



Question Paper For Internal Assessment Examination (Theory) - Credit 3 / 79 /

NAME OF STUDY CENTER: SCHOOL OF AERONAUTICS, NEW DELHI

Instructions for Students / Faculty

Mid Term I (Total 60 Marks, 2 HRS. Syllabus from Unit-1)

- Part A: Total number of questions to be given are six (3 from CO1 and 3 from CO2), each carrying 2 marks and are compulsory to attend. There is no choice. They are short answer type questions (**Not More Than 25 Words for Both Question & Answer**), no objective type or fill in the blanks. Total 12 marks.
- Part B: Total number of questions to be given are six (3 from CO1 and 3 from CO2), out of which student has to answer four (2 from CO1 and 2 from CO2). They are long answer type (**Not More Than 50 Words for Question**), each carrying 4 marks. Total 16 marks.
- Part C: Total number of questions to be given are six (3 from CO1 and 3 from CO2), out of which student has to answer four (2 from CO1 and 2 from CO2). They are numerical answer type / fully elaborative type (**Not More Than 70 Words For Question**)*, each carrying 8 marks. Total 32 marks.

Mid Term II (Total 90 Marks, 2.5 HRS., Syllabus from Unit-2)

- Part A: Total number of questions to be given are ten (5 from CO3 and 5 from CO4), each carrying 3 marks and are compulsory to attend. There is no choice. They are short answer type questions (**Not More Than 25 Words for Both Question & Answer**), no objective type or fill in the blanks. Total 30 marks
- Part B: Total number of questions to be given are six (3 from CO3 and 3 from CO4), out of which student has to answer four (2 from CO3 and 2 from CO4). They are long answer type (**Not More Than 50 Words for Question**), each carrying 6 marks. Total 24 marks.
- Part C: Total number of questions to be given are six (3 from CO3 and 3 from CO4), out of which student has to answer any four (2 from CO3 and 2 from CO4). They are numerical answer type / fully elaborative type (**Not More Than 70 Words For Question**)*, each carrying 9 marks. Total 36 marks.

Mid Term III (Total 90 Marks, 2.5 HRS., Syllabus from Unit-3)

- Part A: Total number of questions to be given are ten (5 from CO5 and 5 from CO6), each carrying 3 marks and are compulsory to attend. There is no choice. They are short answer type questions (**Not More Than 25 Words for Both Question & Answer**), no objective type or fill in the blanks. Total 30 marks
- Part B: Total number of questions to be given are six (3 from CO5 and 3 from CO6), out of which student has to answer four (2 from CO5 and 2 from CO6). They are long answer type (**Not More Than 50 Words for Question**), each carrying 6 marks. Total 24 marks.
- Part C: Total number of questions to be given are six (3 from CO5 and 3 from CO6), out of which student has to answer four (2 from CO5 and 2 from CO6). They are numerical answer type / fully elaborative type (**Not More Than 70 Words For Question**)*, each carrying 9 marks. Total 36 marks.

* **LIST OF ELABORATIVE THEORY QUESTION SUBJECTS:** 3 MH4 - 07 Manufacturing Process, 4 AN4 - 06 Aircraft Materials and Processes (Cr 3), 5 AN4 - 05 Aircraft System (Cr 3), 6 AN4 - 05 Avionics-I (Cr 3), 6 MH4 - 03 Applied Hydraulics & Pneumatics (Cr 3), 6 MH5 - 11 Principles of Management (Cr 3), 6 MH5 - 13 Aircraft Electronics System (Cr 3), 7 AN5 - 12 Maintenance of Airframe and System (Cr 3), 7 AN5 - 13 Helicopter Theory (Cr 3), 7 AG6 - 60.1 Human Engineering and Safety (Cr 3), 7 ST - 01 Avionics II (Special Theory Subject) (Cr 3), 7 MH5 - 11 Design of Mechatronics Systems (Cr 3), 7 MH5 - 12 Robotics and Machine Vision System (Cr 3), 7 MH6 - 13 Medical Electronics (Cr 3), 7 AN6 - 60.1 Aircraft Avionic System (Cr 3), 8 AN5 - 12 Maintenance of Power Plant and System



Question Paper For Internal Assessment Examination (Theory) - Credit 3 / 79 /

NAME OF STUDY CENTER: SCHOOL OF AERONAUTICS, NEW DELHI(Cr 3), 8 AN5 - 13 Unmanned Aerial Vehicles & Systems (UAV) (Cr 3), 8 MH5 - 13 Product Development & Launching
(Cr 3), 8 EC6 - 60.2 Robotics and control (Cr 3)**Instructions For Faculties**

There should be total 6 Course Outcomes (COs) for each subject.

- Mid Term Question Papers are to be submitted as per Course Outcomes (COs) which should be divided equally in Part A, Part B and Part C according to Mid Term Examination and Credit Point.
- In Mid Term-1, the questions are to be given from CO1 and CO2. In Mid Term-2, the questions are to be given from CO3 and CO4. Similarly, in Mid Term-3, the questions are to be given from CO5 and CO6.
- **FACULTY MEMBERS, PLEASE ENSURE EXCEPT ABOVE LISTED SUBJECTS, NO THEORITICAL ELABORATIVE QUESTION SHOULD BE GIVEN IN PART 'C' OF QUESTION PAPER**

INSTRUCTION FOR STUDENTS

- **STUDENT IS ALLOWED TO ENTER LATE NOT MORE THAN 15 MIN AFTER STARTING OF EXAM,**

QUESTION PAPER & STUDENTS DETAILS

Type of Exam	Mid Term 1	Date of Submission	15/03/2021
Name of Faculty	Sonali Singh	Date of Examination	23/03/2021
Course	B.Tech Engineering) (Aeronautical	Semester	SEMESTER : 6
Batch	DS - 2018	Subject	6 AN4 - 04 Aircraft Performance (Cr 3)-

COURSE OUTCOMES FOR REFERENCE TO FRAME QUESTION PAPERS

(Faculties are required to mention Course Outcome Number against each part of the question paper)

Course Outcome	<p>COURSE OBJECTIVE</p> <p>CO 1. Predict performance characteristics of physical nature of atmosphere and concepts of EAS, TAS and IAS.</p> <p>CO 2. Interpret the concept of basic equations governing the steady performance of airplanes.</p> <p>CO 3. Gain insights into the performance of airplanes during steady glide and climb.</p> <p>CO 4. Investigate the factors affecting landing and take-off performance of airplanes.</p> <p>CO 5. Demonstrate about the flight envelope and turning performance of airplanes.</p> <p>CO 6. Explain the working of High Lift devices and its performance parameters.</p>		
Email I'd	sonali@soaneemrana.org	Phone No.	900-324-6157
Student Name		Student Reg No.	

PART A**All the questions are compulsory to attend.**



Question Paper For Internal Assessment Examination (Theory) - Credit 3 / 79 /

NAME OF STUDY CENTER: SCHOOL OF AERONAUTICS, NEW DELHI

1. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.

CO 1

Question : 1	Define international standard atmosphere.		
2	Standard Atmosphere	Introduction to Flight by John D. Anderson	
Question : 2	Define pressure and density altitude.		
3	Stability of atmosphere	Introduction to Flight by John D. Anderson	
Question : 3	Write the name of primary flight instruments		
4	Primary Flight Instruments	Aircraft Stability and Control by Robert b. nelson	
Question : 4			
Question : 5			

2. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.

CO 2

Question : 6	Write the equations of motion for steady, level flight.		
5	Aerodynamic Characteristics	Aircraft Performance and Design by Jhon D. Anderson	
Question : 7	Define aspect ratio.		
6	Effect of aspect ratio	Aircraft Performance and Design by Jhon D. Anderson	
Question : 8	Write the types of drag.		
8	Different Types of Drag	: Aircraft Performance and Design by Jhon D. Anderson	
Question : 9			
Question : 10			

PART B



Question Paper For Internal Assessment Examination (Theory) - Credit 3 / 79 /

NAME OF STUDY CENTER: SCHOOL OF AERONAUTICS, NEW DELHI

FOR MIDTERM 1 - Part B: Total number of questions to be given are six (3 from CO1 and 3 from CO2), out of which student must answer four (2 from CO1 and 2 from CO2).

FOR MIDTERM 2 - Part B: Total number of questions to be given are six (3 from CO3 and 3 from CO4), out of which student must answer four (2 from CO3 and 2 from CO4).

FOR MIDTERM 3 - Part B: Total number of questions to be given are six (3 from CO5 and 3 from CO6), out of which student has to answer four (2 from CO5 and 2 from CO6).

3. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.

CO 1

Question : 1

Derive the relation between geopotential and geometric altitudes.

2

Standard atmosphere

Introduction to Flight by
John D. Anderson**Question : 2**

Discuss about dry adiabatic lapse rate.

3

Stability of atmosphere

Introduction to Flight by
John D. Anderson**Question : 3**Write short notes on:
a. Airspeed Indicator
b. Vertical Speed Indicator
c. Turn and Bank Indicator

4

Primary Flight Instruments

Aircraft Stability and
Control by Robert b.
nelson**4. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.**

CO 2

Question : 4

Discuss about variation of aerodynamic coefficients with angle of attack.

5

Aerodynamic Characteristics

Aircraft Performance
and Design by Jhon D.
Anderson**Question : 5**Write short notes on:
a. Interference Drag
b. Skin-friction Drag
c. Induced Drag

8

Different types of drag

Aircraft Performance
and Design by Jhon D.
Anderson**Question : 6**

Discuss about area rule.

9

Design methods to reduce drag

Aircraft Performance
and Design by Jhon D.
Anderson**Question : 7 (Old Pattern)**



Question Paper For Internal Assessment Examination (Theory) - Credit 3 / 79 /

NAME OF STUDY CENTER: SCHOOL OF AERONAUTICS, NEW DELHI**PART C**

FOR MIDTERM 1 - Part C: Total number of questions to be given are six (3 from CO1 and 3 from CO2), out of which student must answer four (2 from CO1 and 2 from CO2).

FOR MIDTERM 2 - Part C: Total number of questions to be given are six (3 from CO3 and 3 from CO4), out of which student must answer four (2 from CO3 and 2 from CO4).

FOR MIDTERM 3 - Part C: Total number of questions to be given are six (3 from CO5 and 3 from CO6), out of which student has to answer four (2 from CO5 and 2 from CO6).

5. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.

CO 1

Question : 1

Calculate the standard atmosphere values of T, P, and ρ at a Geo-potential altitude of 15 km.

2

Standard Atmosphere

Introduction to Flight by John D. Anderson

Question : 2

If an airplane is flying at an altitude where the actual pressure and temperature are 4.72×10^4 N/m² and 255.7 K, respectively, Calculate pressure, temperature, and density altitudes.

2

Standard Atmosphere

Introduction to Flight by John D. Anderson

Question : 3

An aircraft altimeter calibrated to the standard atmosphere reads 10,000 ft. The airspeed indicator has been calibrated for both instrument and position errors and reads a velocity of 120 knots. If the outside air temperature is 20°F, determine the true airspeed.

4

Primary Flight Instruments

Aircraft Stability and Control by Robert b. nelson

6. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.

CO 2

Question : 4

Consider a swept wing with a taper ratio of 0.5, leading edge sweep angle of 45°, and an aspect ratio of 3. Calculate the lift coefficient at Mach 2 at an angle of attack of 2°.

7

Planform, Sweep, Taper And Twist On Aerodynamic Characteristics

Aircraft Performance and Design by Jhon D. Anderson

Question : 5

For low-speed flow, calculate the lift-to-drag ratio for this wing at 6° angle of attack. Assume the span efficiency factor e is 0.95.

8

Different Types Of Drag

Aircraft Performance and Design by Jhon D. Anderson

Question : 6

Derive the drag polar equation.



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NAME OF STUDY CENTER: SCHOOL OF AERONAUTICS, NEW DELHI

8	Drag Polar	Aircraft Performance and Design by Jhon D. Anderson	
Upload Scanned Document In Case of Numerical or Diagram For Any of The Above Questions. <i>(Mention question number with relevant fig / numerical / equations. Max 150 KB)</i>			
I have scrutinized the question paper. There is no spelling mistake or any type of irrelevant question.			

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Question Paper For Internal Assessment Examination (Theory) - Credit 3 / 87 /

NAME OF STUDY CENTER: SCHOOL OF AERONAUTICS, NEEMRANA

Instructions for Students / Faculty

Mid Term I (Total 60 Marks, 2 HRS. Syllabus from Unit-1)

- Part A: Total number of questions to be given are six (3 from CO1 and 3 from CO2), each carrying 2 marks and are compulsory to attend. There is no choice. They are short answer type questions (**Not More Than 25 Words for Both Question & Answer**), no objective type or fill in the blanks. Total 12 marks.
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Mid Term II (Total 90 Marks, 2.5 HRS., Syllabus from Unit-2)

- Part A: Total number of questions to be given are ten (5 from CO3 and 5 from CO4), each carrying 3 marks and are compulsory to attend. There is no choice. They are short answer type questions (**Not More Than 25 Words for Both Question & Answer**), no objective type or fill in the blanks. Total 30 marks
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Question Paper For Internal Assessment Examination (Theory) - Credit 3 / 87 /

NAME OF STUDY CENTER: SCHOOL OF AERONAUTICS, NEEMRANA(Cr 3), 8 AN5 - 13 Unmanned Aerial Vehicles & Systems (UAV) (Cr 3), 8 MH5 - 13 Product Development & Launching
(Cr 3), 8 EC6 - 60.2 Robotics and control (Cr 3)**Instructions For Faculties**

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INSTRUCTION FOR STUDENTS

- **STUDENT IS ALLOWED TO ENTER LATE NOT MORE THAN 15 MIN AFTER STARTING OF EXAM,**

QUESTION PAPER & STUDENTS DETAILS

Type of Exam	Mid Term 1	Date of Submission	17/03/2021
Name of Faculty	Mr. Bipin Kumar Dwivedi	Date of Examination	23/03/2021
Course	B.Tech (Aeronautical Engineering)	Semester	SEMESTER : 6
Batch	Combined Batches 15, 16, 17, SF 1	Subject	6 AN4 - 04 Aircraft Performance (Cr 3)-

COURSE OUTCOMES FOR REFERENCE TO FRAME QUESTION PAPERS

(Faculties are required to mention Course Outcome Number against each part of the question paper)

Course Outcome	CO 1. Predict performance characteristics of physical nature of atmosphere and concepts of EAS, TAS and IAS. CO 2. Interpret the concept of basic equations governing the steady performance of airplanes.		
Email I'd	bipinkumardwivedi@soaneemrana.org	Phone No.	931-400-9035
Student Name		Student Reg No.	

PART A

All the questions are compulsory to attend.

1. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.

CO 1

Question : 1 Define the Absolute altitude.



Question Paper For Internal Assessment Examination (Theory) - Credit 3 / 87 /

NAME OF STUDY CENTER: SCHOOL OF AERONAUTICS, NEEMRANA

1	International standard atmosphere	INTRDUCTION TO FLIGHT BY JHON D ANDERSON	
Question : 2	Differentiate between geometric and geopotential altitude.		
2	International standard atmosphere	INTRDUCTION TO FLIGHT BY JHON D ANDERSON	
Question : 3	Differentiate between equivalent airspeed and true airspeed.		
5	International standard atmosphere	INTRDUCTION TO FLIGHT BY JHON D ANDERSON	
Question : 4			
Question : 5			
2. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.			CO 2
Question : 6	Define the aspect ratio of wing.		
7	Aerodynamic Characteristics	INTRDUCTION TO FLIGHT BY JHON D ANDERSON	
Question : 7	Differentiate between drag divergence Mach number and critical Mach number.		
8	Aerodynamic Characteristics	INTRDUCTION TO FLIGHT BY JHON D ANDERSON	
Question : 8	Define the drag polar.		
9	Aerodynamic Characteristics	INTRDUCTION TO FLIGHT BY JHON D ANDERSON	
Question : 9			
Question : 10			

PART B



Question Paper For Internal Assessment Examination (Theory) - Credit 3 / 87 /

NAME OF STUDY CENTER: SCHOOL OF AERONAUTICS, NEEMRANA

FOR MIDTERM 1 - Part B: Total number of questions to be given are six (3 from CO1 and 3 from CO2), out of which student must answer four (2 from CO1 and 2 from CO2).

FOR MIDTERM 2 - Part B: Total number of questions to be given are six (3 from CO3 and 3 from CO4), out of which student must answer four (2 from CO3 and 2 from CO4).

FOR MIDTERM 3 - Part B: Total number of questions to be given are six (3 from CO5 and 3 from CO6), out of which student has to answer four (2 from CO5 and 2 from CO6).

3. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.

CO 1

Question : 1 Derive the expression of pressure variation in following atmospheric regions,
(a) Troposphere region.
(b) Isothermal region in stratosphere.

2	International standard atmosphere	INTRDUCTION TO FLIGHT BY JHON D ANDERSON	
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Question : 2 Derive the expression to determine the stability of atmosphere.

3	International standard atmosphere	INTRDUCTION TO FLIGHT BY JHON D ANDERSON	
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Question : 3 Explain the following
(a) Indicated airspeed
(b) Calibrated airspeed
(c) Equivalent airspeed
(d) True airspeed

4	International standard atmosphere	INTRDUCTION TO FLIGHT BY JHON D ANDERSON	
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4. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.

CO 2

Question : 4 Derive the relation between Finite wing lift slope(a) and Infinite wing lift Slope(a0).

7	Aerodynamic Characteristics	INTRDUCTION TO FLIGHT BY JHON D ANDERSON	
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Question : 5 Explain the following,
(a) Effect of aspect ratio on the lift and drag.
(b) Effect of sweep angle on critical Mach number.

8	Aerodynamic Characteristics	INTRDUCTION TO FLIGHT BY JHON D ANDERSON	
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Question : 6 Explain about the various types of drag generated on aircraft.

9	Aerodynamic Characteristics	INTRDUCTION TO FLIGHT BY JHON D ANDERSON	
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Question Paper For Internal Assessment Examination (Theory) - Credit 3 / 87 /

NAME OF STUDY CENTER: SCHOOL OF AERONAUTICS, NEEMRANA**Question : 7 (Old Pattern)****PART C****FOR MIDTERM 1 - Part C:** Total number of questions to be given are six (3 from CO1 and 3 from CO2), out of which student must answer four (2 from CO1 and 2 from CO2).**FOR MIDTERM 2 - Part C:** Total number of questions to be given are six (3 from CO3 and 3 from CO4), out of which student must answer four (2 from CO3 and 2 from CO4).**FOR MIDTERM 3 - Part C:** Total number of questions to be given are six (3 from CO5 and 3 from CO6), out of which student has to answer four (2 from CO5 and 2 from CO6).**5. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.**

CO 1

Question : 1

Calculate the pressure, temperature and density at an altitude of 15000m in International standard atmosphere.

3

International standard atmosphere

INTRDUCTION TO
FLIGHT BY JHON D
ANDERSON**Question : 2**

An aircraft flies at an altitude of 10,000m. Determine the air temperature, air pressure and air density at this altitude.

4

International standard atmosphere

INTRDUCTION TO
FLIGHT BY JHON D
ANDERSON**Question : 3**A high speed subsonic Boeing 777 airliner is flying at a pressure altitude of 12km. A pitot tube on the vertical tail measures a pressure of $2.96 \times 10^4 \text{ N/m}^2$. At what Mach number airplane is flying?

5

International standard atmosphere

INTRDUCTION TO
FLIGHT BY JHON D
ANDERSON**6. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.**

CO 2

Question : 4

Consider a low-speed airplane flying at a velocity of 55m/sec. If the velocity at a point on the fuselage is 62m/sec, what is pressure coefficient at this point?

7

Aerodynamic Characteristics

INTRDUCTION TO
FLIGHT BY JHON D
ANDERSON**Question : 5**The Cessna cardinal, a single- engine light plane, has a wing with an area of 16.2 m² and an aspect ratio of 7.31. Assume the span efficiency factor is 0.62 . If the airplane is flying at standard sea level conditions with a velocity of 251 km/h, what is the induced drag when the total weight is 9800 N?



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9	Aerodynamic Characteristics	INTRDUCTION TO FLIGHT BY JHON D ANDERSON	
Question : 6	Consider a finite wing at an angle of attack of 6 degree. The normal and axial force coefficients are 0.8 and 0.06, respectively. Calculate the corresponding lift and drag coefficients.		
9	Aerodynamic Characteristics	INTRDUCTION TO FLIGHT BY JHON D ANDERSON	
Upload Scanned Document In Case of Numerical or Diagram For Any of The Above Questions. (Mention question number with relevant fig / numerical / equations. Max 150 KB)			
I have scrutinized the question paper. There is no spelling mistake or any type of irrelevant question.			
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The message has been sent from 123.63.6.45 (India) at 2021-03-17 17:18:38 on Firefox 86.0
Entry ID: 87