



Question Paper For Internal Assessment Examination (Theory) - Credit 3 / 111 /

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.
- 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



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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**

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 2	Date of Submission	21/06/2021
Name of Faculty	Mr. Bipin Kumar Dwivedi	Date of Examination	29/06/2021
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 3. Gain insights into the performance of airplanes during steady and level flight. CO 4. Investigate the factors affecting climbing and gliding 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 3

Question : 1 Define the steady level flight.

11	Steady level flight	INTRDUCTION TO FLIGHT BY JHON D ANDERSON	
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NAME OF STUDY CENTER: SCHOOL OF AERONAUTICS, NEEMRANA

Question : 2	Differentiate between thrust required and thrust available.		
13	Steady level flight	INTRDUCTION TO FLIGHT BY JHON D ANDERSON	
Question : 3	Differentiate between power required and power available.		
15	Steady level flight	INTRDUCTION TO FLIGHT BY JHON D ANDERSON	
Question : 4	Draw the thrust required vs velocity curve.		
14	Steady level flight	INTRDUCTION TO FLIGHT BY JHON D ANDERSON	
Question : 5	Draw the power required vs velocity curve.		
16	Steady level flight	INTRDUCTION TO FLIGHT BY JHON D ANDERSON	
2. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.			CO 4
Question : 6	Define rate of climb.		
18	Steady level flight	INTRDUCTION TO FLIGHT BY JHON D ANDERSON	
Question : 7	Define excess power.		
19	Steady level flight	INTRDUCTION TO FLIGHT BY JHON D ANDERSON	
Question : 8	Define absolute and service ceiling.		
21	Steady level flight	INTRDUCTION TO FLIGHT BY JHON D ANDERSON	
Question : 9	Define gliding flight.		
22	Steady level flight	INTRDUCTION TO FLIGHT BY JHON D ANDERSON	
Question : 10	Define the condition of maximum glide range.		
22	Steady level flight	INTRDUCTION TO FLIGHT BY JHON D ANDERSON	



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NAME OF STUDY CENTER: SCHOOL OF AERONAUTICS, NEEMRANA**PART B**

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 3

Question : 1 Derive the equation of motion for Aircraft.

12

Steady level flight

INTRDUCTION TO
FLIGHT BY JHON D
ANDERSON

Question : 2 Derive the minimum thrust required condition for Aircraft.

15

Steady level flight

INTRDUCTION TO
FLIGHT BY JHON D
ANDERSON

Question : 3 Derive the minimum power required condition for Aircraft.

16

Steady level flight

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

CO 4

Question : 4 Derive the altitude effects on minimum power required condition for steady level flight.

20

Steady level flight

INTRDUCTION TO
FLIGHT BY JHON D
ANDERSON

Question : 5 Derive the expression of maximum rate of climb.

21

Steady level flight

INTRDUCTION TO
FLIGHT BY JHON D
ANDERSON

Question : 6 Derive the expression of gliding angle to achieve maximum glide range.

22

Steady level flight

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**Question : 7 (Old
Pattern)**



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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 3

Question : 1

A single engine light plane has a wing with an area of 16.2 square Meter and 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 251km/h, what is the induced drag when the total weight is 9800N.

14

Steady level flight

INTRDUCTION TO
FLIGHT BY JHON D
ANDERSON

Question : 2

For the single engine light plane in problem (part-c, question-1), Calculate the induced drag and induced drag factor (δ), when the Stalling speed at sea level with flap down is 85.5km/h.

14

Steady level flight

INTRDUCTION TO
FLIGHT BY JHON D
ANDERSON

Question : 3

A finite wing of area 0.14m² and AR of 6 is tested in wind tunnel at a velocity of 40 m/s at standard sea-level conditions. At an angle of attack of -10, the measured lift and drag are 0 and 0.81N. At an angle of attack of 20, the lift and drag are measured as 22.25 and 1.023 N. Calculate the span efficiency factor and the infinite wing lift slope.

11

Steady level flight

INTRDUCTION TO
FLIGHT BY JHON D
ANDERSON

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

CO 4

Question : 4

Consider an airplane weight is 38220N, wing area is 27.3 m², Aspect ratio is 7.5, span efficiency factor is 0.9, and zero lift drag Coefficient is 0.03. Calculate the thrust required to fly at a velocity Of 350 km/h at standard sea level conditions.

16

Steady level flight

INTRDUCTION TO
FLIGHT BY JHON D
ANDERSON



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Question : 5	An airplane weighing 22250 N is flying at standard sea level with A velocity of 89.41m/s. At this velocity, the L/D ratio is a maximum. The wing area and aspect ratio are 18.58m ² and 8.5, respectively. The span efficiency factor is 0.93. Calculate the zero lift drag and Drag due to lift.		
17	Steady level flight	INTRDUCTION TO FLIGHT BY JHON D ANDERSON	
Question : 6	An aeroplane weight 160,000N and has a wing area of 42m ² . At a flight sped of 100m/s the engines give a trust of 27, 000N if the aircraft drag equation is $C_D=0.014+0.05C_L^2$. Find the rate of climb at sea-level at 100m/s flight speed.		
23	Steady level flight	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.			
Corporate Office: H 974, Palam Extension, Part: 1, Sector: 7, Dwarka, New Delhi			

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