

PRAGYAN DESIGN CHALLENGE

EVENT DESCRIPTION :

“Human subtlety will never devise an invention more beautiful, simple or more direct than does nature because in her inventions nothing is lacking, and nothing is superfluous. The human body itself is a masterpiece of engineering and a work of art.”

Unleash your engineering skills, creativity and intuition, and structure your ideas into a well-defined 3D model for the given design problems.

FORMAT :

The event is divided into two rounds:

Prelims:

1) A) MODELLING QUESTION: (COMPULSORY)

i. 500ml Polypropylene (PP) Bottle for School Children

The design should be very attractive and suitable for school children in various colours.

- Overflow Volume : 550ml.
- Neck Size : 45mm.

OR

ii. 500ml PET (Polyethylene Terephthalate) Jar for Ghee Packaging

Since Ghee is a food product of daily use and handled by women, the design should be very attractive in the Retail Shelf.

- Overflow Volume : 540ml.
- Neck Size : 63mm.

It is an industrial problem statement and the winning entries would be selected and fabricated in the industry.

To be submitted by 14th Feb '15 to pdcc@pragyan.org.

(Maximum Score Possible in 1) a) = 100

1. Modelling of parts: 50
2. Final assembly: 30
3. Generation of simulation video: 10
4. Rendering and animation effects: 10

The following are to be submitted:

- 1) Part-model of each of individual parts in step/iges/prt format
- 2) Assembly of the concerned mechanism in asm/prt/srt format
- 3) Video of the mechanism in mp4/avi format.

1) B) A set of 20 MCQ questions testing the following aspects of design will be put-up on 10th Feb '15 and it is to be answered by 13th Feb '15. :

- i. General knowledge of orthographic views, projections, sections, elements, etc in CAD software.
- ii. Geometric dimensions and tolerances.
- iii. Simple problems on Analysis- static structural, dynamic structural and thermal/ fluid fields like weight, stress zones, rigidity, deformation, etc. (which can be solved manually as well as using software)
- iv. Problems based on modeling a given component and finding its centre of mass, moment of inertia, density, volume etc.

Marks: 5 for each correct answer. No deductions for wrong response.

(Maximum Score Possible in 1) b) = 100

(Maximum Score Possible in 1) = 200

TOP 10 teams will be shortlisted based on their scores in the prelims and will be informed by 15th Feb '15.

2) Main round:

The top 10 teams from the prelims are eligible for the main event.

The participants are given the freedom to **select ANY ONE of the problem statement above.**

One Sports Equipment of their choice OR any Idea regarding the multi-purpose customized furniture model will ultimately be their design problem for the main round.

The teams are required to draft and design their own prototype of the Sports Equipment/Furniture Model and make a detailed analysis of their model and present the same during the event day during Pragyan'15.

The teams can perform dynamic simulation, stress analysis, flow/thermal analysis, and mechanical simulation if any. This would be highly appreciated and would be equally valued while awarding points.

The presentation may include

- A 3-D CAD model of the design in multiple views.
- Assembly (if required) model
- Feasibility /Marketability/ Cost Effectiveness/Material Selection of their model
- Animations/Simulations/Any Creative Audio-Visual Aids with which model can be well presented and explained.
- Results of the analysis. (Include project files if necessary)
- Any design-optimization done by the team.

RULES :

A team can consist of a maximum of 4 members.

Preferred Software: **AutoCAD, Inventor, Pro E Wildfire, Pro E Creo, Catia, SolidWorks, NX CAD, Abaqus, ANSYS, MCS Adams, Altair- Hyper Mesh.** (In case you are using some other software ask the organizers prior to the event)

- No professional assistance can be sought. All entries will be rigorously scrutinized and checked for authenticity of the design. Any team deemed unfair will be disqualified.
- Prelims Questions will be released on 10th Feb'15. Teams have to submit their answers within 5pm, 13th Feb'14.
- Finalized list for the main round will be released on 15th February'15.
- Decision of the judges will be final and binding.
- Only one entry per team is allowed.

JUDGING CRITERIA :

1. Creativity, Originality of the idea (whether they have used some pre-existing idea or they have creatively come up with a solution) (5)
2. Completeness of the Idea.(whether all aspects and details are thought upon or the idea is left quite loose ended) (5)
3. Whether the solution is feasible? Will it actually solve the problem? How? (10)
4. CAD Model/ Drawings in Different Views / Assemblies (30)
5. Complete Analysis/ Calculations/Explanations of all aspects of the design in the presentation. (Can be manually done without using software) (20)
6. Cost effectiveness of the model/ Marketability of it as a product/Feasibility/

Material Selection (20)

Bonus Points:

1. Animations/Simulations/Dynamic Study/ Explanations in the presentation provided through other Creative Audio-Visual Aids. (25)
2. Analysis carried out through computer software. (25)

Two presentations will be selected based on two criteria: Best design & Best innovation.

PROBLEM STATEMENT :

1. Design sports equipment that can be used in the Paralympics. (OR)
2. Design a multi-purpose customized furniture model which will prove its utility in as many ways possible and is feasible for people in houses, hostels, hotels, etc.

Designing is to be done using CAD MODELLING SOFTWARES and if you have it in you then ANALYZE AND SIMULATE YOUR EQUIPMENT, to check its safety, robustness, reliability and performance.

FAQ :

1. Is it maximum of 4 people or strictly a team of 4?

Maximum 4.

2. Are cross-college teams allowed?

Yes.

3. Are UG-PG collaboration teams allowed?

Yes.

4. Is any registration fee required?

No.

5. When will I be intimated if I am selected for the next round?

Around 10 days before Pragyan '15, i.e. around 15th February.

6. Any help if we use some particular Software?

No, because we will be needing only the IGES/STEP file from your side

7. Any extra points if we get a fabricated model/ prototype?

NO, this event is for testing only your design skills specifically through computer based softwares.

8. What analysis can we come up with for the models?

Preferably begin with Static Structural analysis and show that it has an optimum Factor of Safety, then go ahead with Dynamic Analysis. In certain cases, Thermal (Static/Transient) can also be done.

9. What if we don't perform any Analysis tests using some software as we aren't knowing any?

It's not at all a problem as it's only going to give you Bonus Points and isn't necessary, just be aware of the critical conditions in which your model might fail and you should be able to convincingly answer the judge the same. Also 'basic analysis' can be carried out 'manually, without any software' and the calculations can be shown in the presentation.

10. Any particular file formats necessary?

Yes, get your

a) Model in IGES/STEP format preferably

b) Drawings in .dwg or converted to .pdf.

c) For the analysis carried out using software, get pictures and copy those into your PowerPoint file (.ppt); manual calculations can be neatly done, scanned and attached to the .ppt file too

d) other photos if any u can get them as .jpg if you aren't uploading them in your .ppt file

e) animation videos can be .mp4/.avi/.3gp and must preferably be linked to your .ppt

f) In case of files apart from .ppt a folder must be submitted well before time of your presentation through a pen drive to the organizers on the event day.

RESOURCES :

<http://www.digitaltutors.com/software/AutoCAD-tutorials>

www.proetutorials.com/

<https://catiatutor.com/>

http://www.catia.com.pl/tutorial/part_design.pdf

<http://catia5v6videotutorials.caddsoftsolutions.com/2011/10/catia-v5-basics-getting-started.html>

<http://www.cgonlinetutorials.com/tutorials/catia-tutorials.html>

www.solidworkstutorials.com/

<https://www.youtube.com/user/solidworks>

www.solidworkslessons.info/

www.creatutorial.com/

WWW.PRAGYAN.ORG

LET'S CELEBRATE TECHNOLOGY

Creo tutorials-You Tube (<https://www.youtube.com/playlist?list=PLgh-maHw9pPc557b-dHMZ43dkTMAY5AKR>)

Apart from these links, go to the HELP section of your software and practice examples, option wise. Use HELP Files in any CAD Software like SolidWorks/Catia/PTC Creo/Pro E, etc.

Go to the official websites of any of these software and post in your doubts at the help sections available.

PRIZE MONEY: Worth INR 35,000

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