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 / 56 / 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 3	**Date of Submission**	26/09/2020
Name of Faculty	Mr. Sidhartha Sondh	**Date of Examination**	30/09/2020
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. 6. To have developed the understanding of air standard cycles and being able to apply it in the engineering problems. 7. To have developed the familiarity with the use of stream table and also be able to solve problems on steam cycles.

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Student Name		**Student Reg No.**	

Part A

Question : 1	What is Classius inequality?		
15	Entropy	Self	3
Question : 2	Represent a steady state function mathematically.		
2	Fundamentals	Self	1
Question : 3	What is the significance of Gibbs energy?		
17	Availability	Self	4
Question : 4	How does Rankine cycle improve Carnot cycle?		
19	Thermodynamic cycles	Self	7
Question : 5	Differentiate between Kelvin and Celsius.		
3	Fundamentals	Self	1
Question : 6	What is the significance of thermodynamic laws in engineering?		
4	Fundamentals	Self	1
Question : 7	What is control volume system?		
6	Fundamentals	Self	1
Question : 8	Define COP.		
14	2nd Law	Self	3
Question : 9	Differentiate between work and heat.		
6	Fundamentals	Self	1
Question : 10	What is a pure substance? State with an example.		
8	Pure substance	Self	1
Part B			
Question : 1	Write short notes on: i. Carnott cycle ii. Reheat Rankine cycle iii. Otto cycle		
38	Thermodynamic cycles	Self	7
Question : 2	Derive the relations for entropy change of an ideal gas in terms of Temperature and Pressure.		
17	Entropy	Self	3
Question : 3	Differentiate between (i) P-v diagram and T-s diagram (ii) Reversible and Irreversible process		
5	Fundamentals	Self	1
Question : 4	Why availability is defined on the basis of wok and not on heat? What is quality of energy? Describe with a suitable example.		
18	Availability	Self	4
Question : 5	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 ^{o}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 ^{o}C.		
14	2nd Law	Engineering Thermodynamics By Domkundwar	3
Question : 6	State working of 2 stroke petrol engine giving neat sketch. Also define: i. Mean effective pressure ii. Compression ratio		

34	Thermodynamic sycle	Self	7
Question : 7	State the role of laws of thermodynamics i.e; First law, Second law, Zeroth law in designing an energy conversion system.		
4	Application of laws	Self	1
Part C			
Question : 1	Comment on the statement “The entropy of universe tends to be maximum”. What do you understand by thermal death of universe?		
15	Entropy	Self	3
Question : 2	400 kJ of heat from a large source at 1000 K is supplied to 2 kg of gas initially at 2 bar and 350 K in a closed tank. Cv = 0.86 kJ/kg- K for the gas. Find the loss in available energy of the system. Take surrounding temperature as 300 K.		
18	Availability	Engineering Thermodynamics By Domkundwar	4
Question : 3	Derive the mathematical expression for Maxwell relation		
31	Thermodynamic relations	Self	5
Question : 4	In a steam power plant operating on an ideal Rankine cycle, the steam enters the turbine at 3 MPa and 400deg C and it is exhausted at 10 kPa. Determine i. Thermal efficiency ii. Thermal efficiency, if steam is super heated to 500 deg C at 3 MPa before it enters turbine.		
22	Thermodynamic cycles	Previous year RTU questions	6
Question : 5	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	Application of 1st law	Engineering Thermodynamics By Domkundwar	2
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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