout of views- Freehand sketching of multiple views from pictorial views of objects

UNIT - II PROJECTION OF POINTS, LINES AND PLANE SURFACES **6+12**

Orthographic projection- principles-Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes -Determination of true lengths and true inclinations by rotating line method and traces. Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method. Introduction to Basic Commands in auto CAD (Not for examination).

UNIT - III PROJECTION OF SOLIDS **6+12**

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes and parallel to the other by rotating object method. Practicing three-dimensional modelling of simple objects by CAD Software (Not for examination).

UNIT- IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 6+12

Section of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes and parallel to the other by rotating object method. Development of lateral surfaces of solids with cut-outs and holes. Practicing three-dimensional modelling of simple objects by CAD Software (Not for examination).

UNIT -V ISOMETRIC AND PERSPECTIVE PROJECTIONS **6+12**

Principles of isometric projection — isometric scale - isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions - Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method. Practicing three-dimensional modelling of isometric projection of simple objects by CAD Software (Not for examination).

TOTAL: (L=30; T=60) 90 PERIODS

COURSE OUTCOMES:

COURSE OUTCOMES	Upon completion of this course, the student will be able to	Cognitive Level
CO1	Use BIS conventions and specifications for engineering drawing and construct the conic curves, involutes and cycloid.	Apply
CO2	Solve practical problems involving projection of lines and plane surfaces.	Apply
CO3	Draw the projections of 3D primitive objects like prisms, pyramids, cylinders and cones.	Apply
CO4	Develop the lateral surfaces of simple and truncated solids.	Analyze
CO5	Draw the orthographic, isometric and perspective projections of simple solids.	Analyze

CO – PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	2	-	1	-	-	1	-	-	-	2	2	2
2	3	2	2	1	2	-	-	1	-	-	-	1	2	2
3	3	2	1	-	2	-	-	1	-	-	-	2	2	2
4	3	2	2	-	2	-	-	-	1	-	-	2	2	2
5	3	2	1	1	2	-	-	1	-	-	-	2	2	2

1-low, 2-medium, 3-high, '-' - no correlation

TEXT BOOK:

1. Venugopal K. and Prabhu Raja V., "Engineering Graphics", 15th Edition, New Age International Pvt. Ltd., New Delhi, 2018.
2. Natrajan K.V., "A Text Book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2018.

REFERENCES:

1. Parthasarathy N. S. and Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, 2015.
2. Basant Agrawal, Agrawal C.M., "Engineering Drawing", 2nd Edition, McGraw Hill Education, 2019.
3. Gopalakrishnana K.R. "Engineering Drawing", Volume. I & II, Subhas Publications, Bengaluru, 2014.
4. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 53rd Edition, 2019.

PUBLICATION OF BUREAU OF INDIAN STANDARDS:

1. IS10711 — 2001: Technical products Documentation — Size and layout of drawing sheets.
2. IS 9609 (Parts 0 & 1) — 2001: Technical products Documentation —Lettering.
3. IS 10714 (Part 20) — 2001 & SP 46 — 2003: Lines for technical drawings.
4. IS 11669 — 1986 & SP 46 —2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) — 2001: Technical drawings — Projection Methods

SPECIAL POINTS APPLICABLE TO UNIVERSITY EXAMINATIONS ON ENGINEERING GRAPHICS:

1. There will be five questions, each of either-or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.
4. The examination will be conducted in appropriate sessions on the same day.

NPTEL/ SWAYAM/ MOOC REFERENCE:

1. https://nptel.ac.in/courses/112102304
2. https://nptel.ac.in/courses/112103019
3. https://archive.nptel.ac.in/courses/112/102/112102304/
4. https://users.encs.concordia.ca/~nrskumar/Index_files/Mech211/Full%20Lecture/Lecture%201.pdf

PUCC1HM02	HERITAGE OF TAMILS	L T P C
		1 0 0 1

UNIT I: LANGUAGE AND LITERATURE 3

Language Families in India - Dravidian Languages – Tamil as a Classical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.

UNIT II: HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE 3

Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.

UNIT III: FOLK AND MARTIAL ARTS 3

Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.

UNIT IV: THINAI CONCEPT OF TAMILS 3

Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of .Cholas

UNIT V: CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE 3

Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India — Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.

TOTAL: 15 PERIODS

TEXT-CUM-REFERENCE BOOK:

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும்
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils – The Classical Period (Dr.S.Singaravelu) (Published by: International\ statute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D.Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by:International Institute of Tamil Studies).
9. Keeladi – 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author).
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Refernece Book.

PUCC1PL01	PROFESSIONAL ENGLISH-I LABORATORY	L T P C
		0 0 4 2

COURSE OBJECTIVE

- To improve the communicative competence of learners
- To develop various listening strategies to comprehend various types of audio materials like lectures, discussions, videos etc.
- To use language efficiently in expressing their opinions via various media

LIST OF ACTIVITIES

UNIT – I **12**

Activity 1	Listening for general information-specific details - Audio / video : Gap Filling Activity
Activity 2	Creating a Brochure (technical context), Preparing Emails and letter of introduction
Activity 3	Telephone etiquette , making telephone calls, Self-Introduction; Introducing a friend;
Activity 4	Role play : Politeness strategies- making polite requests, making polite offers, replying to polite requests and offers- understanding basic instructions(filling out a bank application for example)

UNIT – II **12**

Activity 1	Listening to anecdotes / stories /Short films
Activity 2	Hints development
Activity 3	Listening to biographies/ News/ documentaries and interviews with celebrities: Narrating personal experiences / events
Activity 4	Listening the audio of field trips : Engaging in small talk- Describing experiences and feelings

UNIT – III **12**

Activity 1	Listen to advertisements, gadget reviews and user manuals
Activity 2	Role play – Advertisement and reviews
Activity 3	Listening to product and process descriptions
Activity 4	Presenting a product :Giving instruction to use the product- explaining uses and purposes

UNIT – IV **12**

Activity 1	Listen to data Interpretation (Graphs & chart) :
Activity 2	Prepare and describe the chart (pie chart,Bar chart, Flow chart & Tabular Chart)
Activity 3	listen to technical / general passage and Take Note
Activity 4	prepare a journal / an article

UNIT – V **12**

Activity 1	Listening to TED Talks / debates /group discussion
Activity 2	Participate in debate
Activity 3	Participate in Group discussion
Activity 4	Presenting Technical / General Topic.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

COURSE OUTCOMES	Upon completion of this course, the student will be able to	Cognitive Level
CO1	Create Email and letter of introduction in formal and informal.	Apply
CO2	Communicate effectively about personal experiences and events.	Apply
CO3	Make Presentation on products and technical processes effectively.	Apply
CO4	Transcode visual content appropriately.	Apply
CO5	Participate in group discussion or debates.	Apply

CO – PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	-	-	-	-	-	3	-	1	2	3	-	3	-	-
2	-	-	-	-	-	2	-	2	2	3	-	3	-	-
3	-	-	-	-	-	2	-	2	3	3	-	2	-	-
4	-	-	-	-	-	2	-	1	3	3	-	2	-	-
5	-	-	-	-	-	2	-	2	3	3	-	3	-	-

1-low, 2-medium, 3-high, '-' - no correlation

TEXT BOOK:

1. Faculty ,Anna university , Orient Blackswan ,"English for Engineers and Technologists" Volume I ,2022.
2. Cambridge University Press ,"English for Science & Technology - II" , 2023.

REFERENCE:

1. Adrian Wallwork , Springer , "English for Academic Correspondence and Socializing" 2011.
2. Stella Cortrell , Red Globe Press, "The Study Skills Handbook" , 2019
3. Mathew Richardson , Charlie Creative Lab ,"Advanced Communication Skills" , 2020.
4. Jack C.Richards , "Interchange", Cambridge University Press , Fifth Edition, 2017
5. Mathew Richardson, Charlie Creative Lab ,"Advanced Communication Skills" , 2020

PUCC1PL02	PHYSICS AND CHEMISTRY LABORATORY	L T P C
	PHYSICS LABORATORY: (Any seven experiments to be conducted)	0 0 4 2

COURSE OBJECTIVE

- To learn the proper use of various kinds of physics laboratory equipment.
- To learn how data can be collected, presented and interpreted in a clear and concise manner.
- To learn problem solving skills related to physics principles and interpretation of experimental data.
- To determine error in experimental measurements and techniques used to minimize such error.
- To make the student as an active participant in each part of all lab exercises.

LIST OF EXPERIMENTS

1. Torsional pendulum - Determination of rigidity modulus of wire and moment of inertia of regular and irregular objects.
2. Simple harmonic oscillations of cantilever.
3. Non-uniform bending - Determination of Young's modulus
4. Uniform bending – Determination of Young's modulus
5. Laser- Determination of the wave length of the laser using grating
6. Air wedge - Determination of thickness of a thin sheet/wire
7. a) Optical fibre -Determination of Numerical Aperture and acceptance angle
   b) Compact disc- Determination of width of the groove using laser.
8. Acoustic grating- Determination of velocity of ultrasonic waves in liquids.
9. Ultrasonic interferometer – determination of the velocity of sound and compressibility of liquids
10. Post office box -Determination of Band gap of a semiconductor.
11. Photoelectric effect
12. Michelson Interferometer.
13. Melde's string experiment
14. Experiment with lattice dynamics kit.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

COURSE OUTCOMES	Upon completion of this course, the student will be able to	Cognitive Level
CO1	Demonstrate the functioning of various physics laboratory equipment.	Apply
CO2	Use graphical models to analyze laboratory data.	Analyze
CO3	Use mathematical models as a medium for quantitative reasoning and describing physical reality.	Analyze
CO4	Access, process and analyze scientific information.	Analyze
CO5	Solve problems individually and collaboratively.	Apply

CO – PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	1	-	-	1	-	-	1	2	-	--	1	3	1
2	3	2	-	1	1	1	-	1	1	-	-	1	3	2
3	3	1	-	-	1	1	-	1	1	-	-	1	3	1
4	3	1	-	1	1	1	-	1	1	-	-	1	3	1
5	3	1	-	-	2	-	-	1	2	-	-	1	3	1

1-low, 2-medium, 3-high, '-' - no correlation

CHEMISTRY LABORATORY: (Any seven experiments to be conducted)

COURSE OBJECTIVE

- To inculcate experimental skills to test basic understanding of water quality parameters, such as, acidity, alkalinity, hardness, DO, chloride and copper.
- To induce the students to familiarize with electroanalytical techniques such as, pH metry, potentiometry and conductometry in the determination of impurities in aqueous solutions.
- To demonstrate the analysis of metals and alloys.
- To demonstrate the synthesis of nanoparticles

LIST OF EXPERIMENTS

1. Preparation of Na_2CO_3 as a primary standard and estimation of acidity of a water sample using the primary standard.
2. Determination of types and amount of alkalinity in water sample. - Split the first experiment into two.
3. Determination of total, temporary & permanent hardness of water by EDTA method.
4. Determination of DO content of water sample by Winkler's method.
5. Determination of chloride content of water sample by Argentometric method.
6. Estimation of copper content of the given solution by Iodometry.
7. Estimation of TDS of a water sample by gravimetry.
8. Determination of strength of given hydrochloric acid using pH meter.
9. Determination of strength of acids in a mixture of acids using conductivity meter.
10. Conductometric titration of barium chloride against sodium sulphate (precipitation titration)
11. Estimation of iron content of the given solution using potentiometer.
12. Estimation of sodium /potassium present in water using flame photometer.
13. Preparation of nanoparticles (TiO_2/ZnO/CuO) by Sol-Gel method.
14. Estimation of Nickel in steel
15. Proximate analysis of Coal

TOTAL: 30 PERIODS

COURSE OUTCOMES:

COURSE OUTCOMES	Upon completion of this course, the student will be able to	Cognitive Level
CO1	To analyze the quality of water samples with respect to their acidity, alkalinity, hardness and DO.	Analyze
CO2	To determine the amount of metal ions through volumetric and spectroscopic techniques	Analyze
CO3	To analyze and determine the composition of alloys	Analyze
CO4	To learn simple method of synthesis of nanoparticles	Analyze
CO5	To quantitatively analyze the impurities in solution by electroanalytical techniques	Analyze

CO – PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	1	-	-	1	-	-	1	2	-	--	1	3	1
2	3	2	-	1	1	1	-	1	1	-	-	1	3	2
3	3	1	-	-	1	1	-	1	1	-	-	1	3	1
4	3	1	-	1	1	1	-	1	1	-	-	1	3	1
5	3	1	-	-	2	-	-	1	2	-	-	1	3	1

1-low, 2-medium, 3-high, '-' - no correlation

SEMESTER - II

S. NO.	COURSE CODE	COURSE NAME	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	PUCC2HM04	Professional English-II	HM	2	-	-	2	2
2.	PUCC2BS04	Statistics and Numerical Methods	BS	3	1	-	4	4
3.	PUCC2BS05	Engineering Materials	BS	3	-	-	3	3
4.	PUMT2BE02	Basic Concepts of Mechatronics	BE	3	-	-	3	3
5.	PUCC2BE03	Basic Electrical & Electronics Engineering	BE	3	-	-	3	3
6.	PUCC2BE04	Problem Solving using Python Programming	BE	2	-	-	2	2
7.	PUCC2HM05	Tamils and Technology தமிழரும் தொழில்நுட்பமும்	HM	1	-	-	1	1
PRACTICALS								
8.	PUCC2PL03	Professional English – II Laboratory	HM	-	-	4	4	2
9.	PUCC2PL04	Problem Solving using Python Programming Laboratory	BE	-	-	4	4	2
10.	PUCC2PL05	Civil and Mechanical Engineering Practices	BE	-	-	2	2	1
11.	PUCC2PL06	Electrical and Electronics Engineering Practices	BE	-	-	2	2	1
12.	PUCC2HM06	Wellness	HM	-	-	1	1	0
Total				**17**	**1**	**13**	**31**	**24**

SYLLABUS FOR SEMESTER – II

PUCC2HM04	PROFESSIONAL ENGLISH - II	L T P C
		2 0 0 2

COURSE OBJECTIVE

- To engage learners in meaningful language activities to improve their reading and writing skills
- To help learners understand the purpose, audience, contexts of different types of writing
- To demonstrate an understanding of job applications and interviews for internship and placements

UNIT I: MAKING COMPARISONS 6

Reading - Reading advertisements, user manuals, brochures; Writing – Professional emails, Email etiquette - Compare and Contrast Essay; Grammar – Mixed Tenses, Prepositional phrases

UNIT II: EXPRESSING CAUSAL RELATIONS IN SPEAKING AND WRITING 6

Reading - Reading longer technical texts– Cause and Effect Essays, and Letters / emails of complaint, Writing - Writing responses to complaints. Grammar - Active Passive Voice transformations, Infinitive and Gerunds

UNIT III: PROBLEM SOLVING 6

Reading - Case Studies, excerpts from literary texts, news reports etc. Writing – Letter to the Editor,Checklists, Problem solution essay / Argumentative Essay. Grammar – Error correction; If conditional sentences

UNIT IV: REPORTING OF EVENTS AND RESEARCH 6

Reading –Newspaper articles; Writing – Recommendations, Transcoding, Accident Report, SurveyReport Grammar – Reported Speech, Modals

UNIT V: THE ABILITY TO PUT IDEAS OR INFORMATION COGENTLY 6

Reading – Company profiles, Statement of Purpose, (SOP), an excerpt of interview with professionals; Writing – Job / Internship application – Cover letter & Resume; Grammar – Numericaladjectives, Relative Clauses.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

COURSE OUTCOMES	Upon completion of this course, the student will be able to	Cognitive Level
CO1	Compare and Contrast products and ideas in technical texts.	Apply
CO2	Identify cause and effect in longer text for technical communication	Apply
CO3	Analyze problems in order to ensure solutions in oral and written professional communication	Analyze
CO4	Presenting oral and written Report of Events and Technical process	Apply
CO5	Prepare job applications and resume	Apply

CO – PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	-	-	-	-	-	1	-	1	2	3	-	2	-	-
2	-	-	-	-	-	1	-	1	2	3	-	1	-	-
3	-	-	-	-	-	1	-	1	3	3	-	1	-	-
4	-	-	-	-	-	2	-	1	3	3	-	2	-	-
5	-	-	-	-	-	2	-	1	3	3	-	3	-	-

1-low, 2-medium, 3-high, '-' - no correlation

TEXTBOOKS:

1. Elizabeth Tebeaux, Sam Dragga, The Essentials of Technical Communication, Oxford University Press, 2017
2. Raman. Meenakshi, Sharma. Sangeeta . Professional English. Oxford university press. New Delhi.2019.

REFERENCES:

1. Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Joevani, Department of English, Anna University., English for Science & Technology Cambridge University Press 2021.
2. Kieran Morgan & Sanja Spajic, Technical Writing Process, Better On Paper Publications,2015.
3. Krishna Mohan, Meera Banerji, "Developing Communication Skills", Trinity Press, 2017.
4. Phillip, A. Laplante,Technical Writing: A Practical Guide for Engineers and Scientists , CRC Press; 2 edition,2018
5. Gerald J. Alred, Walter E. Oliu, Charles T. Brusaw, Handbook of Technical Writing, Bedford/St. Martin's; 12th edition,2018

WEBSITE REFERENCE:

1. IELTS : https://ieltstrainingonline.com/british-council-practice-ielts-reading-actual-tests/
2. http://www.englishdaily626.com/c-errors.php?010 (common errors)

NPTEL/ SWAYAM/ MOOC REFERENCE:

1. https://nptel.ac.in/courses/109105144 (employment communication)
2. https://onlinecourses.nptel.ac.in/noc22_hs05/preview (effective Writing)
3 .https://www.slideshare.net/Punitayadav19/cv-writing-nptelpdf (resume Preparation)

PUCC2BS04	STATISTICS AND NUMERICAL METHODS	L T P C
		3 1 0 4

COURSE OBJECTIVE

- This course aims at providing the necessary basic concepts of a few statistical and numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology.
- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
- To introduce the basic concepts of solving algebraic and transcendental equations.
- To introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines.
- To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.

UNIT I TESTING OF HYPOTHESIS 9+3

Sampling distributions - Tests for single mean, proportion and difference of means (Large and small samples) – Tests for single variance and equality of variances – Chi square test for goodness of fit – Independence of attributes -Application: Real life problems in varies field.

UNIT II DESIGN OF EXPERIMENTS 9+3

One way and two-way classifications - Completely randomized design – Randomized block design – Latin square design – 2 Square factorial designs.

UNIT III SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 9+3

Solution of algebraic and transcendental equations – Newton Raphson method- Solution of linear system of equations - Gauss elimination method – Pivoting – Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Eigenvalues of a matrix by Power method.

UNIT IV INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION 9+3

Lagrange's and Newton's divided difference interpolations – Newton's forward and backward difference interpolation – Approximation of derivates using interpolation polynomials – Numerical single and double integrations using Trapezoidal and Simpson's 1/3 rules- Applications: Application of numerical differentiation and integration

UNIT V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS 9+3

Single step methods: Taylor's series method – Euler's method - Modified Euler's method – Fourth order Runge- Kutta method for solving first order differential equations - Multi step methods: Milne's predictor corrector methods for solving first order differential equations- Application of numerical solution of ordinary differential equations

TOTAL: 60 PERIODS

COURSE OUTCOMES:

COURSE OUTCOMES	Upon completion of this course, the student will be able to	Cognitive Level
CO1	Apply the concept of testing of hypothesis for small and large samples in real life problems.	Apply
CO2	Apply the basic concepts of classifications of design of experiments in the field of agriculture	Apply
CO3	Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems	Evaluate
CO4	Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations	Understand
CO5	Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications	Apply

CO – PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	-	-	-	-	-	1	-	1	2	3	-	2	-	-
2	-	-	-	-	-	1	-	1	2	3	-	1	-	-
3	-	-	-	-	-	1	-	1	3	3	-	1	-	-
4	-	-	-	-	-	2	-	1	3	3	-	2	-	-
5	-	-	-	-	-	2	-	1	3	3	-	3	-	-

1-low, 2-medium, 3-high, '-' - no correlation

TEXTBOOKS:

1. Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015.
2. Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.46

REFERENCES:

1. Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.
2. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.
3. Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum's Outlines on Probability and Statistics ", Tata McGraw Hill Edition, 4th Edition, 2012.
4. Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", 9th Edition, Pearson Education, Asia, 2010.

WEBSITE REFERENCE:

1. https://learnengineering.in/ma3251-statistics-and-numerical-methods/ - Learn Engineering
2.https://lms.su.edu.pk/download?filename=1588490822-walpole-probability-statistics-for-engineers-scientists-9th-edition.pdf&lesson=15012 – Probability & Statistics for Engineers and Scientist

NPTEL/ SWAYAM/ MOOC REFERENCE:

1. NPTEL: Introduction to testing Hypothesis, Prof.Arun, K Tangirala,IIT Madras
2. NPTEL: Numerical Methods , Prof. Ameeya kumar Nayak, Sanjeev Kumar -IIT Roorkee.
3. SWAYAM: Numerical Analysis, Prof. S. Baskar , IIT Bombay.

PUCC2BS05	ENGINEERING MATERIALS	L T P C
		3 0 0 3

COURSE OBJECTIVE

- To make the students to understand the basics of crystallography and its importance in studying materials properties.
- To understand the electrical properties of materials including free electron theory, applications of quantum
- To insit knowledge on physics of semiconductors, determination of charge carriers and device applications
- To establish a sound of knowledge on different optical properties of materials, optical displays and applications
- To introduce the preparation, properties and applications of ceramics, composites and Nanomaterials

UNIT I CRYSTAL PHYSICS **9**

Single Crystals: Unit Cell-Crystal System-Bravais Lattices-Crystal structures: BCC, FCC and HCP – Directions and planes: Miller indices-inter-planar distances - linear and planar densities – Crystal imperfections: Point defects - edge and screw dislocations – grain and twin boundaries - Burgers vector – nucleation and growth – homogeneous and heterogeneous nucleation.

UNIT II CONDUCTING MATERIALS **9**

Classical free electron theory: Expression for electrical conductivity – Thermal conductivity, expression - Quantum free electron theory: Tunneling – degenerate states – Fermi- Dirac statistics – Density of energy states – Electron in periodic potential – Energy bands in solids: Tight binding approximation - Electron effective mass – concept of hole.

UNIT III SEMICONDUCTING MATERIALS **9**

Intrinsic Semiconductors – Energy band diagram – direct and indirect band gap semiconductors – Carrier concentration in intrinsic semiconductors – extrinsic semiconductors – Carrier concentration in N-type & P-type semiconductors – Variation of carrier concentration with temperature – Carrier transport in Semiconductors: Drift, mobility and diffusion – Hall effect and devices – Ohmic contacts – Schottky diode

UNIT IV OPTICAL PROPERTIES OF MATERIALS **9**

Classification of optical materials – Optical absorption and emission, charge injection and recombination. Absorption and emission in Metals, Insulators and Semiconductors – Optoelectronic devices: light detectors and solar cells – light emitting diode – laser diode - OLED – Electro-optics and nonlinear optics: Modulators and switching devices.

UNIT V NEW ENGINEERING MATERIALS **9**

Ceramics: Types and applications- refractories, abrasives and cements – Composites: classification, role of matrix and reinforcement - Fiber reinforced composites – carbon-carbon composites – Nanomaterials: types, physical, chemical and mechanical properties –- synthesis of nano-materials: physical vapor deposition (PVD) and chemical vapor deposition (CVD). Carbon nanotubes: properties and applications

TOTAL: 45 PERIODS

COURSE OUTCOMES:

COURSE OUTCOMES	Upon completion of this course, the student will be able to	Cognitive Level
CO1	Explain the basics of crystallography and its importance in materials properties	Understand
CO2	Illustrate the electrical properties of Conducting materials and their applications	Understand
CO3	Comprehend the concepts of semiconductor physics and functioning of semiconductor devices	Understand
CO4	Illustrate optical properties of materials and working principles of various optical devices	Understand
CO5	Demonstrate preparation, properties and applications of ceramics, composites and nano-materials	Apply

CO – PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	2	-	-	-	-	-	-	-	--	1	3	2
2	3	3	1	1	1	1	-	-	-	-	-	1	3	3
3	3	2	2	-	1	1	-	-	-	-	-	1	3	2
4	3	3	1	1	1	-	-	-	-	-	-	1	3	3
5	3	3	2	-	2	-	-	-	-	-	-	1	3	3

1-low, 2-medium, 3-high, '-' - no correlation

TEXTBOOKS:

1. V.Raghavan. Materials Science and Engineering: A First Course, Prentice Hall India Learning Private Limited, 2015.
2. Safa Kasap, Principles of Electronic Materials and Devices, Mc-Graw Hill, 2018.

REFERENCES:

1. R.Balasubramaniam, Callister's Materials Science and Engineering. Wiley (Indian Edition), 2014.
2. Wendelin Wright and Donald Askeland, Essentials of Materials Science and Engineering, CL Engineering, 2013.
3. Pallab Bhattacharya, Semiconductor Optoelectronic Devices, Pearson, 2017.
4. Wahab, M.A. "Solid State Physics: Structure and Properties of Materials", Narosa Publishing House, 2009.

NPTEL/ SWAYAM/ WEBSITE REFERENCE:

1. https://onlinecourses.nptel.ac.in/noc19_cy35/preview - Chemical Crystallography by By Prof. Angshuman Roy Choudhury, IISER Mohali
2. https://archive.nptel.ac.in/courses/113/102/113102080/ -Introduction to Materials science and Engineering by Prof. Rajesh Prasad, IIT Delhi.
3. https://onlinecourses.nptel.ac.in/noc20_ph10/preview - Electronic Theory of Solids, by Prof. Arghya Taraphder, IIT Kharagpur
4. https://nptel.ac.in/courses/112107086 - Engineering Materials and Processing Techniques by Inderdeep Singh, IIT Roorke
5. https://onlinecourses.nptel.ac.in/noc19_mm13/preview - Advanced Materials and Processes by Prof. Jayanta Das, IIT Kharagpur

PUME2PC01	ENGINEERING MECHANICS	L T P C
		3 0 0 3

COURSE OBJECTIVE

- To learn the use scalar and vector analytical techniques for analyzing forces in statically determinate structures
- To introduce the equilibrium of rigid bodies, vector methods and free body diagram
- To study and understand the distributed forces, surface, loading on beam and intensity
- To learn the principles of friction, forces and to determine the apply the concepts of frictional forces at the contact surfaces of various engineering systems
- To develop basic dynamics concepts – force, momentum, work and energy

UNIT I - STATICS OF PARTICLES 9

Fundamental Concepts and Principles, Systems of Units, Method of Problem Solutions, Statics of Particles -Forces in a Plane, Resultant of Forces, Resolution of a Force into Components, Rectangular Components of a Force, Unit Vectors. Equilibrium of a Particle- Newton's First Law of Motion, Space and Free-Body Diagrams, Forces in Space, Equilibrium of a Particle in Space.

UNIT II - EQUILIBRIUM OF RIGID BODIES 9

Principle of Transmissibility, Equivalent Forces, Vector Product of Two Vectors, Moment of a Force about a Point, Varignon's Theorem, Rectangular Components of the Moment of a Force, Scalar Product of Two Vectors, Mixed Triple Product of Three Vectors, Moment of a Force about an Axis, Couple - Moment of a Couple, Equivalent Couples, Addition of Couples, Resolution of a Given Force into a Force -Couple system, Further Reduction of a System of Forces, Equilibrium in Two and Three Dimensions - Reactions at Supports and Connections.

UNIT III - DISTRIBUTED FORCES 9

Centroids of lines and areas – symmetrical and unsymmetrical shapes, Determination of Centroids by Integration, Theorems of Pappus- Guldinus, Distributed Loads on Beams, Centre of Gravity of a Three- Dimensional Body, Centroid of a Volume, Composite Bodies, Determination of Centroids of Volumes by Integration. Moments of Inertia of Areas and Mass - Determination of the Moment of Inertia of an Area by Integration, Polar Moment of Inertia, Radius of Gyration of an Area, Parallel-Axis Theorem, Moments of Inertia of Composite Areas, Moments of Inertia of a Mass - Moments of Inertia of Thin Plates, Determination of the Moment of Inertia of a Three-Dimensional Body by Integration.

UNIT IV – FRICTION 9

The Laws of Dry Friction, Coefficients of Friction, Angles of Friction, Wedge friction, Wheel Friction, Rolling Resistance, Ladder friction.

UNIT V - DYNAMICS OF PARTICLES 9

Kinematics - Rectilinear Motion and Curvilinear Motion of Particles. Kinetics- Newton's Second Law of Motion - Equations of Motions, Dynamic Equilibrium, Energy and Momentum Methods - Work of a Force, Kinetic Energy of a Particle, Principle of Work and Energy, Principle of Impulse and Momentum,
Impact of bodies.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

COURSE OUTCOMES	Upon completion of this course, the student will be able to	Cognitive Level
CO1	Illustrate the vector and scalar representation of forces and moments	Apply
CO2	Analyses the rigid body in equilibrium	Analyze
CO3	Evaluate the properties of distributed forces	Evaluate
CO4	Determine the friction and the effects by the laws of friction	Apply
CO5	Calculate dynamic forces exerted in rigid body.	Apply

CO – PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	2	1	2	1				1		2	2	1
2	3	2	2	1	2	1				1		2	2	1
3	3	2	3	1	2	1				1		2	2	1
4	3	2	3	1	2	1				1		2	2	1
5	3	2	3	1	2	1				1		2	2	1

1-low, 2-medium, 3-high, '-' - no correlation

REFERENCES:

- Hibbeller, R.C., Engineering Mechanics: Statics, and Engineering Mechanics: Dynamics, 13th edition, Prentice Hall, 2013.
- Meriam J L and Kraige L G, Engineering Mechanics: Statics and Engineering Mechanics: Dynamics, 7th edition, Wiley student edition, 2013.
- Timoshenko S, Young D H, Rao J V and Sukumar Pati, Engineering Mechanics, 5th Edition, McGraw Hill Higher Education, 2013.

WEBSITE REFERENCE:

- https://easyengineering.net/ge8292-engineering-mechanics/
- https://www.javatpoint.com/engineering-mechanics
- https://www.tutorialspoint.com/mechanics-and-its-applications

NPTEL/ SWAYAM/ MOOC REFERENCE:

- https://archive.nptel.ac.in/courses/112/106/112106286/
- https://onlinecourses.nptel.ac.in/noc24_me02/preview

PUCC2BE02	BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING	L T P C
		3 0 0 3

COURSE OBJECTIVE

- To introduce the basics of electric circuits and analysis
- To impart knowledge in the basics of working principles and application of electrical machines
- To introduce analog devices and their characteristics
- To educate on the fundamental concepts of digital electronics
- To introduce the functional elements and working of measuring instruments

UNIT I - DC CIRCUITS 9

DC Circuits: Circuit Components: Conductor, Resistor, Inductor, Capacitor – Ohm's Law - Kirchhoff's Laws –Independent– Simple problems- Nodal Analysis, Mesh analysis with Independent sources only (Steady state)

UNIT II - AC CIRCUITS 9

Introduction to AC Circuits and Parameters: Waveforms, Average value, RMS Value, Instantaneous power, real power, reactive power and apparent power, power factor – Steady state analysis of RLC circuits (Simple problems only) Operating Principle of single phase Energy Meter

UNIT III - ELECTRICAL MACHINES 9

Construction and Working principle - DC Generator & DC motor. Types and Applications. Transformer-Construction, Working principle and Applications, Working principle of Stepper Motor and Single phase, induction Motors

UNIT IV - ANALOG ELECTRONICS 9

Semiconductor Materials: Silicon &Germanium – PN Junction Diodes, Zener Diode –Characteristics Applications – Bipolar Junction Transistor, MOSFET, SCR I-V Characteristics and Applications, Rectifier

UNIT V - DIGITAL ELECTRONICS 9

Review of number systems, Binary codes, Logic gates, Boolean algebra, Half Adder & Full Adder, Multiplexer & De-Multiplexer, Encoder & Decoder. (Qualitative Treatment only)

TOTAL: 45 PERIODS

COURSE OUTCOMES:

COURSE OUTCOMES	Upon completion of this course, the student will be able to	Cognitive Level
CO1	Understand the basic knowledge in DC circuits with passive components	Understand
CO2	Understand the basic knowledge in AC circuits	Understand
CO3	Explain the working principle and applications of electrical machines	Remember
CO4	Analyze the characteristics of analog electronic devices	Analyze
CO5	Explain the basic concepts of digital electronics	Remember

CO – PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	2	1	-	-	-	-	1	-	-	-	2	2	2
2	2	2	1	-	-	-	-	1	-	-	-	2	2	2
3	2	1	1	-	-	-	-	1	-	-	-	2	2	1
4	2	2	1	-	-	-	-	1	-	-	-	2	2	2
5	2	2	1	-	-	-	-	1	-	-	-	2	2	2

1-low, 2-medium, 3-high, '-' - no correlation

TEXT BOOKS:

1. Kothari DP and I.J Nagrath, "Basic Electrical and Electronics Engineering", Second Edition, McGraw Hill Education, 2020

2. S.K.Bhattacharya "Basic Electrical and Electronics Engineering", Pearson Education, Second Edition, 2017.

REFERENCES:

1. James A .Svoboda, Richard C. Dorf, "Dorf's Introduction to Electric Circuits", Wiley, 2018.
2. Sedha R.S., "A textbook book of Applied Electronics", S. Chand & Co., 2018

WEBSITE REFERENCE:

1. https://www.electricaleasy.com/
2. https://easyengineering.net/be3251-basic-electrical-and-electronics-engineering-notes

NPTEL/ SWAYAM/ MOOC REFERENCE:

1. NPTEL: https://nptel.ac.in/courses/117106108 - Basic Electrical Circuits

PUCC2BE04	PROBLEM SOLVING AND PYTHON PROGRAMMING	L T P C
		2 0 0 2

COURSE OBJECTIVE

- The objective of this course is to familiarize the students with to know the design of algorithm and efficiency, to understand variables, expressions and statements, to explore flow of data and its executions, to study the compound data types, to know about class and objects in python.

UNIT I: - COMPUTER-PROBLEM-SOLVING 6

Introduction: Top Down Design, Implementation of Algorithms, Program verification, Efficiency of algorithms.

UNITII:-DATA-TYPES, EXPRESSIONS, STATEMENTS 6

Python interpreter and interactive mode, debugging; values and types: int, float, Boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments, Errors.

UNIT III - CONTROL FLOW, FUNCTIONS, STRINGS 6

Conditionals: Boolean values and operators, conditional, chained conditional; Iteration: while, for, break, continue, pass, Random Number Generation; Functions: return values, parameters, local and global scope, function composition, recursion; Strings: slices, immutability, functions and methods, module.

UNIT IV - LISTS, TUPLES, DICTIONARIES 6

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing – list comprehension; Illustrative programs: Word histogram, Most Common Words, Word Frequency analysis.

UNIT - V: FILES, MODULES, PACKAGES 6

Files and Exceptions : text files, reading and writing files, errors and exceptions, handling exceptions, Pickling; Modules & Packages- Writing a Module- Library Files-Numpy-Pandas

TOTAL: 30 PERIODS

COURSE OUTCOMES:

COURSE OUTCOMES	Upon completion of this course, the student will be able to	Cognitive Level
CO1	Identify Computer problems with its algorithmic design and solutions.	Remember
CO2	Illustrate simple Python data types, Expressions and Operators.	Remember
CO3	Execute simple Python programs using conditionals, looping statement and Functions for solving problems.	Apply
CO4	Identify Compound Data Types using List, Tuple and Dictionaries Python programs.	Apply
CO5	Infer the Object Oriented Concepts.	Remember

CO – PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	2	1	1	-	-	1	2	2	-	-	2	2
2	3	3	3	2	3	-	-	1	2	2	-	-	3	2
3	3	3	3	2	3	-	-	1	2	2	-	-	3	2
4	3	3	3	2	3	-	-	1	2	2	-	-	3	2
5	3	3	3	2	3	-	-	1	2	2	-	-	3	2

1-low, 2-medium, 3-high, '-' - no correlation

TEXT BOOK:

1. Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016.

REFERENCES:

1. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021.
2. G Venkatesh and MadhavanMukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition,Notion-Press,2021.
3. John V Guttag,"Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data", Third Edition, MIT Press.
4. Eric Matthes, "Python Crash Course, A Hands – on Project Based Introduction to Programming", 2nd Edition, No Starch-Press,2019.
5. R.G.Dromey,"How to solve it by Computer",Pearson India 2007

WEBSITE REFERENCE:

1. https://www.vlab.co.in/broad-area-computer-science-and-engineering
2. "Python for Everybody" at Coursera Online Courses. https://www.coursera.org/courses?query=python%20for%20beginners

NPTEL/ SWAYAM/ MOOC REFERENCE:

1. The Joy of Computing using Python, IIT Ropar ,Prof. SudarshanIyengar NPTEL Courses.https://onlinecourses.nptel.ac.in/nc21_cs32/preview

PUCC2HM05	TAMILS AND TECHNOLOGY	L T P C
		1 0 0 1

UNIT I: WEAVING AND CERAMIC TECHNOLOGY 3

Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.

UNIT II: DESIGN AND CONSTRUCTION TECHNOLOGY 3

Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age — Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.

UNIT III: MANUFACTURING TECHNOLOGY 3

Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting, steel -Copper and gold- Coins as source of history - Minting of Coins – Beads making-industries Stone beads -Glass beads - Terracotta beads -Shell beads/ bone beats - Archeological evidences - Gem stone types described in Silappathikaram.

UNIT IV: AGRICULTURE AND IRRIGATION TECHNOLOGY 3

Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries — Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.

UNIT V: SCIENTIFIC TAMIL & TAMIL COMPUTING 3

Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil Software — Tamil Virtual Academy — Tamil Digital Library — Online Tamil Dictionaries — Sorkuvai Project.

TOTAL: 15 PERIODS

TEXT-CUM-REFERENCE BOOK:

1. கணினித் தமிழ் –மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும்
2. கல்வியியல் பணிகள் கழகம்). முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils – The Classical Period (Dr.S.Singaravelu) (Published by: International\ statute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D.Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by:International Institute of Tamil Studies).
9.Keeladi – 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author).
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Refernece Book.

PUCC2PL03	PROFESSIONAL ENGLISH – II LABORATORY	L T P C
		0 0 4 2

COURSE OBJECTIVE

- To identify varied group discussion skills and apply them to take part in effective discussions in a professional context.
- To analyse concepts and problems and make effective presentations explaining them clearly and precisely.
- To be able to use appropriate language structures to write emails, reports and essays

LIST OF ACTIVITIES

T – I **12**

Activity 1	Reading Advertisement and Group activity
Activity 2	Writing Professional Emails
Activity 3	Group activity : create simple user manuals
Activity 4	writing compare and contrast essay

T – II **12**

Activity 1	Reading longer text and identify the main ideas
Activity 2	Writing cause and effect essay
Activity 3	Reading complaint letter
Activity 4	Writing Responding letter

UNIT – III **12**

Activity 1	Reading Case Studies
Activity 2	Discussion and presentation on Case studies
Activity 3	Excerpts from literary texts or news reports
Activity 4	Group Activity : Create simple News report

UNIT – IV **12**

Activity 1	Reading Article from newspaper
Activity 2	Group Activity :Writing article
Activity 3	Reading types of reports
Activity 4	pair activity : writing Survey / Accident Report

UNIT – V **12**

Activity 1	Reading company profile
Activity 2	Role play activity – Create company profile
Activity 3	Reading Types of Resume
Activity 4	Create Cover letter and resume

TOTAL: 60 PERIODS

COURSE OUTCOMES:

COURSE OUTCOMES	Upon completion of this course, the student will be able to	Cognitive Level
CO1	Write professional emails	Apply
CO2	Prepare complaint and responding letter	Apply
CO3	Discuss and analyse problems from various perspectives to arrive solutions	Analyze
CO4	Write short articles with precision	Apply
CO5	Create company profile	Apply

CO – PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	-	-	-	-	-	1	-	1	3	3	-	3	-	-
2	-	-	-	-	-	2	-	2	3	3	-	3	-	-
3	-	-	-	-	-	2	-	2	3	3	-	3	-	-
4	-	-	-	-	-	2	-	1	3	3	-	2	-	-
5	-	-	-	-	-	3	-	1	3	3	-	3	-	-

1-low, 2-medium, 3-high, '-' - no correlation

TEXT BOOK:

1. Department of English, Anna University,English for Engineers & Technologists ,Orient Blackswan, 2021.
2. Cambridge University Press ,English for Science & Technology ,2021.

REFERENCES:

1. Raman. Meenakshi, Sharma. Sangeeta , Professional English, Oxford university press.New Delhi.2019
2. Stella Cortrell , Red Globe Press, "The Study Skills Handbook" , 2019
3. Mathew Richardson , Charlie Creative Lab ,"Advanced Communication Skills" , 2020.
4. Jack C.Richards , "Interchange", Cambridge University Press , Fifth Edition, 2017
5. Mathew Richardson, Charlie Creative Lab ,"Advanced Communication Skills" , 2020

PUCC2PL04 PROBLEM SOLVING USING PYTHON PROGRAMMING LAB	L T P C
	0 0 4 2

COURSE OBJECTIVE

- The objective of this course is to familiarize the students with to know the design of algorithm and efficiency, to understand variables, expressions and statements, to explore flow of data and its executions, to study the compound data types, to know about class and objects in python.

LIST OF EXERCISES

1. Use Linux shell commands, use Python in interactive mode, and an editor
    a. os.system()
    b. subprocess.run()
    c. subprocess.Popen()
    d. os.utime()
2. Write simple python programs for
    a. Area of a geometric shape
    b. Simple interest
    c. Solve quadratic equation
    d. Netsalary
3. Write programs using conditional statements for
    a. Leap year
    b. Simple calculator
    c. Grade of the total mark
4. Develop programs using loops and nested loops for
    a. Multiplication table
    b. Sum of a series
    c. Print patterns
5. Develop programs using functions for
    a. Sine and cosine series
    b. Pythagorean triplets
6. Develop programs using recursion for
    a. Efficient power of a number
    b. Factorial
    c. Fibonacci number
7. Develop programs using strings for
    a. Palindrome
    b. Finding substring
8. Develop programs using lists and tuples
    a. linear search
    b. binary search
    c. selection sort
    d. insertion sort
    e. quicksort
9. Develop matrix manipulations programs using nested lists.
10. Develop simple programs using dictionaries

a. frequency histogram
b. nested dictionary

11. Develop programs using Files.
    a. read files
    b. write files
12. Develop programs to perform any task by reading arguments from command line.
13. Implement a simple application using appropriate datatypes and files

Total Periods: 60

COURSE OUTCOMES:

COURSE OUTCOMES	Upon completion of this course, the student will be able to	Cognitive Level
CO1	Execute simple Python data types, Expressions and Operators.	Apply
CO2	Write simple Python programs using conditionals, looping statement and Functions for solving problems.	Apply
CO3	Represent Compound Data Types using List, Tuple and Dictionaries Python programs.	Apply
CO4	Read and write data from/to files in Python programs and Object Oriented Concepts.	Apply
CO5	Implement a simple application using appropriate datatypes and files	Apply

CO – PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	3	3	1	3	-	-	-	3	-	-	-	3	1
2	2	3	3	1	3	-	-	-	3	-	-	-	3	1
3	2	3	3	1	3	-	-	-	3	-	-	-	3	1
4	2	3	3	1	3	-	-	-	3	-	-	-	3	1
5	2	3	3	1	3	-	-	-	3	-	-	-	3	1

1-low, 2-medium, 3-high, '-' - no correlation

TEXT BOOK:

1. Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016.

REFERENCES:

1. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021.
2. G Venkatesh and MadhavanMukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition,Notion-Press,2021.
3. John V Guttag,"Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data", Third Edition, MIT Press.
4. Eric Matthes, "Python Crash Course, A Hands – on Project Based Introduction to Programming", 2nd Edition, No Starch-Press,2019.

5. R.G.Dromey,"How to solve it by Computer", Pearson India 2007

WEBSITE REFERENCE:

1. https://www.vlab.co.in/broad-area-computer-science-and-engineering
2. "Python for Everybody" at Coursera Online Courses. https://www.coursera.org/courses?query=python%20for%20beginners

NPTEL/ SWAYAM/ MOOC REFERENCE:

1. The Joy of Computing using Python, IIT Ropar ,Prof. Sudarshan Iyengar NPTEL Courses. https://onlinecourses.nptel.ac.in/noc21_cs32/preview

PUCC2PL05	CIVIL AND MECHANICAL ENGINEERING PRACTICES LABORATORY	L T P C
		0 0 2 1

COURSE OBJECTIVE

- Drawing pipe line plan; laying and connecting various pipe fittings used in common household plumbing work; Sawing; planning; making joints in wood materials used in common house hold wood work.
- Welding various joints in steel plates using arc welding work; Machining various simple processes like turning, drilling, tapping in parts

  Assembling simple mechanical assembly of common household equipment's; Making a tray out of metal sheet using sheet metal work

GROUP – A CIVIL PRACTICE **12**

PLUMBING WORK:

a) Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers, elbows and other components which are commonly used in household.

b) Preparing plumbing line sketches.

c) Laying pipe connection to the suction side of a pump

d) Laying pipe connection to the delivery side of a pump.

e) Connecting pipes of different materials: Metal, plastic and flexible pipes used in house hold appliances.

WOOD WORK:

a) Sawing,

b) Planning and

c) Making joints like T-Joint,

d) Mortise joint

e) Tenon joint and Dovetail joint.

Wood Work Study:

a) Studying joints in door panels and wooden furniture

b) Studying common industrial trusses using models.

GROUP - B MECHANICAL PRACTICES **18**

WELDING WORK:

a) Welding of Butt Joints, Lap Joints, and Tee Joints using arc welding.

b) Practicing gas welding.

BASIC MACHINING WORK:

a) Simple Turning.

b) Simple Drilling.

c) Simple Tapping.

d) Simple Grinding

ASSEMBLY WORK:

a) Assembling a centrifugal pump.

b) Assembling a household mixer.

c) Assembling an air conditioner.

SHEET METAL WORK:

a) Making of a square tray and Rectangle tray

FOUNDRY WORK:

a) Demonstrating basic foundry operations.

(b) Smithy operations, upsetting, swaging, setting down and bending. Example – Exercise – Production of hexagonal headed bolt.

(c) Fitting – Exercises – Preparation of square fitting and V – fitting models.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

COURSE OUTCOMES	Upon completion of this course, the student will be able to	Cognitive Level
CO1	Draw pipe line plan; lay and connect various pipe fittings used in common household Plumbing work.	Apply
CO2	Make joints in wood materials used in common household wood work.	Apply
CO3	Perform various machining operation in a lathe, drilling and Milling.	Apply
CO4	Perform the various welding processes and know about its applications.	Apply
CO5	Demonstrate the various foundry and fitting Exercises and know about its applications.	Apply

CO – PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	-	2	-	1	-	-	-	-	-	-	2	2	1
2	3	-	3	-	2	-	-	-	-	-	-	1	2	2
3	3	1	1	-	2	1	1	1	-	-	-	3	2	2
4	3	1	2	-	3	1	1	1	1	-	-	3	2	2
5	3	-	1	1	2	-	-	-	-	-	-	2	2	2

1-low, 2-medium, 3-high, '-' - no correlation

TEXT BOOKS/REFERENCE BOOKS:

1. Willis H. Wagner, Howard "Bud" Smith, and Mark W. Huth Modern Carpentry, 12th Edition, 2015
2. P.C.Sharma, Production Technology (Manufacturing Process): Manufacturing Process, S.Chand publisher, 2006
3. Robert W. Messler, Reverse Engineering: Mechanisms, Structures, Systems & Materials, McGraw-Hill Education, 2014
4. K.Jeyachandran, S.Natarajan& S, Balasubramanian, "A Primer on Engineering
5. Practices Laboratory", Anuradha Publications, (2007).
6. Steam Generators and Waste Heat Boilers: For Process and Plant Engineers (Mechanical Engineering) by V. Ganapathy

PUCC2PL06	ELECTRICAL AND ELECTRONICS ENGINEERING PRACTICES LABORATORY	L T P C
		0 0 2 1

COURSE OBJECTIVE

- To enable the students to understand the behavior of semiconductor device based onexperimentation.
- Be exposed to active and passive circuit elements.
- Familiarize the operation and characteristics of transistor like BJT and FET.
- Explore the characteristics of amplifier gain and frequency response.
- Learn the required functionality of positive and negative feedback systems.

Electrical Engineering Practices **15**

a) Introduction to switches, fuses, indicators and lamps - Basic switch board wiring with lamp, fan and three pin socket
b) Staircase wiring
c) Fluorescent Lamp wiring with introduction to CFL and LED types.
d) Energy meter wiring and related calculations/ calibration
e) Measurement of electrical quantities – voltage, current, power &power factor in RLC circuit.
f) Measurement of resistance to earth of electrical equipment
g) Study of Iron Box / Fan Regulator / emergency lamp wiring and assembly

Electronics Engineering Practices **15**

a) Study of Electronic components and equipments – Resistor, colour coding measurement of AC signal parameter (peak-peak, rms period, frequency) using CRO.
b) Verification truth table of logic gates AND, OR, NOT and NAND,NOR
c) Generation of Clock Signal.
d) Soldering practice – simple electronic circuits and checking continuity & Assembling and testing electronic components on a small PCB
e) Study elements of smart phone./ LED TV/ computer/ laptop

TOTAL: 30 PERIODS

COURSE OUTCOMES:

COURSE OUTCOMES	Upon completion of this course, the student will be able to	Cognitive Level
CO1	Wire various electrical joints in common house hold electrical works	Apply
CO2	Solder and test simple electronic circuits, Assemble and test simple electronic components on PCB	Apply

CO – PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	3	3	3	3	3	3	3	3	3	3	3	3	3	3

1-low, 2-medium, 3-high, '-' - no correlation

SEMESTER - III

S.NO.	COURSE CODE	COURSE NAME	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	PUCC3BS06	Transforms and Partial Differential Equations	BS	3	1	-	4	4
2.	PUAE3PC01	Fundamentals of Aeronautical Engineering	PC	3	-	-	3	3
3.	PUAE3PC02	Aero Engineering Thermodynamics	PC	3	-	-	3	3
4.	PUCE3PC01	Fluid Mechanics and Machinery	BE	3	1	-	4	4
5.	PUCE3PC03	Strength of Materials	BE	3	1	-	4	4
6.	PUCC3MCXX	Mandatory Course – I (Non-Credit)	MC	2	-	-	2	0
PRACTICALS								
7.	PUAE3PL01	Thermodynamics and Strength of Materials Laboratory	PC	-	-	4	4	2
8.	PUCE3PL02	Fluid Mechanics and Machinery Laboratory	BE	-	-	4	4	2
9.	PUCC3HM07	Extension Activities	HM	-	-	1	1	0
Total				17	3	9	29	22

SYLLABUS FOR SEMESTER- III

PUCC3BS06	TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS	L T P C
		3 1 0 4

COURSE OBJECTIVE

- To introduce the basic concepts of PDE for solving standard partial differential equations.
- To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems.
- To acquaint the student with Fourier series techniques in solving heat flow problems used in various situations.
- To acquaint the student with Fourier transform techniques used in wide variety of situations.
- To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop Z transform techniques for discrete time systems.

UNIT I -PARTIAL DIFFERENTIAL EQUATIONS 9+3

Formation of partial differential equations - Solutions of standard types of first order partial differential equations - First order partial differential equations reducible to standard types- Lagrange's linear equation (multiplier method only)

UNIT II - FOURIER SERIES 9+3

Dirichlet's conditions - General Fourier series - Odd and even functions - Half range sine series and cosine series - Parseval's identity - Harmonic analysis.

UNIT III - APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS 9+3

Classification of PDE - Fourier series solutions of one dimensional wave equation - One dimensional equation of heat conduction - Steady state solution of two dimensional equation of heat conduction (Cartesian coordinates only).

UNIT IV - FOURIER TRANSFORMS 9+3

Fourier transform pair -Fourier sine and cosine transforms -Properties - Transforms of simple functions - Parseval's identity.

UNIT V - Z – TRANSFORMS 9+3

Z-transforms - Elementary properties - Initial and final value theorems - Inverse Z-transform using partial fraction, residues and Convolution theorem.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

COURSE OUTCOMES	Upon completion of this course, the student will be able to	Cognitive Level
CO1	Understand how to solve the given standard partial differential equations.	Understand
CO2	Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.	Analyse
CO3	Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.	Understand
CO4	Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.	Understand
CO5	Use the effective mathematical tools for the solutions of partial differential equations by using Z-transform techniques for discrete time systems.	Apply

CO – PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	1	2	1	-	-	-	2	2	-	2	1	1
2	3	3	1	2	1	-	-	-	2	2	-	2	1	1
3	3	3	1	2	1	-	-	-	2	2	-	2	1	1
4	3	3	1	2	1	-	-	-	2	2	-	2	1	1
5	3	3	1	2	1	-	-	-	2	2	-	2	1	1

1-low, 2-medium, 3-high, '-' - no correlation

TEXTBOOK:

- Grewal B.S., "Higher Engineering Mathematics", 44thEdition, Khanna Publishers, New Delhi, 2018.
- Kreyszig E, "Advanced Engineering Mathematics ", 10th Edition, John Wiley, New Delhi, India, 2016.

REFERENCES:

- Bali. N.P and Manish Goyal, "A Textbook of Engineering Mathematics", 10th Edition, Laxmi Publications Pvt. Ltd, 2015.
- James. G., "Advanced Modern Engineering Mathematics", 4thEdition, Pearson Education, New Delhi, 2016.
- Ramana. B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi, 2018.

NPTEL/ SWAYAM/ MOOC REFERENCE:

- https://nptel.ac.in/courses/111/103/111103021/
- https://archive.nptel.ac.in/courses/111/107/111107111/
- https://archive.nptel.ac.in/courses/111/105/111105123/

PUAE3PC01	Fundamentals of Aeronautical Engineering	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

1	To acquire the knowledge on the Historical evaluation of Airplanes
2	To learn the different configurations and control systems of Aircraft
3	To understand the basics concepts of aerodynamics
4	To know the basics of aircraft structures
5	To learn the various types of power plants used in aircrafts

UNIT – I	HISTORY OF FLIGHT	9

Balloon flight-ornithopters-Early Airplanes by Wright Brothers, biplanes and monoplanes, Developments in aerodynamics, materials, structures and propulsion over the years.

UNIT – II	AIRCRAFT CONFIGURATIONS AND ITS CONTROLS	9

Different types of flight vehicles, Classifications-Components of an airplane and their functions-Conventional control, powered control- Basic instruments for Flying-Typical systems for control actuation, Fly By Wire control system, Modern Glass Cockpit.

UNIT – III	BASICS OF AERODYNAMICS	9

Physical Properties and structures of the Atmosphere, ISA , AtmosModeler Simulator (NASA), Relationship between Temperature, pressure, density and altitude, Newton's Law of Motions applied to Aeronautics-Evolution of lift, drag and moment. Nomenclature of Aerofoils, Mach number, types of Manoeuvres.

UNIT – IV	BASICS OF AIRCRAFT STRUCTURES	9

General types of construction, Monocoque, semi-monocoque and geodesic constructions, typical wing and fuselage structure. Types of loads on aircraft structure, Use of metallic, non-metallic and composite materials.

UNIT – V	BASICS OF PROPULSION	9

Principle of operation of Air breathing Engines– types, components and comparative merits, Principle of operation of rockets and missiles - types, basics of space propulsion.

TOTAL: 45 PERIODS

COURSE OUTCOMES: After the completion of this course, the students will be able to,		**Cognitive Level**
CO1	Illustrate the history of aircraft & developments over the years	Remember
CO2	Identify the types & classifications of components and control systems	Understand
CO3	Explain the basic concepts of flight & physical properties of Atmosphere	Apply

CO4	Know the types of wings, fuselages and their constructions details	Understand
CO5	Distinguish the types of engines	Analyze

TEXT BOOK:

1	E Rathakrishnan, "Introduction to Aerospace Engineering: Basic Principles of Flight", John Wiley, NJ, 2021

REFERENCE BOOKS:

1	Anderson, J.D., Introduction to Flight, McGraw-Hill; 8th edition, 2015
2	Sadhu Singh, "Internal Combustion Engines and Gas Turbine", SS Kataraia & Sons, 2015
3	Stephen.A. Brandt, Introduction to aeronautics: A design perspective, 2nd edition, AIAA Education Series, 2004.
4	Kermode, "Flight without Formulae", Pitman; 5th revised edition 2004.

WEBSITE REFERENCE / NPTEL/ SWAYAM/ MOOC REFERENCE:

1	https://archive.nptel.ac.in/courses/101/101/101101079/
2	https://onlinecourses.nptel.ac.in/noc20_ae12/preview
3	https://onlinecourses.nptel.ac.in/noc22_ae14/preview
4	https://archive.nptel.ac.in/courses/101/105/101105088/

CO-PO MAPPING:

CO	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	1	1	-	-	1	1	-	2	1	-	2	2	1
2	3	1	1	-	-	1	1	-	2	1	-	2	2	1
3	3	1	1	-	3	1	1	-	2	1	-	2	3	3
4	3	1	1	-	-	1	1	-	2	1	-	2	2	1
5	3	1	1	-	-	1	1	-	2	1	-	2	2	1

PUAE3PC02	Aero Engineering Thermodynamics	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

1	To make the student understand the quantitative analysis of system and processes for transformation of energy and between work & heat.
2	To Make the student understand the Laws of thermodynamics would be able to quantify through measurement of related.
3	To Apply the thermodynamic properties, energies and their interactions in real time problems
4	To develop basic concept of air cycle, gas turbine engines and heat transfer.
5	To analyse different types of Heat transfer

UNIT – I	FUNDAMENTAL CONCEPT AND FIRST LAW	9

Zeroth law of thermodynamics, Concept of continuum, macroscopic approach, thermodynamic systems – closed, open and isolated. Property, state, path and process, quasi-static process, work, internal energy, enthalpy, specific heat capacities and heat transfer, SFEE, application of SFEE to jet engine components, First law of thermodynamics, relation between pressure, volume and temperature for various processes.

UNIT – II	SECOND LAW AND ENTROPY	9

Second law of thermodynamics – Kelvin Planck and Clausius statements of second law. Reversibility and Irreversibility, Thermal reservoir, Carnot theorem. Carnot cycle, Reversed Carnot cycle, efficiency, COP, Thermodynamic temperature scales - Clausius inequality, Concept of entropy, Entropy changes for various processes.

UNIT – III	AIR STANDARD CYCLES	9

Otto, Diesel, Dual, Ericsson, Atkinson, Stirling and Brayton cycles - Air standard efficiency – Mean effective pressure.
Application of the cycles, Brayton Cycle simulation– MATLAB & Simulink.

UNIT – IV	FUNDAMENTALS OF VAPOUR POWER CYCLES	9

Properties of pure substances – solid, liquid and vapour phases, phase rule, p-v, p-T, T-v, T-s, h-s diagrams, p-v-T surfaces, thermodynamic properties of steam - calculations of work done and heat transfer in non-flow and flow processes - standard Rankine cycle, Reheat and Regeneration cycle. Heat rate, Specific steam consumption, Tonne of refrigeration.

UNIT – V	BASICS OF PROPULSION AND HEAT TRANSFER	9

Classification of jet engines - basic jet propulsion arrangement – Engine station number– Specific thrust, SFC, TSFC, specific impulse, actual cycles, isentropic efficiencies of jet engine components, polytropic efficiency, conduction in parallel, radial and composite wall, Basics of convective and radiation heat transfer.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the completion of this course, the students will be able to,		Cognitive Level
CO1	Apply the laws of thermodynamics in real time problems.	Apply
CO2	Understand the concepts of Carnot's cycle, entropy and enthalpy.	Understand
CO3	Demonstrate the efficiency of different air standard cycles.	Understand
CO4	Illustrate the heat transfer in different conditions of working medium.	Understand
CO5	Apply conduction, convention and radiation in real time problems	Apply

TEXT BOOK:

1	Rathakrishnan E., "Fundamentals of Engineering Thermodynamics", Prentice-Hall India, 2005.

REFERENCE BOOKS:

1	Nag.P.K. "Engineering Thermodynamics", Tata McGraw-Hill, New Delhi, 6th Edition, 2017.
2	Yunus A. Cengel and Michael A. Boles, "Thermodynamics: An Engineering Approach" McGraw-Hill Science/Engineering/Math; 7thedition 2010.
3	Holman.J.P. "Thermodynamics", 3rd Edition, McGraw-Hill, 2007.
4	Ramalingam K.K. "Thermodynamics", Sci-Tech Publications, 2018

WEBSITE REFERENCE / NPTEL/ SWAYAM/ MOOC REFERENCE:

1	https://archive.nptel.ac.in/courses/101/104/101104067/
2	https://onlinecourses.nptel.ac.in/noc22_ae17/preview
3	https://archive.nptel.ac.in/courses/112/106/112106310/

CO-PO MAPPING:

CO	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	3	2	2	-	1	1	-	2	1	-	2	2	1
2	3	3	2	2	-	1	1	-	2	1	-	2	2	1
3	3	3	2	2	3	1	1	-	2	1	-	2	3	3
4	3	3	2	2	-	1	1	-	2	1	-	2	2	1
5	3	3	2	2	-	1	1	-	2	1	-	2	2	1

1-Low,2-Medium,3-High,"-"-no correlation

PUCE3PC01	FLUID MECHANICS AND MACHINERY	L T P C
		3 1 0 4

COURSE OBJECTIVE

- To introduce students to the fundamental concepts and principles of fluid mechanics
- To provide students with a comprehensive understanding of fundamental principles in fluid mechanics
- To provide students with a comprehensive understanding of flow through pipes and channels
- To understand the principles of dimensional analysis and model studies in fluid mechanics
- To provide students with comprehensive knowledge and understanding of the principles and selection criteria of hydraulic machines.

UNIT I - FLUID PROPERTIES AND FLUID STATICS 9+3

Scope of fluid mechanics – Definitions of a fluid – Methods of analysis – Continuum hypothesis – System and Control volume approach – Reynold's transportation theorem – Fluid properties – Fluid statics – Manometry – Forces on plane and curved surfaces – Buoyancy and floatation – Stability of floating bodies.

UNIT II – FLUID KINEMATICS AND DYNAMICS 9+3

Continuity equation, Velocity Potential and Stream function, Bernoullis equation, and its applications, Impulse- Momentum principle, Impact of Jet and Velocity triangle.

UNIT III - FLOW THROUGH PIPES AND CHANNELS 9+3

Laminar and turbulent flows in circular pipes, Major and Minor losses in pipes, Darcy Weisbach equation, Hagen Poiseuille equation,Multi reservoir problems, pipe network design, Types of open Channel flows, Measurement of discharge in open channels, Notches, Analysis of most economical channel section .

UNIT IV – DIMENSIONAL ANALYSIS AND MODEL STUDIES 9+3

Fundamental dimensions – Dimensional homogeneity – Rayleigh's method and Buckingham Pi theorem – Dimensionless parameters – Similitude and model studies – Distorted and undistorted models.

UNIT V - HYDRAULIC MACHINES 9+3

Centrifugal pumps, Work done, Head developed , Pump output and Efficiencies ,priming - minimum starting speed, performance of multistage pumps, Cavitation, methods of prevention, Pump characteristics, Classification of hydraulic turbines, Pelton wheel, Francis turbine, Kaplan and turbines,Specific speed,Performance characteristics, Selection of turbines, Turbine efficiencies

TOTAL: 60 PERIODS

Course Outcomes	On Completion of this course, the student will be able to	Cognitive Level
CO1	Students will be able to define and distinguish between different types of fluids and understand the continuum hypothesis	Understand
CO2	Apply the continuity equation, velocity potential, and stream function concepts	Apply
CO3	Analyze and distinguish between laminar and turbulent flows in	Analyse

	circular pipes, and determine the associated major and minor losses	
CO4	Understand the concept of fundamental dimensions and dimensional homogeneity	Understand
CO5	Analyze, select, and optimize the performance of these machines in various engineering applications.	Analyse

CO – PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	2	2	1	-	-	-	2	1	-	1	2	1
2	3	3	2	2	1	-	-	-	2	1	-	1	2	1
3	3	2	2	2	1	-	-	-	2	1	-	1	2	1
4	2	2	2	2	1	-	-	-	2	1	-	1	2	1
5	2	2	2	2	1	-	-	-	2	1	-	1	2	1

1-low, 2-medium, 3-high, '-' - no correlation

TEXTBOOK:

C.P Kothandanraman, R.Rudramoorthy, Fluid Mechanics and Machinery, New Age International Publishers; Second edition, 2012

REFERENCES:

- G Shanmugam, M S Palanichamy, Basic Civil and Mechanical Engineering, McGraw Hill Education; First edition, 2018
- Modi P.N and Seth Hydraulics and Fluid Mechanics including Hydraulic Machines Standard Book House New Delhi. 2015.
- Chandramouli P N, Applied Hydraulic Engineering, Yes Dee Publisher, 2017.

WEBSITE REFERENCE:

- https://www.resolvedanalytics.com/theflux/fluid-dynamics-best-inventions
- https://lntcmb.com/hydraulic-excavator-working-principle/
- https://heicoin.com/blog/best-hydraulic-machines-uses-working-principles-types-applications/
- https://in.pinterest.com/biswa_nath316/fluid-mechanics/
- https://publishing.aip.org/publications/journals/special-topics/phf/artificial-intelligence-in-fluid-mechanics/

NPTEL/ SWAYAM/ MOOC REFERENCE:

- https://nptel.ac.in/courses/112105183 - Introduction to Fluid Mechanics and Fluid Engineering

PUCE3PC03	STRENGTH OF MATERIALS	L T P C
		3 1 0 4

COURSE OBJECTIVE

- To impart basic knowledge on Stress and Strain
- To create knowledge on determining shear force and bending moment
- To apply appropriate method to calculate deflection of beams
- To analyze deflection and deformation of shaft and spring
- To determine stress due to unsymmetrical bending and study various theory of failures

UNIT I - SIMPLE AND COMPOUND STRESSES **9+3**

Stresses and Strain in simple and compound bars – Thermal stresses – Elastic constants - Thin cylindrical and spherical shells – Biaxial state of stress – Principal stresses and principal planes – Mohr's circle of stresses.

UNIT II – BENDING OF BEAMS **9+3**

Types of beams and transverse loadings– Shear force and bending moment for simply supported, cantilever and over-hanging beams - Theory of simple bending – Bending stress distribution – Shear stress distribution - Flitched beams

UNIT III - DEFLECTION OF BEAMS **9+3**

Double Integration method – Macaulay's method – Area moment method – Conjugate beam method

-Strain energy method for determinate beams.

UNIT IV – TORSION AND SPRING **9+3**

Torsion formulation stresses and deformation in circular and hollows shafts – Stepped shafts– Deflection in shafts fixed at the both ends – Stresses in helical springs – Deflection of helical springs, carriage springs.

UNIT V - COLUMNS AND THEORY OF FAILURE **9+3**

Columns with different end conditions-Euler's Buckling load-thick cylinders - Theories of failure – Principal stress, principal strain, shear stress, strain energy and distortion energy theories – application problems.

TOTAL: 60 PERIODS

Course Outcomes	On Completion of this course, the student will be able to	Cognitive Level
CO1	Understand the concepts of stress and strain, principal stresses and principal planes.	Understand
CO2	Determine Shear force and bending moment in beams and understand concept of theory of simple bending.	Apply
CO3	Calculate the deflection of beams by different methods and selection of method for determining slope or deflection.	Apply
CO4	Analyze the deformation of shaft and deflection of springs.	Apply
CO5	Determine the stresses due to Unsymmetrical bending of beams	Apply

CO – PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	3	2	1	2	1	3	1	-	-	3	3	3
2	3	3	3	2	1	2	1	3	1	-	-	3	3	3
3	3	3	3	2	1	2	1	3	1	-	-	3	3	3
4	3	3	3	2	1	2	1	3	1	-	-	3	3	3
5	3	3	3	2	1	2	1	3	1	-	-	3	3	3

1-low, 2-medium, 3-high, '-' - no correlation

TEXTBOOK:

- S S Bhavikatti. "Strength of Materials", Vikas Publishing House Pvt. Ltd., New Delhi, 2013.

REFERENCES:

- Rattan.S.S., "Strength of Materials", Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2017.
- Kazimi S.M.A, "Solid Mechanics", Tata McGraw-Hill Publishing Co., New Delhi, 2017
- William A .Nash, "Theory and Problems of Strength of Materials", Schaum's Outline Series,Tata McGraw Hill Publishing company, 2017.
- Singh. D.K., " Strength of Materials", Ane Books Pvt. Ltd., New Delhi, 2021
- Egor P Popov, "Engineering Mechanics of Solids", 2nd edition, PHI Learning Pvt. Ltd., NewDelhi, 2015

WEBSITE REFERENCE:

- https://nptel.ac.in/courses/112107146
- https://pressbooks.bccampus.ca/powr4406/chapter/bending-moment-stress/
- https://mechanicalc.com/reference/beam-analysis
- https://mechanicalc.com/reference/beam-deflection-tables
- https://shorturl.at/kuw01

NPTEL/ SWAYAM/ MOOC REFERENCE:

- https://archive.nptel.ac.in/courses/105/105/105105108/ - Strength of materials.

PUAE3PL01	THERMODYNAMICS AND STRENGTH OF MATERIALS LABORATORY	L T P C
		0 0 4 2

COURSE OBJECTIVES

This course will enable the students:

- To study the mechanical properties of materials when subjected to different types of loading.
- To study how to improve the material properties
- To understand the nature of materials under microscopic Examination.

STRENGTH OF MATERIALS
LIST OF EXPERIMENTS:

1. Tension test on a mild steel rod.
2. Double shear test on Mild steel and Aluminum rods.
3. Torsion test on mild steel rod.
4. Impact test on metal specimen.
5. Hardness test on metals - Brinell and Rockwell Hardness Number.
6. Deflection test on beams.

TOTAL: 30 PERIODS

COURSE OUTCOMES:	**Cognitive Level**
After completing this course, students should demonstrate competency in the following skills:	
CO1: Analyse the Hardness and Tensile strength of the given material.	Analyze
CO2: Examine the deformation and torsion strength of the given material.	Analyze
CO3: Analyse the compression and shear strength of given materials	Analyze

CO – PO Mapping:

CO	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	3	1	2	-	1	1	-	2	1	-	2	2	2
2	3	3	1	2	-	1	1	-	2	1	-	2	2	2
3	3	3	1	2	-	1	1	-	2	1	-	2	2	2

1-Low,2-Medium,3-High,"-"-no correlation

THERMODYNAMICS LABORATORY

COURSE OBJECTIVES

- To study the engine types and its performance
- To understand the importance of heat transfer and its application.
- To understand the fuel properties.

LIST OF EXPERIMENTS

1. Performance test on a 4-stroke engine.
2. Valve timing of a 4 – stroke engine and port timing of a 2 stroke engine.
3. Determination of effectiveness of a parallel flow heat exchanger.
4. Determination of effectiveness of a counter flow heat exchanger.
5. Determination of heating value of a fuel.
6. Determination of thermal resistance of a composite wall.

TOTAL: 30 PERIODS

COURSE OUTCOMES: After completing this course, students should demonstrate competency in the following skills:	Cognitive Level
CO1: Perform test on diesel/petrol engine	Analyze
CO2: Determine the properties of the fuels.	Analyze
CO3: Analyze the heat transfer properties of solid and composite walls	Analyze

CO – PO Mapping:

CO	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	3	1	2	-	1	1	-	2	1	-	2	2	2
2	3	3	1	2	-	1	1	-	2	1	-	2	2	2
3	3	3	1	2	-	1	1	-	2	1	-	2	2	2

1-Low,2-Medium,3-High,"-"-no correlation

PUCE3PL02	FLUID MECHANICS AND MACHINERY LABORATORY	L T P C
		0 0 4 2

COURSE OBJECTIVES:

- To provide hands on experience in calibration of flow meters, performance characteristics ofpumps and turbines.

LIST OF EXPERIMENTS FLOW MEASUREMENT

A. FLOW MEASUREMENT

1. Flow through Orifice meter/mouthpiece,Venturimeter and Notches
2. Bernoulli's Experiment

B. LOSSES IN PIPES

3 Determination of friction factor in pipes.
4 Determination of minor losses

C. PUMPS

5 Characteristics of Centrifugal pumps
6 Characteristics of Gear pump
7 Characteristics of Submersible pump
8 Characteristics of Reciprocating pump

D. TURBINES

9 Characteristics of Pelton wheel turbine
10 Characteristics of Francis turbine

TOTAL: 60 PERIODS

COURSE OUTCOMES:

CO1 Apply Bernoulli equation for calibration of flow measuring devices.
CO2 Measure friction factor in pipes and compare with Moody diagram
CO3 Determine the performance characteristics of rotodynamic pumps.
CO4 Determine the performance characteristics of positive displacement pumps.
CO5 Determine the performance characteristics of turbines.

CO – PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	2	1	3	1	2	2	1	2	1	1	2	2	1
2	3	2	1	3	1	2	2	1	2	1	1	2	3	1
3	3	3	2	3	1	2	2	1	3	1	1	2	3	2
4	3	3	2	3	1	2	2	1	3	1	1	2	3	2
5	3	3	2	3	1	2	2	1	3	1	2	2	3	2

1-low, 2-medium, 3-high, '-' - no correlation

REFERENCES:

- Hydraulic Laboratory Manual, Centre for Water Resources, Anna University, 2015.
- Modi P.N. and Seth S.M., Hydraulics and Fluid Mechanics. Standard Book House. New Delhi,2017.
- Subramanya K, Fluid Mechanics and Hydraulic Machines, Tata McGraw Hill Edu. Pvt. Ltd.2011

AE 60

SEMESTER - IV

S.NO	COURSE CODE	COURSE NAME	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	PUCC4BS07	Environmental Science & Sustainability	BS	3	-	-	3	3
2.	PUAE4PC03	Aerodynamics - I	PC	3	-	-	3	3
3.	PUAE4PC04	Air Breathing Propulsion	PC	3	-	-	3	3
4.	PUAE4PC05	UAV Systems and Design	PC	3	-	-	3	3
5.	PUAE4PC06	Aircraft Systems and Instrumentation	PC	3	-	-	3	3
6.	PUCC4MCXX	Mandatory Course – II (Non-Credit)	MC	2	-	-	2	0
PRACTICALS								
7.	PUAE4PL02	Aerodynamics Laboratory	PC	-	-	4	4	2
8.	PUAE4PL03	Aircraft Propulsion Laboratory	PC	-	-	4	4	2
9.	PUCC4HM08	Extension Activities	HM	-	-	1	1	0
10.	PUAE4IP01	In-plant Training / Internship	SD	-	-	-	-	-
Total				**17**	**-**	**9**	**26**	**19**

- In-Plant-Training/Internship – 2 Weeks of training each during 4th/5th/6th Semester – During college hours or semester vacation
- Total 4 weeks of Training – 2 Credits

SYLLABUS FOR SEMESTER - IV

PUCC4BS07	ENVIRONMENTAL SCIENCE AND SUSTAINABILITY	L T P C
		3 0 0 3

COURSE OBJECTIVE

- To introduce the basic concepts of environment, ecosystems and biodiversity and emphasize on the biodiversity of India and its conservation.
- To impart knowledge on the causes, effects and control or prevention measures of environmental pollution and natural disasters.
- To facilitate the understanding of global and Indian scenarios of renewable and non-renewable resources, causes of their degradation and measures to preserve them.
- To familiarize the concept of global sustainable development goals and actions taken to achieve sustainability.
- To understand the environmental impact of the human population and the role of information technology in environment.

UNIT I ENVIRONMENT, ECOSYSTEM AND BIODIVERSITY **9**

Definition, Scope and Importance of Environment – Need for Public Awareness - Concept of an Ecosystem – Structure and Function of an Ecosystem – Energy Flow in the Ecosystem – Ecological Succession – Food Chains, Food Webs and Ecological Pyramids – Introduction, Types, Characteristic Features, Structure and Function of the various types of ecosystems – Introduction to Biodiversity Definition: Genetic, Species and Ecosystem Diversity – Value of Biodiversity – India as a Mega-Diversity Nation – Hot-Spots of Biodiversity – Threats to Biodiversity – Endangered and Endemic Species of India – Conservation of Biodiversity.

UNIT II ENVIRONMENTAL POLLUTION AND DISASTER MANAGEMENT **9**

Definition - Causes, Effects and Control Measures of Air, Water, Soil, Noise and Light Pollutions - Pollution Case Studies - Solid waste, Hazardous waste and E-waste Management – Disaster Management: Floods, Earthquake, Cyclone and Landslides, Climate change, Global Warming. Case studies on Occupational Health and Safety Management system (OHASMS). Environmental protection, Environmental protection acts.

UNIT III NON-RENEWABLE AND RENEWABLE SOURCES OF ENERGY **9**

Non-renewable energy sources (coal, petroleum, LPG, natural gas, nuclear) - Environmental Impact – air pollution control methods - Energy management and conservation, Concept, process, applications of Renewable energy sources (solar, wind, geothermal, ocean, hydrogen, tidal, biomass) New Energy Sources: Need of new sources. Different types new energy sources.

UNIT IV SUSTAINABILITY PRACTICES AND MANAGEMENT **9**

Development, GDP, Sustainability - concept, needs and challenges – economical social and governance for sustainability (ESG) - from unsustainability to sustainability - 17 Global Sustainable Development Goals - Action plan to achieve - Zero waste and R concept.

UNIT V HUMAN POPULATION AND ENVIRONMENT **9**

Population Growth, Variation Among Nations – Population Explosion – Family Welfare Programme – Human Rights – Value Education – Women and Child Welfare – Role of Information Technology in Environment and Human Health. Environmental Impact Assessment. Green Engineering: Green buildings, Green materials.

TOTAL: 45 PERIODS

COURSE OUTCOMES

Course Outcomes	Upon completion of this course, the student will be able to	Cognitive Level
CO1	To recognize and understand the functions of the environment, ecosystems and biodiversity and their conservation.	Understand
CO2	To identify the causes and effects of environmental pollution and natural disasters and contribute to the preventive measures in the society.	Apply
CO3	To recognize the need for renewable and the effect of non-renewable resources and contribute to sustainable measures to preserve them for future generations.	Understand
CO4	To apply global sustainable development goals, practices and action plans to achieve societal development.	Apply
CO5	To learn about the human welfare program, green materials and the role of information technology in the environment.	Apply

CO – PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	2	1	-	-	-	2	3	1	1	1	-	2
2	3	2	-	-	-	3	3	1	1	1	-	3
3	3	1	-	-	-	2	2	1	1	1	-	2
4	3	2	-	-	-	2	2	1	1	1	-	2
5	3	2	-	-	-	2	2	1	1	1	-	2

1-low, 2-medium, 3-high, '-' - no correlation

TEXTBOOK:

1. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2017.
2. Ajay Ahlawat, Sustainable Development Goals: Directive Principles for Sustainable India by 2030, First Edition, Notion Press, 2019.
3. Gilbert M. Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education, 2004.

REFERENCES:

1. Manoj Kumar Arya, Biodiversity Environment and Ecosystem Services, Discovery Publishing House Pvt Ltd, 2023.
2. C.S. Rao, Environmental Pollution Control Engineering, New Age International Private Limited, Fourth edition, 2021.
3. D.S. Chauhan, S.K. Srivastava, Non-Conventional Energy Resources, New Age International Private Limited, Fourth edition, 2021.
4. R.K. Trivedi, — Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, B.S. Publications, 2010.
5. Rajagopalan, R 'Environmental Studies-From Crisis to Cure', Oxford University Press, Fourth edition, 2023.
6. Twidell, J.W. & Weir A., "Renewable Energy Resources", EFNSpon Ltd., UK, 2015.

WEBSITE REFERENCE:

1. https://biologydictionary.net/biodiversity/
2. https://www.nationalgeographic.org/topics/resource-types/
3. Energy Flow in the Ecosystem: Get Details - Embibe – Energy flow in Ecosystem
4. https://www.unicef.org/child-rights-convention/what-are-human-rights
5. https://www.planradar.com/au/guide-sustainable-material-selection-green-building-projects/

NPTEL/ SWAYAM/ MOOC REFERENCE:

1. Complex Ecosystem Dynamics - Course (swayam2.ac.in) - Complex Ecosystem Dynamics

PUAE4PC03	Aerodynamics - I	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

1	To introduce the concepts of mass, momentum and energy conservation relating to aerodynamics.
2	To make the student understand the concept of vorticity and irrotationality.
3	To make the student understand about airfoil and the flow over the wing sections.
4	To introduce the basics of viscous flow.
5	To make the student to understand the different boundary layers and Blasius Solution

UNIT – I	INTRODUCTION TO LOW-SPEED FLOW	9

Governing Differential Equations for continuity, Euler equation, incompressible Bernoulli's equation. Circulation and vorticity, green's lemma and Stoke's theorem, barotropic flow, kelvin's theorem, streamline, stream function, irrotational flow, potential function, Equipotential lines, elementary flows and their combinations.

UNIT – II	TWO-DIMENSIONAL INVISCID INCOMPRESSIBLE FLOW	9

Ideal Flow over a circular cylinder, D'Alembert's paradox, Magnus effect, Kutta Joukowski's theorem, starting vortex, Kutta condition, real flow over smooth and rough cylinder.

UNIT – III	AIRFOIL THEORY	9

Cauchy-Riemann relations, complex potential, methodology of conformal transformation, Kutta-Joukowski's transformation and its applications, thin airfoil theory and its applications, NACA airfoil series and modern airfoils.

UNIT – IV	SUBSONIC WING THEORY	9

Vortex filament, Biot and Savart law, bound vortex and trailing vortex, horse shoe vortex, lifting line theory and its limitations, Subsonic flow visualisation techniques, High lifting devices. FoilSim simulator (NASA).

UNIT – V	INTRODUCTION TO BOUNDARY LAYER THEORY	9

Boundary layer and boundary layer thickness, displacement thickness, momentum thickness, energy thickness, shape parameter, boundary layer equations for a steady, two-dimensional incompressible flow, boundary layer growth over a flat plate, critical Reynolds number, Blasius solution, basics of turbulent flow.

TOTAL: 45 PERIODS

COURSE OUTCOMES: After the completion of this course, the students will be able to,		**Cognitive Level**
CO1	Understand the basics physics for low-speed flows.	Understand
CO2	Understand the concept of 2D inviscid incompressible flows in low-speed aerodynamics.	Understand

CO3	Analyze the lift generation problems using aerofoil theories.	Analysing
CO4	Understand the concept of vortex and its influence in lift & drag.	Understand
CO5	Understand the boundary layer effects in a steady, two-dimensional incompressible flow	Understand

TEXT BOOK:

1	E Rathakrishnan, "Theoretical Aerodynamics", John Wiley, NJ, 2013

REFERENCE BOOKS:

1	Anderson, J.D., "Fundamentals of Aerodynamics", McGraw Hill Book Co., 2010
2	John J Bertin., "Aerodynamics for Engineers", Pearson Education Inc, 6th Edition, 2013
3	Houghton, E.L., and Caruthers, N.B., "Aerodynamics for Engineering students", Edward Arnold Publishers Ltd., London, 7th Edition, 2016.
4	Clancey, L J.," Aerodynamics", Pitman, 2006
5	Ira H. Abbott, Albert E. Von Doenhoff, "Theory of Wing Sections: Including a summary of Airfoil Data", Dover Publications Inc., 1959.

WEBSITE REFERENCE / NPTEL/ SWAYAM/ MOOC REFERENCE:

1	https://archive.nptel.ac.in/courses/101/105/101105059/
2	https://archive.nptel.ac.in/courses/101/105/101105088/
3	https://onlinecourses.nptel.ac.in/noc22_ae09/preview
4	https://archive.nptel.ac.in/courses/101/101/101101058/

CO-PO MAPPING:

CO	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	2	2	1	-	1	1	-	2	1	-	2	2	1
2	3	2	2	1	-	1	1	-	2	1	-	2	2	1
3	3	2	2	1	-	1	1	-	2	1	-	2	2	1
4	3	2	2	1	3	1	1	-	2	1	-	2	2	3
5	3	2	2	1	-	1	1	-	2	1	-	2	2	1

1-Low,2-Medium,3-High,"-"-no correlation

PUAE4PC04	Air Breathing Propulsion	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

1	To establish fundamental approach and application of jet engine & piston engine components.
2	To learn about the analysis of flow phenomenon and estimation of thrust developed by jet engine.
3	To get familiar with the combustion process.
4	To know about the inlets, compressor and its stages.
5	To understand the purpose of turbines and nozzles.

UNIT – I	PRINCIPLES OF AIR BREATHING ENGINES	9

Operating principles of piston engines – thermal efficiency calculations – classification of piston engines - illustration of working of gas turbine engines – factors affecting thrust – methods of thrust augmentation – performance parameters of jet engines, Thrust equation.

UNIT – II	JET ENGINE INTAKES AND EXHAUST NOZZLES	9

Ram effect, Internal flow and Stall in subsonic inlets – relation between minimum area ratio and eternal deceleration ratio – diffuser performance – modes of operation - supersonic inlets – starting problem on supersonic inlets – shock swallowing by area variation – real flow through nozzles and nozzle efficiency – losses in nozzles – ejector and variable area nozzles - interaction of nozzle flow with adjacent surfaces – thrust reversal, Wall jets.

UNIT – III	JET ENGINE COMBUSTION CHAMBERS	9

Chemistry of combustion, Combustion equations, Combustion process, classification of combustion chambers – combustion chamber performance – effect of operating variables on performance – flame stabilization, Cooling process, Materials, Aircraft fuels, HHV, LHV, Orsat apparatus, EngineSim simulation (NASA).

UNIT – IV	JET ENGINE COMPRESSORS	9

Euler's turbo machinery equation, Principle operation of centrifugal compressor, Principle operation of axial flow compressor– Work done and pressure rise – velocity diagrams – degree of reaction – free vortex and constant reaction designs of axial flow compressor – performance parameters axial flow compressors– stage efficiency, Stator and rotor blade profile design considerations.

UNIT – V	JET ENGINE TURBINES	9

Principle of operation of axial flow turbines– limitations of radial flow turbines- Work done and pressure rise – Velocity diagrams – degree of reaction – constant nozzle angle designs – performance parameters of axial flow turbine– turbine blade cooling methods – stage efficiency calculations – basic blade profile design considerations – matching of compressor and turbine, Maintenance of engine components.

TOTAL: 45 PERIODS

COURSE OUTCOMES: After the completion of this course, the students will be able to,		Cognitive Level
CO1	Understand the difference between the thrust produced by piston and jet engines.	Understand
CO2	Know the purpose of engine intakes and nozzles & their different configurations.	Remember
CO3	Understand the purpose of fuel injectors, different types of combustion chambers and the combustion process.	Understand
CO4	Know the purpose of stators and rotors in a compressor, stages of compressor and stage efficiency.	Remember
CO5	Understand the purpose of turbines and the thermal loads on the turbines.	Understand

TEXT BOOK:

1	V Ganesan, "Gas Turbines", McGraw Hill Education, 3rd Edition, 2017.

REFERENCE BOOKS:

1	Hill, P.G. & Peterson, C.R. "Mechanics & Thermodynamics of Propulsion", Pearson education, 2009.
2	Cohen, H. Rogers, G.F.C. and Saravanamuttoo, H.I.H. "Gas Turbine Theory", Pearson Education Canada; 7th edition, 2017.
3	Oates, G.C., "Aero thermodynamics of Aircraft Engine Components", AIAA Education Series, New York, 1985.
4	"Rolls Royce Jet Engine", Rolls Royce; 5th edition, 2015
5	Mathur, M.L. and Sharma, R.P., "Gas Turbine, Jet and Rocket Propulsion", Standard Publishers & Distributors, Delhi, 2nd edition 2014.

WEBSITE REFERENCE / NPTEL/ SWAYAM/ MOOC REFERENCE:

1	https://nptel.ac.in/courses/101104084
2	https://archive.nptel.ac.in/courses/101/104/101104084/
3	https://onlinecourses.nptel.ac.in/noc20_ae13/preview
4	https://archive.nptel.ac.in/courses/101/106/101106033/

CO-PO MAPPING:

CO	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	2	1	1	-	1	1	-	2	1	-	2	2	1
2	3	2	1	1	-	1	1	-	2	1	-	2	2	1
3	3	2	1	1	3	1	1	-	2	1	-	2	2	3
4	3	2	1	1	-	1	1	-	2	1	-	2	2	1
5	3	2	1	1	-	1	1	-	2	1	-	2	2	

1-Low,2-Medium,3-High,"-"-no correlation

PUAE4PC05	UAV Systems and Design	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

1	To expose students to concepts needed in modelling and analysing an unmanned system.
2	To expose students to the design and development of UAV.
3	To expose students to the type of payloads used in UAV.
4	To study path planning
5	To understand the avionics hardware used in the UAV

UNIT – I	INTRODUCTION TO UAV	9

History of UAV –classification – Introduction to Unmanned Aircraft Systems--models and prototypes – System Composition-applications, Fixed, flapping and rotary wing configurations.

UNIT – II	THE DESIGN OF UAV SYSTEMS	9

Introduction to Design and Selection of the System- Aerodynamics and Airframe Configurations-Characteristics of Aircraft Types- Design Standards and Regulatory Aspects-UK,USA and Europe-Design for Stealth--control surfaces-specifications.

UNIT – III	AVIONICS HARDWARE	9

Autopilot – AGL-pressure sensors-servos-accelerometer –gyros-actuators- power supply processor, integration, installation, configuration, and testing.

UNIT – IV	COMMUNICATION PAYLOADS AND CONTROLS	9

Payloads-Telemetry-tracking-Aerial photography-controls-PID feedback-radio control frequency range –modems-memory system-simulation-ground test-analysis-trouble shooting

UNIT – V	THE DEVELOPMENT OF UAV SYSTEMS	9

Waypoints navigation-ground control software- System Ground Testing- System In-flight Testing-Future Prospects and Challenges-Case Studies – Mini and Micro UAVs.

TOTAL: 45 PERIODS

COURSE OUTCOMES: After the completion of this course, the students will be able to,		**Cognitive Level**
CO1	Understand the conceptual design UAV system	Understand
CO2	Prepare preliminary design requirements for an unmanned aerial vehicle	Understand
CO3	Identify different hardware for UAV	Understand
CO4	Understand the control and communication systems	Understand
CO5	Design micro aerial vehicle systems by considering practical limitations.	Understand

TEXT BOOK:	
1	Reg Austin "Unmanned Aircraft Systems UAV design, development and deployment", Wiley, 2011.
REFERENCE BOOKS:	
1	Kimon P. Valavanis, "Advances in Unmanned Aerial Vehicles: State of the Art and the Road to Autonomy", Springer, 2011
2	Dr. Armand J. Chaput, "Design of Unmanned Air Vehicle Systems", Lockheed Martin Aeronautics Company, 2001
3	Paul G Fahlstrom, Thomas J Gleason, "Introduction to UAV Systems", UAV Systems, Inc, 5th Edition, 2022
4	Robert C. Nelson, Flight Stability and Automatic Control, McGraw-Hill, Inc, 2nd Edition, 2017
WEBSITE REFERENCE / NPTEL/ SWAYAM/ MOOC REFERENCE:	
1	https://archive.nptel.ac.in/courses/101/104/101104073/
2	https://onlinecourses.nptel.ac.in/noc19_ae06/preview
3	https://archive.nptel.ac.in/courses/101/104/101104083/
4	https://onlinecourses.swayam2.ac.in/ntr24_ed12/preview

CO-PO MAPPING:

CO	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	2	2	-	-	1	1	-	2	2	-	2	2	1
2	3	2	2	-	-	1	1	-	2	2	-	2	2	1
3	3	2	2	-	-	1	1	-	2	2	-	2	2	1
4	3	2	2	-	-	1	1	-	2	2	-	2	2	1
5	3	2	2	-	-	1	1	-	2	2	-	2	2	1

PUAE4PC06	Aircraft Systems and Instrumentation	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

1	To impart knowledge of the hydraulic and pneumatic systems components
2	To Study the types of instruments and its operation including navigational instruments
3	To study the various engine systems in aircraft
4	Acquire the knowledge of essential systems of safe aircraft operation
5	To learn the concepts of display systems

UNIT – I	AIRCRAFT SYSTEMS	9

Hydraulic systems – Study of typical systems – components – Hydraulic systems controllers – Modes of operation – Pneumatic systems – Working principles – Typical Pneumatic Power system – Brake system – Components, Landing Gear Systems – Classification – Shock absorbers – Retractive mechanism, Types of fluids used in hydraulic and pneumatic systems, applications of hydraulic and pneumatic systems in modern aircraft.

UNIT – II	AIRPLANE CONTROL SYSTEMS	9

Conventional Systems – Power assisted and fully powered flight controls – Power actuated systems – Engine control systems – Push pull rod system – operating principles – Modern control systems – Digital fly by wire systems – Auto pilot system.

UNIT – III	ENGINE SYSTEMS	9

Piston and Jet Engines- Fuel systems – Components - Multi-engine fuel systems, lubricating systems – Starting and Ignition systems.

UNIT – IV	AIRCONDITIONING AND PRESSURIZING SYSTEM	9

Basic Air Cycle systems – Vapour Cycle Systems, Boot-strap air cycle system – Evaporative vapour cycle systems – Evaporation air cycle systems – Oxygen systems – Fire extinguishing system and smoke detection system, De-icing and anti-icing system.

UNIT – V	AIRCRAFT INSTRUMENTS	9

Flight Instruments and Navigation Instruments – Accelerometers, Air speed Indicators – Mach Meters – Altimeters - Gyroscopic Instruments– Principles and operation – Study of various types of engine instruments – Tachometers – Temperature and Pressure gauges.

TOTAL: 45 PERIODS

COURSE OUTCOMES: After the completion of this course, the students will be able to,		**Cognitive Level**
CO1	Demonstrate the ability to design a various system using pneumatic and hydraulic components.	Understand
CO2	Understand the advancement in modern control system over the past systems.	Understand

CO3	Demonstrate the fundamental understanding of the operation of engine auxiliary systems	Understand
CO4	Understand the various cabin comfort systems	Understand
CO5	Know about the various navigation and guidance instruments.	Understand

TEXT BOOK:

1	Pallet, E.H.J. Aircraft Instruments & Principles, Pitman & Co, 2nd Edition, 2009.

REFERENCE BOOKS:

1	Teager, S, "Aircraft Gas Turbine technology, McGraw Hill, 3rd Edition, 2017.
2	Handbooks of Airframe and Power plant Mechanics, US dept. of Transportation, Federal, Aviation Administration, the English Book Store, New Delhi, 1995.
3	McKinley, J.L. and R.D. Bent, Aircraft Power Plants, McGraw Hill, 1993.
4	McKinley, J.L. and Bent R.D. Aircraft Maintenance & Repair, McGraw Hill, 1993.

WEBSITE REFERENCE / NPTEL/ SWAYAM/ MOOC REFERENCE:

1	https://nptel.ac.in/courses/101104071
2	https://onlinecourses.nptel.ac.in/noc22_ae11/preview
3	https://onlinecourses.nptel.ac.in/noc24_ae05/preview

CO-PO MAPPING:

CO	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	1	2	-	-	1	1	-	2	1	-	2	2	1
2	3	1	2	-	-	1	1	-	2	1	-	2	2	1
3	3	1	2	-	-	1	1	-	2	1	-	2	2	1
4	3	1	2	-	-	1	1	-	2	1	-	2	2	1
5	3	1	2	-	-	1	1	-	2	1	-	2	2	1

1-Low,2-Medium,3-High,"-"-no correlation

PUAE4PL02	AERODYNAMICS LABORATORY	L T P C
		0 0 4 2

COURSE OBJECTIVES

This course will enable the students:

- To understand pressure distribution and characteristic over an airfoil and bluff bodies due to airflow.
- To measure the forces and moments acting on the airfoil at different angle of attack using wind tunnel balance set up.
- To visualize the flow pattern over an object by different method.

LIST OF EXPERIMENTS:

1. Calibration of a subsonic Wind tunnel.
2. Determination of lift for the given airfoil section.
3. Pressure distribution over a smooth circular cylinder.
4. Pressure distribution over a rough circular cylinder.
5. Pressure distribution over a symmetric aerofoil.
6. Pressure distribution over a cambered aerofoil.
7. Force measurement using wind tunnel balancing set up.
8. Flow over a flat plate at different angles of incidence.
9. Flow visualization studies in low speed flows over cylinders.
10. Flow visualization studies in low speed flows over airfoil with different angle of incidence.
11. Flow visualization on bluff bodies using water flow channel.

TOTAL: 60 Periods

COURSE OUTCOMES: After the completion of this course, the students will be able to	**Cognitive Level**
CO1: Calculate the aerodynamic forces and moments experienced by airfoils, wings and bluff bodies.	Evaluate
CO2: Evaluate the performance of thin airfoils with the effects of angle of attack and camber by considering thin aerofoil theory.	Evaluate
CO3: Measure flow velocity, lift and drag by use of wind tunnel instrument and to Visualize the flow by water flow and smoke methods.	Analyze

CO – PO Mapping:

CO	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	3	1	2	-	1	1	-	2	1	-	2	2	2
2	3	3	1	2	-	1	1	-	2	1	-	2	2	2
3	3	3	1	2	-	1	1	-	2	1	-	2	2	2

1-Low,2-Medium,3-High,"-"-no correlation

PUAE4PL03	AIRCRAFT PROPULSION LABORATORY	L T P C
		0 0 4 2

COURSE OBJECTIVES

This course will enable the students:

- To explore practically components of aircraft piston and gas turbine engines and their working principles.
- To impart practical knowledge of flow phenomenon of subsonic and supersonic jets.
- To determine practically thrust developed by rocket propellants.

LIST OF EXPERIMENTS:

1. Study of aircraft piston and its components.
2. Determine the velocity profiles of free jets.
3. Determine Velocity profiles of wall jets.
4. Wall pressure measurements of a subsonic diffusers and ramjet ducts.
5. Flame stabilization studies using conical and hemispherical flame holders.
6. Cascade testing of compressor blades.
7. Velocity and pressure measurements of jets.
8. Performance test of propeller
9. Study of gas turbine engines and its components
10. Study of missiles and its components.
11. Study of scramjet and its components

TOTAL: 60 Periods

COURSE OUTCOMES:	**Cognitive Level**
CO1: Identify components and information of piston and gas turbine engine.	Analyze
CO2: Analyze the behaviour of flow through ducts.	Analyze
CO3: Analyze the jet engine components.	Analyze

CO – PO Mapping:

CO	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	3	1	2	-	1	1	-	2	1	-	2	2	2
2	3	3	1	2	-	1	1	-	2	1	-	2	2	2
3	3	3	1	2	-	1	1	-	2	1	-	2	2	2

1-Low,2-Medium,3-High,"-"-no correlation

PUCC3MC01	WOMEN AND GENDER STUDIES	L T P C
		3 0 0 0

COURSE OBJECTIVE

1. To provide an effective educational program that will equip students to utilize the frameworks of various disciplines in order to analyze women, gender and sexuality in meaningful ways.
2. To produce interdisciplinary/intersectional student research that addresses political and practical issues of gender in relation to race, ethnicity, class, sexuality, privilege and power.
3. To prepare students to meet the needs of an increasingly ethnically and gender-diverse workplace.

UNIT I: CONCEPTS 9

Sex Vs. Gender, Masculinity, Femininity, Socialization, Matriarchy, Patriarchy, Public/ Private, Essentialism, Binaryism, Power, Hegemony, Hierarchy, Stereotype, Gender Roles, Female, Feminine, Feminist, Gender Relation, Deconstruction, Resistance, Sexual Division Of Labour.

UNIT II: FEMINIST THEORY 9

Feminist thinkers and theories: Liberal, Marxist, Socialist, Radical, Psychoanalytic, Postmodernist, Indian Feminism, Eco-feminism.

UNIT III: WOMEN'S MOVEMENTS: GLOBAL, NATIONAL AND LOCAL 9

Rise of Feminism in Europe and America. Women's Movement in India.

UNIT IV: GENDER AND LANGUAGE 9

Linguistic Forms and Gender. Gender and narratives.

UNIT V: GENDER AND REPRESENTATION 9

Advertising and popular visual media. - Gender and Representation in Alternative Media. - Gender and social media.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

COURSE OUTCOMES	Upon completion of this course, the student will be able to	Cognitive Level
CO1	Define and Evaluate gender as a social construct.	Understand
CO2	Identify the ways gender, power, privilege, and oppression play out across a range of cultures and human experiences.	Understand
CO3	Demonstrate an understanding of gender as it intersects with sexuality, race, ethnicity, religion, class and other critical variables.	Understand
CO4	Analyze human interactions and social/political systems using a "gender lens".	Apply
CO5	Conduct scholarly research on key gender issues and/or debates in the present modern era.	Apply

CO – PO Mapping

Course Outcomes	Programme Outcomes (Pos)											
	PO-1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	2	2	1	3	3	-	3
CO2	-	-	-	-	-	2	2	1	3	3	-	3
CO3	-	-	-	-	-	2	2	1	3	3	-	3
CO4	-	-	-	-	-	2	2	1	3	3	-	3
CO5	-	-	-	-	-	3	2	1	3	3	-	3

1-low, 2-medium, 3-high, '-' - no correlation

TEXT BOOKS:

1. Junaid Dani & Harpreet Haur, Women, Gender and Modern Society, Peridot Literary Books, 2023, ISBN: 9789390393893
2. Melissa J. Gillis and Andrew T. Jacobs, Introduction to Women's and Gender Studies, Oxford University Press, 2019, ISBN: 9780190064235

REFERENCES:

1. Afshar, Haleh. (1991) (Ed), Women, Development and Survival in the Third World, Longman, New York
2. John, Mary (2008) Women's Studies in India: A Reader, Pengiun Books India
3. Sarkar, Tankia and Sumit Sarkar ed., 2007, Women and Social Reform in Modern India (Vol. 1 and Vol. 2), Permanent Black
4. Jain, Jasbir ed., 2014, Women's Writing: Text & Context, Rawat Publication
5. Radha Kumar, The History Of Doing; An illustrated account of women's movement and feminism in india-1800-1900, Zubaan Publications, 2015
6. Flavia Agnes. (1999). Law and Gender Inequality. The Politics of Women's Rights in India. (Oxford University Press: India

WEBSITE REFERENCE:

1. https://en.wikipedia.org/wiki/Gender_studies
2. https://www.wellesley.edu/departments-programs/department/womens-and-gender-studies

NPTEL/ SWAYAM/ MOOC REFERENCE:

1. https://nptel.ac.in/courses/109103122
2. https://www.youtube.com/watch?v=lI8pyUSg4ns&list=PL2QYOrBMOd7-Jw6OA78pfp4B0oIDhsqwF

PUCC3MC02	ELEMENTS OF LITERATURE	L T P C
		3 0 0 0

COURSE OBJECTIVE

1. Students will be able to understand the relevance of literature in human life and appreciate its aspects in developing finer sensibilities.
2. Stimulate the interest of the students and sharpen their critical sensibility so that they may appreciate the beauty and richness of the texts they study.

UNIT I: POETRY 9

Poet – Persona/Speaker – Lines – Stanzas – Themes – Types of Poetry Figurative Language: Simile – Metaphor – Irony – Personification – other Literary devices

UNIT II: PROSE 9

Author – Character – Plot – Setting – Themes – Types of Prose Narrative Techniques: Flashback – Foreshadowing – Irony – Figurative Devices

UNIT III: DRAMA 9

Playwright – Plot – Dialogue – Characters – Setting –Audience – Themes; Types of Drama: Comedy – Tragedy – Modern Drama – Indian Drama; Dramatic Techniques: Dramatic Irony – Situational Irony

UNIT IV: FICTION & NOVEL 9

Bildungsroman, Picaresque, Epistolary, Stream-of-Consciousness, Novel of Social Reality, Psychological Novel , Historical Novel, Science Fiction, Gothic Novel and Graphic Novel

UNIT V: LITERARY CRITICISM 9

Definition - Classical and medieval criticism - Renaissance criticism - Baroque criticism - Enlightenment criticism - 19th-century Romantic criticism - The New Criticisms – Eco Criticism

TOTAL: 45 PERIODS

COURSE OUTCOMES:

COURSE OUTCOMES	Upon completion of this course, the student will be able to	Cognitive Level
CO-1	Analyze the various elements of poetry and develop their critical thinking skills.	Apply
CO-2	Comprehend Complex academic texts for narrating experience and events.	Understand
CO-3	To understand the nature of the dramatic genres including comedy, romance, tragedy, and history.	Understand
CO-4	To analyze the texts and understand the modernist techniques in the narratives & to develop critical thinking and close reading of texts.	Apply
CO-5	Critically view literary artifacts & apply high seriousness as guiding principles in appreciating literature.	Apply

CO – PO Mapping

Course Outcomes	Programme Outcomes (Pos)											
	PO-1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	2	2	1	3	3	-	3
CO2	-	-	-	-	-	2	2	1	3	3	-	3
CO3	-	-	-	-	-	2	2	1	3	3	-	3
CO4	-	-	-	-	-	2	2	1	3	3	-	3
CO5	-	-	-	-	-	3	2	1	3	3	-	3

1-low, 2-medium, 3-high, '-' - no correlation

TEXT BOOK:

1. Nozar Niazi & Rama Gautam, How To Study Literature : Stylistic And Pragmatic Approaches, Prentice Hall of India; 1st edition, 2010, ISBN – 10: 8120340612
2. Mahdi Javidshad, Amirhossein Nemati, An Outline Of The Norton Anthology Of English Literature, Arb Publications, 2024, ISBN-10: 9382527559

REFERENCES:

1. David Green, The Winged World, Macmillan Education, 2016, ISBN-10: 9352521005
2. Patricia Waugh, Literary Theory and Criticism, Oxford University Press, 2006.
3. George. K. M., Modern Indian Literature – An Anthology, Sahitya Akademi, 1994, ISBN: 8172017839
4. X. J. Kennedy, Dana Gioia, Literature: An Introduction to Fiction, Poetry, Drama, and Writing, Pearson; 13th edition, 2015, ISBN – 10: 0321971663
5. About Edgar V. Roberts, Literature: An Introduction to Reading and Writing, Pearson; 6th edition, 2014, ISBN – 10: 032194478X

WEBSITE REFERENCE:

1. https://www.britannica.com/art/literature
2. https://www.worldhistory.org/literature/
3. https://www.ereadingworksheets.com/e-reading-worksheets/all-reading-worksheets-list/
4. https://www.readingandwritinghaven.com/10-of-the-best-literary-analysis-activities-to-elevate-thinking

NPTEL/ SWAYAM/ MOOC REFERENCE:

1. https://onlinecourses.nptel.ac.in/noc22_hs01/preview
2. https://archive.nptel.ac.in/courses/109/106/109106124/

PUCC3MC03	FILM APPRECIATION	L T P C
		3 0 0 0

COURSE OBJECTIVE

1. To understand the relevance of Films and Movies in human life and appreciate its aspects in developing analytical sense.
2. To stimulate the interest of the students and sharpen their critical sensibility so that they can appreciate the aesthetics of films practically.

UNIT I: The Component Of Films 9

The material and equipment - The story, screenplay and script -The actors, crew members, and the director - The process of film making & structure of a film

UNIT II: Evolution of Film Language 9

Film language, form, movement etc. - Early cinema… silent film (Particularly French) - The emergence of feature films: Birth of a Nation - Talkies

UNIT III: Film Theories and Criticism/Appreciation 9

Realist theory; Auteurists - Psychoanalytic, Ideological, Feminists - How to read films? - Film Criticism / Appreciation

UNIT IV: Development of Films 9

Representative Soviet films - Representative Japanese films - Representative Italian films - Representative Hollywood film and the studio system

UNIT V: Indian Films 9

The early era - The important films made by the directors - The regional films - The documentaries in India

TOTAL: 45 PERIODS

COURSE OUTCOMES:

COURSE OUTCOMES	Upon completion of this course, the student will be able to	Cognitive Level
CO-1	Analyze the various Components of Films and develop their critical thinking skills.	Apply
CO-2	To understand the evolutionary levels of Films and analyze its linguistic nature.	Understand
CO-3	To understand the nature of the Film genres including comedy, romance, tragedy, and history and appreciate it as criticism.	Understand
CO-4	To analyze the history of films at universal level.	Apply
CO-5	To Understand the native film techniques and appreciate it.	Understand

CO – PO Mapping

Course Outcomes	Programme Outcomes (Pos)											
	PO-1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	2	2	1	3	3	-	3
CO2	-	-	-	-	-	2	2	1	3	3	-	3
CO3	-	-	-	-	-	2	2	1	3	3	-	3
CO4	-	-	-	-	-	2	2	1	3	3	-	3
CO5	-	-	-	-	-	3	2	1	3	3	-	3

1-low, 2-medium, 3-high, '-' - no correlation

TEXT BOOK:

1. Jill Nelmes, An Introduction to Film Studies, Routledge, 2012, ISBNL: 9780415582599
2. Barnouw, E. and Krishnaswamy, S, Indian Film (2nd edn), Oxford University Press, New York, 1980

REFERENCES:

1. Chatterji, Gayatri , Mother India , BFI Classics, BFI, London, 2002.
2. Chopra, Anupama , Sholay: The Making of a Classic, Penguin Books India, New Delhi, 2000.
3. Desai, Jigna , Beyond Bollywood: The Cultural Politics of South Asian Diasporic Film, Routledge, New York and London, 2004.
4. Ganti, Tejaswini , Bollywood: A Guidebook to Popular Hindi Cinema, Routledge, New York and London, 2004.
5. Pendakur, Manjunath , Indian Popular Cinema: Industry, Ideology, and Consciousness , Hampton Press, Cresshill, NJ, 2003.
6. Rai, Amit S. , Untimely Hollywood: Globalization and India's New Media Assemblage , Duke University Press, Durham, NC and London, 2009.
7. Rajadhyaksha, Ashish and Willeman, Paul (eds), Encylopaedia of Indian Cinema (2nd edn), British Film Institute, London, 1999.

WEBSITE REFERENCE:

1. https://testbook.com/objective-questions/mcq-on-cinema--626bb8c22de86486d8920d08
2. https://www.videomaker.com/how-to/directing/film-history/an-introduction-to-film-studies/
3. https://www.youtube.com/watch?v=g3qFVVjzQFA
4. https://www.filmconnection.com/reference-library/how-the-internet-has-changed-movies-and-the-movie-business/

NPTEL/ SWAYAM/ MOOC REFERENCE:

1. https://onlinecourses.nptel.ac.in/noc21_hs17/preview
2. https://onlinecourses.swayam2.ac.in/cec23_ge0
3. https://www.ftii.ac.in/p/courses8/preview

PUCC3MC04	THE CONSTITUTION OF INDIA	L T P C
		3 0 0 0

COURSE OBJECTIVE

1. To create an awareness in students on the Constitution of India.
2. To understand the function wings of the Government, fundamental rights and duties of citizens.
3. To analyse the powers of central, state, and local government, and strengthen constitutional institutions.

UNIT I: INTRODUCTION TO INDIAN CONSTITUTION 9

Constitution meaning of the term - The making of the Indian Constitution – Sources and constitutional history – Salient features of Indian Constitution - Philosophy of Constituent Assembly - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

UNIT II: THE UNION: EXECUTIVE, LEGISLATIVE AND JUDICIARY 9

Union Government and its Administration Structure: Role, power and position of President and Vice President; PM and Council of ministers, Cabinet and Central Secretariat: Powers and Functions of Lok Sabha, Rajya Sabha, The Supreme Court and High Court

UNIT III: THE STATES AND THE UNION TERRITORIES 9

State Government and its Administration: Governor -Role and Position – CM and Council of ministers, State Secretariat: Organisation, Structure and Functions – Relation between the Union and the States.

UNIT IV: LOCAL ADMINISTRATION 9

District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative – Panchayati Raj: Functions PRI: Zilla Panchayat, 73rd and 74th amendments; Elected officials and their roles - Block level Organizational Hierarchy, Village level - Role of Elected and Appointed officials - Importance of grass-root democracy

UNIT V: EMERGENCY PROVISIONS AND THE MAJOR FUNCTIONARIES 9

Emergency: Proclamation of Emergency, types of emergency – Election Commission – Union Service Public Commission – Planning Commission (NITI).

TOTAL: 45 PERIODS

COURSE OUTCOMES:

COURSE OUTCOMES	Upon completion of this course, the student will be able to	Cognitive Level
CO-1	Describe historical background of the constitution making and its importance for building ademocratic India.	Apply
CO-2	Explain the functioning of three wings of the Union government i.e., executive, legislative andjudiciary.	Understand
CO-3	Explain the functions of State Government and the Union Territories and compare with the Union.	Understand
CO-4	Analyse the decentralization of power between central, state and local self-government.	Apply
CO-5	Apply the knowledge in strengthening of the constitutional institutions like CAG, NITI ElectionCommission and USPC for sustaining democracy.	Apply

CO – PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	-	-	-	-	-	2	2	1	3	3	-	3
2	-	-	-	-	-	2	2	1	3	3	-	3
3	-	-	-	-	-	2	2	1	3	3	-	3
4	-	-	-	-	-	2	2	1	3	3	-	3
5	-	-	-	-	-	3	2	1	3	3	-	3

1-low, 2-medium, 3-high, '-' - no correlation

TEXT BOOK:

1. Sujit Choudhry, Madhav Khosla, The Oxford Handbook of the Indian Constitution, Oxford University Press Indian Ltd. 2016, ISBN: 9780198787334
2. Mahendra P Singh, Constitution of India, Eastern Book Company, 2024, ISBN: 9789351453512

REFERENCES:

1. Fali S. Nariman, You Must Know Your Constitution, Hay House Publishers India, 2023, ISBN-10 : 8195991726
2. P M Bakshi, Constitution of India, Lexis Nexis, 19th edition 2023

WEBSITE REFERENCE:

1.https://cdnbbsr.s3waas.gov.in/s380537a945c7aaa788ccfcdf1b99b5d8f/uploads/2023/05/2023050195.pdf

2.https://books.google.co.in/books?hl=en&lr=&id=d0knDAAAQBAJ&oi=fnd&pg=PP1&dq=online+material+on+the+constitution+of+india&ots=NCBHUYUqJn&sig=gKBTjU0Wua3EBaYI3GUn9CarZXQ#v=onepage&q=online%20material%20on%20the%20constitution%20of%20india&f=false

3.https://en.bharatpedia.org/wiki/Constitution_of_India

NPTEL/ SWAYAM/ MOOC REFERENCE:

1.https://onlinecourses.nptel.ac.in/noc24_lw05/preview

2.https://archive.nptel.ac.in/courses/129/106/129106003/

3.https://legalaffairs.nalsar.ac.in/students/student/course-details/1/courses

PUCC4MC01	MANDATORY COURSES – II	L T P C
	PRACTICES FOR WELL BEING	3 0 0 0

COURSE OBJECTIVE

1. To provide an effective educational program that will equip students to gain an in-depth understanding of the various ways to improve Physical & Mental Health and Wellbeing.
2. To produce interdisciplinary/intersectional student research that addresses Health and hygiene, Diseases and disorders, Diet and nutrition and traditional and modern practices of wellbeing.
3. To engage students in a process of healthy behavior change or health promotion.

UNIT I: HEALTH AND ITS IMPORTANCE 9

Health: WHO definition - Ten types of health one has to maintain - Physical health - Mental health - Social health - Financialhealth - Emotional health - Spiritual health - Intellectual health - Relationship health - Environmentalhealth - Occupational/Professional heath – Prevention is better than Cure.

UNIT II: DISEASES AND DISORDERS 9

Life expectancy rate - mortality rate

Types of diseases and disorders - dreadful diseases - Non-communicable diseases (NCDs) - heart disease – cancer – chronic pulmonary diseases - Lifestyle disorders – Obesity – Diabetes - Cardiovascular diseases – Strokes – hypertension – PCOD – infertility – ADHD – sleeplessness - Mental health issues.

Causes & Risk factors – tobacco – alcohol - unhealthy diet - lack of physical activities.

UNIT III: DIET AND NUTRICIAN 9

Role of diet in maintaining health - energy one needs to keep active throughout the day - nutrients one needs for growth and repair.

Balanced Diet and its 7 Components - Carbohydrates – Proteins – Fats – Vitamins – Minerals - Fibre and Water.

Food additives and their merits & demerits - Effects of food additives - Types of food additives -Food additives and processed foods - Food additives and their reactions

Simple lifestyle modifications to maintain health - Healthy Eating habits (Balanced diet according to age) Physical Activities (Stretching exercise, aerobics, resisting exercise) - MaintainingBMI-Importance and actions to be taken

UNIT IV: AYURVEDA & SIDDHA SYSTEMS 9

AYUSH systems and their role in maintaining health

Traditional Diet and Nutrition - Regimen of Personal and Social Hygiene - Daily routine (Dinacharya) - Seasonal regimens (Ritucharya) - basic sanitation andhealthy living environment - Sadvritta (good conduct) - for conducive social life.

Principles of Siddha & Ayurveda systems - Macrocosm and Microcosm theory - Pancheekarana Theory / (Five Element Theory) 96 fundamental Principles - Uyir Thathukkal (Tri-Dosha Theory) - Udal Thathukkal

UNIT V: PHYSICAL & EMOTIONAL WELLNESS 9

Definition and importance of yoga - Types of yoga - The Eight Limbs of Yoga - Simple Yogasanas for cure and prevention of health disorders - What yoga can bring to our life.

Emotional health - 3 key elements: the subjective experience - the physiological response - the behavioral response - Role of emotions in daily life -Short term and long term effects of emotional disturbances - Practices for emotional health - Recognize how thoughts influence emotions - Cultivate positive thoughts - Practice self-compassion - Expressing a full range of emotions.

Stress management - Stress definition - How stress affects one's life - causes of stress - Symptoms of stress - Managing stress (habits, tools, training, professional help) - Complications of stress mismanagement.

Sleep - Sleep and its importance for mental wellness - Sleep and digestion.

Immunity - Types and importance - Ways to develop immunity

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course, the students will be able:

COs	Course Outcome (CO)	Cognitive Level
CO-1	Able to describe Health and its importance at multi-dimensional levels.	Understand
CO-2	To be summarize on various diseases and disorders and their symptoms.	Understand
CO-3	Able to illustrate habits of food intake and nutritious diet.	Apply
CO-4	To explain on traditional methods of Medical Treatments: Ayurvedha and Siddha.	Understand
CO-5	Able to Implement best practices to manage physical and emotional Quotient.	Apply

Course Outcomes	Programme Outcomes (Pos)											
	PO-1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	1	1	-	2	1	-	3
CO2	-	-	-	-	-	1	1	-	2	1	-	3
CO3	-	-	-	-	-	1	2	-	2	1	-	3
CO4	-	-	-	-	-	1	1	-	2	1	-	3
CO5	-	-	-	-	-	1	1	-	3	1	-	3

*For Entire Course, PO /PSO Mapping; 1 (Low); 2(Medium); 3(High) Contribution to PO/PSO

TEXT BOOK:

1. Ashley Martin: Nutrition and Dietetics, Published by White Word Publications, New York, NY 10001,
2. Cory Martin: Yoga for Beginners_35 Simple Yoga Poses to Calm Your Mind and Strengthen Your Body, Althea Press, Berkeley, California, 2015

REFERENCES:

1. Moshe Zeidner, Gerald Matthews, and Richard D.Roberts, : WHAT WE KNOW ABOUT EMOTIONAL INTELLIGENCE How It Affects Learning, Work, Relationships, and Our Mental Health, The MIT Press, Cambridge, Massachusetts, London, England
2. Kristin Neff, Ph.D Christopher Germer, Ph.D,: The Mindful Self-Compassion Workbook The Guilford Press A Division of Guilford Publications, 2011

WEBSITE REFERENCE:

3. https://www.who.int/
4. https://standard.wellcertified.com/mind/health-and-wellness-awareness
5. https://www.niehs.nih.gov/health/topics/conditions
6. https://www.ayurwakeup.com/how-are-ayurveda-and-yoga-related/#:~:text=Yoga%20can%20help%20release%20physical,their%20physical%20health%20as%20well.

NPTEL/ SWAYAM/ MOOC REFERENCE:

1. https://www.tnpesu.org/syllabus/414%20-%20Certificate%20Course%20in%20Yoga%20and%20Naturopathy
2. https://onlinecourses.swayam2.ac.in/aic23_ge05/preview
3. https://onlinecourses.nptel.ac.in/noc21_hs29/preview

PUCC4MC02	MANDATORY COURSES – II	L T P C
	HISTORY OF SCIENCE AND TECHNOLOGY IN INDIA	3 0 0 0

COURSE OBJECTIVE

1. To provide an understanding of the socio-cultural and philosophical context in which the various scientific and technological ideas got developed in India
2. Stimulate student's interest in knowing various evolutions and thereby help in repositioning India's contributions in science and technology.

UNIT I: CONCEPTS AND PERSPECTIVES 9

Science and Technology-Meaning, Scope and Importance, Interaction of science, technology & society, Sources of history on science and technology in India.
Introduction to the works of D.D. Kosambi, Dharmpal, Debiprasad Chattopadhyay, Rehman, S. IrfanHabib, Deepak Kumar, Dhruv Raina, and others

UNIT II: SCIENCE AND TECHNOLOGY IN ANCIENT INDIA 9

Technology in pre-historic period - Beginning of agriculture and its impact on technology - Science and Technology during Vedic and Later Vedic times-Science and technology from 1st century AD to C-1200.

UNIT III: SCIENCE AND TECHNOLOGY IN MEDIEVAL INDIA 9

Legacy of technology in Medieval India, Interactions with Arabs-Development in medical knowledge, interaction between Unani and Ayurveda and alchemy-Astronomy and Mathematics: interaction with Arabic Sciences-Science and Technology on the eve of British conquest

UNIT IV: SCIENCE AND TECHNOLOGY IN COLONIAL INDIA 9

Science and the Empire - Indian response to Western Science Growth of techno-scientific institutions

UNIT V: SCIENCE AND TECHNOLOGY IN A POST-INDEPENDENT INDIA 9

Science, Technology and Development discourse - Shaping of the Science and Technology - Policy Developments in the field of Science and Technology-Science and technology in globalizing India-Social implications of new technologies like the Information Technology and Biotechnology.

TOTAL: 45 PERIODS

COURSE OUTCOMES: (Each unit – one outcome, total 5 outcomes)
At the end of the course, the students will be able:

COs	Course Outcome (CO)	Cognitive Level
CO-1	Able to explain the origin and development of Science & Technology in India.	Understand
CO-2	Able to Summarize the evolution of Science and Technology in Ancient India.	Understand
CO-3	Comprehend the evolution of Science and Technology in Medieval India.	Understand
CO-4	Comprehend the evolution of Science and Technology during Colonialism.	Understand
CO-5	Comprehend the evolution of Science and Technology during Modern period in India.	Understand

CO – PO Mapping

Course Outcomes	Programme Outcomes (Pos)											
	PO-1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	3	-	-	1	1	-	3
CO2	-	-	-	-	-	3	-	-	1	1	-	3
CO3	-	-	-	-	-	3	-	-	1	1	-	3
CO4	-	-	-	-	-	3	-	-	1	1	-	3
CO5	-	-	-	-	-	3	-	-	1	1	-	3

*For Entire Course, PO /PSO Mapping; 1 (Low); 2(Medium); 3(High) Contribution to PO/PSO

TEXT BOOK:

1. Kuppuram. G.: History of Science and Technology in India, South Asia Books, 1990, ISBN-13: 978-8185067315.
2. Dr. P Lathwal,: A Brief History of Science & Technology In India, Indu Book Services Pvt Ltd, 2022, ISBN: 9789391377205

REFERENCES:

1. Suvobrata Sarkar, : History of Science, Technology, Environment, and Medicine in India, Taylor & Francis, 2021, ISBN: 1000485005
2. Rattan Lal Hangloo,: HISTORY OF SCIENCE AND TECHNOLOGY: Exploring New Themes, Rawat Publications, 2011, ISBN 9788131604267
3. Dilip K. Chakrabarti,: History of Ancient India: Volume IX: Science and Technology, Medicine, Aryan Books International, 2023, ISBN: 9788173054884
4. ___:The Great Indian Scientists,: Cengage India Private Limited, 2017, ISBN-13 : 978-8131533321
5. D M Bose, S N Sen, B V Subbarayappa,: A Concise History of Science in India, Orient Blackswan, 2009, ISBN: 9788173716195

WEBSITE REFERENCE:

https://en.wikipedia.org/wiki/History_of_science_and_technology_on_the_Indian_subcontinent
https://en.wikipedia.org/wiki/Science_and_technology_in_India
https://link.springer.com/journal/43539
https://www.youtube.com/watch?v=zxDp7OkjlLM
https://en.wikipedia.org/wiki/List_of_Indian_scientists
https://www.indiascience.in/
http://www.indianscience.org/index.html
https://www.ias.ac.in/About_IASc/History/

NPTEL/ SWAYAM/ MOOC REFERENCE:

https://onlinecourses.swayam2.ac.in/arp20_ap35/preview
https://onlinecourses.nptel.ac.in/noc20_ae10/preview
https://www.classcentral.com/subject/indian-history
https://iisc.ac.in/courses/

PUCC4MC03	MANDATORY COURSES – II	L T P C
	POLITICAL AND ECONOMIC THOUGHT FOR A HUMANE SOCIETY	3 0 0 0

COURSE OBJECTIVE

1. To Understand the political history of a diversity of development paradigms.
2. To Develop a comparative research paper that seeks to understand why development politics and outcomes have varied across time and/or across geographic space.
3. To read theoretical and policy literature and be able to identify key concepts, arguments, assumptions, and adequacy of logic as well as evidence.

UNIT I: SOCIETY & HUMANE 9

Society – Human – Six Senses - Responsibilities - holistic thought – Desires - harmony in self, Relationship, society, nature, societal systems.

UNIT II: EVOLUTION OF POLITICAL THOUGHTS 9

Capitalism – Free markets, demand-supply, perfect competition, laissez-faire, monopolies,imperialism, Liberal democracy - Fascism and totalitarianism. World war I and II. Cold war - Communism – Mode of production, theory of labour, surplus value, class struggle, dialecticalmaterialism, historical materialism, Russian and Chinese models.

UNIT III: GANDHIAN THOUGHTS 9

Gandhian thought. Swaraj, Decentralized economy & polity, Community. Control over one's lives. Relationship with nature - Welfare state. Relation with human desires. Empowered human beings, satisfaction.

UNIT IV: CIVILIZATIONS 9

History of Civilization – Indian Civilization - Essential elements of Indian civilization - Technology as driver of society, Role of education in shaping of society. Future directions.

UNIT V: MODERN ECONOMY 9

Concept of modernity - Tradition Vs Modernity – Globalization – Industrial Revolutions – Modernism and Post – Modernism.

TOTAL: 45 PERIODS

COURSE OUTCOMES: (Each unit – one outcome, total 5 outcomes)
At the end of the course, the students will be able:

COs	Course Outcome (CO)	Cognitive Level
CO-1	Able to describe human, society and their interrelationships	Understand
CO-2	Able to summarize various political theories and their evolutions.	Understand
CO-3	To summarize the theory of Gandhi and his uniqueness.	Understand
CO-4	To be illustrate the formation, role and future of civilization in making of human	Apply
CO-5	To be illustrate the trends of Modern Economic Policies.	Apply

CO – PO Mapping

Course Outcomes	Programme Outcomes (Pos)											
	PO-1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	3	-	1	2	1	-	3
CO2	-	-	-	-	-	3	-	1	2	1	-	3
CO3	-	-	-	-	-	3	-	1	2	1	-	3
CO4	-	-	-	-	-	3	-	1	2	1	-	3
CO5	-	-	-	-	-	3	-	1	2	1	-	3

*For Entire Course, PO /PSO Mapping; 1 (Low); 2(Medium); 3(High) Contribution to PO/PSO

TEXT BOOK:

1. Jogdand P G, Globalization and social movements : Struggle for a humane society, Jaipur Rawat Publications, 2003, ISBN: 9788170338154
2. Adam Smith, The Wealth of Nations, Fingerprint Publishing, 2018, ISBN-13: 978-9387779464

REFERENCES:

1. Maharajan. M, Economic Thoughts of Mahatma Gandhi, Discovery Publishing Pvt.Ltd; First Edition, 2008, ISBN-13 : 978-8171414154
2. James Mill, The Elements of Political Economy, Cosimo Classics, 2007, ISBN-13 : 978-1602069800
3. Lokanathan. V., A History Of Economic Thought, S Chand & Co Ltd, 2018, ISBN-13 : 978-9352533374

WEBSITE REFERENCE:

https://www.acton.org/node/6298
https://thegreatthinkers.org/
https://oll.libertyfund.org/pages/major-political-thinkers
https://www.youtube.com/watch?v=3_lmd4XH-a4
https://en.wikipedia.org/wiki/Political_philosophy

NPTEL/ SWAYAM/ MOOC REFERENCE:

https://onlinecourses.swayam2.ac.in/nou21_hs34/preview

PUCC4MC04	MANDATORY COURSES – II	L T P C
	SOCIOLOGY, SOCIETY AND CULTURE	3 0 0 0

COURSE OBJECTIVE

- To understand the reciprocal relationship between the individual and society.
- To develop an understanding of societal and cultural dimensions of the nature of society and the environment in which they will live and work as scientists, engineers and entrepreneurs.
- To analyse problems and frame research questions relating to humans and their experience.

UNIT I: Sociology as a Science 9

Sociology and common Sense - Sociology and current affairs - Sociology as a science - Logic in sociological inquiry - Sociology of action - The field and relevance of sociology - Positivism

UNIT II: Society and Culture 9

Culture and society - The structure of culture - Cultural Traits and complexes - Subcultures and counter cultures - Cultural integration - Cultural relativism - Real and Ideal culture – Ethnocentrism - Xenocentrism - Cultural lag.

UNIT III: Social Institutions 9

The concept of varna - The Caste system: Origin and characteristics (of caste) as a system - Hierarchy based on birth - Religious sanctions on social participation - Caste and subcaste - Caste conflicts - Caste councils - An appraisal of caste system - Prospects of caste in modern India.

The Class system: What is social class? - Development of class - Self-identification and class consciousness - Class in itself and class for itself - Class having blue collar status and white collar status - Industrial class - Significance of social class.

The future of social classes: From Proletariat to status seekers

UNIT IV: Environment and Ecology 9

Conceptualising environment - Forest, ecology and society - Common Property Resources and its management - Significance of forest and environment in modern life - Environmental movement with reference to forest and water management

UNIT V: Issues of modernity 9

Concept of modernity - Tradition Vs Modernity – Globalization: Is globalization new and real? - Has globalization weakened the state? - Has globalization led to cultural homogenisation? - Does globalization lead to a clash of cultures?

TOTAL: 45 PERIODS

COURSE OUTCOMES: (Each unit – one outcome, total 5 outcomes)
At the end of the course, the students will be able:

COs	Course Outcome (CO)	Cognitive Level
CO-1	Able to Describe Society in terms of science and find logic behind establishment of society.	Understand
CO-2	Able to Illustrate Society with Culture to develop the best cultural environment.	Apply
CO-3	To summarize two major revolutionary concepts of Varna: The Caste and The Class.	Understand
CO-4	Able to describe the relationship between environment and modern society.	Understand
CO-5	Able to illustrate various levels of modern issues in the evolution of society.	Apply

CO – PO Mapping

Course Outcomes	Programme Outcomes (Pos)											
	PO-1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	3	-	1	3	1	-	3
CO2	-	-	-	-	-	3	-	1	3	1	-	3
CO3	-	-	-	-	-	3	-	1	3	1	-	3
CO4	-	-	-	-	-	3	3	1	3	1	-	3
CO5	-	-	-	-	-	3	-	2	3	1	-	3

*For Entire Course, PO /PSO Mapping; 1 (Low); 2(Medium); 3(High) Contribution to PO/PSO

TEXT BOOK:

1. ROSAMUND BILLINGTON, SHEELAGH STRAWBRIDGE, Culture and Society: A Sociology of Culture, Palgrave Macmillan, 1991, ISBN-13 : 978-0333460399
2. Subas Mohapatra, Society and Culture in India: A Reader, Orient Blackswan, 2017, ISBN: 9789383166145

REFERENCES:

1. Satish Chandra, State, Society, and Culture in Indian History, Oxford University Press, 2012, ISBN: 9780198077398
2. Byran S. Turner, Chris Rojek, Society & Culture, Sage Knowledge, 2001, ISBN: 9780761970491

WEBSITE REFERENCE:

- https://en.wikipedia.org/wiki/Society
- https://en.wikipedia.org/wiki/Culture
- https://www.sparknotes.com/sociology/society-and-culture/context/
- https://en.wikipedia.org/wiki/Sociology_of_culture
- https://ncert.nic.in/textbook/pdf/kesy104.pdf

NPTEL/ SWAYAM/ MOOC REFERENCE:

- https://nptel.ac.in/courses/109106180
- https://archive.nptel.ac.in/courses/109/103/109103023/
- https://onlinecourses.swayam2.ac.in/cec21_hs40/preview
- https://www.my-mooc.com/en/categorie/sociology