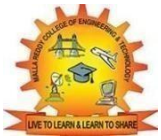

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

Sponsored by CMR Educational Society

(Affiliated to JNTU, Hyderabad, Approved by AICTE - Accredited by NBA & NAAC – 'A' Grade - ISO 9001:2015 Certified)

Maisammaguda, Dhulapally (Post Via. Kompally), Secunderabad – 500100, Telangana State, India.

Contact Number: 040-23792146/64634237, E-Mail ID: mrcet2004@gmail.com, website: www.mrcet.ac.in

BACHELOR OF TECHNOLOGY
AERONAUTICAL ENGINEERING

ACADEMIC REGULATIONS
(Batches admitted from the academic year 2020 - 2021)

Note: The regulations hereunder are subject to amendments as may be made by the Academic Council of the College from time to time. Any or all such amendments will be effective from such date and to such batches of candidates (including those already pursuing the program) as may be decided by the Academic Council.

PRELIMINARY DEFINITIONS AND NOMENCLATURES

- ”Autonomous Institution /College” means an institution/college designated as autonomous institute / college by University Grants Commission (UGC), as per the UGC Autonomous College Statutes.

- “Academic Autonomy” means freedom to the College in all aspects of conducting its academic programs, granted by the University for promoting excellence.

- “Commission” means University Grants Commission.

- “AICTE” means All India Council for Technical Education.

- “University” the Jawaharlal Nehru Technological University, Hyderabad.

- “College” means Malla Reddy College of Engineering & Technology, Secunderabad unless indicated otherwise by the context.

- “Program” means:
  - Bachelor of Technology (B.Tech) degree program
  - UG Degree Program: B.Tech

- “Branch” means specialization in a program like B.Tech degree program in Electronics & Communication Engineering, B.Tech degree program in Computer Science and Engineering etc.

- “Course” or “Subject” means a theory or practical subject, identified by its course – number and course-title, which is normally studied in a semester.

- T–Tutorial, P–Practical, D–Drawing, L-Theory, C-Credits

FOREWORD

The autonomy is conferred on Malla Reddy College of Engineering & Technology (MRCET) by UGC based on its performance as well as future commitment and competency to impart quality education. It is a mark of its ability to function independently in accordance with the set norms of the monitoring bodies like UGC and AICTE. It reflects the confidence of the UGC in the autonomous institution to uphold and maintain standards it expects to deliver on its own behalf and thus awards degrees on behalf of the college. Thus, an autonomous institution is given the freedom to have its own curriculum, examination system and monitoring mechanism, independent of the affiliating University but under its observance.

Malla Reddy College of Engineering & Technology (MRCET) is proud to win the credence of all the above bodies monitoring the quality of education and has gladly accepted the responsibility of sustaining, and also improving upon the values and beliefs for which it has been striving for more than a decade in reaching its present standing in the arena of contemporary technical education. As a follow up, statutory bodies like Academic Council and Boards of Studies are constituted with the guidance of the Governing Body of the College and recommendations of the JNTU Hyderabad to frame the regulations, course structure and syllabi under autonomous status.

The autonomous regulations, course structure and syllabi have been prepared after prolonged and detailed interaction with several experts drawn from academics, industry and research, in accordance with the vision and mission of the college which reflects the mindset of the institution in order to produce quality engineering graduates to the society.

All the faculty, parents and students are requested to go through all the rules and regulations carefully. Any clarifications, if needed, are to be sought at appropriate time with principal of the college, without presumptions, to avoid unwanted subsequent inconveniences and embarrassments. The cooperation of all the stakeholders is sought for the successful implementation of the autonomous system in the larger interests of the institution and brighter prospects of engineering graduates.

"A thought beyond the horizons of success committed for educational excellence"

PRINCIPAL

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
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VISION

- To establish a pedestal for the integral innovation, team spirit, originality and competence in the students, expose them to face the global challenges and become technology leaders of Indian vision of modern society.

MISSION

- To become a model institution in the fields of Engineering, Technology and Management.
- To impart holistic education to the students to render them as industry ready engineers.
- To ensure synchronization of MRCET ideologies with challenging demands of International Pioneering Organizations.

QUALITY POLICY

- To implement best practices in Teaching and Learning process for both UG and PG courses meticulously.
- To provide state of art infrastructure and expertise to impart quality education.
- To groom the students to become intellectually creative and professionally competitive.
- To channelize the activities and tune them in heights of commitment and sincerity, the requisites to claim the never - ending ladder of **SUCCESS** year after year.

For more information: www.mrcet.ac.in

PRE-REQUISITES FOR CORE ELECTIVES

Core Elective Number	Subject Code	Title of the Subject	Pre-Requisite Subject Code	Pre-Requisite Subject Title
I	R20A2131	Space Exploration Technology	R20A2104	Elements of Aeronautical Engineering
	R20A2132	Mechanisms and Machine Design	R20A2102	Applied Mechanics
			R20A2108	Solid Mechanics
	R20A2133	Wind Tunnel Techniques	R20A2107	Aerodynamics
II	R20A2134	Flight Scheduling Operations	R20A2104	Elements of Aeronautical Engineering
	R20A2135	Air Transportation systems	R20A2104	Elements of Aeronautical Engineering
	R20A2136	Airframe Structural Design	R20A2110	Aircraft Structures
III	R20A2137	Aircraft Maintenance Engineering	R20A2104	Elements of Aeronautical Engineering
	R20A2138	Aircraft systems	R20A2104	Elements of Aeronautical Engineering
	R20A2139	Helicopter Engineering	R20A2107	Aerodynamics
IV	R20A2140	AVIONICS	R20A2114	Aircraft Stability and Control
	R20A2141	Aero-elasticity	R20A2104	Elements of Aeronautical Engineering
			R20A2107	Aerodynamics
	R20A2142	Analysis of Composite Structure	R20A2115	Aircraft Composite Materials

DEPARTMENT OF AERONAUTICAL ENGINEERING

VISION

Department of Aeronautical Engineering aims to be indispensable source in Aeronautical Engineering which has a zeal to provide the value driven platform for the students to acquire knowledge and empower themselves to shoulder higher responsibility in building a strong nation.

MISSION

a) The primary mission of the department is to promote engineering education and research.

(b) To strive consistently to provide quality education, keeping in pace with time and technology.

(c) Department passions to integrate the intellectual, spiritual, ethical and social development of the students for shaping them into dynamic engineers.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1: PROFESSIONALISM & CITIZENSHIP To create and sustain a community of learning in which students acquire knowledge and learn to apply it professionally with due consideration for ethical, ecological and economic issues.
PEO2: TECHNICAL ACCOMPLISHMENTS To provide knowledge based services to satisfy the needs of society and the industry by providing hands on experience in various technologies in core field.
PEO3: INVENTION, INNOVATION AND CREATIVITY To make the students to design, experiment, analyze, interpret in the core field with the help of other multi disciplinary concepts wherever applicable.
PEO4: PROFESSIONAL DEVELOPMENT To educate the students to disseminate research findings with good soft skills and become a successful entrepreneur.
PEO5: HUMAN RESOURCE DEVELOPMENT To graduate the students in building national capabilities in technology, education and research.

PROGRAM SPECIFIC OBJECTIVES (PSOs)

To mould students to become a professional with all necessary skills, personality and sound knowledge in basic and advance technological areas.

1. To promote understanding of concepts and develop ability in design manufacture and maintenance of aircraft, aerospace vehicles and associated equipment and develop application capability of the concepts sciences to engineering design and processes.
2. Understanding the current scenario in the field of aeronautics and acquire ability to apply knowledge of engineering, science and mathematics to design and conduct experiments in the field of Aeronautical Engineering.
3. To develop leadership skills in our students necessary to shape the social, intellectual, business and technical worlds.

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

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 and safety, and the 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, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and 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 and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member

or leader in diverse teams, and in multidisciplinary settings.

10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multi disciplinary environments.
12. Life- long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

AERONAUTICAL ENGINEERING

COURSE STRUCTURE

I Year B. Tech – I Semester

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R20A0001	English	2			2	30	70
2	R20A0021	Mathematics – I	3	1		4	30	70
3	R20A0013	Advanced Material Chemistry	3			3	30	70
4	R20A0012	Engineering Physics	3			3	30	70
5	R20A0501	Programming For Problem Solving	3			3	30	70
6	R20A0084	Engineering & IT Workshop	-		4	2	30	70
7	R20A0581	Programming for Problem Solving Lab	-		3	1.5	30	70
8	R20A0083	Engineering Physics Lab	-		3	1.5	30	70
9*	R20A0014*	Environmental Science	2		-	0	100	-
		TOTAL	**16**	**1**	**10**	**20**	**340**	**560**

I Year B. Tech – II Semester

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	MAX.MARKS	
							INT	EXT
1	R20A0002	Professional English	2			2	30	70
2	R20A0022	Mathematics – II	3	1		4	30	70
3	R20A0201	Basic Electrical Engineering	3			3	30	70
4	R20A0301	Engineering Graphics	3			3	30	70
5	R20A0502	Python Programming	1		4	3	30	70
6	R20A0081	English Language Communication Skills Lab	-		4	1.5	30	70
7	R20A0281	Basic Electrical Engineering Lab	-		3	1.5	30	70
8	R20A0582	Python Programming Lab	-		4	2	30	70
9*	R20A0003*	Human Values and Professional Ethics	2	0		-	**100**	-
		TOTAL	**14**	**1**	**15**	**20**	**340**	**560**

***Mandatory course: Non-credit course, 50% of scoring is required for the award of the degree**

B. Tech (ANE) – III Semester (II Year – I Semester)

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	MAX.MARKS	
							INT	EXT
1	R20A2101	Fluid Mechanics	3	0	0	3	30	70
2	R20A2102	Applied Mechanics	3	0	0	3	30	70
3	R20A2103	Engineering Thermodynamics	2	1	0	3	30	70
4	R20A2104	Elements of Aeronautical Engineering	3	0	0	3	30	70
5	R20A2105	Aircraft Production Technology	3	0	0	3	30	70
6	R20A2106	CAD/CAM	3	0	0	3	30	70
7	R20A2181	Aircraft Production Technology Lab	0	0	3	1.5	30	70
8	R20A2182	Aircraft Engineering Drawing Lab Using Cad	0	0	3	1.5	30	70
9*	R20A0008	Global Education & Professional Career	2	0		-	100	-
		TOTAL	19	1	6	21	340	560

Mandatory course: Non-credit course, 50% of scoring is required for the award of the degree

B. Tech (ANE) – IV Semester (II Year – II Semester)

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	MAX.MARKS	
							INT	EXT
1	R20A2107	Aerodynamics	3	0	0	3	30	70
2	R20A2108	Solid Mechanics	3	0	0	3	30	70
3	R20A0061	Managerial Economics And Financial Analysis	3	0	0	3	30	70
4	R20A2109	Aircraft Performance	2	1	0	3	30	70
5	R20A0024	Probability and Statistics	3	0	0	3	30	70
6		OPEN ELECTIVE – I	3	0	0	3	30	70
7	R20A2183	Solid Mechanics and Fluid Mechanics Lab	0	0	3	1.5	30	70
8	R20A2184	Aerodynamics and Propulsion Lab	0	0	3	1.5	30	70
9	R20A0005	* Foreign Language German	2	-	-	0	100	-
		TOTAL	19	1	6	21	340	560

Mandatory course: Non-credit course, 50% of scoring is required for the award of the degree

OPEN ELECTIVE I		
S.NO	SUBJECT CODE	SUBJECT
1	R20A0451	Basics of Computer Organization
2	R20A1251	Web Designing Tools
3	R20A0551	Introduction to DBMS
4	R20A0051	Enterprise Resource Planning
5	R20A0351	Intellectual Property Rights

B. Tech (ANE) – V Semester (III Year – I Semester)

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	MAX.	
							INT	EXT
1	R20A2110	Aircraft Structures	3	0	0	3	30	70
2	R20A2111	Air Breathing Propulsion	3	0	0	3	30	70
3	R20A0561	Artificial Intelligence and Machine Learning	3	0	0	3	30	70
4	R20A2113	Compressible Flow Aerodynamics	3	0	0	3	30	70
5	R20A2131 R20A2132 R20A2133	PROFESSIONAL ELECTIVE – I 1. Space Exploration Technology 2. Mechanisms and Machine Design 3. Wind Tunnel Techniques	3	0	0	3	30	70
6	OE – II	OPEN ELECTIVE – II	3	0	0	3	30	70
7	R20A0566	Artificial Intelligence and Machine Learning lab	0	0	3	1.5	30	70
8	R20A2185	Aircraft Structures Lab	0	0	3	1.5	30	70
9	R20A0007	* Constitution of india	2	0	0	0	100	-
		TOTAL	20	0	6	21	340	560

**Mandatory course: Non-credit course, 50% of scoring is required for the award of the degree*

OPEN ELECTIVE II		
S.NO	SUBJECT CODE	SUBJECT
1	R20A1252	Management Information Systems
2	R20A0552	JAVA Programming
3	R20A1253	Software Project Management
4	R20A0553	Operating Systems
5	R20A0452	IOT and Application

B. Tech (ANE) – VI Semester (III Year – II Semester)

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R20A2114	Aircraft Stability and Control	2	1	0	3	30	70
2	R20A2115	Aircraft Composite Materials	3	0	0	3	30	70
3	R20A2116	Finite Element Analysis	3	0	0	3	30	70
4	R20A2134 R20A2135 R20A2136	PROFESSIONAL ELECTIVE – II 1. Flight Scheduling Operations 2. Air Transportation systems 3. Airframe Structural Design	3	0	0	3	30	70
5	OE – III	OPEN ELECTIVE – III	3	0	0	3	30	70
6	R20A2186	Aircraft Computational Structures Lab	0	0	3	1.5	30	70
7	R20A2187	Aircraft Materials and Metrology Lab	0	0	3	1.5	30	70
8	R20A2191	Industry oriented Internship	0	0	6	3	30	70
9	R20A0006	*Technical communication and soft skills	2	0	0	0	100	-
		TOTAL	16	1	12	21	340	560

Mandatory course: Non-credit course, 50% of scoring is required for the award of the degree

OPEN ELECTIVE III		
S.NO	SUBJECT CODE	SUBJECT
1	R20A0453	Robotics and Automation
2	R20A1254	Big Data Architecture
3	R20A0555	Basics of Cloud Computing
4	R20A0554	Cyber Security
5	R20A1255	DevOps

B. Tech (ANE) – VII Semester (IV Year – I Semester)

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	MAX.MARKS	
							INT	EXT
1	R20A2117	Computational Aerodynamics	2	1	0	3	30	70
2	R20A2118	Space Propulsion	2	1	0	3	30	70
3	R20A2119	Flight Vehicle Design	3	0	0	3	30	70
4	R20A2137 R20A2138 R20A2139	PROFESSIONAL ELECTIVE – III 1. Aircraft Maintenance Engineering 2. Aircraft systems 3. Helicopter Engineering	3	0	0	3	30	70
5	R20A2140 R20A2141 R20A2142	PROFESSIONAL ELECTIVE – IV 4. Avionics 5. Aero-elasticity 6. Analysis of Composite Structure	3	0	0	3	30	70
6	R20A2188	Computational Aerodynamics Lab	0	0	3	1.5	30	70
7	R20A2189	Flight Vehicle Design Lab	0	0	3	1.5	30	70
8	R20A2192	Mini Project	-	-	6	3	30	70
		TOTAL	13	2	12	21	240	560

B. Tech (ANE) – VIII Semester (IV Year – II Semester)

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R20A2193	Start up and Innovation	-	-	8	4	30	70
2	R20A2194	Entrepreneurship	-	-	6	3	30	70
3	R20A2195	Major Project	-	-	16	8	30	70
4		TOTAL	-	-	30	15	90	210

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

I Year B.Tech. ANE- I Sem **L/T/P/C**
3/-/-/3

(R20A0001) English

INTRODUCTION

English is a global language which is a means to correspond globally. Keeping in account of its vital role in the global market, emphasis is given to train the students to acquire language and communication skills. The syllabus is designed to develop and attain the competency in communicative skills.

The lectures focus on the communication skills and the selected excerpts support as resources for the teachers to develop the relevant skills in the students. The lessons stimulate discussions and help in comprehending the content effectively. The focus is on skill development, nurturing ideas and practicing the skills.

COURSE OBJECTIVES

1. To enable students to enhance their lexical, grammatical and communicative competence.
2. To equip the students to study the academic subjects with better perspective through theoretical and practical components of the designed syllabus.
3. To familiarize students with the principles of writing and to ensure error-free writing.
4. To analyze, interpret and evaluate a text and critically appreciate it.
5. To improve the writing and speaking skills, the productive skills.

SYLLABUS

Reading Skills:

Objectives

1. To develop an awareness in the students about the significance of silent reading and comprehension.
2. To augment the ability of students to guess the meanings of words from context and grasp the overall message of the text, draw inferences etc.
   Skimming the text
   - Understanding the gist of an argument
   - Identifying the topic sentence
   - Inferring lexical and contextual meaning
   - Understanding discourse features
   - Recognizing coherence/sequencing of sentences
   - Scanning the text

NOTE:

The students will be trained in reading skills using the prescribed text for detailed study. They will be examined in reading and answering questions using 'unseen' passages which may be taken from authentic texts, such as magazines/newspaper articles.

Writing Skills:

Objectives

1. To develop an awareness in the students about basic formal writing skills.
2. To equip students with the components of different forms of writing, beginning with the required ones:
   - Writing sentences
   - Use of appropriate vocabulary
   - Coherence and cohesiveness
   - Formal and informal letter writing

Unit –I

"The Road not taken"by Robert Frost

Grammar –Tenses and Punctuation(Sequences of Tenses)
Vocabulary –Word Formation - Prefixes and Suffixes
Writing –Paragraph Writing (Focusing on Tenses and Punctuations)
Reading –The art of skimming and scanning -Reading Exercise Type 1
(Match the statements to the text they refer to)

Unit – II

Act II from 'Pygmalion' by G.B. Shaw

Grammar –Direct and Indirect Speech
Vocabulary– Synonyms, Antonyms
Writing –Essay Writing (Introduction, body and conclusion)
Reading –Comprehending the context– Reading Exercise Type 2
(Place the missing statement)

Unit – III

Satya Nadella's Email to His Employees on his First Day as CEO of Microsoft

Grammar – Voices
Vocabulary –One-Word Substitutes, Standard Abbreviations
Writing –E-mail Writing, Letter Writing (complaints, requisitions, apologies).
Reading –Reading Comprehension- Reading Exercise Type 3
(Reading between the lines)

Unit – IV

J K Rowling's Convocation Speech at Harvard

Grammar – Articles, Misplaced Modifiers
Vocabulary –Phrasal Verbs
Writing – Précis Writing
Reading –Reading Exercise Type 4
(Cloze test)

Unit –V

Abdul Kalam's Biography

Grammar – Subject-Verb Agreement, Noun-Pronoun Agreement
Vocabulary – Commonly Confused Words
Writing – Memo Writing
Reading –Reading Exercise Type 5
(Identifying errors)

* Exercises apart from the textbook shall also be used for classroom tasks.

REFERENCE BOOKS

1. Practical English Usage. Michael Swan. OUP. 1995.
2. Remedial English Grammar. F.T. Wood. Macmillan.2007
3. On Writing Well. William Zinsser. Harper Resource Book. 2001
4. Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
5. Communication Skills. Sanjay Kumar and Pushpa Lata. Oxford University Press. 2011.
6. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

COURSE OUTCOMES

Students will be able to:

1. Gain competence and proficiency in 'productive' skills, i.e., writing and speaking with the recognition of the need for life-long learning of the same
2. Hone their language abilities in terms of comprehending complex technical texts with a potential to review literature
3. Present ideas clearly and logically to analyze data and provide valid conclusions in written communication
4. Enrich their grammatical accuracy and fluency to be adept at both the active and passive skills
5. Represent old conventions with a set of the new by professional verbal communicative ability

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

I Year B.Tech. ANE- I Sem **L/T/P/C**
3/1/-/4

(R20A0021) Mathematics – I

COURSE OBJECTIVES:

1. The concept of a Rank of the matrix and applying the concept to know the consistency and solving the system of linear equations.
2. The concept of Eigen values, Eigen vectors and Diagonolisation.
3. The maxima and minima of functions of several variables.
4. The Applications of first order ordinary differential equations and methods to solve higher order differential equations.
5. The properties of Laplace Transform, Inverse Laplace Transform and Convolution theorem.

UNIT I: Matrices

Introduction, Rank of a matrix - Echelon form, Normal form, Consistency of system of linear equations (Homogeneous and Non-Homogeneous)-Gauss-Siedel method, Linear dependence and independence of vectors, Eigen values and Eigen vectors and their properties (without proof), Cayley-Hamilton theorem(without proof), Diagonalisation of a matrix.

UNIT II: Multi Variable Calculus (Differentiation)

Functions of two variables, Limit, Continuity, Partial derivatives, Total differential and differentiability, Derivatives of composite and implicit functions, Jacobian-functional dependence and independence, Maxima and minima and saddle points, Method of Lagrange multipliers, Taylors theorem for two variables.

UNIT III: First Order Ordinary Differential Equations

Exact, Equations reducible to exact form, Applications of first order differential equations - Newton's law of cooling, Law of natural growth and decay, Equations not of first degree- Equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

UNIT IV : Differential Equations of Higher Order

Linear differential equations of second and higher order with constant coefficients: Non-homogeneous term of the type $f(x) = e^{ax}$, sinax, cosax, x^n, e^{ax} V and x^n V - Method of variation of parameters, Equations reducible to linear ODE with constant coefficients- Cauchy's Euler equation and Legendre's equation.

UNIT V: Laplace Transforms

Definition of Laplace transform, domain of the function and Kernel for the Laplace transforms, Existence of Laplace transform, Laplace transform of standard functions, first shifting Theorem, Laplace transform of functions when they are multiplied and divided by "t", Laplace transforms of derivatives and integrals of functions, Unit step function, Periodic function.

Inverse Laplace transform by Partial fractions, Inverse Laplace transform of functions when they are multiplied and divided by "s", Inverse Laplace Transforms of derivatives and integrals of functions, Convolution theorem, Solving ordinary differential equations by Laplace transform.

TEXT BOOKS

1. Higher Engineering Mathematics by B V Ramana ., Tata McGraw Hill.
2. Higher Engineering Mathematics by B.S. Grewal, Khanna Publishers.
3. Advanced Engineering Mathematics by Kreyszig ,John Wiley & Sons .

REFERENCE BOOKS

1. Advanced Engineering Mathematics by R.K Jain & S R K Iyenger, Narosa Publishers.
2. Ordinary and Partial Differential Equations by M.D. Raisinghania, S.Chand Publishers
3. Engineering Mathematics by N.P Bali and Manish Goyal.

COURSE OUTCOMES: After learning the concepts of this paper the student will be able to

1. Analyze the solutions of the system of linear equations and find the Eigen values and Eigen vectors of a matrix, which are used to analyze the long term behavior of any system.
2. Find the extreme values of functions of two variables with / without constraints.
3. Solve first order, first degree differential equations and their applications.
4. Form a differential equation for typical engineering problems and hence can solve those higher order differential equations.
5. Solve differential equations with initial conditions using Laplace Transformation.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

I Year B.Tech. ANE- I Sem **L/T/P/C**
3/-/-/3

(R20A0013) Advanced Material Chemistry

COURSE OBJECTIVES: The students will be able to

1. Apply the electrochemical principles for construction of batteries and fuel cells.
2. Analyze engineering problems related to corrosion and develop different corrosion control techniques.
3. Identify different types of polymers, composites and their applications in various engineering fields.
4. Gain knowledge on wide variety of advanced materials like nano and smart materials which have excellent engineering properties.
5. Explain the principles and applications of photochemistry in engineering field.

UNIT-I : Electrochemistry: (8 hours)

Introduction-Electrochemical cells - electrode potentials, construction and working of a galvanic cell, EMF and its applications - potentiometric titration; Nernst equation and its applications; electrochemical series and its applications. Batteries-classification of batteries, primary cell - lithium cells; secondary cells - lead acid battery and lithium ion battery; Fuel cells - H_2-O_2fuel cell; applications and advantages of fuel cells.

UNIT-II: Corrosion: (8 hours)

Introduction-Causes and effects of corrosion; Theories of corrosion- chemical(oxidation corrosion) and electrochemical corrosion, Corrosion control methods - cathodic protection - sacrificial anodic protection and impressed current cathodic protection; protective coatings-galvanizing and tinning, electroplating (Cu plating) and electroless plating (Ni plating) - advantages and applications of electroplating/electrolessplating.

Unit IIIFunctional Materials: (10 hours)

Polymers: Introduction-thermoplastic and thermosetting resins, preparation, properties and engineering applications of Polyvinylchloride(PVC), Teflon (PTFE),Polymethyl methacrylate (PMMA), Polycarbonate, Bakelite. Conducting polymers-classification of conducting polymers-conduction mechanism in polyacetylene and applications of conducting polymers.

Composite materials: Introduction-Fibre reinforced plastics (FRPs)-Glass fibre reinforced, Carbon fibre reinforced plastics and their applications.

Unit IV Advanced Materials: (8 hours)

Nanomaterials: Introduction andclassification of nanomaterials; preparation of nanomaterials -Sol-gel and Chemicalvapour deposition method; applications ofnanomaterials (industrial and medicinal). Carbon nanotubes (CNTs)-applications.

Smart materials: Introduction-types of smart materials-examples and applications of piezoelectric materials, shape memory alloys,magnetostrictive materials and elertrostricitve materials.

Unit V Photochemistry: (8 hours)

Introduction- Laws of photochemistry- Stark-Einstein law, Beer-Lambert's law, photochemical processes - Jablonsky diagram, applications of fluorescence, phosphorescence and photo sensitization.

Suggested Text Books:

1. Engineering Chemsitry by P.C. Jain & M. Jain: Dhanpat Rai Publishing Company (P) Ltd, New Delhi. 16thEdition.
2. Engineering Chemistry by Prasanta Rath, B. Rama Devi, C. H. Venkata Ramana Reddy, SubhenduChakroborty,Cengage Learning Publication, India Private Limited, 2018.
3. Principles and Applications of Photochemistry by Brian Wardle Manchester Metropolitan University, Manchester, UK, A John Wiley & Sons, Ltd., Publication, 2009.
4. Engineering Analysis of Smart Material Systems by Donald J. Leo, Wiley, 2007.

Reference Books:

1. Engineering Chemistry by Shashi Chawla, Dhanpat Rai Publishing Company (P) Ltd, New Delhi.
2. Engineering Chemistry, by S. S. Dara, S. Chand & Company Ltd, NewDelhi.
3. P.W. Atkins, J.D. Paula, "Physical Chemistry", Oxford, 8thedition (2006).
4. B.R. Puri, L.R. Sharma and M.S. Pathania, "Principles of Physical Chemistry", S. Nagin Chand & Company Ltd.,46thedition(2013).

COURSE OUTCOMES: After completion of the course, the student will be able to

1. Relate the knowledge of operating principles of various types of electrochemical cells, including fuel cells and batteries, to optimize the need for sustainable development.
2. Analyze and develop technically sound, economic and sustainable solutions for complex engineering problems related to corrosion and its effects.
3. Identify, formulate and develop polymeric compounds used in various engineering materials for futuristic engineering applications.
4. Apply the knowledge of nanotechnology and smart materials to find solutions for various engineering problems.
5. Evaluate the photochemical and photo physical processes to reach substantiated conclusions in the technological arena.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

I Year B.Tech. ANE- I Sem **L/T/P/C**
3/-/-/3

(R20A0012) Engineering Physics

COURSE OBJECTIVES:

1. To gain the knowledge on the basic concepts of oscillations exhibited by various systems in nature.
2. To Study the basic concepts of light through interference and diffraction.
3. To explore band structure of the solids and classification of materials.
4. To Compare dielectric and magnetic properties of the materials and enable them to design and apply in different fields.
5. To analyze the ordinary light with a laser light and realize the transfer of light through optical fibers.

UNIT – I HARMONIC OSCILLATIONS (10Hours)

Introduction to harmonic oscillators, simple harmonic oscillator: equation of motion and its solution (complex exponential method), damped harmonic oscillator: equation of motion and its solution, over, critical and lightly-damped oscillators; energy decay in damped harmonic oscillator, Quality factor (qualitative), forced damped harmonic oscillator: equation of motion and its solution.

UNIT – II WAVEOPTICS (10Hours)

Interference- Introduction, Superposition of waves, interference of light by division of wave front-interference of reflected light in thin films, interference of light by division of amplitude- Newton's rings, Diffraction- difference between Fresnel and Fraunhofer diffraction, Fraunhofer diffraction due to single slit, Diffraction grating- Grating spectrum and resolving power.

UNIT- III INTRODUCTION TO SOLIDS (7 Hours)

Free electron theory (Classical & Quantum): Assumptions, Merits and drawbacks, Fermi level, Density of states, Periodic potential, Bloch's theorem, Kronig – Penny modal , E – K diagram, Effective mass, Origin of energy bands in solids, Classification of materials : Metals, semi conductors and insulators.

UNIT – IV DIELECTRICS AND MAGNETIC PROPERTIES OF MATERIALS (10 Hours)

Dielectrics: Introduction, Types of polarizations (Electronic and Ionic) and calculation of their polarizabilities, internal fields in a solid, Clausius-Mossotti relation.

Magnetism: Introduction, Bohr magneton, classification of dia, para and ferro magnetic materials on the basis of magnetic moment, Properties of anti-ferro and ferri magnetic materials, Hysteresis curve based on Domain theory of ferro magnetism, Soft and hard magnetic materials.

UNIT-V LASERS **(10 Hours)**

Characteristics of lasers, Absorption, Spontaneous and Stimulated emissions, Einstein's Coefficients, population inversion, meta stable state, types of pumping, lasing action, construction and working of Ruby Laser, Helium-Neon Laser,CO_2 Laser, Applications of lasers.

Fiber Optics: Introduction to optical fiber, Construction and working principle of an Optical Fiber, Acceptance angle and Numerical aperture, Types of Optical fibers - Mode and Propagation through step and graded index fibers , Attenuation in optical fiber, Optical Fiber in Communication System, Applications of optical fibers

TEXT BOOKS:

1. Engineering Physics by Arumugam, Anuradha publications.
2. Engineering Physics- B.K. Pandey, S. Chaturvedi, Cengage Learning.

REFERENCES:

1. Engineering Physics – R.K. Gaur and S.L. Gupta, DhanpatRai Publishers.
2. Engineering Physics, S Mani Naidu- Pearson Publishers.
3. Engineering physics 2nd edition –H.K. Malik and A.K. Singh.
4. Engineering Physics – P.K. Palaniswamy, Scitech publications.
5. Physics by Resnick and Haliday.

COURSE OUTCOMES: After completion of studying Engineering Physics the student is able to,

1. Analyze the various oscillations made by different oscillating bodies in nature.
2. Design different devices to go to maximum accuracy in measuring the dimensions optically.
3. Find the importance of band structure of solids and their applications in various electronic devices.
4. Examine dielectric, magnetic properties of the materials and apply them in material technology.
5. Observe the properties of light and its engineering applications of laser in fiber optic communication systems.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

I Year B.Tech. ANE- I Sem **L/T/P/C**
3/-/-/3

(R20A0501) Programming For Problem Solving

COURSE OBJECTIVES:

1. To understand the use of computer system in problem solving.
2. Enable the student to build program logic with algorithms and flowcharts.
3. Explain the features and constructs of C programming such as data types, expressions Loops, arrays, strings and pointers.
4. To learn how to write modular Programs using Functions.
5. Understand the use of Structures, Unions and Files.

UNIT - I

Introduction to Computing – Computer Systems, Computing Environments, Computer Languages, Algorithms and Flowcharts, Steps for Creating and Running programs.
Introduction to C – History of C, Features Of C, Structure of C Program, Character Set, C Tokens-keywords, Identifiers, Constants, Data types, Variables.

UNIT-II

C Operators, Expressions, Precedence and Associativity, Expression Evaluation, Type conversion Statements- Selection Statements(Decision Making) – if and switch statements, Repetition statements (Loops)-while, for, do-while statements, other statements related to looping –break, continue,goto.

UNIT – III

Functions-Designing Structured Programs, Types of Functions- user defined functions, Standard Functions, Categories of functions,Parameter Passing techniques, Scope, Storage classes, Recursion- Recursive functions.
Arrays – Declaration and Initialization, Arrays with functions, Two dimensional arrays, Multi-dimensional arrays.

UNIT-IV

Strings – Declaration and Initialization, String Input / Output functions, Arrays of strings, String manipulation functions.
Pointers-Introduction, Definition and uses of pointers, Pointer variables, Pointer arithmetic, Pointers to Pointers, Pointers with Arrays, Pointers with Functions, Command line arguments.
Dynamic Memory Management functions: malloc(), calloc(), realloc() and free()

UNIT-V

Structures and Unions - Introduction, Declaration and Initialization, Structure within a structure, Array of Structures, Pointer to Structure, Unions.

Files – Concept of a file, Streams, Text files and Binary files, Opening and Closing files, File input / output functions.

TEXT BOOKS:

1. Computer Science: A Structured Programming Approach Using C, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
2. Mastering C, K.R.Venugopal, S R Prasad, Tata McGraw-Hill Education.

REFERENCE BOOKS:

1. The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI.
2. Computer Programming, E.Balagurusamy, First Edition, TMH.
3. C and Data structures – P. Padmanabham, Third Edition, B.S. Publications.
4. Programming in *C, Ashok Kamthane*. Pearson Education India.
5. Let us C ,YashwanthKanethkar, 13th Edition, BPB Publications.

COURSE OUTCOMES:

At the end of the course the student will be able to

1. Understand a problem and build an algorithm/flowchart to solve it
2. Define variables and construct expressions using C language
3. Construct C programs using various conditional statements and loops
4. Develop efficient, modular programs using functions
5. Utilize arrays, structures and unions for storing and manipulating data.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

I Year B.Tech. ANE- I Sem **L/T/P/C**
-/-/4/2

(R20A0084) Engineering & IT Workshop

ENGINEERING WORKSHOP:

COURSE OBJECTIVES:

1. To Study of different hand operated power tools, uses and their demonstration.
2. To gain a good basic working knowledge required for the production of various engineering products.
3. To provide hands on experience about use of different engineering materials, tools, equipment's and processes those are common in the engineering field.
4. To develop a right attitude, team working, precision and safety at work place.
5. To understand the construction, function, use and application of different working tools, equipment and machines.
6. To study commonly used carpentry joints.
7. To have practical exposure to various welding and joining processes.

TRADES FOR EXERCISES:

At least two exercises from each trade:

1. Carpentry – (T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint)
2. Fitting – (V-Fit, Dovetail Fit & Semi-circular fit)
3. Tin-Smithy – (Square Tin, Rectangular Tray & Conical Funnel)
4. Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern)
5. Welding Practice – (Arc Welding & Gas Welding)
6. House-wiring – (Parallel & Series, Two-way Switch and Tube Light)
7. Black Smithy – (Round to Square, Fan Hook and S-Hook)

COURSE OUTCOMES:

At the end of the course, the student will be able to:

1. Every student can study and practice on machine tools and their operations
2. Every Student will have hands-on practice on manufacturing of components using workshop trades including pluming, fitting, carpentry, foundry, house wiring and welding.
3. Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
4. Apply basic electrical engineering knowledge for house wiring practice.

IT WORKSHOP

COURSE OBJECTIVES: The IT Workshop for engineers is a training lab course spread over 54 hours. The modules include training on PC Hardware, Internet & World Wide Web.

1. PC Hardware introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like MS Windows; In addition hardware and software level troubleshooting process, tips and tricks would be covered.
2. Internet & World Wide Web module introduces the different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet. Usage of web browsers, email, newsgroups and discussion forums would be covered. In addition, awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with the viruses, worms and other cyber attacks would be introduced.
3. HTML introduction for creating static web pages.
4. HTML 5 Introduction and Features.
5. JavaScript Introduction and benefits with Html.
6. Linux programming Introduction to basic commands.

PC HARDWARE

Week 1:

Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral

Week 2:

Assembling and disassembling of PC

Week 3:

Every student should individually install MS windows on the personal computer. Basic DOS Commands

Week 4: HARDWARE TROUBLESHOOTING

Students have to be given a PC which does not boot due to improper assembly or defective peripherals Software Troubleshooting: Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition.

Week 5: INTERNET & WEB BROWSERS

Web Browsers, Web Servers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers and what is web servers and its architecture, How to access the websites and email& Search Engines & various threats on the internet and would be asked to configure their computer to be safe on the internet, Antivirus downloads to avoid viruses and/or worms.

WEB DESIGNING

Week 6: **HTML**

Introduction to HTML & Basic HTML Tags: Understand what are the tasks used for creation of website. Designing a static web page: Understand how to create a webpage.

Week 7: HTML 5

Introduction to HTML 5 with new tags

1. Create an HTML 5 Template
2. Specify page title and Meta tags

Week 8: JAVASCRIPT

1. Create and Assign variables using JavaScript
2. Change style of an HTML elements using JavaScript.
3. Style your website using different types of CSS.

Week 9: **BASIC COMMANDS OF LINUX PROGRAMMING**

1. Installation of Unix/Linux operating system.
2. Study of logging/logout details.
3. Study of Unix/Linux general purpose utility command list obtained from (man, who, cat, cd, cp, ps, ls, mv, rm, mkdir, rmdir, echo, more, date, time, kill, history, chmod, chown, finger, pwd, cal, logout, shutdown) commands.
4. Study of vi editor.
5. Study of Bash shell, Bourne shell and C shell in Unix/Linux operating system.
6. Write a C program to find factorial of a given integer using script language.

TEXT BOOKS:

1. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education
2. PC Hardware and A+ Handbook-Kate J.Chase PHI(Microsoft)
3. Web Development and Design Foundations with HTML 5, pearson Education
4. Web Design with HTML,CSS by Jon Duckett

COURSE OUTCOMES:

1. The Students are able to identify the major components of a computer and its basic peripherals. They are capable of assembling a personal computer, and can perform installation of system software like MS Windows and required device drivers.
2. Students can detect and perform minor hardware and software level troubleshooting.
3. The Students are capable of working on Internet & World Wide Web and can make effective usage of the internet for academics.
4. The students are able to create a static webpage‘s using HTML.
5. Students will be able to use new Features of HTML5 and design the Webpage.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

I Year B.Tech. ANE- I Sem **L/T/P/C**
-/-/3/1.5

(R20A0581) Programming for Problem Solving Lab

COURSE OBJECTIVES:

1. Familiarity with the C programming environment.
2. Systematic introduction to programming constructs
3. Learning basic concepts of C through illustrative examples and small exercises
4. Understanding concept of Arrays, Strings and Structures with examples
5. Perform basic operations on Files.

Week1:

A. Write a C program to find sum and average of three numbers
B. Write a program to calculate simple interest for a given P, T, and R
(SI = P*T*R/100)

Week2:

A. Write a program to swap two variables values with and without using third variable
B. Write a program to take input of roll no and marks obtained by a student in 5 subjects each and display the roll no with percentage score secured.

Week3:

A. Write a program to check whether the entered year is leap year or not (a year is leap if it is divisible by 4 and divisible by 100 or 400)
B. Write a program to read the values of coefficients a, b and c of a quadratic equation **$ax^2+bx+c=0$** and find roots of the equation

Week4:

A. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)
B. Write a program to check whether input alphabet is vowel or not using switch statement.

Week5:

A. Write a C program to find the sum of individual digits of a given positive integer.
B. Write a C program to generate the first n terms of the Fibonacci sequence.

Week6:

B. Write a C program to generate prime numbers from 1 to n.
C. Write a C program to check whether given number is Armstrong number or not.

Week7:

A. Write a C program to find factorial of a given integer using non-recursive function.
B. Write C program to find GCD of two integers using non-recursive function

Week8:

A. Write a C program to find factorial of a given integer using recursive function
B. Write C program to find GCD of two integers by using recursive function

Week9:

A. Write a C program to find both the largest and smallest number in a list of integers.
B. Write a C program to find the sum of all the elements in an array

Week10:

A. Write a program to search for a given element in an array using linear search
B. Write a C program to Sort the array in an Ascending order

Week11:

A. Write a C program to perform addition of two matrices.
B. Write a C program that uses functions to perform multiplication of two Matrices.

Week12:

A. Write a program to copy one string to another string without using string handling function
B. Write a C program to determine whether the given string is palindrome or not.

Week13:

A. Write a program to swap values of two variables using pointer
B. Write a C program to find the sum of integer array elements using pointers. Create the array using dynamic memory allocation functions

Week14:

A. Write a C program to check whether given number is even or odd; number is given as input through command line
B. Write a C program to check whether a given number is prime or not; Accept the number as a command line argument

Week15:

A. Write a C program to Calculate Total and Percentage marks of a student using structure.
B. Write a C program to create an array of structures

Week16:

A. Write a C program showing basic file operations – open a file, read data from file, write data to a file, close a file.
B. Write a C program to copy contents of one file to another file

COURSE OUTCOMES:

After completion of the course the student will be able to

1. Translate mathematical expressions to C notation using operators
2. Develop C programs using loops and nested loops
3. Construct custom functions for solving problems using modular approach
4. Solve problems related to arrays and strings
5. Use structures and unions for storing dissimilar data items.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

I Year B.Tech. ANE- I Sem **L/T/P/C**
-/-/3/1.5

(R20A0083) Engineering Physics Lab

COURSE OBJECTIVES: Students can be able to,

1 Identify the specific types of elastic and electrical nature of materials in physics lab.
2 Observe concepts of magnetism in physics lab.
3 Analyze propagation of light in various optical devices practically.
4 Examine various opto electronic devices practically

LIST OF EXPERIMENTS:

1. Torsional pendulum-Rigidity modulus of given wire.
2. Melde's experiment –Transverse and Longitudinal modes.
3. Stewart and Gee's method- Magnetic field along the axis of current carrying coil.
4. Spectrometer-Dispersive power of the material of a prism
5. Diffraction grating-using laser -Wave length of light.
6. Newton's Rings –Radius of curvature of Plano convex lens.
7. LED -Characteristics of LED.
8. LCR Circuit- To determine quality factor and resonant frequency of LCR circuit.
9. Optical fiber: Evaluation of numerical aperture of optical fiber.
10. Optical fiber: To determine the bending losses of Optical fibers.

Reference practical physics books:

1. Practical physics by Dr. Aparna, Dr K.V Rao, V.G.S. Publications.
2. Engineering physics practical lab manual – MRCET.

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

1 To measure the elastic constants of the given material of the wire and also determine the ac frequency of vibrating bar.
2 To determine the magnetic induction of a circular coil carrying current by applying the principles of terrestrial magnetism.
3 To frame relativistic ideas of light phenomenon
4 To achieve the analysis of V-I characteristics of opto electronic devices
5 To determine the numerical aperture of optical fiber.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

I Year B.Tech. ANE- I Sem **L/T/P/C**
2/-/-/2

(R20A0014) Environmental Science

COURSE OBJECTIVES: On successful completion of this course, students will be able to:

1. Distinguish the inter relationship between living organism and environment.
2. Categorize various types of natural resources available on the earth surface.
3. Detect the causes, and control measures of various types of environmental pollution.
4. Articulate the issues related to solid waste and its management.
5. Explain and understand the importance of sustainable development.

UNIT-I: ECOSYSTEMS:(6 hours)

Definition, Scope, and Importance of ecosystem. Classification, natural and artificial ecosystems, structure - abiotic and biotic component, functions of an ecosystem, food chains, food webs and ecological pyramids.

Activities: Case studies, poster making.

UNIT-II: NATURAL RESOURCES:(6 hours)

Classification of Resources: Definition of natural resource, renewable and non -renewable resources. Renewable resources: Energy resources: growing energy needs, solar energy, hydro energy, biogas, biofuel. Non-Renewable Resources: Fossil fuels, refining of Coal, Petroleum, and natural gas. Use of alternate energy source.

Activities: Case studies, seminars.

UNIT-III: ENVIRONMENTAL POLLUTION AND TECHNIQUES:(6 hours)

Definition, Types of pollution:Air pollution causes, effects,control measures of air pollution and prevention techniques.Water pollution causes, effects, control measures and techniques.

Activities: Debate, seminars

UNIT-IV: SOLID WASTE MANAGEMENT:(6 hours)

Definition of Solid waste, characteristics of solid waste, solid waste management: collection, transportation, processing treatment, disposal methods and e-waste management,3R techniques: reduce, reuse, recycle.

Activities: Seminars, Case studies.

UNIT-V: SUSTAINABLE DEVELOPMENT:(6 hours)

Definition of sustainable development, concept,sustainable development goals, threats to sustainability, strategies to achieve sustainable development.Introduction to green chemistry, green building concept.

Activities: Worksheets, seminars.

TEXT BOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses by ErachBharucha for University Grants Commission
2. Environmental Studies by R. Rajagopalan, Oxford University Press.
3. Textbook of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications
4. Dr. P. D Sharma, "Ecology and Environment", Rastogi Publications, New Delhi, 12 Edition, 2015

REFERENCE BOOKS

1. Environmental Studies by Anubha Kaushik, 4 Edition, New age international publishers
2. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Pvt. Ltd, New Delhi
3. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHL Learning Pvt. Ltd, New Delhi
4. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition

COURSE OUTCOMES: The basic concepts included in this course will help the student to:

1. Differentiate between various biotic and abiotic components of ecosystem.
2. Describe the various types of natural resources.
3. Examine the problems associated with waste management.
4. Evaluate the causes, and apply control measures of various types of environmental pollutions.
5. Develop technologies on the basis of ecological principles on environment which in turn helps in sustainable development.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

I Year B.Tech. ANE- II Sem **L/T/P/C**
2/-/-/2

(R20A0002) Professional English

INTRODUCTION:

English is a tool for global communication and is the dominant language which is sweeping almost all the fields in the world. It has become a necessity for people to speak in English comfortably, if they want to enter the global workforce. Hence, the course is designed to help the students to meet the global standards. Each unit focuses on English skill-set to improve: Interview skills, giving presentations and professional etiquette.

COURSE OBJECTIVES:

1. To enrich students to express themselves appropriately and fluently in professional contexts.
2. To enhance their employability through regular participation in group discussions and interview skills.
3. To lay foundation with writing strategies for the future workplace needs.
4. To acquaint students with different components of professional presentation skills.
5. To equip students with necessary training in listening to comprehend dialects of English language.

SYLLABUS:

UNIT-I

Listening - Listening for General Details.
Speaking - Description of Pictures, Places, Objects and Persons
NOTE: Listening and Speaking tasks are solely for lab purpose and not for testing in the examinations.
Extract - The summary of Asimov's *Nightfall*
Grammar - If clauses
Vocabulary - Technical Vocabulary
Writing - Paragraph Writing

Unit –II

Listening -Listening for Specific Details
Speaking - Oral presentations
NOTE: Listening and Speaking tasks are solely for lab purpose and not for testing in the examinations.
Extract - A literary analysis of Asimov's *Nightfall*
Grammar - Transformation of Sentences
Vocabulary - Idioms
Writing -Abstract Writing

Unit –III

Listening - Listening for Gist
Speaking - Mock Interviews
NOTE: Listening and Speaking tasks are solely for lab purpose and not for testing in the examinations.
Extract - Character sketches of Asimov's *Nightfall's* - protagonists and antagonists - Dr. Susan Calvin, Mike Donovan, Stephen Byerley, Francis Quinn
Grammar - Transitive and Intransitive Verbs
Vocabulary - Standard Abbreviations (Mini Project)
Writing - Job Application – Cover letter

Unit – IV

Listening - Listening for Vocabulary
Speaking - Telephonic Expressions
NOTE: Listening and Speaking tasks are solely for lab purpose and not for testing in the examinations.
Extract - Theme of Asimov's *Nightfall*
Grammar - Auxiliary verbs, Degrees of Comparison
Vocabulary - Word Analogy
Writing - Job Application - Resume

Unit – V

Listening - Critical Listening (for attitude and Opinion)
Speaking - Group discussion
NOTE: Listening and Speaking tasks are solely for lab purpose and not for testing in the examinations.
Extract -Asimov's *Nightfall*: A Science Fiction
Grammar - Common Errors, Prepositions
Vocabulary - Homonyms, homophones and homographs
Writing - Report Writing

* Isaac Asimov's *Nightfall* for intensive and extensive reading
* Exercises apart from the text book shall also be referred for classroom tasks.

REFERENCE BOOKS:

1. Nightfall, Isaac Asimov; Robert Silverberg, 1990
2. Practical English Usage. Michael Swan. OUP. 1995.
3. Remedial English Grammar. F.T. Wood. Macmillan.2007
4. On Writing Well. William Zinsser. Harper Resource Book. 2001
5. Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
6. Communication Skills. Sanjay Kumar and Pushpa Lata. Oxford University Press. 2011.
7. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

COURSE OUTCOMES:

Students will be able to:

1. Analyze and interpret a diverse range of engineering concepts through the synthesis of information
2. Understand the impact of professional engineering solutions is societal contexts and demonstrate its knowledge
3. Achieve communicative ability in their personal and professional relations with clarity of speech and creativity in content
4. Function effectively as an individual and a team; and would be able to prepare themselves to be market ready
5. Comprehend and write effective reports and design documentation, manage projects and make effective presentations.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

I Year B.Tech. ANE- II Sem **L/T/P/C**
3/1/-/4

(R20A0021) Mathematics – I

COURSE OBJECTIVES:

1. The aim of numerical methods is to provide systematic methods for solving problems in a numerical form using the given initial data,also used to find the roots of an equation and to solve differential equations.
2. The objective of interpolation is to find an unknown function which approximates the given data points and the objective of curve fitting is to find the relation between the variables x and y from given data and such relationships which exactly pass through the data (or) approximately satisfy the data under the condition of sum of least squares of errors.
3. PDE aims at forming a function with many variables and also their solution methods, Method of separation of variables technique is learnt to solve typical second order PDE.
4. Evaluation of multiple integrals.
5. In many engineering fields the physical quantities involved are vector valued functions. Hence the vector calculus aims at basic properties of vector-valued functions and their applications to line, surface and volume integrals.

UNIT – I: Solutions of algebraic, transcendental equations and Interpolation

Solution of algebraic and transcendental equations: Introduction, Bisection Method, Method of false position, Newton-Raphson method and their graphical interpretations.

Interpolation: Introduction, errors in polynomial interpolation, Finite differences - Forward differences, Backward differences, Central differences. Newton's formulae for interpolation, Gauss's central difference formulae, Interpolation with unevenly spaced points - Lagrange's Interpolation.

UNIT – II: Numerical Methods

Numerical integration : Generalized quadrature - Trapezoidal rule, Simpson's $1/3^{rd}$ and Simpson's $3/8^{th}$ rules.

Numerical solution of ordinary differential equations: Solution by Taylor's series method, Euler's method, Euler's modified method, Runge-Kutta fourth order method.

Curve fitting : Fitting a straight line, second degree curve, exponential curve, power curve by method of least squares.

UNIT III: Partial Differential Equations

Introduction, formation of partial differential equation by elimination of arbitrary constants and arbitrary functions, solutions of first order Lagrange's linear equation and non-linear equations, Charpit's method, Method of separation of variables for second order equations and applications of PDE to one dimensional equation (Heat equation).

Unit IV: Double and Triple Integrals

Double and triple integrals (Cartesian and polar), Change of order of integration in double integrals, Change of variables (Cartesian to polar).

Unit V: Vector Calculus

Introduction, Scalar point function and vector point function, Directional derivative, Gradient, Divergence, Curl and their related properties, Laplacian operator, Line integral - work done, Surface integrals, Volume integral. Green's theorem, Stoke's theorem and Gauss's Divergence theorems (Statement & their Verification).

Text Books:

1. Higher Engineering Mathematics by B V Ramana ., Tata McGraw Hill.
2. Higher Engineering Mathematics by B.S. Grewal, Khanna Publishers.
3. Mathematical Methods by S.R.K Iyenger, R.K.Jain, Narosa Publishers.

Reference Books:

1. Elementary Numerical Analysis by Atkinson-Han, Wiley Student Edition.
2. Advanced Engineering Mathematics by Michael Greenberg –Pearson publishers.
3. Introductory Methods of Numerical Analysis by S.S. Sastry, PHI

COURSE OUTCOMES: After learning the concepts of this paper the student will be able to independently

1. Find the roots of algebraic, non algebraic equations and predict the value at an intermediate point from a given discrete data.
2. Find the most appropriate relation of the data variables using curve fitting and this method of data analysis helps engineers to understand the system for better interpretation and decision making.
3. Solve first order linear and non-linear partial differential equations which are very important in engineering field.
4. Evaluate multiple integrals; hence this concept can be used to evaluate Volumes and Areas of an object.
5. Evaluate the line, surface, volume integrals and converting them from one to another using vector integral theorems.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

I Year B.Tech. ANE- II Sem **L/T/P/C**
3/-/-/3

(R20A0201) Basic Electrical Engineering

COURSE OBJECTIVES:

1. To understand the basic concepts of electrical circuits & networks and their analysis which is the foundation for all the subjects in the electrical engineering discipline.
2. To emphasize on the basic elements in electrical circuits and analyze Circuits using Network Theorems.
3. To analyze Single-Phase AC Circuits.
4. To illustrate Single-Phase Transformers and DC Machines.
5. To get overview of basic electrical installations and calculations for energy consumption.

UNIT –I:

Introduction to Electrical Circuits: Concept of Circuit and Network, Types of elements, R-L-C Parameters, Independent and Dependent sources, Source transformation and Kirchhoff's Laws

UNIT –II:

Network Analysis: Network Reduction Techniques- Series and parallel connections of resistive networks, Star–to-Delta and Delta-to-Star Transformations for Resistive Networks, Mesh Analysis, and Nodal Analysis,
Network Theorems**:** Thevenin's theorem, Norton's theorem, MaximumPower Transfer theorem and Superposition theorem, Illustrative Problems.

UNIT-III:

Single Phase A.C. Circuits: Average value, R.M.S. value, form factor and peak factor for sinusoidal wave form. Steady State Analysis of series R-L-C circuits. Concept of Reactance, Impedance, Susceptance, Admittance, Concept of Power Factor, Real, Reactive and Complex power and Illustrative Problems.

UNIT –IV:

Electrical Machines (elementary treatment only):
Single phase transformers: principle of operation, constructional features and emf equation. DC.Generator: principle of operation, constructional features, emf equation. DC Motor: principle of operation, Back emf, torque equation.

UNIT –V:

Electrical Installations:
Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, Types of Wires and Cables, Earthing. Elementary calculations for energy consumption and battery backup.

TEXT BOOKS:

1. Engineering Circuit Analysis - William Hayt, Jack E. Kemmerly, S M Durbin, Mc Graw Hill Companies.
2. Electric Circuits - A. Chakrabarhty, Dhanipat Rai & Sons.
3. Electrical Machines – P.S.Bimbra, Khanna Publishers.

REFERENCE BOOKS:

1. Network analysis by M.E Van Valkenburg, PHI learning publications.
2. Network analysis - N.C Jagan and C. Lakhminarayana, BS publications.
3. Electrical Circuits by A. Sudhakar, Shyammohan and S Palli, Mc Graw Hill Companies.
4. Electrical Machines by I.J. Nagrath & D. P. Kothari, Tata Mc Graw-Hill Publishers.

COURSE OUTCOMES:

At the end of the course students, would be able to

1. Apply the basic RLC circuit elements and its concepts to networks and circuits.
2. Analyze the circuits by applying network theorems to solve them to find various electrical parameters.
3. Illustrate the single-phase AC circuits along with the concept of impedance parameters and power.
4. Understand the Constructional Details and Principle of Operation of DC Machines and Transformers
5. Understand the basic LT Switch gear and calculations for energy consumption.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

I Year B.Tech. ANE- II Sem **L/T/P/C**
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(R20A0502) Python Programming

OBJECTIVES:

1. To read and write simple Python programs.
2. To develop Python programs with conditionals and loops.
3. To define Python functions and call them.
4. To use Python data structures –- lists, tuples, dictionaries.
5. To do input/output with files in Python.

UNIT I

Introduction to Python Programming Language: Introduction to Python Language and installation, overview on python interpreters, working with python, Numeric Data Types: int, float, Boolean, complex and string and its operations, Standard Data Types: List, tuples, set and Dictionaries, Data Type conversions, commenting in python.

UNIT II

Variables and Operators: Understanding Python variables, Multiple variable declarations, Python basic statements, Python basic operators: Arithmetic operators, Assignment operators, Comparison operators, Logical operators, Identity operators, Membership operators, Bitwise operators, Precedence of operators, Expressions.

UNIT III

CONTROL FLOW AND LOOPS

conditional (if), alternative (if-else), chained conditional (if- elif -else), Loops: For loop using ranges,string, Use of while loops in python, Loop manipulation using pass, continue and break

UNIT IV

Functions

Defining Your Own Functions, Calling Functions, passing parameters and arguments, Python Function arguments: Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions (Function Returning Values), Scope of the Variables in a Function - Global and Local Variables. Powerful Lambda functions in python.

UNIT V

I/O and Error Handling in Python

Introduction, Access Modes, Writing Data to a File, Reading Data from a File, Additional File Methods introduction to Errors and Exceptions, Handling IO Exceptions, Run Time Errors, Handling Multiple Exceptions.

Introduction to Data Structures: What are Data structures, Types of Data structures, Introduction to Stacks and Queues.

TEXT BOOKS

1. R. Nageswara Rao, “Core Python Programming”, dreamtech
2. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist‘‘, 2nd edition,Updated for Python 3, Shroff/O‘Reilly Publishers, 2016.
3. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
4. Data Structures and Algorithmic Thinking with Python by Narasimha Karumanchi

REFERENCE BOOKS:

1. Core Python Programming, W.Chun, Pearson.
2. Introduction to Python, Kenneth A. Lambert, Cengage
3. Learning Python, Mark Lutz, Orielly

COURSE OUTCOMES: Upon completion of the course, students will be able to

1. Read, write, execute by hand simple Python programs.
2. Structure simple Python programs for solving problems.
3. Decompose a Python program into functions.
4. Represent compound data using Python lists, tuples, dictionaries.
5. Read and write data from/to files in Python Programs

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

I Year B.Tech. ANE- II Sem **L/T/P/C**
3/-/-/3

(R20A0301) Engineering Graphics

COURSE OBJECTIVES:

1. To enable the students with various concepts like Dimensioning, Conventions and standards related to working drawing in order to become professionally efficient and to introduce fundamental concepts of curves used in engineering,
2. Students are capable to understand the Orthographic Projections of Points and Lines and are able to improve their visualization skills so that they can apply these skills in developing the new products.
3. Understands and becomes efficient in applying the concept of Orthographic Projections of Points, Lines and Planes in industrial applications
4. Can employ freehand 3D pictorial sketching to aid in the visualization process and to efficiently communicate ideas graphically.
5. Analyze a drawing and can efficiently communicate ideas graphically and Draw the 3D views using CAD.

UNIT – I

Introduction To Engineering Drawing: Principles of Engineering Drawing/Graphics – Various Drawing Instruments – Conventions in Drawing- Dimensioning – Lettering practice – BIS Conventions.

a) Polygons – Construction of regular polygons (General Method only)
b) Conic Sections (General Method only- Eccentricity Method)
c) Cycloid, Epicycloid and Hypocycloid
d) Scales-Plain, Diagonal and Vernier

UNIT – II

Orthographic Projection in First Angle only: Principles of Orthographic Projections – Conventions – First and Third Angle projections (Introduction).

Projections of Points. Points in all four quadrants.

Projections of Lines– Parallel and inclined to both planes.

UNIT – III

Projections of Planes: Projection of regular planes, Plane inclined to both reference planes (No conditional problems).

Projections of Solids: Projections of regular solids prism and pyramid inclined to both planes (No conditional problems).

UNIT – IV

Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views– Conventions –Plane Figures, Simple and Compound Solids.

UNIT – V

Transformation of Projections: Conversion of Isometric Views to Orthographic Views. Conversion of orthographic views to isometric views – simple objects

Basic Principles of ACAD – Demo Only.

TEXT BOOKS:

1. Engineering Drawing, Special Edition-MRCET, McGrahill Publishers, 2017.
2. Engineering Drawing, N.D. Bhatt
3. Engineering Drawing by K.Venu Gopal& V.Prabu Raja New Age Publications.

REFERENCE BOOKS:

1. Engineering drawing – P.J. Shah .S.Chand Publishers.
2. Engineering Drawing- Johle/Tata Macgraw Hill Book Publishers.

COURSE OUTCOMES:

1. Gets knowledge on usage of various drawing instruments and capable to draw various curves like conic curves, cycloidal curves and involutes.
2. Understand the Orthographic Projections of Points and Lines and are able to improve their visualization skills so that they can apply these skills in developing the new products.
3. Understand about orthographic projection and able to draw planes and solids according to orthographic projections.
4. Can employ freehand 3D pictorial sketching to aid in the visualization process and to draw the 3D views using CAD software.
5. To convert and draw the given orthographic view to isometric view using CAD software and vice versa.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

I Year B.Tech. ANE- II Sem **L/T/P/C**
-/-/3/1.5

(R20A0281) Basic Electrical Engineering Lab

COURSE OBJECTIVES:

1. To design electrical systems.
2. To analyze a given network by applying various network theorems.
3. To expose the students to the operation of dc generator.
4. To expose the students to the operation of dc motor and transformer.
5. To examine the self excitation in dc generators.

CYCLE – I

1. Verification of KVL and KCL.
2. Verification of Thevenin's theorem.
3. Verification of Norton's theorem.
4. Verification of Super position theorem.
5. Verification of Maximum power transfer theorem.
6. Verification of Reciprocity theorem.

CYCLE -II

7. Magnetization characteristics of DC shunt generator.
8. Swinburne's test on DC shunt machine.
9. Brake test on DC shunt motor.
10. OC &SC tests on single phase transformer.
11. Load test on single phase transformer.

NOTE: Any 10 of above experiments are to be Conducted

COURSE OUTCOMES:

At the end of the course, students would be able to

1. Calculate the branch currents and mesh voltages by conducting KCL and KVL test on given circuit.
2. Prove the various circuit theorems like Superposition, Thevenin's, Norton's, Maximum power transfer and Reciprocity theorems.
3. Plot the Magnetization characteristics of DC shunt generator.
4. Plot the characteristics of DC shunt motor by conducting Brake Test.
5. Determine the Efficiency of single-phase transformer by conducting OC, SC and Load test

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

I Year B.Tech. ANE- II Sem **L/T/P/C**
-/-/4/2

(R20A0582) Python Programming Lab

COURSE OBJECTIVES:

1. Syntax and Semantics and create Functions in Python.
2. Different data types Lists, Dictionaries in Python.
3. how to execute the programs using loops and control statements
4. Decision Making and Functions in Python
5. Files and exception Handlingin Python

Week 1:

A) Write python program to print Hello World
B) Write a python program to get string, int, float input from user
C) Write a python program to add 2 numbers

Week 2:

A) Create a list and perform the following methods
1) insert() 2) remove() 3) append() 4) len() 5) pop() 6) clear()
B) Write a python program to find the length of list?
C) Write a python program to find the smallest and largest number in the list?

Week 3:

A) Create a tuple and perform the following methods
1) Add items 2) len() 3) check for item in tuple 4)Access iems
B) Write a python program using the following methods: 1) count 2) index
C) Write a python program using "+" and "*" operations which resulting a new tuple?

Week 4:

A) Create a dictionary and apply the following methods
1) Print the dictionary items 2) access items 3) use get() 4)change values 5) use len()
B) Write a python code to convert list of tuples into dictionaries?
C) Write python program to store data in list, tuple, set, dictionary and then try to print them.

Week 5:

A) Write a python program to perform arithmetic, assignment, logical and comparison operators?
B) Write a Python program to add two positive integers without using the '+' operator. (use bitwise operator)
C) Write a Python program to perform the basic four operators (+, -, *, /)

Week 6:

A) Write a simple python program to declare a variable in different possible ways?

B) Write a python program to show precedence of operators using the expression: z = (v+w) * x / y

C) Write a python program to check whether the values of a list exist or not (use membership operator) and also perform identity operation?

Week 7:

A) Write a python program to print a number is positive/negative using if-else.

B) Write a python program to find largest number among three numbers.

C) Write a python Program to read a number and display corresponding day using if_elif_else?

D) Write a python program to print list of numbers using range and for loop

Week 8:

A) Write a python code to print the sum of natural numbers using while loop?

B) Write a python program to print the factorial of given number?

C) Write a python program to find the sum of all numbers stored in a list using for loop?

Week 9:

A) Write a Python function that takes two lists and returns True if they are equal otherwise false

B) Write python program in which an function is defined and calling that function prints Hello World

C) Write python program in which an function(with single string parameter) is defined and calling that function prints the string parameters given to function.

D) Write a python program using with any one of python function argument?

Week 10:

A) Write a program to double a given number and add two numbers using lambda()?

B) Write a program for filter() to filter only even numbers from a given list.

C) Write a program for map() function to double all the items in the list?

D) Write a program to find sum of the numbers for the elements of the list by using reduce()?

Week 11:

A) Write a python program to open and write “hello world” into a file?

B) Write a python program to write the content “hi python programming” for the existing
file.

C) Write a python program to read the content of a file?

Week 12:

A) write a program to implement stack using array.

B) write a program to implement Queue using array.

TEXT BOOKS:

1. R. Nageswara Rao, "Core Python Programming", dreamtech
2. Allen B. Downey , " Think Python: How to Think Like a Computer Scientist", Second Edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016.

COURSE OUTCOMES:

After completion of the course, Students will be able to**:**

1. Evaluate Problem solving and programming capability
2. Describe the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python
3. Implement conditional and loop for python programs
4. Express different Decision Making statements and Functions
5. Understand and summarize different File handling operations and exceptions

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

I Year B.Tech. ANE- II Sem **L/T/P/C**
-/-/4/1.5

(R20A0081) English Language Communication Skills Lab

The Language Lab focuses on the production and practice of sounds of the English language and familiarizes the students with its use in everyday situations and contexts.

COURSE OBJECTIVES:

1. To facilitate computer-aided multi-media instruction enabling individualized and independent language learning
2. To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm
3. To bring about a consistent accent and intelligibility in their pronunciation, ample speaking opportunities are provided.
4. To improve the fluency in spoken English and neutralize mother tongue influence
5. To train students to use language appropriately for interviews, group discussions and public speaking

English Language Communication Skills Lab has two parts:

A. Computer Assisted Language Learning (CALL) Lab
B. Interactive Communication Skills (ICS) Lab

The following course content is prescribed for the English Language Communication Skills Lab

UNIT –I

CALL Lab: Introduction to Phonetics –Speech Sounds –Vowels and Consonants-Transcriptions
ICS Lab: Ice-Breaking activity - JAM session

UNIT –II

CALL Lab: Pronunciation: Past Tense Markers and Plural Markers
ICS Lab: Situational Dialogues/Role Plays-–Greetings - Taking Leave – Introducing Oneself and Others - Requests and Seeking Permissions

UNIT–III

CALL Lab: Syllable and Syllabification

ICS Lab: Communication at Workplace- Situational Dialogues/Role Plays – Seeking Clarifications – Asking for and Giving Directions – Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice

UNIT –IV

CALL Lab: Word Stress and Intonation

ICS Lab: Information transfer – from visual to verbal - maps, charts, tables and graphs

UNIT –V

CALL Lab: Errors in Pronunciation- Accent - the Influence of Mother Tongue (MTI)

ICS Lab: Making a Short Speech - Extempore

ELCS Lab:

1. **Computer Assisted Language Learning (CALL) Lab:**
   The Computer aided Language Labfor 60 students with 60 systems, one master console, LAN facility and English language software for self-study by learners.
   System Requirement (Hardware component):
   Computer network with LAN with minimum 60 multimedia systems with the following specifications:
   i) P –IV Processor
   a) Speed –2.8 GHZ
   b) RAM –512 MB Minimum
   c) HardDisk –80 GB
   ii) Headphones of High quality
2. **Interactive Communication Skills (ICS) Lab :**
   A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V., a digital stereo –audio & video system and camcorder etc.

COURSE OUTCOMES:

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

1. Learn with precision through computer-assisted individualized and independent language learning to work independently in an engineering set-up.
2. Improve conversational reception and articulation techniques in the course of repetitive instruction thereby gaining confidence both in institutional and professional environment.
3. Acquire accuracy in pronunciation and restoring Standard English thereby crafting better command in English language so that the students have a cutting edge over others in society.
4. Imbibe appropriate use of language in situations where one works as an individual and as a leader/team player.
5. Display professional behaviors and body language.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

I Year B.Tech. ANE- II Sem **L/T/P/C**
2/-/-/2

(R20A0003) Human Values and Professional Ethics

COURSE OBJECTIVES:

This introductory course input is intended:

1. To help the students appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
2. To facilitate the development of a holistic perspective among students towards life, profession and happiness, based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of value based living in a natural way.
3. To highlight plausible implications of such a holistic understanding in terms of ethical human conduct, trustful and mutually satisfying human behavior and mutually enriching interaction with Nature.

UNIT - I:

Course Introduction - Need, Basic Guidelines, Content and Process for Value Education: Understanding the need, basic guidelines, content and process for Value Education.

Self Exploration - what is it? - its content and process; 'Natural Acceptance' and Experiential Validation - as the mechanism for self exploration. Continuous Happiness and Prosperity

A look at basic Human Aspirations- Right understanding, Relationship and Physical Facilities - the basic requirements for fulfillment of aspirations of every human being with their correct priority.

Understanding Happiness and Prosperity correctly - A critical appraisal of the current scenario. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

UNIT - II:

Understanding Harmony in the Human Being - Harmony in Myself! : Understanding human being as a co-existence of the sentient 'I' and the material 'Body'.

Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer).

Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Swasthya.

UNIT - III:

Understanding Harmony in the Family and Society - Harmony in Human - Human Relationship: Understanding harmony in the Family the basic unit of human interaction. Understanding values in human - human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship.

Understanding the meaning of Vishwas; Difference between intention and competence. Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship.
Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astiva as comprehensive Human Goals. Visualizing a universal harmonious order in society - Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha) - from family to world family!

UNIT - IV:
Understanding Harmony in the nature and Existence - Whole existence as Coexistence: Understanding the harmony in the Nature. Interconnectedness and mutual fulfillment among the four orders of nature - recyclability and self-regulation in nature.
Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space. Holistic perception of harmony at all levels of existence.

UNIT - V:
Implications of the above Holistic Understanding of Harmony on Professional Ethics: Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basic for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics:

a. Ability to utilize the professional competence for augmenting universal human order.
b. Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems.
c. Ability to identify and develop appropriate technologies and management patterns for above production systems.

TEXT BOOKS:

1. R. R. Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.
2. Prof. K. V. Subba Raju, 2013, Success Secrets for Engineering Students, Smart Student Publications, 3rd Edition.

REFERENCE BOOKS:

1. Ivan IIlich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
2. E. F. Schumancher, 1973, Small is Beautiful: a study of economics as if people mattered. Blond & Briggs, Britain.
3. A Nagraj, 1998 Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.
4. Sussan George, 1976, How the Other Half Dies, Penguin Press, Reprinted 1986, 1991.
5. P. L. Dhar, R. R. Gaur, 1990, Science and Humanism, Commonwealth Publishers.
6. A. N. Tripathy, 2003, Human Values, New Age International Publishers.
7. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
8. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth - Club of Rome's report, Universe Books.
9. E G Seebauer & Robert L.Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press.

10. M Govindrajan, S Natrajan & V. S Senthil kumar, Engineering Ethics (including Humna Values), Eastern Economy Edition, Prentice Hall of India Ltd.

Relevant CDs, Movies, Documentaries & Other Literature:

1. Value Education website, http://www.uptu.ac.in
2. Story of Stuff, http://www.storyofstuff.com
3. Al Gore, An Inconvenient Truth, Paramount Classics, USA
4. Charle Chaplin, Modern Times, United Artists, USA
5. IIT Delhi, Modern Technology - the Untold Story

COURSE OUTCOMES:

1. The students will be able to obtain happiness and prosperity in their life.
2. The students will develop harmony at all levels.
3. The students can have satisfying human behavior throughout their life.

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MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

II Year B.Tech. ANE- I Sem **L/T/P/C**
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(R20A2101) Fluid Mechanics

Objectives:

1. To introduce and explain about fundamentals of Fluid Mechanics,
2. To give fundamental knowledge of fluid, its properties and behavior under various conditions of internal and external flows
3. To develop understanding about hydrostatic law, and application of mass, momentum and energy equation in fluid flow
4. Understand boundary layer concepts and flow through pipes.
5. To make students understand about dimensional analysis and similitSude. With which Students can able to create models for experimental analysis.

UNIT I

Fluid Properties: Density, specific weight, specific gravity, surface tension & capillarity, Newton's law of viscosity, incompressible & compressible fluid.

Hydrostatic forces on submerged bodies: Pressure at a point, Pascal's law, pressure variation with temperature and height, Center of pressure on vertical surfaces.

Manometers- simple and differential manometers, inverted manometers, micro manometers, Pressure gauges.

UNIT II

Fluid Kinematics: Stream line, path line, streak line, stream tube, Classification of flows: steady, unsteady, uniform, non uniform, laminar, turbulent flows. One dimensional & two dimensional approximation, 2-D flow in wind tunnel, Continuity equations for 1-D and 2-D flows both compressible and incompressible, Velocity potential function and stream function.

UNIT III

Fluid Dynamics: Surface & body forces, momentum equation, Euler equation, Bernoulli's equation for flow along a stream line.

Flow measurements: pressure, velocity and mass flow rate, viscosity, venturi meter and orifice meter.

Flow of through pipes: Darcy's Weisbach Equation, major and minor losses.

UNIT IV

Boundary Layer flows: Introductory concepts of boundary layer, Prandtl's boundary layer hypothesis, Boundary layer growth along a flat plate. Boundary layer thickness (Displacement, Energy and Momentum), Von Karman's Momentum Integral Equation, Drag forces due to laminar and turbulent boundary layer on flat plate.

Separation of boundary layer: Adverse pressure gradient and Sharp bending/turning of surface. Methods of preventing separation of boundary layer.

UNIT V

Dimensional and Model Analysis: Dimensional homogeneity, Methods of Dimensional Analysis, Buckingham's π-theorem, Model Analysis, Similitude: Types of similarities, Dimensionless numbers, Similarity laws.

Text Books:

1. Engineering Fluid mechanics – K.L . Kumar, S.Chand & Co.
2. Introduction to Fluid Mechanics and Fluid machines – S.K. Som and G. Biswas
3. Fluid Mechanics and Hydraulic Machines – RK Bansal, Laxmi Publications
4. Fundamentals of Aerodynamics, Anderson, Jr., J.D., International edition, McGraw Hill, 2001, ISBN: 0-07-118146-6.

Reference Books:

1. Fluid Mechanics – Frank M and White, Mc-Grawhill.
2. Fluid Mechanics- Fox and Mc Donald
3. Fluid Mechanics – E. Rathakrishnan

Outcomes:

1. Understands different types of manometers and explain buoyancy force, stability of floating bodies by determining its metacenter height
2. Basic concepts of fluid kinematics and classification of flows, concepts of stream function and velocity potential function which provides solution for velocity and acceleration of fluid flow in real time applications
3. Recognize the surface and body forces required for obtaining momentum equation and energy equation and explain types of derivatives utilized in various flow field conditions.
4. Understands the concepts of boundary layer and qualitative description of boundary layer thickness and velocity profile on a flat plate
5. Develop Buckingham's π theorem and explain similarity parameters used for scale down models and explain flow measurements with dimensionless parameters.

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MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

II Year B.Tech. ANE- I Sem **L/T/P/C**
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(R20A2102) Applied Mechanics

Course Objectives:

1. Introducing the concepts of forces acting on a system, types of forces andimportance of free body diagram.
2. Have an overa ll understanding of the concept's centroids and center of gravity,frames of reference.
3. Calculate the moments of inertia and understand the significance.
4. The concepts of kinematics and importance in mechanics
5. Give the concepts of structural members used in various machine parts.

UNIT – I

Introduction Resultants of Force System Parallelogram law –Forces and components-Resultant of coplanar Concurrent Forces Moment of Force-problems.

Equilibrium of Force Systems: Free Body Diagrams, Equations of Equilibrium - Equilibrium ofplanar Systems

Unit – II

Centroid and Centers of Gravity: Introduction – Centroids and Centre of gravity of simple figures (from basic principles) – Centroids of Composite Figures - Theorem of Pappus – Center of gravity of bodies and centroids of volumes.

Unit – III

Moments of Inertia: Definition – Perpendicular and parallel axes theorems, Polar Moment of Inertia –Radius of gyration - Transfer formula for moment of inertia - Moments of Inertia for Composite areas

Mass Moment of Inertia: Moment of Inertia of Masses- Transfer Formula for MassMoments of Inertia

Unit – IV

Kinematics: Motion of a particle – Rectilinear motion – motion curves – Rectangularcomponents of curvilinear motion.

Kinetics of particles: D'Alembert's principle for plane motion and connected bodies.

Unit – V

Introduction to structural members: Introduction to different beams with end conditions and loadings with applications in aircraft (Theory only), columns with different end conditions with applications in aircraft (Theory only), Introduction to truss and frames, joints-pin, hinge etc, (Theory only) degrees of freedom for different structures (Theory only).

TEXT BOOKS:

1. Engineering Mechanics/ S. Timoshenko and D.H. Young, Mc Graw Hill Book Company.
2. Engineering Mechanics - Statics and Dynamics by Vijaya Kumar Reddy K ,Suresh Kumar J.BSPublications

REFERENCES:

1. Engineering Mechanics / S.S. Bhavikati & K.G. Rajasekharappa
2. A text of Engineering Mechanics / YVD Rao / K. Govinda Rajulu/ M.Manzoor Hussain,Academic Publishing Company
3. Engg. Mechanics / M.V. Seshagiri Rao & D Rama Durgaiah/ Universities Press
4. Engineering Mechanics, Umesh Regl / Tayal.
5. Engineering Mechanics / KL Kumar / Tata McGraw Hill.
6. Engineering Mechanics / Irving Shames / Prentice Hall

Course Outcomes:

1. Understand and Apply the concept of drawing free bodydiagram for variousmachine components.
2. Evaluate forces in various frames of structural members and estimatethe location ofcenter of gravity theoretically.
3. Calculate the moment of inertia in various sectional componentsand apply this toreal life structures.
4. Understand the importance of kinetics and kinematics in mechanicsand apply theprinciples to various frames.
5. Distinguish between various structural members according totheir load carryingcapacity.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

II Year B.Tech. ANE- I Sem **L/T/P/C**
2/1/-/3

(R20A2103) Engineering Thermodynamics

Objectives:

1. Learn about concepts and laws of thermodynamics.
2. Students acquire knowledge and relation of various thermodynamic properties.
3. Students can learn about transfer of energies.
4. Students acquire knowledge on mixture of gases.
5. Students gain information about the working principle of different engines.

UNIT - I

Introduction: Basic Concepts: System, Control Volume, Surrounding, Boundaries, Universe, Types of Systems, Macroscopic and Microscopic view points, Thermodynamic Equilibrium, State, Property, Process, Cycle - Quasi - static Process, Work, Displacement & Other forms of Work, Heat, Point and Path functions, Zeroth Law of Thermodynamics - Concept of Temperature - First law of Thermodynamics – applied to a process and system, Energy, specific heats, Enthalpy, Steady Flow Energy Equation.

UNIT - II

Second Law of Thermodynamics, Kelvin-Planck and Clausius Statements and their Equivalence / Corollaries, PMM of Second kind, Reversible and Irreversible processes, Carnot's principle, Carnot cycle and its specialties, Thermodynamic scale of Temperature, Clausius Inequality, Entropy, Principle of Entropy Increase - Energy Equation, Availability and Irreversibility

UNIT - III

Perfect Gas Laws – Equation of State, specific and Universal Gas constants - various Non-flow processes, properties, end states, Heat and Work Transfer, changes in Internal Energy - Throttling and Free Expansion Processes - Flow processes. Perfect Gas Model, derivations - Vander Waals Equation of State - Compressibility charts - variable specific Heats - Gas Tables - Dryness Fraction - Clausius - Clapeyron Equation Property tables.

UNIT - IV

Mixtures of perfect Gases - Mole Fraction, Mass fraction, Gravimetric and volumetric Analysis - Dalton's law of partial pressure, Avogadro's Laws of additive volumes - Mole fraction, Volume fraction and partial pressure, Equivalent Gas const. and Molecular Internal Energy. Enthalpy, specific heats and Entropy of Mixture of perfect Gases.

UNIT - V

Thermodynamic Cycles: Power cycles: Otto, Diesel, Dual Combustion cycles, Lenoir Cycle - Description and representation on P-V and T-S diagram, Thermal Efficiency, Mean Effective Pressures on Air standard basis - comparison of Cycles. Application of Brayton cycles in aviation.

Text Books:

1. Engineering Thermodynamics, Special Edition - MRCET, McGrawHill Publishers-2017
2. Engineering Thermodynamics / PK Nag / TMH, 5th Edition
3. Engineering Thermodynamics / E Rathakrishnan / PHI / Second Edition / 2013

Reference Books:

1. Engineering Thermodynamics / DP Mishra / Cengage Learning / Second impression 2012
2. Thermodynamics - An Engineering Approach - Yunus Cengel & Boles / TMH
3. Thermodynamics - J.P. Holman / McGrawHill
4. Engineering thermodynamics - Jones & Dugan
5. Engineering Thermodynamics / P. Chattopadhyay / Oxford higher Education / Revised First Edition
6. Thermodynamics & Heat Engines - Yadav - Central Book Dept. Allahabad

Outcomes:

1. Basic concepts of thermodynamic laws can be applied by the students
2. Analyze about the direction of process and conversion of energy to useful work.
3. Gains the knowledge of problem solving gases in different phases.
4. Able to understand the composition of gas mixtures.
5. Students should be able to analyze the relationship between various processes and working mechanisms of the engines.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

II Year B.Tech. ANE- I Sem **L/T/P/C**
3/-/-/3

(R20A2104) Elements of Aeronautical Engineering

Objectives

1. The goal is to obtain the knwoledge in understanding the principles, concepts and facts of the airplane.
2. The goal of the objective is to use the principles of aerodynamics and their realization to aircraft.
3. After the learning of course, students will be able to diffeentiate and will have sufficient knwoledge on engine timeline.
4. The objective is to make student to understand the importance of the structural configuaration and its role in design.
5. At the end of the session, the objective is to enable studentsto device performance of aircraft.

UNIT-1 History and first principles of flight

Evolution of Flight- Hot air balloons, Airships, Heavier than air, Wright flyer to commercial transportation, rotorcraft, missiles, standard atmosphere. Understanding space-environment, laws of gravitation, kepler's law, micro-gravity, rockets, spacecrafts and planetory environment.Basic forces on an aircraft, aerofoil nomenclature and types and airflow distribution, types of air-breathing engines-rocket engines-missiles, loads on aircraft, Structural components and members of an aircraft-schematics and purpose.

UNIT-2 Aerodynamics

Aerodynamics and its importance, Flow regimes based on Mach number, forces and Moments, Derivation of Lift, Drag and moment Coefficients with pressure distribution, Variation of pressure distribution with respect to angle of attack, Airfoil- nomenclature and types. Control surfaces, High Lift devices, Spoilers, Propeller, Rotary wing aircraft concepts, Compressible flow aerodynamics, shock and expansion waves.

UNIT-3 Propulsion

Basic forces on an aircraft, need for thrust, working of reciprocating enegines (2/4 stroke variants), types and working of air-breathing engines, rocket engines-types and principles, missiles and their types, Introduction to ramjet and scramjet engines.

UNIT-4 Aircraft Performance

The role and design mission of an aircraft, Specification of the performance requirements and mission profile.Off-standard and design atmosphere. Measurement of air data. Air data computers. Equations of motion for performance - the aircraft force system. The propulsive forces – the thrust production engines, power producing engines, variation of thrust, propulsive power and specific fuel consumption with altitude and flight speed.

UNIT-5 Aircraft Measurement Instrumentation

Sensors and Instrumentation-pitot static tube, primary flight instruments, principles of gyro and accelerometer, hydraulics and pneumatic systems, high lift devices, engine and navigation instruments.

Course Outcomes

1. Introduction to evolution of flight and characteristics of environment and space.
2. Understanding Flight in aerodynamic point of view.
3. Analyze the importance of Flight as a means of transport, development of engines.
4. Evaluate the stability and size of the aircraft, a structural perspective.
5. Estimate performance and devise new technologies to improve performance.

TEXT BOOKS:

1. Anderson, J.D., Introduction to Flight, fifth edition, Tata McGraw-Hill, 2007, ISBN: 0-07-006082-4.

2. Kermode, Flight Without Formulae, fifth edition, Pearson Education, 2004, ISBN-10: 0273403605; ISBN- 13: 978-0273403609.

3. V. Ganesan, Gas Turbines, Tata McGraw-Hill, 1999, ISBN, 0070681929

4. Turner, M.J.L., Rocket and Spacecraft Propulsion, Springer, 2001.

5. Fundamentals of Aerodynamics, Anderson, Jr., J.D., International edition, McGraw Hill, 2001, ISBN: 0-07-118146-6.

6. Eshelby, M.E., Aircraft Performance; Theory and Practice, AIAA Education Series, AIAA, 2000, ISBN: 1-56347-398-4.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

II Year B.Tech. ANE- I Sem **L/T/P/C**
3/-/-/3

(R20A2105) Aircraft Production Technology

Objectives:

1. Students gain the knowledge of different casting and welding processes involved in manufacturing
2. Acquire knowledge of Conventional and unconventional processes.
3. Able to know the importance and applications of Sheet metal in Aircraft Industry
4. Students acquire knowledge of Material processing and property improvements techniques
5. Students gain the importance of DT and NDT in Aircraft Industry

UNIT – I Casting and Welding Techniques:

Various molding process employed in aircraft industry, Types of patterns, Casting Process involved in Sand casting, die-casting, centrifugal casting, investment casting and shell molding. Working Principles and equipment used with emerging trends in arc welding, gas welding, resistance welding, Laser welding, Soldering and brazing techniques.

UNIT – II Machining and Forming:

Classification of machining processes, Types of chips, working principles (with schematic diagram only), types-lathe, shaper, milling machines, grinding (designation of grinding wheel), drilling m/c, CNC machining (overview of G-Codes, M-Codes). Sheet metal operations- shearing, punching, super plastic forming and diffusion bonding. Bending, Automation in bend forming and different operations in bending like stretch forming, spinning, drawing etc.

UNIT – III Unconventional Machining:

Principles of working and applications of abrasive jet machining, ultrasonic machining, electron beam, EDM, EBM, and plasma arc machining, Water jet machining, Ion beam machining.

UNIT – IV Heat Treatment and Surface Finishing:

Heat treatment of Aluminum alloys, titanium alloys, steels, case hardening. Corrosion prevention, protective treatment for aluminum alloys, steels, anodizing of titanium alloys, organic coating, and thermal spray coatings.

UNIT – V Jigs & Fixtures:

Jigs, fixtures, stages of assembly, types and equipment for riveted joints, bolted joints (only). Aircraft Tooling Concepts. - types of tools used in A/C industry.

NDT and Other Inspection Techniques: comparison of NDT & DT, process involved in Dye Penetrate Test, X-ray, and magnetic particle and ultrasonic testing.

Text Books:

1. "Manufacturing Engineering and Technology" by Kalpajikau - Addison Wesley.
2. "Aircraft production techniques' Keshu S.C, Ganapathy K.K, Interline Publishing House, Bangalore-1993.

Reference Books:

1. "Production technology" - R.K. Jain - Khanna Publishers - 2002.
2. "Production technology" - O.P.Khanna and lal. M.Dhanpat rai publications - New delhi - 1997.

Outcomes:

1. The student can correlate the various methods of manufacturing employed for different materials.
2. Students acquire of various processes involved in Sheet metal for aircraft production
3. Gain knowledge of Machining and correlate various applications to aircraft industry
4. Gain a knowledge and importance of heat treatment and surface finish in aircraft manufacturing
5. Able to gain knowledge in differentiating and applying DT and NDT in Aircraft Industry

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MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

II Year B.Tech. ANE- I Sem **L/T/P/C**
3/-/-/3

(R20A2106) CAD/CAM

Objectives:

1. To provide an overview of how computers are being used in design, development of manufacturing plans and manufacture
2. To get effective knowledge on the usage of mathematical equations in model development through the computer.
3. To understand different functions of computers in design and manufacturing.
4. To understand the need for integration of CAD and CAM
5. Study of different types of production, Knowledge of group technology (GT).
6. Detailed study of Computer Aided Quality Control.

UNIT–I

Introduction: Computers in Industrial Manufacturing, Product cycle, CAD / CAM Hardware, Basic structure.

Computer Graphics: Raster scan graphics coordinate system, database structure for graphics modeling, transformation of geometry, 3D transformations, clipping.

UNIT–II

Geometric modeling: Requirements, geometric models, geometric construction models, curve representation methods, surface representation methods, modeling facilities desired.

UNIT–III

Numerical control: NC, NC modes, NC elements, NC machine tools, structure of CNC machine tools, features of Machining center, turning center, CNC Part Programming fundamentals, manual part programming methods, Computer Aided Part Programming.

UNIT–IV

Group Technology: Part family, coding and classification, production flow analysis, advantages and limitations, Computer Aided Processes Planning, Retrieval type and Generative type.

UNIT–V

Computer Aided Quality Control: Terminology in quality control, the computer in QC, contact inspection methods, noncontact inspection methods-optical, noncontact inspection methods-nonoptical, computer aided testing, integration of CAQC with CAD/CAM.

Computer integrated manufacturing systems: Types of Manufacturing systems, Machine tools and related equipment, material handling systems, computer control systems, human labor in the manufacturing systems, CIMS benefits.

TEXT BOOKS:

1. CAD / CAM Theory and Practice / Ibrahim Zeid / TMH Publishers
2. CAD / CAM /A Zimmers & P.Groover/PE/PHI Publishers

3. Automation, Production systems & Computer integrated Manufacturing/ Groover/Pearson Education

REFERENCE BOOKS:

1. CAD / CAM / CIM / Radhakrishnan and Subramanian / New Age Publishers
2. Principles of Computer Aided Design and Manufacturing / Farid Amirouche / Pearson Edu
3. CAD/CAM: Concepts and Applications/Alavala/ PHI Publishers Computer Numerical Control Concepts and programming / Warren S Seames / Thomson Publishers
4. CAD / CAM – P N RAO McGraw Hill Publications

OUTCOMES: Student will be able to:

1. Understand the applications of computer in the design and manufacturing.
2. Understand and develop the Mathematical representations of curves used in geometric construction.
3. Understand the concept and working principle of NC, CNC, and DNC and can develop a program using G and M codes.
4. Make use of GT, FMS and CAPP concepts and are able to apply these concepts in bringing the benefits of mass production in real working environment.
5. Plan the computer integrated production planning in working environment and able to analyze the quality of a product through computer aided quality control

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

II Year B.Tech. ANE- I Sem **L/T/P/C**
-/-/3/1.5

(R20A2181) Aircraft Production Technology Lab

Objectives:

1. The main objective of this course is to impart practical exposure on various aircraft production technologies used in industry.
2. Impart the fundamental aspects of the metal cutting principles
3. application in studying the behavior of various machining processes
4. train in knowing the fundamental parts of various machining operations and their kinematic schemes.
5. Basic Exercises in Lathe, Shaper, Milling, Slotting, CNC and Grinding machines welding equipment comprising Microscopes polishing disc grinders as under.

PRODUCTION LAB

1. Plain Turning, Facing, Knurling, Taper turning, And Thread Cutting.
2. Drilling, boring, counter boring, counter sinking.
3. Simple exercises on shaping
4. Simple exercises in Planing
5. Plain Milling
6. Gear Milling
7. Sheet metal joining by Soldering.
8. Simple exercises on CNC machines and Programme generation.
9. Simple exercises in Gas.
10. Simple exercises in Arc Welding.
11. Aircraft wood gluing practice
12. Study of properties of sandwich structures

Note: Any 10 experiments can be conducted.

Equipment needed: Lathe, Shaper, Milling, Slotting, EDM, CNC and Grinding machines welding equipment and metallurgy equipment comprising Microscopes polishing disc grinders.

Reference Books:

1. "Aircraft production techniques" Keshu S.C, Ganapathy K.K., Interline Publishing House, Banglore- 1993.
2. "Manufacturing Engineering and Technology" by Kalpakajam - Addison Wesley.

Outcomes:

After completion of the course students will be able to

1. impart the desired size and shape to work pieces, the desired accuracy is achieved by removing excess metal in the form of chips.
2. In this lab, students perform different operations on the lathe such asturning,facing, taper turning, thread cutting and grooving.
3. They also cut different types of gears on the milling machine that is provided with an indexing mechanism and Identify basic parts and operations of machines including lathe, shaper, planer, drilling and milling machine.
4. Exhibit the ability in developing sequence of machining operations required for industry. Capable of manufacturing components according to given drawings using various machines.
5. Student will have hands on experience on various production techniques.

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MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

II Year B.Tech. ANE- I Sem **L/T/P/C**
-/-/3/1.5

(R20A2182) Aircraft Engineering Drawing Lab Using Cad

OBJECTIVES:

1. To expose them to existing national standards related to technical drawing.
2. To understand the limits and tolerance system
3. To give external and internal details of the machine components.
4. To understand the usage of computers in engineering field.
5. To understand how to model a component by using a software.

Unit 1 Machine Drawing Conventions:

Need for drawing conventions – introduction to IS conventions - Conventional representation of materials, common machine elements

Unit 2 Limits and tolerances:

Limit System – Tolerances – Fits - Tolerances of Form and Position – Standards followed in Industry

Unit 3 Assembly Drawings:

Drawings of assembled views for the part drawings of the following using conventions and easy drawing proportions.

a) Engine parts – stuffing boxes, Knuckle joint, Eccentric.
b) Wing, Landing gear, horizontal stabilizer.

NOTE: First angle projection to be adopted. The student should be able to provide working drawings of actual parts

Unit 4

1. INTRODUCTION to CAD and AutoCAD – BASICS
2. 2D – FIGURES for practice USING AutoCAD (Orthographic Projection)
3. ISOMETRIC DRAWING for practice USING AutoCAD

Unit 5

1. Introduction to CREO – 3.0
2. INTRODUCTION TO CREO 3.0
3. Modeling of 3-D FIGURES USING CREO
   a. Modeling of Knuckle Joint
   b. Modeling of stuffing box

Outcomes:

On completion of the course, the student will be able to

1. Understand and apply the knowledge of machine drawing as a system of communication in which, i exposed clearly and all information is fully conveyed.
2. Apply the limits and tolerances
3. Produce the assembly drawing from list of components.
4. Apply AutoCAD commands to draw 2D drawing and 3D drawings.
5. Apply CREO commands to model any solid component.

TEXT BOOK

1. Machine Drawing by K. L. Narayana, P. Kannaiah, K. Venkata Reddy New Age International

2. Raymer, D.P., Aircraft Design: A Conceptual Approach, third edition, AIAA Education Series, AIAA, 1999, ISBN: 1-56347-281-0.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

II Year B.Tech. ANE- I Sem **L/T/P/C**
2/-/-/2

(R20A0008) Global Education & Professional Career

Introduction

In every era of human life, studying abroad has allowed one to experience another part of oneself in a different setting. Additionally, if all that hurry is geared towards success in one's career, international education will most definitely be worth one's time. It is not only an expedition of self-discovery but also an investment in one's resume.

The world, today, is redefining knowledge and great leadership to encompass critical values that are key to meeting modern career challenges. To meet the current requirements, a study delineating Global Education is of utmost importance towards prospective growth.

Course Objectives:

1. To assist students to understand the broad scope of engineering.
2. To equip the students to study the academic subjects with better perspective of the expectations of the international standards
3. To familiarize students with the financial requirements and ways to receive monetary aid
4. To enable students' understanding of the various admission tests
5. To acquaint them with their own skill set and train the students towards skills development

Unit 1

Importance and relevance of Engineering in today's and futuristic contexts. The jobs that will thrive in the market in the coming decades. For eg., Robot Manufacturer &service Management, Big Data & AI Scientists, Artificial Bodies Manufacturer, Gene Designers, etc

Unit 2

Countries and their entry requirements Non-immigrant student visas, Work Permit visas

Unit 3

Admission tests to colleges and universities world-over PSAT, SAT, TOEFL, AP, IELTS…

Unit 4

Financial capacity requirements Scholarships, Full scholarships, merit scholarships, on-campus jobs

Unit 5

Skills Mapping Match one's skills with jobs, Skills development

COURSE OUTCOMES

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

1. Comprehend the usage of engineering in various fields and disciplines.
2. Identify the right college and country to pursue higher education.
3. Prepare themselves for the skill-oriented academics and prospective growth.
4. Plan for their future education with the precise financial management.
5. Discover and discuss their skill set and the jobs that map their skills.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

II Year B.Tech. ANE- II Sem **L/T/P/C**
3/-/-/3

(R20A2107) Aerodynamics

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, irrotationality, theory of airfoils and wing sections.
3. To introduce the basics of viscous flow.

UNIT I

Basics of Aerodynamics: Aerodynamic forces and Moments, Derivation of Lift, Drag and momentCoefficients with pressure distribution, Variation of pressure distribution with respect to angle of attack,Governing equations of flow- Continuity, momentum and Energy equations in differential form. Flow regimes based on Mach number.

UNIT - II

Inviscid Incompressible Flow over Airfoil: Governing Equation for incompressible and irrotational flow,Elementary flows and their combinations, Magnus effect, D'Alembert's Paradox, Kutta - Joukowsky theorem, kutta condition. Kelvin's circulation theorem & starting vortex, Thin airfoil theory, expressions for calculating the aerodynamic center and Center of pressure.

UNIT – III

Inviscid Incompressible Flow over Wings: Vortex filament statement of Helmholtz's vortex theorems,Biot - Savart Law, horse shoe vortex, Prandtl's Lifting line theorem - downwash and induced drag, Elliptic loading & wings of elliptic planforms, expression for induced drag.

UNIT IV

Applied Aerodynamics: Lift augmentation and Drag Reduction methods - Flaps, slats, slots, winglets,Leading edge root extensions, Large Eddy Breakup device, Co-flow jet, Cuffs and vortex generators.NACA Airfoils, Circulation control, strakes. Drag augmentation methods – spoilers, Air brakes.

UNIT – V

Experimental Aerodynamics Wind tunnel and its Components, types of wind tunnels and Model testing in wind tunnels. Pressure,Temperature, Velocity measurements – Hotwire and Laser – Doppler anemometer. Force measurements– Wind tunnel balances. Flow visualization techniques-schileren and shadowgraph methods.

Text books:

1. Fundamentals of Aerodynamics, Anderson, Jr., J.D., International edition, McGraw Hill, 2001, ISBN: 0-07-118146-6.
2. Aerodynamics by L.J. Clancy

3. Compressible Aerodynamics, John D. Anderson

Reference Books:

1. Aerodynamics for Engineers, fourth edition, Bertin, J.J., Pearson Education, 2012, ISBN: 81-297-0486-2.
2. Kuchemann, D., The Aerodynamic Design of Aircraft, Pergamon, 1978.
3. Shevell, R.S., Fundamentals of Flight, Indian reprint, Pearson Education, 2004, ISBN: 81-297-0514-1.
4. McCormick, B.W., Aerodynamics, Aeronautics & Flight Mechanics second edition John Wiley, 1995,ISBN: 0-471-575062.

Outcomes:

1. An ability to apply thin airfoil theory to predict aerodynamic characteristics of air foil
2. Application of Elementary flows to develop real problems.
3. Development of devices to enhance aerodynamic characteristics of aircraft components.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

II Year B.Tech. ANE- II Sem **L/T/P/C**
3/-/-/3

(R20A2108) Solid Mechanics

OBJECTIVES:

The course should enable the students to:

1. Acquire knowledge on the fundamental concepts of stress and strain in materials
2. Describe beams and analyze Shear Force and Bending moments
3. Find the slope and deflection in different types of beam
4. Determine critical loads of columns
5. Obtain knowledge on theories of failure

Unit – I

Analysis of stress- Introduction to Solid Mechanics – Basic Concepts, Types of Stress, General State of Stress at a Point, State of stress at a point, Complimentary Shear stresses, Stresses on Oblique planes, Materials Subjected to pure shear, Material subjected to two mutually perpendicular direct stresses.

Unit – II

Members Subjected to Flexural Loads: Geometric Forms of beams, Classifications of beams, statistically determinate Beams, Concept of Shear Force and bending moment in beams, Cantilever Beam and Simply Supported Beam- Shear Force and Bending Moment Diagrams, Simple Bending theory and Derivation of flexural equation.

Unit – III

Deflection of beams: for a simply supported and Cantilever beam with problems using Double Integration method and Macaulay's method.

Unit – IV

Elastic stability of Columns: Euler's theory, Critical load determination of columns with different end constraints.

Unit – V

Theories of failures: Von-mises theory, octahedral shears distortion energy theory, Maximum principle elastic strain theory, Maximum principle shear strain theory, Maximum shear stress theory.

TEXT BOOKS:

1. Strength of Materials by R S Khurmi, S Chand and company Ltd
2. Strength of Materials by S Ramamrutam, DhanpatRai Publications

REFERENCES:

1. Aircraft Structures for Engineering Students by THG Megson, Elsevier Aerospace Engineering Series.

COURSE OUTCOMES:

Upon the successful completion of the course, students will be able to:

1. Understand the fundamental concepts of stress and strain in materials
2. Analyze Shear Force and bending moments on different types of beams
3. Apply the basic concepts to find the slope and deflection in simply supported and Cantilever beam
4. Define critical loads of columns with different end Conditions
5. Acquire knowledge on theories of failure.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

II Year B.Tech. ANE- II Sem **L/T/P/C**
3/-/-/3

(R20A0061) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

COURSE OBJECTIVES:

1. TolearnthebasicsofEconomicconceptsandthroughanalysisoffirmsdemand.
2. Tounderstandvariousconceptsoffirmsproductionandcostanalysis.
3. Tounderstandvariousmarketstructuresandpricingpoliciesoffirmswithdistinctivefo rmsofbusiness.
4. Toknowaboutaccountingprocedureofthefirm.
5. To develop asignificantperspective aboutinvestmentdecision processandcompleteanalysisofthecompanyusingratios.

UNIT-I

INTRODUCTION TO MANAGERIAL ECONOMICS:
Definition,NatureandScopeofManagerialEconomics,MicroandMacroeconomicConcepts.
DemandAnalysis: DemandDeterminants,LawofDemandandexceptions.
ELASTICITYOFDEMAND: Definition,Types,MeasurementandSignificanceofelasticityofDemand.
DEMANDFORECASTING: FactorsgoverningDemandForecasting,MethodsofDemandForec asting(SurveyMethods,ExpertOpinion,TestMarketing,ControlledExperience,Judgemental Approach,andTime SeriesAnalysis).

UNIT-II

PRODUCTION & COST ANALYSIS: Production Function- Isocost and Isoquants, MRTS, LeastCost Combination of Inputs, Cobb-Douglas Production Function, Laws of Returns, InternalandExternalEconomiesofScale.
COSTANALYSIS: CostConcepts. Break-EvenAnalysis (BEA)-Determinationof Break-EvenPoint(SimpleProblems)

UNIT-III

MARKETS: TypesofCompetitionandMarkets,FeaturesofPerfectCompetition,Monopolyand MonopolisticCompetition;
PRICING: Objectives,MethodsofPricing;
BUSINESS: Featuresofdifferentformsof BusinessOrganisation (Sole Trader, Partnership,JointStockCompany,CooperativeSociety,and PublicEnterprises).

UNIT-IV

INTRODUCTION TO CAPITAL AND FINANCIAL ACCOUNTING: NeedforCapital,Typesof Capital,WorkingCapitalAnalysis,MethodsandSourcesofraisingFinance.
ACCOUNTING: Definition, Concepts and Conventions (GAAP); Accounting Cycle; Formats forpreparation of Trial Balance and Final Accounts (Trading Account, Profit and Loss AccountandBalanceSheet).

UNIT-V

INVESTMENT DECISION: Capital Budgeting - Features, Objectives, and Methods (PaybackMethod, Accounting Rate of Return and Net Present Value) - advantages & disadvantages.(Simple Problems)

FINANCIAL ANALYSIS: Analysis and Interpretation of Liquidity Ratios, Activity Ratios, CapitalStructureRatiosandProfitabilityRatios. (Simple Problems)

TEXTBOOKS:

1. Varsheney&Maheswari,ManagerialEconomics,SultanChand,2009.
2. S.A.Siddiqui&A.S.Siddiqui,ManagerialEconomicsandFinancialAnalysis,NewAgeInternationalPublishers,Hyderabad2013
3. M. KasiReddy&Sarawathi, ManagerialEconomicsand Financial Analysis,PHI, NewDelhi,2010.

REFERENCEBOOKS:

1. ManagerialEconomics&FinancialAnalysis,SpecialEdition-MRCET.McGrawHillPublications,2017
2. D.N.Dwivedi,ManagerialEconomics,VikasPublications.
3. JustinPaul,Leena,Sebastian,ManagerialEconomics,Cengage
4. P.L.Mehta,ManagerialEconomics:Analysis,ProblemsandCases,SultanChand&Sons.
5. S.N.Maheswari&S.K.Maheswari,FinancialAccounting,VikasPublications.
6. M.Y.KhanandP.K.Jain,FinancialManagement,McGrawHill

COURSE OUTCOMES:

Studentsshouldbeable

1. Gainingthe analytical approachof firmsdemand and their significanceinbusinessdecisions.
2. Acquiringtheknowledgethat,howtheproductionistobeanalyzedwithinthelimitsofcostfor effectivedecisionmaking.
3. Exposureaboutvariousmarketstructuresavailabletovariousbusinessesforsmoothrunning ofthe firm.
4. Aclearpictureonhowafirmismaintainingtheirbusinessrecordsusingvariousaccounting formats foreffectiverunningofthebusiness.
5. Students are ableto calculate variousmethodsof capitalbudgetingand analysingfinancialstatementsofthefirm foreffective decision making.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

II Year B.Tech. ANE- II Sem **L/T/P/C**
2/1/-/3

(R20A2109) Aircraft Performance

OBJECTIVES OF THE COURSE:

1. To equip the students with fundamental understanding of aircraft performance in various flight regimes.
2. To familiarize the concepts and parameters affecting flight performance.

UNIT – I: INTRODUCTION TO AIRCRAFT PERFORMANCE- THE FORCE SYSTEMS OF THE AIRCRAFT

The role and design mission of an aircraft. Specification of the performance requirements and mission profile. Importance of performance analysis, estimation, measurement, operational safety and economy. The Standard Atmosphere. Off-standard and design atmosphere. Measurement of air data. Air data computers. Equations of motion for performance - the aircraft force system. The propulsive forces - the thrust production engines, power producing engines, variation of thrust, propulsive power and specific fuel consumption with altitude and flight speed.

UNIT – II: CRUISE PERFORMANCE

Maximum and minimum speeds in level flight. Range and endurance with thrust production, and power producing engines. Cruise techniques - constant angle of attack, constant Mach number; constant altitude, methods- comparison of performance. The effect of alternative fuel flow laws, weight, altitude and temperature on cruise performance. Cruise performance with mixed power-plants.

UNIT – III: CLIMB & DESCENT PERFORMANCE

Climb and descent techniques, safety considerations, performance analysis- maximum climb gradient,climb rate. Energy height and specific excess power, optimal climbs - minimum time, minimum fuel climbs. Measurement of climb performance. Descent performance in aircraft operations. Effect of wind on climb and descent performance.

UNIT – IV: MANEUVER PERFORMANCE

Accelerated motion of aircraft - equations of motion- the maneuver envelope. Longitudinal maneuvers the pull-up, push over maneuvers. Lateral maneuvers- turn performance- turn rates, turn radius- limiting factors. Maneuver boundaries, Maneuver performance of military aircraft, transport aircraft.

UNIT-V: TAKE-OFF AND LANDING- SAFETY REQUIREMENTS - FLIGHT PLANNING

Estimation of take-off distances. The effect on the take-off distance with respect to weight, wind,runway conditions, ground effect. Take off safety factors. The estimation of landing distances, the discontinued landing, baulked landing, air safety procedures and requirements on performance. The effect on the landing distance, of weight, wind, runway conditions, ground effect. Fuel planning, fuel requirement, trip fuel, reserve and tankering.

TEXT BOOKS:

Eshelby, M.E., Aircraft Performance; Theory and Practice, AIAA Education Series, AIAA, 2000, ISBN: 1-56347-398-4.

REFERENCE BOOKS:

1. Raymer, D.P., Aircraft Design: A Conceptual Approach, third edition, AIAA Education Series,AIAA, 1999,ISBN: 1-56347-281-0.
2. Yechout, T.R. et al., Introduction to Aircraft Flight Mechanics, AIAA Education Series, AIAA, 2003, ISBN:1-56347-577-4.

Outcomes:

1. The student will have a clear understanding of the fundamental concept leading to aircraft performance including military and passenger aircraft.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

II Year B.Tech. ANE- II Sem **L/T/P/C**
3/-/-/3

(R20A0024) Probability and Statistics

COURSE OBJECTIVES:

1. To identify a random variable that describes randomness or an uncertainty in certain realistic situation. It can be either discrete or continuous type.
2. To learn important probability distributions like: in the discrete case, study of the Binomial and the Poisson Distributions and in the continuous case the Normal Distributions.
3. To build the linear relationship between two variables and also to predict how a dependent variable changes based on adjustments to an independent variable.
4. To interpret the types of sampling, sampling distribution of means and variance, Estimations of statistical parameters.
5. To give comprehensive knowledge of probability theory to make inferences about a population from large and small samples.

UNIT – I: Random Variables

Single Random Variables -Discrete and Continuous, Probability distribution function, Probability mass and density functions, mathematical expectation and variance.

Multiple Random variables: Discrete and Continuous, Joint probability distribution, Marginal probability density functions, conditional probability distribution function and density functions.

UNIT-II: Probability Distributions

Binomial distribution – properties, mean, variance and recurrence formula for Binomial distribution, Poisson distribution – Poisson distribution as Limiting case of Binomial distribution, properties, mean variance and recurrence formula for Poisson distribution, Normal distribution – mean, variance, median, mode and characteristics of Normal distribution.

UNIT -III: Correlation and Regression

Correlation -Coefficient of correlation, Rank correlation, Regression- Regression coefficients, Lines of regression.

Multiple correlation and regression- Coefficient of multiple Correlation, multiple regression, multiple linear regression equations.

UNIT –IV: Sampling and Testing of Hypothesis for Large Samples

Sampling: Definitions - Types of sampling - Expected values of sample mean and variance, Standard error - Sampling distribution of means and variance. Estimation - Point estimation and Interval estimation.

Testing of hypothesis: Null and Alternative hypothesis - Type I and Type II errors, Critical region - confidence interval - Level of significance, One tailed and Two tailed test.

Large sample Tests: Test of significance - Large sample test for single mean, difference of means, single proportion, and difference of proportions.

Unit-V: Testing of Hypothesis for Small Samples

Small samples: Test for single mean, difference of means, paired t-test, test for ratio of variances (F-test),Chi- square test for goodness of fit and independence of attributes.

TEXT BOOKS:

1. Fundamental of Statistics by S.C. Gupta, 7th Edition,2016.
2. Fundamentals of Mathematical Statistics by SC Gupta and V.K.Kapoor
3. Higher Engineering Mathematics by B.S. Grewal, Khanna Publishers, 35th Edition,2000.

REFERENCES BOOKS:

1. Introduction to Probability and Statistics for Engineers and Scientists by Sheldon M.Ross.
2. Probability and Statistics for Engineers by Dr. J. Ravichandran

COURSE OUTCOMES: After completion of the course, the student will be able to

1. Evaluate randomness in certain realistic situation which can be either discrete or continuous type and compute statistical constants of these random variables.
2. Provide very good insight which is essential for industrial applications by learning probability distributions.
3. Higher up thinking skills to make objective, data-driven decisions by using correlation and regression.
4. Assess the importance of sampling distribution of a given statistic of a random sample.
5. *Analyze and interpret statistical inference* using samples of a given size which is taken from a population.

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II Year B.Tech. ANE- II Sem **L/T/P/C**
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(R20A2183) Solid Mechanics and Fluid Mechanics Lab

Objectives:

1. To supplement the theoretical knowledge gained in Mechanics of Solids with practical testing for determining the strength of materials under externally applied loads.
2. To analyze various strength of materials
3. To understand various characterization methods
4. To conduct experiments to verify fundamental principles of fluid mechanics.
5. To calibrate measuring devices and analyze experimental data

(A) SOLID MECHANICS LAB:

1. Direct tension test
2. Torsion test
3. Hardness test

a) Brinells hardness test

b) Rockwell hardness test

4. Test on springs
5. Compression test on cube
6. Impact test
7. Punch shear test

(B) FLUID MECHANICS LAB

8. Calibration of Venturimeter
9. Calibration of orifice meter
10. Verification of Bernoulli's apparatus.
11. Pipe friction.
12. Determination of co-efficient of discharge for external Mouth Piece.

Note: Any 10 experiments can be conducted minimum five from each section.

Equipment needed

SM – lab

1. UTM – 20 / 40 Tons with load Vs Elongation graphical attachment and provision for Bending and sheering along with accessories and end grips
2. Deflection test rig (Fabricated hardware + precession dial gauge)
3. Torsion testing Machine
4. Hardness testing Machine (Brinnel and Rockwell)
5. Impact Testing Machine
6. Spring testing Machine.

FM – lab

1. Venturimeter test rig
2. Test rig for Flow over notch
3. Pipe friction apparatus
4. Bernoulli's apparatus
5. test rig for Orifice meter
6. Mouthpiece apparatus.

Outcomes:

1. Prove good understanding of concepts and their applications in the laboratory
2. Analyze various strength of materials through characterization
3. Understand various characterization methods depending on the type of loading.
4. Ability to use equipment for flow measurements.
5. Ability to analyze experimental data and develop empirical equations.

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MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

II Year B.Tech. ANE- II Sem **L/T/P/C**
-/-/3/1.5

(R20A2184) Aerodynamics and Propulsion Lab

Objectives:

1. Determine the functions of wind tunnel components.
2. Analyze experimental procedure to summarize aerodynamic characteristics
3. Summarize the difference aerodynamics properties for various models
4. To familiarize students and to expose them practically with various aircraft piston and gas turbine Engines.
5. Evaluate various engine performance characteristics

AERODYNAMICS

1. Calibration of Wind Tunnel.
2. Pressure Distribution over a symmetric Airfoil
3. Pressure Distribution on a cylinder
4. Pressure Distribution over a sphere
5. Estimation of aerodynamics characteristics of NACA0012 airfoil
6. Efficiency of Vanes in Centrifugal blower

PROPULSION

7. Performance estimation for single cylinder four stroke Petrol engines.
8. Performance estimation and heat balance test for single cylinder four stroke Diesel engines.
9. Determination of Port timing and sketching for two stroke petrol engines.
10. Determination of Valve timing and sketching for four stroke diesel engines.
11. Estimating the efficiency of centrifugal compressor.
12. Estimating the efficiency of axial flow compressor.

Note: Any 10 Experiments can be conducted minimum 5 from each section

Equipment needed:

1. Low Speed Wind-tunnel Test Rig with a test section of 1-meter X 1 meter with necessary accessories.
2. Test Rig for Axial flow Compressor
3. Test rig for centrifugal flow compressor.
4. Heat Engine Test Rig.
5. Balancing test Rig
6. Piston Engine

Reference Books:

1. Low speed wind tunnel testing, W.E. Rae & Allen Pope, John Willey &sons
2. Fundamentals of Aerodynamics by John D Anderson TATA MC GRAW HILL
3. Internal Combustion Engines by RK Rajput Laxmi Publications.

Outcomes

1. The student can analyze aerodynamic performance of various geometries.
2. Ability to understand details of piston and gas turbine engine
3. Acquire knowledge of evaluation of performance
4. Demonstrate and visualize the lift and drag variations on different components
5. Correlate various engines based on the application

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II Year B.Tech. ANE- II Sem **L/T/P/C**
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(R18A0005) Foreign Language German
(Mandatory Course)

INTRODUCTION

This is the age of globalization. Faster communication, extensive travel, greater interaction, outsourcing of jobs, demand of skilled person had made the engineering graduates to learn GERMAN language. Nowadays Aircraft and mechanical domain require more and more graduates with minimum knowledge to speak in German language

German language has been one of the fastest learning language in the world. This course is customized according to the demand of the requirement in job industries.

OBJECTIVES:

1. To equip with the vocabulary to create new sentences, sentence pattern, correct pronunciation.
2. To make the students an efficient German language speaker.
3. To focus on basic linguistic and communicative structures of the German language.

SYLLABUS

UNIT 1 : Basics of Deutsch

Introduction – (About German Country, Language & Culture)
Formal And Informal Greetings
Alphabet
Numbers (0-50)
Days Of The Week And Months Of The Year
Vocabulary, Exercises and Assignments

UNIT 2 : Getting closer with Deutsch

Family
Seasons & Weather
Time & Directions, Days Of Weak, Months
Colours & Shapes, Numbers (51 – 100)
Subject Pronouns
Vocabulary, Exercises and Assignments

Unit 3 : **Construction of Simple Sentences**

Formal Introduction
Asking Questions
Responding to the Questions

Simple Sentences

Articles, Numbers (101 And Above)

Vocabulary, Exercises and Assignments

Unit 4 : **Dialogue Writing**

Introduce Oneself

Introduce Others

At the Restaurant

At the Railway Station

At the University

Vocabulary, Exercises and Assignments

REFERENCE BOOKS

1. Collins easy learning GERMAN dictionary
2. Hallo deutsch – Parul sharma
3. Studio D A1 – Hermann
4. So geht das – New Saraswati book house
5. Practice German language for beginners – Dominic
6. German Made easy – Diego Agundez

OUTCOMES

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

1. stand ahead of getting the opportunity in the Job market by learning German language.
2. learn German language with engineering degree that will give them a sense of identity among the competitive global engineering industry.
3. learn German language on a regular basis that will help them in improving multi-lingual ability.

OPEN ELECTIVE - I

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

II Year B.Tech. ANE- II Sem **L/T/P/C**
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OPEN ELECTIVE - I
(R20A0451) BASICS OF COMPUTER ORGANIZATION

COURSE OBJECTIVES:

1. To understand basic components and operations in asystem
2. To understand the execution of an instruction in acomputer.
3. To acquire the knowledge to design of CPU.
4. To explore the memory organization.
5. To explore I/O organization and parallel processing in depth.

UNIT I

Basic Structure of Computers: Computer Types, Functional Units, Computer Registers, Basic Operational Concepts, Bus Structures, Software, Performance, Multiprocessors and Multi Computers. **Data Representation**: Fixed Point Representation, Floating – Point Representation.

Register Transfer Language and Micro Operations: RTL- Register transfers, Bus and Memory Transfers. **Micro operations:** Arithmetic, Logic, Shift micro operations, Arithmetic logic shift unit.

UNIT-II

Computer Arithmetic: Addition and Subtraction, Multiplication Algorithms, Division Algorithms. Error detection and Correction Codes

Basic Computer Organization and Design: Instruction codes, Timing and Control, Computer Instructions: Memory Reference Instructions, Register Transfer Instructions, Input– Output Instructions, Instruction cycle. Interrupt and Interrupt cycle, Complete Computer Description

UNIT III

Central Processing Unit organization: General Register Organization, Stack organization**,** Instruction formats, Addressing Modes, Data Transfer and Manipulation, Program Control, **CISC** and **RISC** processors.

Control Unit Design: Control Memory, Address sequencing, Design of CU: Micro Programmed Control, Hardware Control, Micro Program example. **Case Sudy-** Introduction to x86 architecture.

UNIT IV

Memory Organization: Memory Hierarchy, Memory Interleaving, **Main Memory-**RAM and ROM chips, **Associative Memory**-Hardware Organization, Match logic. Mapping functions-Associate, Direct, Set Associative Mapping. **Cache Memory**: Hit Ratio, Cache Coherence, Cache writes policies. **Auxiliary memory:** Magnetic Disks, Magnetic Tapes Optical devices, Page Replacement Algorithms.

UNIT V

Input –Output Organization: Peripheral Devices, Input-Output Subsystems, I/O Device Interface, I/O Processor, I/O Transfers–Program Controlled, Interrupt Driven, and DMA, Interrupts and Exceptions. I/O Device Interfaces – SCII, USB.

Pipelining and Vector Processing: Basic Concepts, Instruction level Parallelism Throughput and Speedup, Pipeline hazards. Vector Processing: Applications, an Example for Vector Processing.

TEXT BOOKS:

1. Computer System Architecture by M. Morris Mano, 3rd Edition.
2. Computer Organization and Design: The Hardware/Software Interface , 5th Edition by David A. Patterson and John L. Hennessy, Elsevier.
3. Computer Organization and Embedded Systems , 6th Edition by CarlHamacher, McGraw Hill Higher Education.

REFERENCE BOOKS:

1. Computer Architecture and Organization , 3rd Edition by John P. Hayes,WCB /McGraw-Hill
2. Computer Organization and Architecture: Designing for Performance , 10th Edition by William Stallings, Pearson Education.
3. Computer System Design and Architecture , 2nd Edition by Vincent P. Heuring and Harry F. Jordan, Pearson Education.

COURSE OUTCOMES:

1. Able to understand functional components and micro operations in a computer.
2. Able to understand arithmetic operations and computer instructions.
3. Able to understand CPU organization and design of control unit.
4. Able to understand the Memory organization.
5. Able to understand I/O Transfer and Parallel Processing.

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II Year B.Tech. ANE- II Sem **L/T/P/C**
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OPEN ELECTIVE - I
(R20A1251) Web Designing Tools

COURSE OBJECTIVES:

1. To learn the basics of web & html programming
2. To learn about CSS and its style
3. To learn about Java Scripting & Dynamic Html
4. To learn about web server software AJAX
5. To learn about PHP

Unit I

Web Basics- Introduction, Concept of Internet- History of Internet, Protocols of Internet, World Wide Web, URL, Web Server, Web Browser,HTML-Introduction HTML-Basic Formatting Tags , HTML- Grouping Using Div Span, HTML-Lists,: HTML-Images, HTML-Hyperlink, HTML-Table, HTML- Iframe,HTML – Form HTML – Headers, HTML-Miscellaneous using tool Dreamweaver/ Visual studio

Unit II

CSS –Introduction, Syntax, CSS-Selectors, CSS-Color Background Cursor, CSS-Text Fonts, CSS-Lists Tables, CSS -Box Model, CSS-Display Positioning, CSS Floats. Using tool using tool Dreamweaver/ Visual studio, Net Bean

Unit III

Introduction of Java Script, JavaScript characteristics, Objects in Java Script, Dynamic HTML with Java Script. XMLHttpRequest- Introduction, XMLHttpRequest, The XMLHttpRequest Object, Events for the XMLHttpRequest Object, Request Object for XMLHttpRequest, Response Object for XMLHttpRequest. Using tool using tool Visual studio, Net Bean & Eclipse

Unit IV

AJAX Introduction- Introduction, AJAX Introduction, AJAX Components, Handling Dynamic HTML with Ajax, CSS to Define Look and Feel, Understand the XML Mark-up, XMLHttpRequest. AJAX using XML and XML HttpRequest- Introduction, Ajax Using XML and XMLHttpRequest, Accessing, Creating and Modifying XML Nodes, Loading XML Data into an HTML Page, Receiving XML Responses, Handling Response XML. Using tool using tool Visual studio, Net Bean & Eclipse

Unit V

PHP Introduction- PHP Introduction, Structure of PHP, PHP Functions, AJAX with PHP, PHP Code and the Complete AJAX Example. AJAX with Database- Introduction, AJAX Database, Working of AJAX with PHP, Ajax PHP Database Form, AJAX PHP MySQL Select Query. Using tool using tool Visual studio, Net Bean & Eclipse.

TEXT BOOKS:

1. Web Programming ,Building Internet Applications, CHRIS BATES II Edition, Wiley Dreamtech.
2. Programming world wide web ,SEBESTA,PEARSON.

REFERENCE BOOKS:

1. Internet and World Wide Web – How to program, Dietel and Nieto PHI/Pearson
2. Ajax: The Complete Reference By Thomas Powell
3. PHP: The Complete reference-steven Holzner Tata McGraw-Hill.
4. An Introduction to web Design and Programming –Wang-Thomson
5. Web Warrior Guide to Web Programming -Bai/Ekedaw-Thomas
6. Beginning Web Programming-Jon Duckett WROX

COURSE OUTCOMES:

1. Ability to learn to web application.
2. To develop a own style sheet
3. Ability to create a own java scripting web application.
4. Ability to create a own web design using of AJAX
5. Ability to create a own web design using of PHP

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II Year B.Tech. ANE- II Sem **L/T/P/C**
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OPEN ELECTIVE - I
(R20A0551) Introduction to DBMS

COURSE OBJECTIVES

1. To understand the basic concepts and the applications of database systems
2. To Master the basics of SQL and construct queries using SQL
3. To understand the relational database design principles
4. To become familiar with the basic issues of transaction processing and concurrency control
5. To become familiar with database storage structures and access techniques

UNIT I: INTRODUCTION

Database: Purpose of Database Systems,File Processing System Vs DBMS, History, Characteristic-Three schema Architecture of a database, Functional components of a DBMS.DBMS Languages-Database users and DBA.

UNIT II: DATABASE DESIGN

ER Model: Objects, Attributes and its Type. Entity set and Relationship set-Design Issues of ER model-Constraints. Keys-primary key, Super key, candidate keys. Introduction to relational model-Tabular, Representation of Various ER Schemas. ER Diagram Notations-Goals of ER Diagram- Weak Entity Set- Views.

UNIT III: STRUCTURED QUERY LANGUAGE

SQL: Overview, The Form of Basic SQL Query -UNION, INTERSECT, and EXCEPT– join operations: equi join and non equi join-Nested queries - correlated and uncorrelated-Aggregate Functions- Null values.Views, Triggers.

UNIT IV - DEPENDENCIES AND NORMAL FORMS

Importance of a good schema design,:- Problems encountered with bad schema designs, Motivation for normal forms- functional dependencies, -Armstrong's axioms for FD's-Closure of a set of FD's,- Minimal covers-Definitions of 1NF,2NF, 3NF and BCNF-Decompositions and desirable properties -

UNIT V:

Transactions: Transaction concept, transaction state, System log, Commit point, Desirable Properties of a Transaction, concurrent executions, serializability, recoverability, implementation of isolation, transaction definition in SQL, Testing for serializability**,** Serializability by Locks-Locking Systems with Several Lock Modes- Concurrency Control by Timestamps, validation.

TEXT BOOKS:

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts , McGraw- Hill, 6th Edition , 2010.
2. Fundamental of Database Systems, by Elmasri, Navathe, Somayajulu, and Gupta, Pearson Education.

REFERENCE BOOKS:

1) Raghu Ramakrishnan, Johannes Gehrke, -Database Management System , McGraw Hill., 3rd Edition 2007.
2) Elmasri&Navathe, Fundamentals of Database System, Addison-Wesley Publishing, 5th Edition, 2008.
3) Date.C.J, -An Introduction to Database , Addison-Wesley Pub Co, 8th Edition, 2006.
4) Peterrob, Carlos Coronel, -Database Systems – Design, Implementation, and Management , 9th Edition, Thomson Learning, 2009.

COURSE OUTCOMES:

1) Understand the basic concepts and the applications of database systems
2) Master the basics of SQL and construct queries using SQL
3) Understand the relational database design principles
4) Familiarize with the basic issues of transaction processing and concurrency control
5) Familiarize with database storage structures and access techniques

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II Year B.Tech. ANE- II Sem **L/T/P/C**
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OPEN ELECTIVE - I
(R20A0051) Enterprise Resource Planning

COURSE OBJECTIVES:

1) To learn the basics, role, issues and agreement on trade aspects of IPR
2) To know the Parties to IP Rights
3) To learn how to ensure the value of IP
4) To learn about how to manage IP rights
5) To learn the remedies and IPR evaluation

Unit-I

Introduction: Intellectual property rights basics, the role and value of IP in international commerce, Issues affecting IP internationally. Agreement on trade related aspects of Intellectual Property Rights. (TRIPS) - Agreement on TRIPS and India.

Unit-II

Parties to IP Rights: Owner, customer, authorized user, licensee, attorney, protection of the weak and strong, finalizing ownership and use rights.

Unit-III

Ensuring the value of IP: Ensuring the value of IP at creation stage, after creation stage, precise contractual protection of IP rights. Key issues related to IP internationally. IP rights in international forums. Fundamentals in Country legal systems, generalities. Validity of IP rights locally: specifics.

Unit-IV

Managing IP Rights: Acquiring IP Rights: letters of instruction, joint collaboration agreement, work made for hire agreement - Protecting IP Rights: non disclosure agreement, cease and desist letter, settlement memorandum. Transferring IP Rights: assignment contract, license agreement, deed of assignment or license agreement, addendum to unrecorded assignment or license.

Unit-V

Remedies and IPR Evaluation - GATT - WTO - Role of WTO in solving IPR issues.

REFERENCES:

1) A short course in International Intellectual Property Rights – Karla C. Shippey, World Trade Press – 2nd Edition.
2) Intellectual Property Rights – Heritage, Science, & Society under international treaties – A. Subbian, - Deep & Deep Publications – New Delhi.
3) Intellectual Property Rights: N K Acharya: ISBN: 9381849309
4) Intellectual Property Rights: C B Raju : ISBN-8183870341
5) Intellectual Property : Examples and Explanation – Stephen M McJohn, 2/e, ISBN-13: 978-

0735556652
6) Intellectual Property Rights in the Global Economy – Keith E Maskus, PIIE, ISBN paper 0-88132-282-2

COURSE OUTCOMES

1) Understand the basics, role, issues and agreement on trade aspects of IPR
2) Understand and identifying the Parties to IP Rights
3) Learn how to ensure the value of IP
4) Understand about how to manage IP rights
5) Learn the remedies and IPR evaluation

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II Year B.Tech. ANE- II Sem **L/T/P/C**
3/-/-/3

OPEN ELECTIVE - I
(R20A0351) Intellectual Property Rights

COURSE OBJECTIVES

1. To know the basics of ERP
2. To understand the key implementation of ERP
3. To know the business modules of ERP
4. To learn about the post implementation of ERP
5. To evaluate the current and future trends in ERP

UNIT 1

INTRODUCTION: Overview and Benefits of ERP, ERP Related Technologies- Business Process Reengineering (BPR), Online Analytical Processing (OLAP), Supply chain Management (SCM). Applications of ERP.

UNIT II

ERP IMPLEMENTATION: Implementation and Product Lifecycle, Implementation Methodology, Planning Evaluation and selection of ERP systems, Organizing the Project Management and Monitoring. Case Study on Manufacturing.

UNIT III

ERP MODULES: Business modules in an ERP Package- Manufacturing, Human Resources, Plant Maintenance, Materials Management, Data Warehousing, Data Mining, Quality Management, Sales and Distribution. Case Study in Banking Sector.

UNIT IV

POST IMPLEMENTATION: Overview of ERP software solution. Maintenance of ERP-Organizational and Industrial impact; Success and Failure factors of ERP Implementation. Case Study of Success Story and Failure of Processing Sector.

UNIT V

EMERGING TRENDS IN ERP: Extended ERP system, ERP add–ons –Customer Relations Management (CRM), Customer satisfaction (CS). Business analytics etc- Future trends in ERP systems-web enabled, Wireless technologies. Case Study in Service Sector.

TEXT BOOKS:

1. Jagan Nathan Vaman, ERP in Practice, Tata McGraw-Hill, 2008
2. Alexis Leon, “ERP Demystified”, Tata McGraw Hill, New Delhi, 2000
3. Mahadeo Jaiswal and Ganesh Vanapalli, ERP Macmillan India, 2009.

REFERENCE BOOKS:

1. Alexis Leon, Enterprise Resource Planning, second edition, Tata McGraw-Hill, 2008.
2. Vinod Kumar Grag and N.K. Venkitakrishnan, ERP- Concepts and Practice, Prentice Hall of India,2 nd edition, 2006.
3. Joseph A Brady, Ellen F Monk, Bret Wagner, “Concepts in Enterprise Resource Planning”, Thompson Course Technology, USA, 2001.

COURSE OUTCOMES:

1) Understand the basics of ERP
2) Understand the key implementation of ERP
3) Learn the business modules of ERP
4) Learn about the post implementation of ERP
5) Evaluating the current and future trends in ERP

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III Year B.Tech. ANE- I Sem **L/T/P/C**
3/-/-/3

(R20A2110) Aircraft Structures

OBJECTIVES:

The course should enable the students to:

1. Familiarize with modern aircraft structures.
2. Investigate buckling of plates
3. Obtain knowledge on Strain Energy
4. Idealize a real aircraft structure
5. Analyze various structural components like wing and fuselage

UNIT –I

THEORY OF THIN PLATES AND THIN WALLED BEAMS

Analysis of thin rectangular plates subject to bending, distributed transverse load, combined bending and twisting, Wagner beam analysis.

UNIT –II

UNSYMMETRICAL BENDING

Unsymmetrical bending-resolution of bending moments - direct stress distribution, shear flow in open section beams, shear centre, Torsion of thin walled closed section- Bredth - Batho shear flow.

UNIT-III

STRUCTURAL IDEALIZATION AND LOADING DISCONTINUITIES IN THIN WALLED BEAMS

Structural idealization of different aircraft components, shear stress distribution at a built in end of aclosed section beam.

UNIT- IV

STRESS ANALYSIS OF AIRCRAFT COMPONENTS

Wing and Fuselage - Direct stress and shear flow distribution -Wing spars, tapered wing and fuselage frames.

UNIT –V

ENERGY METHODS

Strain Energy due to axial, bending and torsional loadings. Deflection in beams- Castigliano's theorem

Text Books:

1. Aircraft structures for engineering students by T H G Megson
2. Strength of materials by Hibler.
3. Strength of materials by R.S.Khurmi.

Reference Books:

1. David J. Peery "Aircraft Structures" McGraw Hill Book Company.
2. Argyris J.H. and Kelsey S.Energy theorems and structural analysis, Butter worths Scientific Publications 1960.

COURSE OUTCOMES:

Upon the successful completion of the course, students will be able to:

1. Understand theoretical foundations, complexities, and design of modern aircraft structures.
2. Analyze Rectangular sheets under compression and Local buckling stress of thin walled sections
3. Acquire knowledge on Strain Energy in axial, bending, torsion and shear loads
4. Idealize a real aircraft structure and apply theoretical foundations to convert into an analytical form.
5. Analyze various structural components like wing and fuselage subject to different loading conditions

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III Year B.Tech. ANE- I Sem **L/T/P/C**
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(R20A2111) Air Breathing Propulsion

Objective:

1. Students can focus on various propulsion systems available in aerospace industry and also understand the future scenario.
2. Students will study the design aspects of inlet and Nozzles and their importance in performance of engine
3. To provide an exposure with compressor and turbine design features
4. Evaluate design aspects of burner
5. Understand the performance aspects at the design point and off design operations

UNIT I FUNDAMENTALS OF PROPULSION:

Aircraft Engine Components- Performance Requirements, Thermodynamic Processes- Representation by T-s and p-v diagrams - Pressure ratios, Temperature ratios. Energy transfer, losses; Polytropic andStage Efficiencies;Engine Station Numbering, Thrust generation, Equation of Thrust for installed and uninstalled cases, Factors affecting thrust, Role of propulsion in aircraft performance.

UNIT II ANATOMY OF JET ENGINE-I

INLETS: Locations, Types of inlets, operating principle, functions, geometry, operating conditions, flow field, capture area, flow distortion, drag, and diffuser losses and methods of mitigation, performance; Numericals on inlets.

NOZZLE: Function, Types, Engine Back-pressure control, Exhaust nozzle Area Ratio; Thrust Vectoring, Types; Thrust Reversal, Types of Thrust Reversal Systems; Nozzle Coefficients, Gross Thrust coefficient, Discharge Coefficient, Velocity coefficient, Angularity coefficient

UNIT III ANATOMY OF JET ENGINE-II

COMPRESSOR & TURBINE: Types, construction, stage, cascade, blade geometry, velocity triangles, Euler equation, types of flow analysis, diffusion factor, stage loading, Performance Maps, Off-design Performance, Multi-spooling; Axial flow turbines, Velocity diagram analysis, no exit swirl condition, flow losses, causes tangential stresses, repeating stages, Typical blade profiles, turbine performance maps, Blade cooling, materials, Similarities and differences with compressors;Numericals on turbo- machinery

UNIT IV ANATOMY OF JET ENGINE-III

BURNER: Essential considerations in Design of Burners; Primary Burners- types, components, schematic diagram, operation; airflow distribution, Flame stability, Ignition and Engine starting; Factors effecting Combustion Chamber Performance; Flame tube Cooling; Fuel injection, Afterburners, flame stabilization, flame holders; fuels - composition and properties

UNIT V:

DESIGN OF GAS TURBINE ENGINE: Aircraft Mission Analysis, Engine Selection- Performance and Parametric Analysis, Sizing the Engine, Major Considerations in Engine Components Design.
SYSTEM MATCHING AND ANALYSIS: Component Matching of Gas Turbine Engine, Gas Generator, Component Modelling, Equilibrium Points; Solution of Matching Problem, Dynamic and Transient Response, Matching of Engine and Aircraft.

Text Books:
1. Mattingly, J.D., Elements of Gas Turbine Propulsion, McGraw-Hill, 1996, ISBN0-07-912196-9.
2. Flack, R.D., Fundamentals of Jet Propulsion with applications, Cambridge University Press, 2005, ISBN0-521-81983-0.
3. Jack D Mattingly., William Heiser& David Pratt., Aircraft Engine Design

References:
1. V. Ganesan., Gas Turbines, Tata McGraw-Hill, 1999, ISBN, 0070681929.

Course Outcomes
1. Understand operation of different air breathing propulsion systems and their applications
2. Learn construction and design features of inlets and nozzles
3. Develop knowledge on function of compressors and turbines and their performance measurement techniques
4. Develop knowledge on function of combustors and their performance criteria
5. Identify problems of matching components of gas turbine engine and their design features

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MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III Year B.Tech. ANE- I Sem **L/T/P/C**
3/-/-/3

(R20A0561) Artificial Intelligence and Machine Learning

Course Objectives

1. Understanding artificial intelligence (AI) principles and approaches.
2. Develop a basic understanding of the building blocks of AI as presented in terms of intelligent agents
3. Implementing Search techniques, Knowledge representation, inference, logic, and learning.
4. To introduce the basic concepts and techniques of machine learning and the need for Machine learning techniques for real world problem
5. To provide understanding of various Machine learning algorithms and the way to evaluate the performance of ML algorithms

UNIT-1

AI Fundamentals: Defining Artificial Intelligence, Defining AI techniques, AI Applications.

State Space Search and Heuristic Search Techniques:

Defining problems as State Space search, Production systems and characteristics, Hill Climbing, Breadth first and depth first search, Best first search

Knowledge Representation Issues:

Representations and Mappings, Approaches to knowledge representation

UNIT-2

Using Predicate Logic and Representing Knowledge as Rules:

Representing simple facts in logic, Computable functions and predicates, Procedural vs. Declarative knowledge, Logic Programming, Forward vs. backward reasoning

Symbolic Reasoning under Uncertainty:

Non-monotonic Reasoning, Logics for non-monotonic reasoning

UNIT-3

Statistical Reasoning:

Probability and Bayes Theorem, Certainty factors, Probabilistic Graphical Models, Bayesian Networks, Markov Networks, Fuzzy Logic.

Introduction to Machine Learning:

Idea of Machines learning from data, Classification of problem – Regression and Classification, Supervised and Unsupervised learning

UNIT-4

Supervisedlearning:

Linear Regression

Model representation for single variable, Single variable Cost Function, Gradient Decent for Linear Regression, Multivariable model representation, Multivariable cost function, Gradient Decent in practice, Normal Equation and non-invertibility

Logistic Regression

Classification, Hypothesis Representation, Decision Boundary, Cost function, Advanced Optimization, Multi-classification (One vs. All), Problem of Over fitting, Regularization

Classification Problems: Support Vector Machines:

Optimization Objective, Large Margin Classifiers, Kernels, SVM practical considerations

UNIT-5

Unsupervised learning:

Unsupervised learning introduction, k-Means Algorithm, Optimization objective, Random Initialization, Choosing number of clusters

Neural Networks :

Non-linear Hypothesis, Biological Neurons, Model representation, Intuition for Neural Networks, Multiclass classification, Cost Function, Back Propagation Algorithm, Back Propagation Intuition, Weights initialization, Neural Network Training

Text Book:

1. Artificial Intelligence, Elaine Rich and Knight, McGraw-Hill Publications
2. MACHINE LEARNING An Algorithmic Perspective 2nd Edition, Stephen Marsland,2015, by Taylor & Francis Group, LLC
3. Introduction to Machine Learning ,The Wikipedia Guide

Reference Books:

1. Introduction To Artificial Intelligence & Expert Systems, Patterson, PHI
2. Multi Agent systems- a modern approach to Distributed Artificial intelligence, Weiss.G, MITPress.
3. Artificial Intelligence: A modern Approach, Russell and Norvig, Printice Hall
4. Introduction to Machine Learning, Second Edition, EthemAlpaydın, The MIT Press, Cambridge, Massachusetts, London, England.
5. Machine Learning, Tom M. Mitchell, McGraw-Hill Science, ISBN: 0070428077
6. Understanding Machine Learning: From Theory to Algorithms, c 2014 by Shai Shalev-Shwartz and Shai Ben-David Published 2014 by Cambridge University Press.

COURSE OUTCOMES

1. Apply difficult real life problems in a state space representation so as to solve those using AI techniques like searching and game playing.
2. Design and evaluate intelligent expert models for perception and prediction from intelligent environment.
3. Formulate valid solutions for problems involving uncertain inputs or outcomes by using decision making techniques.
4. Apply machine learning techniques in the design of computer systems
5. To differentiate between various categories of ML algorithms
6. Design and make modifications to existing machine learning algorithms to suit an individual application to improve classification accuracy

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III Year B.Tech. ANE- I Sem **L/T/P/C**
3/-/-/3

(R20A2113) Compressible Flow Aerodynamics

Course objectives:

1. Study the basic governing equations of compressible flows and its parameters.
2. Study the effects of Shock and Expansion waves on aerodynamic characteristics.
3. Learnabout mathematical modelling and the corresponding corrections in the equations of incompressible flows for modelling compressible flows.
4. Learn about mathematical equations to predict lift and drag of any object in supersonic and hypersonic flows.
5. Learn about the experimental methods to study about compressible flows.

Tables: Isentropic, Normal Shock, Oblique Shock, Prandtl Meyer function.

UNIT-I ONE DIMENSIONAL COMPRESSIBLE FLOWS

Review of Thermodynamics. Definition of Compressibility, Stagnation conditions, Speed of sound, Mach number, shock waves. One dimensional flow governing equations. Alternative forms of Energy equations, Normal shock relations with numerical.

UNIT-II OBLIQUE SHOCK AND EXPANSION WAVES

Oblique shock waves. Supersonic flow over a wedge Θ - β - M relations strong and weak shock solutions, regular reflection from a solid boundary. Expansion waves, Prandtl – Meyer Expansion. Shock Expansion theory.

UNIT-III SUBSONIC COMPRESSIBLE FLOW OVER AIRFOIL

Introduction - Velocity potential equation –small perturbation equation - Prandtl-Glauert compressibility corrections - Critical Mach number with numericals - Drag divergence Mach number - Area rule - Supercritical airfoil.

UNIT – IV LINEARIZED SUPERSONIC FLOWS AND HYPERSONIC FLOWS

Linearized supersonic pressure coefficient, application to airfoils, lift and drag for flat plate, comparision with shock expansion theory.

Qualitative aspects of hypersonic flows, Newtonian theory, modified Newtonian theory, lift and drag.

UNIT- V FLOW THROUGH NOZZLES AND VARIABLE AREA DUCTS

Quasi one dimensional flow, Area-velocity relation, Isentropic flow through Convergent – Divergent nozzles. Choked flow conditions. Under and Over expansion conditions. Flow through diffusers – wave reflections from a free boundary. Application to supersonic wind tunnel.

Text Books:

1. Anderson, J .D., Fundamental of Aerodynamics, Mc Graw-Hill International third edition Singapore-2001.

Reference Books:

1. Radhakrishnan, E, E., Gas Dynamics, Prentice Hall of India, 1995.
2. Anderson, J .D., Modern Compressible Flow with Historical Perspective, Mc Graw-Hill International third edition Singapore-2004.

Outcomes:

1. A fundamental understanding of the effect of compressibility at high-speeds and the ability to make intelligent design decisions based on this understanding. .
2. A fundamental understanding of shock formation, dynamics, and the ability to estimate the shock location.
3. The ability to estimate drag and lift forces on basic aerodynamic (lifting) shapes traveling at high-speed.
4. The ability to determine the full high-speed flow field on thin airfoils, wedges, and in nozzles.
5. An ability to analyze airfoils at subsonic, transonic, supersonic and hypersonic flight conditions

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III Year B.Tech. ANE- I Sem **L/T/P/C**
3/-/-/3

(R20A2131) Space Exploration Technology
(PROFESSIONAL ELECTIVE – I)

Objectives:

1. Students acquire knowledge about the present Rocket Propulsion System.
2. Students can focus on orbit mechanics and their Maneuvers.
3. Students can understand on various orbits, Re-entry path.
4. To provide the knowledge of satellite attitude dynamics.
5. To understand about the Space Mission Operations.

UNIT-I

Fundamentals of Rocket Propulsion: Space Mission-Type based on Space Environmental, vehicle selection, Rocket Propulsion-Types, Rocket Equation, Chemical Rocket Propulsion, Solid Propellant Rocket Motor, Liquid Propellant Rocket Engine.

Two-Dimensional Trajectories of Rockets and Missiles, Multi-Stage Rockets, Vehicle Sizing, Two-Stages, Multi-Stage Rockets- Trade-off Ratios- Single Stage to Orbit-Sounding Rocket-Aerospace Plane – Gravity Turn Trajectories – Impact Point Calculation – Injection conditions – Flight Dispersions.

UNIT-II

Fundamentals of Orbit Mechanics, Orbit Maneuvers: Two-Body motion, Circular, Parabolic, Elliptic and Hyperbolic Orbits, Basic Orbital Elements, Ground trace in-plane, Orbit Changes-Hohmann Transfer, Bi-elliptical Transfer, Plane Changes, Combined Maneuvers, Propulsion for Maneuvers.

UNIT-III

Atmospheric Re-entry: Introduction, Steep Ballistic, Re-entry Ballistic, Orbital Re-entry, Skip Re-entry, “Double-Dip” Re-entry, Aero-Braking, Lifting Body Re-entry.

UNIT-IV

Satellite Attitude Dynamics: Introduction, Torque free motion, Stability of Torque-free motion, Dual-Spin Spacecraft, Attitude Control Thrusters, Yo-Yo Design Mechanism, Gyroscopic Attitude Control, Gravity-gradient Stabilization.

UNIT-V

Space Mission Operations: Supporting Ground Systems, Architecture and Team interfaces, Mission Phases and Core Operations, Team Responsibilities, Mission Diversity, Standard Operations Practices.

Text Books:

1. “Spaceflight Dynamics”, W.E. Wiesel, McGraw Hill, 1997
2. “Rocket Propulsion and Space Flight Dynamics”, Cornelisse, Schoyer HFR and Wakker KF, Pitman, 1984.
3. “Orbital Mechanics for Engineering Students”, Howard D. Curtis.

Reference Books:

1. Vincet L. Pisacane, "Fundamentals of Space Systems", Oxford university Press 2005.
2. "Understanding space: An Introduction to Astronautics", J. Sellers, McGraw Hill, 2000.
3. "Introduction to Space Flight", Francis J Hale, Prentice-Hall, 1994.
4. "Spacecraft Mission Design", Charies D. Brown, AIAA education series, 1998.
5. "Elements of Space Technology for Aerospace Engineers", Meyer Rudolph X, Academic Press, 1999.

OUTCOMES:

1. Students can understand about the Rocket Propulsion accordingly their mission.
2. Students can correlate with the different orbits and mechanics available.
3. Students can understand the mechanics of Re-entry.
4. Students can easily visualise and understand the Attitude of Spacecraft Dynamics.
5. Students can obtain knowledge of space mission operations.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III Year B.Tech. ANE- I Sem **L/T/P/C**
3/-/-/3

(R20A2132) Mechanisms and Machine Design
(PROFESSIONAL ELECTIVE – I)

Objectives:

1. The subject gives in depth knowledge on general mechanisms and mechanical design of which aircraft systems are important component.
2. To understand how to draw velocity and acceleration diagrams for various mechanisms
3. To impart the effect of motion in a vehicle when it is moving in air , on water and on road
4. To design different types of cam profiles
5. To understand and design the gear for various gear trains

UNIT – I

Mechanisms: Elements of links: Classification, Types of kinematic pairs: Lower and higher pairs, closed and open pairs. Constrained motion. Kinematic chain, inversions of mechanisms: inversion of quadratic cycle. Chain – single and double slider crank chains.

UNIT – II

Kinematic Analysis and Design of Mechanisms:

Kinematic analysis: Velocity and acceleration. Motion of link in machine determination of velocity and acceleration diagrams – graphical method. Application of relative velocity method for four bar chain. Analysis of slider crank chain for displacement, velocity and acceleration of sliding- Acceleration diagram for a given mechanism, Klein's construction, Coriolis acceleration, Determination of Coriolis component of acceleration.

Instantaneous centre of rotation, centrode and axode – relative motion between two bodies – Three centres in line theorem – Graphical determination of instantaneous centre, diagrams for simple mechanisms and determination of angular velocity of points and links.

UNIT – III

Gyroscope – Processional Motion: The gyroscope – free and restrained – working principle – the free gyro, rate gyro, integrating gyro as motion measuring instruments. Effect of precession on the stability of vehicles – motorbikes, automobiles, airplanes and ships, Static and dynamic forces generated due to in precession in rotating mechanisms.

UNIT – IV

CAMS and Followers: Cams and followers – definition, uses – types – terminology. Types of follower motion – uniform velocity, simple harmonic motion and uniform acceleration. Maximum velocity and acceleration during outward and return strokes.

UNIT – V

Gears and Gear Trains: Introduction to gears – types , law of gearing. Tooth profiles – specifications, classification – helical, bevel and worm gears, simple and reverted gear train, epicyclic gear trains – velocity ratio or train value.

Belts & Ropes: Types of belts, Velocity Ratio of belt drive, Slip of belt, Creep of belt, Length of open belt drive, length of cross belt drive, Power transmitted, Angle of contact, Centrifugal tension, Condition for transmission of maximum power, V-belt drives, Rope drives, Ratio of driving tensions for rope drives.

Text Books:

1. The Theory of machines – Thomas Beven., Third Edition – Pearson Publishers.
2. Theory of machines and Mechaisms Third Edition – John J. Uicker, Jr. Gordon R. Pennock, Josph E. Shigley, Oxford Publisher.
3. Theory of Machines - J.K. Gupta and R.S. Khurmi – S Chand Publications

Reference Books:

1. Mechanism and Machine Theory – J. S Rao, R.V.D Dukkipati, New age Publishers.
2. Theory of Machines, - III rd Edition Sadhu Singh, Pearson Publishers.

Outcomes:

1. Application of principles in the formation of mechanisms and their kinematics.
2. *Able to understand the effect of friction in different machine elements.*
3. Can analyze the forces and toques acting on simple mechanical systems
4. To apply different cam profiles for different types of motion
5. To design gear trains for transmission of power.

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III Year B.Tech. ANE- I Sem **L/T/P/C**
3/-/-/3

(R20A2133) Wind Tunnel Techniques
(PROFESSIONAL ELECTIVE – I)

Objectives:

1. Identify the importance of wind tunnel and types.
2. Students learn about Low Speed wind tunnel performance and various components
3. Students gain knowledge about measurement and correction methods involved in wind tunnel
4. Gain knowledge of Measurement and their importance in Aerodynamics
5. Recognize various flow visualization techniques.

UNIT- I AERODYNAMIC EXPERIMENTS- HISTORY, MODEL TESTNG Forms of aerodynamic experiments- Model testing- wind tunnel- principles-scaling laws, scale parameters- significance. low speed wind tunnels - types, description. High speed tunnels- transonic, supersonic, hypersonic, shock tubes, special tunnels- low turbulence, high Re, environmental, automobile- function, distinctive features, application. Major wind tunnel facilities- description, details.

UNIT- II LOW SPEED WIND TUNNELS- CONSTRUCTION, COMPONENTS, PERFORMANCE Low speed wind tunnel- principal components- working section, diffuser, corners, turning vanes, fan, straighteners, honeycombs, screens, contraction cone, fan, motor- function, description, design requirements, constraints, construction, performance- loss coefficients. Wind tunnel performance- flow quality, power losses.

UNIT- III WIND TUNNEL CORRECTIONS & LOAD MEASUREMENTS Wind tunnel corrections. Sources of inaccuracies- buoyancy, solid blockage, wake blockage, streamline curvature causes, estimation, correction. Total correction on airspeed, dynamic pressure, zero lift drag. wind tunnel balances Load measurements-wind tunnel balances, types, description, application.

UNIT- IV FLOW MEASUREMENTS- INSTRUMENTATION Steady and unsteady pressure measurements and various types of pressure probes and transducers, errors in pressure measurements; measurement of temperature using thermocouples, resistance thermometers, temperature sensitive paints and liquid crystals; measurement of airspeed, flow direction, boundary layer profile using Pitot static tubes, 5 hole probes, total head rake- function, working principle, types, details of design and construction, use. Hot Wire Anemometry, Laser Doppler Anemometry, Particle Image Velocimetry- working principles, description of equipment, experimental setup, settings, calibration, measurement, data processing, applications.

UNIT- V FLOW VISUALISATION TECHNIQUES Flow visualization- need, types- tufts, china clay, oil film, smoke- working principle, description, setting up, operation, observation, recording, interpretation of imagery, relative merits, applications. High speed flows- optical methods of shadowgraph, Schlieren, interferometry.

TEXT BOOKS

1. Low Speed Wind Tunnel Testing, Barlow, J.B., Rae, W.H., Pope, A., Wiley 1999.
2. High Speed Wind Tunnel Testing, Pope, A. and Goin, K.L., Wiley, 1965.
3. Yang, W.J., Handbook of Flow Visualization, 2nd edition, Taylor and Francis, 2001.

Outcomes:

1. Able to correlate various wind based on applications.
2. Students gain knowledge of Low Speed wind tunnel.
3. Acquire knowledge of various measurement techniques involved in wind tunnel
4. Gain knowledge of various components of wind tunnel
5. Recognize various flow visualization techniques.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III Year B.Tech. ANE- I Sem **L/T/P/C**
-/-/3/1.5

(R20A0566) Artificial Intelligence and Machine Learning lab

Lab Objectives

1. Familiarity with the Prolog programming environment &Systematic introduction to Prolog programming constructs
2. Learning basic concepts of Prolog through illustrative examples and small exercises &Understanding list data structure in Prolog.
3. To introduce students to the basic concepts and techniques of Machine Learning.
4. To become familiar with regression methods, classification methods, clustering methods.
5. To become familiar with Dimensionality reduction Techniques.

Study of PROLOG; Write the following programs using PROLOG

week-1. Implementation of DFS for water jug problem using LISP/PROLOG

week-2. Implementation of BFS for tic-tac-toe problem using LISP/PROLOG/Java

week-3. Solve 8-puzzle problem using best first search

week-4. Write a program to solve 8 queens problem

week-5. Implementation of TSP using heuristic approach usingJava/LISP/Prolog

week-6. Implementation of Simulated Annealing Algorithm using LISP/PROLOG

week-7. Implementation of Hill-climbing to solve 8- PuzzleProblem

Machine Learning Laboratory

Week-1
Data Extraction, Wrangling
1. Loading different types of dataset in Python
2. Arranging the data

Week-2
Data Visualization
1. Handling missing values
2. Plotting the graphs

Week-3
Supervised Learning
1. Implementation of Linear Regression
2. Implementation of Logistic regress

Week-4
Supervised Learning
1. Implementation of Decision tree classification
2. Implementation of K-nearest Neighbor

Week-5
Supervised Learning
1. Implementation of Naïve Bayes classifier algorithm
2. Implementation of SVM Classification

Week-6
Dimensionality Reduction
1. Implementation of PCA
2. Implementation of LDA

Week-7
Unsupervised Learning
1. Implementing K-means Clustering
2. Implementing Hierarchical Clustering

Lab Outcomes

1. Apply various AI search algorithms (uninformed, informed, heuristic, constraint satisfaction,)
2. Understand the fundamentals of knowledge representation, inference and theorem proving using AI tools
3. Gain knowledge about basic concepts of Machine Learning
4. Identify machine learning techniques suitable for a given problem & Solve the problems using various machine learning techniques
5. Apply Dimensionality reduction techniques
6. Design application using machine learning techniques.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III Year B.Tech. ANE- I Sem **L/T/P/C**
-/-/3/1.5

(R20A2185) Aircraft Structures Lab

Objectives:

1. To study the properties of materials used in Aircraft structure.
2. To know the different structures involved in aircraft.
3. To know the influence of size,shape,thickness of structures on structural behavior
4. To study the failure of different component under different loading condition
5. To know the technique to avoid the structural twisting

LIST OF EXPERIMENTS:-

1. Tensile testing using universal Testing Machine - Stress - strain curves and strength tests for various engineering materials.
2. Bending tests - Stress and deflection of beams for various end conditions
3. Compression tests on long columns - Critical buckling loads
4. Compression tests on short columns - Critical buckling loads
5. Failure strength of riveted joints.
6. Failure strength of bolted joints.
7. NDT inspection methods.
8. Shear Center of open and closed sections.
9. To calculate instability of a Wagner beam
10. Deflection of a simply supported beam with varying load conditions.
11. Unsymmetrical bending of cantilever beam
12. Verification of principle of superposition

Note: Any10 Experiments should be conducted

Equipment needed

1. UTM – 20 / 40 Tons with. Jigs and Fixtures
2. Deflection test rig (Fabricated hardware + precession dial gauge)
3. NDT Equipment. a) Ultrasonic apparatus, b) Magnetic Particle test rig, c) Dye penetration test.
4. Various Hardware rigs desired in the lab for specific test.
5. Photo and magnetic speed setup
6. Vibration beam setup
7. Shear Center of open and closed section setup.

Reference Books:

1. Megson, T.M.G., Aircraft Structures for Engineering Students, Edward Arnold, 1985.
2. Bruhn. E.H, Analysis and Design of Flight Vehicles Structures, tri -state off set company, USA, 1965

Outcomes:

1. Experimental and theoretical studies of beams under different boundary conditions
2. Student will be attained knowledge about structures under different size
3. Understanding of Failure strength in joints
4. Student will be identified material defect using NDT techniques
5. Symmetric and Un-symmetric structures differentiation will be identified

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III Year B.Tech. ANE- I Sem **L/T/P/C**
2/-/-/2

(R20A0007) Constitution of india

INTRODUCTION

The Indian judiciary and particularly the Supreme Court of India has played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of India and its historic contributions has been recognized throughout the world and it gradually made it "as one of the strongest court in the world".

This course "Indian Constitution" has been designed to develop understanding of the Indian Constitution among the students.

COURSE OBJECTIVES:

6. To enrich the students' understanding of the constitution's origin and its power
7. To facilitatestudents to analyze the political principles
8. To assist the students to be aware of their fundamental rights and duties
9. To enable learning about the federal structure Parliamentary form of government
10. To be acquainted with the historical perspectives of the constitutional amendments

UNIT –I

Meaning of constitution law and constitutionalism Historical perspective of the constitution of India Salient features and characteristics of the constitution of India

UNIT –II

Scheme of fundamental rights The scheme of the fundamental duties and its legal status
The Directive Principles of State Policy-its importance and implementation

UNIT–III

Federal structure and distribution of legislative and financial powers between the Union and the States, Parliamentary Form of Government in India-the constitution powers and status of the president of India, Amendment of the Constitutional Powers and Procedure

UNIT –IV

The historical perspectives of the constitutional amendments in India., Emergency provisions: National Emergency, President Rule, Financial Emergency, Local self government-Constitutional scheme in India

UNIT –V

Scheme of fundamental Right to Equality Scheme of fundamental Right to certain Freedom under Article 19 Scope of the Right to Life and Personal Liberty under Article 21

COURSE OUTCOMES:

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

1. Improve their knowledge about Indian constitution
2. Value their identity and exercise their fundamental rights
3. Comprehend how differently government bodies function
4. Define their rights as voters of the country
5. Analyze the constitution and become responsible citizens

OPEN ELECTIVE - II

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III Year B.Tech. ANE- I Sem **L/T/P/C**
3/-/-/3

(OPEN ELECTIVE-II)
(R20A1252) Management Information Systems

COURSE OBJECTIVES:

1) To understand the importance of MIS, structure and types of MIS
2) To learn business applications of Information Systems
3) To learn about the Management of Information Systems
4) To learn how to build Information Systems
5) To know about Cyber crime

UNIT-I:

Introduction : MIS importance, definition, nature and scope of MIS, Structure and Classification of MIS, Information and Systems Concept, Types of Information, Information systems for competitive advantage.

Case Study: MIS at any business establishment.

UNIT-II:

Business Applications of Information Systems: E-Commerce, ERP Systems, DSS, Business Intelligence and Knowledge Management System.

Case Study: Knowledge Management Systems at an Enterprise.

UNIT-III:

Management of IS: Information system planning, system acquisition, systems implementation, evaluation & maintenance of IS, IS Security and Control.

Effectiveness of MIS: A Case Study.

UNIT-IV:

Building of Information Systems: System Development Stages, System Development Approaches. Systems Analysis and Design-Requirement Determination, Strategies for Requirement Determination. Structured Analysis Tools, System Design – Design Objectives, Conceptual Design, and Design Methods. Detailed system design.

UNIT-V:

Introduction to Cyber Crime: Cyber Crime Definition and orgin of the word, cyber crime and information security, cyber criminals. Classification of cyber criminals-Legal Perspectives-Indian Perspectives-Cyber crimes and ndian ITA 2000, Global perspective on cybercrime-Cybercrime era.(Refer : Nina Godbole et al)

TEXT BOOK

D P Goyal, Management Information Systems–Managerial Perspective, MacMillan, 3rd Edition, 2010.

REFERENCE:

1. Nina Godbole & Sunit Belapure " Cyber Security" Wiley india 2012.
2. Jawadekar, MIS Text and Cases, TMH, 2012.
3. Dr Milind M Oka "Cases in Management Information system 'Everest, 2012.
4. A K Gupta, Sharma "Management of Systems" Macmillan, 2012.
5. Sandra Senf "Information Technology Control and Audit" 3e, CRC Press, 2012.

6. Apache OFBiz for Ecommerce and ERP – https://ofbiz.apache.org/
7. Magneto for Ecommerce (B2B Commerce) – https://magento.com/
8. Adempiere – ERP : http://www.adempiere.net/web/guest/welcome
9. Analytica – DSS – http://www.lumina.com
10. OpenRules – Business Rules and Decision Management system – http://openrules.com/

COURSE OUTCOMES:

1) Understand the importance of MIS, structure and types of MIS
2) Understand business applications of Information Systems
3) Learning about the Management of Information Systems
4) Learning about how to build Information Systems
5) Knowing about Cyber crime

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III Year B. Tech, ANE-I Sem **L/T/P/C**
3/-/-/3

OPEN ELECTIVE – II
(R20A0552) JAVA PROGRAMMING

COURSE OBJECTIVES:

This subject aims to introduce students to the Java programming language. Upon successful completion of this subject, students should be able

1) To create Java programs that leverage the object-oriented features of the Java language, such as encapsulation, inheritance and polymorphism;
2) Use data types, arrays and strings;
3) Implement error-handling techniques using exception handling,
4) To know about Applets and Event Handling
5) Create and event-driven GUI using AWT components

UNIT I

OOP Concepts: Data abstraction, encapsulation, inheritance, Polymorphism, classes and objects, Procedural and object oriented programming paradigms.
Java Basics History of Java, Java buzzwords, data types, variables, constants, scope and life time of variables, operators, expressions, control statements, type conversion and casting, simple java programs, concepts of classes, objects, arrays, strings, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion, BufferedReader class, Scanner class, StringTokenizer class, inner class.

UNIT II

Inheritance – Types of Inheritance, super keyword, and preventing inheritance: final classes and methods.
Polymorphism – Dynamic binding, method overriding, abstract classes and methods. Interfaces- Interfaces Vs Abstract classes, defining an interface, implement interfaces, extending interface.
Packages- Defining, creating and accessing a package, importing packages.

UNIT III

Exception handling - Concepts of exception handling, benefits of exception handling, exception hierarchy, and usage of try, catch, throw, throws and finally, checked exceptions and unchecked exceptions, built in exceptions.
Multi threading: Differences between multi threading and multitasking, thread life cycle, creating threads, synchronizing threads, inter thread communication.

UNIT IV

Applets – Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets.
Event Handling: Events, Handling mouse and keyboard events, Adapter classes. Files- Streams- Byte streams, Character streams, Text input/output.

UNIT V

GUI Programming with Java – AWT class hierarchy, component, container, panel, window, frame, graphics. AWT controls - Labels, button, text field, check box, and graphics. Layout Manager – Layout manager types: border, grid and flow. Swing – Introduction, limitations of AWT, Swing vs AWT.

TEXT BOOKS:

1. Java- the complete reference, 7th editon, Herbert schildt,TMH.
2. Understanding OOP with Java, updated edition, T. Budd, pearsoneduction.
3. Core Java an integrated approach, dreamtech publication, Dr. R.NageswaraRao.

REFERENCE BOOKS:

1. Java for Programmers, P.J.Deitel and H.M.Deitel, PEA (or) Java: How to Program , P.J.Deitel and H.M.Deitel,PHI
2. Object Oriented Programming through Java, P. Radha Krishna, UniversitiesPress.

COURSE OUTCOMES:

1) An understanding of the principles and practice of object oriented programming and design in the construction of robust, maintainable programs which satisfy their requirements;
2) A competence to design, write, compile, test and execute straightforward programs using a high level language;
3) An awareness of the need for a professional approach to design and the importance of good documentation to the finished programs.
4) Be able to make use of members of classes found in the Java API.
5) Demonstrate the ability to employ various types of constructs and a hierarchy of Java classes to provide solution to a given set of requirements.

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OPEN ELECTIVE – II
(R20A1253) SOFTWARE PROJECT MANAGEMENT

COURSE OBJECTIVES:

The Main goal of software development projects is to create a software system with a predetermined functionality and quality in a given time frame and with given costs. For achieving this goal, models are required for determining target values and for continuously controlling these values. This course focuses on principles, techniques, methods & tools for model-based management of software projects, assurance of product quality and process adherence (quality assurance), as well as experience - based creation & improvement of models (process management). The Objectives of the course can be characterized as follows:

1) To understand the specific roles within a software organization as related to project and process management
2) To understand the basic infrastructure competences (e.g., process modeling and measurement)
3) To understand the basic steps of project planning, project management, quality assurance, and process management and their relationships
4) To understand the Flow Process and Check points of the process.
5) To understand Project Organizations and Responsibilities

UNIT-I

Conventional Software Management: The waterfall Model, Conventional Software Management Performance, evolution of Software Economics: software Economics. Pragmatic Software Cost Estimation. Improving Software Economics: Reducing Software Product Size, Improving Software Processes, Improving Team Effectiveness, Improving Automation, Achieving Required Quality, Peer Inspections.

UNIT-II

Conventional And Modern Software Management: Principles of Conventional Software Engineering, Principles of Modern Software Management, Transitioning to an interactive Process, Life Cycle Phases: Engineering and Production Stages Inception, Elaboration, Construction, Transition phases .

UNIT-III

Artifacts of the Process: The Artifact Sets. Management Artifacts, Engineering Artifacts, Programmatic Artifacts. Model Based Software Architectures: A Management Perspective and Technical Perspective.

UNIT-IV

Flows of the Process: Software Process Workflows, Iteration workflows. Checkpoints of the

Process: Major Mile Stones, Minor Milestones, Periodic Status Assessments. Interactive Process Planning: Work Breakdown Structures, Planning Guidelines, Cocomo Cost Estimation model.

UNIT-V

Project Organizations and Responsibilities: Line-of-Business Organizations, Project Organizations, and Evolution of Organizations. Process Automation Building Blocks, the Project Environment. Project Control and Process Instrumentation: Seven Core Metrics, Management Indicators, Quality Indicators, Life Cycle Expectations Pragmatic Software Metrics Automation.

TEXT BOOKS:

1. Walker Royce, -Software Project Management , 1998,PEA.
2. Henry, -Software Project Management , Pearson.

REFERENCE BOOKS:

1. Richard H.Thayer. Software Engineering Project Management , 1997, IEEE Computer Society.
2. Shere K.D.: -Software Engineering and Management , 1998,PHI.
3. S.A. Kelkar, -Software Project Management: A Concise Study ,PHI.
4. Hughes Cotterell, -Software Project Management , 2e, TMH. 88 5. Kaeron Conway, Software Project Management from Concept toD

COURSE OUTCOMES:

At the end of the course, the student shall be able to:

1) Understanding the specific roles within a software organization as related to project and process management
2) Understanding the basic infrastructure competences (e.g., process modeling and measurement)
3) Understanding the basic steps of project planning, project management, quality assurance, and process management and their relationships
4) Understanding the Flow Process and Check points of the process.
5) Understanding the Project Organizations and Responsibilities

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OPEN ELECTIVE – II
(R20A0452) INTERNET OF THINGS AND ITS APPLICATIONS

COURSE OBJECTIVES:

1) To study IoT Networking Core
2) To study IoT related network fundamentals
3) To study IoT Architecture.
4) To study IoT Application Development procedure
5) To study various case studies and IoT applications.

UNIT I

The IoT Networking Core:

Technologies involved in IoT Development: Internet/Web and Networking Basics OSI Model, Data transfer referred with OSI Model, IP Addressing, Point to Point Data transfer, Point to Multi Point Data transfer & Network Topologies, Sub-netting, Network Topologies referred with Web, Introduction to Web Servers, Introduction to Cloud Computing IoT Platform overview of IoT supported Hardware platforms such as: Raspberry pi, ARM Cortex Processors, Arduino and Intel Galileo boards.

UNIT II

Network Fundamentals*:* Overview and working principle of Wired Networking equipment's – Router, Switches, Overview and working principle of Wireless Networking equipment's– Access Points, Hubs etc. Linux Network configuration Concepts: Networking configurations in Linux Accessing Hardware &Device Files interactions.

UNIT III

IoT Architecture: History of IoT, M2M–Machine to Machine, Web of Things, IoT protocols Applications: Remote Monitoring & Sensing, Remote Controlling, and Performance Analysis. The Architecture Layering concepts, IoT Communication Pattern, IoT protocol Architecture, The 6LoW PAN Security aspects in IoT

UNIT IV

IoT Application Development: Application Protocols MQTT, REST/HTTP, CoAP, MySQL. Back-end Application Designing Apache for handling HTTP Requests, PHP & My SQL for data processing, Mongo DB Object type Database, HTML, CSS & jQuery for UI Designing, JS ON lib for data processing, Security & Privacy during development, Application Development for mobile Platforms: Overview of Android/IOS App Development tools

UNIT V

Case Study & IoT Applications: IoT applications in home, infrastructures, buildings, security, Industries, Home appliances, other IoT electronic equipment's. Use of Big Data and Visualization in IoT,Industry 4.0 concepts. Sensors and sensor Node and interfacing using any Embedded target boards (Raspberry Pi/ Intel Galileo/ARM Cortex/ Arduino)

TEXT BOOKS:

1. 6LoWPAN:TheWirelessEmbeddedInternet,ZachShelby,CarstenBormann,Wiley
2. Internet of Things: Converging Technologies for Smart Environments and Integrated Eco systems, Dr.Ovidiu Vermesan, Dr.Peter Friess, RiverPublishers
3. Interconnecting Smart Objects with IP: The Next Internet, Jean-Philippe Vasseur, Adam Dunkels, Morgan Kuffmann

REFERENCES:

1. The Internet of Things: From RFID to the Next-Generation Pervasive Networked Lu Yan, Yan Zhang, Laurence T.Yang, Huansheng Ning
2. Internet of Things (A Hands-on-Approach), Vijay Madisetti, Arshdeep Bahga
3. Designing the Internet of Things, Adrian McEwen (Author),Hakim Cassimally
4. Asoke K Talukder and Roopa R Yavagal, "MobileComputing,"Tata Mc Graw Hill,2010.
5. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014
6. Computer Networks; By: Tanenbaum, AndrewS; Pearson Education Pte.Ltd., Delhi, 4thEdition
7. Data and Computer Communications; By: Stallings, William; Pearson Education Pte.Ltd., Delhi, 6thEdition

COURSEOUTCOMES:

At the end of the course, the student will be able to

1) Understand IoT Networking Core
2) Understand IoT related network fundamentals
3) Understand IoT Architecture.
4) Understand IoT Application Development procedure
5) Understand various case studies and IoT applications.

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OPEN ELECTIVE – II
(R20A0553) OPERATING SYSTEMS

COURSE OBJECTIVES:

1) To understand the basic concepts and functions of operating systems.
2) To understand Processes and Threads
3) To understand the concept of Deadlocks.
4) To analyze various memory management schemes.
5) To understand I/O management and File system

UNIT-I

Introduction: Concept of Operating Systems, OS Services, Structure of an Operating Systems **Processes:** Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching

Thread: Definition, Various states, Benefits of threads, Types of threads, Concept of Multithreads.

UNIT-II

Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and Non pre-emptive, FCFS, SJF, RR

Inter-process Communication: Critical Section, Race Conditions, Mutual Exclusion. Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem, The Producer/Consumer Problem, Semaphores, Monitors.

UNIT-III

Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation – Fixed and variable partition–Internal and External fragmentation; **Paging**: Principle of operation – Page allocation – Hardware support for paging, protection and sharing, Disadvantages of paging.

Virtual Memory: Basics of Virtual Memory, Page fault , Demand paging; **Page Replacement algorithms:** Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU).

UNIT-IV

File Management: Concept of File, Access methods, File types, File operation, File System structure, Allocation methods (contiguous, linked, indexed), Directory structure, directory implementation (linear list, hash table), efficiency and performance.

UNIT-V

Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.

Disk Management: Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks.

TEXT BOOKS:

1. Operating System Concepts Essentials, 9th Edition by AviSilberschatz, Peter Galvin,Greg Gagne, Wiley Asia Student Edition.
2. Operating Systems: Internals and Design Principles, 5th Edition, William Stallings,Prentice Hall of India.

REFERENCE BOOKS:

1. Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin Publishing
2. Operating Systems: A Modern Perspective, 2nd Edition by Gary J. Nutt, Addison-Wesley
3. Design of the Unix Operating Systems, 8th Edition by Maurice Bach, Prentice- Hall of India
4. Understanding the Linux Kernel, 3rd Edition, Daniel P. Bovet, Marco Cesati, O'Reillyand Associates

COURSE OUTCOMES:

At the end of the course the students are able to:

1) Create processes and threads.
2) Implement algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time.
3) Develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time.
4) Design and implement file management system.
5) Analyze various disk scheduling schemes

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(R20A2114) Aircraft Stability and Control

Objectives:

1. To understand the concepts of stability and control of aircraft.
2. To familiarize with various Aircraft motions and related stability
3. Analyze the different type of modes in longitudinal, lateral and directional motion of aircraft, and recovery from those modes.
4. Understand Method of mathematical modeling of physical systems
5. Review Performance analysis and design of aircraft control system

UNIT –I: Stability, Control Requirements &Static Longitudinal Stability and Control: Degree of freedom of a system -Static and dynamic stability -Purpose of controls -Inherently and marginally stable airplanes. **Stick Fixed**-Basic equilibrium equation-stability criterion-contribution of wing, tail, fuselage-the most aft center of gravity, Power effects-elevator power, stick fixed neutral point-**stick free stability**-Hinge moment coefficient-stick free neutral points-maneuvers-stick force gradients-stick force per'g'-Aerodynamic balancing.

UNIT –II: **Aircraft Equations of motion- Perturbed Motion- Linearized, Decoupled Equations**: Aircraft Equations of Motion (EOM), Aircraft Position and Orientation, Stability-Frame andBody-Frame, Euler's Equations, Small Disturbance Theory and Linearization of EOM, Decouplinginto longitudinal and lateral-directional motions- conditions for validity- role of symmetry.

UNIT –III: **Lateral ,Directional & Dynamic Stability-Response To Control**: Lateral and directional stability-definition, static directional stability rudder fixed , directional control, stick – free directional stability, dihedral effect and lateral control, estimation of airplane dihedral effect, lateral control introduction ,estimation of lateral control power, Adverse yaw , aileron control forces.

Solutions to the stability quartic of the linearized equations of motion, the principal mode-phugoid, short period, Dutch roll and spiral modes-further approximations, restricted degrees of motion-solutions, response to controls, auto rotation and spin.

UNIT –IV: **Control System Modeling and Feedback Control**

Basic components of control system, open loop system, closed loop system, Types. Reduction of block diagrams - rules and conventions. Stability analysis- Routh Hurwitz, Bode Plot, Polar plot, - determination of gain margin and phase margin.

UNIT-V: Design of Aircraft Controller, Stability and Control Augmentation & Auto Pilots

Design of Stability Augmentation System (SAS) using displacement & rate feed-back, Control augmentation system, Full authority fly-by-wire control, need for automatic control. Auto pilots- purpose, functioning, displacement auto pilot, pitch, yaw, bank, altitude and velocity hold auto pilot.

Text Books:

1. Yechout, T. R. et al., Introduction to Aircraft Flight Mechanics, AIAA education Series, 2003, ISBN 1-56347-577-4.
2. Airplane performance stability and control by Courtland D.Perkins ,Robert E.Hage John wiley& sons.

Reference Books:

1. Etkin, B. and Reid, L. D., Dynamics of Flight, 3rd Edition. John Wiley, 1998, ISBN 0-47103418-5.
2. Schmidt, L. V., Introduction to Aircraft Flight Dynamics, AIAA Education Series, 1998, ISBN A-56347-226-0.
3. McCormick, B. W., Aerodynamics, Aeronautics and Flight Mechanics, 2nd Edition., Wiley India, 1995, ISBN 978-]
4. Nelson, R. C., Flight Stability and Automatic Control, 2nd Edition., Tata Mc Graw Hill, 2007, ISBN 0-07-066110-3.

Outcomes:

1. An understanding of the static stability of aircraft and describe stick fixed and stick free neutral point
2. Can able to linearize equations of motion
3. Able to understand the dihedral effect and adverse yaw and understands about the longitudinal modes and lateral –directional modes
4. The student should be able to model and analyze control system components.
5. Identify different methods to analyze the plot the stability and margins

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(R20A2115) Aircraft Composite Materials

Objectives:

1. To study the types of mechanical behavior of materials for aircraft applications.
2. To make the student understand the analysis of composite laminates under different loading
3. Conditions and different environmental conditions.
4. To impart the knowledge in usage of composite materials in aircraft component design.
5. To impart the knowledge and design concepts of Hybrid Composites for the Selection criteria for Aerospace Materials
6. Able to know Application and Testing of composite material for aircraft components

UNIT-I MECHANICAL BEHAVIOUR OF ENGINEERING MATERIALS

Linear and non linear elastic properties – Yielding, strain hardening, fracture, Bauschinger's effect – Notch effect testing and flaw detection of materials and components – creep and fatigue – Comparative study of metals, ceramics, plastics and composites.

UNIT-II HEAT TREATMENT OF METALS AND ALLOYS

Light Metal Alloys: Aluminum and its alloys, high strength and high corrosion alloys. Titanium and its alloys: applications, Classification of steels alloys, effect of alloying elements, magnesium alloys and their properties, maraging steels: properties and applications.

High Strength and Heat Resistant Alloys: Classification of heat resistant materials, iron, nickel and cobalt based alloys, refractory materials, silica based ceramics, properties of inconel, monel, nimonic and super alloys; application of heat resistant alloy in aerospace vehicles. Heat treatment of steel and its alloys. Case hardening, initial residual stresses and stress alleviation procedures, corrosion prevention and protective treatments.

UNIT-III INTRODUCTION TO COMPOSITE MATERIALS

Introduction, polymer matrix composites, metal matrix composites, ceramic matrix composites, carbon-carbon composites, fiber, reinforced composites and nature-made composites and applications.

Reinforcements: Fibers Glass, Silica, Kevlar, carbon, boron, silicon carbide, and born carbide, fibres. Particulate composites, Polymer composites, Thermoplastics, Thermosetting

UNIT-IV Hybrid Composites

Basic design concepts of sandwich construction - Materials used for sandwich construction. Failure modes of sandwich panels. Basic design of composite structure, Smart materials, Functionally Graded Materials (FGM)

Selection criteria for Aerospace Materials: Properties of flight vehicle materials, importance of strength/ weight ratio of materials for aerospace vehicles structures, importance of

temperature variations, factors affecting the selection of material for different parts of airplanes.

UNIT-V Application and Testing

Classification of Aircraft Materials used for Aircraft Components-Application of Composite Materials-Super Alloys (Ni & Mg Alloys), Indigenes Alloys (Ti6AL4V, Si-Al-Cu). Emerging Trends in Aerospace Materials (Shape memory alloys). Latest techniques in testing and Flaw Detection of Material and Components by mechanical and NDT checks.

Text Books

1. G. F. Titterton, Aircraft Materials and Processes, 5/e, Sterling Book House,1998.
2. D. Agarwal, L.J. Broutman and K. Chandrasekhara, Analysis and Performance of Fibre Composites, Wiley, 3rd edition, 2015
3. Vijay K.Varadan, K.J.Vinoy, S.Gopalakrishnan, Smart Material Systems and MEMS: Design and Development Methodologies,Wiley

References

1. Martin, J.W., "Engineering Materials, Their properties and Applications", Wykedham Publications (London) Ltd., 1987.
2. G. E. Dieter, Mechanical Metallurgy, 1/e, McGraw Hill, 1976.
3. Nonlinear Approaches in Engineering Applications

Outcomes:

1. Understanding the mechanical properties of the materials.
2. Understanding heat treatment processes
3. Exposure to high temperature materials for space applications
4. Understanding the mechanics of composite materials
5. Knowledge gained in manufacture of composites

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(R20A2116) Finite Element Analysis

Objectives:

1. To provide the fundamental concepts of the theory of the finite element method.
2. It covers the theoretical approach beginning with a review of differential equations, boundary conditions, integral forms, interpolation, parametric geometry, numerical integration, and matrix algebra.
3. Engineering applications to field analysis, stress analysis and vibrations are introduced.
4. Time dependent problems are also treated.
5. Students are also introduced, by means of selected tutorials, to the commercial finite element system Solid Works which is similar to one they could be expected to use upon graduation. Graduate students will also be introduced to the more powerful (and difficult to use) Ansys system.

UNIT – I

Introduction to Finite Element Method for solving field problems. Stress and Equilibrium. Strain – Displacement relations. Stress – strain relations. One Dimensional problems: Finite element modeling coordinates and shape functions. Potential Energy approach: Assembly of Global stiffness matrix and load vector. Finite element equations, Treatment of boundary conditions, Quadratic shape functions.

UNIT – II

Analysis of Beams: Element stiffness matrix for two node, two degrees of freedom per node beam element.

Analysis of Trusses: Stiffness matrix for plain truss elements, stress calculations and problems.

UNIT – III

Finite element modelling of two dimensional stress analysis with constant strain triangles and treatment of boundary conditions. Finite element modelling of Axisymmetric solids subjected to Axisymmetric loading with triangular elements. Two dimensional four noded isoparametric elements and numerical integration.

UNIT – IV

Steady state heat transfer analysis: one dimensional analysis of a fin and two dimensional analysis of thin plate.

UNIT-V

Dynamic Analysis: Formulation of finite element model, element matrices, evaluation of Eigen values and Eigen vectors for a stepped bar and a beam.

Text Books:

1. Introduction to Finite Elements in Engineering / Chandraputla, Ashok and Belegundu /Prentice – Hall.
2. The Finite Element Methods in Engineering / SS Rao / Pergamon.
3. The Finite Element Method for Engineers – Kenneth H. Huebner, Donald L. Dewhirst, Douglas E. Smith and Ted G. Byrom / John Wiley & sons (ASIA) Pte Ltd.

Reference Books:

1. An introduction to Finite Element Method / JN Reddy / Me Graw Hill
2. Finite Element Methods/ Alavala/TMH
3. Finite Element Analysis/ C.S.Krishna Murthy

Outcomes:

Upon completion of the course students should be able to:

1. Correlate a differential equation and its equivalent integral form.
2. Understand parametric interpolation and parametric geometry enforces essential boundary conditions to a matrix system.
3. Capable of doing thermal analysis.
4. Capable of doing vibrational analysis
5. Capable of doing structural analysis on two and three Dimensional components.

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(R20A2134) Flight Scheduling Operations
(PROFESSIONAL ELECTIVE – II)

Objectives:

1. Discuss airline network flows for minimum and maximum cost flow problem
2. Understand the importance fleet assignment and crew and manpower scheduling
3. Understand mathematical formulation-decision variables, objective function, constraints and methods of solution for airline scheduling
4. Demonstrate assignment and aircraft boarding strategy.
5. Understand the common strategies for aircraft boarding.

UNIT I

AIRLINE NETWORK AND AIRCRAFT ROUTING

Complexity of airline planning, operations and dispatch- need for optimization- Networks-definitions, network flow models shortest path problem, minimum cost flow problem maximum flow problem, multi-commodity problem. Integer programming models- set covering/ partitioning problems, traveling salesman problem- mathematical formulation-decision variables, objective function, constraints. Goal of aircraft routing- maintenance requirements, other constraints Routing cycles, route generators Mathematical models of routing- decision variables, objective functions, alternatives, constraints- flight coverage and aircraft available Example problems and solutions

UNIT II

FLIGHT AND FLEET SCHEDULING

Significance of flight scheduling. The route system of the airlines- point-to-point flights, hub and spoke flights Schedule construction- operational feasibility, economic viability Route development and flight scheduling process- load factor and frequency Case study. Purpose of fleet assignment. Fleet types, fleet diversity, fleet availability- performance measures Formulation of the fleet assignment problem- decision variables, objective function, constraints, solution Scenario analysis, fleet assignment models.

UNIT III

CREW AND MANPOWER SCHEDULING

Crew scheduling process- significance Development of crew pairing- pairing generators-mathematical formulation of crew pairing problem- methods of solution. Crew rostering-rostering practices .The crew rostering problem-formulation, solutions. Man power scheduling-modeling, formulation of the problem, solutions.

UNIT IV

GATE ASSIGNMENT AND AIRCRAFT BOARDING STRATEGY

Gate assignment- significance- the problem- levels of handling-passenger flow, distance matrix-mathematical formulation, solution Common strategies for aircraft boarding process, mathematical model, interferences, model description, aisle interferences.

UNIT V

AIRLINE IRREGULAR OPERATION, DISRUPTION OF SCHEDULE AND RECOVERY COMUTATIONAL COMPLEXITY-CASE STUDIES

The problem statement, the time band approximation model formulation of the problem the scenarios- solution.Complexity theory, heuristic procedures Case studies of airline operation and scheduling study through simulation modeling- use of available software.

Text Books:

1. Bazargan,M.,'Airline Operations and Scheduling'2nd edn., Ashgate Publishing ltd, 2010

Outcomes:

1. Calculate the shortest path flow for minimum cost flow problem.
2. Discuss fleet assignment pairing for different airlines and crew and manpower scheduling.
3. Apply the formulation of crew pairing problem, crew rostering, and crew generators.
4. Analyze the gate assignment for different terminal gates and aircraft boarding strategy
5. Analyze the role of solution for constructing flight scheduling and operations

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(R20A2135) Air Transportation systems
(PROFESSIONAL ELECTIVE – II)

Objectives:

1. The subject will introduce the air transportation systems in detail.
2. To study the basic governing bodies of ATS, its laws and regulations
3. To understand the Airspace sectors, setting up Airport, Airlines and economic considerations involved in it
4. To impart the knowledge of Fleet Planning And Route Evaluation
5. The student can able to assess the factors effecting the environment and strategies to control.

UNIT-I

AVIATION INDUSTRY & ITS REGULATORY AUTHORITIES: Introduction, history of aviation-evolution, development, growth, challenges. Air transportation industry-economic impact-types and causes. The breadth of regulation- ICAO, IATA, national authorities (DGCA, FAA). Safety regulations-risk assessment-human factors and safety, security regulations, environmental regulations.

UNIT II

AIRPORT OPERATIONS MANAGEMENT: Airspace and air traffic management, Airport operations management under FAR Part 139, Airport terminals and ground access, Airport security and Administration -Security at commercial service airports-Security at general aviation airports.

UNIT- III

AIRLINES: Setting up an airline-modern airline objectives. Structure of Airline Industry (Domestic & International) Route selection and development, annual utilization and aircraft size, seating arrangements. Aircraft- buy or lease. Revenue generation and yield management. Airline scheduling, Factors in Fleet Planning-Hub-and-Spoke System.

UNIT-V

FLEET PLANNING AND ROUTE EVALUATION: Factors in Fleet Planning-Hub-and-Spoke System-Technical Aspects-Fleet Rationalization-Fleet Commonality-Long Range Aircraft-Noise Restrictions-Factors in Design and Development-Fleet Planning Process; Route Evaluation in Hub Networks-Route profitability estimation issues-Demand Driven Dispatch.

UNIT-V

ENVIRONMENTAL CONTROL

Noise, Characteristics, Evaluation of Noise in the Vicinity of Airports, Aircraft Noise Measurement, Short Term Measurement, Long-term Noise Monitoring, Prediction of Air Transport Noise, Airport Noise Mitigation and Noise Abatement Procedures , Control of Gaseous Emissions, Bird Control, Bird Strike Statistics.

Text Books:

1. Hirst, M., The Air Transport System,Wood head Publishing Ltd,Cambridge, England, 2008.
2. Antonin Kazda, Robert E Caves , Airport design and operation, Second edition, Elseiver, 2007.

Reference Books:

1. Wensven, J.G.,AirTransportion:A Management Perspective, Ashgate, 2007.
2. Belobaba,P.,Odoni,A.andBarnhart,C.,Global Airline Industry, Wiley,2009.
3. M.Bazargan,M., Airline operations and Scheduling Ashgate, 2004.
4. Wells, A. and young, S.,Airport Planning and Management, fifth edn., McGraw-Hill, 1986.

Outcomes:

1. The students understand the aviation laws and regulations.
2. The operational structure of the Airport, its establishing, working strategies in detail
3. The student can get an broad overview and functioning of the airline industry. It focuses on the underlying marketing, financial, operational and competitive factors that influence airline viability.
4. The student can investigate how the sensitivity of fleeting and routes affects airline profitability and analyze the principles of airline economics, costs and pricing.
5. The student can assess the factors effecting the environment and strategies to control.

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(R20A2136) Airframe Structural Design
(PROFESSIONAL ELECTIVE – II)

Objectives:

1. To know about detailed structural components present in aircraft
2. To acquire the knowledge about the design parameters how why and where they will be used in manufacturing
3. To gain the knowledge of different joints and fastener design in airplane
4. Students can acquire the knowledge about the loading conditions done on the structure
5. To know about different failure modes and failure measures in aircraft structure

UNIT I INTRODUCTION

Principal structural components of aircraft. Design requirements- structural integrity, stiffness, service life. Baseline aerodynamic configuration, Air loads, external loading, weight, operating conditions, conformity to government regulations.

Unit II FASTENERS AND STRUCTURAL JOINTS

Fasteners and fittings- role, significance, general design considerations, Fastener systems, types, fastener information, dimensions, materials, allowable strength- tensile, shear, bending. Rivets, bolts and screws, nuts-detail design consideration. Joints – splices, eccentric, gusset, welded, brazed, bonded- types, methods of joining.

UNIT III DESIGN OF WING AND TAIL STRUCTURES

The wing- role- summary of wing loads, structural components- wing box, leading and trailing edges. Wing layout- location of spars, ailerons and flaps, rib spacing and direction, root rib bulkhead, span wise stiffeners, wing covers- skin-stringer panels, integrally stiffened panels, access holes, attachment of leading edge and trailing edge panels Spars- general rules of spar design. Ribs and bulkheads- rib spacing and arrangement .Wing root joints, carry through structure. Leading and trailing edge assembly- control surfaces, flaps- structure. Tail unit- horizontal, vertical tail, elevator, rudder- configuration.

UNIT IV DESIGN OF FUSELAGE AND LANDING GEAR

Function of fuselage- loading, general requirements. Principal structural components –skin and stringers, frame and floor beam, pressure bulkheads, wing & fuselage intersection- layout. Landing gear- purpose, types, general arrangement, loads- design considerations- ground handling, take-off, landing, braking, pavement loading, support structure. stowage and retraction, gear lock- kinematic design Shock absorbers- function, types, Wheels and brakes.

UNIT V FATIGUE LIFE , FAIL SAFE- SAFE LIFE DESIGN

Catastrophic effects of fatigue failure- examples- modes of failure- design criteria- fatigue stress, fatigue performance, fatigue life. Fatigue design philosophy- fail-safe, safe life, Aircraft materials.

Text Books:

1. NIU.M.C. Airframe Structural Design, second edition, Hongkong Conmlit Press, 1988, ISBN: 962- 7128-09-0
2. NIU.M.C. Airframe Stress Analysis And Sizing, second edition, Hongkong Conmlit Press, 1987, ISBN: 962-7128-08-2

Out comes:

1. The student will be able to describe overall flight loads acting an aircraft with safe life and fail safe conditions.
2. Different types of fasteners and joints on aeronautical field.
3. Define complete knowledge about wing and tail section functions and design criteria.
4. Students will be attained complete knowledge about fuselage and landing gear functions and structural components
5. Students will be acquainted knowledge about aircraft materials and different failure theories.

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(R20A2186) Aircraft Computational Structures Lab

Objectives:

1. To obtain an understanding of the fundamental theory of the FEA method;
2. To understand the use of the basic finite elements for structural applications using truss, beam, frame, and plane elements;
3. To gain knowledge about element and mesh selection for a particular structural problem
4. To know the different material influence and their limitation when a particular structure is loading
5. To understand the application and use of the FE method for Aerospace problems.

LIST OF EXPERIMENTS:-

1. Introduction to computational structural analysis in ANSYS
2. Computational Analysis of Truss Structure.
3. Static Analysis of Cantilever Beam.
4. Modal Analysis of Cantilever Beam
5. Computational analysis of spar beam
6. Computational Analysis of Rectangular Stiffened Panel.
7. Stress analysis of Thick and thin Walled Closed Section Panel.
8. Computational Analysis of Tapered Wing Structure.
9. Computational Analysis of Fuselage Structure
10. Computational Analysis of Landing Gear.
11. Computational analysis of beam using metal and ceramic based composite
12. Computational analysis of fiber reinforced composite plate.

Note: Total 10 experiments are to be conducted.

Equipment Needed:

1. **Computers**: Core 2 duo processor with 1 GB RAM
1. **Softwares:** Ansys or NASTRAN or equivalent

Reference Books:

1. Aircraft STRUCTURES for Engineering Students 4th Edition by THG MEGHSON
2. Finite Element Simulations with ANSYS by Huei-Huang Lee

Outcomes:

1. The ability to create models for trusses, frames, plate structures, machine parts, and components using ANSYS general-purpose software;
2. Students gains knowledge about plate under compression
3. To develop a basic understanding of the limitations of the FE method and understand the possible error sources in its use.
4. Major aircraft components analysis design and element selection will be attained
5. Influence of different material on structures

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-/-/3/1.5

(R20A2187) Aircraft Materials and Metrology Lab

AIRCRAFT MATERIALS LAB

1 SPECIMEN PREPARATION FOR METALLOGRAPHIC EXAMINATION AND STUDY OF METALLURGICAL MICROSCOPE
2 STUDY OF MICROSTRUCTURE OF FERROUS METAL
3 STUDY OF MICROSTRUCTURE OF FERROUS ALLOY
4 STUDY OF MICROSTRUCTURES OF NON FERROUS METALS
5 STUDY OF STRUCTURES OF NON FERROUS ALLOYS
6 HARDENING AND HARDENING ABILITY TEST OF STEEL

METROLOGY LAB

1. Preparation and study of the micro structure of pure metals like Iron, Copper and Aluminum.
2. Preparation and study of the micro structure of Mild Steel, Low Carbon Steel and High Carbon Steels.
3. Study of the micro structures of Cast Irons
4. Study of the micro structures of Non Ferrous Alloys
5. Study of the micro structures of Heat Treated Steels
6. Hardenability of steels by Jomny End Quench Test
7. To Find out the hardness of various treated and untreated steels.

OUTCOMES:

1. Students can understand micro structures of different materials.
2. Different heat treatment methods change of mechanical properties based on micro structures
3. Iron carbon equilibrium diagram.

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2/-/-/2

(R20A0006) Technical communication and soft skills
(MANDATORY COURSE)

INTRODUCTION:

'Technical Communication and Soft skills' focus on enhancing students' communication skills. Various technical writing styles and skills are developed. Students' placementneeds met by giving them an exposure to group discussions and mock interviews. Soft skills such as building positive relationships and teamwork are also emphasized.

The trainee hones these skills under the guidance ofthe instructor whose constant evaluation helps in the professional development of students. This course fulfils the need of the aspirants in acquiring and refining the skills required for placements and professional success.

COURSE OBJECTIVES:

1. To make the students recognize the role of technical English in their academic and professional fields
2. To improve language proficiency and to develop the required professional ethics
3. To equipstudents, organize, comprehend, write, and present, short and long forms of any technical work within the broad framework of the Scientific Method
4. To facilitate communication about projects and ideas throughout the industry and also to the non-technical people
5. To display professional behaviors and body language

UNIT I – Effective Presentations

Just-a-Minute sessions, Formal versus informal communication, Non-verbal communication; Concord**:**Subject-verb agreement

UNIT 2 - Professional Communication

Role Plays, Persuasion techniques, Presentation aids, Body language, Importance of listening in effective communication; Email Writing, Business Letter Writing, Letters of complaint, enquiry, responses; Memo Writing; Transformation of Sentences

UNIT 3 – Career Planning

Oral Presentations, Techniques of Listening Skills, types of Group discussions; Etiquette, Protocol; Resume Writing, Cover letter, Writing a statement of purpose; Tenses

UNIT 4 - Technical Writing

Group Discussion, Principles of Effective Writing, Paragraph writing, Advanced Essay Writing, Expansion for or against the essay, Narrative essay, Descriptive essay; Technical Report Writing, Format &Style; Active & Passive Voice

UNIT 5 – Academic Writing

Mock Interview sessions, facing interviews; Correction of Sentences

REFERENCE BOOKS:

1. R.K. Narayan, The Guide, Viking Press, 1958
2. David F. Beer and David Mc Murrey, Guide to writing as an Engineer, John Willey. New York, 2004
3. Diane Hacker, Pocket Style Manual, Bedford Publication, New York, 2003. (ISBN 0312406843)
4. Shiv Khera, You Can Win, Macmillan Books, New York, 2003.
5. Raman Sharma, Technical Communications, Oxford Publication, London, 2004.
6. Meenakshi Raman, Prakash Singh, Business communication, Oxford Publication, New Delhi 2012.
7. Dale Jung k, Applied Writing for Technicians, McGraw Hill, New York, 2004. (ISBN: 07828357-4)
8. Sharma, R. and Mohan, K. Business Correspondence and Report Writing, TMH New Delhi 2002.
9. Xebec, Presentation Book, TMH New Delhi, 2000. (ISBN 0402213)

COURSE OUTCOMES:

After completion of the course, the Students will be able to

1. Understand information which assists in completion of the assigned job tasks more successfully.
2. Communicate his ideas by writing projects, reports, instructions, diagrams and many other forms of professional writing.
3. Adhere to ethical norms of scientific communication.
4. Strengthen their individual and collaborative work strategies.
5. Successfully market themselves and sell themselves to the employer of their choice.

OPEN ELECTIVE - III

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(OPEN ELECTIVE-III)
(R20A0453) Robotics and Automation

COURSE OBJECTIVES:

1) To study overview of Embedded Systems, Robots, Microprocessors & Microcontrollers.
2) To study in detail about Robotics and sensors.
3) To study about AVR RISC Microcontroller architecture in detail.
4) To study about ARM Processor in detail.
5) To study about Artificial Intelligence in Robotics.

UNIT -I

Introduction to Embedded System Design, Categories of ES, Overview of Embedded System Architecture, Recent Trends in Embedded Systems, Hardware Architecture of Embedded System, Real-time Embedded Systems and Robots, Robots and Robotics, Microprocessors and Microcontrollers, Microcontroller or Embedded Controller

UNIT - II

Robotics: Classification of Robots, Degree of freedom, Kinematics; Multidisciplinary approach: Motors-DC motors, Stepper Motors, Servo Motors; Power Transmission-Type of Gears, Gear Assembly, CAM follower, Sensors, Open loop and Closed-loop Controls, Artificial Intelligence.

UNIT- III

The AVR RISC microcontroller architecture: Introduction , AVR family architecture, register file, the ALU, memory access and instruction execution, I/O memory ,EEPROM ,I/O ports, timers, UART, Interrupt structure.

UNIT-IV

ARM Processor: Fundamentals, Registers, current program status register, pipeline concept, Interrupt and the vector table.

UNIT V

AI IN ROBOTICS: Robotic perception, localization, mapping- configuring space, planning uncertain movements, dynamics and control of movement, Ethics and risks of artificial intelligence in robotics.

TEXT BOOKS:

[1] Subrata Ghoshal, "Embedded Systems & Robots", Cengage Learning
[2] Stuart Russell, Peter Norvig, “Artificial Intelligence: A modern approch”, Pearson Education, India2003.
[3] ARM System Developer’s Guide: Designing and Optimizing System Software- Andrew N. Sloss, Dominic Symes, Chris Wright, Elsevier Inc., 2007

REFERENCE BOOKS:

[1] M.A. Mazidi, J.G. Mazidi, R.D. Mckinlay, "8051 Microcontroller and Embedded Systems", Pearson.

[2] Dr. K.V.K. Prasad, "Embedded/Real-Time Systems: Concepts Design & Programming", Dreamtech
[3] Microcontrollers and applications, Ajay V Deshmukh , TMGH,2005

COURSE OUTCOMES:

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

1) Understand the overview of Embedded Systems, Robots, Microprocessors & Microcontrollers.
2) Understand in detail about Robotics and sensors.
3) Understand AVR RISC Microcontroller architecture in detail.
4) Understand about ARM Processor in detail.
5) Understand about Artificial Intelligence in Robotics.

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(OPEN ELECTIVE-III)
(R20A1254) Big Data Architecture

COURSE OBJECTIVES

1. To introduce the terminology, technology and its applications
2. To introduce the concept of Analytics and Visualization
3. To demonstrate the Big Data Architecture and its components, tools
4. To introduce Apache Spark
5. To introduce Technology Landscape using NoSQL

UNIT I

Big Data Introduction: Classification of Digital Data, Structured and Unstructured Data, Introduction to Big Data: Characteristics – Evolution – Definition - Challenges with Big Data - Other Characteristics of Data , Why Big Data - Traditional Business Intelligence versus Big Data, Importance of Big Data.

UNIT II

Big Data Architecture Introduction: Big Data Architecture- Definition, Why Big Data Architecture. Evolution of Big Data Architecture, Market Trends, Big Data Architecture and Its Sources, Big Data Architecture Use Cases.

UNIT-III

Big Data architecture components: Data ingestion, Data storage, Data Computing, Data Analysis, Data Visualization. Understanding the Lambda architecture, HBase, Spark Libraries, Spark Streaming.

UNIT IV

Introducing Apache Spark : Introduction to Spark, Spark Architecture and its components, Features of Spark, Spark vs Hadoop, Challenges of Spark.

UNIT V

Introduction to Technology Landscape

NoSQL, Comparison of SQL and NoSQL, Hadoop -RDBMS Versus Hadoop - Distributed Computing Challenges – Hadoop Overview - Hadoop Distributed File System - Processing Data with Hadoop - Managing Resources and Applications with Hadoop YARN - Interacting with Hadoop Ecosystem

TEXT BOOKS:

1) Tom White — Hadoop: The Definitive Guide Third Edit on, O'reily Media, 2012.
2) Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015.

REFERENCE BOOKS:

1) Michael Berthold, David J. Hand, "Intelligent Data Analysis , Springer, 2007.
2) Jay Liebowitz, -Big Data and Business Analytics Auerbach Publications, CRC press (2013)
3) Tom Plunkett, Mark Hornick, -Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop , McGraw-Hill/Osborne Media (2013), Oracle press.
4) Glen J. Myat, -Making Sense of Data , John Wiley & Sons, 2007
5) Pete Warden, -Big Data Glossary , O'Reily, 2011.
6) Michael Mineli, Michele Chambers, Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley Publications, 2013.
7) ArvindSathi, -BigDataAnalytics: Disruptive Technologies for Changing the Game , MC Press, 2012
8) Paul Zikopoulos ,Dirk DeRoos , Krishnan Parasuraman , Thomas Deutsch , James Giles , David Corigan , "Harness the Power of Big Data The IBM Big Data Platform ", Tata McGraw Hill Publications

COURSE OUTCOMES:

Upon successful completion of the course, the student is able to

1) Identify Big Data and its Business Implications.
2) Categorize and summarize Big Data and its importance.
3) Acquire fundamental enabling techniques and scalable algorithms like Hadoop, Map Reduce in big data analytics
4) Compare various file systems and use an appropriate file system for storing different types of data.
5) Connect to web data sources for data gathering, Integrate data sources with Hadoop components to process streaming data.

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(OPEN ELECTIVE-III)
(R20A0555) Basics of Cloud Computing

COURSE OBJECTIVES:

1) To learn various system models for Distributed and Cloud Computing.
2) To understand about Virtual machines, Its Structure and mechanisms.
3) To learn Cloud Computing Paradigm.
4) To introduce the various levels of services that can be achieved by cloud.
5) To describe the security aspects in cloud.

UNIT- I

Systems Modeling: System Models for Distributed and Cloud Computing- Cloud Computing in a Nutshell, Layers and Types of Clouds , Desired Features of a Cloud , Infrastructure as a Service Providers ,Platform as a Service Providers , Challenges and Risks

UNIT- II

Virtualization: Virtual machines, Implementation Levels of Virtualization -Virtualization Structures/Tools and Mechanisms-Virtualization of CPU, Memory, and I/O Devices

UNIT- III

Foundations: Introduction to Cloud Computing- Migrating into a Cloud-The Enterprise Cloud Computing Paradigm.

UNIT- IV

Infrastructure as a Service (IAAS) & Platform (PAAS): Virtual machines provisioning and Migration services-On the Management of Virtual machines for Cloud Infrastructures- Aneka—Integration of Private and Public Clouds

UNIT- V

Software as a Service (SAAS) &Data Security in the Cloud: Google App Engine , An Introduction to the idea of Data Security- The Current State of Data Security in the Cloud- Cloud Computing and Data Security Risk- Cloud Computing and Identity.

TEXT BOOKS:

1. Distributed and Cloud Computing, Kaittwang Geoffrey C.Fox and Jack J Dongrra, Elsevier India 2012.
2. Mastering Cloud Computing- Raj Kumar Buyya, Christian Vecchiola and S.TanuraiSelvi, TMH, 2012.
3. Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online, Que Publishing, August 2008.

COURSE OUTCOMES:

1) Understanding various system models for Distributed and Cloud Computing.
2) Understanding about Virtual machines, Its Structure and mechanisms.
3) Learning Cloud Computing Paradigm.
4) Understanding the various levels of services that can be achieved by cloud.
5) Learning about security aspects in cloud.

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(OPEN ELECTIVE-III)
(R20A0554) Cyber Security

Course objectives:

- To familiarize various types of cyber-attacks andcyber-crimes
- To give an overview of the cyberlaws
- To study the defensive techniques against theseattacks

UNIT - I

Introduction to Cyber Security: Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Spectrum of attacks, Taxonomy of various attacks, IP spoofing, Methods of defense, Security Models, risk management, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy.

UNIT - II

Cyberspace and the Law & Cyber Forensics: Introduction, Cyber Security Regulations, Roles of International Law. The INDIAN Cyberspace, National Cyber Security Policy.

Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics, Special Techniques for Forensics Auditing.

UNIT - III

Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

UNIT- IV

Cyber Security: Organizational Implications: Introduction, cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations.

Cybercrime and Cyber terrorism: Introduction, intellectual property in the cyberspace, the ethical dimension of cybercrimes the psychology, mindset and skills of hackers and other cyber criminals.

UNIT - V

Privacy Issues: Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Data linking and profiling, privacy policies and their specifications, privacy policy languages, privacy in different domains- medical, financial, etc.Cybercrime: Examples and Mini-Cases

Examples: Official Website of Maharashtra Government Hacked, Indian Banks Lose Millions of Rupees, Parliament Attack, Pune City Police Bust Nigerian Racket, e-mail spoofing instances.

Mini-Cases: The Indian Case of online Gambling, An Indian Case of Intellectual Property Crime, Financial Frauds in Cyber Domain.

TEXT BOOKS:

Nina Godbole and SunitBelpure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives,Wiley

B. B. Gupta, D. P. Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles, Algorithm, Applications, and Perspectives, CRC Press, ISBN 9780815371335,2018.

REFERENCES:

Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRCPress.

Introduction to Cyber Security, Chwan-Hwa(john) Wu,J. David Irwin, CRC Press T&FGroup.

COURSE OUTCOMES:

Student will be able to

1) Understandbasicconcepts ofCyber Crimes.
2) Ability to identify the attacks in CyberCrimes
3) Able to specify the suitable methods used in CyberCrime
4) Ability to face cyber securitychallenges
5) Understand Cyber Security

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(OPEN ELECTIVE-III)
(R20A1255) DevOps

COURSE OBJECTIVES

1) To introduce the terminology, technology and its applications
2) To learn about Source Code Management
3) To introduce the concept of Automation and understanding the code quality
4) To demonstrate the usage of Continuous delivery and deployment management
5) To learn Continuous Deployment, Containerization using Kubernetes and AWS & AZURE Cloud

UNIT-I

INTRODUCTION TO DevOPS: Introduction, DevOps Features, Work Management, Source Code Management, Build Automation, Delivery Automation, Understanding Code Quality, Automation of CI/CD.

UNIT-II

SOURCE CODE MANAGEMENT (GIT): Version controlling with SVN and GIT, Branching Workflows in SVN & GitHub Flow. **BUILD AUTOMATION** – CI: Build (CI) Orchestration using Jenkins Automation Server, Pipeline Basics – Jenkins Master, Node, Agent and Executor.

UNIT-III

AUTOMATION SERVER: JENKINS – Continuous Integration and Delivery server JENKINS – CD Orchestrator. **UNIT TESTING** – CODE COVERAGE: jUnit, nUnit & Code Coverage with Sonar Qube, SonarQube – Code Quality Analysis. **ARTIFACT MANAGEMENT:** Nexus, JFrog Artifactory, JFrog Artifactory as Kubernetis Registry, Helm chart for Microsoft Azure Pipeline.

UNIT-IV

CONTINUOUS DELIVERY: Software components can be released in short cycles, CONTINUOUS DEPLOYMENT: Extends Continuous Delivery, Change is automatically deployed to Production, CD Flow. **CONTINUOUS DEPLOYMENT:** Containerization with Docker: Introduction to Docker, Images & Containers, DockerFile.

UNIT-V

CONTINUOUS DEPLOYMENT: Configuration Management – Ansible: Introduction to Ansible, Ansible tasks, Roles, Jinja templates, Vaults, Deployments using Ansible. **CONTAINERIZATION USING KUBERNETES(OPENSHIFT):** Introduction to Kubernetes Namespace & Resources.
AWS & AZURE – CLOUD: Introduction to AWS & Azure Clouds, Pipeline of AWS & Azure Clouds – CI/CD.

TEXT BOOKS:

1. Version Control with Subversion -O'Reilly Media; Second edition

2. Version Control with Git -O'Reilly Media; Second edition

REFERENCE BOOKS:

1. The DevOps Handbook:: How to Create World-Class Agility, Reliability, and...
2. By Gene Kim, Jez Humble, Patrick Debois, John Willis
3. Practical DevOps By Joakim Verona
4. Jenkins: The Definitive Guide by John Ferguson Smart -O'Reilly Media 2011
5. DevOps for Developers By Michael Huttermann

COURSE OUTCOMES:

Upon successful completion of the course, the student is able to

1) Compare various source code management tools and use with Jenkins Automation servers.
2) Demonstrate the concepts of GIT hub and SVN workflows.
3) Elaborate Jenkins Automation server in the development of various application area.
4) Understanding about continuous delivery process.
5) Apply the knowledge of programming to process the Automation process. Connect to AWS and AZURE cloud to integrate the various platforms.

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2/1/-/3

(R20A2117) Computational Aerodynamics

Objectives:

The course should enable the students to:

1. Application of CFD to various engineering problems.
2. Understand the physics of mathematical equations governing aerodynamic flows.
3. Understand discretization methods to solve fluid flow problems
4. Generation of grid and its importance
5. Various CFD techiques

UNIT-I - INTRODUCTION TO COMPUTATIONAL FLUID DYNAMICS

CFD and its importance as research and design tool, General Procedure of CFD, Application of CFD to various Engineering problems. Models of fluid flow- Finite Control Volume, Infinitesimal Fluid Element. substantial derivatives, divergence of Velocity.

UNIT-II - GOVERNING EQUATIONS OF FLUID DYNAMICS

The continuity equation, momentum equation, energy equation, physical boundary conditions. Form of Governing equation suited for CFD - Conservation form - shock fitting and shock capturing. Impact of partial differential equations on CFD. Classification of Quasi-Linear Partial differential equation, The Eigen value method, General behavior of different classes of Partial differential equation – elliptic, parabolic and hyperbolic with examples.

UNIT-III – DISCRETIZATION TECHNIQUES

Introduction, Finite differences and formulas for first and second derivatives, difference equations, Explicit and implicit approaches. Basis of finite volume method- conditions on the finite volume selections- approaches - Cell-centered and cell-vertex. Definition of finite volume discretization general formulation of a numerical scheme.

UNIT-IV - GRID GENE RATION

Need for grid generation. Structured grids- Cartesian grids, elliptic grid, body fitted structured grids, Multi-block grids - overset grids with applications. Unstructured grids- triangular/ tetrahedral cells, hybrid grids, quadrilateral/hexahedra cells. Grid Generation techniques - Delaunay triangulation, Advance font method. Grid quality parameters.

UNIT-V – CFD TECHNIQUES

Lax-Wendroff technique, MacCormack's technique, Crank Nicholson technique, Relaxation technique, Alternating-Direction-Implicit (ADI) Technique. Pressure correction technique Numerical procedures- SIMPLE algorithm. Boundary conditions for the pressure correction method.

TEXT BOOKS

1. John .D. Anderson "Computational Fluid Dynamics", McGraw Hill
2. Charles Hirsch "Numerical computation of internal and external flows" Second Edition Butterworth-Heinemann is an imprint of Elsevier

REFERENCES

1. Hoffmann, K.A: Computational Fluid Dynamics for Engineers, Engineering Education System, Austin, Tex., 1989
2. J Blazek "Computational Fluid Dynamics: Principles and Applications" Elsevier.
3. Introduction to Computational Fluid Dynamics, Chow CY, John Wiley, 1979

Outcomes:

The student should be able to

1. Solve differential equations governing fluid flow problems.
2. The student will demonstrate an ability to recognize the type of fluid flow that is occurring in a particular physical system and to use the appropriate model equations to investigate the flow.
3. Generation of grid according to geometry of flow.
4. The student can able to select appropriate discretization method to solve given problem.
5. Application of CFD techniques for aerospace problems.

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2/1/-/3

(R20A2118) Space Propulsion

Objectives:

1. Students acquire knowledge about the Air-Breathing Propulsion.
2. Students can focus on various chemical-Rocket propulsionand understand the future scenario.
3. To provide an exposure of Nuclear Rocket Propulsion and its utilities.
4. Students get the knowledge of Advanced Rocket Propulsion.
5. Students understand about the Launch vehicles and their space mission operation.

UNIT-I
HYPERSONIC AIR-BREATHING PROPULSION

Ramjets at high speeds and limitations of turbojets. Need for supersonic combustion, Implications criticality of efficient diffusion and acceleration, problems of combustion in high speed flow, scramjet engine- construction, flow process- description, spill-over drag, plume drag. Isolator, combustor, thermal protection, thermal throat, scheduled &distributed fuel injection. Types of nozzles and nozzle flow. Scramjet performance- numericals.

Combined cycle engines- turbo-ramjet, Air turbo-rocket (ATR), ejector ramjet, Liquid-air collection engine (LACE) - need, principle, construction, operation, performance.

UNIT-II
CHEMICAL ROCKET PROPULSION

Classification of rocket engine, chemical rocket engine types, working principle, schematic diagram, applications, types, advantages and disadvantages- solid, liquid and hybrid propellant rocket engine, TVC.

Solid propellant rocket motors, principle, applications, Solid propellant types, composition, properties, Propellant grain, properties, structural design, insulators and inhibitors- functions, requirements, Rocket motor casing- materials. Igniters, types, construction, Liquid propellants- types, composition, properties, performance, Propellant, feed systems- pressurisation, injectors, starting and ignition, cryogenic engines, Engine cooling.

UNIT-III NUCLEAR ROCKET PROPULSION: Nuclear propulsion history, Power, thrust, energy. Nuclear fission- basics, sustainable chain reaction, neutron leakage, control, reflection, prompt and delayed neutrons, thermal stability. Principles and fuel elements. The nuclear thermal

rocket engine, start-up and shutdown. Development status of nuclear engines, alternative reactor types, safety issues in nuclear propelled missions.

UNIT-IV ADVANCED ROCKET PROPULSION

ELECTRICAL: Limitations of chemical rocket engines. Electric propulsion systems- structure, types, generation of thrust. Electrostatic thrusters, electro-magnetic thrusters, applications to space missions, pulsed plasma thrusters (PPT) for micro-spacecraft, solar electric propulsion.

ADVANCED SYSTEMS: Micro-propulsion, application of MEMS, chemical, electric micro-thrusters, principle, description, Propellantless propulsion, teethers, momentum exchange, Photon rocket, beamed energy propulsion, solar, magnetic sails.

UNIT V LAUNCH VEHICLES

Role and military functions of space launch vehicle, Types, missions, mission profile, staging employed in the vehicle, guidance and control requirements. Some successful launch vehicles, Description of space shuttle engine, Propellant slosh - Propellant hammer, geysering effect in cryogenic rocket engines, SSTO.

Text Books:

1. Cornelisse, J. W., Schoyer H.F.R. and Wakker, K.F., Rocket propulsion and space flight Dynamics, Pitman, 1979.
2. Turner, M.J.L., Rocket and Spacecraft Propulsion, Springer, 2001.

Outcomes:

1. Students can correlate all Air-Breathing propulsion.
2. Students will be able to configure the Chemical Rocket Propulsion.
3. Students will be able to understand about the Nuclear Rocket Propulsion [advantages/disadvantages].
4. Students can predict about the Advanced Rocket Propulsion.
5. Students can able to predict Launch vehicles accordingly their missions.

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(R20A2119) Flight Vehicle Design

Course objectives

1. goal is to obtain the knowledge in understanding the principles, concepts and facts of the design process.
2. The goal of the objective is to use the principles to demonstrate the prepration of geometric sizing of an airplane.
3. After the learning of course, students will be able to optimize the design requirements through various inputs such as materials and size.
4. The objective is to make student realize the performance of aircraft depending on the type of the engine.
5. At the end of the session, the objective is to enable students to realize the stability and control of aircraft based on the design characteristics.

UNIT I

Design process overview, airfoil

Overview of aircraft design, Phases of aircraft design. Aircraft conceptual design process, Sizing from conceptual sketch, Empty weight & fuel fraction estimation, Mission profiles, Mission segment weight fractions. L/D estimation. Take-off weight estimation. Airfoil and geometry selection, Airfoil design, Design lift coefficient, Stall, Airfoil thickness ratio, Airfoil considerations.

UNIT II

Geometry selection, thrust to weight ratio, wing loading

Wing geometry (aspect ratio, wing sweep, tapper ratio and wing vertical location, wing tip shapes. Tail geometry and arrangements. Thrust to weight ratio & Wing loading- statistical estimation, thrust matching. Wing loading (for take-off, instantaneous/sustained turn rate, loiterer endurance, cruise range).

UNIT III

Initial sizing & configuration layout

Sizing with fixed engine and with rubber engine. Refined sizing equations/ methods. Geometry sizing of fuselage, Wing, Tail, Control surfaces. Development of configuration lay out from conceptual sketch. The inboard profile drawing, Wetted area, Volume distribution and fuel volume plots, Lofting- definition, significance and methods, flat wrap lofting. Special consideration in configuration lay out. Isobar tailoring Sears-Haack volume distribution, structural load paths.

UNIT IV

Crew station, passengers &payload, landing gear &subsystems, structures, weight & balance

Fuselage design- crew station, passenger compartment, cargo provisions, weapons carriage, gun installation, Landing gear arrangements, guidelines for lay out. Shock absorbers – types, sizing, stroke determination, gear load factors. Gear retraction geometry. Aircraft subsystems, significance to configuration lay out. Airworthiness requirements - loads, safety margins, material properties, methods of estimation- construction, operation, maintenance, training-procedures, Aircraft materials- mechanical properties- design data- allowable, allowable bases. Failure theory. Flight loads- atmospheric, maneuver- construction of flight envelope. Wing loads, Empennage loads, Fuselage loads.

UNIT V

Performance and constraint analysis refined sizing & trade studies

The aircraft operating envelope. Take off analysis, Balanced field length Landing analysis. Fighter performance measures of merit. Effects of wind on aircraft performance.

Initial technical report of baseline design analysis and evaluation. Refined baseline design and report of specifications. Elements of life cycle cost, cost estimating method, RDT&E and production costs, operation and maintenance costs, fuel and oil costs, crew salaries Refined conceptual sizing methods. Sizing matrix plot and carpet plot. Trade studies - design trades, requirement trades, growth sensitivities. Measures of merit Determination of final baseline design configuration, preparation of type specification report

TEXT BOOK:

1. Raymer,D.P., Aircraft Design: A Conceptual Approach, 3rd edition., AIAA Education series, AIAA, 1999,ISBN: 1-56347-281-0

REFERENCE BOOK:

1. Howe, D., Aircraft Conceptual Design Synthesis, Professional Engineering Publishing, London,2000, ISBN:1-86058-301-6

Outcomes

1. Define the design process overview followed during the design of the aircraft.
2. Demonstrate initial sizing and layout preparation and handwork for geometric sizing.
3. Discuss material properties, geometry, size and systems requirement to construct flight envelope.
4. understand performance and trade studies which allows to distinguish type of engine and design to be adopted.
5. Interpret importance of design on stability and control of the aircraft.

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(R20A2137) Aircraft Maintenance Engineering
(PROFESSIONAL ELECTIVE - III)

Objectives:

1. To introduce the knowledge of the maintenance and repair procedures followed for overhaul of aero engines.
2. To impart the standards of FAA for documentation.
3. To impart over all technical service of aircraft
4. To introduce in Hanger maintenance and responsibilities of various cadres aero officers.
5. Students can know quality of maintenance with respect to FAA

UNIT – I

NECESAITY & DEVELOPMENT OF MAINTENANCE PROGRAMS

Definition of maintenance, role of the engineer, role of the mechanic, two types of maintenance, reliability, establishing a maintenance program. Goals and objectives of maintenance. Maintenance steering group(MSG) Approach, process – Oriented maintenance, task- oriented maintenance, current MSG process – MSG – 3, maintenance program documents.

UNIT – II

AVIATION CERTIFICATION REQUIREMENTS AND DOCUMENTATION FOR MAINTENANCE & ENGINEERING

Aircraft certification, delivery inspection, operator certification, certification of personnel, aviation industry interaction; types of documentation. Manufacturer`s documentation, regulatory documentation. Airline generated documentation. ATA document standards. Objectives of a maintenance program, outline of aviation maintenance program, summary of FAA requirements, additional maintenance program requirements; organization of maintenance and engineering, organization structure, M&E organization chart, general groupings, managerial level functions- technical services, aircraft maintence, overhaul shops, material.

UNIT – III

TECHNICAL SERVICES

Engineering: makeup of engineering, mechanics and engineers, engineering department functions, engineering order preparation; production planning & control – forecasting, production planning, production control , Organization of PP&C; technical publications-functions of technical publications, airline libraries, control of publications,; Technical Training-organization, training for aviation maintenance, airframe manufacturer`s training courses,

UNIT – IV

MAINTENANCE AND MATERIAL SUPPORT

Line maintenance(on – aircraft), functions that control maintenance, MCC responsibilities, general line maintenance operations, aircraft logbook, ramp and terminal operations, maintenance crew requirement, morning meeting; Hangar Maintenance (on-aircraft)-organization of hangar maintenance, problem areas in hangar maintenance, maintenance support shops, ground support equipment, typical C – check: Shop data collection; Material support –organization and function of material. Material directorate, M&E support functions

UNIT – V

OVERSIGHT FUNCTIONS, ART & SCIENCE OF TROUBLE SHOOTING

Quality Assurance , quality audits, ISO 9000 quality standard, technical records, Quality control-quality control organization, FAA and JAA QC inspector qualifications. Basic inspection policies,; Reliability – definition and types of reliability, elements of a reliability program, Maintenance safety – safety regulations, maintenance safety program, general safety rules, accident and injury reporting . Human factors in maintenance, Trouble shooting, knowledge of malfunctions, Basic concepts of trouble shooting.

Text Books:

1. Kinnison, H.A , Aviation Maintenance Manageent, Mc Graw – Hill – 2004.
2. Mc Kinley, J.L. Bent, R.D ., Maintenance and Repair of Aerospace Vehicles, Northrop Institute of Technology, Mc Graw Hill, 1967.

Reference Books:

1. Friend, C.H., Aircraft maintence Management . Longman, 1992.
2. Kroes, M., Watkins. W., and Delp. F. Aircraft Maintenance and Repair, Tata Mc Graw – Hill. 2010

Outcomes:

1. Ability to maintain and repair the areo engines.
2. Ability to prepare aircraft maintenance manuals.
3. Ability to know the standards of quality, FAA
4. Ability to perform technical service of aircraft
5. Students should come across Hanger responsibilities

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(R20A2138) Aircraft systems
(PROFESSIONAL ELECTIVE - III)

OBJECTIVES OF THE COURSE:

1. Student will be introduced to various aircraft system and their integration.
2. Learn about hydraulic system types and operation
3. Identify and learn about various components and function of electrical system in aircraft
4. Learn about various pneumatic and environmental system operation and importance in aircraft
5. Learn about engine control and fuel system functions, importance and components in aircraft

UNIT-I: INTRODUCTION TO AIRCRAFT SYSTEM:

Types of aircraft system-airframe, vehicle, avionics, mission and their subsystems. Specifications of requirements (mission and performance requirements). Operating environmental conditions. Need for integration. Enumeration of aircraft systems and some subsystems-purpose and very brief description.

UNIT-II: HYDRAULIC SYSTEM.

Function, merits and system loads. Principle components, pumps, reservoir and accumulator. Flight control actuation need for redundancy. Hydraulic fluid properties requirements. Operating fluid pressures and flow rates. Landing gear and brake management system.

UNIT-III: ELECTRICAL SYSTEMS AND FLIGHT CONTROL SYSTEMS:

Electrical loads in aircraft, Electrical power generation and control-DC, AC. Power conversion and batteries. Load protection. Variable speed constant frequency (VSCF) Cyclo- converter, 27V DC system. Flight control systems-primary and secondary flight control. Flight control actuation systems in brief.

UNIT-IV: PNEUMATIC AND ENVIRONMENTAL CONTROL SYSTEMS:

Engine as a source of high-pressure air-engine bleed air and its users. Wing and engine anti-ice system. Engine starting system. Pitot-static system. Principal heat sources in aircraft. Method of cooling-ram air, fuel cooling. Cooling system-air cycle refrigeration-types-turbo fan, bootstrap,

reverse bootstrap systems. Cabin pressurization. g-tolerance and protection. Molecular-Sieve oxygen concentrator.

UNIT-V: ENGINE CONTROL AND FUEL SYSTEM:

Principle of operation of aircraft gas turbine engine. Engine-airframe interface. Control of fuel flow, air flow, exhaust gas flow- need, means, system parameters, basic input and outputs. Limited authority and full authority engine control systems. Engine monitoring sensors and indicators. Power offtakes-need, types and effect on engine performance. Fuel system-components, fuel tank safety-fuel inerting system.

TEXT BOOKS

1. Moir, I. and Seabridge, A., Aircraft Systems: mechanical, Electrical and Avionics sub -systems Integration, 3 rd edition, John Wiley 2008, ISBN 978-0-470-05996-8

2. Moir, I. and Seabridge, A., Design and development of aircraft systems-an introduction, AIAA education series, AIAA,2004.

REFERENCES:

Aircraft systems by David A Lambro tata Mc Graw Hill. Ed;2009.

OUTCOMES:

1. Students gain a knowledge of integration levels and operation priorities of various systems.
2. Acquire knowledge of hydraulic system functioning in aircraft
3. Understand the electrical system functioning
4. Gain a knowledge of Pneumatic and Environment control system functioning
5. Understand the importance of fuel and engine control in aircraft operation

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IV Year B.Tech. ANE- I Sem **L/T/P/C**
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(R20A2139) Helicopter Engineering
(PROFESSIONAL ELECTIVE - III)

Objectives:

1. To understand the basic difference between aircraft and helicopter
2. To know the helicopter 's configuration and their limitation
3. To know the aerodynamic characteristics on rotor system during different mode of flight condition
4. To know how the helicopter movement is achieved and what are the controls associated with
5. Basic stability of helicopter and how it is differ from airplane

UNIT I

INTRODUCTION.

Historical Development of Helicopters, Helicopter Configuration, Control Requirements, Types of Rotor Systems, Basic Power Requirements.

UNIT II

INTRODUCTION TO HOVERING THEORY.

Momentum Theory, Blade Element Theory, Combined Blade Element and Momentum theories for non-uniform inflow calculation, Ideal Rotor vs. Optimum Rotor.

UNIT III

VERTICAL FLIGHT.

Various flow states of Rotor, Autorotation in Vertical Descent, Ground Flight.

UNIT IV

FORWARD FLIGHT.

Momentum Theory, Variable Inflow Models, Blade Element Theory, Rotor Reference Planes, Hub Loads, Power variation with forward speed, Rotor Blade flapping Motion: Simple Model.

UNIT V

HELICOPTER TRIM AND STABILITY.

Equilibrium condition of helicopter, Trim analysis, Basics of helicopter stability.

Text Books:

1. Gessow.A and Meyers G.C. Aerodynamics of Helicopter,Macmillan& co ., N.Y.1987
2. Johnson W Helicopter theory, Princeton University pres 1980
3. MccormickB.W.Aerodynamics,Aeronautics& Flight mechanics ,John Wiley ,1995
4. Gupta. L Helicopter Engineering, Himalayan Books 1996

5. Bramwell A.R.S Helicopter Dynamics Edward Arnold Publications London 1976
6. Stepniewski W.Z Rotary Rotary wing Aerodynamics Vol 1 & 2 Dover publications 1984

Outcomes:

1. The student will be able to identify the key differences between Aircraft and Helicopter
2. The analyze the basic concepts, theories regarding hover Student gains knowledge about how the flow varies during climb and descent.
3. Student attains the complexity of forward flight condition
4. Stability of helicopter and trim requirement
5. Various equilibrium conditions

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IV Year B.Tech. ANE- I Sem **L/T/P/C**
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(R20A2140) Avionics
(PROFESSIONAL ELECTIVE - IV)

Objectives :

1. To introduce the students with functioning and principle of operation of various avionics systems including sensors installed on a modern passenger and fighter aircraft.
2. Identify various display systems used in aircraft
3. Identify and know the functioning of various attitude determination and air data equipment's used in aircraft
4. To introduce various navigation and landing equipment's used
5. Knowledge of surveillance and flight systems functioning

UNIT I: INTRODUCTION TO AVIONICS

Importance and role of Avionics in modern aircraft-systems which interface directly with pilot-aircraft state sensor systems, outside world sensor systems, task automation systems. The avionics equipment and system requirement- environmental, weight, reliability. Standardization and specification of avionics equipment and systems- ARINC and MIL specification. Electrical and optical data bus systems. Integrated modular avionics architectures.

UNIT II: DISPLAY &MAN-MACHINE INTERACTION AND COMMUNICATION SYSTEM

Introduction to displays-head-up displays (HUD)-basic principles, Helmet mounted displays, Head tracking systems. Head down displays-Civil cockpit, Military cockpit, Solid state standby display systems, Data fusion in displays-Intelligent display systems. Introduction to voice and data communication systems- HF, VHF, UHF and Satellite communications, Flight data recorders.

UNIT III: INERTIAL SENSORS, ATTITUDE DERIVATION AND AIR DATA SYSTEMS

Basic principles of gyroscope and accelerometers. Introduction to optical gyroscope- ring laser gyros-principles. Stable platform system-strap down systems- error in inertial systems and corrections. Air data Information and its use, derivation of Air Data Laws and relationship-altitude-static pressure relationship, variation of ground pressure, Speed of sound, Mach Number, CAS, TAS, Pressure error. Air data sensors and computing

UNIT IV: NAVIGATION (INS AND GPS) AND LANDING SYSTEM

Principles of Navigation, Types of Navigation systems-. Inertial Navigation System-Initial alignment and Gyro compassing, Strap down INS computing. Landing System- localizer and glide-slope-marker systems. Categories of ILS.Global navigation satellite systems-GPS-description and basic principles. Integration of GPS and INS, Differential GPS.

UNIT V: SURVEILLANCE AND AUTO FLIGHT SYSTEMS

Traffic alert and collision avoidance systems (TCAS)-Enhanced ground proximity warning system. Weather radar. Autopilots-Basic principle, height control, heading control, ILS coupled autopilot control, satellite landing system, speed control and auto throttle. Flight management systems-principles-flight planning-navigation and Guidance, performance prediction and flight path optimization.

TEXTBOOKS

1. Collinson, R.P.G., Introduction to Avionics Systems, second edition, Springer,2003, ISBN 978-81-8489-795-1
2. Moir, I. and Seabridge, A., Civil Avionics Systems, AIAA education Series, AIAA, 2002, ISBN 1-56347589-8

REFERENCE BOOKS

1. Kayton, M., & Fried, W.R, Avionics Navigation Systems, Wiley, 1997, ISBN 0-471-54795-6Z

Outcomes:

1. The student would gain understanding of the basic principles of avionics system.
2. Corelate different displays and communicating ranges their operation and importance
3. Understand the air data computation and attitude determination
4. Understand landing and navigation equipment components and functioning
5. Identify the surveillance and auto flight systems operation and their importance

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(R20A2141) Aero-elasticity
(PROFESSIONAL ELECTIVE - IV)

Objectives:

The course should enable the students to:

1. To elucidate the aero elastic Phenomena and formulations
2. Find solution techniques for aerospace vehicles in flight and to incorporate the spin off benefits.
3. Understand the application of aero elasticity and its effect on aircraft components.
4. To impart the various of phenomenon Flutter And Buffeting.
5. Students can able to understand some typical Prevention of aero-elastic instabilities.

UNIT-I INTRODUCTION TO AEROELASTICITY

Definition and historical background, Static and dynamic aeroelastic phenomenon, integretion of aerodynamic, elastic and inertia forces, influence of aeroelstic phenomenon on air craft design, Comparison of critical speeds.

UNIT-II DIVERGENCE OF LIFTING SURFACE

The phenomenon of divergence, divergence of 2-D wing section, divergence of an idealized cantilever wing, solution based on semi-rigid assumptions, solution to generalized co-ordinates Method of successive approximation, use of Numerical Methods.

UNIT-III STEADY STATE AERO-ELASTICITY PROBLEMS IN GENERAL

Loss and reversal of aileron Control: 2D case, aileron reversal general case. Lift distribution on a rigid and elastic wing. Effect on Static Longitudinal stability of airplane.

UNIT-IV INTRODUCTION TO FLUTTER AND BUFFETING

The phenomenon of flutter, flutter of a cantilever wing. Approximate determination of critical speed by Galerkin's Method, buffeting and stall flutter.

UNIT-V NON AERONAUTICAL PROBLEMS

Some typical example in civil engineering, Flow around an oscillating circular cylinder applications to H-shaped sections, Prevention of aero-elastic instabilities.

Text Books:

1. Fung Y.C. an introduction to the Theory of Aeroelasticity John Wiley and Sons, New York, 1985.

2. Bisphlinghoft R. C. Ashlay. H and Halfmam. R Aero-elasticity – Addition Werley Publishing Company.
3. Scnlan R.H. and Rosenbaum. R Introduction to the study of Aircraft Vibrations and Flutter McGraw Company New York 1981.

Reference Books:

Bisphlinghoft R. C. and Ashely, Principles of Aeroelasticity Johnwiley Company. 1998.

Outcomes:

The student should be able to:

1. Understand the formation of Aileron reversal and wing divergence.
2. Control aero elastic problems on fight stability and control.
3. Apply Aero elastic theories to Non aeronautical problems.
4. perform various phenomenon on Flutter And Buffeting.
5. Solve non aeronautical problems and elastic instability problems

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IV Year B.Tech. ANE- I Sem **L/T/P/C**
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(R20A2142) Analysis of Composite Structure
(PROFESSIONAL ELECTIVE - IV)

Objectives

1. Defines about the various composite types and functions
2. Failure the properties of composite materials
3. Identify various analysis methods of composite materials and laminates
4. Outlines various buckling analysis used in composite material
5. Introduce various theories based on composite material

UNIT-I

Properties of Constituent Materials and Composite Laminates: Introduction to laminated composite plates, Mechanical Properties of constituent materials such as Matrix and Filaments of different types.

Netting analysis of composite materials, determination of properties of laminates with fibers and matrices.

UNIT-II

Stress-Strain relations of Isotropic, Orthotropic and Anisotropic materials, transformation of material properties for arbitrary orientation of fibers.

UNIT-III

Methods of Analysis: Mechanics of materials approach to determine Young‘s modulus, Shear Modulus and Poisson‘s ratio, brief mention of elasticity approach and Macro mechanics of laminates

Anisotropic elasticity, stress –strain relations in material coordinates - Transformation of geometric axes, strength concepts, Biaxial strength theories, Maximum stress and Maximum strain.

UNIT-IV

Analysis of laminated plates: Classical plate theory, Classical lamination theory – Special cases of single layer, symmetric, anti-symmetric & unsymmetric composites with cross ply, angle ply layup. Deflection analysis of laminated plates, Analysis laminated beam and plates.

UNIT-V

Shear deformation theories for composite laminated beams, plates-first, second and third order theories, nth Order theory.

Buckling analysis of laminated composite plates with different orientation of fibers, Tsai-wu criteria and Tsai – Hill Criteria.

Text Books

1. Agarwal B. D., Broutman. L. J., *Analysis and performance of fiber composites,* John wiley and sons-New York, 1980.
2. Lubin. G, *Hand Book on Advanced Plastics and Fiber Glass,* Von. Nostrand*,* Reinhold Co. New York, 1989.

REFERENCES

1. Gupta, L., *Advanced composite Materials,* Himalayan Books, New Delhi, 1998.
2. Jones, R. M., *Mechanics of Composite Materials,* McGrawHill, Kogakusha, ltd. Tokyo.
3. Reddy J.N., Mechanics of Composite Materials.

Outcomes:

1. The students will be able to select appropriate composite materials and analyzes for different elastic properties by using various methods.
2. Gain knowledge of materials used in manufacturing of composite materials
3. Gain knowledge of performance parameters of composite materials
4. Knowledge of various properties of composite materials
5. Gain knowledge of various theories

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IV Year B.Tech. ANE- I Sem **L/T/P/C**
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(R20A2188) Computational Aerodynamics Lab

Objectives:

The course should enable the student to:

1. Understand the use of modern CFD software, including geometry building, mesh generation,solution techniques, and flow visualization.
2. Understand various numerical methods to solve fluid flow problems.
3. Gain knowledge towards the investigation of various fluid flow systems aimed at a deeper understanding of the basicprinciples of fluid mechanics.
4. Experience with some of the difficulties that one may encounter in CFD, such as geometrysimplification, mesh problems, convergence problems, multiple solutions, etc.
5. Carry out an individual CFD project from a set contributed by the instructor or from the student'sown experience.

LIST OF EXPERIMENTS:

1. Numerical simulation of Flow over an airfoil using commercial software
2. Numerical simulation of Supersonic flow over a wedge using commercial Software
3. Numerical simulation of Flat plate boundary layer using commercial software
4. Numerical simulation of Laminar flow through pipe using commercial software
5. Numerical simulation of Flow past cylinder using commercial software
6. Numerical simulation of flow through nozzle using commercial software
7. Numerical simulation of flow over wing using commercial software
8. Numerical simulation of combustion using commercial software
9. Solution for the one dimensional wave equations using explicit method of lax using finite
   Difference method (code development)
10. Solution for the one dimensional heat conduction equation using explicit method using finite difference method (code development)
11. Generation of the Algebraic Grid (code development)
12. Generation of the Elliptic Grids (code development)

Note: Any 10 Experiments can be conducted.

Equipment Needed:

1. **Computers**: Core 2 duo processor with 1 GB RAM
2. **Softwares:** Matlab or scilab and Ansys or equivalent softwares

Reference Books:

1. MATLAB an Introduction with Applications Fifth Edition AMOS GILAT by WILEY Publications
2. Programming in SCI lab by VINU V DAS New Age International Publications
3. ANSYS FLUENT and CFX Tutorials

Outcomes:

Upon completion of the course:

1. The student will demonstrate the ability to use modern CFD software tools to build flow geometries, generate an adequate mesh for an accurate solution, select appropriate solvers to obtain a flow solution, and visualize the resulting flow field.
2. The student will demonstrate the ability to analyze a flow field to determine various quantities of interest, such as flow rates, heat fluxes, pressure drops, losses, etc., using flow visualization and analysis tools.
3. The student will demonstrate an ability to recognize the type of fluid flow that is occurring in a particular physical system and to use the appropriate model equations to investigate the flow.
4. The student will demonstrate the ability to simplify a real fluid-flow system into a simplified model problem, to select the proper governing equations for the physics involved in the system, to solve for the flow, to investigate the fluid-flow behavior, and to understand the results.
5. The student will demonstrate the ability to communicate the results of this detailed fluid-flow study in a written format.

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IV Year B.Tech. ANE- I Sem **L/T/P/C**
-/-/3/1.5

(R20A2189) Flight Vehicle Design Lab

Objectives:

1. To learn conceptual aircraft design of a typical civil transport and fighter aircraft.
2. Generate coding to evaluate Engine sizing and Wing design.
3. Generate codes for airfoil, vertical and horizontal tail contour sketch
4. Perform 3D Modelling of Aircraft
5. Demonstrate various systems used in aircraft

LIST OF EXPERIMENTS:

1. Weight estimation (Fixed engine) of the fighter and transport aircraft.
2. Weight estimation (Rubber engine) of the fighter and transport aircraft.
3. Estimating Wing Loading of transport and fighter aircraft.
4. Wing design and estimation of aerodynamic (lift and Drag) and stability parameters to meet the system requirement.
5. Design of Horizontal and vertical tail and control surfaces to meet system requirements.
6. Design of Crew and passenger cabin for the hypothetical aircraft identified in experiment no one.
7. 3D modelling of Aircraft.
8. Estimation of Nozzle characteristics
9. Demonstration of Hydraulic Test Rig.
10. Demonstration of Pneumatic Test Rig.
11. Demonstration of Control surface Test Rig.

Note: Minimum 10 experiments should be conducted.

Software Required: Catiaor Equivalent software&Microsoft Excel,MATLAB/SIMULINK Programming or Equivalent software

TEXTBOOKS:

1. AIRCRAFT DESIGN: A Conceptual Approach AIAA Book ISBN:0-930403-51-7 by Daniel P Raymer
2. MATLA/SIMULINK Users' Guide.

Outcomes:

1. Student will be able to develop preliminary design of a given aircraft (transport and fighter aircraft) to meet given performance requirements.

2. Able to use various software tools in design & analysis of aircraft.
3. Correlate fixed and rubber engine
4. Understand the functioning of aircraft systems
5. Analyze design paSrameters