

Name of the Examinations: BACHELOR OF ARCHITECTURE FIRST YEAR FIRST SEMESTER SUPPLEMENTARY EXAM - 2024

Subject : STRUCTURAL MECHANICS I

Time: 3 Hours

Full Marks: 100

Instructions:

- | | |
|----|--|
| I | All notations represent their standard relevant meaning. |
| II | If you feel that any data or condition is/are missing in any question, please assume relevant inputs and mention the same. |

Sl No	Question	Marks
1	<p>(a) Consider the force diagram from Figure: 01.A and determine resultant of the given force system (magnitude of resultant vector and the angle that the resultant vector makes with respect to positive x axis where x axis and y axis are horizontal and vertical axis respectively perpendicular to each other) by graphical approach using polygon law of vector addition. Also, use analytical approach to get the resultant and compare the results by calculating the percentage of error for the resultant force as well as the angle that the resultant vector makes with respect to the positive x axis. (20 marks)</p> <p>(b) Consider the beam given in Figure: 01.B and check if the structure is determinate or not. Also find out the amount and nature of resisting moment at fixed support of the cantilever beam. (5 marks)</p>	25
2	<p>Consider the beam given in Figure: 02 and Find out reaction forces using Analytical Method and Graphical Method. Also Find out percentage of error of your results obtained using graphical approach compared with respect to the analytical results. Additionally, find out moment inside the beam at 3m from the hinged support using any method.</p>	25

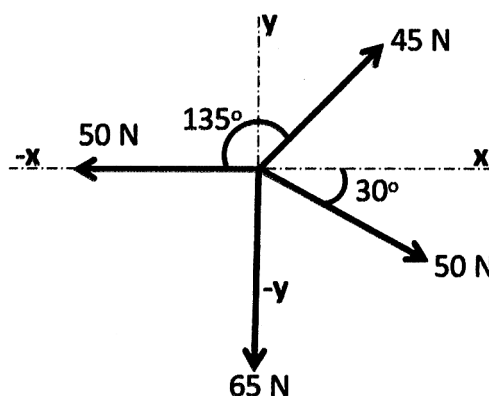


Figure: 01.A (Not to Scale)

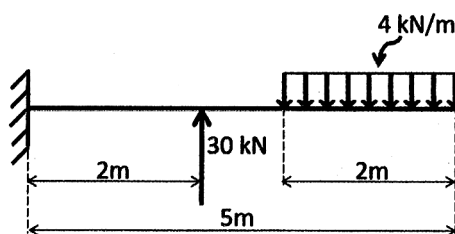


Figure: 01.B (Not to Scale)

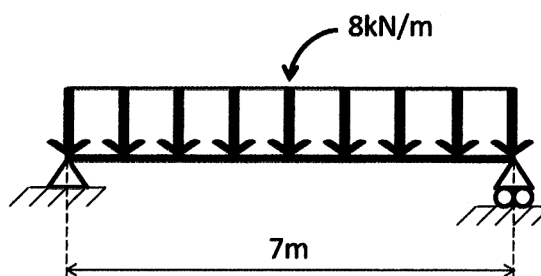
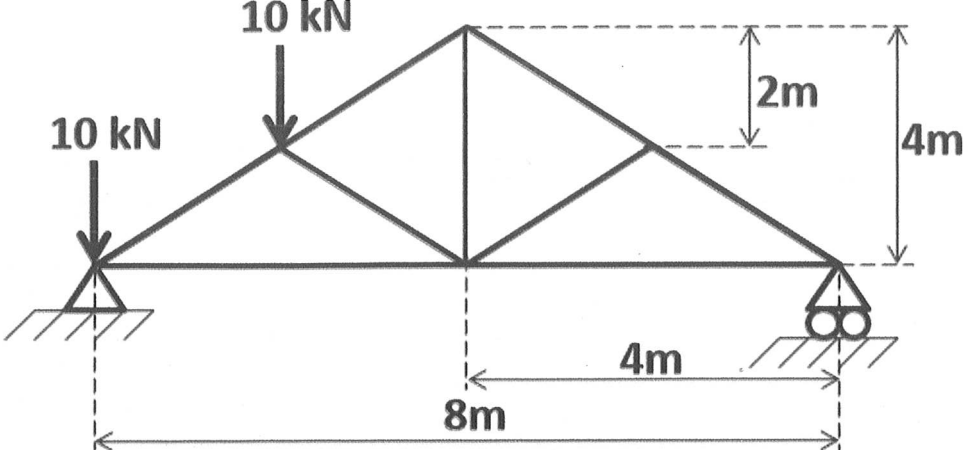
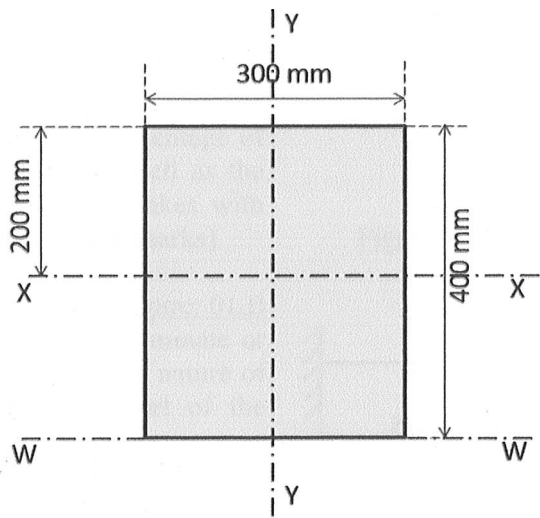


Figure: 02 (Not to Scale)

3	<p>Consider the plane truss from <u>Figure: 03</u>, check if the truss is statically determinate and determine all member forces by using method of joints (Show the member forces and joint forces in the diagram with proper notations). Check Member forces of any 3 members using method of section.</p>  <p style="text-align: center;"><u>Figure: 03 (Not to Scale)</u></p>	25
4	<p>(a) Derive the expression of moment of inertia of a circular solid section of a prismatic column of uniform cross section along its neutral axis.(12 marks)</p>  <p style="text-align: center;"><u>Figure: 04 (Not to Scale)</u></p> <p>(b) Consider the solid rectangular column cross section given in <u>Figure: 04</u> and determine Moment of Inertia for the section with respect to XX,YY and WW axis where XX,YY and WW axis are shown in the figure. (13 marks)</p>	25