



The Annual Techno-Management Festival  
29th Aug. - 1st Sept. 2013

Indian Institute of Technology  
Guwahati

&

Present



**Technothlon**  
the international school championship  
.....Inspiring Young minds!

KNOWLEDGE PARTNER  
 SHARDA  
UNIVERSITY  
Beyond Boundaries

## Hauts Squad

Duration: 2hours 30 min

Maximum Marks: 181

## TEAM DETAILS

Name of Participants:

1. \_\_\_\_\_

2. \_\_\_\_\_

Roll Number: \_\_\_\_\_

School Name: \_\_\_\_\_

**Please read the instructions carefully.**

**General Instructions**

1. Fill in the Team Details in the space provided, before starting to attempt the paper.
2. Verify that the question paper contains 20 pages and 17+8+5 questions (objective, subjective and think outside the box respectively).
3. All answers must be written in the OMR provided separately which has to be submitted at the end of the examination. The Question Paper can be taken back home.
4. All answers must be clear and legible. In case of any ambiguity, the decision of evaluation is final.
5. All the questions are correct and no queries will be entertained during the examination.
6. The medium for answering this Paper is English. Answers in any other Language will not be accepted.
7. Blank papers, clipboards, log tables, slide rulers, calculators, cellular phones, pagers and any other electronic gadgets are not allowed. No additional sheets will be provided for the rough work.

**Selection Criteria and Result**

1. Top 1500 teams will be shortlisted on the basis of the objective section marks.
2. Top 250 teams will be selected from these 1500 teams on the basis of their Subjective+Objective (excluding Strategia) section marks.
3. Strategia section would be evaluated, only for these top 250.
4. The final ranking will be based on the total marks obtained in all the sections.
5. The result will be declared on or before 2nd week of August 2013 on our website: [technothlon.techniche.org](http://technothlon.techniche.org). To access it, please preserve your hall ticket.
6. Top 50 teams will be invited to IIT Guwahati for Mains and will receive Gold certificates. The next 200 teams will receive Silver certificates.

**OMR Instructions**

1. DO NOT TAMPER WITH THE OMR.
2. Darken the bubbles properly by **BLACK** ball point pen only.
3. Fill all the details given in the OMR sheet properly.
4. In case the students feel any question wrong or short of information, then answer it 9999 or '1', whichever is applicable to the respective question.
5. Follow the correct method to fill in the OMR Sheet.
6. Interpret options A,B,C,D as 1,2,3,4 respectively.

Wrong Methods				
1	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
3	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
4	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

Correct Method				
1	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

**Think Outside the Box Example**



Answer: Reading between the lines

**DISCLAIMER**

*In any case of any discrepancy, the decision of the Organizers will be deemed final and no further correspondence will be entertained.*

### Question Paper Format

1. The first 12 questions are SINGLE answer type objective. You need to bubble the correct options in the OMR.
2. Question number 13 to 17 are integer type. Write the answer in the space provided in the OMR and bubble the correct options. (Answer should be of four digits: xxxx)
3. Rest of the questions are subjective type. Write the corresponding answers in the space provided for the respective question in the OMR. (Same applies for Think Outside The Box.)

### Marking Schemes

#### 1. Mystery Scheme – Try your Luck

The possible marks for this scheme are also a mystery. If you solve the  $i^{\text{th}}$  question correctly, then you will be awarded ( $i^{\text{*}} \text{option of correct answer}$ ) marks for that question, else you neither gain nor lose.

#### 2. Climb and Fall Scheme

You start with a base score of 1. If you answer the question correctly, your base score increases by 1 (i.e. to 2) for the next question. With every correct answer, your base score for the next question increases by 1. But if you break the sequence, you fall back to the base of 1, and will have to start climbing again.

#### 3. Collatz Conjecture Scheme

Collatz Conjecture defines a sequence (Starting with p) as follows:  
if  $i^{\text{th}}$  term of the sequence,  $x$  is odd then  $(i+1)^{\text{th}}$  term is:  $3x+1$ , else it is:  $x/2$

Let's make a convention:

C -> number of correct answers    W -> number of wrongly answered    N -> left un-attempted  
The marks you get are given by twice the sum of the first C-W (if  $>0$ ) terms of the sequence( $p=4$ ).

#### 4. Let the Ends Meet - for Think outside the box.

It teaches you a lesson of life: how to achieve maximum possible with least problems.  
In a section of N questions, every question has been pre-allotted base marks, 3 . You get an additional bonus of 3, if you correctly solve the  $i^{\text{th}}$  and the  $(N-i+1)^{\text{th}}$  question correctly.

#### 5. Heap Scheme

This scheme guarantees more marks for more correct answers! Marks obtained are equal to  $2^{n+1}$ , where n is the number of correctly answered questions in that section.

#### 6. Kinetic Scheme

Remember the great Newton! We have modified his formula:

$$v^2 = u^2 + 2*a*s$$

Where:  $v^2$  are the marks you will score for a particular question.  
 $u^2=0$

$s = 1 + \text{number of Questions in the section} - \text{Order of the question in the section } (1, 2, 3, \dots)$   
 $a = 1$  for the first question of the section

If you answer a question correctly, 'a' increases by 1. If incorrectly then 'a' decreases by 1, upto zero, else it remains unchanged.

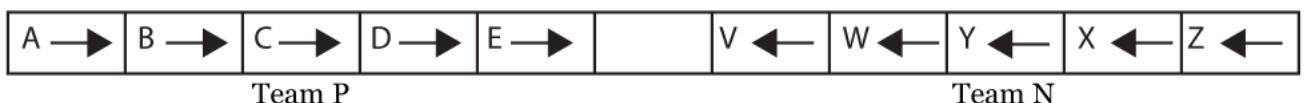
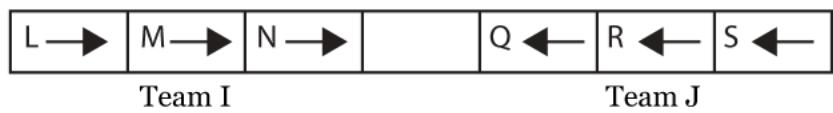
#### 7. Relative Scheme – for Strategia

The strategies will be awarded points relatively : 25, 24.9, 24.8 ...  
This score will be added to the score of other sections to rank the top 250 teams.

(Note:  $i^{\text{th}}$  question means that the order of the question in that section (1,2,3,...) is: ' $i$ '.)

## Heap Marking scheme

A Kindergarten teacher has introduced a new game for her students, during their school picnic. She divided students into 6 teams: 1st two teams (G and H) had 1 student each, next 2 teams (I and J) had 3 students each, and the last two teams(P and N) had 5 students each. The equisized teams were to face each other in the interesting game. For the same, she arranged the opponent teams in rows, facing each other as shown:



Opponent teams are to exchange their positions, but with certain twists:  
a student can move only in the direction of his arrow to an empty block only if:

- The empty block is exactly in front of him, or
- There is exactly one student of opposition and none of his own team between him and the empty block.

Finally all the kids completed the game, and were rewarded by the teacher. Shockingly there was a striking similarity between all the game plays : One team in each gameplay had to take 1 step more than its opponent team.

With this fact in mind, we can derive some more similarities the game had in each case.

(They played....You solve :P)

(Hint: Try to visualize for small sized teams, and then build your logic.)

### Question 1:

The total number of steps taken by student A, E and V can be-

- 1) 7, 9      2) 8, 9      3) 9, 11      4) 10, 11

### Question 2:

How many total steps were taken by all the little kids(in 3rd match) of teams Pand N to complete the game?

- 1) 30      2) 33      3) 35      4) 38

### Question 3:

If E being the bold started first, then the total number of steps taken by A, B, C and D is-

- 1) 12      2) 15      3) 13      4) 14



## Mystery Marking Scheme

While supervising the construction of Metro in Technolasia, Pavan came up with quite a weird pattern of placing the barricades near the “Work in progress” board. There are 2 pillars, Left and Right, separated by 8m long stretch. He chose seven equidistant positions in this stretch to place the barricades. But the length of the rope required to connect these depends on their order of placement. Once a barricade is placed, it is connected to its immediate left and right barricades, if there is none, then to the pillar, with a stretched rope.

Assuming Pavan bought a 57m of rope.

### Question 4:

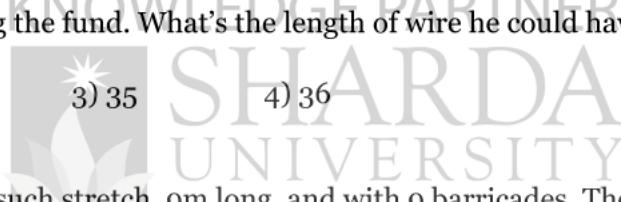
What's the minimum amount of wire he could have used?

- 1) 28      2) 20      3) 26      4) 24

### Question 5:

If he has no bar on using the fund. What's the length of wire he could have used (not wasted)?  
(not wasted)?

- 1) 27      2) 28      3) 35      4) 36



### Question 6:

If he applies to another such stretch, 9m long, and with 9 barricades. Then what would be his minimum wastage? (in case of 57 m long rope)

- 1) 3      2) 2      3) 0      4) 1



## Mystery marking scheme

Richa has been challenged by her friend, Naveen to solve the following “Jumbled Set” of 4 questions. The rules are simple:

(i) No three of these four questions have same option as their answer.

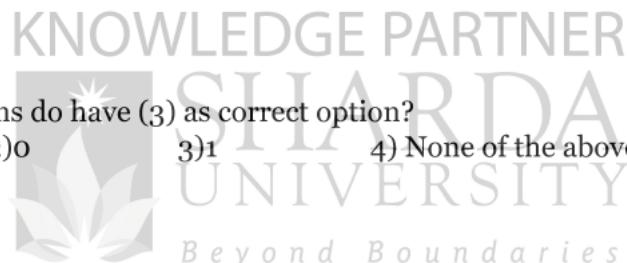
(ii) Q.10 must be answered just after Q.8.

She has promised you a treat, if you could help her.  
Give it a try !

### Question 7:

Which question's answer will you get at last?

- 1) 1                  2) 4                  3) 2                  4) 3



### Question 8:

How many questions do have (3) as correct option?

- 1) 2                  2) 0                  3) 1                  4) None of the above

### Question 9:

Which one is the basic question that you must answer first, to be able to answer other 3 questions?

- 1) 1                  2) 3                  3) 2                  4) 4

### Question 10:

What is your answer to question 8?

- 1) 4                  2) 3                  3) 2                  4) 1

# INGENIOSO MATEMATICA



Collatz Conjecture Scheme

### Question 11:

There are 8 teams in a tournament, and are known by their captains names. Four matches will take place to select the teams for the next level. Every team plays only once. Three umpires have predicted the following winners, and see the coincidence, all three of them are correct.

- Umpire-1: Sayantan, Vijay, Ashima, and Vishal.  
 Umpire-2: Kanheiya, Himanshu, Ashima, and Sayantan.  
 Umpire-3: Anirudh, Vijay, Himanshu, and Sayantan.

None picked Greeshma. Who played with Kanheiya?

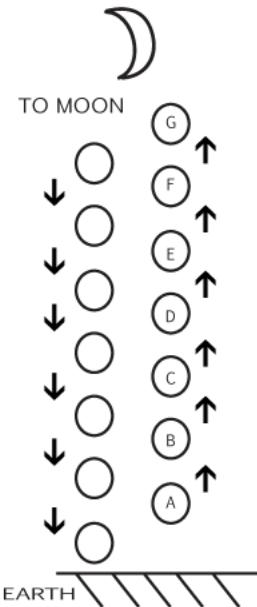
- 1) Anirudh      2) Vijay      3) Vishal      4) none of these

### Question 12:

A lunar Spaceship takes off every odd hour (1,3,5,7,...), night and day, from the Piternia launching station. Every odd hour a ship, from the moon also leaves for earth. A constant distance is maintained from one another by the spaceships, in both directions , and the speed is maintained so that they arrive at the final spot on the even hour(2,4,6,8,...). You are lucky to get a chance to go in the space shuttle, with your partner. "That's the seventh ship we've passed since we left the ground.",says the person seated by the window.

On which ship are you riding?

- 1) E      2) C      3) D      4) G

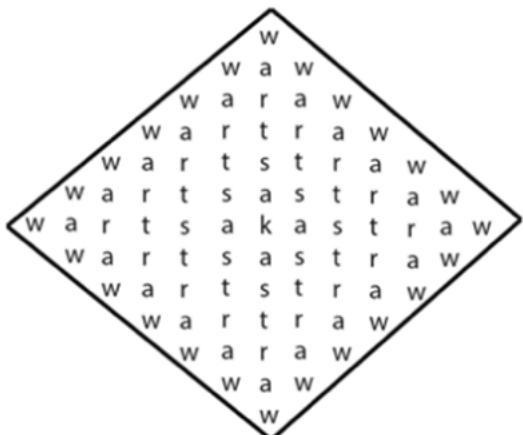


### Question 13:

Kushal has joined the summer camp, where he gets to solve some interesting problems to sharpen his brain. He has been given 2 cubes, using which he has to represent all the months and dates. Each face of a cube bears a unique digit(from 0-9), but the digits on two cubes can be same. He does that first assuming that '5' will be represented as '5' and not '05'. He then repeats the same for the case where '5' is represented as '05'. What's the minimum number of common faces the two cubes can have, with first cube faces adding up to give the least sum, in 2 cases.

#### Question 14:

A long time ago, when the Egyptian Empire was spreading across the boundaries of Egypt; several different ethnic groups were made slaves. Over time the slave communities united and made their own Pidgin(a new language) to communicate with each other. To take revenge, the oldest members of these groups: Dhruv, Sanny, and Zilani, indulged in black magic, and cursed the oldest and the most powerful Mummy of the Dynasty and its treasure: "WARTS AKA STRAW" meaning: "2013 will see the fall of Dynasty and you would be the reason". But the curse will show its effect only when the Mummy is re-awaken, and the one who reawakens will die. To save the Empire one must get control over the Mummy.



Now in 2013 A.D., archeologists Anirudh and Vishal visit the pyramids in search of the treasure, and come across a manuscript which asks them to find the number of ways there are, to spell, "WARTS AKA STRAW" excluding the spaces, by travelling from letter to letter in the grid. Unaware of the curse, in greed of Treasure they accidentally re-awake the Mummy, and are forced to death. You can save the Empire by getting control over the Mummy if you can find this mysterious number.

(Hint: Most probably, much more than you think.)

(Hint: Every possible path passes through the center.)

(How to answer? Answer the last four digits of your answer. Eg.: if the answer is: 0123, then mark your answer as: 0123)

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#### Question 15:

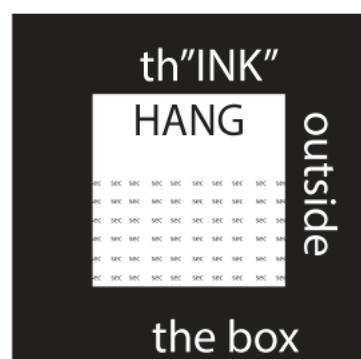
In a botanical garden, owned by Megha; there are three types of plants, ones which bear red flowers (I), ones which bear pink flowers (II), and rest bear both (III). Currently, the garden accommodates equal number of flowers from each category. As an effect of fertilizers, the red ones have lost the ability to reproduce, and the rest two have equal chances to reproduce any of the three types, but one plant can reproduce only one plant at a time. The moment type-III plant is produced; the mother plant is treated so as to stop reproducing. If this continues for a long time, what would be the ratio of the three types of plants in the garden?

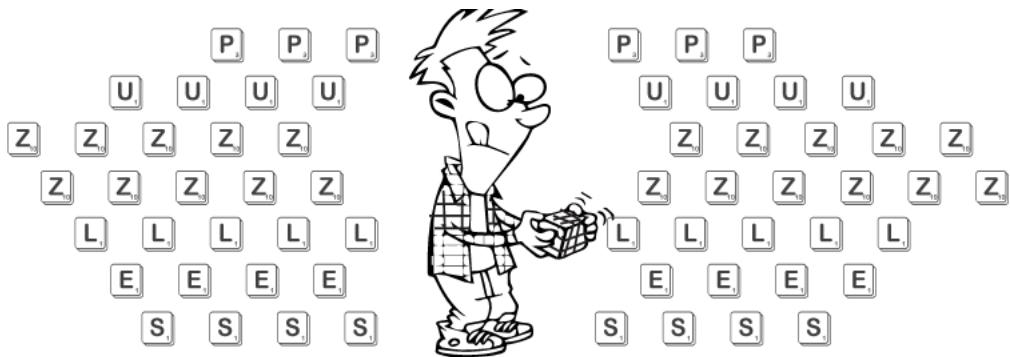
(How to answer: If the ratio is: x:y:z (say 7:8:9) then answer xyz(0789).)



Box 1

Box 2





Kinetic Marking Scheme (Ques.: 16-19)

# hit and trial



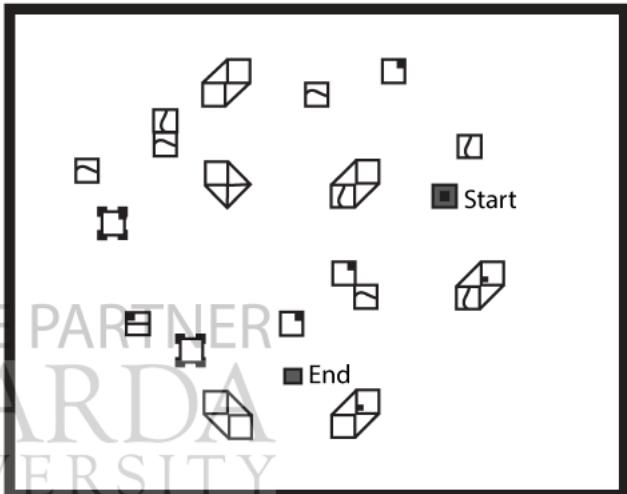
### Question 16:

The great Indian Scientist, Roshan has been captured, and sent to jail, by the inhabitants of the planet, Zorgo.

After acquiring all the knowledge he has, the aliens have given him a chance to save his life. He can escape by reaching the exit door, by moving either left, right, up, or down. But it's not that simple, once he starts moving, he can be stopped only by a hit with some barrier, or else, if he moves out of the allotted area; he is dead. Also, the slant edged barriers reflect him, on being encountered.

What is the minimum number of moves made by Roshan before he escapes?

(Don't count Hit with "End")



### Box 3



# Collapsing TOWERS

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A township, owned by Vinay resembles a 10 X 10 grid with each block containing towers, which need to be collapsed. His civil engineer, Yogesh has developed a device which when placed in any of the blocks, and triggered, collapses all the towers in the horizontal and vertical direction, but its effect cannot pass through the barriers marked in the grid. It must be ensured that it doesn't destroy another device, already placed in the grid.

Numbered barriers indicate the quantity of devices that could be placed in the horizontally or vertically adjacent blocks. For a crossed barrier, you can put any number of devices beside it. The devices can also be placed in a block that is not adjacent to a barrier.

**Question 17:**

Vinay has created 34 devices, for the plot-1.  
How many of these devices will not come in use?

				3			1		
				X					
				1	1			X	X
1								0	
	1	0	X	0					
X			1						
		1				1			0
X									
1	0			2			X		

Plot 2

2					X	X	X		
		X		2		X	X		2
							X		
1							0		
								1	
				2			1		X
		X				X	X	0	
X			2						

Plot 1

**Question 18:**

To use the remaining devices, they have contracted with another builder, Uttej, owning plot-2. Please help them place the devices on that grid.  
(Represent the position of device by shading that particular square in the answer sheet.)

## Box 3



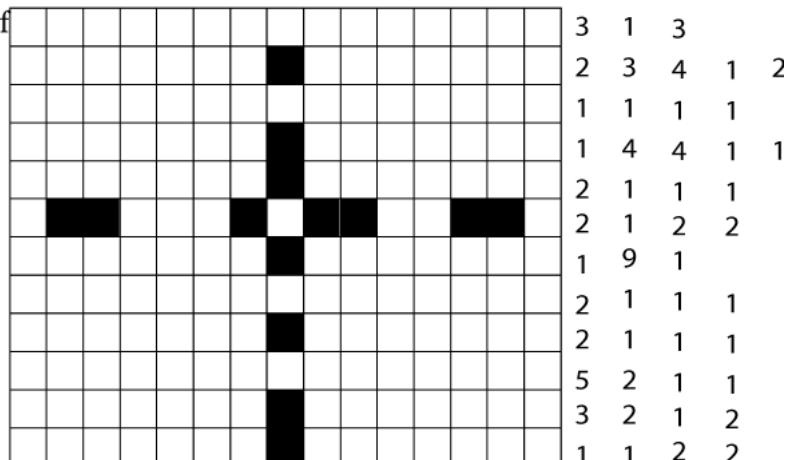
# MINE BOGGLING



## Question 19:

A free-lance developer Manikanta got bored of the old dull Minesweeper. To give it a new twist, he has come up with this Min'E'-Boggling puzzle. The player has to find the positions where mines have been planted. The rules are simple: The numbers along a row or below a column list the sizes of the groups of adjacent mines, in that row or column. But there's a catch, there can be any number ( $>0$ ) of safe squares between any two groups. For your help, some mines have already been flagged.

Let's check out the beta-version of the game!



1 3 1 1 3 1 1 1 1 1 1 3 2 1 4

2 2 3 2 1 1 1 2 1 1 2 2 1 1 4

1 3 2 1 4 5 2 1 2 2 1 1 2 1

1 1 1 1 1 2 2

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# Decrypt Decrypto

## Climb and Fall Marking Scheme

Pavan in search of the ultimate mantra for success goes to a saint, living in the Himalayas. The Saint wants to test the determination Pavan has, to achieve his goal, and shows him a passage. On unlocking its door he can find the hidden code of life. But the door only opens with a magical keyword, which is hidden in the Saint's words.

**"Sky there, humbly blesses, Ajanta caves:  
‘asamba kimba amar... asamba kimba amar!!’ "**

To help him, the saint has also given him a clue:  
**"Wait for a second, think carefully , repeat, you will get it."**

He also tells him," Everything you see beyond this door, will have a relation to what you see next."

### Question 20:

Say the magical word to open the door for Pavan.

### Question 21:

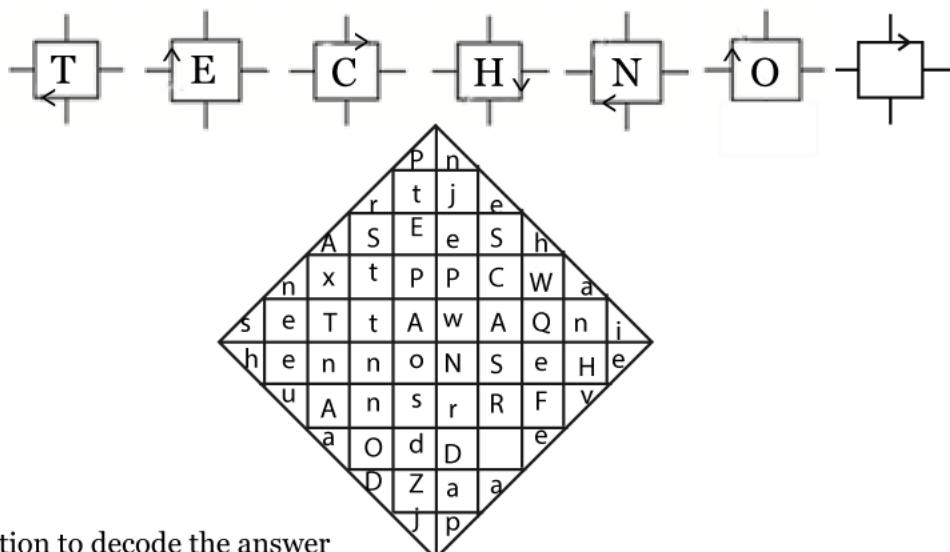
The door opens, and Pavan finds that a series of challenges await him. First up, is a sign board that looks like this:



**(Hint:** Think inside the box.)

### Question 22:

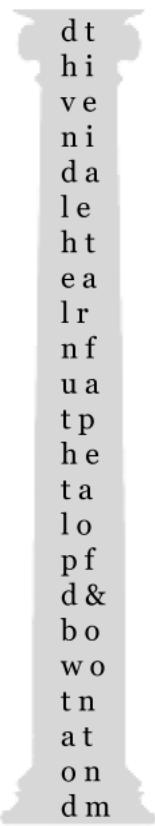
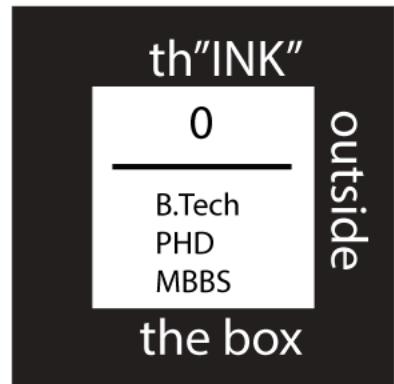
Then he encounters an ancient scroll, that has the following inscriptions:



(Use the inscription to decode the answer from the diamond)

**Question 23:**

In a dark corner, is a pillar with inscriptions all over it, here's what it looks like

**Box 4****Question 24:**

An unsuccessful hunter, has written on the walls

S LA ET NI T H E ADD ATTR R RAG ET N NS

**(Hint:** Divide and rule)

**Question 25:**

You are just a step away from success, echoes a voice

ees\_h\_bdlk\_ \_ ihzadbwt\_ yhi\_ \_twaei\_caetervr

("\_" represent spaces)

**Question 26:**

Finally, unravel the mystery of success.

rwwzgv mfigfiv prmwov

**(Hint :** Techniche speaks)



### Relative Marking scheme

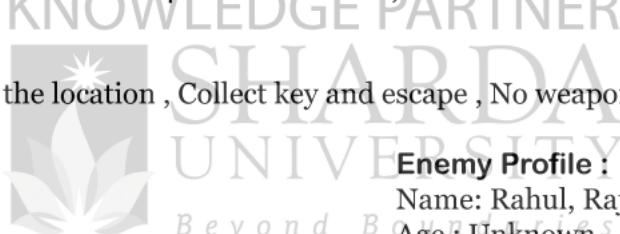
A Nuclear activation key has been stolen by terrorists. It is kept under heavy surveillance with guards patrolling around the area and a sniper overlooking the entire site. The terrorists have taken the key and hidden it in their camp somewhere in Assam, which is filled with Forests and is near a mountainous area. The site is next to the Brahmaputra river which has high and fast currents.

#### **Constraints of the mission:**

- \*Patrolling paths are shown by dotted lines and guards cover to and fro, with a speed of 1 minute per block, 50 seconds after the alarm is triggered.
- \*Agent Vinod's speed - 2 Minutes per block and 30 secs per block after collecting the key.
- \*Sniper reacts to uneven sound or actions taking 4 minutes to set his Magnum Sniper and 'shoot'.
- \*Collecting the key triggers an alarm.
- \*Points of interest are marked on map for e.g.. M,H,I,G.
- \*Patrolling starts at the given - X - Mark of the Dotted line.
- \*Entrance to the site is given in the question.
- \*The flammable substance takes 12-14 minutes to blast, once lit.

#### **Your objective:**

Infiltrate(gain access to) the location , Collect key and escape , No weapons, or Armour



#### **Personal Profile:**

Name : Agent Vinod

Age : 23 Yr

Skills : Stealthy Agent

Habits: Addicted to Technology,weapons and adventure.

#### **Enemy Profile :**

Name: Rahul, Rajesh, Bhavin, Suwardhan

Age : Unknown

Skills : Bandits

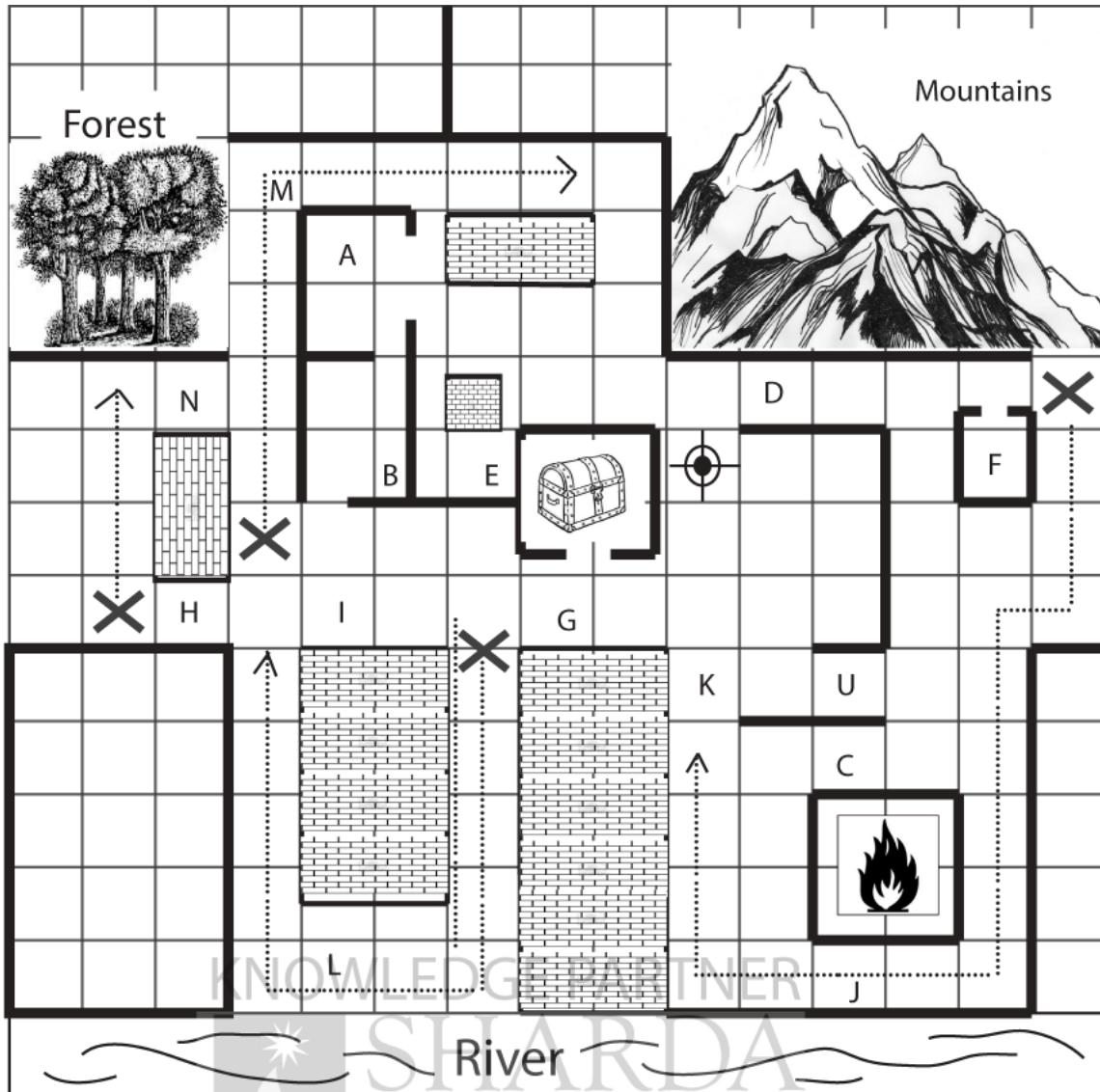
Habits: Evil Persons and have an utter thirst for blood.

#### **Question 27:**

Share your wise strategy with us.

Pattern to be followed:

- Points you visit in sequence;
- Time you wait at each point;
- LIKE      A      1m [ Wait at A for 1 minute ] , B      2s [ Wait at B for 2 seconds ]



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## Box 5



# 10 Years of Inspiring Young Minds

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## A word from the Organizers of Technothlon 2013

### The Question Paper

As our team sat together to prepare the question paper that you attempted during the course of the last two hours, a few thoughts often crossed our minds:

'Is the paper too tough? Will the students be able to enjoy it? Should we make it easier?' Well, we contemplated long and hard on this, and the answer we came up with was:

The paper has been designed such that you've got to be awesome to solve all of the questions within the stipulated time. We stressed on this fact during our team's meetings. Our intention was to select the best and the brightest minds from across the country, through a paper that would uniformly inspire all young minds that wrote it.

The preliminary round of Technothlon 2013, in our opinion, comes close to testing the mental prowess that a student requires to become a world leader. Most definitely, it is wonderful to clear the preliminary round. However - don't be disheartened if you don't manage to clear it! "Success is not final, and failure is not fatal. It's the courage to continue that counts.", as Winston Churchill famously put it. We hope that you will positively take up the challenge of returning here next year and attempt to clear what is arguably, one of the most competitive examinations conducted for school students in India.

On a side note, you might have noticed that the question paper was prepared with names of various people. We would like to point out that these are the names of members of Team Technothlon who were involved with the preparation of the Question paper. They've spent long hours in building from scratch a question paper that students all over the nation could solve, and as you might probably agree, they have done a pretty good job! We really do hope that you had as good a time solving the questions as we did while preparing them!

# Flashback

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## Indian Institute of Technology Guwahati

Presenting the body that brought Technothlon 2013 to you – IIT Guwahati!

Established in 1994 as the sixth member of the IIT Fraternity, IIT Guwahati is one of the premier institutions for engineering, science and technology in the country. IIT Guwahati functions completely in a state-of-the-art and generously endowed campus both in infrastructure and natural beauty. Spread across 700 acres with the majestic Brahmaputra on one side, and hillocks and lakes on the other, this campus with its natural beauty provides an ideal setting for learning and innovation. We, as IITians, strive for excellence in all walks of life. Because, excellence and innovation are two words that aptly define the 3000-odd students who live on this campus.

## Techniche

Techniche is the Annual Techno–Management Festival of IIT Guwahati. Every year, the IIT-G student community organises Techniche which draws an immense participation from around the world. Techniche is conducted with a vision to foster the spirit of science and technology among the youth of India and has successfully completed 14 editions. Eminent personalities, Nobel laureates, and world leaders have graced the stage during Techniche in its past editions. With '**Ideate nurture Kindle**' as the tag line for the coming-up 2013 edition of Techniche, you just know that the techno-management extravaganza is going to get much bigger. Technothlon – The International School Championship is the module of Techniche devoted exclusively to school students across India!



*Ideate. Nurture. Kindle.*

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## An open invitation for a lifelong association with Technothlon

Before you feel like you have reached the end of a sensation, we should remind you that this is merely the beginning! The Technothlon community has been growing at a phenomenal rate, and we invite YOU, the future leaders of the country, to be a part of it. Regardless of whether you make it through to the final round or not, we cherish the opportunity to interact with every one of you. Facebook is our means of reaching out to the student community.

*Be connected, stay updated!*

We are eager to help through counseling of any kind required in any sphere by utilizing the experienced pool of IITians and highly qualified faculty of IIT Guwahati.

And finally, we would be glad to receive any constructive feedback about the question-paper or any general issue that you would like to discuss with us. After all, your feedback is what Technothlon thrives on for improvement. :)

### Chief Organising Team

Pranshu Anand  
Vijay Sai

Neha Singh  
Krtin Kumar  
Om Prakash Reddy

Durvank Yewle  
Arpit Jain

**Contact us at**  
[www.techniche.org/technothlon/](http://www.techniche.org/technothlon/)



"Technothlon is glad to associate with Sharda University as its Knowledge Partner. Sharda University will be offering scholarship to top 30 students of XII standard who get selected in Technothlon 2013."



[www.sSparsha.com](http://www.sSparsha.com)

"You can grab Technothlon Merchandise @ [store.esparsha.com](http://store.esparsha.com)"

# Scribble Here

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