



megalith  
DEPARTMENT OF CIVIL ENGINEERING

INDIAN INSTITUTE OF TECHNOLOGY  
KHARAGPUR



# MEGALITH

PRESENTS

# ROTOLOARE

# INTRODUCTION

Roller Coaster is an astounding structure which provides stunning rides. The exception is that the cars on a typical roller coaster are not self-powered. Instead, a standard full circuit coaster is pulled up with a chain or cable along the lift hill to the first peak of the coaster track. The potential energy accumulated by the rise in height is transferred to kinetic energy as the coaster race down the first downward slope. The kinetic energy is then converted back into potential energy as the coaster moves up again to the second peak. As the coaster goes through its twists, turns, rolls, and loops, it gains energy due to gravity and loses its initial energy due to friction. Roller Coaster geeks play with changes in gravitational potential and kinetic energy and thrive to make the most exciting ride.

Teams shall design and build a “roller coaster” meeting the design requirements as per specified below. The “roller coaster” shall mean the entire structure, including the roller coaster track and the base, but not the actual vehicle. The “COASTER” means a vehicle that travels on the Roller Coaster track.

## PROBLEM STATEMENT

Teams need to make a model of a roller coaster track using the basic hardware material like plastic tubes, rubber tubes (transparent) and paper. It is recommended to design your roller coaster around **hills and valleys** as that adds up to the excitement factor.

**Note:** - Participants can bring their model in disassembled form and can assemble it at the time of the event.

**Materials provided by Megalith team:** Five rectangular blocks (6''\*6''), Tape, Fevicol and Scissor.

**Note:** - Students have to bring their own track and any other material required for making the roller coaster (Megalith Team will not provide any other material apart from specified above). Commercially available roller coaster kits are not allowed to use. Participants need to bring 'double sided tape' to join rectangular blocks and ground.

## MODEL RULES

- a) Size restrictions - the height should not be more than **2.0m**.
- b) The model should be designed for a regular size, steel or glass marble.
- c) The starting and stopping points must be clearly marked in the model
- d) The energy source for the ride can be gravitational pull only. Use of external energy sources like magnets, springs, electricity is not allowed. However, these energy sources can be used for aesthetics and design (like background lightning).
- e) Each team will have to measure the total length of the track of writing it down on respective roller coasters.
- f) You cannot get ground support from more than five columns that rest on the given wooden blocks.
- g) Teams may use more than one marble in case one marble fails to complete the Track. (Participants will get maximum three chances)

# JUDGING CRITERIA

## 1) Time (30 Pts):

Each model will be entitled to three runs. The longest time to go from the start position to the finish will be the official time for that model.

Calculation of Points for Time: - Points will be relative.

Points = (Your time/max time) \* 30

For example, if your time is 25 seconds and max time by any team = 30 sec, then you will get marks =  $(25/30) * 30 = 25$  points.

## 2) Technical Points (40 Pts):

### a) Loop Factor (15 Pts):

Points = (Sum of diameters of all the loops in the roller coaster/Maximum sum of diameters by any team) \* 15

### b) Vertical Jump Height (5 Pts):

Height Coaster travels during a jump.

H = Max height Coaster jumps in any Roller Coaster in competition.

h = Height jumped by your Coaster.

Points =  $(h/H) * 5$

### c) Vertical Loop (10 Pts)

Vertical loop is defined as, the loop of track where the 'rider' is upside down. If the vertical loop is a portion of a corkscrew (helix), it counts as a vertical loop.

Points: For, 1 loop = 6 Pts, 2 loop = 10 Pts.

### d) Degree of Openness (10 Pts)

Points will be awarded for degree of openness of track.

Mostly closed- 0 Pts

Around 50% open - 5 Pts

More than 75% open - 10 Pts.

Bonus: Multiple passing – If the rolling object passes a point more than 1 time, additional 5 points will be awarded.

### **3) Aesthetics (30 Pts)**

#### **a) Creativity (15 Pts)**

For, 90° turn of the track Points: for 1 turn= 2 Pts, for 2 turns= 5 Pts

For, 180° turn of the track Points: for 1 turn= 4 Pts, for 2 turns= 10 Pts

#### **b) Aesthetically Charming (5 pts) -**

Whether the track is neatly designed and is having uniformity in color/design. Whether it is well-constructed or having any roadway Obstruction.

#### **c) Theme (5 pts) -**

What is the name of your roller coaster? Does your scenery support this theme? Does the design support your theme? Is there a coolness or cleverness factor in your name?

#### **d) Details (5 points) -**

Teams must submit the following: -

i) Start height

ii) Vertical jump heights

iii) Diameter of loops

iv) Diameter of the corkscrews/helix

v) Total length of the track.

**Note:** - Providing wrong information may lead to disqualification.

# RULES AND REGULATIONS

- a) The event is open to all.
- b) Maximum team size is **5**.
- c) Participants can form teams from different branches/ college/ university/ institute)
- d) No two teams must have any common member.
- e) Teams are not allowed to touch their model once the ride begins.
- f) The time limit for the completion is **180** minutes.
- g) The decision of the judges shall be final and abiding. Any coaster that violates the rule above or the spirit of the competition will be disqualified.

## CONTACTS

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