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 / 25 /

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 2	**Date of Submission**	19/08/2020
Name of Faculty	Mr. Rahul Dev Bairwan	**Date of Examination**	26/08/2020
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 PAPER
(Faculties are required to mention relevant Course Outcome number against the respective question in QP)

Course Outcome	3AN4-06: Mechanics of Solids (Credit-3) COURSE OBJECTIVE 1. To learn about the basic properties, behavior and response of materials. 2. To allow the student to carry out easy and moderate level structural analysis of basic structural members. 3. To enable the student to gain knowledge in how stresses are developed and distributed internally in beams. 4. To familiarize with the different methods used for beam deflection analysis. 5. To impart knowledge to the students on Buckling of columns 6. To acquire knowledge on how structural elements are sized. COURSE OUTCOME Upon completion of the course, Students will be able to CO1: Apply materials and their elastic constants for composite bar subjected to various loads including thermal load. CO2: Solve the problems on structural members subjected to Uni-axial load. CO3: Construct Shear Force, Bending moment and Bending stress distribution in beams subjected to transverse load. CO4: Determine the deflection of statically determinant beam. CO5: Design Columns with different end conditions. CO6: Analyze the problems on torsion Circular Shafts.

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Student Name		**Student Reg No.**	

Part A			
Question : 1	Define strain hardening.		
2	Stress & strain curve	Mechanics of Solids by S. S. Bhavikatti,	1
Question : 2	What is the concept behind finding transverse shear stress?		
20	Transverse shear stress.	Strength of materials by S. S. Bhavikatti,	3
Question : 3	Why and when Mohr's analysis is used?		
11	Principal stress and strains	Strength of materials by S. S. Bhavikatti,	2
Question : 4	What is a hinge support?		
13	Beams	Strength of materials by S. S. Bhavikatti,	3
Question : 5	Differentiate between statically determinate and statically indeterminate structures.		
13	Beams	Strength of materials by S. S. Bhavikatti,	3
Question : 6	What is the advantage of using Macaulay's method?		
24	Methods of finding deflection	Strength of materials by S. Ramamrutham,	4
Question : 7	Define pure bending.		
17	Bending stress	Strength of materials by S. S. Bhavikatti,	3
Question : 8	Define moment carrying capacity.		
18	Section moduli of standard sections.	Strength of materials by S. S. Bhavikatti,	3
Question : 9	Define centroid and Moment of inertia.		
19	Stresses in Beams	Strength of materials by S. S. Bhavikatti,	2
Question : 10	Define shear force & bending moment		
15	Shear force and bending moment diagrams	Strength of materials by S. S. Bhavikatti,	3
Part B			
Question : 1	A circular bar ABC 18 m horizontally long is having a cross-sectional area of 4 mm^2 weighs 22.5 N . If young's modulus of steel is 210 GN/m^2, find the deflections at C and B.		
22	Deflection in cantilever beams	Strength of materials by S. Ramamrutham,	4
Question : 2	A cantilever beam is loaded as shown in figure. Determine all reactions at support A.		
14	Shear force and bending moment	Strength of materials by S. S. Bhavikatti,	3
Question : 3	Derive bending equation.		
17	Stress in beams	Strength of materials by S. S. Bhavikatti,	3
Question : 4	Derive an expression of maximum deflection for a Cantilever beam with a point load at free end according to moment area method.		
25	Methods of finding deflection	Strength of materials by S. Ramamrutham,	4
Question : 5	Write the assumptions in theory of bending.		
17	Bending stress	Strength of materials by S. S. Bhavikatti,	3
Question : 6	For a given loading conditions the state of stress in the wall of a cylinder is expressed as follows: a) 85 MN/m^2 tensile in x direction (b) 25 MN/m^2 tensile in y directions (c) Shear stresses of 60 MN/m^2 on horizontal planes is clockwise in effect. Calculate the principal stresses and the planes on which they act.		

12	Principal stress and strains	Strength of materials by S. S. Bhavikatti,	2
Question : 7	A column has the external diameter of 300mm and thickness is 20mm. Find the safe compressive load on the column with factor of safety of 5, if the crushing strength of the material is 550N/mm^2.		
3	Stress components under axial loading	Mechanics of Solids by S. S. Bhavikatti	1
Part C			
Question : 1	A concentrated load of 300 N is applied to the simply supported beam as shown in Fig. Determine the equations of the elastic curve between each change of load point and the maximum deflection in the beam.		
21	Deflection of Beams	Strength of materials by S. Ramamrutham,	4
Question : 2	Calculate the shear force and bending moment for the beam subjected to a load as shown in the figure, then draw the shear force diagram (SFD) and bending moment diagram (BMD).		
16	Shear force and bending moment	Strength of materials by S. Ramamrutham,	3
Question : 3	The simply supported beam in Fig. has a rectangular cross section 120 mm wide and 200 mm high. (1) Compute the maximum bending stress in the beam. (2) Sketch the bending stress distribution over the cross section on which the maximum bending stress occurs. (3) Compute the bending stress at a point on section B that is 25 mm below the top of the beam.		
19	Stresses in beams	Strength of materials by S. S. Bhavikatti,	3
Question : 4	An I - section girder, 200mm wide by 300 mm depth flange and web of thickness is 20 mm is used as simply supported beam for a span of 7 m. The girder carries a distributed load of 5 KN /m and a concentrated load of 20 KN at mid-span. Determine the (i). The second moment of area of the cross-section of the girder (ii). The maximum stress set up.		
19	Stresses in beams	Strength of materials by S. S. Bhavikatti,	3
Question : 5	A beam of wide-flange shape with b = 165 mm, t = 7.5mm, h = 320 mm, and h1 = 290 mm, vertical shear force V = 45 kN determine τ max, τ min and total shear force in the web.		
20	Transverse Shear Stresses in beams	Strength of materials by S. S. Bhavikatti,	3
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)*	https://www.123formbuilder.com/upload_dld.php?fileid=08690d8830e562a016c01c1023743f15		
I have scrutinized the question paper. There is no spelling mistake or any type of irrelevant question.			

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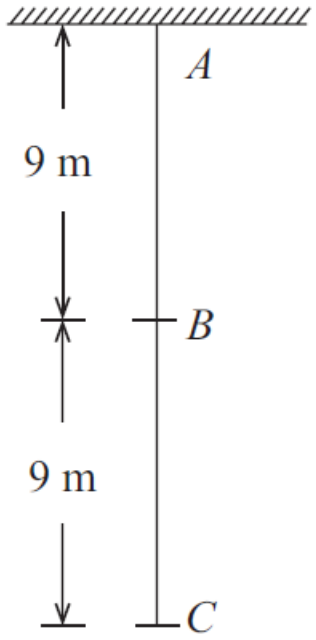
Entry ID: 25

PART B

1.



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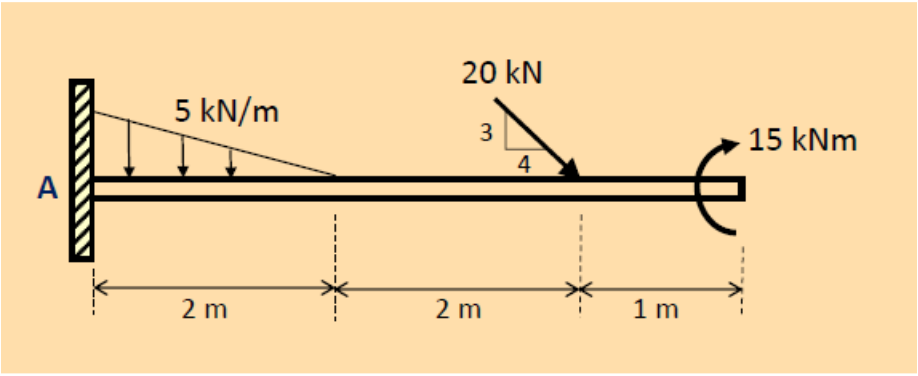
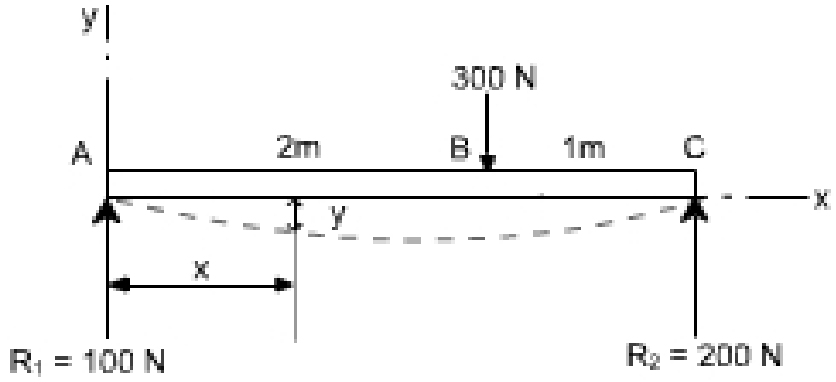
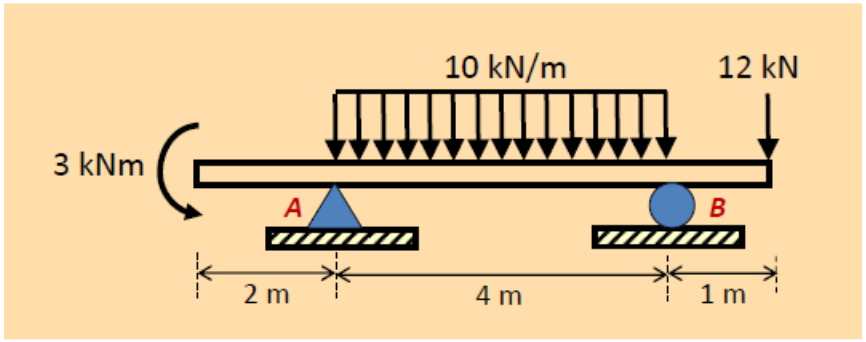


PART C

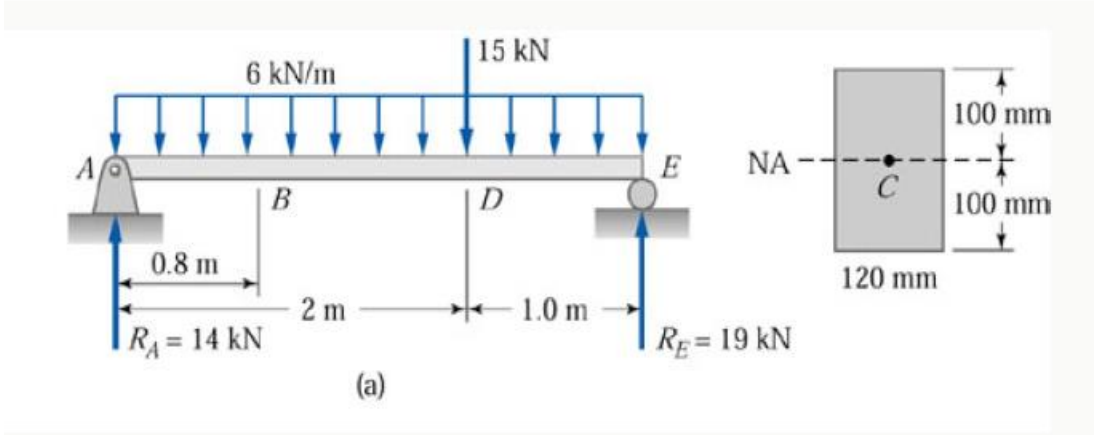
1.


y
300 N
A
2m
B
1m
C
x
y
x
R₁ = 100 N
R₂ = 200 N

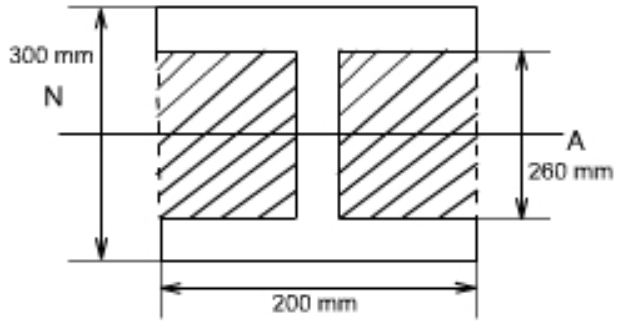
2.


10 kN/m
12 kN
3 kNm
A
B
2 m
4 m
1 m

3.


15 kN
6 kN/m
A
B
D
E
0.8 m
2 m
1.0 m
R_A = 14 kN
R_E = 19 kN
(a)
NA
C
100 mm
100 mm
120 mm

4.



5.