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 2 / 150

Instructions for Students / Faculty

Mid Term I (Total 40 Marks, 1.5 HRS., Syllabus from Unit-1)

- Part A: Total number of questions to be given are four (2 from CO1 and 2 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 8 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 Only)**, each carrying 4 marks. Total 16 marks.
- Part C: Total number of questions to be given are four (2 from CO1 and 2 from CO2), out of which student has to answer two (1 from CO1 and 1 from CO2). They are numerical answer type / fully elaborative type* **(Not More Than 70 Words for Question Only)**, each carrying 8 marks. Total 16 marks.

Mid Term II (Total 60 Marks, 2 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 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 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 Only)**, each carrying 4 marks. Total 16 marks.
- Part C: Total number of questions to be given are four (2 from CO3 and 2 from CO4), out of which student has to answer any two (1 from CO3 and 1 from CO4). They are numerical answer type / fully elaborative type **(Not More Than 70 Words For Question Only)** *, each carrying 12 marks. Total 24 marks.

Mid Term III (Total 60 Marks, 2 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 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 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 Only)**, each carrying 4 marks. Total 16 marks.
- Part C: Total number of questions to be given are four (2 from CO5 and 2 from CO6), out of which student has to answer any two (1 from CO5 and 1 from CO6). They are numerical answer type / fully elaborative type **(Not More Than 70 Words For Question Only)** *, each carrying 12 marks. Total 24 marks.

*** LIST OF ELABORATIVE THEORY QUESTION SUBJECTS**: 1 FY1 - 04 Communication Skills (Cr 2), 1 FY1 - 05 Human Values (Cr 2), 2 FY1 - 04 Communication Skills (Cr 2), 2 FY1 - 05 Human Values (Cr 2), 3 AN1 - 02 Technical Communication (Cr 2), 4 MH1 - 02 Technical Communications (Cr 2), 4 MH1 - 03 Economics and Financial Accounting (Cr 2), 5 AN5 - 12 Aircraft Maintenance Practices (Cr 2), 6 AN3 - 01 Mechanics of Composite Materials (Cr 2), 6 AN5 - 12 Aircraft Rules and Regulation (Cr 2), 6 MH3 - 01 Automobile Engineering (Cr 2).

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 & Student Details

Type of Exam	Mid Term 3	**Date of Submission**	18/08/2021
Name of Faculty	Mr. Yatan	**Date of Examination**	24/08/2021
Course	B.Tech (Aeronautical Engineering)	**Semester**	SEMESTER : 4
Batch	Combined Batches 18, 19, SF 2	**Subject**	4 AN3 - 03 Heat Transfer (Cr 2)

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 concept of Heat exchangers and the different types of Heat exchangers and its application in engineering and technology disciplines. CO6: Classify Types of thermal radiation, its principle of working and their application in engineering problems.		
Email I'd	yatannagpal@soaneemrana.org	**Phone No.**	798-226-2196
Student Name		**Student Reg No.**	

Part A

INSTRUCTIONS FOR 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 heat exchanger effectiveness.		
Lesson Plan No. - 23	Topic - Effectiveness of heat exchanger, No. of transfer Units (NTU) methodEffectiveness of heat exchanger, No. of transfer Units (NTU) method	Source - R.K. Rajput	CO No. -
Question : 2	Define No. of transfer units (NTU).		
Lesson Plan No. - 23	Topic - Effectiveness of heat exchanger, No. of transfer Units (NTU) method	Source - R.K. Rajput	CO No. -
Question : 3	Define Drop wise condensation and Film wise condensation.		
Lesson Plan No. - 20	Topic - Drop wise condensation	Source - R.K. Rajput	CO No. -
Question : 4	Define heat exchanger.		
Lesson Plan No. - 21	Topic - Heat exchangers: Different types of heat exchangers	Source - R.K. Rajput	CO No. -
Question : 5	State the meaning of evaporation and condensation.		
Lesson Plan No. - 18	Topic - Nature of vaporization phenomenon, different regimes of boiling heat transfer	Source - R.K. Rajput	CO No. -
2. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.			6
Question : 6	Define electrical analogy and state the meaning of re-radiating surfaces.		
Lesson Plan No. - 28	Topic - Electrical analogy, Re-radiating surfaces	Source - R.K. Rajput	CO No. -
Question : 7	Define shape factor and state reciprocity theorem.		
Lesson Plan No. - 27	Topic - Heat exchange between gray bodies, Shape factor	Source - R.K. Rajput	CO No. -
Question : 8	State reciprocity theorem.		
Lesson Plan No. - 27	Topic - Heat exchange between gray bodies, Shape factor	Source - R.K. Rajput	CO No. -
Question : 9	Define Plank's distribution law and Kirchhoff's law.		
Lesson Plan No. - 25	Topic - Thermal radiation: Plank distribution law, Kirchhoff's law	Source - R.K. Rajput	CO No. -
Question : 10	Define Lambert's cosine law and state the meaning of intensity of radiation.		
Lesson Plan No. - 26	Topic - Lambert's law, Radiation intensity	Source - R.K. Rajput	CO No. -
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 has to 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 has to 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	Define AMTD. Derive LMTD equation for counter flow heat exchanger.		
Lesson Plan No. - 21	Topic - Arithmetic and logarithmic mean temperature difference (LMTD).	Source - R.K. Rajput	CO No. -
Question : 2	Explain with the help of a diagram the various boiling regimes.		
Lesson Plan No. - 18	Topic - Heat transfer with change of phase: Nature of vaporization phenomenon, different regimes of boiling heat transfer.	Source - R.K. Rajput	CO No. -
Question : 3	Explain briefly the classification of heat exchanger.		
Lesson Plan No. - 21	Topic - Heat exchangers: Different types of heat exchangers	Source - R.K. Rajput	CO No. -
4. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.			6
Question : 4	Obtain an expression to show heat exchange between two grey bodies.		
Lesson Plan No. - 27	Topic - Heat exchange between gray bodies	Source - R.K. Rajput	CO No. -
Question : 5	Define and explain the terms - absorptivity, reflectivity and transmissivity.		
Lesson Plan No. - 25	Topic - Thermal radiation: Plank distribution law, Kirchhoff's law, Radiation properties, Diffuse radiations	Source - R.K. Rajput	CO No. -
Question : 6	Derive an expression indicating heat exchange between two black bodies.		
Lesson Plan No. - 26	Topic - Heat exchange between two black bodies	Source - R.K. Rajput	CO No. -

Part C

FOR MIDTERM 1 - Part C: Total number of questions to be given are four (2 from CO1 and 2 from CO2), out of which student has to answer two (1 from CO1 and 1 from CO2).
FOR MIDTERM 2 - Part C: Total number of questions to be given are four (2 from CO3 and 2 from CO4), out of which student has to answer any two (1 from CO3 and 1 from CO4).
FOR MIDTERM 3 - Part C: Total number of questions to be given are four (2 from CO5 and 2 from CO6), out of which student has to answer any two (1 from CO5 and 1 from CO6).

5. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.			5
Question : 1	Derive NTU and effectiveness for parallel flow heat exchanger and counter flow heat exchanger.		
Lesson Plan No. - 23	Topic - Effectiveness of heat exchanger, No. of transfer Units (NTU) method	Source - R.K. Rajput	CO No. -
Question : 2	In a counter-flow double pipe heat exchanger water is heated from 25 degree C to 65 degree C by an oil with a specific heat of 1.45 kJ/kgK and mass flow rate of 0.9 kg/s. The oil is cooled from 230 degree C to 160 degree C. If the overall heat transfer coefficient is 420 W/m^2 degree C, calculate:- a) The rate of heat transfer (b) The mass flow rate.		
Lesson Plan No. - 22	Topic - Heat transfer coefficient for parallel, counter and cross flow heat exchanger.	Source - R.K. Rajput	CO No. -

6. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.			6
Question : 3	The effective temperature of a body having an area of 0.12 m^3 is 527 degree C. Calculate the following:- a) Total rate of energy emission. b) Intensity of normal radiation. c) Wavelength of maximum monochromatic power.		
Lesson Plan No. - 26	Topic - Heat exchange between two black bodies	Source - R.K. Rajput	CO No. -
Question : 4	A refractory material which has ε=0.4 at 1500 K and ε=0.43 at 1420 K is exposed to black furnace walls at 1500 K. What is the rate of gain of heat radiation per m^2 area?		
Lesson Plan No. - 25	Topic - Electrical analogy, Re-radiating surfaces and heat transfer in presence of reradiating surfaces.	Source - R.K. Rajput	CO No. -
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.