

# 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 / 113

### 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 1	Date of Submission	21/06/2021
Name of Faculty	Mr. Yatan	Date of Examination	29/06/2021
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	CO1: Apply different concepts of heat transfer process in the real time problems. CO2: Analyze Conduction and Heat Transfer from the finned surface and its application in real time.		
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.**

1

**Question : 1** State any two differences between heat transfer and thermodynamics.

Lesson Plan No. - 1	Topic - Importance of Heat Transfer	Source - R.K. Rajput	CO No. -
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**Question : 2** Write the modes of heat transfer and define them by giving relevant examples.

Lesson Plan No. - 2	Topic - Introduction to heat transfer	Source - R.K. Rajput	CO No. -
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<b>Question : 3</b>			
Lesson Plan No. -	Topic -	Source -	CO No. -

<b>Question : 4</b>			
Lesson Plan No. -	Topic -	Source -	CO No. -

<b>Question : 5</b>			
Lesson Plan No. -	Topic -	Source -	CO No. -

**2. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.**

2

**Question : 6** Define the term thermal conductivity and give the expression of thermal resistance and thermal conductivity.

Lesson Plan No. - 3	Topic - Thermal conductivity of solids, liquids and gases	Source - R.K. Rajput	CO No. -
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**Question : 7** Define all the laws of modes of heat transfer respectively.

Lesson Plan No. - 4	Topic - Newton's law of cooling	Source - R.K. Rajput	CO No. -
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<b>Question : 8</b>			
Lesson Plan No. -	Topic -	Source -	CO No. -

<b>Question : 9</b>			
Lesson Plan No. -	Topic -	Source -	CO No. -

<b>Question : 10</b>			
Lesson Plan No. -	Topic -	Source -	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.**

1

**Question : 1** Explain the effect of thermal conductivity on solids.

Lesson Plan No. - 3	Topic - Thermal conductivity of solids	Source - R.K. Rajput	CO No. -
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**Question : 2** Define overall heat transfer coefficient. Also, derive the expression of overall heat transfer coefficient.

Lesson Plan No. - 4	Topic - Overall heat transfer coefficient	Source - R.K. Rajput	CO No. -
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**Question : 3** Explain in detail the parameters influence on the value of heat transfer coefficient.

Lesson Plan No. - 4	Topic - Parameters influence on the value of heat transfer coefficient	Source - R.K. Rajput	CO No. -
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**4. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.**

2

**Question : 4** Derive the equation of heat transfer through composite wall.

Lesson Plan No. - 7	Topic - Heat conduction through composite walls	Source - R.K. Rajput	CO No. -
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**Question : 5** Derive general heat conduction equation in 3-D in cartesian coordinate system.

Lesson Plan No. - 5	Topic - General 3-dimensional conduction equation in cartesian coordinates	Source - R.K. Rajput	CO No. -
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**Question : 6** Derive general heat conduction equation in 3-D in spherical/cylindrical coordinate system.

Lesson Plan No. - 5	Topic - General 3-dimensional conduction equation in spherical/cylindrical coordinates	Source - R.K. Rajput	CO No. -
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**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.**

1

**Question : 1** A hot plate 1 m x 1.5 m is maintained at 300 degree C. Air at 20 degree C blows over the plate, if the convective heat transfer coefficient is 20 W/m<sup>2</sup> degree C, calculate the rate of heat transfer.

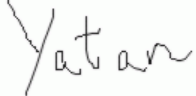
Lesson Plan No. - 4	Topic - Newton's law of cooling	Source - R.K. Rajput	CO No. -
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**Question : 2** The inner surface of a plane brick wall is at 60 degree C and the outer surface is at 35 degree C. Calculate the rate of heat transfer per m<sup>2</sup> of surface area of the wall, which is 220 mm thick. The thermal conductivity of the brick is 0.51 W/m degree C.

Lesson Plan No. - 5	Topic - Introduction to Conduction	Source - R.K. Rajput	CO No. -
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**6. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.**

2

<b>Question : 3</b>	A pipe ( $k=180 \text{ W/m degree C}$ ) having inner and outer diameters 80 mm and 100 mm respectively is located in a space at 25 degree C. Hot gases at 160 degree C flow through the pipe. Neglect surface heat transfer coefficient, calculate:- a) The heat loss through the pipe per unit length. b) The temperature at a point halfway between inner and outer surfaces.		
Lesson Plan No. - 6	Topic - Nature of differential equations	Source - R.K. Rajput	CO No. -
<b>Question : 4</b>	The insulation boards for air-conditioning purposes are made of three layers, middle being of packed grass 10 cm thick ( $k=0.02 \text{ W/m degree C}$ ) and the sides are made of plywood each of 2 cm thickness ( $k=0.12 \text{ W/m degree C}$ ). They are glued with each other. Determine the heat flow per $\text{m}^2$ area if one surface is at 35 degree C and the other surface is at 20 degree C.		
Lesson Plan No. - 6	Topic - Introduction to General 3-D conduction equation	Source - R.K. Rajput	CO No. -
<b>Upload Scanned Document In Case of Numerical or Diagram For Any of The Above Questions.</b> (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.			
<b>Corporate Office: H 974, Palam Extension, Part 1, Sector 7, Dwarka, New Delhi 110077</b>			

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