



TA211: MANUFACTURING PROCESSES-I PINBALL MACHINE

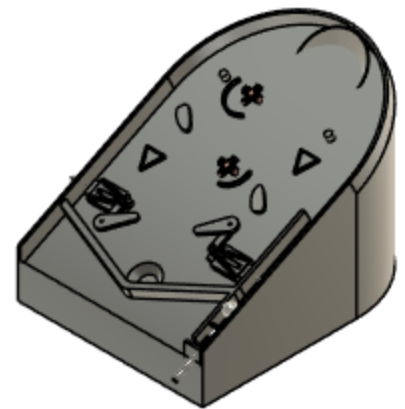
2024-25 Semester-I

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Course In-Charge: **Mr. I. P. Singh**

Lab In-Charge: **Mr. Anil Kumar Verma**

Group No: 8 (Monday)



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Certificate About Plagiarism

This is to certify that the project report titled "**Pinball Machine**" and the corresponding model are original pieces of work carried out by **Kartikey Gupta, Khushal Wadhwa, Kruti Marthak, Laksh Bansal, Kulshreshth Chikara, Shiva Teja and Chaithra Sai** under the guidance of **Prof. Kantesh Balani, Mr. I. P. Singh and Mr. Anil Kumar Verma** in partial fulfillment of the requirements for **TA211** at **IIT Kanpur**. The content of this report is the result of our research, analysis, and understanding, and has not been copied or plagiarized from any other source.

We declare that this project and model is our own work and have not been previously submitted for any other course or examination. We confirm that this report has been checked for plagiarism and has met the required standards of originality as set by the institution.

We understand that plagiarism is a serious academic offense, and have ensured that our model is free from any form of plagiarism. We understand that any instance of plagiarism detected after submission will be subject to disciplinary action as per the college's policies.

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We thank our course in-charge, **Mr. I. P. Singh**, for providing us with this opportunity to learn and create something valuable using different manufacturing processes



Introduction

A **PINBALL MACHINE** is a fascinating example of mechanical engineering, where precision and design come together to create an engaging, interactive experience. The machine operates purely on mechanical principles, with components such as flippers, bumpers, and ramps strategically positioned to guide a metal ball across a sloped playfield. The challenge in engineering a pinball machine lies in the careful design and alignment of these components to ensure that the ball's movement is smooth, consistent, and responsive, all while adhering to the laws of physics like gravity and momentum.

In this project, our focus is on the mechanical design and construction of a fully functional pinball machine. We aim to master the intricacies involved in fabricating and assembling the various moving parts, ensuring they work together seamlessly to provide a reliable and exciting gameplay experience. Through this project, we seek to deepen our understanding of mechanical systems and the engineering precision required to create a complex, yet elegant, piece of interactive machinery.



Motivation

We first encountered the idea of building a pinball machine while exploring various concepts for our project. Our group decided that we wanted to create something that would be mechanically engaging and provide a sense of nostalgia and entertainment. The concept of a pinball machine, with its dynamic interaction and intricate design, immediately caught our interest.

As we delved deeper into the mechanics behind pinball machines, we were fascinated by the precise and complex interplay of components required to bring the game to life. This realization fueled our determination to apply the theoretical knowledge we had gained and to turn this engaging idea into a tangible project.

Our excitement grew as we imagined the joy and thrill that others might experience when playing with the machine we built. Sharing this enthusiasm and the engineering behind it with others became a key motivation in our journey.

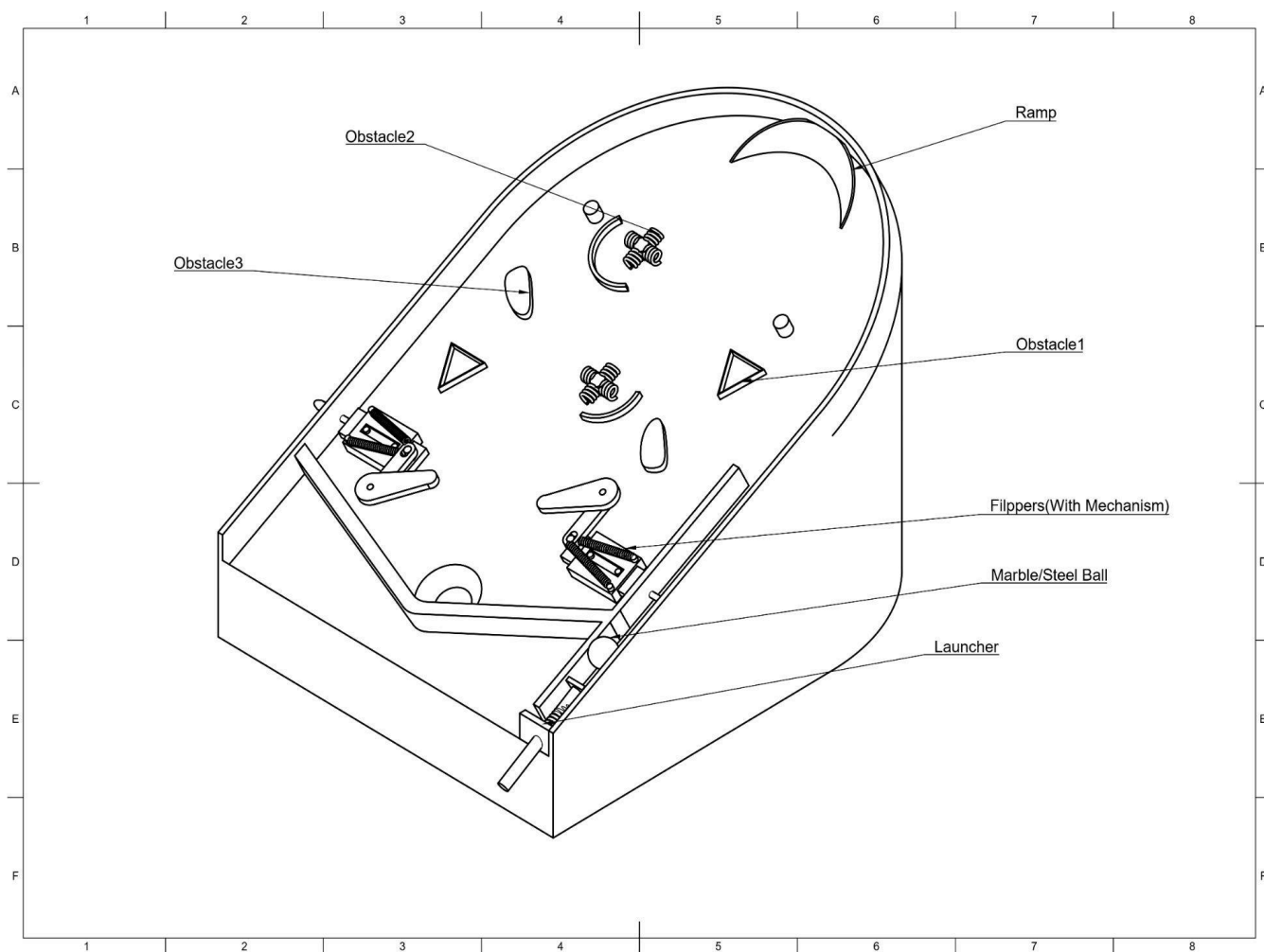
Group Member Work Distribution

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Kartikey Gupta	Obstacle 1	Extra Obstacle	Ramp	Flipper 1	Assembly	Assembly
Khushal Wadhwa	Body Fabrication	Body Fabrication	Body Fabrication	Body Fabrication	Assembly	Assembly
Kruti Marthak	Obstacle2	Obstacle2	Launcher	Ramp	Assembly	Assembly
Laksh Bansal	Body Fabrication	Body Fabrication	Extra Obstacle	Flipper 2	Assembly	Assembly
Kulshreshth Chikara	Body Fabrication	Body Fabrication	Body Fabrication	Body Fabrication	Assembly	Assembly
Shiva Teja	Obstacle 3	Obstacle 3	Body Fabrication	Body Fabrication	Assembly	Assembly
Kondluru Chaithra Sai	Obstacle1	Obstacle2	Flipper 1	Flipper 2	Assembly	Assembly

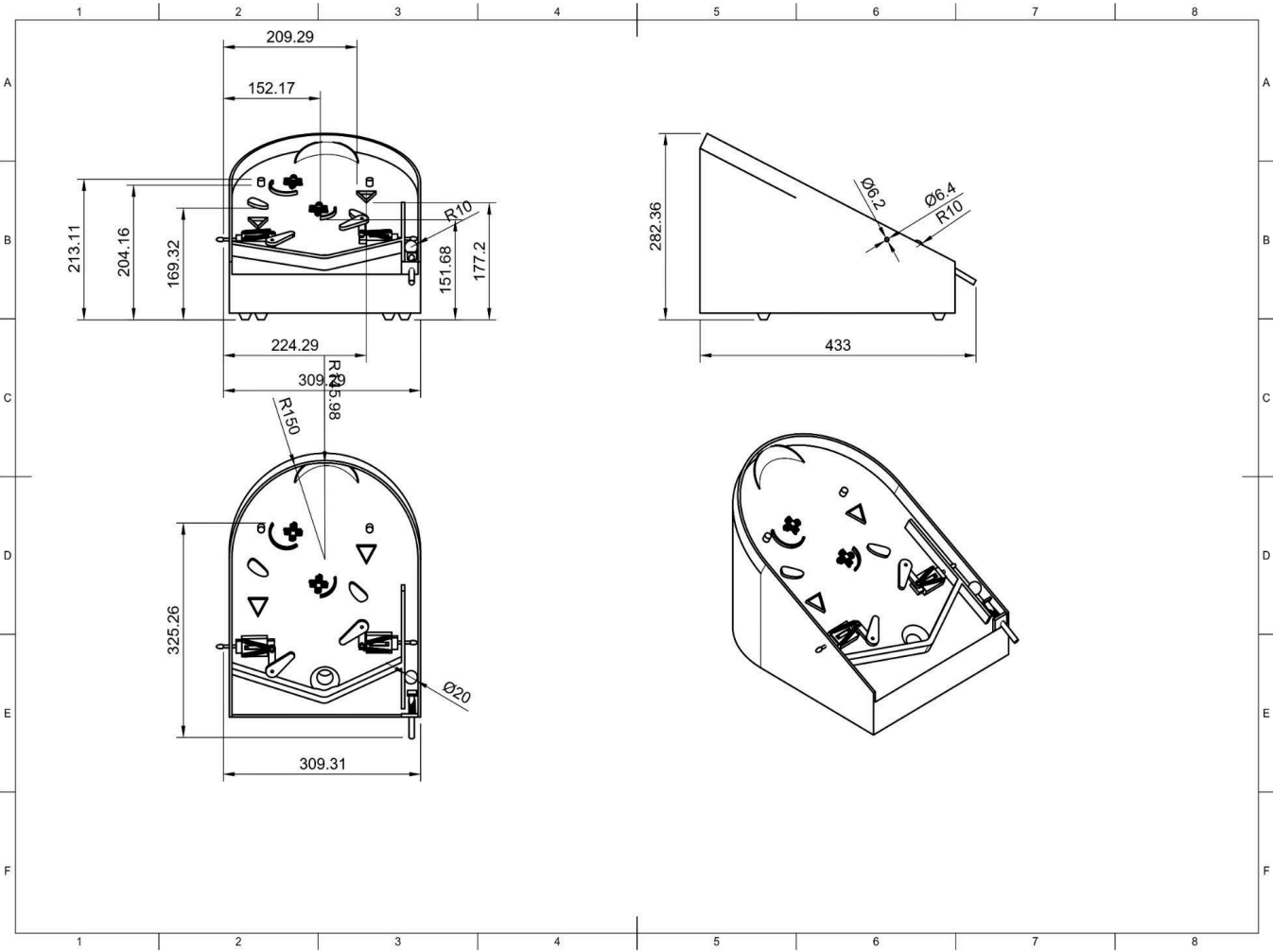
Materials List

S. No.	Description	Size	Quantity
1	Mild Steel Flat	25 mm x 5 mm	1 m
2	Mild Steel Round Rod	10 mm dia	200mm
3	Mild Steel Round Rod	8 mm dia	200 mm
4	Mild Steel Round Rod	4 mm dia	300 mm
5	Mild Steel Discs	20 mm dia x 10 mm thick	4
6	Mild Steel Sheet	4 ft x 8 ft x 1.0 mm	2
7	Thin Galvanized Wire	1 mm dia	5 m
8	Thin Galvanized Wire	2 mm dia	3 m

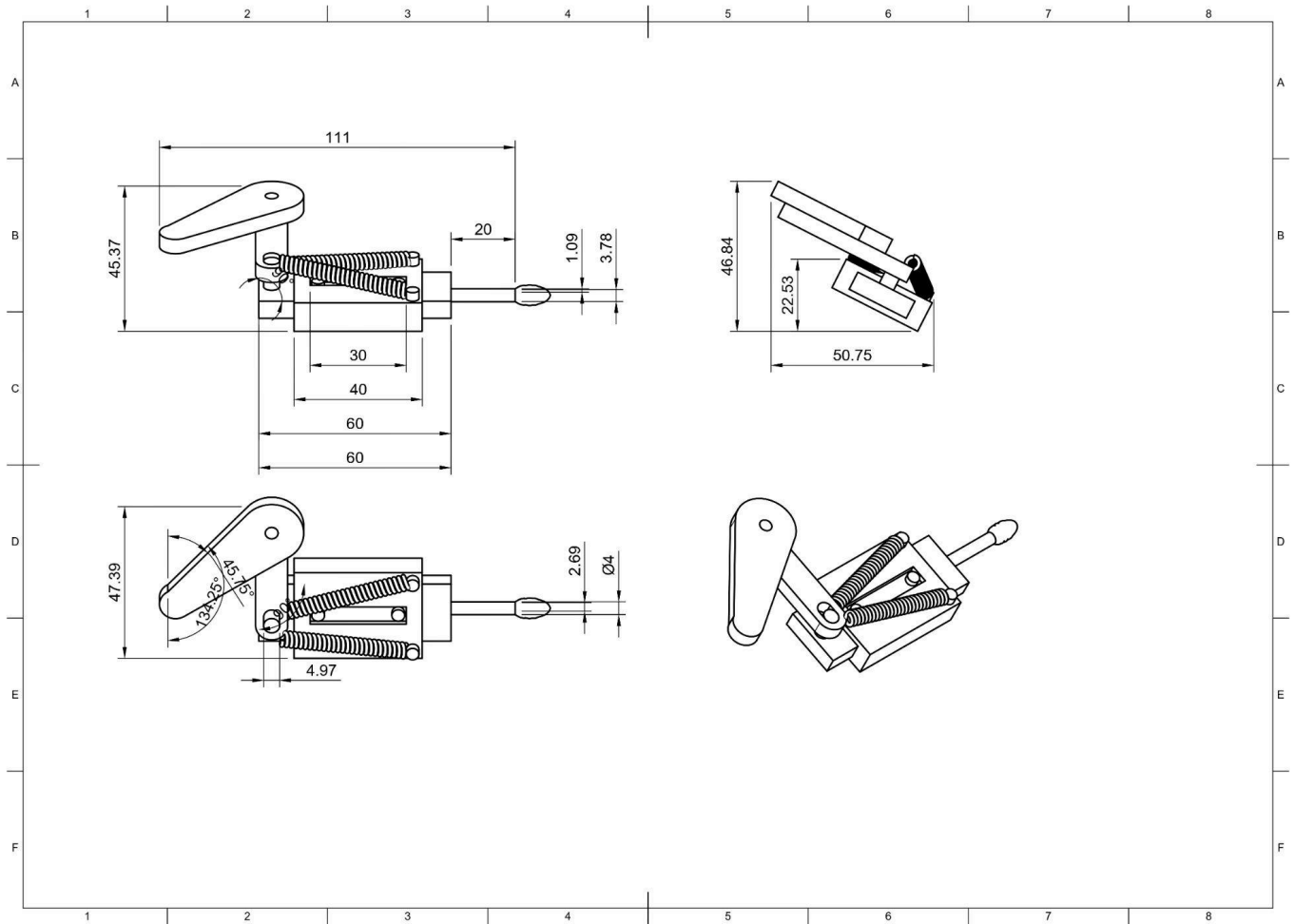
Isometric Drawing



Orthographic Full Drawing

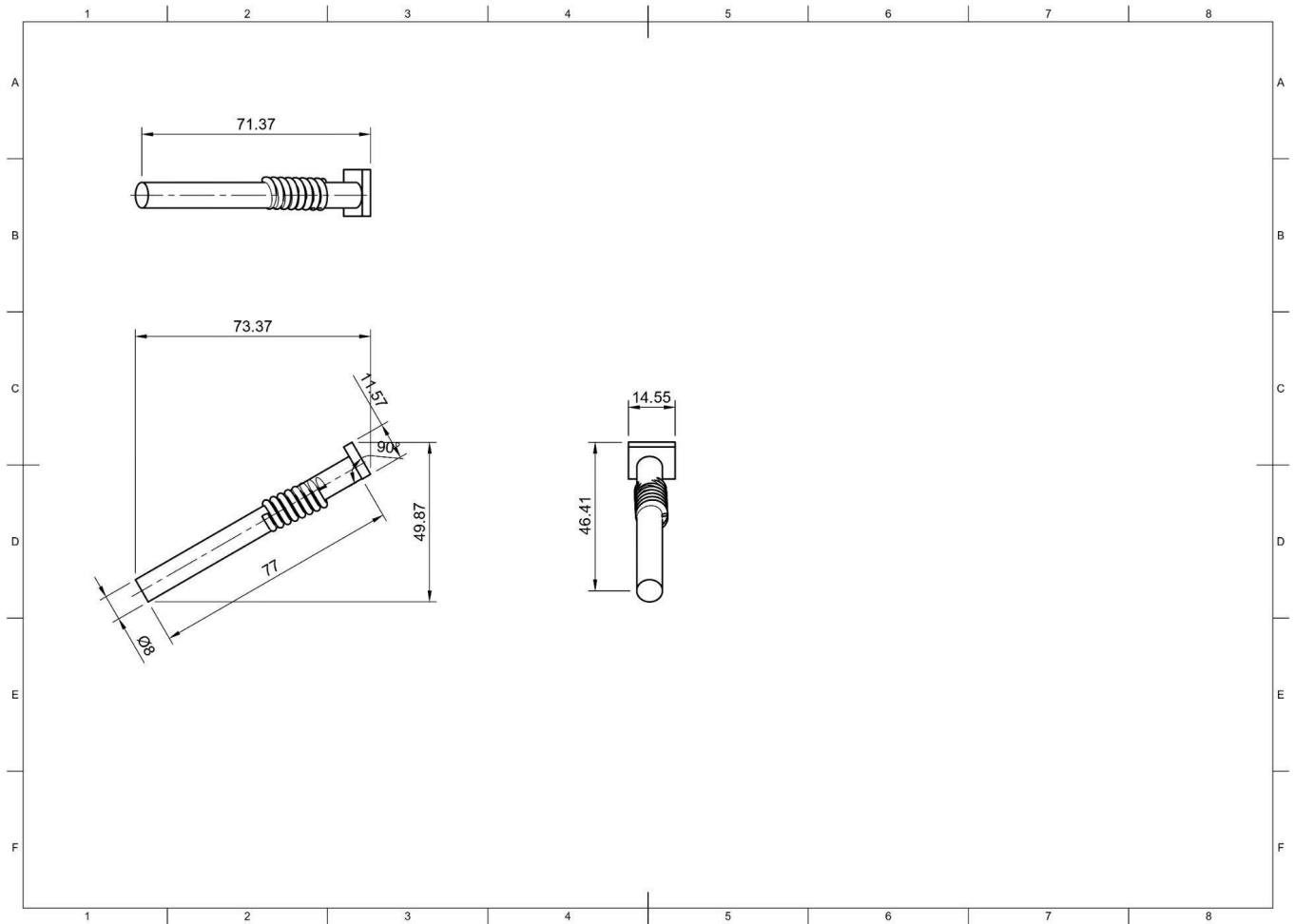


Flippers



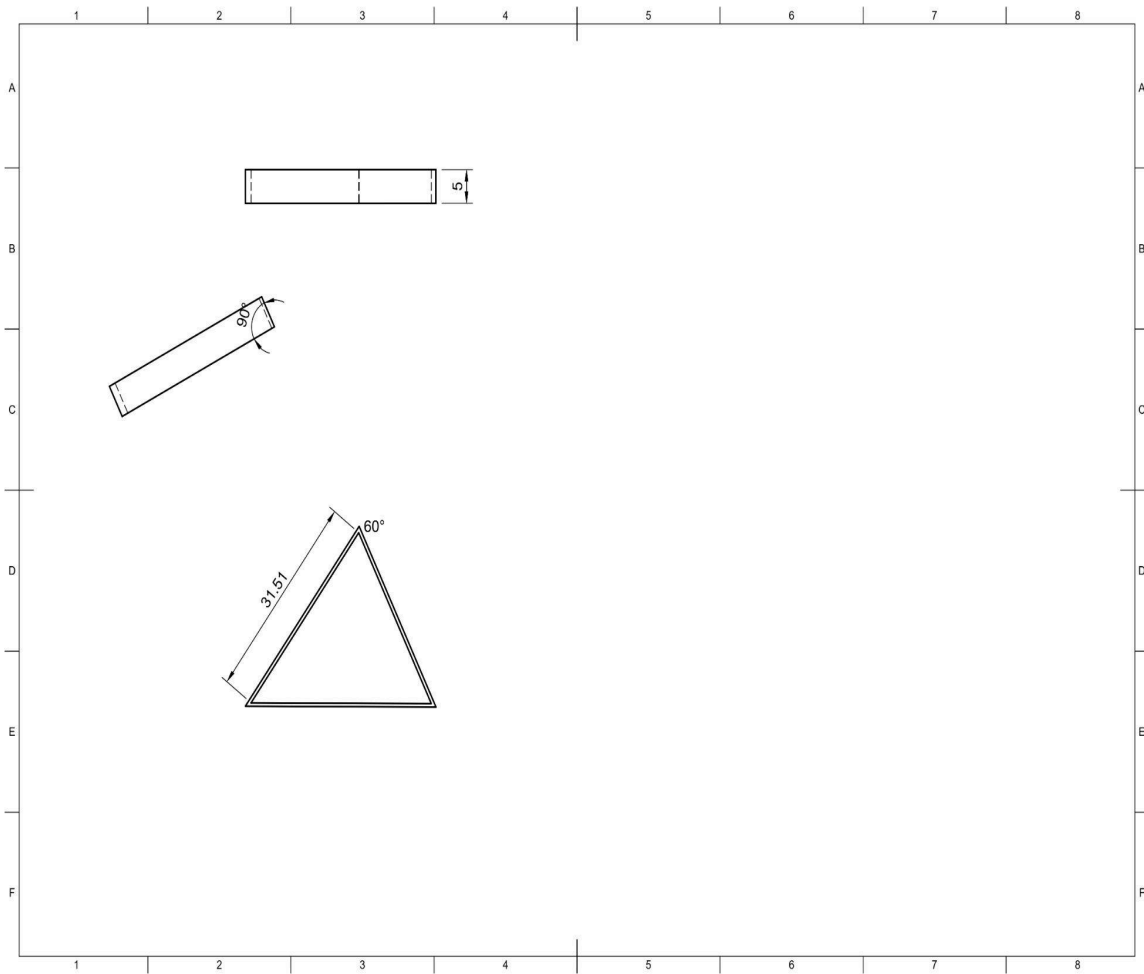
1. Part No: 1
2. Part Name: Flipper
3. Material Required: Mild Steel Flat, Copper coated steel wire, Steel Round Rod
4. Quantity: 2
5. Process Used: Drilling, Object fabrication, Welding, Cutting, grinding

Launcher



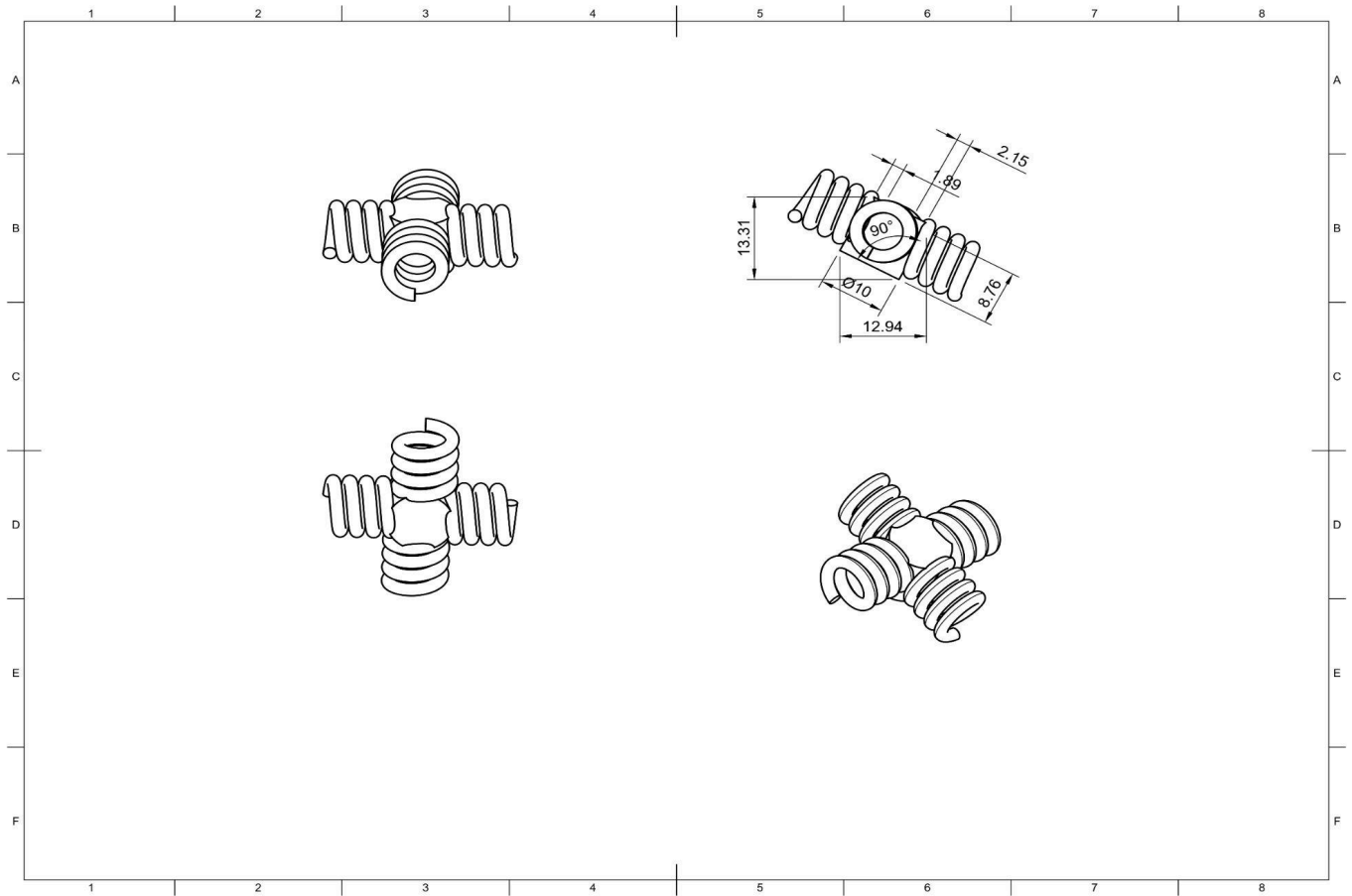
1. Part No: 2
2. Part Name: Launcher
3. Material Required: Steel Round Rod, Copper coated steel wire, Mild Steel flat
4. Quantity: 1
5. Process Used: Object fabrication, Welding, Cutting

Obstacle 1



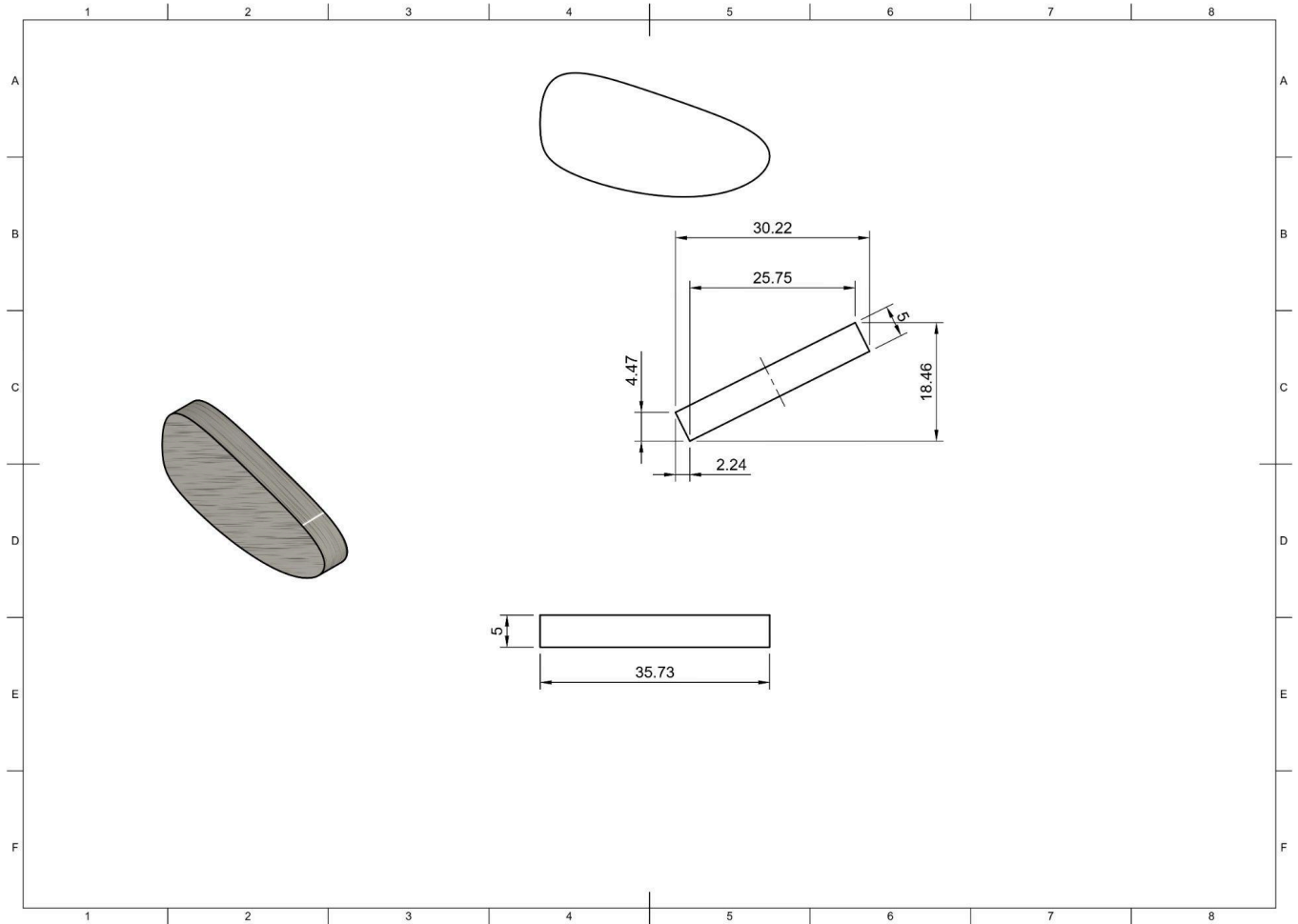
1. Part No: 3
2. Part Name: Obstacle 1
3. Material Required: Mild Sheet Flat
4. Quantity: 2
5. Process Used: Cutting

Obstacle 2



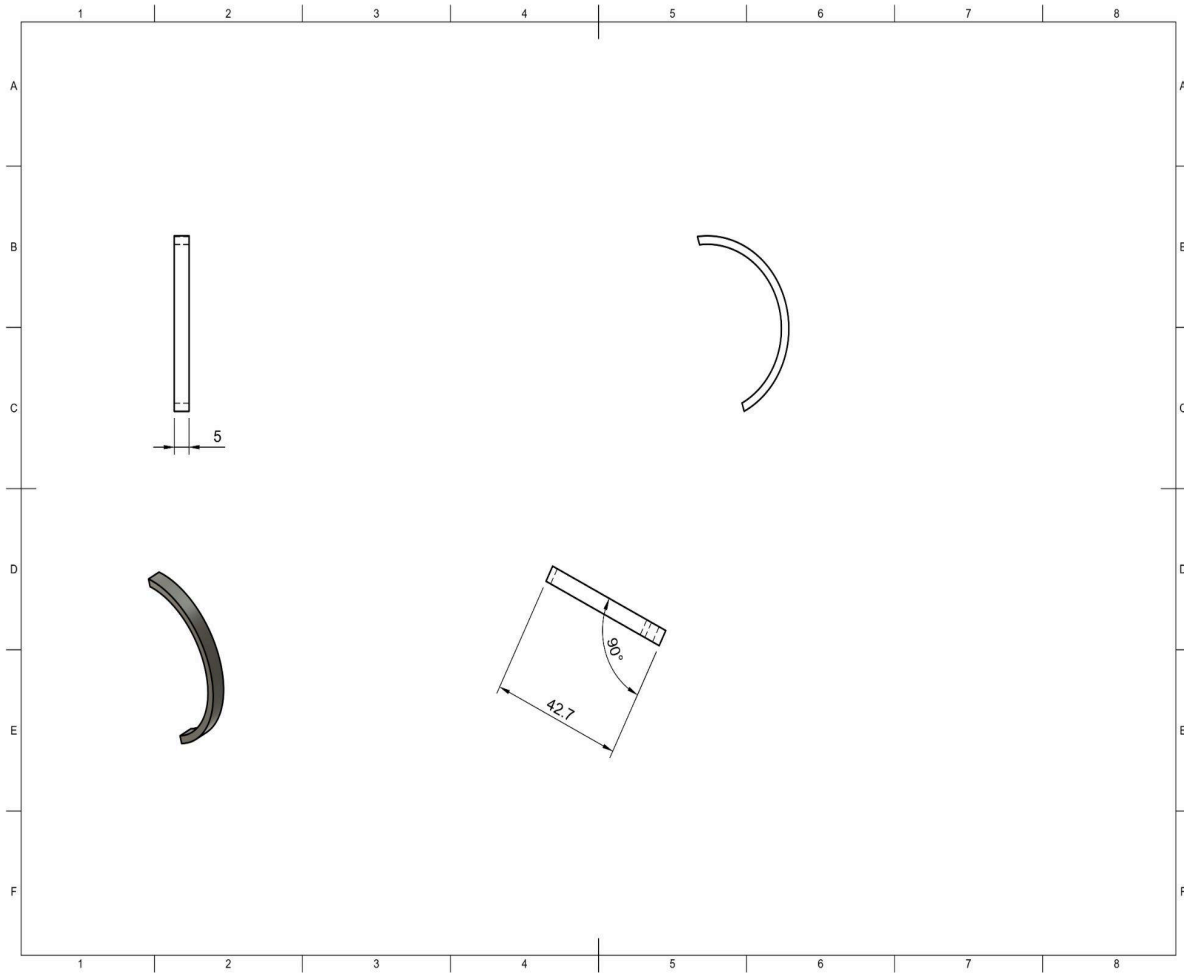
1. Part No: 4
2. Part Name: Obstacle 2
3. Material Required: Steel Round Rod, Thin Copper Wires
4. Quantity: 2
5. Process Used: Welding, Brazing, Object Fabrication

Obstacle 3



1. Part No: 5
2. Part name: Obstacle 3
3. Material Required: Mild Steel Flat
4. Quantity: 2
5. Process Used: Cutting, Grinding

Extra Obstacles



1. Part No: 6
2. Part Name: Extra Obstacle
3. Material Required: Mild Sheet Flat
4. Quantity: 2
5. Process Used: Cutting, Folding

Ramp

1. Part No: 7
2. Part Name: Ramp
3. Material Used: Mild Steel Sheet
4. Quantity: 1
5. Process Used: Sheet Metal Forming

Cost Estimation

S. No.	Description	Size	Quantity	Price	Total (in Rs)
1	Mild Steel Flat	25 mm x 5 mm	1 m	Rs 45/feet	180
2	Mild Steel Round Rod	10 mm dia	200mm	Rs 24/feet	16
3	Mild Steel Round Rod	8 mm dia	200 mm	Rs 20/feet	14
4	Mild Steel Round Rod	4 mm dia	300 mm	Rs 12/feet	12
5	Mild Steel Discs	20 mm dia x 10 mm thick	4	Rs 32/disc	128
6	Mild Steel Sheet	4 ft x 8 ft x 1.0 mm	2	Rs 3078/sheet	6156
7	Thin Galvanized Wire	1 mm dia	5 m	Rs 7/feet	114
8	Thin Galvanized Wire	2 mm dia	3 m	Rs 7/feet	69

Total material cost = Rs. 6689

Man-hour costs:

Minimum wage in India = Rs 178/day

No of people = 7

No of working labs = 6

So total estimated cost = $178 \times 7 \times 6$ = Rs 7476

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