(UPSC CSE Prelims 2023 CSAT Paper)

Directions for the following 5 (five) 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

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. Which 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's municipal solid waste is a little over 50 per cent, and biomethanation offers a major solution for processing this.

Q.1) 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

Ans) d

Exp) Option d is the correct answer.

Assumption 1 is incorrect- The passage does not make any assumptions about who should be responsible for collection, processing, and segregation of municipal waste. It simply states that more than three-fourths of the municipal budget goes into collection and transportation, which leaves very little for processing/resource recovery and disposal. This suggests that the current system is not working very well, and that some changes need to be made. However, the passage does not say who should make these changes, or how they should be made.

Assumption 2 is incorrect- The passage also does not make any assumptions about the role of the private sector in waste management. It simply states that resource recovery and recycling require technological inputs, which might be best handled by private sector if we think out of context. Since, the passage does not say anything about involvement of private sector, we assume this statement as incorrect.

Q.2) 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.
e) 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.

Ans) c

Exp) Option c is the correct answer.

Option a is incorrect- The passage does not provide any information about the cost or expense associated with the generation of energy from municipal solid waste. It focuses more on the allocation of the municipal budget, stating that more than three-fourths of it goes into collection and transportation, leaving very little for processing/resource recovery and disposal. Therefore, there is insufficient information to support the claim that energy generation from municipal solid waste is inexpensive.

Option b is incorrect- While the passage mentions that biomethanation offers a major solution for processing the biodegradable component of India's municipal solid waste, it does not explicitly state that it is the "most ideal" way of generating energy from municipal solid waste. The passage suggests that the choice of technology for waste-to-energy conversion depends on the composition of the waste (biodegradable versus non-biodegradable) and its calorific value. It implies that biomethanation is a viable solution for processing the biodegradable component, but it does not make a comparative assessment or declare it as the best option.

Option c is correct- The passage states that the segregation of municipal waste at the source is rare in India. It also mentions that waste-to-energy fits into the waste management chain ideally after segregation (between wet waste and the rest), collection, and recycling, but before reaching the landfill. This suggests that segregation of municipal solid waste is a crucial step in the process of implementing waste-to-energy plants. By segregating the waste at the source, it becomes easier to separate the different components and identify the biodegradable portion. The passage further highlights that the biodegradable component of India's municipal solid waste is a little over 50 percent. Biomethanation is presented as a major solution for processing this biodegradable component, which indicates that separating it through segregation is an essential prerequisite for effective waste-to-energy conversion.

Option d is incorrect- The passage states that the biodegradable component of India's municipal solid waste is a little over 50 percent. It also highlights that biomethanation offers a major solution for processing this component. Nowhere does it suggest that the biodegradable component is inadequate to provide energy effectively and efficiently. In fact, the passage implies that biomethanation is a significant solution for processing the biodegradable portion of the waste.

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.

Q.3) 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

Ans) b

Exp) Option b is the correct answer.

Assumption 1 is incorrect- This statement concludes that organic farming is inherently unsafe for both farmers and consumers. However, the passage does not support this assumption. It highlights specific issues related to the organic farming industry in India, such as the lack of regulation and the misuse of certain products. While there are safety concerns associated with organic farming in the context described in the passage, it does not imply that organic farming as a whole is inherently unsafe.

Assumption 2 is correct- This statement concludes that farmers and consumers need to be educated about eco-friendly food. This aligns with the passage's mention of confusion among farmers and consumers regarding the best products and the potential harm that can arise from improper usage. It suggests that education and awareness about eco-friendly food practices are necessary.

Q.4) 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 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

Ans) c

Exp) Option c is the correct answer.

Option a is incorrect- This option suggests that organic farming should not be promoted as a substitute for conventional farming, but the passage does not explicitly make this claim or advocate against organic farming.

Option b is incorrect- This option states that there are no safe organic alternatives to chemical fertilizers, which is not directly supported by the passage. The passage mentions that organic fertilizers are difficult to obtain on a large scale in India, leading to the use of farmyard manure that may contain toxic chemicals and heavy metals. However, it does not claim that safe alternatives do not exist, but rather highlights the challenges in accessing them.

Option c is correct- The passage discusses the challenges and issues associated with the organic farming industry in India, including the lack of regulation and confusion among farmers and consumers. It mentions that farmers sometimes use products in ways that could harm them due to a lack of knowledge or availability of appropriate organic alternatives. It also states that certain aspects of organic farming, such as the use of organic fertilizers and plant sprays, need further research and regulation. Given these points, the author emphasizes the need for guidance and assistance to make organic farming in India sustainable. This suggests that farmers require support in understanding the best practices, accessing safe and effective organic inputs, and navigating the challenges associated with organic farming. By promoting sustainable practices, farmers can maximize the benefits of organic farming while minimizing potential risks and ensuring the long-term viability of the industry.

Option d is incorrect- This option suggests that the aim of organic farming should not be to generate huge profits due to the lack of a global market for organic products. While the passage mentions the young and not well-regulated nature of the organic farming industry, it does not directly address the issue of profits or the global market for organic 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 the issue of malnutrition. For long, the agriculture sector focussed on increasing food production particularly staples, which led to lower production and consumption of indigenous traditional crops/grains, fruits vegetables, impacting food and nutrition security and other in the process. Further, intensive, monoculture agriculture practices can perpetuate the food and nutrition security problem by degrading the quality of land, water and food derived through them.

Q.5) 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

Ans) b
Exp) Option b is the correct answer.
Statement 1 is incorrect- The passage does not suggest that monoculture agriculture practices are inevitable to achieve the Sustainable Development Goals or zero-hunger goals. In fact, it highlights the negative consequences of intensive monoculture agriculture practices, such as the degradation of land, water, and food quality. The passage does not make a direct connection between monoculture practices and the achievement of these goals. Therefore, assumption 1 is not valid.
Statement 2 is correct- The passage explicitly states that the focus on increasing food production, particularly staples, has led to lower production and consumption of indigenous traditional crops/grains, fruits, and vegetables. This indicates a dependence on a few crops, which has resulted in the disappearance of nutritious foods like millets. The passage also suggests that this dependence impacts food and nutrition security.
Statement 3 is correct- The passage highlights the inadequate addressing of malnutrition despite the increase in food grain production. It emphasizes the need to shift the focus from increasing food production to incorporating indigenous traditional crops/grains, fruits, and vegetables, which can improve food and nutrition security. This implies that government policies regarding food planning should incorporate nutritional security.
Statement 4 is incorrect- The passage does not provide specific information about subsidies and remunerative prices for grains in relation to monoculture agriculture practices. While it does mention the focus on increasing food production, it does not make a direct connection between these practices and the incentives received by farmers. Therefore, assumption 4 is not supported by the passage.

Q.6) A box contains 14 black balls, 20 blue balls, 26 green balls, 28 yellow balls, 38 red balls and 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

Ans) c

Exp) Option c is the correct answer.

Kindly watch the live discussion of the paper for more clarity.

Q.7) If 'ZERO' is written as **'CHUR,** then how 'PLAYER' written?

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

Ans) d

Exp) Option d is the correct answer.

'ZERO' written as 'CHUR'

Z -> Z+ 3 -> C
E-> E + 3 -> H
R -> R + 3 -> U
0 -> O + 3 -> R

Going by the same logic,

P-> P+ 3 -> S
L-> L+ 3-> O
A-> A + 3-> D
Y -> Y + 3 -> B
E-> E + 3 -> H
R -> R + 3 -> U

Hence, 'PLAYER' can written as 'SODBHU'

Hence, option d is the correct answer.

Q.8) 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 required to determine the is oldest person/persons?

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

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Ans) d

Exp) Option d is the correct answer.

Let's use the sign convention '>' as Sohan > Mohan to represent Sohan older than Mohan and '=' sign as Sohan = Mohan to represent 'Sohan is of same age as Mohan'.

Statement 1- A is older than B -> A> B

Statement 2- C and D are of same age -> C = D

Statement 3- E is the youngest ->

Statement 4- F is younger than D -> D > F

Statement 5 - F is older than A -> F > A

Combing all these five, we can represent something as - C = D > F > A > B > E.

Hence, all five statement is required to determine who is oldest.

Q.9) 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, Statement-3 and Statement-4 are sufficient to answer the Question.

c) All four and Statements together are sufficient to answer the Question.

d) All four statements are not sufficient to answer the Question.

Ans) c

Exp) Option c is the correct answer.

Lets us use the following sign convention to solve the said problem

=   Married Couple

☐   Male

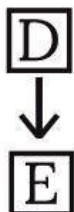◯   Female

—   Siblings relationship

↓   Parents relationship

<u>Statement 1</u>

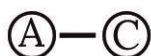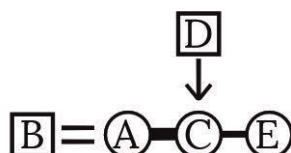A = B - We don't know the gender of A and B at this stage

Statement 2

D
↓   We Don't know gender of C at this stage
C

Statement 3

D
↓
E

Statement 4

Ⓐ—Ⓒ

Combining the Diagrams

D
↓
B=Ⓐ-Ⓒ-Ⓔ

Looking at above diagram and the question asked i.e Relation between E and B. So, we can answer using all the four statements.

Hence the correct answer is option c.

Q.10) 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

Ans) d

Exp) Option d is the correct answer.

Option a is incorrect-17, 37, 47, 97: This group consists of prime numbers. The numbers 17, 37, 47, and 97 are all prime.

Option b is incorrect- 31, 41, 53, 67: This group also consists of prime numbers. The numbers 31, 41, 53, and 67 are all prime.

Option c is incorrect- 71, 73, 79, 83: Similar to the previous groups, this group consists of prime numbers. The numbers 71, 73, 79, and 83 are all prime.

Option d is correct- 83, 89, 91, 97: In this group, all the numbers except 91 are prime. The numbers 83, 89, and 97 are prime, but 91 is not. Factors of 91 = 1, 91, 7, and 13.

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

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 form them.

Q.11) Which one of the following statements best reflects the most logical and rational implication conveyed by the passage?
a) Arbitrary curbs on vehicles to reduce pollution are difficult to implement.
b) Knee-jerk reactions cannot solve the problem of pollution but an evidence-based approach will be more effective.
c) A heavy penalty should be enforced on those driving without periodic pollution tests.
d) In the absence of laws to deal with the problems of pollution, the administration tends to make arbitrary decisions.

Ans) b

Exp) Option b is the correct answer.

Option a is incorrect- This option is not supported by the passage. While the passage criticizes the arbitrary nature of some bans on vehicles, it doesn't specifically mention that implementing curbs on vehicles is difficult. The focus of the passage is more on the need for a scientific and reliable approach to tackle pollution.

Option b is correct- The passage highlights that the current measures taken to tackle pollution, such as temporary odd-even schemes, closing schools and factories, and banning certain vehicles or fuels, have not resulted in clean air. It argues that these actions are drastic and arbitrary, without considering scientific evidence or reliable information about the sources of pollutants and the technologies that can effectively reduce pollution. The passage emphasizes the need for a more systematic and evidence-based approach to address pollution. It suggests that relying on scientific and reliable information about the sources of pollutants on a continuing basis, as well as identifying the technologies that can effectively reduce pollution from them, is necessary.

Option c is incorrect- This option is not directly addressed in the passage. The passage discusses the unfairness of arbitrary bans on vehicles that have passed mandated fitness and pollution tests, but it doesn't mention the enforcement of heavy penalties on those driving without periodic pollution tests.

Option d is incorrect- This option is not explicitly mentioned in the passage. The passage discusses the arbitrary nature of certain bans and the need for a scientific approach, but it doesn't specifically mention the absence of laws or attribute arbitrary decisions to the administration.

Passage-2

Good corporate governance structures encourage companies to provide accountability and control. A fundamental Corporate governance has moved onto the why reason economic and political agenda worldwide has been the rapid growth in international capital markets. Effective corporate enhances access to external financing by firms, leading to greater investment, higher governance 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.

Q.12) Which of the following statements best reflects the logical inference from the passage given above?
a) It is an important agenda of the countries around the world to ensure access to good external financing.
b) Good corporate governance improves the credibility of the firms.
c) International capital markets ensure that the firms maintain good corporate governance.
d) Good corporate governance paves the way for robust supply chains.

Ans) b

Exp) Option b is the correct answer.

Option a is incorrect- This option goes beyond the scope of the passage. While the passage mentions that effective corporate governance enhances access to external financing, it does not explicitly state that it is an important agenda of countries around the world. The passage focuses more on the benefits of good corporate governance for firms and investors rather than the specific agendas of countries.

Option b is correct- The passage states that effective corporate governance structures encourage companies to provide accountability and control. It further explains that good corporate governance is important because it enhances access to external financing by firms, leading to greater investment, higher growth, and employment. Investors are more likely to invest in companies that meet the standards of disclosure, timely and accurate financial reporting, and equal treatment to all stakeholders. Based on this information, it can be inferred that good corporate governance improves the credibility of firms. When companies have strong governance practices in place, investors perceive them as more trustworthy and reliable. This improves the credibility of the firms in the eyes of investors, making them more attractive for investment.

Option c is incorrect- This option is not supported by the passage. The passage mentions that the rapid growth in international capital markets has been a reason for corporate governance moving onto the economic and political agenda worldwide. However, it does not state that international capital markets ensure that firms maintain good corporate governance. The emphasis in the passage is on how good corporate governance enhances access to external financing and attracts investors.

Option d is incorrect- This option is not addressed in the passage. The passage primarily discusses how good corporate governance structures encourage accountability, control, and access to external financing. It does not mention anything about supply chains or how they are impacted by corporate governance.

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.

Q.13) Which one of the following statements best reflects the most logical and rational inference that can be drawn from the passage?
a) The home range of elephants needs to be a vast area of rich biodiversity.
b) Elephants are the keystone species and they benefit the biodiversity.
c) Rich biodiversity cannot be maintained in the forests without the presence of elephants.

d) Elephants are capable of regenerating forests with species as per their requirement.

Ans) b

Exp) Option b is the correct answer.

Option a is incorrect- This option goes beyond the scope of the passage. While the passage highlights the positive impact elephants have on the ecosystem and biodiversity, it does not explicitly state that the home range of elephants needs to be a vast area of rich biodiversity. The passage focuses more on the specific ecological roles and activities of elephants rather than the size or characteristics of their home range.

Option b is correct- The passage provides several reasons why elephants play a crucial role in maintaining the ecosystem and supporting biodiversity. It states that elephants act as landscape architects by creating clearings in the forest, preventing overgrowth of certain plant species, and allowing space for the regeneration of others. This, in turn, provides sustenance to other herbivorous animals. Elephants also contribute to seed dispersal through their consumption of plants, fruits, and seeds, propagating the seeds when they defecate in other places as they travel. Their dung provides nourishment to plants and animals and acts as a breeding ground for insects. Additionally, in times of drought, elephants dig holes to access water, benefiting other wildlife. Based on this information, it can be inferred that elephants are a keystone species. A keystone species is one that plays a critical role in maintaining the structure and functioning of an ecosystem. Elephants, with their actions of clearing vegetation, promoting seed dispersal, and creating water holes, contribute significantly to the overall biodiversity of the forest. Their presence and activities have cascading effects on other plant and animal species, making them an essential part of the ecosystem.

Option c is incorrect- This option is not supported by the passage. While the passage emphasizes the important role of elephants in creating clearings, seed dispersal, and maintaining the ecosystem, it does not make a definitive statement that rich biodiversity cannot be maintained in forests without the presence of elephants. While elephants contribute significantly to biodiversity, it is not the only factor influencing biodiversity in forests.

Option d is incorrect- This option goes beyond the information provided in the passage. While the passage highlights the positive impact of elephants on vegetation and seed dispersal, it does not explicitly state that elephants can regenerate forests with specific species as per their requirement. The passage focuses more on the broader ecological roles of elephants rather than their specific role in forest regeneration.

Q.14) If $7 \oplus 9 \oplus 10 = 8$, $9 \oplus 11 \oplus 30 = 5$, $11 \oplus 17 \oplus 21 = 13$, what is the value of $23 \oplus 4 \oplus 15$?
a) 6
b) 8
c) 13
d) 15

Ans) a

Exp) Option a is the correct answer.

$$7 \oplus 9 \oplus 10 = 8$$

Breaking it down, $7 + 9 + 10 = 26$, adding the resulting digit $2 + 6 = 8$ which is the right hand side.

$$9 \oplus 11 \oplus 30 = 5$$

Breaking it down, $9 + 11 + 30 = 50$. Adding the resulting digit , $5 + 0 = 5$, which is the right hand side of the equation.

$$11 \oplus 17 \oplus 21 = 13$$

Breaking it down, 11 + 17 + 21 = 49. Adding the resulting digit, 9 + 4 = 13, which is the right hand side of the equation.

Hence, $23 \oplus 4 \oplus 15$ *will be* $23 + 4 + 15 = 42$. Adding the resulting digit, 4 + 2 = 6

Hence, option a is the correct answer.

Q.15) Let x be a positive integer such that 7x+ 96 is divisible by x. How many values of x are possible?
a) 10
b) 11
c) 12
d) Infinitely many

Ans) c

Exp) Option c is the correct answer.

For 7x + 96 to be divisible by x, x must be a factor of 96. The factors of 96 are 1, 2, 3, 4, 6, 8, 12, 16, 24, 32, 48, and 96. Therefore, there are 12 possible values of x.

Q.16) If p, q, r and s are distinct single digit positive numbers, then what is the greatest value of
(p + q) (r+s) ?
a) 230
b) 225
c) 224
d) 221

Ans) b

Exp) Option b is the correct answer.

To maximize (p+q)(r+s), we need to maximize both p+q and r+s.

Since p, q, r, and s are distinct single digit positive numbers, the greatest possible values of p+q and r+s are 9+6=15 and 7+8=15.

Therefore, the greatest possible value of (p+q)(r+s) is 15×15=225.

Q.17) A number N is formed by writing 9 for 99 times. What is the remainder if N is divided by 13?
a) 11
b) 9
c) 7
d) 1

Ans) a

Exp) Option a is the correct answer.

We know,

9/13 –> Remainder - 9

99/13 –> Remainder - 8

999/13 –> Remainder - 11

9999/13 –> Remainder - 2

99999/13 –> Remainder - 3

999999/13 –> Remainder - 0

9999999/13 –> Remainder -9

99999999/13 –> Remainder - 8

and the remainder trend continues as 9, 8, 11, 2, 3, 0, 9, 8, ...

So, for 96th 9's (6*16 = 96) -> Remainder = 0

for 97th 9's -> Remainder 9

for 98th 9's -> Remainder = 8

for 99th 9's -> Remainder = 11

Hence, option a is the correct answer.

Q.18) 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?

a) 64

b) 80

c) 81

d) 100

Ans) c

Exp) Option c is the correct answer.

We know,

1 * 1 = 1

11 * 11 = 121

111* 111 = 12321

1111*1111= 1234321

going by the trend,

111111111 * 111111111 = 12345678987654321

Summing up the digit = Summing up 1 to 9 + Summing up 1 to 8

Using the formula = $\frac{n}{2}(a + l)$ where, n = number of terms, a= first digit, l= last digit

Summing up = $\frac{9}{2}(1 + 9)$ + $\frac{8}{2}(1 + 8)$= 45+36 = 81

Hence, option c is the correct answer.

Q.19) What is the sum of all digits which appear in all the integers from 10 to 100?

a) 855

b) 856

c) 910

d) 911

Ans) b

Exp) Option b is the correct answer.

Numbers from 10 to 100 includes - 10, 11, 12, 13...99

If we observe the pattern from number 11 to 19 - there will be 1 to 9 at unit place and 1 at tenth place.

similarly if we observe the pattern 21 to 29- there will be 1 to 9 at unit place and 2 at tenth place.

1st Case- calculating digit's sum at unit place(11 to 99 excluding 10, 20, ...100):

From 11 to 99 - number 1 to 9 will repeat 9 times.

So, sum will be calculated using the formula =

$9 * (\frac{n}{2}(a + l))$ where, n = number of terms, a= first digit, l= last digit.

Putting n = 9, a =1 and l = 9

Sum = 45 * 9 = 405.

2nd Case- calculating digit sum at tenth place (11 to 99 excluding 10, 20, ...100):

From 11 to 19, there will be 9 1's,

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from 21 to 29, there will be 9 2's

following the pattern, sum of digits at tenth place from 11 to 99 will be

9 * 1 + 9 * 2 + 9*3 + 9* 4 + ... + 9* 9

or 9 * (1 +2+3+4+5+6+7+8+9) = 9 * 45 = 405.

3rd Case (From 10, 20, ...100)

From 10 to 90, there will be 0 at unit place and 1 to 9 at tenth place.

Resulting sum = 45 + 1 = 46. (Note- extra 1 comes because of 100 i.e 1)

Adding results from all three case-

405 + 405 + 46 = 856.

Hence, option b is the correct answer.

Q.20) 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?

a) 18
b) 20
c) 24
d) 16

Ans) c

Exp) Option c is the correct answer.

Given:

 ABCD is square. One point on AB, One on CD, 2 on BC and 2 on AD are made.

Total of 6 points are made on AB, CD, BC, and AD.

A triangle has 3 vertices, and number of distinct triangle that can be drawn out of 6 points

$= C_3^6 = \frac{6!}{3! \, (6-3)!} = \frac{6 * 5 * 4}{3 * 2} = 20.$

Hence, option c is the correct answer.

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.

Q.21) 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.

Ans) c

Exp) Option c is the correct answer.

Option a is incorrect- This option focuses on the consequences for businesses that cause emissions. While it may be true that businesses causing emissions could face regulations or penalties for pollution, it doesn't capture the broader message conveyed in the passage. The passage emphasizes the need for proactive action and the potential trade-off between reducing emissions and suffering the effects of unabated warming, rather than focusing solely on the consequences for businesses.

Option b is incorrect- This option suggests that technological development is the sole solution to the issues of climate change. However, the passage does not make such a definitive statement. It mentions that technological change could potentially make a transition away from fossil fuels cheap, but it also acknowledges the uncertainty surrounding future technological advancements. The passage does not exclude other potential solutions or strategies beyond technological development.

Option c is correct- The passage emphasizes the importance of addressing carbon emissions and the impact they have on the climate. It highlights that the emissions being released into the atmosphere now will affect the climate in the future. The author points out that relying solely on technological change to transition away from fossil fuels is uncertain and could lead to a difficult choice between reducing emissions at a high cost or enduring the consequences of unabated warming.

Option d is incorrect- This option implies that new industries should solely focus on renewable energy sources due to the uncertainty of future technological change. While renewable energy sources are mentioned in the passage as a potential component of transitioning away from fossil fuels, the passage does not specifically advocate for all new industries to be based solely on renewable energy sources. It highlights the importance of addressing carbon emissions now rather than relying solely on future technological advancements.

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.

Q.22) Which one of the following statements best implies the most rational assumption that can be made from the passage?
a) We are likely to spend more money on cure than prevention.
b) It is the job of the government to solve our environmental and public health problems.
c) Health can be protected even if environmental problems go on unattended.
d) Loss of traditional lifestyle and the influence of western values led to some unhealthy ways of living.

Ans) c

Exp) Option c is the correct answer.

Option a is incorrect- This option implies that there is a tendency to prioritize spending on treating health problems rather than investing in preventive measures. While the passage discusses the importance of substantial lifestyle changes to reduce environmental and health problems, it doesn't explicitly suggest a preference for spending more on cure than prevention. Therefore, this option cannot be considered the most rational assumption based on the given information.

Option b is incorrect- This option suggests that the responsibility for solving environmental and public health problems lies primarily with the government. While the passage acknowledges the impact of

individual choices on health outcomes, it emphasizes the collective lethargy towards making such choices. The passage does not explicitly state that it is solely the government's responsibility to address these problems. Therefore, this option is not the most rational assumption based on the given information.

Option c is correct- This option implies that it is possible to protect health even in the absence of addressing environmental problems. This appears to be the most rational assumption.

Option d is incorrect- This passage does not explicitly attribute this to the loss of traditional lifestyle or the influence of western values. The passage focuses more on the perceived negligible effect of individual efforts in addressing environmental problems. Therefore, option (d) cannot be considered the most rational assumption based on the given information.

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. Somewhere along that long road from farm to fork, there are serious detours taking place.

Q.23) Which one of the following statements best reflects the crux of the passage?
a) The scheme of Universal Basic Income should be implemented worldwide as way of poverty alleviation.
b) We must place food-based nutrition at the centre of our policy debate.
c) Nutritional status of food should be improved by creating appropriate genetically modified crops.
d) Using modern food processing technologies, we must fortify food items with required nutrient elements.

Ans) b

Exp) Option b is the correct answer.

Option a is incorrect- This option introduces the idea of implementing Universal Basic Income (UBI) as a solution for poverty alleviation. However, the passage does not discuss poverty alleviation or propose UBI as a solution. The main focus of the passage is on the importance of food-based nutrition and the negative consequences of inadequate nutrition. Therefore, option (a) is not directly related to the crux of the passage.

Option b is correct- The passage highlights the issue of people not eating the right food, leading to an increase in non-communicable diseases and burden on healthcare systems. It also mentions limited access to nutritious food and a lack of affordability, resulting in monotonous diets that lack essential nutrients. The passage further emphasizes that food systems are not adequately responding to nutritional needs.

Option (b) aligns with the main idea of the passage by suggesting that food-based nutrition should be the central focus of policy debates. It implies that addressing the issue of inadequate nutrition through policy measures and discussions is crucial.

Option c is incorrect- This option suggests improving the nutritional status of food by creating genetically modified crops. While the passage highlights issues related to nutrition, it does not specifically mention genetically modified crops as a solution. The passage focuses more on the need for food systems

to properly respond to nutritional needs rather than suggesting specific approaches like genetically modified crops. Therefore, option (c) is not directly supported by the passage.

Option d is incorrect- This option proposes fortifying food items with required nutrient elements using modern food processing technologies. While fortification can be a strategy to address nutrient deficiencies, the passage does not explicitly mention fortification or modern food processing technologies as a solution. The passage emphasizes the overall need for food systems to better respond to nutritional needs. Therefore, option (d) goes beyond the scope of the passage and is not directly related to the crux of the passage.

Q.24) 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:

1. p+ q+ r - s- t is definitely even.
2. 2p+ q+ 2r-2s+t is definitely odd.

Which of the above statements is/are correct?

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

Ans) a

Exp) Option a is the correct answer.

Statement 1 is correct- Let assume p, q, and r be even with values, 2, 4, 6. Let's assume s and t be odd with values, 1 and 3.

Putting values in p+q+r-s-t = 2 + 4 + 6 - 1 -3 = 8 which is even. Hence, the given statement is correct.

Statement 2 is incorrect- Putting values in 2p + q + 2r- 2s + t = 4 + 4 + 6 -1 -3 = 23 which is odd. But 8+5+12-4+3=24 which is even. Hence not definitely odd. Hence, the given statement is incorrect.

Q.25) Consider the following in respect of prime number p and composite number c.

1. $\frac{P+C}{P-C}$ can be even
2. 2p + c can be odd
3. pc can be odd.

Which of the statements given above are correct?

a) 1 and 2 only
b) 2 and 3 only
c) 1 and 3 only
d) 1, 2 and 3

Ans) d

Exp) Option d is the correct answer.

Let's analyze each statement:

Statement 1 is correct- Lets assume p = 2, and c = 6. Then according to equation, (p+c)/(p-c) = (2 + 6)/(2- 6) = 8/(-4) = -2 which is even.

Statement 2 is correct- If p and c is odd then sum of both odd number can be odd. Lets assume p = 3 and c = 15, then 2p + c = 6 + 15 = 21 which is odd.

Statement 3 is correct- If p and c both are odd number, then their product can be odd. For example, lets assume, p = 3 (a prime number), c = 15 (a composite number), then p * c = 15 * 3 = 45 which is odd number.

Q.26) 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?

a) 18
b) 16
c) 15
d) Cannot be determined due to insufficient data.

Ans) a
Exp) Option a is the correct answer.
ABCD is a distinct non-zero number,
According to the question, ABC * D = 37DD
=> (100A + 10B + C) * D = 3700 + 7D + DD
=> 936 * 4= 3744
A+B+C= 9+3+6= 18

Q.27) For any choices of values of X, Y and Z, the 6-digit number of the form XYZXYZ is Read divisible by:
a) 7 and 11 only
b) 11 and 13 only
c) 7 and 13 only
d) 7, 11 and 13

Ans) d
Exp) Option d is the correct answer.
Lets assume the X, Y, and Z as 1, 2, and 3. So the resulting number would be 123, 123.
Checking divisibility by 7 - 123, 123/7 => remainder = 0
Checking divisibility by 13- 123,123/13 => remainder = 0
Checking divisibility by 11 - 123, 123/11 => remainder = 0.
Hence, the correct answer is option d.

Q.28) 125 identical cubes are arranged in the form of a cubical block. How many cubes are surrounded by other cubes from each side?
a) 27
b) 25
c) 21
d) 18

Ans) a
Exp) Option a is the correct answer.
A cube has 6 faces. The cubes that are on the outermost layer of the block will have 5 of their faces exposed, while the cube at the center of the block will have all 6 faces exposed.
Now, let's calculate the number of cubes that are surrounded by other cubes from each side:
On the outermost layer, there will be cubes on the edges, corners, and faces. Each edge will have 3 cubes, each corner will have 1 cube, and each face (excluding the corners and edges) will have 9 cubes.
The number of cubes on the edges = 12 edges * 3 cubes per edge = 36 cubes.
The number of cubes at the corners = 8 corners * 1 cube per corner = 8 cubes.
The number of cubes on the faces = 6 faces * 9 cubes per face = 54 cubes.
Therefore, the number of cubes on the outermost layer = 36 + 8 + 54 = 98 cubes.
Number of cubes surrounded by other cubes = Total cubes - Cubes on outermost layer

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17

= 125 - 98

= 27 cubes.

Hence, option a is the correct answer.

Q.29) 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?

a) 12
b) 18
c) 36
d) 72

Ans) c

Exp) Option c is the correct answer.

Given- We have numbers 11223344.

Even digits- 2244, Odd digits- 1133

There are total of 8 numbers where odd places will be located at sequence 1, 3, 5, 7 and even places will be located at sequence 2, 4, 6, 8

So,

Odd digits occupying odd places - $\frac{4!}{2!2!}$ = 6

Even digits occupying even places = $\frac{4!}{2!2!}$ = 6

So, the distinct 8 digits numbers that can be formed with odd digits at odd places and even digits at even places = 6 * 6 = 36.

Hence, option c is the correct answer.

Q.30) 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:

1. The work will be finished on Thursday.

2. The work will be finished in 10 days.

Which of the above statements is/are correct?

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

Ans) a

Exp) Option a is the correct answer.

Total work = LCM of 8, 16, 12 = 48 units

Efficiency of A = 48/8 = 6 Units.

Efficiency of B = 48/16= 3 Units

Efficiency of C = 48/12 = 4 Units

Work done by A, B, and C together = 6 + 3 + 4 = 13 Units

Statement 1 is correct- In 3 days, work done by A, B, and C = 13 Units

=> In 3 * 3 = 9 Days, work done by A, B, and C = 13 * 3 = 39 Units.

=> On 9th day, C has finished the work and its Tuesday (assuming workers doing work 7 days a week).

Work left = 48 - 39 = 9 Units

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=> Wednesday will come and A will work 6 units

Now, Work left for Thursday, that is to be completed by B = 9 -6 = 3 Units.

=> B will come on Thursday and since, B does 3 Units of work in a day, hence, the total number of days will be 11 days and the day will be Thursday.

Statement 2 is incorrect- The work will be finished in 11 days and not 10 days.

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

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 increased 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.

Q.31) Which one of the following statements best reflects the most rational, 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.

Ans) a

Exp) Option a is the correct answer.

Option a is correct- This option aligns well with the passage's emphasis on the need for a basin-based approach and assessments based on objective criteria. Establishing a national, pragmatic, legal, and policy framework would provide a systematic and comprehensive approach to water allocation, taking into account the competing demands of various stakeholders and ensuring fair and equitable distribution of water resources. It would also help address conflicts among different states and provide a unified approach to water management. Based on the information provided, option (a) - A national, pragmatic, legal, and policy framework for water allocation should be made - best reflects the most rational, practical, and immediate action required to ensure fair and equitable allocation of water to different stakeholders. This option aligns with the passage's emphasis on a basin-based approach, objective assessments, and the need for a comprehensive framework to address water allocation issues effectively.

Option b is incorrect- While interlinking river systems and creating huge aquifers may have some benefits, it is not directly supported by the information provided in the passage. The passage emphasizes the importance of a basin-based approach and assessments based on objective criteria for water allocation. Interlinking river systems and creating large aquifers may involve significant infrastructure and ecological challenges, making it a complex and long-term solution rather than an immediate action.

Option c is incorrect- This option suggests the creation of water channels between regions of water surplus and deficit. While it may be a potential solution to address water scarcity in specific areas, the

passage doesn't explicitly mention this as the most rational and immediate action. The passage emphasizes the importance of a basin-based approach, objective assessments, and considering the specificities of the river basin and existing water use. Water channels between regions should be considered as part of a comprehensive water management strategy but may not be the sole solution.

Option d is incorrect- This option is consistent with the passage's mention of the demands of rising population, agriculture, urbanization, and industrialization contributing to water stress. Reducing water demand in sectors such as agriculture and industry can be an effective approach to mitigate the water crisis. However, the passage doesn't indicate that this action alone is the most rational, practical, and immediate solution. It should be considered as one of the measures alongside other strategies for fair and equitable water allocation.

Passage-2

More than half of Indian women and almost a quarter of Indian men of working age suffer from anaemia. According to studies, they are anywhere from 5 - 15% less productive than they could be, as a result thereof. India 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.

Q.32) 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 programme 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.

Ans) d

Exp) Option d is the correct answer.

Option a is incorrect- While the passage mentions the cognitive abilities of malnourished Indian children, it doesn't specifically focus on the education system or suggest that strengthening the education system in rural areas is the most crucial step. The primary concern raised in the passage is the impact of malnutrition on cognitive abilities and the need to address health and nutrition for overall development.

Option b is incorrect- While the passage mentions the future dependence on highly skilled workers, it doesn't explicitly state that the implementation of skill development programs is the immediate or primary need. The focus of the passage is more on the impact of malnutrition on productivity and cognitive abilities, emphasizing the importance of addressing health and nutrition.

Option c is incorrect- This option narrows the focus to only skilled workers, which is not the main concern highlighted in the passage. The passage emphasizes the overall health and nutrition of the population and its impact on productivity and cognitive abilities, rather than solely focusing on skilled workers.

Option d is correct- This option correctly reflects the main message of the passage. It acknowledges the link between health, nutrition, and economic growth, and emphasizes the importance of addressing the health and nutrition of the entire population for achieving rapid economic growth.

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 government to come up the 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 not always enough for adaptation. It is important how a farmer perceives the risks associated with climate change.

Q.33) 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 important for motivating them taking adaptation decisions.
d) Since mitigation is not possible, governments should come up with policies for quick response to climate change

Ans) c

Exp) Option c is the correct answer.

Option a is incorrect- While the passage emphasizes the importance of adaptation to climate change and the need for policy-driven approaches, it doesn't state that the responsibilities of adaptation and mitigation solely lie with the government. The passage acknowledges the challenges faced by farmers and highlights the need for their perception and participation in adaptation efforts. It suggests that adaptation is paramount, which implies the involvement of multiple stakeholders, including farmers, communities, and the government.

Option b is incorrect- The passage doesn't specifically mention climate change causing a change in government policies regarding land use patterns. It primarily focuses on the challenges faced by farmers and the importance of adaptation, perception, and policy-driven approaches. While changes in land use patterns may be a potential consideration in addressing climate change, the passage doesn't provide direct support for this statement.

Option c is correct- This option correctly reflects the main message of the passage. The passage emphasizes the importance of farmers' perception of the risks associated with climate change and how it influences their decisions regarding adaptation. It suggests that perception is a necessary prerequisite for adaptation, indicating that farmers' risk perceptions play a crucial role in motivating them to take adaptation decisions.

Option d is incorrect- The passage doesn't state that mitigation is not possible. It acknowledges the need for a fast mitigation response alongside adaptation efforts. The passage emphasizes the importance of adaptation and policy-driven approaches but doesn't negate the possibility or importance of mitigation. Therefore, this option goes beyond the scope of the passage and is not supported by the given information.

Q.34) 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

Ans) d
Exp) Option d is the correct answer.
Raj has 10 pairs of red shoe => There are 20 red shoes in total.
He randomly picks shoes one by one without replacement until he gets a red pair of shoes.
To maximize the number of attempts, Raj will first have to pick all the non-red shoes before picking the red pair. Therefore, he will need to pick all the white and black shoes.
Raj has 9 pairs of white shoes and 8 pairs of black shoes, making a total of 9+8 = 17 pairs. Since each pair consists of two shoes, Raj will need to pick 17 x 2 = 34 individual shoes before he picks one red shoe and suppose all of them are right or left pair. So after picking 44 individual shoes the next one will be pair. Thus, correct answer would be 45.

Q.35) 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

Ans) b
Exp) Option b is the correct answer.
Different scenarios can be:
4 Sixes--→0 four and 1 single=1 way
3 Sixes-→ 1 four and 3 singles + 0 four and 7 singles= 2 ways
2 sixes-→Similarly we can see there will be 4 ways
1 six-> There can be 5 ways
0 six→ There can be 7 ways
Thus, 1+2+4+5+7= 19 ways.

Q.36) 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

Ans) b
Exp) Option b is the correct answer.
Statement 1 is incorrect- Since there are four letters and four envelopes, there are 4! = 24 possible arrangements.

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To determine the number of arrangements where exactly one letter goes into an incorrect envelope, we need to count the number of derangements of four letters. A derangement is an arrangement where no letter is in its correct envelope.

The number of derangements for four letters is given by the formula D(4) = 4! * (1/0! - 1/1! + 1/2! - 1/3! + 1/4!) ≈ 9.333.

Since a derangement is not a whole number, it means that there are no arrangements where exactly one letter goes into an incorrect envelope.

Statement 2 is correct-

Let's consider the possible case:

Case 1: Letter A and letter B are in their correct envelopes.

In this case, letters C and D must be in the incorrect envelopes.

Case 2: Letter A and letter C are in their correct envelopes.

In this case, letters B and D must be in the incorrect envelopes.

Case 3: Letter A and letter D are in their correct envelopes.

In this case, letters B and C must be in the incorrect envelopes.

Case 4: Letter B and letter C are in their correct envelopes.

In this case, letters A and D must be in the incorrect envelopes.

Case 5: Letter B and letter D are in their correct envelopes.

In this case, letters A and C must be in the incorrect envelopes.

Case 6: Letter C and letter D are in their correct envelopes.

In this case, letters A and B must be in the incorrect envelopes

Therefore, there are indeed six ways in which exactly two letters can go into the correct envelopes.

Q.37) What is the remainder when

85 x 87 x 89 x 91 x 95 x 96 is divided by 100?

a) 0

b) 1

c) 2

d) 4

Ans) a

Exp) Option a is the correct answer.

Prime Factor methods:

When we divide some number by 100

N/100 = Remainder (Last 2 digit of N)

85 = 17 x 5

87 = 3 x 29

89 = 1 x 89

91 = 13 x 7

95 = 19 x 5

96 = 2^5 x 3

3^2 * 17 * 2^3 * 89* 29 * 10 * 10 * 13 * 7 * 19

Unit digits are , 9 , 7, 8, 9, 9, 10, 10, 3, 7, 9

=> 9* 7 * 8 * 9* 9 * 10 * 10* 3 * 7 * 9 = 54496800 = Last 2 digit = 0

Hence, Remainder = 0.

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Q.38) What is the unit digit in the expansion of

$(57242)^{9x7x5x3x1}$?

a) 2

b) 4

c) 6

d) 8

Ans) a

Exp) Option a is the correct answer.

$(57242)^{9*7*5*3*1} = (57242)^{945}$

For 2, 2^1 = 2, observe that the unit digit is 2.

For 2, 2^2 = 4, observe that the unit digit is 4.

For 2, 2^3 = 8, observe that the unit digit is 8.

For 2, 2^4 = 16, observe that the unit digit is 6.

For 2, 2^5 = 32, observe that the unit digit is 2. Hence cyclicity of 2 is 4.

Similarly, for 3,

For 3, 3^1 = 3, observe that the unit digit is 3.

For 3, 3^2 = 9, observe that the unit digit is 9.

For 3, 3^3 = 27, observe that the unit digit is 7.

For 3, 3^4 = 81, observe that the unit digit is 1.

For 3, 3^5 = 243, observe that the unit digit is 3. Hence cyclicity of 3 is 4

Similarly, for 7 and 8, the cyclicity is 7,9,3,1 i.e 4 and 8,4,2,4 i.e 2

Unit of digit of

$(57242)^{945} = Unit\ digit\ of\ 2^{945}$

Cyclicity of 2 is 4

=> 945/2 => remainder = 1

=> $(57242)^{945} = Unit\ digit\ of\ 2^{945} = Unit\ digit\ of\ 2^1 = 2$

Therefore, the last digit of $(57242)^{945} = 2$.

Hence, option a is the correct answer.

Q.39) 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

Ans) d

Exp) Option d is the correct answer.

Since, A,B, C, D, E, and F are distinct number non-zero number, so the minimum values A, B, and C can have 123 and maximum values, DEF can have 987

Adding ABC + DEF = 123 + 987 = 1110, but since, in question it is written as the sum should be 1111, so lets assume the value of C as 4.

The resulting number is ABC = 124, DEF = 987

A+B+C+D+E+F = 1 + 2+ 4+ 9 + 8 + 7 = 31.

Hence, option d is the correct answer.

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Q.40) 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

Ans) c
Exp) Option c is the correct answer
For the ratio of the number to the sum of its digits to be least, we want to minimize the number D while maximizing the sum of its digits.
To do this, we need to assign the smallest possible value to the hundreds digit and the largest possible value to the unit's digit.
The smallest possible value for the hundreds digit is 1, as it cannot be zero. For the unit's digit, the largest possible value is 9, as it must be a single-digit number.
Lets consider the number , D = 199
=> 199/19 = 10.4
Difference between digits at hundredth place and units place= 1-9 = - 8
Hence, option c is the correct answer.

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
In India, while the unemployment rate is a frequently used measure of poor performance of the economy, under conditions of rising school and college enrolment, 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.

Q.41) 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.

Ans) b
Exp) Option b is the correct answer.
Option a is incorrect: This statement is not directly supported by the passage. While the passage mentions rising school and college enrolment, it does not explicitly discuss the quality of education. The focus is on the unemployment challenges faced by educated individuals, rather than the quality of education itself.
Option b is correct: This statement aligns with the passage because it recognizes that unemployment is influenced by the increasing education levels and aspirations of young Indians. The passage highlights

that younger Indians face higher employment challenges and exhibit a greater willingness to wait for the right job. Therefore, this statement accurately reflects the author's intention.

Option c is incorrect: The passage does not provide any information about the availability or lack of labor-intensive industries. It primarily emphasizes the unemployment challenges faced by educated individuals, suggesting that rising education levels inflate these challenges. Therefore, this statement goes beyond the scope of the passage.

Option d is incorrect: The passage does not discuss the need for designing the education system to enable self-employment. While it acknowledges that unemployment challenges are greater for individuals with secondary or higher education, it does not propose specific solutions or recommendations for the education system. Therefore, this statement goes beyond the scope of the passage.

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 aright when the goal itself has not been rightly placed. What science needs is philosophy – the analysis of scientific method 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."

Q.42) 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.

Ans) b

Exp) Option b is the correct answer

Option a is incorrect: It suggests that modern statesmen need to be well trained in scientific methods and philosophical thinking to gain a better perspective of their roles, responsibilities, and goals. While this may be a valid point, it does not directly align with the main message of the passage, which emphasizes the need for a force outside of science to coordinate and guide scientific pursuits and government actions. The passage does not specifically address the qualifications of statesmen or suggest that they need to be trained in scientific methods.

Option b is correct: This Statement aligns with the passage's message that a force outside of science, such as philosophy, is necessary to guide and coordinate the actions of governments. The passage argues that without philosophy, government and science become aimless and lacking in perspective. option (b) is the best choice as it aligns most closely with the main message of the passage, emphasizing the importance of having a mixture of empirical statesmen and those grounded in learning and wisdom to guide governments, just as philosophy guides science.

Option c is incorrect: It suggests that it is desirable to have a system of education that focuses on training citizens in scientific methods and philosophical thinking from an early age. While education is important and the passage does mention the need for philosophy, this option focuses solely on the education system and does not capture the broader context of coordinating and guiding scientific pursuits and government actions.

Option d is incorrect: It proposes that all scientists should be philosophers as well to make their work goal-oriented, purposeful, and useful to society. While the passage emphasizes the need for philosophy in guiding scientific pursuits, it does not specifically state that all scientists need to be philosophers. The passage highlights the role of philosophy in coordinating scientific methods and purposes but does not necessarily imply that all scientists should be philosophers.

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."

Q.43) 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

Ans) d

Exp) Option d is the correct answer

Option a is incorrect: While personal safety is mentioned in the passage as an important aspect, it is not explicitly stated as the ultimate goal of the state. The passage emphasizes freeing individuals from fear and enabling them to live and act with full security. Personal safety is a means to achieve the broader goal of liberty, but it is not the ultimate goal itself.

Option b is incorrect: The passage does mention enabling bodies and minds to function safely, indicating the importance of physical and mental well-being. However, this is also not explicitly stated as the ultimate goal of the state. It is a condition necessary for individuals to exercise their free reason and avoid negative emotions and unfair actions.

Option c is incorrect: While communal harmony and living without injury to oneself or one's neighbor are mentioned in the passage, they are not stated as the ultimate goal of the state. Rather, they are presented as outcomes of individuals living and acting with full security, exercising free reason, and avoiding negative behaviors. Communal harmony is a desirable result, but it is not explicitly mentioned as the ultimate goal itself.

Option d is correct: The passage clearly highlights that the end of the state is to enable individuals to live and act with full security, without fear, and to exercise free reason. The state aims to free individuals from fear, prevent them from wasting their strength in negative emotions and unfair actions, and ensure they can live without harming themselves or others. These ideas strongly align with the concept of liberty, which encompasses freedom from fear, the ability to exercise reason, and the absence of coercion or undue restraint.

Q.44) What is the remainder if 2^{192} is divided by 6?
a) 0
b) 1
c) 2
d) 4

Ans) d

Exp) Option d is the correct answer

In this case, we want to find the remainder when 2^192 is divided by 6. We can simplify the calculation by considering the remainders of smaller powers of 2 when divided by 6.

Let's calculate the remainders of smaller powers of 2 when divided by 6:

2^1 = 2 (remainder 2)
2^2 = 4 (remainder 4)
2^3 = 8 (remainder 2)
2^4 = 16 (remainder 4)
2^5 = 32 (remainder 2)
2^6 = 64 (remainder 4)
2^7 = 128 (remainder 2)
2^8 = 256 (remainder 4)

We can observe a pattern here. The remainder alternates between 2 and 4 as we increase the power of 2. Specifically, the remainder is 2 when the power is odd (1, 3, 5, etc.), and the remainder is 4 when the power is even (2, 4, 6, etc.).

Now, let's consider 2^192. Since 192 is an even number, the remainder will be 4.

Therefore, the remainder when 2^192 is divided by 6 is 4 (option d).

Q.45) 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

Ans) d

Exp) Option d is the correct answer

Let us solve it by filling the missing letters with each option and then find a pattern.

Option a is incorrect: ABC_DA_ABC_C_DABBCD_B_ABCD. It does not follow any fixed pattern.

Option b is incorrect: ABC_CD_ABC_A_DABBCD_B_ABCD. It does not follow any fixed pattern.

Option c is incorrect: ABC_DC_ABC_C_DABBCD_A_ABCD. It does not follow any fixed pattern.

Option d is correct: ABC_DD_ABC_C_DABBCD_A_ABCD. In the given sequence, the pattern is formed by grouping the letters into sets of four. Each group consists of four letters, and the last letter of each group becomes the first letter of the next group and then follows the alphabetical order within the group. Therefore, the sequence will continue with the same pattern of groups: "DABC," "CDAB," "BCDA," "ABCD," and so on.

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Q.46) 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

Ans) a
Exp) Option a is the correct answer
Let's analyze the given information step by step:
Step1: AB × CD = DEF or AB × CD = D08
Here, we are told that multiplying AB with CD results in a 3-digit number DEF. However, since we know that E = 0 and F = 8, we can conclude that the result is D08.
Step2: D08 + GHI = 975
It is mentioned that adding D08 to another 3-digit number GHI results in 975.
Step3: Analyzing the digits:
We are given that E = 0 and F = 8. From the equation D08 + GHI = 975, we can deduce that I = 7 and H = 6 because all the digits (A, B, C, D, E, F, G, H, I) are distinct.
Step4: D + G = 9
Since D and G are distinct digits and their sum is 9, there are two possibilities: D = 4 and G = 5 or D = 5 and G = 4.
Step5: Determining the remaining digits:
With the above deductions, the remaining three digits are 1, 2, and 3 because all digits must be distinct.
Step6: Now, let's calculate A + B + C:
Since A, B, and C could be either 1, 2, or 3, the sum of A + B + C is 1 + 2 + 3 = 6.
Therefore, the value of A + B + C is 6, which corresponds to option (a) 6.

Q.47) 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

Ans) d
Exp) Option d is the correct answer
Let's analyze the given statements and the conclusions:
From the first true statement, we know that either P or Q was selected for the job.
From the second false statement, we can conclude that at least one of R and S were not selected for the job.

From the third true statement, we know that at most two of R, S, and T were selected for the job. This means that either two or fewer of them were selected.

Now let's consider the conclusions:

Conclusion 1: Based on the information we have, we know that at most two of R, S, and T were selected. And One of P or Q is selected. Therefore, it is not possible for at least four candidates to be selected. Hence, conclusion 1 is false.

Conclusion 2: Based on the information we have, we cannot conclude whether S was selected or not. Hence, conclusion 2 is false.

Q.48) 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

Ans) a
Exp) Option a is the correct answer
Let's analyze the given statements and determine the conclusions that can be drawn.
I. If P is true, then both Q and S are true.
This statement establishes a conditional relationship between P, Q, and S. It states that if P is true, both Q and S must be true. This can be represented as:
$P \rightarrow (Q \wedge S)$
II. If R and S are true, then T is false.
This statement establishes a conditional relationship between R, S, and T. It states that if both R and S are true, then T must be false. This can be represented as:
$(R \wedge S) \rightarrow \neg T$
Now let's analyze the conclusions:
Conclusion1 is correct: If T is true, then at least one of P and R must be false.
To evaluate this conclusion, we need to consider the contrapositive of the second statement. The contrapositive of $(R \wedge S) \rightarrow \neg T$ is $\neg\neg T \rightarrow \neg(R \wedge S),$ which simplifies to $T \rightarrow (\neg R \vee \neg S)$. This means that if T is true, either ¬R (R is false) or ¬S (S is false) must be true. **Therefore, the conclusion 1 can be drawn as it is certain R is false.**
Conclusion2 is incorrect: If Q is true, then P is true.
From the first statement, we know that if P is true, both Q and S must be true. However, the reverse is not necessarily true. It is possible for Q to be true even if P is false. **Therefore, the conclusion 2 cannot be drawn.**

Q.49) A cuboid of dimensions 7 cm x 5 cm x 3 cm is painted red, green and blue colour on each pair of opposite faces of dimensions 7 cm x 5 cm, 5 cm x 3 cm, 7 cm x 3 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

Ans) a
Exp) Option a is the correct answer.
Statement 1: There are exactly 15 small cubes with no paint on any face.
To determine the number of cubes with no paint on any face, we need to find the cubes that are located at the center of each face, i.e., not touching any painted face.
The number of small cubes along the length with no paint on any face = (Number of small cubes along the length) - 2 = 7 - 2 = 5
The number of small cubes along the width with no paint on any face = (Number of small cubes along the width) - 2 = 5 - 2 = 3
The number of small cubes along the height with no paint on any face = (Number of small cubes along the height) - 2 = 3 - 2 = 1
So, the total number of small cubes with no paint on any face = (Number of small cubes along the length with no paint on any face) × (Number of small cubes along the width with no paint on any face) × (Number of small cubes along the height with no paint on any face)
Total number of small cubes with no paint on any face = 5 × 3 × 1 = 15
Therefore, statement 1 is correct.

Q.50) 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

Ans) c
Exp) Option c is the correct answer
To solve this question, let's follow the steps provided:
Step 1: Arrange the letters of the word "INCOMPREHENSIBILITIES" alphabetically.
The alphabetical arrangement of the letters is as follows:
BCEEEIIIIILMNNNOPRSST
Step 2: Reverse the order from step 1.
The reversed order is:
TSSRPOONNMLIIIIIEEECB
Step 3: Compare the letters in step 2 with the given word "INCOMPREHENSIBILITIES."
Comparing the letters in step 2 with the given word, we can determine the positions that remain unchanged.
The unchanged positions are as follows:
I (position 13)
I (position 15)
Therefore, there are two positions (letters) which remain unchanged.

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 1 with attractive life choices, yet find themselves unhappy and anxious.

Q.51) Which one of the following statements best reflects the most logical message implied by the above passage?
a) Modern technology enfeebles societal structure and makes life difficult.
b) Modern life is full of uncertainties and endless difficult choices.
c) We are influenced by the opinion of others and have no courage to follow our own convictions.
d) In our lives, having too few choices may not be a good thing, but having too many can be equally as difficult.

Ans) d

Exp) Option d is the correct answer

Option a is incorrect: It states that modern technology enfeebles societal structure and makes life difficult. While the passage mentions the challenges posed by technology and the abundance of choices, it does not make a claim about technology enfeebling societal structure. Therefore, option a is not the best reflection of the passage's message.

Option b is incorrect It is not the best reflection of the most logical message implied by the passage. While the passage does mention the paradox of choice and the difficulties it brings, it does not specifically state that modern life is full of uncertainties and endless difficult choices. The passage focuses more on the negative impact of excessive choices and the overwhelming nature of modern technology, rather than the inherent uncertainty of choices in life.

Option c is incorrect: It suggests that we are influenced by the opinion of others and lack the courage to follow our own convictions. While the passage mentions the overwhelming nature of choices and the influence of technology, it does not explicitly discuss the fear of following one's own convictions or the role of others' opinions in decision-making. Therefore, option c) is not the best reflection of the passage's message.

Option d is correct: It states that in our lives, having too few choices may not be a good thing, but having too many can be equally difficult. This option accurately reflects the core concept of the paradox of choice discussed in the passage. The story of Buridan's ass, presented in the passage, demonstrates how an overwhelming number of choices can lead to an inability to decide and dissatisfaction. Additionally, the passage mentions that changes in technology and the abundance of choices can make decision-making more challenging. Therefore, option d) provides the most logical message implied by the passage, making it the best answer among the given options.

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.

Q.52) Regarding the financialization of household savings, which of the following statements best reflect the solutions that are implied by the passage?

1. A flexible environment is needed to develop solutions.
2. Households need customised solutions.
3. Innovations in financial technology are required.

Select the correct answer using the code given below:

a) 1 and 2 only
b) 2 and 3 only
c) 1 and 3 only
d) 1, 2 and 3

Ans) a

Exp) Option a is the correct answer

Statement 1 is correct: This statement is implied by the passage because it mentions the hurdles to change, including onerous bureaucracy and a lack of information. These factors suggest that a flexible environment is necessary to overcome these obstacles and develop solutions that can address the specific needs and preferences of households.

Statement 2 is correct: The passage mentions that the populace in India is accustomed to traditional processes and tends to invest heavily in physical assets like gold and property. To encourage the financialization of savings, it is necessary to provide customized solutions that cater to the unique requirements of each household. This implies that a one-size-fits-all approach would not be effective in transitioning households towards financialization.

Statement 3 is incorrect: While the passage highlights the need for solutions to encourage financialization, it does not explicitly mention the requirement for innovations in financial technology. It focuses more on bureaucratic hurdles, skepticism of organized financial institutions, and the lack of basic information. Therefore, statement 3 cannot be considered correct based on the information provided in the passage.

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, but could be unaffordable to 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 provide the patentee with a legitimate mechanism to get returns on the costs incurred in innovation and research.

Q.53) Based on the above passage, the following assumptions have been made:

1. Patent protection given to patentees puts a huge burden on public's purchasing power in accessing patented medicines.

2. Dependence on other countries for pharmaceutical products is B burden for developing and poor countries.

3. Providing medicines to the public at affordable prices is a key goal during the public health policy design in many countries.

4. 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?

a) 1 and 2

b) 1 and 4

c) 3 and 4

d) 2 and 3

Ans) b

Exp) Option b is the correct answer

Statement 1 is correct: Statement 1 is valid because the passage mentions that patent protection allows patentees to determine the prices of medicines, which could be unaffordable to the public. This implies that accessing patented medicines can be financially burdensome for the public.

Statement 2 is incorrect: Statement 2 is incorrect because the passage does not directly address the issue of dependence on other countries for pharmaceutical products. It focuses on the impact of patent protection on medicine prices and the balance between patentee rights and patient requirements.

Statement 3 is incorrect: Statement 3 is incorrect because the passage does not explicitly state that providing medicines at affordable prices is a key goal during the public health policy design. It mentions that higher prices for patented medicines are a cost associated with the patent regime, but it does not discuss specific goals of public health policy.

Statement 4 is correct: Statement 4 is valid because the passage mentions that governments need to find an appropriate balance between the rights of patentees and the requirements of the patients. This implies that there is a need to consider both the interests of patentees and the needs of the patients when formulating policies related to pharmaceutical patents.

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.

Q.54) Based on the above passage, the following assumptions have been made:

1. Protection of privacy is not just a right, but it has value to the economy.

2. There is a fundamental link between privacy and innovation.

Which of the above assumptions is/are valid?

a) 1 only

b) 2 only

c) Both 1 and 2

d) Neither 1 nor 2

Ans) c

Exp) Option c is the correct answer.

Statement 1 is correct: The passage states that personal data should be secure and protected. It suggests that individuals should have control over their own data and be able to use, restrict, or monetize it as they

wish. This indicates that privacy is not only considered a fundamental right but also recognized as having economic value. By emphasizing the need for data protection laws that enable user-centric and privacy-protecting innovation, the passage implies that privacy has a positive impact on the economy.

Statement 2 is correct: The passage suggests that innovation thrives in an environment that is not surveillance-oriented and where individuals' personal information is not compromised. It argues that no one will innovate in such an environment. This implies that privacy and innovation are fundamentally linked, as the presence of privacy protections creates a conducive environment for innovation to flourish. By emphasizing the importance of data protection laws that enable privacy-protecting innovation, the passage supports the assumption that privacy and innovation are intertwined.

Q.55) 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?
a) 16
b) 17
c) 23
d) 35

Ans) d
Exp) Option d is the correct answer
99% means overall score of 396 out of 400
Let us find the possible ways of scoring 396
Possibility 1: When score in all papers is 99. There is one possible way.
Possibility 2: When Score in 3 papers is 100 each and 1 paper is 96. There are 4C3 = 4 possible ways.
Possibility 3: When Score in 2 papers is 100 each and 2 papers is 98 each. There are 4C2 × 2C2 ways = 6 possible ways.
Possibility 4: When Score in 2 papers is 100 each and 1 paper is 97 and 1 paper is 99. There are 4C2 × 2C1 × 1C1 ways = 12 possible ways.
Possibility 4: When Score in 1 papers is 100 and 1 paper is 98 and 2 papers is 99 each. There are 4C2 × 2C1 ways = 12 possible ways.
Total Possible ways = 1 + 4 + 6 + 12 + 12 = 35 ways

Q.56) 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?
a) 12
b) 18
c) 24
d) 36

Ans) c
Exp) Option c is the correct answer
To design a flag with 4 horizontal stripes using the colors red, green, and yellow, we need to ensure that no two adjacent stripes have the same color. Let's consider the possibilities for each stripe:
For the first stripe, we have three choices: red, green, or yellow.
For the second stripe, we cannot choose the same color as the first stripe, so we have two choices remaining.

For the third stripe, we cannot choose the same color as the second stripe, so we again have two choices remaining.

For the fourth stripe, we cannot choose the same color as the third stripe, so we have two choices remaining.

To find the total number of possibilities, we multiply the choices for each stripe together:

Number of possibilities = 3 (choices for the first stripe) × 2 (choices for the second stripe) × 2 (choices for the third stripe) × 2 (choices for the fourth stripe) = 3 × 2 × 2 × 2 = 24

Therefore, there are 24 different ways to design the flag with the given conditions. Hence, the correct answer is option (c) 24.
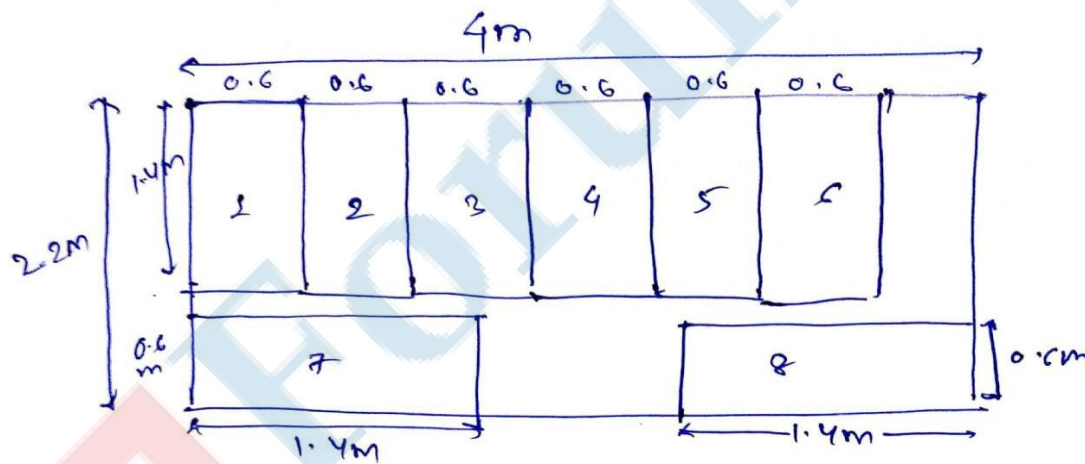
Q.57) A rectangular floor measures 4 m in length and 2·2 m in breadth. Tiles of size 140 cm by 60 cm have to be laid such that the tiles do not overlap. A tile can be placed in any orientation so long as its edges are parallel to the edges of the floor. What is the maximum number of tiles that can be accommodated on the floor?
a) 6
b) 7
c) 8
d) 9

Ans) c
Exp) Option c is the correct answer
Based on the above information we can represent the floor in the following manner:

It is clear from the above representation that maximum 8 tiles can be placed according to the conditions mentioned in the question. Thus Option c is the correct answer.

Q.58) 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

Ans) d

Exp) Option d is the correct answer

To solve this problem, we can break it down into several cases based on the given conditions.

Assigning Task-1: Since neither P nor Q can be assigned Task-1, we have three options for Task-1 (R, S, or T). There are 3 ways of assigning Task1

Assigning Task-2: Task-2 must be assigned to either R or S. Therefore, we have two ways of assigning Task2.

Assigning Task3: Once Task-2 is assigned, we have three remaining people and three tasks left to assign. Thus for the third task, we have three people left so there are 3 ways of assigning the task.

Assigning task4: Once Task-3 is assigned, we have two remaining people and thus for the fourth task, we have two people left so there are 2 ways of assigning the task.

Assigning task5: Once Task-4 is assigned, we have only one remaining person and thus for the fifth task, can be assigned in only 1 way.

To find the total number of ways, we multiply the number of options for each case.

Total number of ways = Number of options for task 1 × Number of options for task 2 × Number of options for Task 3 × Number of options for task 4 ×Number of options for task 5

Total number of ways assigning the tasks = 3 × 2 × 3 × 2 × 1 = 24 ways

Q.59) 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

Ans) c

Exp) Option c is the correct answer

Let's analyze the statements given:

For Statement 1 to be correct, we need to find the minimum number of coins required to reach a total weight of 78 gm. Let's calculate it:

To minimize the number of coins, we should use the largest coins available first. Let's start with the 50 gm coins:

50 gm coin: 1 coin (50 gm)

Remaining weight: 78 gm - 50 gm = 28 gm

Next, we can use a 10 gm coin:

2-- 10gm coin

And 4-- 2 gm coin

Which makes the total 78gm.

Statement 2 is correct: One 50 gm coin and 1 25 gm coin and 1 5gm coin and on the opposite side 1 2 gram coin.

Q.60) 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 × B means A is not smaller than B.

IV. A + B means A is neither greater nor equal to B.

V. A ± B means A is neither smaller nor greater than B.

Statement: P × Q, P-T, T : R, R ± S

Conclusion-1: Q ± 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.

Ans) b

Exp) Option b is the correct answer

let's analyze the given statement and conclusions:

Statement: P × Q, P - T, T : R, R ± S

From the statement, we can deduce the following:

P is not smaller than Q (from P × Q).

P is not greater than T (from P - T).

T is not smaller than R (from T : R).

R is neither smaller nor greater than S (from R ± S).

Conclusion-1: Q ± T

From the given statement, we cannot directly determine the relationship between Q and T. The given statement does not provide any information about the relative sizes of Q and T, so we cannot conclude that Q ± T is true. Therefore, Conclusion-1 does not follow from the statement.

Conclusion-2: S + Q

From the given statement, we know that R is neither smaller nor greater than S. However, we don't have any direct information about the relationship between S and Q. Therefore, we cannot determine whether S + Q is true or not. However, since R is not smaller or greater than S, it is possible that S is greater than Q, which would make S + Q true. Therefore, Conclusion-2 is a possibility and can be inferred from the given statement.

In conclusion, only Conclusion-2 follows from the given Statement. Therefore, the correct answer is b) Only Conclusion-2 follows from the Statement.

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

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.

Q.61) 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.

Ans) d

Exp) Option d is the correct answer.

Option a is incorrect: It is not the best answer because the passage does not explicitly state that food-yielding trees should replace other trees in rural and tribal areas or community-owned lands. The focus is on the productivity of trees and non-agricultural lands in providing a safety net and complementing agricultural food production.

Option b is incorrect: It is not the best answer because the passage does not explicitly claim that food security cannot be ensured with conventional agriculture. Instead, it emphasizes the benefits of sourcing food from non-agricultural lands to address food shortages caused by crop failure or seasonal gaps.

Option c is incorrect: It is not the best answer because the passage does not specifically mention wastelands or degraded areas in India as the primary focus. It acknowledges the potential of non-agricultural lands, such as forests, wetlands, and pastures, to contribute to food consumption, particularly in rural and tribal communities.

Option d is correct: It is the best answer because it suggests the development of agroecosystems in addition to or along with conventional agriculture. This aligns with the idea of sourcing food from non-agricultural lands, such as forests and wetlands, to provide a systemic approach to food consumption and enhance food security, especially during periods of crop failure or seasonal gaps.

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.

Q.62) Which one of the following statements best e 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.

Ans) a

Exp) Option a is the correct answer

Option a is correct: This statement directly addresses the issue highlighted in the passage, which is the lack of waste treatment by antibiotics-manufacturing companies. By implementing proper effluent treatment protocols, these companies can mitigate the pollution caused by their waste and reduce the spread of drug-resistant bacteria in the environment.

Option b is incorrect: It is not the best answer because the passage does not focus on the need to raise general environmental awareness. It specifically highlights the lack of waste treatment by pharmaceutical companies, which requires targeted solutions rather than just promoting awareness.

Option c is incorrect: It is not the best answer either. Although the passage mentions the occurrence of drug-resistant bacteria surrounding pharmaceutical manufacturing plants, it does not make a broad claim about drug-resistant bacteria being inherent in modern medical care. The focus is on addressing the specific pollution caused by the manufacturing process.

Option d is incorrect: It is not supported by the passage. The passage does not suggest relocating pharmaceutical manufacturing plants to remote areas as a solution to the pollution problem. It primarily highlights the need for waste treatment protocols, regardless of the location of these companies.

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, similarly 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.

Q.63) 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.

Ans) a

Exp) Option a is the correct answer

Option a is correct The passage emphasizes the importance of a strong learning foundation at the primary level in order to improve higher education and skill development. It states that the benefits of good quality school education are realized when students complete their education and acquire foundational skills. These foundational skills are compared to learning to walk before running, implying that they are necessary for acquiring advanced skills. The passage also mentions the advent of the knowledge economy and the consequences of having an uneducated workforce. It suggests that without a strong learning foundation at the primary level, a country may be unable to keep pace with the global economy. This implies that investing in universal quality education is crucial for a country like India to become a global power.

Option b is incorrect because the passage does not directly state that India is unable to become a global power. It discusses the consequences of having an uneducated workforce, but it does not make a definitive statement about India's current status.

Option c is incorrect because the passage does not suggest that higher education should focus more on imparting skills. It emphasizes the importance of foundational skills acquired at the primary level for overall improvement in higher education and skill development.

Option d is incorrect because the passage does not mention the literacy or awareness level of parents. It focuses on the benefits of quality education and the impact of a strong learning foundation on the global economy.

Q.64) 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

Ans) b

Exp) Option b is the correct answer

Let's analyze the pattern of passing the ring in more detail.

Starting with Child-1, the ring is passed to Child-2. From Child-2, it is passed to Child-4, skipping Child-3. Then, from Child-4, it is passed to Child-7, skipping Child-5 and Child-6.

If we observe closely, we can see that there is a skipping pattern. After each pass, the number of children skipped increases by 1. So, after Child-7, the next child to receive the ring will be Child-11 (skipping Child-8, Child-9, and Child-10). After Child-11, the next child to receive the ring will be Child-16 (skipping Child-12, Child-13, Child-14, and Child-15).

We can observe that the numbers representing the children where the ring is passed follow a pattern: 1, 2, 4, 7, 11, 16, 22, 29, 37, and so on.

To find out after how many passes the ring will be back in the hands of Child-1, we need to find the number in the pattern that equals 41, 81, and 121,161 and so on.

If we continue the pattern, the next numbers in the sequence would be 46, 56, 67, 79, 92, 106, 121

The Overall sequence is 4, 7, 11, 16, 22, 29, 37, 46, 56, 67, 79, 92, 106, 121.

We can see that the 15th number in the pattern is 121, and thus after the 14th pass, i.e on 15th pass the ring will be back in the hands of Child-1.

Therefore, the correct answer 15 pass.

Q.65) 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

Ans) b

Exp) Option b is the correct answer

To find the middle term of the given sequence, we need to determine the pattern. Looking at the sequence, we can observe the following:

The first letter of each term follows the pattern: Z, Y, X, W, V.

The number of repetitions of each letter increases by 1 for each term.

Based on this pattern, we can deduce that the next letters in the sequence would be U, T, S, R, and so on, until A is reached.

To find the middle term, we need to determine the total number of terms in the sequence. Since the number of repetitions of each letter increases by 1 for each term, the total number of terms can be calculated by summing the first N natural numbers, where N represents the number of letters in the alphabet used in the sequence.

The formula to find the sum of the first N natural numbers is given by:

Sum = (N * (N + 1)) / 2.

In this case, N = 26 (since there are 26 letters in the alphabet). Plugging this value into the formula, we get:

Sum = (26 * (26 + 1)) / 2 = 13 * 27 = 351. But since the first term was 2 so Total number of terms in the sequence is 351-1=350

Therefore, the middle term would be the 175th term (since 351 is an odd number).

Q.66) Question: Is p greater than q?

Statement-1: p x q is greater than zero.

Statement-2: p2 is greater than q2.

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 be answered using either cannot Statement alone.

d) The Question cannot be answered even by using both the Statements together.

Ans) d

Exp) Option d is the correct answer.

Let's evaluate each statement individually:

Statement-1: p x q is greater than zero.

This statement implies that the product of p and q is positive. In order for the product to be positive, either both p and q are positive or both p and q are negative. However, we cannot determine which one is greater based on this statement alone.

Statement-2: p^2 is greater than q^2.

This statement implies that the square of p is greater than the square of q. If both p and q are positive then question can be answered as p will be greater than q but if both p and q are negative, then we cannot conclude that p is greater than q. For ex if P = -8 and q = -6. Here p^2 is greater than q^2 but q > p, thus we cannot determine which one is greater based on this statement alone.

Based on the analysis above, we can conclude that the question cannot be answered by using either statement

Q.67) 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 cannot be answered using either Statement alone.

d) The Question cannot be answered even by using both the Statements together.

Ans) c

Exp) Option c is the correct answer.

To determine if (p + q - r) is greater than (p - q + r), we can simplify the expressions.

(p + q - r) = (p - r) + q

(p - q + r) = (p - q) + r

Now let's analyze the statements:

Statement-1: (p - q) is positive.

This statement provides information about the sign of (p - q) but does not give any information about the sign of (p - r) or r. **Therefore, it is not sufficient to answer the question.**

Statement-2: (p - r) is negative.

This statement provides information about the sign of (p - r) but does not give any information about the sign of (p - q) or q. **Therefore, it is not sufficient to answer the question.**
Combining both statements, we will get the answer thus together only it can be answered.

Q.68) 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.

Ans) d
Exp) Option d is the correct answer
Let's analyze the given information and statements to determine the correct answer:
From the given information:
• 75 persons took tea.
• 60 persons took coffee.
• 15 persons took both tea and coffee.
• No one taking milk takes tea.
• Each person takes at least one drink.
Now let's evaluate the statements:
Statement-1: 50 persons took milk.
This statement alone does not provide any information about the number of persons who attended the party or their drink preferences. It does not help us determine the total number of persons who attended the party. **Therefore, Statement-1 is not sufficient to answer the question**.
Statement-2: The number of persons who attended the party is five times the number of persons who took milk only.
This statement suggests a relationship between the number of persons who attended the party and the number of persons who took milk only. However, without knowing the number of persons who took milk only, we cannot determine the total number of persons who attended the party. **Therefore, Statement-2 is not sufficient to answer the question.**
Combining the statements:
By combining the statements, we know that 50 persons took milk, but we still don't have any information about the number of persons who took milk only. Without this information, we cannot determine the total number of persons who attended the party. **Therefore, even by using both statements together, the question cannot be answered.**
Based on the analysis above, the correct answer is (d) The Question cannot be answered even by using both the Statements together.

Q.69) 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

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.

Ans) d

Exp) Option d is the correct answer

Given that we have a 3-digit number, let's assume the number can be represented as XYZ, where X, Y, and Z represent the digits.

Statement-1: The sum of the digits of the number is equal to the product of the digits.

This means:

X + Y + Z = X * Y * Z

However, this statement alone does not provide enough information to determine the specific value of XYZ. There are multiple combinations of X, Y, and Z that satisfy this equation, such as 1 + 2 + 3 = 1 * 2 * 3 or 2 + 1 + 3 = 2 * 1 * 3. **Therefore, Statement-1 alone is not sufficient to answer the question.**

Statement-2: The number is divisible by the sum of the digits of the number.

This means: XYZ is divisible by (X + Y + Z)

Using this statement alone, we cannot determine the specific value of XYZ.

For example, if XYZ is 111 then the sum of the digits is 1 + 1 + 1 = 6, and XYZ is divisible by 3. However, if XYZ is 222, then the sum of the digits is 2 + 2 + 2 = 6, and XYZ is also divisible by 6. **Therefore, Statement-2 alone is not sufficient to answer the question.**

Since neither statement alone is sufficient to answer the question, let's consider both statements together:

Combining these two statements, if we consider XYZ as 312 it is divisible by 6,similarly if we conside XYZ to be 132, it is divisible by 6. **Therefore, without any specific values or constraints provided in the statements, we cannot uniquely determine the value of XYZ.**

Therefore, the correct answer is option d

Q.70) 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 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.

Ans) b

Exp) Option b is the correct answer

Given the information:

There are five children with ages a, b, c, d, and e.

The ages are in increasing order: a < b < c < d < e.

Any two successive ages differ by 2 years. Thus b= a+2; c= a+4, d=a+6 and e=a+8

We need to determine the age of the youngest child.

Statement-1: The age of the eldest is 3 times the youngest.

Let's consider the possibilities for the ages of the children based on this statement:

If the youngest child's age is a, then the eldest child's age is 3a.Thus e=3a or a + 8 = 3a, a=4

Therefore, Statement-1 alone is sufficient to answer the question.

Statement-2: The average age of the children is 8 years.

Let's consider the average age based on the given information:

$(a + (a + 2) + (a + 4) + (a + 6) + (3a))/5 = 8$

Simplifying the equation:

$(7a + 12)/5 = 8$

$7a + 12 = 40$

$7a = 28$

$a = 4$

Using Statement-2 alone, we can determine that the youngest child's age is 4 years. **Therefore, Statement-2 alone is sufficient to answer the question.**

Since we were able to answer the question using either of Statements alone thus the answer is option b.

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

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.

Q.71) 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

Ans) a

Exp) Option a is the correct answer

Statement 1 is correct: This assumption is supported by the passage. The passage states that warmer winters with less snow result in a longer lag time between spring events and a more protracted vernal window.. It suggests that the timing of spring events is being affected. Therefore, assumption 1 is correct.

Statement 2 is incorrect This assumption is not supported by the passage. The passage mentions that as the ice melts earlier, the birds do not return, causing a delay or lengthening in springtime ecological events. But nowhere mentions it is not good for the birds. Therefore, assumption 2 is incorrect.

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 to cropland goes into the harvested crop while 60 per cent is lost to the environment, says a 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 including forms of pollution, nitrogen eutrophication of lakes and rivers and contamination of river water.

Q.72) 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 organic farming.

Ans) a

Exp) Option a is the correct answer.

Option a is correct: The most logical, rational, and crucial message implied by the passage is option a. The message aligns with the information provided in the passage, which highlights the negative consequences of using excessive fertilizers containing synthetic nitrogen. The passage emphasizes that the current global average for nitrogen use efficiency is low, with only 40% of the nitrogen added to cropland being utilized by the harvested crop. The remaining 60% is lost to the environment, contributing to pollution of waterways and air. The excessive nitrogen leads to the emission of nitrous oxide, a potent greenhouse gas, and causes other forms of pollution, such as eutrophication of lakes and rivers.

Option b is incorrect: It suggests that the production of synthetic nitrogen fertilizers cannot be stopped without adversely affecting global food security. While synthetic nitrogen fertilizers are currently necessary to achieve high crop yields, the passage does not explicitly mention that their production should be stopped. Instead, it emphasizes the need for enhanced efficiency in their use.

Option c is incorrect: It suggests identifying and cultivating alternatives to crops that require excess nitrogen. While this may be a valid approach to reducing nitrogen pollution, the passage does not specifically advocate for this solution. It focuses more on the need for improved nitrogen use efficiency rather than replacing specific crops.

Option d is incorrect: It proposes replacing conventional agriculture that uses synthetic fertilizers with agroforestry, agroecosystems, and organic farming. While these alternatives may contribute to reducing nitrogen pollution and promoting sustainable agriculture, the passage does not explicitly advocate for their complete replacement. It primarily emphasizes the importance of enhancing nitrogen use efficiency

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 principles 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.

Q.73) 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.

Ans) a
Exp) Option a is the correct answer
Option a is correct: It focuses more on the implementation of climate justice in future agreements.
Option b is incorrect: Environmental resources are unevenly distributed and exploited across the globe is a general statement about the distribution and exploitation of environmental resources. While this may be a relevant point, it does not capture the central message of the passage regarding the impending issue of dealing with climate change victims.
Option c is incorrect: The passage discusses the concept of climate justice and its implications in the context of climate change.
Option d is incorrect: It is an argument about the responsibility of developed countries in climate change. While the passage briefly mentions the wider notion of support for adaptation, compensation, and burden-sharing, it does not explicitly state that developed countries should bear a greater burden.

Q.74) 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 5% annual rate of interest, then which one of the following is correct?
a) R-S
b) R>S
c) R<S
d) R<=S

Ans) c
Exp) Option c is the correct answer.
When interest is compounded half-yearly, the effective annual rate of interest is higher than the stated annual rate of interest. This is because the interest is earned on interest, which results in a higher overall return.
When interest is compounded annually, the effective annual rate of interest is equal to the stated annual rate of interest. This is because the interest is only earned on the principal amount, and not on the interest that has been earned.

Therefore, when the principal P becomes Q in 1 year when compounded half-yearly with R% annual rate of interest, the effective annual rate of interest is greater than R%. When the same principal P becomes Q in 1 year when compounded annually with s % annual rate of interest, the effective annual rate of interest is equal to s%.

Since the effective annual rate of interest is higher when interest is compounded half-yearly, R must be less than S.

Q.75) 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

Ans) d
Exp) Option d is the correct answer
To find the number of natural numbers that give a remainder of 31 when 1186 is divided by them, we need to find the factors of the difference between 1186 and 31.
Difference = 1186 - 31 = 1155
Now, we find the factors of 1155. The factors of 1155 are: 1, 3, 5, 7, 11, 15, 21, 33, 35, 55, 77, 105, 165, 231, 385, 1155.
Out of these factors, we need to exclude 1 since every natural number is divisible by 1. Therefore, we have 15 factors remaining.
However, we are looking for the natural numbers that give a remainder of 31 when divided by these factors. The factors 3, 5, 7, 11, 15 and 21 do not satisfy this condition.
Therefore, the natural numbers that give a remainder of 31 when 1186 is divided by them are 33, 35, 55, 77, 105, 165, 231, 385 and 1155
Thus, the correct answer is Option d

Q.76) 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:
1. The number of possible values of p is 5.
2. 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

Ans) c
Exp) Option c is the correct answer.
For better explanation kindly refer the live discussion of the paper.

Q.77) 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

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d) 9238

Ans) a

Exp) Option a is the correct answer

There are only 6 Four digit numbers less than 2000 formed by digits 1, 2, 3 and 4 such that no digit is repeated. The numbers are 1234, 1243, 1324, 1342, 1423 and 1432.

The sum of the above numbers are 1234 + 1243 + 1324 + 1342 + 1423 + 1432 = 7998

Thus option a is the correct answer.

Q.78) 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

Ans) c

Exp) Option c is the correct answer

To calculate the number of selections of 10 consecutive things out of 12 things in a circle taken in the clockwise direction, we can use the concept of combinations.

When selecting 10 consecutive things in a circle, we can start from any of the 12 things and count 10 items in the clockwise direction. Since the circle is symmetric, starting from any point will give us the same set of 10 consecutive items.

Therefore, the number of selections is equal to the number of starting points we can choose. In this case, we have 12 possible starting points (each of the 12 things can be the first item in the selection).

Hence, the correct answer is c) 12, as there are 12 possible selections of 10 consecutive things out of 12 things in a circle taken in the clockwise direction.

Q.79) If today is Sunday, then which day is it exactly on 1010 th day?

a) Wednesday

b) Thursday

c) Friday

d) Saturday

Ans) b

Exp) Option b is the correct answer

To determine the day after 10^{10} days, we need to find the remainder when 10^{10} is divided by 7 (the number of days in a week). This is because after every 7 days, the days repeat in a cycle.

Let's calculate the remainder:

10^{10} mod 7 = 4

Since today is Sunday (the first day of the week), we add the remainder to Sunday to find the day after 10^{10} days:

Sunday + 4 = Thursday

Therefore, Option b is the correct answer

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Q.80) 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 pm, 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 pm

Ans) b

Exp) Option b is the correct answer

The time it takes for the three signals to change color from green to red and then from red to green is 25 seconds, 39 seconds, and 60 seconds, respectively. The durations for green and red colors are the same, so the time it takes for the three signals to change color from green to green is 50 seconds, 78 seconds, and 120 seconds, respectively.

To find the duration after which they will together turn green we need to find the LCM of (50, 78, 120)

Prime factorization of the numbers:

$50 = 2 × 5 × 5$

$78 = 2 × 3 × 13$

$120 = 2 × 2 × 2 × 3 × 5$

LCM(50, 78, 120) $= 2 × 2 × 2 × 3 × 5 × 5 × 13 = 7800$

The least common multiple of these three numbers is 7800 seconds, which is 2 hours and 10 minutes.

Therefore, the next time the three signals will change to green simultaneously is at 4:10 p.m.