SPARK REGIONALS

Question Paper

-------- Class 9 & 10 -------

Shaastra- The annual technical festival of IIT Madras, is a completely student organized festival and acts as a didactic standpoint for the footfall of **50,000** visitors attending the event.

The Shaastra team believes that the future of this world depends on the shoulders of young school children. This program aims to inspire young, brilliant minds by illustrating what lies ahead for them in the world of science and technology.

Shaastra, **IIT Madras** proudly presents **SPARK**, our flagship event for school students, conducted with participants from over **20+** cities across the nation!

Structure of Spark

Shaastra Spark Round 1:
- It is a quiz to test the student's Aptitude, Logical and Mathematical Reasoning skills and happens in over 20+ cities all over the country.

Shaastra Spark Round 2 (Online Case Study Competition):
- A problem statement will be provided to participants. Teams must come up with an innovative solution for the same.
- Further details will be conveyed later.
- The top shortlisted teams will be invited to participate in the Spark Junior Championship (SJC) at Shaastra, IIT Madras.

Shaastra Spark Junior Championship (SJC):
- Selected teams from Round 2 will be invited to IIT Madras on a sponsored two-day trip.
- Finalists will participate in competitions and will get a chance to interact with IIT Madras Professors and students to ensure a holistic learning experience.
- Further details regarding the competition will be provided later to the selected teams.

Instructions for Candidates:

- Do not open this question paper until directed by the invigilator.
- Use of calculators, mobile phones, or any electronic devices is strictly prohibited.
- Answer all questions by marking appropriate option (A, B, C, or D) on provided answer sheet using a blue/black ballpoint pen.
- Ensure that you clearly write your registration number, name, and class in the designated spaces on the answer sheet.
- This paper consists of four sections, each containing five questions.
- For each correct answer, you will receive 1 mark. No marks will be deducted for incorrect or unanswered questions.
- Candidates are not permitted to leave the examination hall during the duration of the exam.

I. Mathematical Reasoning (MCQs)

1. In a row of 40 boys, Satish was shifted 10 places to the right of Rohan and Kartik was shifted 10 places to the left of Vikas. If Vikas was twenty-sixth from the left and there were three boys between Kartik and Satish after shifting, what was the position of Rohan in the row?
   A) 10th from the right end
   B) 10th from the left end
   C) 39th from the right end
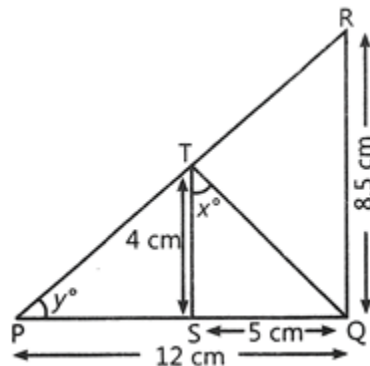   D) Data inadequate

2. Directions:
   Anika is studying in X standard. She is making a figure to understand trigonometric ratio shown as below.
   In triangle PQR, angle Q is right angled, triangle QTR is right angled at T and triangle QST is right angled at S. PQ = 12cm, QR = 8.5cm, ST =4cm
   Angle QTS= x and angle TPQ = y
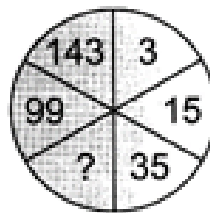   Give answers to her questions by looking at the figure.

   The length of PT is:

   A) 8cm

   B) √65cm

   C) 7.5cm

   D) √69cm

3. If $\cap$ stands for '+', $\subset$ stands for '-', $\supset$ stands for $\times$, $\cup$ stands for $\div$, $\parallel$ stands for '=' and $\rightarrow$ stands for $>$, which of the following expressions is NOT true?

   A) $(10 \cap 2) \supset (2 \cap 2) \rightarrow (10 \cup 2)$

   B) $(20 \subset 8) \cup (4 \subset 1) \parallel (4 \cap 1)$

   C) $(12 \subset 4) \supset (5 \supset 1) \rightarrow (10 \cap 20)$

   C) $(10 \cap 2) \supset (2 \cup 2) \rightarrow (10 \cup 2)$

4. A postman was returning to the post office which was in front of him to the north. When the post office was 100 metres away from him, he turned to the left and moved 50 metres to deliver the last letter at Shantivilla. He then moved in the same direction for 40 metres, turned to his right and moved 100 metres. How many metres was he away from the post office?

A) 0
B) 90
C) 150
D) C

5. If y and 1/y are the zeroes of the quadratic polynomial $2x^2 - x + 8k$, then k is:

A) 4
B) 1/4
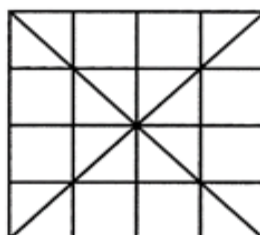C) -1/4
D) 2

II. Logical Reasoning (MCQs)

1. Find the missing number in the figure below.

A) 63
B) 56
B) 60
D) 65

2. Direction: In each of the following questions two statements are given followed by two three or four conclusions numbered I, II, III, and IV. You have to take the given statements to be true even if they seem to be at variance from the commonly known facts and then decide which of the given conclusions logically follows from the given statements disregarding commonly known facts.

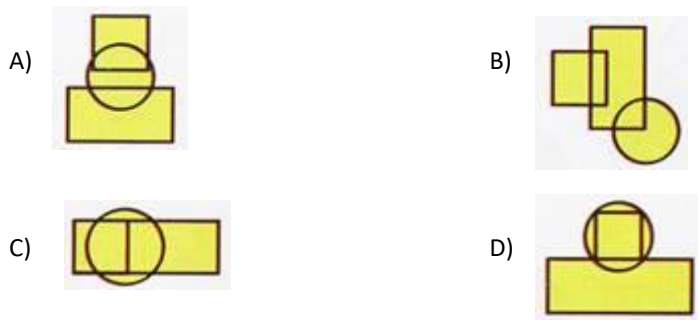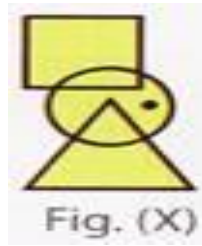Statements: Some birds are aquatic animals. All fish are aquatic animals.

Conclusions:

I. Some birds are fish.
II. Some fish are birds.

A) Only conclusion I follows
B) Only conclusion II follows
C) Either I or II follows
D) Neither I nor II follows
E) Both I and II follows

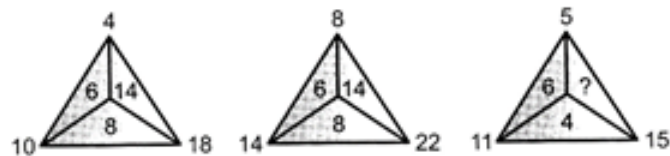3. Identify the number of squares in the figure given.

A) 36
B) 40
C) 44
D) 48

4. Direction: From amongst the figures marked [A], [B], [C] and [D], select a figure which satisfies the same conditions of placement of the dot(s) as in Fig. (X).

Fig. (X)

A)

B)

C)

D)

5. Which number will replace the question mark in the figure below?

A) 6

B) 8

C) 10

D) 14

III. Cognitive Skills (MCQs)

Read the paragraph below and answer the question that follows:

Mr. Grisham had a terrible secret—he was not human, and the world would find out in a matter of minutes. He was not ready for it; he would be excuted if they discovered the truth. Humans and Xenomorphs had been seperated for centuries, and humans despised aliens—for good reason. They were cruele beings, and some Xenomorphs, like Grisham, had human suites to disguise themselves.

It was a cold Febuary morning, and he was shivering, though he couldn't tell whether it was from fear or the cold. His trail was in fifteen minutes, and somehow, he had to beat around the bush until his species wrecked havoc in the courtroom so he could escape. But what would he say? That he din't kill those two humans? Well, he did, and he was caught red-handad.

1. How many mistakes are there in the above paragraph? (NOTE: there are no grammatical errors, only spelling errors)

    A) 9

    B) 10

    C) 11

    D) 12

2. A 4-digit number lock with the password wxyz has to be guessed by detective Nivedha. She has the following clues:

    2890: 2 numbers are right in the wrong place.
    5132: 2 numbers are right in the wrong place.
    3945: 2 numbers are right in the right place.
    2674: All numbers are wrong.
    0973: 2 numbers are right in the right place.

Find (w+x)*y*z. (w,x,y,z are greater than or equal to 0 and less than or equal to 9)

A) 18

B) 36

C) 45

D) 99

3. Shreya, Aditya, Laya and Nivedha are musicians. One is a drummer, one a pianist, one a singer and one a violinist. What do Laya and Aditya do?

A) play drums and play piano

B) plays piano and sings

C) sings and plays violin

D) play violin and play drums

4. Which Aksshith was found murdered one night.
3 suspects were rounded up- Laya, Shreya and Nivedha

Laya:

1. I didn't kill Aksshith

2. Shreya is not my friend

3. I knew Aksshith

Shreya:

1. I didn't kill Aksshith

2. Nivedha and Laya are friends of mine

3. Laya didn't kill Aksshith

Nivedha:

1. I didn't kill Aksshith

2. Laya lied when she said that Shreya was not her friend

3. I don't know who killed Aksshith

Each person lies once and tells the truth twice. Only one of them is guilty. Who is it?

A) Laya

B) Shreya

C) Nivedha

D) Can't find the given information

5. Work out which option is the top-down 2D view of the following 3D figure:
The 3D figure consists of four cubes arranged in a stair-like pattern, with the cubes stacked in such a way that:
The bottom layer contains two cubes placed side by side.
The next layer contains one cube placed on the right cube of the bottom layer.
The top layer contains one cube placed on the top-left of the two bottom cubes.

A) Three squares arranged in an "L" shape.

B) Four squares arranged in a straight horizontal line.

C) Three squares arranged in a straight vertical line.

D) Four squares forming a "T" shape with three squares in the vertical and one sticking out on the side.

IV. **Theme Based Questions** (MCQs)

1. Which of the following statements about the ozone shield is accurate?

A) Ozone shield is found in the troposphere

B) Ozone shield is found in the stratosphere

C) Ozone shield is found in the exosphere

D) Ozone shield is found in the mesosphere

2. Consider the following statements regarding Green Economy:
   1. It is an economic model based on sustainable development.
   2. Green national Income measures the overall development of the economy with environmental upgradation.
   3. Green GDP monetises the loss of biodiversity & accounts for costs caused by climate change.
   Which of the statements given above is/are correct?

   A) 1 and 2 only
   B) 2 only
   C) 2 and 3 only
   D) More than one of the above
   E) None of the above

3. Which of the following is correct if we only achieve two out of three pillars of Sustainable Development?
   A) Social + Economic Sustainability = Equitable
   B) Social + Environmental Sustainability = Bearable
   C) Economic + Environmental Sustainability = Viable
   D) All of the above

4. Which of the following options is not included in the sustainable development parameters?
   A) Gender inequality and diversity
   B) Intergenerational and intragenerational equity
   C) Growing annually
   D) None of the above

5. Which of the following is a key feature of sustainable development?
   A) Short-term gains over long-term benefits
   B) Inequality in resource distribution.
   C) Integration of economic, social, and environmental goals.
   D) Dependence on non-renewable resources.