INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal, Hyderabad - 500 043

ELECTRONICS AND COMMUNICATION ENGINEERING

TUTORIAL QUESTION BANK

Course Name	:	INTRODUCTION TO AEROSPACE ENGINEERING
Course Code	:	BAE701
Class	:	I - M. Tech
Branch	:	EMBEDDED SYSTEMS
Year	:	2017 – 2018
Course Coordinator	:	R. Sabari Vihar, Asst Prof, Aeronautical department.
Course Faculty	:	Mr. R Sabari Vihar, Ms. M Snigdha, Mr. M Vijay kumar.

OBJECTIVES

To meet the challenge of ensuring excellence in engineering education, the issue of quality needs to be addressed, debated and taken forward in a systematic manner. Accreditation is the principal means of quality assurance in higher education. The major emphasis of accreditation process is to measure the outcomes of the program that is being accredited.

In line with this, Faculty of Institute of Aeronautical Engineering, Hyderabad has taken a lead in incorporating philosophy of outcome based education in the process of problem solving and career development. So, all students of the institute should understand the depth and approach of course to be taught through this question bank, which will enhance learner's learning process.

V. COURSE OBJECTIVES:

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

i. Analyze and explain the control-flow and data-flow of a software program and a cycle-based hardware description,
ii. Transform simple software programs into cycle-based hardware descriptions with equivalent behavior and vice versa,
iii. Partition simple software programs into hardware and software components, and create appropriate hardware-software interfaces to reflect this partitioning,
iv. Identify performance bottlenecks in a given hardware-software architecture and optimize them by transformations on hardware and software components, and
v. Use simulation software to co-simulate software programs with cycle-based hardware descriptions.

VI. COURSE OUTCOMES:

After completing this course the student must demonstrate the knowledge and ability to:

1. Identify and analyze the constraints and characteristics of processor architectures, Hardware, software partitioning distributed system.
2. Understand the typical computer hardware and software components and computer technology trends.
3. Understand the future developments in emulation and prototyping architecture specialization techniques, system communication infrastructure target architectures.
4. Develop the application system and control dominated systems in real time embedded architecture design.
5. Apply the practical consideration in a compiler development environment.
6. Design verification, implementation verification of hardware and software co-designing in the real time applications.
7. Analyze the level specification, design representation for system level synthesis system design-I and design-II.

UNIT - I
INTRODUCTION TO AERONAUTICS AND ASTRONAUTICS
PART – A (Short Answer Questions)

S.No	Questions	Blooms Taxonomy Level	Course Outcome
1.	**Differentiate** between Lighter and heavier than air flights.		
2.	**Write** about first successful glider designed by OTTO.		
3.	**What** are different aerodynamic forces acting on a body?		
4.	**Name** few personalities and discuss about their contribution towards the developments of aircraft.		
5.	**Write** about WRIGHT FLYER I developed by the Wright Brothers and its configurations.		
6.	**Write** about PRE WRIGHT era.		
7.	**Differentiate** between Monoplane and Bi-plane?		
8.	**Discuss** about standard atmosphere.		
9.	**Discuss** how the evolution of aircraft contributed towards mankind?		
10.	**What** is altitude and write about properties that vary along with altitude.		

PART – B (Long Answer Questions)			
S.No	Questions	Blooms Taxonomy Level	Course Outcome
1.	**Explain** the greatest success stories in the history of aircraft technology starting from Wright brothers		
2.	**Describe** about earth's atmosphere.		
3.	**With** help of neat diagram explain the anatomy of aircraft and write about each part of the aircraft.		
4.	**Write** about Sir George Cayley and about his experiments and contribution towards aeronautics.		
5.	**What** are Hot air balloons? Discuss their impact on the aeronautical history.		
6.	**What** is an ornithopter? Can ornithopters be called flying machines? Justify your answer.		
7.	**With** help of a neat diagram explain the anatomy of i) Helicopter. ii) Rocket.		
8.	**Write** in detail about the development of balloons during the 18th century that flew in air and created history in lifting a human being off the ground.		
9.	**What** is an ornithopter? Can ornithopters be called flying machines? Justify your answer.		
10.	**Write** in detail about wind tunnel and application of windtunnel in aerodynamics.		

UNIT - II
ONE DIMENSIONAL FLOW IN INCOMPRESSIBLE AND COMPRESSIBLE FLUIDS, TWO DIMENSIONAL FLOW AND FINITE WING
PART – A (Short Answer Questions)

S.No	Questions	Blooms Taxonomy Level	Course Outcome
1.	**Define** mach number.		
2.	**Write** about limitations of one dimensional flow equations.		
3.	**Define** compressibility with respect to fluids.		
4.	**Define** compressible and incompressible fluid.		
5.	**Difference** between inviscid and viscous flows		

S.No	Questions	Blooms Taxonomy Level	Course Outcome
6.	**State** Continuity Equation and also represent the equation		
7.	**State** Momentum Equation and also represent the equation.		
8.	**What** is venturi meter?		
9.	**Define** an orifice meter		
10.	**Write** about finite versus infinite wing.		

PART – B (Long Answer Questions)			
S.No	Questions	Blooms Taxonomy Level	Course Outcome
1.	**List out** and explain the different types of flows		
2.	**Derive** Bernoullis equation.		
3.	**Explain** different types of Pitot tubes and its applications.		
4.	**Discuss** how do you measure the pressure by using manometers and mechanical gauges?		
5.	**Discuss** the importance of aerodynamics. Give historical examples.		
6.	**Define** density, weight density, specific gravity and specific volume of a fluid		
7.	**What** is a wind tunnel? Explain its working with a neat diagram.		
8.	**What** is air speed indicator, how it measures air speed and explain different air speed used in aircraft		
9.	**Derive** the fundamental equation of Prandtl's lifting line theory and obtain an expression for the induced drag coefficient for elliptic lift distribution.		
10.	**State** Helmholtz vortex theorems. Applying these theorems on to flow over a wing calculate induced drag coefficient for an elliptical lift distribution?		

UNIT - III			
VISCOUS EFFECTS, DRAG DETERMINATION, AIRFOILS, WINGS AND HIGH-LIFT SYSTEMS			
PART – A (Short Answer Questions)			
S.No	Questions	Blooms Taxonomy Level	Course Outcome
1.	**What** is boundary layer.		
2.	**What** is parasite drag.		
3.	**Explain** different types of shock waves.		
4.	**What** is aspect ratio.		
5.	**Discuss** the application of Reynolds number.		
6.	**What** is swept back of a wing.		
7.	**Explain** drag due to lift.		
8.	**Write** working principle of a supersonic aircraft.		
9.	**What** are modern airfoils and explain.		
10.	**Name** different types of airfoil characteristics.		

PART – B (Long Answer Questions)			
S.No	Questions	Blooms Taxonomy Level	Course Outcome
1.	**Discuss** briefly about shock waves and their formation.		
2.	**Explain** briefly about different types of drag.		
3.	**Explain** in detail about swept back wings.		
4.	**Discuss** in detail about mach angle.		
5.	**Explain** in detail about the concept of area rule.		
6.	**What** do you understand by subsonic and supersonic flows in detailed.		
7.	**Explain** about high lift devices of an aircraft in detailed.		
8.	**Define** deep stall and its significance.		
9.	**List** out the assumptions made in determination of Reynolds number in moving fluid		
10.	**Explain** about different types of airfoil characteristics with help of neat sketches.		

	UNIT - IV		
	AIRPLANE PERFORMANCE, STABILITY AND CONTROL, AEROSPACE PROPULSION		
	PART – A (Short Answer Questions)		
S.No	Questions	Blooms Taxonomy Level	Course Outcome
1.	**Explain** about the parameters which influence the performance of an aircraft.		
2.	**What** do you understand by the term climb.		
3.	**Write** a short note on term CRUISE.		
4.	**What** is aspect ratio.		
5.	**Discuss** performance in steady flight vehicle.		
6.	**What** do you understand by the terms static stability and dynamic stability.		
7.	**Explain** drag due to lift.		
8.	**Write** working principle of a ramjet engine.		
9.	**Explain** about gas turbine in the aircraft.		
10.	**What** is dynamic longitudinal stability.		

	PART – B (Long Answer Questions)		
S.No	Questions	Blooms Taxonomy Level	Course Outcome
1.	**Discuss** in detail about stall speed.		
2.	**Explain** in detail about mission profile of an civil aircraft.		
3.	**What** are different kinds of rockets and state mission for each type of the rocket.		
4.	**Discuss** longitudinal and lateral stabilities of an aircraft		
5.	**Explain** the concept of accelerated flight symmetric maneuvers.		
6.	**Describe** about the performance of a rocket engine briefly		
7.	**What** do you understand by the term stalling? Explain.		
8.	**Explain** about different parts of a rocket with help of a neat diagram		
9.	**Explain** the difference between Turbo prop and turbo fan engines with diagrams		
10.	**What** do you understand by Accelerated flight and stable flight?		

	UNIT - V		
	AIRCRAFT STRUCTURES, HYPERSONIC FLOWS, ROCKET TRAJECTORIES AND ORBITS		
	PART – A (Short Answer Questions)		
S.No	Questions	Blooms Taxonomy Level	Course Outcome
1.	**What** is stress strain diagram		
2.	**Write** short notes on power systems of satellite.		
3.	**Discuss** about mechanisms of a satellite.		
4.	**What** is fatiuge.		
5.	**What** is hypersonic flow		
6.	**Explain** about Apollo space mission.		
7.	**What** are the materials used in aircraft industry.		
8.	**What** are temperature effects in a hypersonic flow.		
9.	**What** do you understand by the term mission and give example.		
10.	**Write** a short note on "Space shuttle as a part of Satellite deployment".		

	PART – B (Long Answer Questions)		
S.No	Questions	Blooms Taxonomy Level	Course Outcome
1.	**Write** about properties of aluminum alloys and their applications in aircraft manufacturing.		
2.	**State** alloying elements of Steel and discuss the mechanical properties		
3.	**What** are different types of space missions? Explain.		

4.	**Explain** in detail about space mission objectives.		
5.	**Explain** different components of aircraft wing with help of diagram and explain about the types load bared by each component.		
6.	**Explain** how a material has to be chosen for manufacturing of an aircraft wing		
7.	**Describe** about the applications of composite materials in recent aircrafts		
8.	**Write** about properties of Duralumin and its applications in aircraft industry		
9.	**Explain** the difference in construction of monocoque and semi monocoque fuselage construction with help of diagrams.		
10.	**Write** about Ribs, Spars and Stringers and their uses and the stress that each part needs to carry.		

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