School of Aeronautics (Neemrana)

I-04, RIICO Industrial Area, Neemrana, Dist. Alwar, Rajasthan

Approved by Director General of Civil Aviation, Govt. of India, All India Council for Technical Education
Ministry of HRD, Govt of India & Affiliated to Rajasthan Technical University, Kota & BTU, Bikaner Rajasthan

Question Paper For Internal Assessment Examination (Theory) - Credit 3 / 32 / SET 1

Instructions For Students / FacultyMid Term I (Total 60 Marks, 2 HRS. Syllabus From Beginning Of Session)
• Part A: Total number of questions to be given are five, 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 15 marks.
• Part B: Total number of questions to be given are six, out of which student has to answer any four. 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 four, out of which student has to answer any three. They are numerical answer type / fully elaborative type (**Not More Than 70 Words For Question)***, each carrying 7 marks. Total 21 marks.
Mid Term II & III (Total 90 Marks, 2.5 HRS. Syllabus From Beginning Of Session)
• Part A: Total number of questions to be given are ten, 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 seven, out of which student has to answer any five. They are long answer type (**Not More Than 50 Words For Question)**, each carrying 6 marks. Total 30 marks.
• Part C: Total number of questions to be given are five, out of which student has to answer any four. They are numerical answer type / fully elaborative type (**Not More Than 70 Words For Question)***, each carrying 10 marks. Total 40 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 (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)

FACULTY MEMBERS, PLEASE ENSURE EXCEPT ABOVE LISTED SUBJECTS, NO THEORITICAL ELABORATIVE QUESTION SHOULD BE GIVEN IN PART 'C' OF QUESTION PAPER

Question Paper & Student Details

Mid Term	Mid Term 2	**Date of Submission**	21/08/2020
Name of Faculty	Mr. Sidhartha Sondh	**Date of Examination**	25/08/2020
Course	B.Tech (Mechatronics Engineering)	**Semester**	SEMESTER : 3
Batch	Fifth (5)	**Subject**	3 MH4 - 06 Engineering Thermodynamics (Cr 3)

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	COURSE OUTCOME 1. A fundamental understanding of the first and second laws of thermodynamics and their application to a wide range of systems. 2. Understanding of the first law of thermodynamics and various forms of work that can occur. An ability to analyze the work and heat interactions associated with a prescribed process path, and to perform a first law analysis of a flow system. 3. An ability to evaluate entropy changes in a wide range of processes. Familiarity with calculations of the efficiencies of heat engines and other engineering devices. 4. An understanding of the use of the Gibbs and Helmholtz free energies as equilibrium criteria, and the statement of the equilibrium condition for closed and open systems. 5. To be able to use mathematical and thermodynamic relation where ever required.

Email I'd	sidharthasondh@soaneemrana.org	**Phone No.**	963-455-7511
Student Name		**Student Reg No.**	

Part A

Question : 1	What are the different types of system?		
1	Fundamentals	Self	1

Question : 2	What is the necessary condition to determine the entropy of a series of process?		
16	Entropy	Self	4
Question : 3	What is the significance of Carnot efficiency?		
14	Carnot Engine	Self	2
Question : 4	What is a throttling process?		
13	Application of 1st law	Self	2
Question : 5	Differentiate between steady flow process and unsteady flow process.		
14	Application of 1st law	Self	2
Question : 6	What s a control volume?		
16	Control volume	Self	2
Question : 7	Define Carnot engine.		
14	Carnot Engine	Self	3
Question : 8	What is T-s Diagram?		
10	Property	Self	2
Question : 9	Is it possible to mathematically prove second law of thermodynamics? Give reason.		
16	Second law of thermodynamics	Self	4
Question : 10	State Clausius statement of second law of thermodynamics.		
16	Second law of thermodynamics	Self	3
Part B			
Question : 1	Justify the statement "Entropy is degradation of energy". Support your answer with a valid example.		
18	Entropy	Self	3
Question : 2	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.		
16	Heat Pump	Engineering Thermodynamics By Cengel and Boles	4
Question : 3	Write a note on: i. Helmholtz function ii. Gibbs function		
18	Availability function	Self	4
Question : 4	Derive the expression of availability for a closed system.		
21	Availability	Self	4
Question : 5	Considering a suitable example, elaborate on the concept of control volume.		
6	Control volume	Self	2
Question : 6	Is it possible for a heat engine to operate without rejecting any waste heat to a low temperature reservoir? Explain.		
14	Heat engine	Self	3
Question : 7	Differentiate between the following: (i) Heat pump and refrigerator (ii) Efficiency and COP.		
15	Heat Pump	Self	3

Part C			
Question : 1	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.		
18	Heat Engine	RTU question paper	4
Question : 2	Derive Tds mathematical relation.		
25	Thermodynamic relations	Self	5
Question : 3	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.		
8	Application of First law	Engineering Thermodynamics By Cengel and Boles	3
Question : 4	Derive expression for Helmholtz and Gibbs availability function.		
18	Availability function	Self	4
Question : 5	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.		
13	Application of 1st law	Self	3
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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Entry ID: 32