Question Paper For Internal Assessment Examination (Theory) - Credit 3 / 65 /

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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(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**	01/02/2021
Name of Faculty	Mr. Sidhartha Sondh	**Date of Examination**	03/02/2021
Course	B.Tech (Aeronautical Engineering)	**Semester**	SEMESTER : 3
Batch	Combined Batches 18, 19, SF 2	**Subject**	3 AN3 - 03 Engineering Thermodynamics (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	CO3: Relate theoretical knowledge with various flow processes like steady flow, unsteady flow. CO4: Interpret the second law of thermodynamics for various engineering systems.		
Email I'd	sidharthasondh@soaneemrana.org	**Phone No.**	963-455-7511
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	When is the flow through a control volume steady?		
9	Steady flow	Self	

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Question : 2	Define flow energy. Do fluids at rest possess any flow energy?		
10	Flow energy	Self	
Question : 3	Can a steady-flow system involve boundary work?		
11	Boundary work	Self	
Question : 4	Outline the application of throttling process in engineering.		
9	Application of 1st law	Self	
Question : 5	Is heat transfer to or from the fluid desirable as it flows through a nozzle?		
8	Nozzle	Self	
2. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.			CO 4
Question : 6	Is heat transfer to or from fluid desirable as it flows through a nozzle? How will heat transfer affect the fluid velocity at nozzle exit?		
13	Heat engine	Self	
Question : 7	Define thermal energy reservoir. Give some examples.		
14	Reservoir	Self	
Question : 8	Show that the Kelvin–Planck and the Clausius expressions of the second law are equivalent.		
15	2nd law of thermodynamics	Self	
Question : 9	Define the coefficient of performance of a refrigerator in words. Can it be greater than unity?		
15	2nd law of thermodynamics	Self	
Question : 10	Why are engineers interested in reversible processes even though they can never be achieved?		
16	Reversible processes	Self	

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 expression for filling water in a tank.		
10	Unsteady flow	Self	

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Question : 2	Steam enters a nozzle at 400°C and 800 kPa with a velocity of 10 m/s, and leaves at 300°C and 200 kPa while losing heat at a rate of 25 kW. For an inlet area of 800 sq. cm, determine the velocity and the volume flow rate of the steam at the nozzle exit.		
9	Nozzle	Engineering Thermodynamics By Cengel and Boles	
Question : 3	Mention the Carnot theorem for heat engines.		
15	Carnot theorem	Self	
4. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.			CO 4
Question : 4	Give the following statements of the second law of thermodynamics (a) Kelvin-Planck statement and (b) Classius statement. Is the second law independent of first law? Take a suitable example to justify.		
15	2nd law of thermodynamics	Self	
Question : 5	Define COP. An inventor claims to have developed a refrigerator that maintains the refrigerated space at 1°C while operating in a room where the temperature is 24°C and that has a COP of 13.5. Is this claim reasonable? Support your answer with proper reason.		
14	Heat Pump	Engineering Thermodynamics By Cengel and Boles	
Question : 6	Explain what is irreversibility? What are the different types of irreversibility that occur during a process?		
17	Irreversibility	Self	
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 3
Question : 1	Consider a steady-flow heat exchanger involving two different fluid streams. Under what conditions will the amount of heat lost by one fluid be equal to the amount of heat gained by the other? Explain.

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8	Application of First law	Self	
Question : 2	Air at 10°C and 80 kPa enters the diffuser of a jet engine steadily with a velocity of 200 m/s. The diffuser requires a heat of 20 kJ. The air leaves the diffuser with a velocity that is 10 m/s producing a work of 500 W. Determine (a) the mass flow rate of the air and (b) the temperature of the air leaving the diffuser.		
10	Application of First law	Engineering Thermodynamics By Cengel and Boles	
Question : 3	The conditions of steam at inlet and outlet of the triple expansion engine which develops 750 kW power are listed as given below p1 = 10 bar, T1= 200°C, vs1 = 0.206 m3/kg, h1 = 2827 kJ/kg, V1=20 m/sec and p2=0.15 bar, T2=54°C, vs2=8.93 m3/kg, h2=2340.5 kJ/kg, V2 = 120 m/sec. The flow of steam through the turbine is 2.1 kg/sec. Determine heat transfer per second from engine.		
9	Steady Flow Energy Equation	Engineering Thermodynamics By Cengel and Boles	
6. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.			CO 4
Question : 4	A reversible engine receives heat from a reservoir at 700 deg. C and rejects heat at temperature T2. A second reversible engine receives the heat rejected by the first engine and rejects to a sink at temperature 37 deg. C. Calculate the temperature T2 for: (i) Equal efficiency of both the engines (ii) Equal work output of both the engines.		
15	Heat Engine	RTU question paper	
Question : 5	An inventor makes the following claims. Determine, whether his claims are valid or invalid? Why? An engine operates between 1000K and 400K with a heat transfer into the engine of 500 kW. The inventor states that the heat transfer to the low temperature reservoir is 250 kW and the work output is 250 kW.		
14	2nd law of thermodynamics	Engineering Thermodynamics By Cengel and BolesEngineering Thermodynamics By Cengel and Boles	
Question : 6	A reversible heat pump is used for heating a building in the winter season. The heat is absorbed from the earth by a fluid circulating in buried pipes and delivered to the building to maintain the temperature at 23 ^{0}C. Determine amount of heat supplied to building if one kW-hr of electrical energy is needed to operate the heat pump. The soil temperature maybe taken as 0 ^{0}C.		
13	2nd law of thermodynamics	Engineering Thermodynamics By Cengel and Boles	

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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.	