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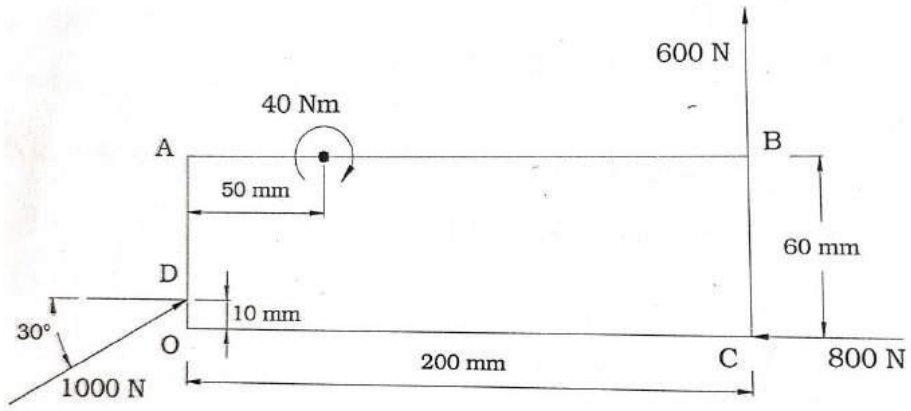
| | **DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE**<br>**Winter Examination – 2022**<br>**Course: First year B. Tech Branch :GroupB(CSE/ETC/AIML) Semester :I**<br>**Subject Code & Name: Engineering Mechanics BTES103**<br>**Max Marks: 60 Date:25/03/2023 Duration: 3 Hr.** | | |
| | ***Instructions to the Students:***<br>*1. All the questions are compulsory.*<br>*2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.*<br>*3. Use of non-programmable scientific calculators is allowed.*<br>*4. Assume suitable data wherever necessary and mention it clearly.* | | |
| | | (Level/CO) | Marks |
| **Q. 1** | **Solve Any Two of the following.** | | **12** |
| **A)** | **Define the Following terms: Moment, Couple and Polygon Law of Forces** | **Remember** | **6** |
| **B)** | **For the force system shown in figure , find the resultant and locate it w.r.t. point 'O'**<br>  <br> | **CO2** | **6** |
| **C)** | **The sum of two forces is 9N. Their resultant which is perpendicular to the smaller force is of 6N. Find the magnitude of the forces.** | **Remember** | **6** |
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| **Q.2** | **Solve Any Two of the following.** | | **12** |
| **A)** | **Two identical cylinders each of weighing 500 N are placed as shown in figure. Determine the reactions developed at contact points A,B,C & D. Assume are points of contact are smooth.** | **CO2** | **6** |

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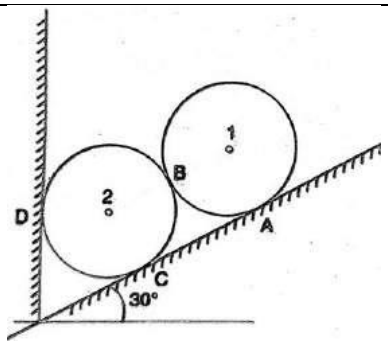
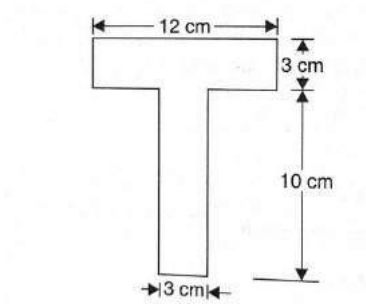
| |  | | |
| **B)** | **Locate the centroid of the T section shown in figure.**<br>  | **CO3** | **6** |
| **C)** | **i) Define the term: Centroid, Centre of gravity, Center of mass**<br>**ii) Types of Truss** | **Remember** | **6** |
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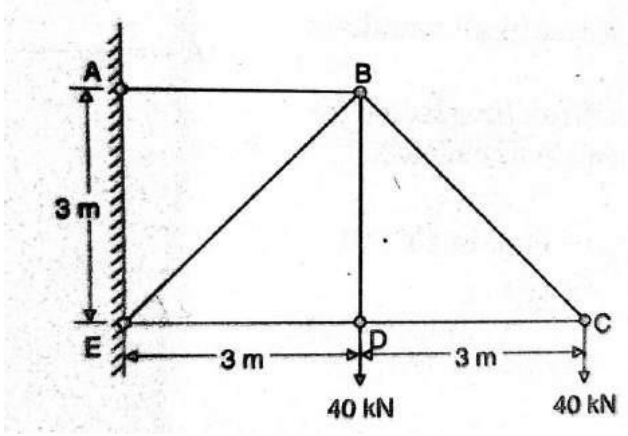
| **Q. 3** | **Solve Any Two of the following.** | | **12** |
| **A)** | **Define a) Limiting Friction. B) Angle of Friction c) Angle of Repose** | **Remember** | **6** |
| **B)** | **A body of weight 500 N is pulled up an inclined plane by a force of 350 N. The Inclination of the plane is $30^0$ to the horizontal and the force is applied parallel to the plane . Determine the coefficient of friction.** | **CO2** | **6** |
| **C)** | **Find the forces in all the members of the truss shown in figure. Tabulate the results.**<br>  | **CO2** | **6** |
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| **Q.4** | **Solve Any Two of the following.** | | **12** |
| **A)** | **A ball is dropped from the top of a tower 30 m high. At the same instant a second ball is thrown upward from the ground with an initial velocity of 15 m/sec. when and where do they cross and with what** | **CO4** | **6** |

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| | **relative velocity?** | | |
| **B)** | **The motion of a particle moving in straight line is given by the expression $S=t^3-3t^2+2t+5$ where S is the displacement in meter and t is the time in seconds. Determine velocity and acceleration after 4 second** | **CO5** | **6** |
| **C)** | **A body is projected at an angle such that its horizontal range is 3 times the maximum height. Find the angle of projection.** | **CO4** | **6** |
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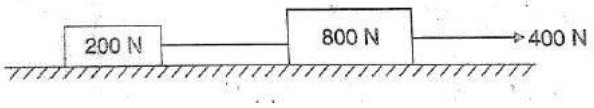
| **Q. 5** | **Solve Any Two of the following.** | | **12** |
| **A)** | **i) Define Direct Impact, Oblique Impact**<br>**ii) State Impulse and Momentum Principle**<br>**iii) Law of Conservation of Momentum** | **Remember** | **6** |
| **B)** | **Two weights 800 N and 200 N are connected by a thread and they move along a rough horizontal plane under the action of a force of 400 N applied to the 800 N weight as shown in figure. The coefficient of friction between the sliding surface of the weights and the plane is 0.3, using D'Alembert's Principle determine the acceleration of the weight and tension in the thread.**<br>  | **CO5** | **6** |
| **C)** | **State and prove the Work Energy Principle** | **CO5** | **6** |
| | ***** End ***** | | |

**The grid and the borders of the table will be hidden before final printing.**