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DELHI ADMINISTRATION, UNDER SOCIETIES REGISTRATION ACT XXI OF 1860.

Question Paper For Internal Assessment Examination (Theory) - Credit 3 / 62 /

NAME OF STUDY CENTER:

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:

(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 1	Date of Submission	12/01/2021
Name of Faculty	Mr. Rahul Dev Bairwan	Date of Examination	13/01/2021
Course	B.Tech (Aeronautical Engineering)	Semester	SEMESTER : 3
Batch	Eighteenth (18)	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	1. They will understand the fundamental concepts of stress and strain and the relationship between both through the strain-stress equations in order to solve problems for different lading conditions. 2. Calculate and represent the stress diagrams in bars and simple structures.
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 1
Question : 1	Explain the concept of thermal stresses and thermal strain.

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Question Paper For Internal Assessment Examination (Theory) - Credit 3 / 62 /

NAME OF STUDY CENTER:

5	Thermal Stresses	Strength Of Materials by S Ramamrutham, Chapter 1, Page 57	
Question : 2	Define stress and strain. Also write their expressions.		
1	Concept of Stress	Strength Of Materials by S Ramamrutham, Chapter 1, Page 1,2	
Question : 3	Define elastic constants.		
7	Elastic Constants	Mechanics of Solids by S Bhavikatti, Third Edition, Chapter 1, Page 11	
Question : 4			
Question : 5			

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

Question : 6	Define principal plane and principal stress.		
8	Principal stress	Strength of materials by S Ramamrutham, Chapter 10, Page no. 634	
Question : 7	Define angle of obliquity.		
8	Principal stress	Strength of materials by S Ramamrutham, Chapter 10, Page no. 634	
Question : 8	Write the advantage of graphical method over analytical method.		
10	Principal stress	Strength of materials by S Ramamrutham, Chapter 10, Page no. 634	
Question : 9			
Question : 10			

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Question Paper For Internal Assessment Examination (Theory) - Credit 3 / 62 /

NAME OF STUDY CENTER:

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 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 1
Question : 1	A bar of length L tapers uniformly from diameter 1.1 D at one end to 0.9 D at the other end. The elongation due to axial pull is computed using mean diameter D. What is the approximate error in computed elongation?		
5	Simple stress and strain	GATE Question	
Question : 2	The figure below shows a steel rod of 25 mm^2 cross sectional area. It is loaded at four points, K, L, M and N. Assume E for steel = 200 GPa. Calculate the total change in length of the rod due to loading.		
4	STRESS COMPONENTS UNDER AXIAL LOADING	GATE-2004, IES 1995, 1997, 1998	
Question : 3	A hollow steel column of external diameter 250 mm has to support an axial load of 2000 kN. If the ultimate stress for the steel column is 480 N/m2 . Find the internal diameter of the column allowing a load factor of 4.		
7	STRESS COMPONENTS UNDER AXIAL LOADING	Strength Of Materials by Ramamrutham, Chapter 1, Page 9, Problem 9	
4. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.			CO 2
Question : 4	The state of stress at a point under plane stress condition is σxx= 40 MPa, σyy= 100 MPa and τxy= 40 MPa (CW). Determine the radius of the Mohr's circle representing the given state of stress in MPa.		
10	Principal stress	GATE Question	
Question : 5	A steel bar of 40 mm × 40 mm square cross-section is subjected to an axial compressive load of 200 kN. If the length of the bar is 2 m and E = 200 GPa, calculate the elongation of the bar.		
4	STRESS COMPONENTS UNDER AXIAL LOADING	GATE QUESTION 2006	
Question : 6	A material has a Young's Modulus of 1.25*10^5 N/mm^2 and a Poisson's ratio of 0.25. Calculate the modulus of rigidity and ta Bulk Modulus.		

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Question Paper For Internal Assessment Examination (Theory) - Credit 3 / 62 /			
NAME OF STUDY CENTER:			
7	STRESS COMPONENTS UNDER AXIAL LOADING	Strength Of Materials by Ramamrutham, Chapter 1, Page 86, Problem 671	
Question : 7 (Old Pattern)			
PART C			
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 1	
Question : 1	Plot tensile test diagram for mild steel. Explain its salient features.		
3	Stress Strain Curve	Strength Of Materials by S Bhavikatti, Third Edition, Chapter 1, Page 8	
Question : 2	Express the relation between Modulus of elasticity and Modulus of rigidity		
7	STRESS COMPONENTS UNDER AXIAL LOADING	Strength of Materials by R K Rajput, Chapter 1, Page 28	
Question : 3	Derive the formula for the elongation in tapered bar subjected to axial tensile load.		
3	Simple Stress and Strain	Mechanics of Solids by S. S. Bhavikatti, Chapter 8, Page No. 248	
6. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.		CO 2	
Question : 4	Construct Mohr's circle for the state of stress in a material stressed to two-dimensional state of stress is as shown in Fig. Determine principal stresses and maximum shear stress and the planes on which they act.		
10	Principal stress	Mechanics of Solids by SS Bhavikatti, Chapter 11, Page no. 354	

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NAME OF STUDY CENTER:

Question : 5	At a point in a crank shaft the stresses on two mutually perpendicular planes are 30 MPa (tensile) and 15 MPa (tensile). The shear stress across these planes is 10 MPa. Find the normal and shear stress on a plane making an angle 30 degree with the plane of first stress. Find also magnitude and direction of resultant stress on the plane.		
9	Principal stress	GATE Question	
Question : 6	Construct Mohr's circle for biaxial like stresses.		
9	Principal stress	Mechanics of Solids by SS Bhavikatti, Chapter 11, Page no. 354	
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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