SCHEME OF COURSE WORK

Course Title	: **AIRCRAFT SYSTEMS**		
Course Code	: **13ME2206**	L T P C	: 4 0 0 3
Program:	: M.Tech.		
Specialization:	: CAAD		
Semester	: I		

Course Outcomes (COs):

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

1	Explain the basics of aircraft industry and aircrafts
2	Differentiate between different types of aircrafts and discuss basicprinciples of flight
3	Explain drag, pitching moments and aerofoil nomenclature
4	Discuss mechanics of flight, aircraft performance and manoeuvres
5	Explain stability control of aeroplane and aircraft systems

Program Outcomes (POs)

At the end of the program, the students in CAAD will be able to

PO 1	acquire knowledge in latest computer-aided design and analysis tools
PO 2	create 3D models of real-time components using latest CAD software
PO 3	acquire technical skills to formulate and solve engineering and industrial problems
PO 4	carry out analysis for the design of new products
PO 5	have proficiency to solve problems using modern engineering design tools
PO 6	have capability to work in multidisciplinary streams
PO 7	apply project and finance management skills to organise engineering projects
PO 8	prepare technical reports and present them effectively
PO 9	engage in lifelong learning
PO 10	realize professional and ethical responsibilities
PO 11	conduct surveys, analyse data, plan, design and implement new ideas into action

Course Outcome versus **Program Outcomes:**

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

S - Strongly correlated, *M* - *Moderately* correlated, *Blank* - *No correlation*

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Teaching-Learning and Evaluation

Week	TOPIC / CONTENTS	Course Outcomes	Sample questions	TEACHING-LEARNING STRATEGY	Assessment Method & Schedule
1	Aircraft industry overview: evolution and history of flight, types ofaerospace industry, key players in aerospace industry, aerospacemanufacturing, industry supply chain, prime contractors, tier 1suppliers	CO1	(i)What are the basic components of an aircraft? (ii)What is the current trend in aerospace industry? (iii)Explain OEM supply chainstrategies.	Lectures , PPT, Seminar	
2	key challenges in industry supply chain, OEM supply chainstrategies, mergers and acquisitions, aerospace industry trends,advances in engineering/CAD/CAM/CAE tools and materialstechnology	CO1			Seminar-I (week 2-8)
3	Global and Indian aircraft scenario, Introduction to aircrafts: basic components of an aircraft, structuralmembers, aircraft axis system, aircraft motions, control surfaces andhigh lift devices	CO1			
4	Types of aircrafts: lighter than air/heavier than air aircrafts, conventional design configurations based on power plant location, wing vertical location, intake location, tail unit arrangements, landing gear arrangements. unconventional configurations-biplane	CO2	(i)Explain the landing geararrangements. (ii)What are the different forces acting onthe airplane? (iii)Explain thepressure distribution over awing section.	Lectures , PPT, Seminar	
5	variable sweep,canard layout, twin boom layouts, span loaders, blended body winglayout, stol and stovl aircraft, stealth aircraft, advantages anddisadvantages of theseconfigurations	CO2			
6	Basic principles of flight:significance of speed of sound, air speed andground speed, properties of atmosphere, Bernoulli's equation, forces onthe airplane, airflow over wing section, pressure distribution over awing section, generation of lift	CO2			
7	Drag, pitching moments: types of drag, lift curve, drag curve, lift/drag ratio curve, factors affecting lift and drag, center of pressure and its effects	CO3	(i)What are thefactors which affectlift and drag? (ii)What iscenter ofpressure and itseffects?	Lectures , PPT, Seminar	
8	Aerofoil nomenclature: types of aerofoil, wing section-aerodynamic center, aspect ratio, effects of lift, drag, speed, air density on drag, machwaves, mach angles	CO3			

9	Mid-Test 1	CO-1, CO-2, CO3			Mid-Test 1 (Week 9)
10	sonic and supersonic flight and its effects, Mechanics of flight aircraft performance: taking-off, climbing, cruise,landing, power curves	CO3, CO4	(i)Explainsonic and supersonic flight. (ii)What are theforces acting on aeroplane during a turn? (iii)Discuss the effects of altitude on power curves.	Lectures , PPT, Seminar	
11	Manoeuvres: Pull out dives, the load factor, loads during a turn, correct and incorrect angles of bank, control and steep banks, invertedmanoeuvres, manoeuvrability.	CO4			Seminar-II (week 11-17)
12	Aircraft performance and manoeuvers: power curves,maximum andminimum speeds of horizontal flight, effects of changes of enginepower, effects of altitude on power curves	CO4			
13	forces acting on a aeroplane during a turn, loads during a turn, correct and incorrect angles of bank, aerobatics, inverted manoeuvres, manoeuvrability	CO4			
14	Stability and control: meaning of stability and control, degree of stability- lateral, longitudinal and directional stability, dihedral and anhedral angles, control of an aeroplane	CO5	(i)Differentiate betweenlateral, longitudinal and directional stability. (ii)Explain different types ofmechanical systems. (iii) Explain different types ofelectrical systems.	Lectures , PPT, Seminar	
15	Introduction to aircraft systems: types of aircraft systems Mechanical systems: Environmental control systems (ECS), Pneumatic systems, Hydraulic systems, Fuel systems, Landing gear systems,	CO5			
16	Engine Control Systems, Ice and rain protection systems, Cabin Pressurization and Air Conditioning Systems, Steering and Brakes Systems Auxiliary Power Unit,	CO5			
17	Electrical systems: Avionics, Flight controls, Autopilot and Flight Management Systems, Navigation Systems, Communication, Information systems, Radar System	CO5			
18	Mid-Test 2	CO-3, CO-4, CO-5			Mid-Test 2 (Week 18)
19/20	END EXAM	All Cos			