

NIRMAAN (bridge making)

The art of constructing Bridge. Bring out the Engineer inside you. May the BRIDGE you build today, light the way for a better tomorrow.

TEAM: Maximum 4 members per team.

REG. FEES: 300/- per team.

● MATERIAL KITS

- Wooden Popsicle sticks, white glue will be provided on spot.
- All other necessary materials (scissors, art paper, blades/other cutting materials, thread, clips etc.) may be brought by the participants themselves.

● CONSTRUCTION OF MODEL BRIDGES

Only wooden Popsicle sticks and white glue can be used to construct the bridges. No other materials are permitted. The wooden sticks can be cut to fit as desired. The amount of sticks used in the bridge is limited only by the Dimensions and Weight restrictions.

Please note the following when you design and build your bridge:

During the strength test of the bridge, one horizontal bar will be placed on the road deck of the bridge. A downward force will be applied onto the horizontal bar. By placing the bar on the deck in this manner, we ensure that the truss members of the bridge are stressed during the strength test. The builder of the model bridge shall ensure that there is one 3cm x 3cm opening, through the side of the bridge structure, immediately beside the bridge deck, to accommodate the load testing.

● DIMENSIONS AND WEIGHT

- The length of the bridge must be between 50 cm and 60 cm at its base. This is critical and the bridge will be disqualified if it is shorter than 50 cm and will be penalized if it is longer than 60 cm at the base.
- The road surface of the bridge must be at least 3 cm wide along its entire length (sufficient to allow a match box to pass through) .
- The overall width of the bridge must be between 10cm and 14 cm. This is critical and the bridge will be penalized if it is wider than 14 cm and bridge will be disqualified if it is shorter than 10cm.
- The overall height of the bridge – height of 1 popsicle stick(minimum) to 18 cm(maximum). This is critical and the bridge will be penalized if it is higher than 18 cm. Height of a zero member will not be considered.
- The weight of the bridge shall not exceed 250 grams. “Weight” means finished weight, including sticks and glue, and includes all attachments submitted with the bridge. Penalties will be assessed against overweight bridges.

● HOW TO ACCUMULATE POINTS IN THE COMPETITION

- Keep the glued joints clean and trimmed. At the joints, be sure to overlap the sticks and wipe off excess glue.
- If the edges of the bridge are intended to be straight, use a straight edge while building the bridge.
- Try to use some artistic imagination.
- Try to use engineering principles, to transfer the force from the middle of the bridge to its supports.
- Comply with the "Weights and Dimensions" restrictions, to avoid penalties.

● PENALTIES

- ❖ The self weight of the bridge must be less than 250 gms . If the above mentioned limit is crossed then points will be deducted as per the following-
 - Upto 5 gms over limit – for each 1gms, 0.5 point will be deducted.
 - 5-10 gms over limit – for each gm, 1 point will be deducted.
 - 10 & above over limit – for each 1gms, 1.5 points will be deducted.
- ❖ 2 points will be deducted from the score if the bridge deck is narrower than 3 cm.
- ❖ 5 points will be deducted for each 1 cm (or portion thereof) that the bridge's height exceeds 18 cm..
- ❖ 2 point will be deducted for each 1 cm that the bridge's width exceeds 14 cm.
- ❖ 2 point will be deducted for each 1 cm that the bridge's length exceeds 60 cm.

● GROUNDS FOR DISQUALIFICATION

1. Entries will be disqualified if they use any material other than fevicol and wooden Popsicle sticks.
2. Entries will be disqualified if the bridge length is shorter than 50 cm.
3. Entries will be disqualified if there is evidence of heat treating (baking, etc.).
4. Entries will be disqualified if the height of the bridge is less than one popsicle stick.
5. Suspension Bridge Model is not permitted in this event.
6. Entries will be disqualified if the bridge width is shorter than 10cm.
7. Entries will be disqualified if there is no road.

● DURATION OF EVENT

1. Construction- 4 hours.
2. Load Test Outcome- Load Testing will be conducted on the 3rd event day.

• Dimensions and Weight & Penalty Summary

PARAMETER	LIMIT	PENALTIES
BRIDGE WEIGHT	Maximum 250gm	Upto 5gms over limit - Deduct 1 point for each 2 grams over limit.
		5 to 10 gms over limit- Deduct 1point for each 1gm.
		10 & above over the limit- Deduct 3points for each 2gms.
ROADWAY WIDTH	Minimum 3cm	Deduct 2 points if roadway is narrower than 3 cm
BRIDGE HEIGHT	Maximum 18cm	Deduct 5 points for each 1 cm in excess of 18 cm
	Minimum height of one popsicle stick	Disqualified if shorter than the height of one popsicle stick
BRIDGE WIDTH	Maximum 14cm	Deduct 2 point for each 1 cm in excess of 14 cm
	Minimum 10cm	Disqualified if shorter than 10cm
BRIDGE LENGTH	Minimum 50cm	Disqualified if shorter than 50 cm
	Maximum 60cm	Deduct 2 point for each 1 cm in excess of 60 cm

**ALLOWANCE FOR TEST
LOAD**

Deduct up to 10 points if the bridge fails to make allowance for the perpendicular test piece or the down rod.

● JUDGING AND TESTING OF BRIDGES

The bridges will be subjected to a Efficiency test in which a downward force will be applied to the bridge and the force will be gradually increased until the bridge fails. This force will be recorded on the Evaluation Sheet. A bridge is considered to fail when at least one member of the bridge breaks.

During the test, the bridge will rest on two blocks placed apart. These blocks are loose and will resist the downward force applied to the bridge.

The Strength Factor will be computed using the formula:

$$\text{Efficiency} = (\text{applied force}) / (\text{self weight of the bridge})$$

The bridge with the highest Strength Factor will be given a score of 100. All other bridge entries within the category will be given a score less than 100, based on the ratio of their Strength Factor score to the highest Strength Factor score.

Decisions taken by judges will be final.

➤ **Contacts:**

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