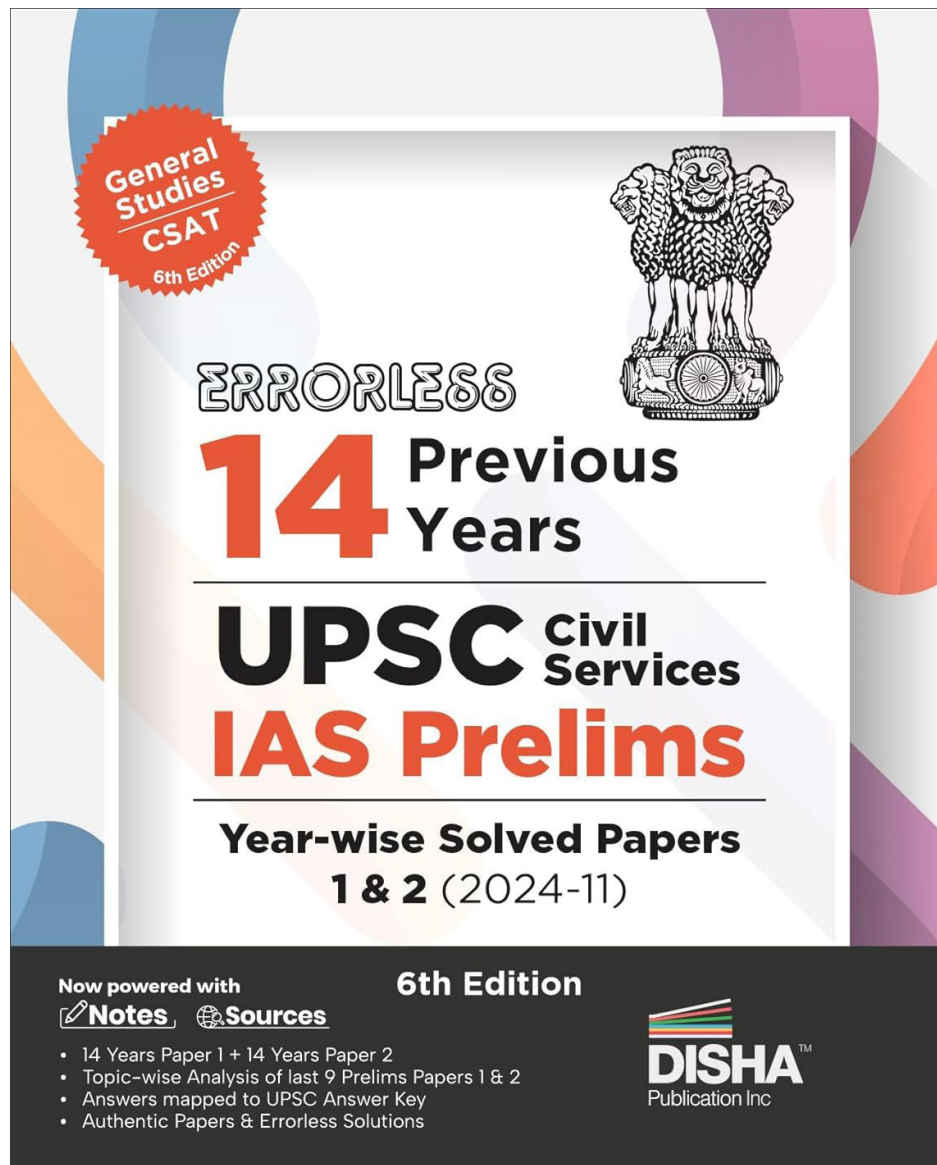




IAS Prelims Solved Paper-2 2023

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IAS PRELIMS

Solved Paper-2 2023

INSTRUCTIONS

1. This Test Booklet contains 80 items (questions). Each item comprises four responses (answers). You will select the response which you want to mark on the Answer sheet. In case, you feel that there is more than one correct response, mark the response which you consider the best. In any case, choose ONLY ONE response for each item.
2. All items carry equal marks.
3. Penalty for wrong answers:
THERE WILL BE PENALTY FOR WRONG ANSWERS MARKED BY THE CANDIDATE EXCEPT FOR QUESTIONS FROM 73 TO 80, WHICH DO NOT CARRY ANY PENALTY FOR WRONG ANSWER.
 - (i) There are four alternatives for the answer to every question. For each question which has a penalty for which a wrong answer has been given by the candidate, one-third of the marks assigned to that question will be deducted as penalty.
 - (ii) If a candidate gives more than one answer, it will be treated as a wrong answer even if one of the given answers happens to be correct and there will be same penalty as above to that question, if it has a penalty.
 - (iii) If a question is left blank, i.e., no answer is given by the candidate, there will be no penalty for that question.

Maximum Marks : 200

Time Limit : 2Hr.

DIRECTION for the following 3 (three) items: *Read the following three passage and answer the items that follow the passages. Your answers to these items should be based on the passages only*

Passage -1

We often hear about conflicts among different States in India over river waters. Of the 20 major river systems, 14 are already water-stressed; 75% of the population lives in water -stressed regions, a third of whom live in water-scarce areas. Climate change, the demands of rising population and the need for agriculture to keep pace, and increases rate of urbanization and industrialization will exacerbate water stress. According to the Constitution of India, water is a State subject and not that of the Union, except for regulation of inter-State rivers. Key to ensuring balance between competing demands of various stakeholders is a basin-based approach to allocate water amongst constituent regions and States. Allocating fair share of water to them requires assessments based on objective criteria, such as specificities of the river basin, size of dependent population, existing water use and demand efficiency of use, projected future use etc. while ensuring the environmental needs of the river and aquifers.

1. Which one of the following statements best reflects the most national, practical and immediate action required to ensure fair and equitable allocation of water to different stakeholders?
 - (a) A national, pragmatic, legal and policy framework for water allocation should be made.

- (b) All river systems of the country should be linked and huge aquifers created.
- (c) Water channels between regions of water surplus and regions of water deficit should be created.
- (d) To mitigate water crisis water demand of sectors such as agriculture and industry should be reduced.

Passage -2

More than half of Indian women and almost a quarter of Indian men of working age suffer from anemia. According to studies, they are anywhere from 5-15% less productive than they could be, as a result thereof. Indian also has the largest tuberculosis burden in the world, costing 170 million workdays to the country annually. But what is just as important as lost productivity now is lost potential in the future. It is becoming increasingly clear that on many measures of cognitive ability, malnourished Indian children perform two or three times worse than their adequately nourished peers. For an economy that will be more dependent on highly skilled workers, this poses a significant challenge. And it is one that really should be addressed given India's demographic outlook.

2. Which one of the following statements best reflects what is implied by the passage?
 - (a) Education system must be strengthened in rural areas.
 - (b) Large scale and effective implementation of skill development program is the need of the hour
 - (c) For economic development, health and nutrition of only skilled workers needs special attention.
 - (d) For rapid economic growth as envisaged by us, attention should be paid to health and nutrition of the people.

Passage -3

In India, a majority of farmers are marginal and small, less educated and possess low adaptive capabilities to climate change, perhaps because of credit and other constraints. So, one cannot expect autonomous adaptation to climate change. Even if it was possible, it would not be sufficient to offset losses from climate change. To deal with this, adaptation to climate change is paramount, alongside a fast mitigation response. Another solution is to have a planned or policy-driven adaptation, which would require the government to come up with policy recommendations. Perception is a necessary pre-requisite for adaptation. Whether farmers are adapting agricultural practices to climate change depends on whether they perceive it or not. However, this is not always enough for adaptation. It is important how a farmer perceives the risks associated with climate change.

3. Which one of the following statements best reflects the most logical and rational message conveyed by the author of the passage?
- (a) Adaptation to climate change and mitigation response are basically the responsibilities of the government.
 (b) Climate change causes a change in government policies regarding land use patterns in the country.
 (c) Risk perceptions of farmers are important for motivating them for taking adaptation decisions.
 (d) Since mitigation is not possible, governments should come up with policies for quick response to climate change.
4. Raj has ten pairs of red, nine pairs of white and eight pairs of black shoes in a box. If he randomly picks shoes one by one (without replacement) from the box to get a red pair of shoes to wear, what is the maximum number of attempts he has to make?
- (a) 27 (b) 36
 (c) 44 (d) 45
5. In how many ways can a batsman score exactly 25 runs by scoring single runs, fours and sixes only, irrespective of the sequence of scoring shots?
- (a) 18 (b) 19
 (c) 20 (d) 21
6. There are four letters and four envelopes and exactly one letter is to be put in exactly one envelope with the correct address. If the letters are randomly inserted into the envelopes, then consider the following statements:
1. It is possible that exactly one letter goes into an incorrect envelope.
 2. There are only six ways in which only two letters can go into the correct envelopes.

Which of the statements given above is/are correct?

- (a) 1 only (b) 2 only
 (c) Both 1 and 2 (d) Neither 1 nor 2

7. What is the remainder when $85 \times 87 \times 89 \times 91 \times 95 \times 96$ is divided by 100?
- (a) 0 (b) 1
 (c) 2 (d) 4
8. What is the unit digit in the expansion of $(57242)^{9 \times 7 \times 5 \times 3 \times 1}$?
- (a) 2 (b) 4
 (c) 6 (d) 8
9. If ABC and DEF are both 3-digit numbers such that A, B, C, D, E and F are distinct non-zero digits such that $ABC + DEF = 1111$, then what is the value of $A + B + C + D + E + F$?
- (a) 28 (b) 29
 (c) 30 (d) 31
10. D is a 3-digit number such that the ratio of the number to the sum of its digits is least. What is the difference between the digit at the hundred's place and the digit at the unit's place of D?
- (a) 0 (b) 7
 (c) 8 (d) 9

DIRECTIONS for the following 3(three) items: Read the following three passages and answer the items that follow the passages. Your answers to these items should be based on the passages only.

Passage - 1

The emissions humans put into the atmosphere now will affect the climate in the middle of the century and onwards. Technological change, meanwhile, could make a future transition away from fossil fuels cheap or it might not, leaving the world with a terrible choice between sharply reducing emissions at huge cost or suffering through the effects of unabated warming. Businesses that do not hedge against the threat of uncertain outcomes fail. The world cannot afford such recklessness on climate change.

11. Which one of the following statements best reflects the crucial message conveyed by the author of the passage?
- (a) Businesses that cause emissions may need to close down or pay for pollution in future.
 (b) The only solution is technological development related to the issues of climate change.
 (c) Waiting to deal with carbon emissions until technology improves is not a wise strategy.
 (d) Since future technological change is uncertain, new industries should be based on renewable energy sources.

Passage -2

Environmental problems cause health problems. Substantial changes in lifestyle can reduce environmental or health problems, but this idea appears almost impossible to adopt. With environmental problems, individual efforts can be perceived as having a negligible effect and therefore lead to inertia. With health, on the other hand, individual choices can make the

difference between life and death, literally. And yet barring a few, there seems to be the same collective lethargy towards making their choices.

12. Which one of the following statements best implies the most rational assumption that can be made from the passage ?
- We are likely to spend more money on cure than prevention.
 - It is the job of the government to solve our environmental and public health problems.
 - Health can be protected even if environmental problems go on unattended.
 - Loss of traditional lifestyle and the influence of western values led to some unhealthy ways of living.

Passage -3

Many people are not eating the right food. For some, it is simply a decision to stick with food they enjoy but which is not too healthy. This is leading to an increase in non-communicable diseases. This in turn leads to major burden on our health-care systems that have the potential to derail the economic progress which is essential for the poor to improve their lives. For others, it is about limited access to nutritious food or a lack of affordability, leading to monotonous diets that do not provide the daily nutrients for them to develop fully. Part of the reason nutrition is under threat worldwide is that our food systems are not properly responding to nutritional needs. Some where along that long road from farm to fork, there are serious detours taking place.

13. Which one of the following statements best reflects the crux of the passage?
- The scheme of Universal Basic Income should be implemented worldwide as a way of poverty alleviation.
 - We must place food-based nutrition at the centre of our policy debate.
 - Nutritional status of food should be improved by creating appropriate genetically modified crops.
 - Using modern food processing technologies, we must fortify food items with required nutrient elements.
14. Three of the five positive integers p, q, r, s, t are even and two of them are odd (not necessarily in order). Consider the following:
- $p + q + r - s - t$ is definitely even.
 - $2p + q + 2r - 2s + t$ is definitely odd.

Which of the above statements is/are correct?

- 1 only
 - 2 only
 - Both 1 and 2
 - Neither 1 nor 2
15. Consider the following in respect of prime number p and composite number c .
- $\frac{p+c}{p-c}$ can be even
 - $2p+c$ can be odd
 - pc can be odd.

Which of the statements given above are correct?

- 1 and 2 only
 - 2 and 3 only
 - 1 and 3 only
 - 1, 2 and 3
16. A 3-digit number ABC , on multiplication with D gives $37DD$ where A, B, C and D are different non-zero digits. What is the value of $A + B + C$?
- 18
 - 16
 - 15
 - Cannot be determined due to insufficient data
17. For any choices of values of X, Y and Z , the 6-digit number of the form $XYZXYZ$ is divisible by :
- 7 and 11 only
 - 11 and 13 only
 - 7 and 13 only
 - 7, 11 and 13
18. 125 identical cubes are arranged in the form of a cubical block. How many cubes are surrounded by other cubes from each side ?
- 27
 - 25
 - 21
 - 18
19. How many distinct 8-digit numbers can be formed by rearranging the digits of the number 11223344 such that odd digits occupy odd positions and even digits occupy even positions ?
- 12
 - 18
 - 36
 - 72
20. A, B, C working independently can do a piece of work in 8, 16 and 12 days respectively. A alone works on Monday, B alone works on Tuesday, C alone works on Wednesday; A alone, again works on Thursday and so on. Consider the following statements :
- The work will be finished on Thursday.
 - The work will be finished in 10 days.
- Which of the above statements is/are correct ?
- 1 only
 - 2 only
 - Both 1 and 2
 - Neither 1 nor 2

DIRECTIONS for the following 3 (three) items: Read the following three passage and answer the items that follow the passages. Your answers to these items should be based on the passages only

Passage - 1

To tackle the problem of pollution in cities, policy makers think that drastic actions like temporary use of odd-even number scheme for vehicles, closing schools, factories, construction activities, and banning the use of certain type of vehicles are a way forward. Even then the air is not clean. Vehicles more than 15 years old comprise one percent of the total; and taking them off the road will not make any difference. Banning certain fuels and car types arbitrarily is not proper. Diesel engines produce more PM 2.5 and less CO_2 than petrol or CNG engines. On the other hand, both diesel and CNG engines produce more NO_x than petrol engines.

No one has measured the amount of NO_x that CNG engines are emitting. Arbitrary bans on vehicles that have passed mandated fitness tests and periodic pollution tests are unfair. What is needed is the scientific and reliable information about the source of pollutants on a continuing basis and the technologies that will work to reduce pollution from them.

21. Which one of the following statement best reflects the most logical & rational implication conveyed by the passage ?
- Arbitrary curbs on vehicles to reduce pollution are difficult to implement.
 - Knee-jerk reactions cannot solve the problem of pollution but evidence-based approach will be more effective.
 - A heavy penalty should be enforced on those driving without periodic pollution tests.
 - In the absence of laws to deal with the problems of pollution, administration tends to make arbitrary decisions.

Passage -2

Good corporate governance structures encourage companies to provide accountability and control. A fundamental, reason why corporate governance has moved onto the economic and political agenda worldwide has been the rapid growth in international capital markets. Effective corporate governance enhances access to external financing by firms, leading to greater investment, higher growth and employment. Investors look to place their funds where the standards of disclosure, of timely and accurate financial reporting, and of equal treatment to all stakeholders are met.

22. Which of the following statements best reflects the logical inference from the passage given above ?
- It is an important agenda of the countries around the world to ensure access to good external financing.
 - Good corporate governance improves the credibility of the firms.
 - International capital markets ensure that the firms maintain good corporate governance.
 - Good corporate governance paves the way for robust supply chains.

Passage -3

Elephants are landscape architects, creating clearings in the forest, preventing overgrowth of certain plant species and allowing space for the regeneration of others, which in turn provide sustenance to other herbivorous animals. Elephants eat plants, fruits and seeds, propagating the seeds when they defecate in other places as they travel. Elephant dung provides nourishment to plants and animals and acts as a breeding ground for insects. In times of drought, they access water by digging holes which benefits other wildlife.

23. Which one of the following statements best reflects the most logical and rational inference that can be drawn from the passage ?

- The home range of elephants needs to be a vast area of rich biodiversity.
 - Elephants are the keystone species and they benefit the biodiversity.
 - Rich biodiversity cannot be maintained in the forests without the presence of elephants.
 - Elephants are capable of regenerating forests with species as per their requirement.
24. If $7 \oplus 9 \oplus 10 = 8$, $9 \oplus 11 \oplus 30 = 5$, $11 \oplus 17 \oplus 21 = 13$, what is the value of $23 \oplus 4 \oplus 15$?
- 6
 - 8
 - 13
 - 15
25. Let x be a positive integer such that $7x + 96$ is divisible by x . How many values of x are possible ?
- 10
 - 11
 - 12
 - Infinitely many
26. If p , q , r and s are distinct single digit positive numbers, then what is the greatest value of $(p + q)(r + s)$?
- 230
 - 225
 - 224
 - 221
27. A number N is formed by writing 9 for 99 times, What is the remainder if N is divided by 13?
- 11
 - 9
 - 7
 - 1
28. Each digit of a 9-digit number is 1. It is multiplied by itself. What is the sum of the digits of the resulting number?
- 64
 - 80
 - 81
 - 100
29. What is the sum of all digits which appear in all the integers from 10 to 100?
- 855
 - 856
 - 910
 - 911
30. ABCD is a square. One point on each of AB and CD; and two distinct points on each of BC and DA are chosen. How many distinct triangles can be drawn using any three points as vertices out of these six points ?
- 16
 - 18
 - 20
 - 24

DIRECTIONS for the following 3 (three) items: Read the following three passage and answer the items that follow the passages. Your answers to these items should be based on the passages only.

Passage - 1

In India, the segregation of municipal waste at source is rare. Recycling is mostly with the informal sector. More than three-fourths of the municipal budget goes into collection and transportation, which leaves very little for processing/resource recovery and disposal. Where does waste-to-energy fit into all this ? Ideally it fits in the chain after segregation (between wet waste and the rest), collection, recycling, and before getting to the landfill. technology is most appropriate in converting waste to energy depends on what is in the waste (that is biodegradable versus non-biodegradable component) and its calorific value. The biodegradable component of India municipal solid waste is a little over 50 per cent, and biomethanation offers a major solution for processing this.

31. Based on the above passage, the following assumptions have been made:

1. Collection, processing and segregation of municipal waste should be with government agencies.
2. Resource recovery and recycling require technological inputs that can be best handled by private sector enterprises.

Which of the assumptions given above is/are correct?

- (a) 1 only (b) 2 only
(c) Both 1 and 2 (d) Neither 1 nor 2

32. Which one of the following statements best reflects the crux of the passage?

- (a) Generation of energy from municipal solid waste is inexpensive
- (b) Biomethanation is the most ideal way of generating energy from municipal solid waste.
- (c) Segregation of municipal solid waste is the first step in ensuring the success of waste-to-energy plants.
- (d) The biodegradable component of India's municipal solid waste is not adequate to provide energy from waste efficiently/effectively.

Passage -2

There is a claim that organic farming is inherently safer and healthier. The reality is that because the organic farming industry is still young and not well-regulated in India, farmers and consumers, alike, are not only confused about what products are best for them, but sometimes use products in ways that could harm them as well. For example, since organic fertilizers are difficult to obtain on a large scale in India, farmers often use farmyard manure, which may contain toxic chemicals and heavy metals. Certain plant sprays, such as Datura flower and leaf spray, have an element called atropine. If it is not applied in the right dose, it can act on the nervous system of the consumer. Unfortunately, how much and when to use it are not well-researched or regulated issues.

33. Based on the above passage, the following assumptions have been made:

1. Organic farming is inherently unsafe for both farmers and consumers.
2. Farmers and consumers need to be educated about eco-friendly food.

Which of the assumptions given above is/are correct ?

- (a) 1 only (b) 2 only
(c) Both 1 and 2 (d) Neither 1 nor 2

34. Which one of the following statements best reflects the most logical, rational and practical message conveyed by the author of the passage ?

- (a) In India, organic farming should not be promoted as a substitute for conventional farming.
- (b) There are no safe organic alternatives to chemical fertilizers.

(c) In India, farmers need to be guided and helped to make their organic farming sustainable.

(d) The aim of organic farming should not be to generate huge profits as there is still no global market for its products.

Passage - 3

Food consumption patterns have changed substantially in India over the past few decades. This has resulted in the disappearance of many nutritious foods such as millets. While food grain production has increased over five times since independence, it has not sufficiently addressed agriculture sector focussed on increasing food production particularly staples, which led to lower production and consumption of indigenous traditional crops/grains, fruits and other vegetables, impacting food and nutrition security in the process. Further, intensive, monoculture agriculture practices can perpetuate the food and nutrition security problem by 'degrading the quality of land and water and food derived through them.'

35. Based on the above passage, the following assumptions have been made .

1. To implement the Sustainable Development Goals and to achieve zero-hunger goal, monoculture agriculture practices are inevitable even if they do not address malnutrition.
2. Dependence on a few crops has negative consequences for human health and the ecosystem.
3. Government policies regarding food planning need to incorporate nutritional security.
4. For the present monoculture agriculture practices, farmers receive subsidies in various ways and government offers remunerative prices for grains and therefore they do not tend to consider crop diversity.

Which of the above assumptions are valid ?

- (a) 1, 2 and 4 only (b) 2 and 3 only
(c) 3 and 4 only (d) 1, 2, 3 and 4

36. A box contains 14 black balls, 20 blue balls, 26 green balls, 28 Yellow balls, 38 red balls 54 white balls. Consider the following Statements:

1. The smallest number n such that any n balls drawn from the box randomly must contain one full group of at least one colour is 175.
2. The smallest number m such that any m balls drawn from the box randomly must contain at least one ball of each colour is 167.

Which of the above statements is/are correct ?

- (a) 1 only (b) 2 only
(c) Both 1 and 2 (d) Neither 1 nor 2

37. If 'ZERO' is written as 'CHUR' then how is 'PLAYER' written ?

- (a) SOCAGT (b) SODBGT
(c) SODBHT (d) SODBHU

38. Consider the following statements :

1. A is older than B.
2. C and D are of the same age.

3. E is the youngest.
4. F is younger than D.
5. F is older than A.

How many statements given above are required to determine the person/persons ?

- (a) Only two (b) Only three
(c) Only four (d) All five

39. Consider the following including the Question and the Statements:

There are 5 members A, B, C, D, E in a family.

Question : What is the relation of E to B?

Statement-1: A and B are a married couple.

Statement-2 : D is the father of C.

Statement-3: E is D's son.

Statement-4: A and C are sisters.

Which one of the following is correct in respect of the above Question and Statements?

- (a) Statement -1, Statement -2 and statement-3 are sufficient to answer the question.
(b) Statement -1, and Statement -3 and Statement -4 are sufficient to answer the question.
(c) All four statements together are sufficient to answer the question.
(d) All four statements are not sufficient to answer the question.

40. Choose the group which is different from the others:

- (a) 17, 37, 47, 97 (b) 31, 41, 53, 67
(c) 71, 73, 79, 83 (d) 83, 89, 91, 97

DIRECTIONS for the following 3 (three) items: Read the following three passage and answer the items that follow the passages. Your answer to these items should be based on the passages only

Passage -1

Scientists studied the vernal window — transition period from winter to the growing season. They found that Warmer winters with less snow resulted in a longer lag time between spring events and a more protracted vernal window. This change in the spring timetable has ecological, social and economic consequences — for agriculture, fisheries and tourism. As the ice melts earlier, the birds don't return, causing a delay, or lengthening in springtime ecological events.

41. With reference to the above passage, the following assumptions have been made:

- 1 Global warming is causing spring to come early and for longer durations.
2. Early spring and longer period of spring is not good for bird populations.

Which of the above assumptions is/are correct ?

- (a) 1 only (b) 2 only
(c) Both 1 and 2 (d) Neither 1 nor 2

Passage -2

A global analysis of nitrogen use efficiency a measure of the amount of nitrogen a plant takes in to grow versus what is left

behind as pollution says that using too much fertilizers will lead to increased pollution of waterways and the air. Currently, the global average for nitrogen use efficiency is approximately 0.4, meaning 40 per cent of the total nitrogen added cropland goes into the to the environment, says as study. More than half of the world's population is nourished by food grown with fertilizers containing synthetic nitrogen, which is needed to produce high crop yields. Plants take the nitrogen they need to grow, and the excess is left in the ground, water and air. This results in significant emissions of nitrous oxide, a potent greenhouse and ozone depleting gas, and other forms of nitrogen pollution, including eutrophication of lakes and rivers and contamination of river water.

42. Which one of the following statements best reflects the most logical, rational and crucial message implied by the passage?

- (a) An enhanced efficiency of use of nitrogen is imperative for both food production and environment.
(b) Production of synthetic nitrogen fertilizers cannot be stopped as it will adversely affect global food security.
(c) Alternatives to crops that require excess of nitrogen should be identified and cultivated.
(d) Conventional agriculture using synthetic fertilizers should be replaced with agroforestry, agroecosystems and eutrophication contamination of river water. organic farming.

Passage -3

Along with sustainable lifestyles, climate justice is regarded as a significant principle in environmental parlance. Both the principles have bearings on political and economic choices of the nation. So far, in our climate change summits or compacts,—both the principle have eluded consensus among nations. Justice, in the judicial sense, is well defined. However, in the context of climate change, it has scientific as well as socio-political connotations. The crucial question in the next few years will be how resources, technologies and regulations are used to support the victims of climate change. Justice in climate, is not confined to actions relating to mitigation, but includes the wider notion of support for adaptation to climate change and compensation for loss and damage.

43. Which one of the following statements best reflects the most logical, rational and crucial message conveyed by the passage ?

- (a) Climate justice should be ingrained in detail in the rules of all the new climate compacts/agreements.
(b) Environmental resources are unevenly distributed and exploited across the globe.
(c) There is an impending issue of dealing with a huge number of climate change victims/climate refugees.
(d) Climate change in all its connotations is mostly due to developed countries and therefore their share of burden should be more.

44. A principal P becomes Q in 1 year when compounded half-yearly with R% annual rate of interest. If the same principal P becomes Q in 1 year when compounded annually with S% annual rate of interest, then which one of the following is correct?
- (a) $R = S$ (b) $R > S$
(c) $R < S$ (d) $R \leq S$
45. How many natural numbers are there which give a remainder of 31 when 1186 is divided by these natural numbers?
- (a) 6 (b) 7 (c) 8 (d) 9
46. Let pp, qq and rr be 2-digit numbers where $p < q < r$. If $pp + qq + rr = tt0$, where tt0 is a 3-digit number ending with zero, consider the following statements :
- The number of possible values of p is 5.
 - The number of possible values of q is 6.
- Which of the above statements is/are correct ?
- (a) 1 only (b) 2 only
(c) Both 1 and 2 (d) Neither 1 nor 2
47. What is the sum of all 4-digit numbers less than 2000 formed by the digits 1, 2, 3 and 4, where none of the digits is repeated ?
- (a) 7998 (b) 8028
(c) 8878 (d) 9238
48. What is the number of selections of 10 consecutive things out of 12 things in a circle taken in the clockwise direction?
- (a) 3 (b) 11
(c) 12 (d) 66
49. If today is Sunday, then which day is it exactly on 10^{10} th day ?
- (a) Wednesday (b) Thursday
(c) Friday (d) Saturday
50. There are three traffic signals. Each signal changes colour from green to red and then from red to green. The first signal takes 25 seconds, the second signal takes 39 seconds and the third signal takes 60 seconds to change the colour from green to red. The durations for green and red colours are same. At 2:00 p.m., they together turn green. At what time will they change to green next, simultaneously ?
- (a) 4:00 p.m. (b) 4:10 p.m.
(c) 4:20 p.m. (d) 4:30 p.m.

DIRECTION for the following 3 (three) items: Read the following three passages and answer the items that follow the passages. Your answers to these items should be based on the passages only.

Passage 1

Sourcing food from non-agricultural lands (uncultivated systems such as forests, wetlands, pastures, etc.) in addition to agricultural lands enables a systemic approach to food consumption. It allows rural and tribal communities to sustain themselves for the whole year and steer clear of natural disasters and season-induced shortfalls of agricultural food. Since the productivity of trees is often more resilient to adverse weather conditions than annual

crops, forest foods often provide a safety net during periods of food shortages caused by crop failure; forest foods also make important contributions during seasonal crop production gaps.

51. Which one of the following statements best reflects the most logical and rational message conveyed by the author of the passage ?
- (a) Food yielding trees should replace other trees in rural and tribal areas and community owned lands.
(b) Food security cannot be ensured in India with the present practice of conventional agriculture.
(c) Wastelands and degraded areas in India should be converted into agroforestry systems to help the poor.
(d) Agroecosystems should be developed in addition to or along with conventional agriculture.

Passage - 2

While awareness on use/misuse and abuse of antibiotics is common knowledge, as is the impact of dosing poultry with antibiotics, the environmental impact of antibiotics-manufacturing companies not treating their waste has scarcely been discussed at any length or seriousness thus far. Pollution from antibiotics factories is fuelling the rise of drug-resistant infections. The occurrence of drug-resistant bacteria surrounding the pharma manufacturing plants is well known.

52. Which one of the following statements best reflects the most logical and practical message conveyed by the passage?
- (a) It is necessary to put proper effluent treatment protocols in place.
(b) It is necessary to promote environmental awareness among people.
(c) Spread of drug-resistant bacteria cannot be done away with, as it is inherent in modern medical care.
(d) Pharma -manufacturing companies should be set up in remote rural areas, away from crowded towns and cities.

Passage - 3

Benefits of good quality school education accrue only when students complete and leave school after having acquired the gateway skills. Like one learns to walk before running, similar one picks up advanced skills only after picking the basic foundational skills. The advent of the knowledge economy poses new challenges, and one of the severe consequences of having an uneducated workforce will be our inability to keep pace with the global economy. Without a strong learning foundation at the primary level, there can be no improvement in higher education or skill development.

53. Which one of the following statements best reflects the crux of the passage?
- (a) To become a global power, India needs to invest in universal quality education.
(b) India is unable to become a global power because it is not focussing or promoting knowledge economy.

- (c) Our education system should focus more on imparting skills during higher education.
- (d) Parents of many school children are illiterate and are unaware of the benefits of quality education.
54. 40 children are standing in a circle and one of them (say child-1) has a ring. The ring is passed clockwise. Child-1 passes on to child-2, child-2 passes on to child-4, child-4 passes on to child-7 and so on. After how many such changes (including child-1) will the ring be in the hands of child-1 again ?
- (a) 14 (b) 15
(c) 16 (d) 17
55. What is the middle term of the sequence Z.Z, Y, Y, Y, X, X, X, X, W, W, W, W, W,..., A?
- (a) H (b) I
(c) J (d) M
56. **Question:** Is p greater than q ?
Statement-1: $p \times q$ is greater than zero.
Statement-2: p^2 is greater than q^2 .
Which one of the following is correct in respect of the above Question and the Statements ?
- (a) The Question can be answered by using one of the Statements alone, but cannot be answered using the other Statement alone.
(b) The Question can be answered by using either Statement alone.
(c) The Question can be answered by using both the Statements together, but cannot be answered using either Statement alone.
(d) The Question cannot be answered even by using both the Statements together.
57. **Question:** Is $(p + q - r)$ greater than $(p - q + r)$, where p, q and r are integers ?
Statement-1: $(p - q)$ is positive.
Statement-2 : $(p - r)$ is negative.
Which one of the following is correct in respect of the above Question and the Statements ?
- (a) The Question can be answered by using one of the Statements alone. but cannot be answered using the other Statement alone.
(b) The Question can be answered by using either Statement alone.
(c) The Question can be answered by using both the Statements together, but answered using either cannot be Statement alone.
(d) The Question cannot be answered even by using both the Statements together.
58. In a party, 75 persons took tea, 60 persons took coffee and 15 persons took both tea and coffee. No one taking milk takes tea. Each person takes, at least one drink.
Question: How many persons attended the party ?
Statement-1: 50 persons took milk.
Statement -2: Number of persons who attended the party is five times the number of persons who took milk only.
Which one of the following is correct in respect of the above Question and the Statements ?
- (a) The Question can be answered by using one of the Statements alone, but cannot be answered using the other Statement alone.
(b) The Question can be answered by using either Statement alone.
(c) The Question can be answered by using both the Statements together, but cannot be answered using either Statement alone.
(d) The Question cannot be answered even by using both the Statements together.
59. Consider a 3-digit number.
Question : What is the number?
Statement - 1 : The sum of the digits of the number is equal to the product of the digits.
Statement - 2: The number is divisible by the sum of the digits of the number.
Which one of the following is correct in respect of the above Question and the Statements?
- (a) The Question can be answered by using one of the Statements alone, but cannot be answered using the other Statement alone.
(b) The Question can be answered by using either Statement alone.
(c) The Question can be answered by using both the Statements together, but cannot be answered using either Statement alone.
(d) The Question cannot be answered even by using both the Statements together.
60. For five children with ages $a < b < c < d < e$; any two successive ages differ by 2 years.
Question : What is the age of the youngest child?
Statement - 1 : The age of the eldest is 3 times the youngest.
Statement - 2: The average age of the children is 8 years.
Which one of the following is correct in respect of the above Question and the Statements?
- (a) The Question can be answered by using one of the Statements alone, but cannot be answered using the other Statement alone.
(b) The Questions can be answered by using either Statement alone.
(c) The Question can be answered by using both the Statements together, but cannot be answered using either Statement alone.
(d) The Question cannot be answered even by using both the Statements together.
-
- DIRECTIONS for the following 4 (four) items:** Read the following four passages and answer the items that follow the passages. Your answers to these items should be based on the passages only.
-
- Passage - 1**
- The paradox of choice is illustrated by the story of Buridan's ass. Jean Buridan, the 14th century philosopher, wrote about free will and the inability to choose due to numerous choices and uncertainties. In the story, a donkey stands between two equally

appealing stacks of hay. Unable to decide which to eat, it starves to death. Changes in technology and innovations such as smart phones and tablets only exacerbate our glut of choices. Constant connectivity and overconsumption of real-time data and social media can leave little room for self-reflection and rest, making decisions more difficult. Life is about choices. Many people are overwhelmed with attractive life choices, yet find themselves unhappy and anxious.

61. Which one of the following statements best reflects the most logical message implied by the above passage ?
- Modern technology enfeebles societal structure and makes life difficult.
 - Modern life is full of uncertainties and endless difficult choices.
 - We are influenced by the opinion of others and have no courage to follow our own convictions.
 - In our lives, having too few choices may not be a good thing, but having too many can be equally as difficult.

Passage - 2

Household finance in India is unique. We have a tendency to invest heavily in physical assets such as gold and property. Steps to encourage the financialization of savings are critical. A populace accustomed to traditional processes will not simply jump into financialization. Hurdles to change include onerous bureaucracy, a scepticism of organized financial institutions, a lack of basic information about which of the myriad services and providers is best for each family, and how (and even if) one can make the transition between them if necessary.

62. Regarding the financialization of household savings, which of the following statements best reflect the solutions that are implied by the passage ?
- A flexible environment is needed to develop solutions.
 - Households need customised solutions.
 - Innovations in financial technology are required.
- Select the correct answer using the code given below
- 1 and 2 only
 - 2 and 3 only
 - 1 and 3 only
 - 1, 2 and 3

Passage - 3

Pharmaceutical patents grant protection to the patentee for the duration of the patent term. The patentees enjoy the liberty to determine the prices of medicines, which is time-limited to the period of monopoly, the public. Such patent protection offered to the patentees is believed to benefit the public over the longer term through innovations and research and development (R&D), although it comes at a cost, in the nature of higher prices for the patented medicine. The patent regime and price protection - through a legally validated high price for the medicine during the currency of the patent - provide the patentee with a legitimate mechanism to get returns on the costs incurred in innovation and research.

63. Based on the above passage, the following assumptions have been made :
- Patent protection given to patentees puts a huge burden on public's purchasing power in accessing patented medicines.

- Dependence on other countries for pharmaceutical products is a huge burden for developing and poor countries.
- Providing medicines to the public at affordable prices is a key goal during the public health policy design in many countries.
- Governments need to find an appropriate balance between the rights of patentees and the requirements of the patients.

Which of the above assumptions are valid ?

- 1 and 2
- 1 and 4
- 3 and 4
- 2 and 3

Passage -4

India should ensure the growth of the digital economy while keeping personal data of citizens secure and protected. No one will innovate in a surveillance-oriented environment or in a place where an individual's personal information is compromised. The ultimate control of data must reside with the individuals who generate it; they should be enabled to use, restrict or monetise it as they wish. Therefore, data protection laws should enable the right kind of innovation - one that is user-centric and privacy protecting.

64. Based on the above passage, the following assumptions have been made:
- Protection of privacy is not just a right, but it has value to the economy.
 - There is a fundamental link between privacy and innovation.

Which of the above assumptions is/are valid?

- 1 only
- 2 only
- Both 1 and 2
- Neither 1 nor 2

65. In an examination, the maximum marks for each of the four papers namely P, Q, R and S are 100. Marks scored by the students are in integers. A student can score 99% in n different ways. What is the value of n?
- 16
 - 17
 - 23
 - 35
66. A flag has to be designed with 4 horizontal stripes using some or all of the colours red, green and yellow. What is the number of different ways in which this can be done so that no two adjacent stripes have the same colour ?
- 12
 - 18
 - 24
 - 36
67. A rectangular floor measures 4 m in length and 2-2 m in breadth. Tiles of size 140 cm by 60 cm have to be laid such that the tiles do not overlap. A tile can be placed in any orientation so long as its edges are parallel to the edges of the floor. What is the maximum number of tiles that can be accommodated on the floor ?
- 6
 - 7
 - 8
 - 9

68. There are five persons P, Q, R, S and T each one of whom has to be assigned one task. Neither P nor Q can be assigned Task-1. Task-2 must be assigned to either R or S. In how many ways can the assignment be done ?
 (a) 6 (b) 12
 (c) 18 (d) 24
69. There are large number of silver coins weighing 2 gm, 5 gm, 10 gm, 25 gm, 50 gm each. Consider the following statements:
 1. To buy 78 gm of coins one must buy at least 7 coins.
 2. To weigh 78 gm using these coins one can use less than 7 coins.
 Which of the statements given above is/are correct?
 (a) 1 only (b) 2 only
 (c) Both 1 and 2 (d) Neither 1 nor 2
70. Consider the following:
 I. $A + B$ means A is neither smaller nor equal to B.
 II. $A - B$ means A is not greater than B.
 III. $A \times B$ means A is not smaller than B.
 IV. $A \div B$ means A is neither greater nor equal to B.
 V. $A \pm B$ means A is neither smaller nor greater than B.
 Statement : $P \times Q, P - T, T \div R, R \pm S$
 Conclusion -1 : $Q \pm T$
 Conclusion -2 : $S + Q$
 Which one of the following is correct in respect of the above Statement and the Conclusions ?
 (a) Only Conclusion-1 follows from the Statement.
 (b) Only Conclusion-2 follows from the Statement.
 (c) Both Conclusion-1 and Conclusion-2 follow from the Statement.
 (d) Neither Conclusion-1 nor Conclusion-2 follows from the Statement.

Passage -I

In India, while the unemployment rate is a frequency used measure of poor performance of the economy, under conditions of rising school and college enrollment, it paints an inaccurate picture. The reported unemployment rate is dominated by the experience of younger Indians who face higher employment challenges and exhibit greater willingness to wait for the right job than their older peers. The unemployment challenge is greater for people with secondary or higher education, and rising education levels inflate unemployment challenges.

71. Which one of the following statements most likely reflects as to what the author of the passage intends to say ?
 (a) Enrolment in schools and colleges is high but there is no quality education.
 (b) Unemployment must be seen as a function of rising education and aspirations of young Indians.
 (c) There are no labour-intensive industries to accommodate the huge number of unemployed people.
 (d) The education system should be properly designed so as to enable the educated people to be self-employed.

Passage -2

“Science by itself is not enough, there must be a force and discipline outside the sciences to coordinate them and point to a goal. It is not possible to run a course a right when the goal itself has not been rightly placed. What science needs is philosophy - the analysis of scientific method and the coordination of scientific method and the and the coordination of scientific purposes and results; without this any science must be superficial. Government suffers, precisely like science, for lack of philosophy. Philosophy bears to science the same relationship which statesmanship bears to politics: movement guided by total knowledge and perspective, as against aimless and individual seeking. Just as the pursuit of knowledge becomes scholasticism when divorced from the actual needs of men and life, so the pursuit of politics becomes a destructive bedlam when divorced from science and philosophy.”

72. Which one of the following statements best reflects the most rational, logical and practical message conveyed by the passage?
 (a) Modern statesmen need to be well trained in scientific methods and philosophical thinking to enable them to have a better perspective of their roles, responsibilities and goals.
 (b) It is not desirable to have Governments managed by empirical statesmen unless well mixed with others who are grounded in learning and reflect wisdom.
 (c) As the statesmen/bureaucrats are the products of a society, it is desirable to have a system of education in a society that focuses on training its citizens in scientific method and philosophical thinking from a very early age.
 (d) It is desirable that all scientists need to be philosophers as well to make their work goal-oriented and thus purposeful and useful to the society.

Passage -3

“The last end of the state is not to dominate men, nor to restrain them by fear; rather it is so to free each man from fear that he may live and act with full security and without injury to himself or his neighbour. The end of the state, I repeat, is not to make rational beings into brute beasts and machines. It is to enable their bodies and their minds to function safely. It is to lead men to live by, and to exercise, a free reason; that they may not waste their strength in hatred, anger and guile, nor act unfairly toward one another.”

73. Based on the above passage, which one of the following terms best expresses the ultimate goal of the state ?
 (a) Personal safety (b) Health of body and mind
 (c) Communal harmony (d) Liberty
74. What is the remainder if 2^{192} is divided by 6?
 (a) 0 (b) 1
 (c) 2 (d) 4

75. Consider the sequence
 ABC _ _ ABC _ DABBCD _ ABCD
 that follows a certain pattern.
 Which one of the following completes the sequence ?
 (a) DACB (b) CDAB
 (c) DCCA (d) DDCA
76. AB and CD are 2-digit numbers, Multiplying AB with CD results in a 3-digit number DEF. Adding DEF to another 3-digit number GHI results in 975. Further A, B, C, D, E, F, G, H, I are distinct digits. If $E = 0$, $F = 8$, then what is $A + B + C$ equal to?
 (a) 6 (b) 7
 (c) 8 (d) 9
77. Consider the following statements in respect of five candidates P, Q, R, S and T. Two statements are true and one statement is false.
True Statement : One of P and Q was selected for the job.
False Statement: At least one of R and S was selected for the job.
True Statement : At most two of R, S and T were selected for the job.
 Which of the following conclusions can be drawn ?
 1. At least four were selected for the job.
 2. S was selected for the job.
 Select the correct answer using the code given below :
 (a) 1 only (b) 2 only
 (c) Both 1 and 2 (d) Neither 1 nor 2
78. Let P, Q, R, S and T be five statements such that:
 I. If P is true, then both Q and S are true.
 II. If R and S are true, then T is false.
 Which of the following can be concluded?
 1. If T is true, then at least one of P and R must be false.
 2. If Q is true, then P is true.
 Select the correct answer using the code given below:
 (a) 1 only (b) 2 only
 (c) Both 1 and 2 (d) Neither 1 nor 2
79. A cuboid of dimensions $7 \text{ cm} \times 5 \text{ cm} \times 3 \text{ cm}$ is painted red, green and blue colour on each pair of opposite faces of dimensions $7 \text{ cm} \times 5 \text{ cm}$, $5 \text{ cm} \times 3 \text{ cm}$, $7 \text{ cm} \times 3 \text{ cm}$ respectively. Then the cuboid is cut and separated into various cubes each of side length 1 cm. Which of the following statements is/are correct?
 1. There are exactly 15 small cubes with no paint on any face.
 2. There are exactly 6 small cubes with exactly two faces, one painted with blue and the other with green.
 Select the correct answer using the code given, below :
 (a) 1 only (b) 2 only
 (c) Both 1 and 2 (d) Neither 1 nor 2
80. The letters of the word "INCOMPREHENSIBILITIES" are arranged alphabetically in reverse order. How many positions of the letter/letters will remain unchanged?
 (a) None (b) One
 (c) Two (d) Three

ANSWERS AND EXPLANATIONS

1. (a) Fair and equitable allocation of water can be ensured if a national, pragmatic, and legal policy framework for water allocation is put in place. This is necessary to balance the competing demands of various stakeholders and develop assessments that are based on objective criteria.
2. (d) The passage establishes a connection between malnourishment and economic development. Rapid economic growth cannot be fathomed without improvement in the health and nutrition of the people. Thus, the implication of the given paragraph is contained in option (d).
3. (c) The most logical and rational message conveyed by the author is related to farmers' perception of the risks associated with climate change. The passage does imply that the risk perceptions of farmers are crucial in motivating them to taking adaptation decisions.
4. (d) In this case Raj would be completing a red pair in the end. So, let's say Raj draws 18 white and 16 black shoes first and then 9 red shoes (all of left foot).
In this way Raj has drawn 44 shoes and a red pair is still not complete. The net shoe drawn will complete a red pair = $44 + 1 = 45$

5. (b)

| Runs | Number of Six, Four and One | | | | | | | | | | | | | | | | | | |
|----------|-----------------------------|---|---|---|---|---|----|---|---|----|----|----|---|---|---|----|----|----|----|
| SIX (6) | 4 | 3 | 3 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | |
| FOUR (4) | 0 | 1 | 0 | 3 | 2 | 1 | 0 | 4 | 3 | 2 | 1 | 0 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| ONE (1) | 1 | 3 | 7 | 1 | 5 | 9 | 13 | 3 | 7 | 11 | 15 | 19 | 1 | 5 | 9 | 13 | 17 | 21 | 25 |

Hence, Total number of ways = 19

6. (b) Total number of ways of putting all four letters into four envelope = $4! = 24$
Suppose A, B, C and D are 4 envelope and L1, L2, L3 and L4 are four letters with correct address respectively.
S1: When L1 is placed in either of envelope B, C or D into an incorrect address, then placed into envelope A into an incorrect address.

Hence, it is not possible that exactly one letter goes into an incorrect envelope.

Hence, Statement 1 is not correct.

S2: Possible ways in which only two letters can go into correct address.

| Envelope | A | B | C | D |
|----------|----------------|----------------|----------------|----------------|
| 1. | L ₂ | L ₁ | L ₃ | L ₄ |
| 2. | L ₃ | L ₂ | L ₁ | L ₄ |
| 3. | L ₄ | L ₂ | L ₃ | L ₁ |
| 4. | L ₁ | L ₃ | L ₂ | L ₄ |
| 5. | L ₁ | L ₄ | L ₃ | L ₂ |
| 6. | L ₁ | L ₂ | L ₄ | L ₃ |

Only 6 possible ways in which only two letters can go into correct envelopes.

Hence, Statement 2 is correct

7. (a) Let $P = 85 \times 87 \times 91 \times 95 \times 96$
 $= 5 \times 17 \times 3 \times 29 \times 7 \times 13 \times 5 \times 19 \times 8 \times 3 \times 4$
 $= 2^5 \times 3^2 \times 5^2 \times 7 \times 13 \times 17 \times 19 \times 29$
 \therefore Number of Zeroes at the end of the product
 $=$ Highest power of 2 or 5 = 2
 Now $P \div 100 \equiv$ Remainder = 0

8. (a)

| | | | |
|------------|------------|-------------|-------------|
| $2^1 = 2$ | $2^2 = 4$ | $2^3 = 8$ | $2^4 = 16$ |
| $2^5 = 32$ | $2^6 = 64$ | $2^7 = 128$ | $2^8 = 256$ |

Here, Periodicity of 2 = 4

$$\text{Now, } \frac{9 \times 7 \times 5 \times 3 \times 1}{4} = \frac{945}{4} = 236, \text{ Remainder} = 1$$

\therefore Unit digit of $2^1 = 2$

9. (d)
- | | | |
|---|---|---|
| A | B | C |
| D | E | F |
| 1 | 1 | 1 |

Here, $C + F = 11$

Possible pair (C, F) = (2, 9), (3, 8), (4, 7), (5, 6)

Similarly $B + E = 10$

Possible pair (B, E) = (1, 9), (2, 8), (3, 7), (4, 6)

Similarly $A + D = 10$

Possible pair (A, D) = (1, 9), (2, 8), (3, 7), (4, 6)

$$\therefore A + B + C + D + E + F = (A + D) + (B + E) + (C + F) = 10 + 10 + 11 = 31$$

10. (c) A fraction is minimum when numerator is minimum and denominator is maximum

$$\text{Ratio (R)} = \frac{100x + 10y + z}{(x + y + z)}$$
 For a three digit number

$$D = (100x + 10y + z)$$

$$\text{Here, } 1 \leq x \leq 9 \text{ and } 0 \leq (y, z) \leq 9.$$

For minimum numerator and maximum denominator, $x = 1, y = z = 9$

$$R = \frac{100 \times 1 + 10 \times 9 + 9}{1 + 9 + 9} = \frac{199}{19} = 10.47$$

$$\therefore \text{Difference} = |x - z| = |1 - 9| = 8$$

11. (c) The crucial message of the passage is that technological advancement might or might not cause a reduction in carbon emissions. Therefore, waiting to deal with the emissions until technology improves is not a wise decision.

12. (c) The most rational assumption made from the passage is as follows- unlike environmental problems, health problems are highly impacted by individual efforts and choices. Thus, it can be concluded from the passage that health can be protected even if environmental problems go on unattended.

13. (b) Since our country's food systems are not responding to the nutritional needs of its people, the passage highlights the need of placing food-based nutrition at the center of country's policy debates. Note that the passage does not mention the scheme of Universal Basic Income or refer to genetically modified crops. Thus, options (a), and (c) cannot be the correct answers.

14. (a) We know that

- (i) Even \pm Even = Even
- (ii) Odd \pm Odd = Even
- (iii) Even \pm Odd = Odd
- (iv) Odd \pm Even = Odd

S1: case I : P, Q, R are even and S, T are odd.

$$P + Q + R - S - t = (P + Q + R) - (S + t)$$

$$= \text{Even} - \text{Even} = \text{Even}.$$

Case II: P, Q, S are even and r, t are odd.

$$(P + Q - S) + (R - t) = \text{Even} + \text{Even} = \text{Even}$$

Case III : P, S, t are even and Q, R are odd

$$(P - (S + T)) + (Q + R)$$

$$= \text{Even} - \text{Even} + \text{Even} = \text{Even}$$

Hence, $P + Q + R - S - t$ is definitely even. Hence, S1 is correct.

S2 : Let P, r, s are even and Q, t are odd

$$2P + E + 2r - 2S + T$$

$$= 2(P + r - s) + (q + t)$$

$$= \text{Even} + \text{Even} = \text{Even}$$

Hence, S2 is not correct.

15. (d) Let Prime number, $P = 11$

Composite number, $C = 9$

$$1. \frac{P + C}{P - C} = \frac{11 + 9}{11 - 9} = \frac{20}{2} = 10 \text{ (Even)}$$

$$2. 2P + C = 2 \times 11 + 9$$

$$= 22 + 9 = 31 \text{ (Odd)}$$

$$3. P \cdot C = 11 \times 9 = 99 \text{ (Odd)}$$

16. (a)

| | | |
|---|---|---|
| A | B | C |
| | | |
| 3 | 7 | D |

| |
|---|
| D |
| |
| D |

$$C \times D = D$$

$$\text{For } C = 6, D = 4, \Rightarrow 6 \times 4 = 24$$

$$\text{For } B = 3, D = 4 \Rightarrow 3 \times 4 = 12$$

$$\text{For } A = 9, D = 4 \Rightarrow 9 \times 4 = 36$$

$$\text{Now, } \begin{array}{r} 9 \quad 3 \quad 6 \\ \quad \quad 4 \\ \hline 3 \quad 7 \quad 4 \quad 4 \end{array}$$

$$\therefore A + B + C = 9 + 3 + 6 = 18$$

17. (d) $XYZXYZ = XYZ \times 1001$

$$\text{L.C. M. of } 7, 11 \text{ and } 13 = 7 \times 11 \times 13 = 1001.$$

$$\therefore XYZ \times 1001 = XYZ \times 7 \times 11 \times 13$$

Hence, Number 'XYZXYZ' is divisible by 7, 11 and 13.

18. (a) Number of Cubes that touches all

$$\text{Cubes} = (n-2)^3 = (5-2)^3 = 27.$$

19. (c)

| | | | | | | | |
|------|------|------|------|------|------|------|------|
| | E | E | | E | | E | |
| 1or3 | 2or4 | 1or3 | 2or4 | 1or3 | 2or4 | 1or3 | 2or4 |

Number of ways of arrangement of odd digits

$$\text{at odd place} = \frac{4!}{2! \times 2!} = 3 \times 2 = 6$$

Number of ways of arrangement of even digits at

$$\text{Even place} = \frac{4!}{2! \times 2!} = 3 \times 2 = 6.$$

$$\text{Total Arrangement} = 6 \times 6 = 36$$

20. (a) L.C.M. of 8, 16 and 12 = 48 units

$$\text{Work done/day by A} = \frac{48}{8} = 6 \text{ units}$$

$$\text{Work done/day by B} = \frac{48}{16} = 3 \text{ units}$$

$$\text{Work done/day by C} = \frac{48}{12} = 4 \text{ units}$$

$$\text{Work done in 3 consecutive days} \\ = 6 + 3 + 4 = 13 \text{ unit}$$

Time required to complete 39 units work

$$= \frac{39}{13} \times 3 = 9 \text{ days}$$

$$\text{Work finished on 11}^{\text{th}} \text{ day} = 39 + 6 + 3 = 48 \text{ units}$$

Hence, on 11th day, whole work is finished and 11th day after monday will be thursday.

21. (b) The paragraph reflects that knee-jerk reactions or arbitrary decisions are not enough to solve the problems related to pollution. What is required is an effective evidence-based approach. Thus, option (b) is the most logical and rational implication conveyed by the passage.

22. (b) The passage clearly states that "Effective corporate governance enhances access to external financing by firms leading to greater investment, higher growth, and employment." From the quoted line, it can be concluded that good corporate governance improves the credibility of the firms.

23. (b) The passage presents elephants as a keystone species that benefits biodiversity at large. Note that this does not make elephants indispensable in maintaining the rich biodiversity of the forest but only signifies their importance as a species at large. Due to this hairline gap in meaning, option (b) is the correct answer.

24. (a) $7 \oplus 9 \oplus 10 = 7 + 9 + 10$

$$= 26 = 2 + 6 = 8$$

$$9 \oplus 11 \oplus 30 = 9 + 11 + 30$$

$$= 50 = 5 + 0 = 5$$

$$11 \oplus 17 \oplus 21 = 11 + 17 + 21$$

$$= 49 = 4 + 9 = 13$$

$$\text{Similarly, } 23 \oplus 4 \oplus 15$$

$$= 23 + 4 + 15$$

$$= 42 = 4 + 2$$

$$= 6$$

25. (c) Let $Z = (7x + 96)$, Here z is divisible by x.

| x | $z \div x$ | | |
|---|---|----|---|
| 1 | $\frac{(7 + 96)}{1} = 103$ | 12 | $\left(\frac{7 \times 12 + 96}{12}\right) = 15$ |
| 2 | $\left(\frac{7 \times 2 + 96}{2}\right) = 55$ | 16 | $\left(\frac{7 \times 16 + 96}{16}\right) = 13$ |
| 3 | $\frac{(7 \times 3 + 96)}{3} = 39$ | 24 | $\left(\frac{7 \times 24 + 96}{24}\right) = 11$ |
| 4 | $\left(\frac{7 \times 4 + 96}{4}\right) = 31$ | 32 | $\left(\frac{7 \times 32 + 96}{32}\right) = 10$ |
| 6 | $\left(\frac{7 \times 6 + 96}{6}\right) = 23$ | 48 | $\left(\frac{7 \times 48 + 96}{48}\right) = 9$ |
| 8 | $\left(\frac{7 \times 8 + 96}{8}\right) = 19$ | 96 | $\left(\frac{7 \times 96 + 96}{96}\right) = 8$ |

Number of value of x = 12.

Tricky Way:

In such type of questions, we should find the factor of constant term: Number of factors of constant term gives the value of X, factors of 96.

$$= 1, 2, 3, 4, 6, 8, 12, 16, 24, 32, 48, 96.$$

∴ Value of X = 12.

26. (b) G.M. ≤ A.M.

$$(p + q)(r + s) \leq \left\{ \frac{(p + q) + (r + s)}{2} \right\}^2$$

For largest value, (p, q, r, s) = (9, 8, 7, 6)

$$\therefore \text{Largest value} = \left(\frac{(9 + 8 + 7 + 6)}{2} \right)^2 = 225$$

27. (a) Rule of divisibility by 13:

From the right most group of 3 digits apply the subtraction and addition operations alternatively and find the result. If the result is either '0' or multiple of 13, then whole number is divisible by 13.

$$\text{Here } N = 999999999 \dots 9999999$$

↓

99th times

$$= 999,999,999, \dots 999, 999$$

33th group

$$= \text{New, } (999 + 999 + \dots 17 \text{ times}) - (999 + 999 \dots 16 \text{ times})$$

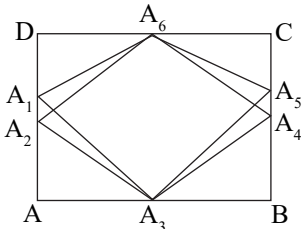
$$= 999$$

when $999 \div 13$, remainder R = 11.

28. (c) $11 \times 11 = 121 \rightarrow$ Sum of digits
 $111 \times 111 = 12321 \rightarrow 1 + 2 + 3 + 2 + 1$
 $= 3 + 2(1 + 2) = 9$
 $1111 \times 1111 = 1234321 \rightarrow 1 + 2 + 3 + 4 + 3 + 2 + 1$
 $= 4 + 2(3 + 2 + 1) = 16$

 $111 - 9 \text{ times} \times 111 - 9 \text{ times} = 12345678987654321$
 $= 9 + 2(1 + 2 + 3 + \dots + 8) = 81$
 Tricks: Sum of digits of product of $111 \dots n \text{ times} \times 111 \dots n \text{ times}$
 $= (n)^2$.
 Here, $n = 9 \therefore$ Sum of digits $= (9)^2 = 81$

29. (b) Number's are 10, 11, 12, 13, ... 98, 99, 100.
 Sum of its digits:
 $(1 + 0) + (1 + 1) + (1 + 2) + (1 + 3) + \dots (1 + 9)$
 $+ (2 + 0) + (2 + 1) + (2 + 2) + \dots + (2 + 9) \dots$
 $+ (9 + 0) + (9 + 1) + \dots + (9 + 9) + 1 + 0 + 0$
 $= 1 + 1 + 1 \dots 10 \text{ times} + 2 + 2 + 2 \dots 10 \text{ times} + 9$
 $+ 9 + 9 \dots 10 \text{ times} + (1 + 2 + 3 + \dots + 9) + (1 + 2 + 3 + \dots + 9) \dots 9 \text{ times} + 1$
 $= 10(1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9) +$
 $9(1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9) + 1$
 $= 19(1 + 2 + 3 + \dots + 9) + 1$
 $= \frac{19 \times 9 \times 10}{2} + 1 = 856$.

30. (c) 
 Number of points on different sides = 6
 \therefore Number of triangles = ${}^6C_3 = 20$

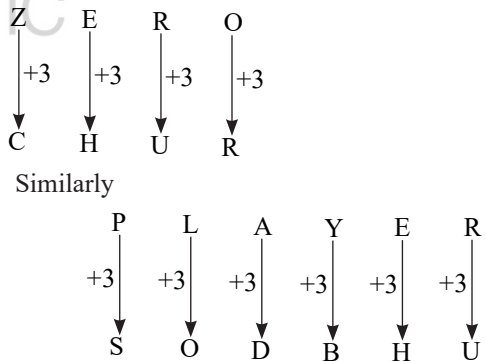
31. (d) The given points do not correspond with the lines in the passage. The assumptions do not correctly follow from the paragraph as the passage does not prescribe particular responsibilities to the government or private sector enterprises.
 32. (c) The crux of the passage can be found in the third option. The focus lies on the idea of segregation of waste. To convert energy into waste, the first step is to properly segregate the solid waste.

33. (b) Following the passage, it is not the case that organic farming is not beneficial but there is a need for educating the farmers and consumers about eco-friendly food. Thus, option (b) is the correct response.

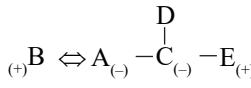
34. (c) The most logical, practical, and rational message conveyed by the passage is that the farmers in India need to be guided and educated about organic farming as it is comparatively a new phenomenon. They need to be helped to make their organic farming sustainable.

35. (b) Option (b) has the correct set of assumptions as the passage implies that the disappearance of many nutritious foods along with the increase in food production of particular crops only has led to failure in addressing the problem of malnutrition and the negative consequences for the ecosystem.

36. (c) Black ball = 14, Blue ball = 20,
 Green ball = 26, Yellow ball = 28
 Red ball = 38, White ball = 54
 Total ball = $14 + 20 + 26 + 28 + 38 + 54 = 180$
 1. Number of drawn which contain one full group of atleast one colour.
 $= (13 + 16 + 25 + 27 + 37 + 54) + 1 = 175$
 2. Number of drawn that contain atleast one ball of each colour
 $= (54 + 38 + 28 + 26 + 20) + 1 = 167$

37. (d) 

38. (d) From given statements
 $A > B, C = D, D > F > A$
 $\Rightarrow C = D > F > A > B > E$

39. (c) From all statements, together

 $(+)B \Leftrightarrow A_{(-)} - C_{(-)} - E_{(+)}$
 Hence from all statements together, we get E is the Brother-in-law of B.

40. (d) In option (d) 91 is only number which is not prime, remaining other numbers are group of prime number.
41. (d) Neither (1) nor (2) statement is the correct assumption. The passage talks about the long gap between two spring events but does not state that spring comes for longer durations. There is no explicit information about the effect of early spring on bird populations either.
42. (a) The most logical and rational message implied by the passage is statement (a) wherein the importance of nitrogen is highlighted for its necessity in environmental concerns and food production.
43. (c) The passage states that the important question in the coming years will be along the lines of how resources, technologies, and regulations should be used to support the victims of climate change. Thus, the logical message from the passage is contained in statement (c).
44. (c) ATQ,

$$Q = P \left[1 + \frac{R}{100} \right]^2$$

{∵ Interest is compounded half yearly}

$$\Rightarrow \frac{Q}{P} = \left[1 + \frac{R}{200} \right]^2 \quad \dots(i)$$

$$\text{Again, } Q = P \left[1 + \frac{S}{100} \right]^1$$

$$\Rightarrow \frac{Q}{P} = \left[1 + \frac{S}{100} \right] \quad \dots(ii)$$

From (i) and (ii), we get

$$\left[1 + \frac{S}{100} \right] = \left[1 + \frac{R}{200} \right]^2$$

$$\frac{S}{100} = \left[1 + \frac{R}{200} \right]^2 - 1$$

$$\frac{S}{100} = \frac{R}{200} \left[\frac{R}{200} + 2 \right]$$

$$S = R \left[\frac{R}{400} + 1 \right]$$

$$\therefore S > R \left\{ \because \left(\frac{R}{400} + 1 \right) > 1 \right\}$$

45. (d) 1186, remainder = 31
 then, Number = 1186 – 31 = 1155
 1155 = 3 × 5 × 7 × 11
 Factor of 1155 = 3, 5, 7, 11, 15, 21, 33, 35, 55, 73,

105, 385, 231, 165, 1155

No. factor's > 31, gives remainder of 31 when divided to 1186.

Hence, required members are 9 and these are 33, 35, 73, 105, 385, 231, 165, 1155.

46. (c) $p < q < r$

$$\therefore 1 \leq p \leq 7; 2 \leq q \leq 8 \text{ and } 3 \leq r \leq q$$

Now, $pp + qq + rr = 10$

i.e. $(p + q + r) = 10$ to 20

So, possible triplet of $(p, q, r) = (1, 2, 7), (1, 3, 6), (1, 4, 5), (2, 3, 5), (3, 8, 9), (4, 7, 9), (5, 6, 9)$ and $(5, 7, 8)$.

Possible value of P are 1, 2, 3, 4 and 5.

Possible value of q are 2, 3, 4, 6, 7 and 8.

Hence, both statements are true.

47. (a) Number < 2000

Then, first digit will be 1.

Last 3-digits will be $3! = 3 \times 2 \times 1 = 6$

Sum of the numbers = 1234 + 1243 + 1324 + 1342 + 1423 + 1432 = 7998

48. (c) Number of selection of 10 consecutive things out of 12 things in clockwise = 12

49. (b) $10^{10\text{th}}$ day = 10000000000 th day.

= 1428571428 weeks + 4 days

So, if today is sunday, then $10^{10\text{th}}$ day will be Sunday + (4 – 1) days i.e. Wednesday.

50. (b) L.C.M. of 25, 39, 60

= $3 \times 4 \times 5 \times 5 \times 13 = 3900$ seconds = 65 minutes.

All three signals changes from green to red simultaneously after 65 minutes. And again red to green after another 65 minutes.

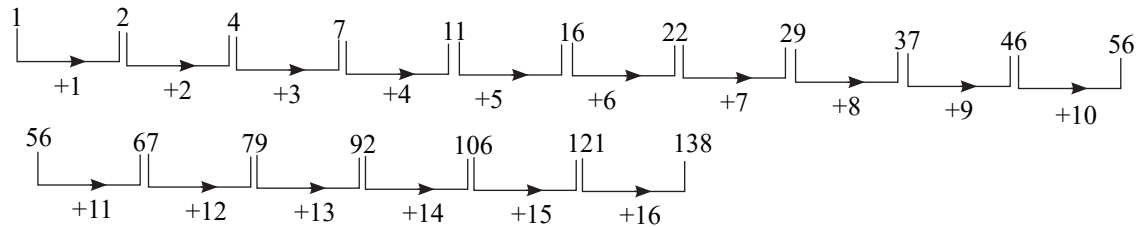
∴ All three light changes to green next simultaneously at 2 : 00 PM + (65 + 65) minutes = 4 : 10 P.M.

51. (d) Agroecosystems are the ecosystems that support the food production systems in farms and gardens. In addition to agricultural lands, uncultivated systems enable a systemic approach to food consumption. Hence, both agroecosystems and conventional agriculture are necessary in the case of food production and consumption.

52. (a) The passage is concerned with the environmental impact of antibiotic-manufacturing companies not treating their waste. Thus, proper effluent treatment protocols must be put in place.

53. (a) A good quality school education should incorporate a strong learning foundation at the primary level while focussing on improving higher education, and inculcating valuable skills. For India to become a global power, investment in the overall quality of education is crucial.

54. (b) Child-1 Passes ring to child-2.
 Child-2 Passes ring to child-4
 Child-4 Passes ring to child-7
 Child-7 passes ring to child-11 and so on.
 Series are like this:



Here, child, no-46 is actually child-6, 56 is child-16, child 79 is child-39, child-121 is child-1

∴ In 15th changes ring will be in the hands of child-1 again.

55. (b) Total number of terms
 $= 2 + 3 + 4 + \dots + 25 + 26 + 27$
 $\frac{26}{2}[2+27] = 377$

∴ Middle Term $= \left(\frac{377-1}{2}\right) + 1 = 188 + 1 = 189^{\text{th}}$
 Now,
 zz, yyy, xxxx, wwwwww (III....)
 2 times 3 times 4 times 5 times 19 times
 As I is 18th term in reverse english alphabet
 Sum of 18 terms in the series: $2 + 3 + 4 + 5 + \dots + 19$
 $= \frac{18}{2}[2+19] = 189$

Hence, I is the 189th term or middle term.

56. (d) Suppose, $P = 2$ and $q = 1$
 $p \times q = 2 \times 1 = 2 > 0$
 and $p^2 = (2)^2 = 4 > (q)^2 = 1$
 Again, $p = -2$ and $q = -1$
 $p \times q = -2 \times -1 = 2 > 0$
 $p^2 = (-2)^2 = 4 > (q)^2 = (-1)^2 = 1$
 ∴ $p < q$
 Hence, we cannot answer the question using both statements

57 (c) $(p + q - r) > (p - q + r) \Rightarrow q > r$
 S1 : $p - q > 0 \Rightarrow p > q$
 $p - q + r > r$
 S2 : $p - r < 0$
 $\Rightarrow p < r$
 From S1 and S2 : $q < p < r$

$0 < p - q < r \Rightarrow p - q + r < 2r$
 Again, $q < p < r$
 $p - r < 0$
 $q + p - r < q \Rightarrow (p + q - r) < q$
 As $q < r$; ∴ $(p + q - r) < (p - q + r)$
 Thus $(p + q - r)$ is not greater than $(p - q + r)$
 58. (b) $n(\text{Tea}) = 75, n(\text{coffee}) = 60, n(\text{Tea} \cap \text{coffee}) = 15$
 ∴ $n(\text{Tea} \cup \text{coffee}) = 75 + 60 - 15 = 120$
 From question, no one taking milk, takes tea but they can take coffee.

Statement 2:
 Let n persons took milk only
 Then, $120 + n = 5n$
 ∴ $n = \frac{120}{4} = 30$
 ∴ total number of persons attended the party
 $= 5 \times 30 = 150$

Hence, statement 2 is sufficient to answer the question only.

59. (d) Consider a number with its 3-digits are 1, 2 and 3
 Statement 1 : Sum of its digit = $1 + 2 + 3 = 6$
 Product of its digit = $1 \times 2 \times 3 = 6$
 Now numbers are 123, 132, 213, 231, 312 and 321
 Statement 2 : Number are divisible by the sum of the digits of the number.
 Sum of its digits = $1 + 2 + 3 = 6$
 Any number, that are divisible by 6, must be divisible by 2 and 3
 ∴ Numbers are 132 or 312
 Hence, we cannot find exact number

60. (b) S1 : Let youngest age is x year
 Then eldest age is 3x year.
 ATQ, $a < b < c < d < e$
 $\begin{matrix} \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright \\ +2 & +2 & +2 & +2 \end{matrix}$
 $\therefore x + 8 = 3x \Rightarrow x = 4$ years

S2 : Average Age = 8

$$\frac{x + (x+2) + (x+4) + (x+6) + (x+8)}{5} = 8$$

$x + 4 = 8 \Rightarrow x = 4$ years

61. (d) The passage presents the idea of having choices in life. It implies that having too less or even too many choices in life can be problematic. Thus, option (d) reflects the most logical message.

62. (a) As per the given information in the passage, Statements (1) and (2) best reflect the implied solutions. We need a flexible environment to develop customized solutions for a populace accustomed to traditional processes.

63. (b) The assumptions that are correctly based on the given passage are contained in statements (1) and (4).

64. (c) Both statements are correct. Protection of privacy adds value to the economy. It is privacy that enables innovation. The passage clearly states that “No one will innovate in a surveillance-oriented environment or in a place where an individual’s personal information is compromised.”

65. (d) Total marks = 100 + 100 + 100 + 100 = 400

99% score = $400 \times \frac{99}{100} = 396$

| P | Q | R | S | Total way |
|-----|-----|-----|----|-----------------------|
| 100 | 100 | 100 | 96 | $\frac{4!}{3!} = 4$ |
| 100 | 100 | 99 | 97 | $\frac{4!}{2!} = 12$ |
| 100 | 100 | 98 | 98 | $\frac{4!}{2!2!} = 6$ |
| 100 | 99 | 99 | 98 | $\frac{4!}{2!} = 12$ |
| 99 | 99 | 99 | 99 | $\frac{4!}{4!} = 1$ |

Total number of ways = 4 + 12 + 6 + 12 + 1 = 35

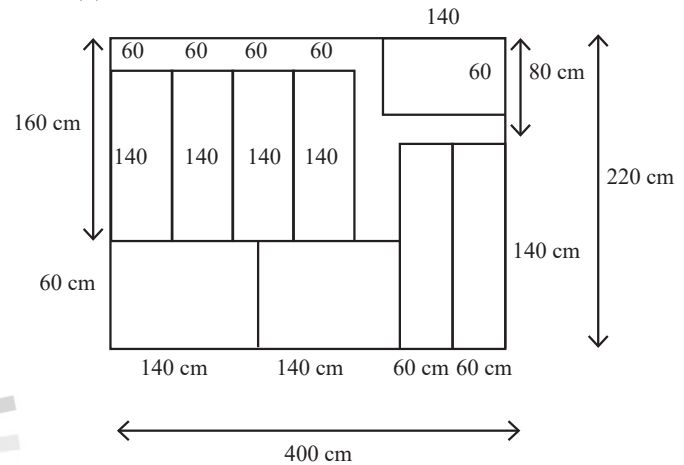
66. (c)

| | |
|-----------|---|
| 1st strip | ← Red or Green or Yellow = 3 way |
| 2nd strip | ← Any two colours, other than 1st strip colour = 2way |

| | |
|-----------|--|
| 3rd strip | ← Any two colours, other than 2nd strip = 2way |
| 4th strip | ← Any two colours, other than 3rd strip = 2way |

\therefore Total number of ways = $3 \times 2 \times 2 \times 2 = 24$

67. (d)



Total number of tiles = 9

68. (d) Understanding from the question, there are two tasks - 1 and 2 and five persons - P, Q, R, S and T. As per the given constraints, the number of ways of assigning tasks to P and Q is just 1 (because P as well as Q can be given only Task -2)

No. of ways of assigning task to T is 2 (T can be given any of the two tasks) No. of ways of assigning tasks to R and S is 3 (R-1, S-2 ; R-2, S-1 ; R-2, S-2) So, total number of ways of assigning tasks to five persons is $1 \times 2 \times 3 \times 4 = 24$

69. (c) Number of ways to get 78gm of coins.

$$78 \begin{cases} 50 + 2 \times 10 + 4 \times 2 \\ 2 \times 25 + 2 \times 10 + 4 \times 2 \\ 50 + 4 \times 5 + 4 \times 2 \end{cases}$$

We need atleast 7 coins to buy 78 gm of silver.

70. (b)

| | | | | | | | | |
|----------|---------------|--------|--------|---------------|--------|-------|---------------|-----|
| $+$ | \rightarrow | $>$ | $-$ | \rightarrow | \leq | \pm | \rightarrow | $=$ |
| \times | \rightarrow | \geq | \div | \rightarrow | $<$ | | | |

$Q \times P - T \div R \pm S$
 $\Rightarrow Q \leq P \leq \times T < R = S$
 $\Rightarrow S > Q$

Hence, only conclusion 2 follow

71. (b) In the end, it is stated that “The unemployment challenge is greater for people with secondary or higher education, and rising education levels inflate unemployment challenges.” Option (b) comes

closest in reflecting the same idea. It establishes unemployment as a function of the rising education and aspirations of young Indians.

72. (a) The passage focuses on the importance of scientific methods and philosophical thinking in pursuit of politics. Option (a) reiterates the same idea and thus is the statement that best reflects the most rational, logical, and practical message conveyed by the passage.
73. (d) The opening statement of the given passage implicates the idea of freedom or liberty. The passage highlights the purpose of the state by mentioning that instead of curtailing freedom or causing undue domination and fear, the state should promote free reason and fairness.

74. (d) $2^1 = 2$
 $2^2 = 4$
 $2^3 = 8$
 $2^4 = 16$
 $2^5 = 32$
 $2^6 = 64$

Periodicity of '2' is '4'

$$192 \div 4 = 48$$

$$\therefore 2^{192} = \dots\dots\dots 6$$

(Unit digit)

Now, when we divide 8, 16, 32, 64, 128, 256 by 6, we get remainders 2, 4, 2, 4, 2, 4.....

When we divide odd exponent of 2 by 6, i.e. 2^3 or 2^5 or $2^7 \div 6$; remainder is 2

Again, when we divide even exponent of 2 by 6, i.e. 2^4 or 2^6 or $2^8 \div 6$, remainder is 4

$$\therefore 2^{192} \div 6 \equiv \text{Remainders} = 4$$

75. (d) The pattern is
 A B C D D, A B C C D, A B B C D, A A B C D
 Hence, correct option is (d) DDCA.

76. (a) \overline{AB} and \overline{DEF} Given that $E = 0, F = 8$

$$\begin{array}{r} \times \overline{CD} \quad \quad + \overline{GHI} \\ \overline{DEF} \quad \quad \quad \quad 975 \\ \hline D08 \\ \Rightarrow + \overline{GHI} \\ \hline 975 \end{array}$$

$$\therefore I = 7, H = 6$$

Probable Value of (D, G) : $D + G = 9$

$$\therefore (D, G) = (0, 9), (1, 8), (2, 7), (3, 6), (4, 5)$$

Among those value, 0, 6, 7, 8 are assigned to other letters

$$\text{So, } (D, G) = (4, 5)$$

Now, \overline{AB} When $B = 2, A = 1$ and $C = 3$

$$\begin{array}{r} \times \overline{C4} \\ \overline{408} \\ \hline 12 \\ \times \overline{34} \\ \hline 48 \\ 36 \\ \hline 408 \end{array}$$

$$\therefore A = 1, B = 2, C = 3$$

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| A | B | C | D | E | F | G | H | I |
| 1 | 2 | 3 | 4 | 0 | 8 | 5 | 6 | 7 |

$$\text{Hence, } A + B + C = 1 + 2 + 3 = 6$$

77. (d) True statement : One of P and Q are selected. Either P or Q are selected.

False statement : Atleast one of R and S was selected. Hence, it would have been true statement, if none of R and S were selected.

True statement : At most two of R, S and T were selected i.e. either none of them were selected or only 'T' was selected.

Hence, both conclusions are false.

78. (a) I.

| | | |
|---|---|---|
| Q | S | P |
| 1 | 1 | 1 |
| 0 | 1 | 0 |
| 1 | 0 | 0 |
| 0 | 0 | 0 |

$$\Rightarrow P = Q \cap S$$

i.e. If p is true, then Q and S both are true.

- II.

| | | | |
|---|---|---|--------|
| R | S | X | T = X' |
| 0 | 0 | 0 | 1 |
| 0 | 1 | 0 | 1 |
| 1 | 0 | 0 | 1 |
| 1 | 1 | 1 | 0 |

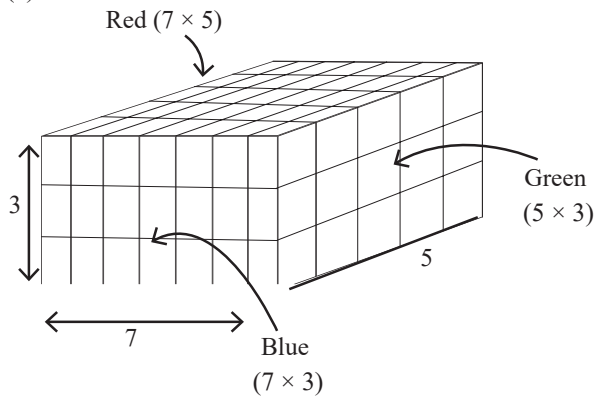
$$\Rightarrow R \cap S = X$$

$$\Rightarrow T = X'$$

i.e. R and S are true, when T is false.

Hence, T is true, then atleast one of P and R must be false.

79. (a)



1. Number of small cubes with no paint on any face

$$= (7 - 2) \times (5 - 2) \times 3 = 5 \times 3 = 15$$

2. Number of cubes with exactly two faces, one painted with blue and other with green.

$$= 1 + 1 + 1 + 1 = 4$$

Hence, only statement 1 is correct.

80. (c)

| | | | | | | | | | | | | | | | | | | | | | |
|------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Given word | I | N | C | O | M | P | R | E | H | E | N | S | I | B | I | L | I | T | I | E | S |
| Arrangement in reverse order | T | S | S | R | P | O | N | N | M | L | I | I | I | I | I | H | E | E | E | C | B |

∴ Position of two I's are remains same.