Question Paper For Internal Assessment Examination (Theory) - Credit 4 / 49 /

Instructions for Students/FacultyMid Term I (Total 80 Marks, 2 HRS. Syllabus from Unit-1)

- Part A: Total number of questions to be given are ten (5 from CO1 and 5 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 20 marks.
- 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). They are long answer type (**Not More Than 50 Words for Question)**, each carrying 5 marks. Total 20 marks.
- 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). They are numerical answer type / fully elaborative type (**Not More Than 70 Words for Question)** *, each carrying 10 marks. Total 40 marks.

Mid Term II (Total 120 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 4 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 40 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 7 marks. Total 28 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 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 13 marks. Total 52 marks.

Mid Term III (Total 120 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 4 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 40 marks.
- Part B: Total number of questions to be given are six (3 from CO5 and 3 from CO6), out of which student must answer four (2 from CO5 and 2 from CO6). They are long answer type (**Not More Than 50 Words for Question)**, each carrying 7 marks. Total 28 marks.
- Part C: Total number of questions to be given are six (3 from CO5 and 3 from CO6), out of which student must 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 13 marks. Total 52 marks.

*** LIST OF ELABORATIVE THEORY QUESTION SUBJECTS**: NO SUBJECT UNDER CREDIT FOUR

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, AND MAY LEAVE THE EXAM HALL ON EXPIRY OF ATLEAST OF 1 Hr FROM THE STARTING TIME OF EXAMINATION.**

QUESTION PAPER AND STUDENTS DETAILS

Type of Exam	Mid Term 3	**Date of Submission**	18/08/2021
Name of Faculty	Maris Brightson C L	**Date of Examination**	24/08/2021
Course	B.Tech (Aeronautical Engineering)	**Semester**	SEMESTER : 4
Batch	Combined Batches 18, 19, SF 2	**Subject**	4 AN4 - 04 Aerodynamics-I (Cr 4)

COURSE OUTCOMES FOR REFERENCE TO FRAME QUESTION PAPER

(Faculties are required to mention relevant Course Outcome number against the respective question in QP)

Course Outcome	CO5: Explain the Finite wing theory and its impact on aircraft design. CO6: Illustrate the principles wind tunnel theory and its practical application in aeronautical engineering field.		
Email I'd	marisbrightson@soaneemrana.org	**Phone No.**	805-667-7643
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.			5
Question : 1	Define effective angle of attack.		
30	Finite Wing Theory	Fundamentals of Aerodynamics - J D Anderson	
Question : 2	Define Helmholtz's vortex theorems.		
31	Finite Wing Theory	Fundamentals of Aerodynamics - J D Anderson	
Question : 3	Define zero-lift angle.		
34	Finite Wing Theory	Fundamentals of Aerodynamics - J D Anderson	

Question : 4	Define span efficiency factor.		
35	Finite Wing Theory	Fundamentals of Aerodynamics - J D Anderson	
Question : 5	List the differences between the finite wing and infinite wing.		
29	Finite Wing Theory	Fundamentals of Aerodynamics - J D Anderson	
2. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.			6
Question : 6	Define flow similarity.		
36	Wind Tunnel Theory	Theoretical and Experimental Aerodynamics	
Question : 7	Define scale factor.		
36	Wind Tunnel Theory	Theoretical and Experimental Aerodynamics	
Question : 8	List some applications of a wind tunnel.		
36	Wind Tunnel Theory	Theoretical and Experimental Aerodynamics	
Question : 9	Define pressure coefficient.		
39	Wind Tunnel Theory	Theoretical and Experimental Aerodynamics	
Question : 10	Define shock tube.		
40	Wind Tunnel Theory	Theoretical and Experimental Aerodynamics	

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.	5

Question : 1	Derive the expression of velocity induced at any arbitrary point by a semi-infinite straight vortex filament		
31	Finite Wing Theory	Fundamentals of Aerodynamics - J D Anderson	
Question : 2	Explain the following: (a) Biot-Savart law (b) Bound vortex (c) Horseshoe vortex		
32	Finite Wing Theory	Fundamentals of Aerodynamics - J D Anderson	
Question : 3	Explain the following: (a) Critical Mach number (b) Drag-divergence Mach number		
35	Finite Wing Theory	Fundamentals of Aerodynamics - J D Anderson	
4. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.			6
Question : 4	Discuss the classification of wind tunnels.		
36	Wind Tunnel Theory	Theoretical and Experimental Aerodynamics	
Question : 5	Explain the layout of an open-circuit low-speed wind tunnel.		
37	Wind Tunnel Theory	Theoretical and Experimental Aerodynamics	
Question : 6	Discuss the merits and demerits of indraft tunnels.		
38	Wind Tunnel Theory	Theoretical and Experimental Aerodynamics	
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.			5
Question : 1	Derive the fundamental equation of Prandtl's classical lifting-line theory.		
32	Finite Wing Theory	Fundamentals of Aerodynamics - J D Anderson	
Question : 2	Consider a cruising airplane with -2 degree zero-lift angle of attack, the lift slope of the airfoil section is 0.1 per degree, the lift efficiency factor $\tau = 0.04$, and the wing aspect ratio is 7.96. At the cruising condition lift coefficient is equal to 0.21, Calculate the angle of attack of the airplane.		
33	Finite Wing Theory	Fundamentals of Aerodynamics - J D Anderson	
Question : 3	Refer attachment		
34	Finite Wing Theory	Fundamentals of Aerodynamics - J D Anderson	
6. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.			6
Question : 4	Refer attachment		
37	Wind Tunnel Theory	Theoretical and Experimental Aerodynamics	
Question : 5	Refer attachment		
37	Wind Tunnel Theory	Theoretical and Experimental Aerodynamics	
Question : 6	Refer attachment		
37	Wind Tunnel Theory	Theoretical and Experimental Aerodynamics	
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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