



Question Paper For Internal Assessment Examination (Theory) - Credit 3 / 101 /

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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NAME OF STUDY CENTER: SCHOOL OF AERONAUTICS, NEEMRANA(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 3	Date of Submission	23/03/2021
Name of Faculty	Mr. Rahul Dev Bairwan	Date of Examination	26/03/2021
Course	B.Tech (Aeronautical Engineering)	Semester	SEMESTER : 3
Batch	Combined Batches 18, 19, SF 2	Subject	3 AN4 - 06 Mechanics of Solids (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	CO5: Design Columns with different end conditions. CO6: Analyze the problems on torsion Circular Shafts.		
Email I'd	rahuldevbairwan@soaneemrana.org	Phone No.	945-634-1170
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 5

Question : 1	Define a Column.		
26	Column	Strength of materials by S. Ramamrutham	



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Question : 2	Define effective length of a column.		
27	Column	Strength of materials by S. Ramamrutham	
Question : 3	Define slenderness ratio of a column.		
28	Column	Strength of materials by S. Ramamrutham	
Question : 4	Define crushing load.		
30	Column	Strength of materials by S. Ramamrutham	
Question : 5	A column of length l is fixed at its both ends. What is the equivalent length of the column?		
31	Column	Strength of materials by S. Ramamrutham	
2. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.			CO 6
Question : 6	Define pure torsion.		
33	Torsion	Strength of materials by S. Ramamrutham	
Question : 7	Define polar moment of inertia.		
35	Torsion	Strength of materials by S. Ramamrutham	
Question : 8	Write the assumptions while comparing a solid and a hollow shaft.		
37	Torsion	Strength of materials by S. Ramamrutham	
Question : 9	Define modulus of rigidity.		
34	Torsion	Strength of materials by S. Ramamrutham	
Question : 10	Define polar section modulus.		
35	Torsion	Strength of materials by S. Ramamrutham	

PART B



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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 5

Question : 1 The buckling load for a column hinged at both ends is 10 kN. If the ends are fixed, calculate the new buckling load.

32

Column

Strength of materials by
S. Ramamrutham**Question : 2**

Write modes of failure in case of columns.

31

Column

Strength of materials by
S. Ramamrutham**Question : 3**

Derive the formula for effective length of a column with both ends hinged/pinned.

27

Column

Strength of materials by
S. Ramamrutham**4. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.**

CO 6

Question : 4

Explain the concept of complimentary shear stress.

33

Torsion

Strength of materials by
S. Ramamrutham**Question : 5**

The maximum and minimum shear stresses in a hollow circular shaft of outer diameter 20 mm and thickness 2 mm, subjected to a torque of 92.7 N-m will be?

36

Torsion

Strength of materials by
S. Ramamrutham**Question : 6**

The diameter of shaft A is twice the diameter of shaft B and both are made of the same material. Assuming both the shafts to rotate at the same speed, calculate the maximum power transmitted by B.

35

Torsion

Strength of materials by
S. Ramamrutham**Question : 7 (Old Pattern)****PART C**



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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 5

Question : 1 A column has moment of inertia about X-X and Y-Y axis as follows: $I_{xx}=4234.4 \text{ mm}^4$ & $I_{yy}=236.3 \text{ mm}^4$. About what axis column will buckle about?

31

Column

Strength of materials by
S. Ramamrutham**Question : 2**

If diameter of a long column is reduced by 20%, the percentage of reduction in Euler buckling load will be?

29

Column

Strength of materials by
S. Ramamrutham**Question : 3**

Calculate the ratio of Euler's buckling loads of columns with the same parameters having (i) both ends fixed, and (ii) both ends hinged.

27

Column

Strength of materials by
S. Ramamrutham**6. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.**

CO 6

Question : 4

A solid circular shaft of 60 mm diameter transmits a torque of 1600 N.m. Calculate the value of maximum shear stress developed.

34

Torsion

Strength of materials by
S. Ramamrutham**Question : 5**

Two shafts having the same length and material are joined in series. If the ratio of the diameter of the first shaft to that of the second shaft is 2, then what is the ratio of the angle of twist of the first shaft to that of the second shaft?

37

Torsion

Strength of materials by
S. Ramamrutham**Question : 6**

A member is subjected to the combined action of bending moment 400 Nm and torque 300 Nm. What respectively are the equivalent bending moment and equivalent torque?

38

Torsion

Strength of materials
by S. Ramamrutham

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)



School of Aeronautics (Neemrana)

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& BIKANER TECHNICAL UNIVERSITY, BIKANER, RUN & MANAGED BY L. N. VERMA MEMORIAL SOCIETY

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I have scrutinized the question paper. There is no spelling mistake or any type of irrelevant question.

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