AIMCAT 2007
VARC

for questions 1 to 5: The passage given below is accompanied by a set of five questions. Choose the best answer to each question.

The credit crunch has forced people to rethink their assumptions about business, the roles of the individual in the larger system, and the very future of the system itself. These reflections are beginning to bear fruit. There's a shift from the old, linear transaction-based approach to business toward a new, circular view, in which shared resources can better benefit all in a way that adds depth (and value) to this future economy. Economists describe this new model in many ways. One way is to use human cellular structures as a metaphor for economic growth. Call it cellular economic theory.

...Well, consider that cells that grow continually and exponentially, like we've been taught our economies should grow, are a form of cancer ... It's likewise unsustainable in business. But that's our current model – to just keep growing. There's no alternative to growth, only stagnation which leads to death. This results in policy at every level (micro, macro, corporate and public) that champions growth at all costs.

Cellular economic theory suggests an alternative to linear growth: circular growth. In the body, cells grow. Cells die. New cells grow. New cells die. On and on. We sustain ourselves through regeneration. In business, a form of staged, regenerative growth could become the norm. The growth may not even change the size of the "economic body."

Here, growth is not seen as the ultimate by-product of an economic life cycle, but just an important one. Growth becomes one of several lifecycle stages that are primarily about replenishment. Instead

of growing in size and scope, companies grow in capabilities, processes and offerings. New ones come along. Old ones die. Growth becomes regenerative – what needs replacing is replaced, reducing waste and improving society.

For example, a brewery in India is using cellular economic thinking to grow its bottom line without producing and selling more beer. Instead, it's using chaff and grain detritus to create fertilizer and biofuels – regenerating resources to lower their own production costs while widening the life cycles of their inputs…

In a cellular economy, key metrics change. GDP growth is less important than GDP regeneration. Successful growth takes into account the sustainability of that growth. The most profound change is the devaluation of the transaction. Today, economic value is determined primarily by the value of the transaction. To grow, we must keep trading, keep consuming – no matter how wasteful the process becomes – because success is creating more transactions. This keeps us locked into a linear, growth-oriented paradox.

Fortunately, the Internet is exposing the impossibility of sustaining a transaction-based economy. As it drives the cost of certain goods and services toward zero, it strips profit from transactions. In publishing, for example, the cost of information is falling while sources multiply. Same for music and other creative enterprises. Same for micro-lending versus traditional banking. Fashion and retail. Oil. The Internet is obviating the need for the middleman between the natural resource and the end consumer. And, in place of transactions and supply chains (which are, essentially, a series of middlemen), communities are gaining leverage and power from these shared commodities like news and gas. We are realizing all systems are like biological systems – even economic ones. Growth-at-all-costs business is malignant. It's time to apply that broad realization in new ways to the situation at hand.

Q1. Which of the following is true in case of linear growth?

a) Shared resources are used to benefit all.

b) There is a continuous cycle of growth and death.

c) There is no alternative to growth.

d) Regenerative growth is the norm.

Number of words and Explanatory notes for RC:

Number of words: 549

Linear transactions can be understood from: '*Today, economic value is determined primarily by the value of the transaction. To grow, we must keep trading, keep consuming – no matter how wasteful the process becomes – because success is creating more transactions. This keeps us locked into a linear, growth-oriented paradox.*'
Option A: Shared resources to benefit everyone is more a characteristic feature of circular growth and not linear growth. Hence, Option A is not the answer.
Option B: A continuous cycle of growth and death is again a feature of circular growth. Linear growth is all about growing. Hence, Option B is not the answer.
Option C: This is true and can be understood from '*To grow, we must keep trading, keep consuming – no matter how wasteful the process becomes*'. Hence, Option C is the answer.
Option D: Regenerative growth is the norm in case of circular growth where growth is not continuous and linear. Rather it is about cutting down on wastage. Hence, Option D is not the answer. Choice (C)

Q2. Which of the following statements will the author agree with about the role of the Internet in the economy?

a) The Internet makes the natural resource more directly accessible to the end consumer.

b) The Internet drives up the cost of certain goods and services.

c) The Internet makes transactions more profitable.

d) The Internet strips communities of leverage through shared commodities.

Number of words and Explanatory notes for RC:

Number of words: 549

Consider the following sentences: '*Fortunately, **the Internet is exposing the impossibility of sustaining a transaction-based economy**. As it **drives the cost** of certain goods and services **toward zero**, it **strips profit from transactions**. In publishing, for example, the cost of information is falling while sources multiply. Same for music and other creative enterprises. Same for micro-lending versus traditional banking. Fashion and retail. Oil. **The Internet is obviating the need for the middleman** between the natural resource and the end consumer. And, in place of transactions and supply chains (which are, essentially, a series of middlemen), communities are gaining leverage and power from these shared commodities like news and gas.*'

Option A: The internet is obviating (getting rid of) the middleman between the natural resource and the end consumer. So, it can be said that the internet makes the natural resource more directly accessible to the end consumer. Option A is the answer.

Option B: The internet doesn't ***drive up*** (increase) the cost of certain goods and services. It drives the cost toward zero. Hence, Option B is not the answer.

Option C: The internet strips (removes) profits from transactions. It doesn't make transactions more profitable. Hence, Option C is not the answer.

Option D: Because of the internet, communities have greater leverage over commodities since the middleman has been eliminated. Hence, Option D is not the answer.

Choice (A)

Q3. Which of the following best explains the paradox the author points to in the penultimate para of the passage?

a) Only linear transactions lead to growth.

b) For one company to grow, another has to die.

c) Instead of growing in capabilities, companies are growing in size and scope.

d) There's no alternative to growth, only stagnation which leads to death.

Number of words and Explanatory notes for RC:

Number of words: 549

Consider the sentences: '*Today, economic value is determined primarily by the value of the transaction. To grow, we must keep trading, keep consuming – no matter how wasteful the process becomes – because success is creating more transactions. This keeps us locked into a linear, growth-oriented paradox.*' Linear growth is continuous. In doing so, it is also wasteful. That is the paradox – the contradiction.
Option A: This option doesn't depict the paradox since only one side of it has been mentioned – the growth. The other facet of it, the wastage, has not been mentioned. Hence, Option A is not the answer.
Option B: The author hasn't discussed competition in linear growth. Linear growth overall is a wasteful process where in order to grow consumption has to be kept up. Hence, Option B is not the answer.
Option C: This is true for linear growth. However, this is not a paradox as only one side of the story is being mentioned. Companies grow in size and shape. What makes this a paradox is that they have to grow not as a positive change but as a way of surviving. Hence, Option C is not the answer.
Option D: This is the paradox being spoken about, that companies do not have an alternative to growth, that growth has become a compulsion and that, the only alternative is stagnation and death. Such a compulsion makes growth an unattractive proposition, and that explains the paradox – the growth that leads to something negative. Hence, Option D is the answer. Choice (D)

Q4. The author mentions the example of a brewery in India to demonstrate that

a) there is an alternative to linear growth.

b) regenerating resources can lower the production costs of companies.

c) wider lifecycles are more environment friendly.

d) companies focusing on higher outputs cause more wastage.

Number of words and Explanatory notes for RC:

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Option A: We cannot really infer that the internet plays a pivotal role in the propagation of regenerative circular growth/cellular growth. Yes, it helps strip transactions of value and cuts off the middleman and empowers communities. But, there is nothing in the passage that confirms that circular growth is not possible without the internet. Hence. Option A is the answer.
Option B: This can be understood from the following sentence: 'The growth may not even change the size of the "economic body."' Circular growth doesn't increase the size of the output/business but improves the efficiency. Hence, Option A is not the answer.
Option C: 'Taking a back seat' is being less important. This can be understood from the following sentence: '*In a cellular economy, key metrics change. GDP* ***growth is less important than GDP regeneration.***' Hence, Option C is not the answer.
Option D: Cellular growth replaces linear growth where economic value is determined by the value of the transaction. This can be understood from – '*Today, economic value is determined primarily by the value of the transaction.*' So, in cellular theory, the value of a transaction is not an influencing factor for economic value, as it is stripped of profit and the cost of goods and services is driven to zero. Hence, Option D is not the answer.

Choice (A)

Which of the following does the cellular economic theory not encompass?

a) Internet plays a pivotal role in the propagation of circular growth.

b) Growth doesn't enlarge the economic body.

c) Growth takes a back seat to regeneration.

d) The value of transactions is no more a determinant of economic value.

Number of words and Explanatory notes for RC:

Number of words: 549

Consider the following sentences: '*Here, **growth is not seen as the ultimate by-product of an economic life cycle**, but just an important one. … Instead of growing in size and scope, **companies grow in capabilities**, processes and offerings. New ones come along. Old ones die. **Growth becomes regenerative** – what needs replacing is replaced, reducing waste and improving society. **For example**, a brewery in India is using cellular economic thinking to grow its bottom line without producing and selling more beer…'*

Option A: This is the point the author was trying to make, that growth need not always be linear, and it can be seen in other ways – improvement of capabilities, processes and offerings, and reducing waste. Hence, Option A is the answer.

Option B: While this is true for the brewery, this is not the purpose of mentioning the example. The author isn't discussing resources and regenerating them. The idea for which the brewery was mentioned is a bigger one – that growth is becoming regenerative. Production cost is a much smaller idea, albeit a part of this bigger idea. Hence, Option B is not the answer.

Option C: While the author does talk about widening lifecycles, no connection has been made between that and being environment friendly, explicitly. Just a passing mention. Also, being environment friendly, vaguely mentioned, is one of the advantages of regenerative growth. That is not the author's central focus area though. Hence, Option C is not the answer.

Option D: The brewery is a classic case of a company that keeps its output constant and improves the bottom-line. So, this option is incoherent with that angle. Hence, Option D is easy to eliminate. Choice (A)

for questions 6 to 10: The passage given below is accompanied by a set of five questions. Choose the best answer to each question.

[It's] nearly 30 years since the Chernobyl plant exploded and caused an unprecedented nuclear disaster... Although no people live in the extensive exclusion zones around the epicenter, animals and plants still show signs of radiation poisoning.

Birds around Chernobyl have significantly smaller brains than those living in non-radiation poisoned areas; trees there grow slower; and fewer spiders and insects – including bees, butterflies and grasshoppers – live there. Additionally, game animals such as wild boar caught outside of the exclusion zone continue to show abnormal and dangerous levels of radiation.

However, there are even more fundamental issues going on in the environment. According to a new study published in Oecologia, decomposers – organisms such as microbes, fungi and some types of

insects that drive the process of decay – have also suffered from the contamination. These creatures are responsible for an essential component of any ecosystem: recycling organic matter back into the soil. Issues with such a basic-level process, the authors of the study think, could have compounding effects for the entire ecosystem.

… [T]rees in the infamous Red Forest – an area where all of the pine trees turned a reddish color and then died shortly after the accident – did not seem to be decaying, even 15 to 20 years after the meltdown.

“Apart from a few ants, the dead tree trunks were largely unscathed when we first encountered them,” says Timothy Mousseau, a biologist at the University of South Carolina, Columbia, and lead author of the study. “It was striking, given that in the forests where I live, a fallen tree is mostly sawdust after a decade of lying on the ground.”

… Mousseau and his colleagues decided to run some field tests… they created around 600 small mesh bags and stuffed them each with leaves, collected at an uncontaminated site, from one of four different tree species: oak, maple, birch or pine. They took care to ensure that no insects were in the bags at first, and then lined half of them with nylon to keep insects from getting in from the outside, unlike the wider mesh-only versions.

…[They] then scattered the bags in numerous locations throughout the exclusion zone, all of which experienced varying degrees of radiation contamination (including no contamination at all). They left the bags and waited for nearly a year – normally, an ample amount of time for microbes, fungi and insects to make short work of dead organic material, and the nylon-lined bags could help them assess whether insects or microbes were mainly responsible for breaking down the leaves.

The results were telling. In the areas with no radiation, 70 to 90 percent of the leaves were gone after a year. But in places where more radiation was present, the leaves retained around 60 percent of their original weight. By comparing the mesh with the nylon-lined bags, they found that insects play a significant role in getting rid of the leaves, but that the microbes and fungi played a much more important role…“The gist of our results was that the radiation inhibited microbial decomposition of the leaf litter on the top layer of the soil,” Mousseau says. This means that nutrients aren’t being efficiently returned to the soil, he adds, which could be one of the causes behind the slower rates of tree growth surrounding Chernobyl…

Q6. All of the following are direct consequences of radiation poisoning around Chernobyl plant as suggested in the passage EXCEPT:

a) An adverse impact on the size of the brains of birds

b) Lack of vital nutrients in the soil

c) Fewer numbers of insects like grasshoppers, bees and butterflies

d) Slower microbial decomposition of trees

Number of words and Explanatory notes for RC:

Number of words: 548

Consider the sentences: '*Birds around Chernobyl have significantly smaller brains than those living in non-radiation poisoned areas; trees there grow slower; and fewer spiders and insects – including bees, butterflies and grasshoppers – live there.*'
Option A: From '*Birds around Chernobyl have significantly smaller brains than those living in non-radiation poisoned areas*', we can understand that this is a direct consequence of radiation poisoning in areas surrounding Chernobyl plant. Option A is not the answer.
Option B: Because of the inhibited microbial decomposition nutrients are not effectively returned to the soil. That could bring down the nutrient content of the soil. However, lack of vital nutrients in the soil in itself has not been mentioned as a direct consequence of the radiation poisoning. Option B is the answer.
Option C: From '*fewer spiders and insects – including bees, butterflies and grasshoppers – live there*', we can clearly say that this option indicates a direct consequence of radiation poisoning. Hence, Option C is not the answer.
Option D: Slower microbial decomposition of trees is a result of the impact of radiation on microbes. This can be understood from '*organisms such as microbes, fungi and some types of insects that drive the process of decay – have also suffered from the contamination.*' Hence, Option D is not the answer. Choice (B)

Q7. Which of the following cannot be understood regarding the field tests run by Mousseau and his colleagues?

a) Nylon-lined bags were used to measure microbial activity without insect interference.

b) Mesh-lined bags demonstrated the total decomposition activity caused by insects and microbes together.

c) Insects are less effective in breaking down leaves when there weren't any microbes.

d) Decomposition of leaf litter was directly proportional to the radiation levels in the forest.

Number of words and Explanatory notes for RC:

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Option A: The nylon-lined bags kept the insects out. That means all the decomposition was caused by microbes. Hence, Option A can be understood to be true about the field tests. Option A is not the answer.
Option B: Mesh-lined bags didn't keep the insects out. Therefore, any decomposition in such bags was due to the insects as well as due to the microbes. Option B is not the answer as it can be understood to be true about the field test.
Option C: This is a logical fallacy. While the decomposition rate drastically fell in the absence of microbes, no connection has been established between the efficacy of insects causing the decomposition of leaves and the presence of microbes. They are independent parameters. Hence, Option C is the answer.
Option D: More the radiation level, less the microbial decomposition of the leaf litter. So, decomposition of leaf litter was directly proportional to the radiation contamination levels. Option D is true. It is not the answer. Choice (C)

Q8. Which of the following, if true, will invalidate the conclusion of the study conducted by Mousseau and his colleagues?

a) In areas with no radiation, the decomposers are generally as active as the insects.

b) In radiation-prone areas, insects were less active than the decomposers.

c) In radiation-affected areas, insects helped recycle nutrients better than microbes did.

d) Radiation-prone areas, where trees register slower growth, were found to have nutrient-rich soil.

Number of words and Explanatory notes for RC:

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The conclusion of Mousseau's study can be understood from the following: '"***The gist*** *of our results was* ***that the radiation inhibited microbial decomposition of the leaf litter on the top layer of the soil***," *Mousseau says.* ***This means that nutrients aren't being efficiently returned to the soil, he adds, which could be one of the causes behind the slower rates of tree growth surrounding Chernobyl***…'
Also, it has been mentioned that decomposers are ***organisms such as microbes, fungi and some types of insects that drive the process of decay.***
Option A: This if proven will further strengthen the findings of the study by showing that radiation has, in fact, influenced the activity of decomposers. Such a statement will therefore, not invalidate the results.
Option B: Reduced activity of the insects doesn't affect the results/findings/conclusions of the study in any way as the study is about the activity of decomposers, not insects. Hence, Option B is not the answer.
Option C: Insects helping recycle nutrients better in areas with more radiation, does not in any way, affect the findings of the study about the microbial activity - the study specifying that microbial activity goes down in radiation-prone areas. Hence, Option C is not the answer.
Option D: This shows that the slower growth of trees was despite the nutrient content in the soil. This contradicts the conclusion of the study that the slow growth rate of trees was because nutrients weren't efficiently returned to the soil. This option will invalidate the conclusion of the specified study. Option D is the answer.

Choice (D)

Q9. It can be inferred from the last para of the passage that:

a) tree growth is dependent on the level of microbial decomposition in an area.

b) there is more dead-leaf litter in forests with no radiation.

c) more nutrients are left in the soil in radiation-prone areas because of absence of growth.

d) leaves decompose not because of insects but entirely because of microbes.

Number of words and Explanatory notes for RC:

Number of words: 548

Consider the sentences: '*The gist of our results was that the radiation inhibited microbial decomposition of the leaf litter on the top layer of the soil," Mousseau says. This means that nutrients aren't being efficiently returned to the soil, he adds, which could be one of the causes behind the slower rates of tree growth surrounding Chernobyl…*'

Option A: Since, the lack of nutrients according to the author could be one of the ***causes behind the slower rates of tree growth***, we could infer that tree growth depends on microbial decomposition which returns nutrients back to the soil. Option A is the answer.

Option B: Areas with more radiation will have less microbial decomposition and hence, more leaf litter. On the other hand, if there is no radiation, there will be very little leaf litter as the microbes help in decomposition of the dead leaves. Hence, Option B is not the answer.

Option C: Radiation-prone areas have limited microbial decomposition because of which nutrients are not returned to the soil. So, it cannot be inferred that more nutrients are left in the soil in such areas. Option C is not the answer.

Option D: The para clearly says that microbes are more responsible than insects are for decomposition. That doesn't however, imply that only microbes cause the decomposition, since insects contribute to a certain extent. Option D is not the answer.

Choice (A)

Q10. The condition of the pine trees in the Red Forest area is mentioned to indicate that:

a) pine trees turn red in areas contaminated by radiation.

b) radiation causes dead trees to decay within 15 to 20 years.

c) pine trees die because of radiation.

d) radiation affects the ecosystem at a basic level.

Number of words and Explanatory notes for RC:

Number of words: 548

Consider the sentences: *'[T]rees in the infamous Red Forest – an area where all of the **pine trees turned a reddish color and then died shortly after the accident** – **did not seem to be decaying,** even 15 to 20 years after the meltdown...was striking, given that in the forests where I live, **a fallen tree is mostly sawdust after a decade** of lying on the ground.'*

Option A: The example of the pine trees was given to demonstrate the absence of decaying in contamination-affected areas rather than to show that the effect of the contamination on pine trees. This can be understood from the underlined sentences above, where ***what was striking was that the fallen trees don't seem to be decaying.*** Hence, Option A is not the answer.

Option B: The dead trees weren't decaying because of the absence of microbial decomposition. So, this option contradicts the content of the passage. Option B is not the answer.

Option C: The death of the pine trees is the premise of the argument. However, the focus was not on the fact that the pine trees were dead. Rather, it was about the fact that the pine trees had not decayed. Hence, Option C is not the answer.

Option D: The example was to demonstrate how the decaying wasn't happening which indicates the adverse effects of radiation at a basic-process level. This is the right answer as it indicates why the author brought the example of a forest where fallen trees didn't seem to be decaying. Option D is the answer. Choice (D)

DIRECTIONS *for questions 11 to 15*: The passage given below is accompanied by a set of five questions. Choose the best answer to each question.

To critics, predicting cryptocurrencies' value is like flipping a coin. Volatility is so high, they say, that a buyer might as well place a wager at a casino. Others see a more direct cause for daily price movements of virtual money: changes in the supply of tokens. And when the company that makes those tokens is suspected of fraud, the casino itself trembles.

Rumours have long swirled about the bona fides of Tether, a four-year-old cryptocurrency, and of Bitfinex, the exchange on which it is traded. New York's attorney-general, Letitia James, accused both of a cover-up intended to hide a $850m loss in client and corporate funds. Tether slid just 1.4% against the dollar, but … virtual currencies, at large, suffered more, with some $10bn wiped off their collective value within an hour of the attorney-general's statement…

The shockwave is caused by Tether's unique status. Its issuer, also called Tether, is the central bank of the crypto world... Many cryptocurrency exchanges struggle to obtain bank accounts, because the market's opacity makes it hard to keep tabs on flows of funds or to detect money-laundering. That makes lenders nervous. For those exchanges, Tether acts as a dollar substitute. Like fiat, as cryptocurrency buffs call government-issued money, it is pegged to hard currency, which is meant to insulate it from the worst of the volatility experienced by its anchorless peers. Traders use it as a common currency. Unhindered by regulation and the slowness of bank clearing, Tether flows quickly and easily between exchanges.

Tether is not the only "stablecoin" – a cryptocurrency designed to hold a steady price - but it is vastly dominant, representing 96% of daily trading volumes in that category. The currency's wide acceptance is its strength – and a worry for everyone else … Tether justifies the peg saying that every coin issued is backed by a real dollar in a real bank account but has provided no audit of these hard-currency holdings.

The allegations will provide doubters some relief – and more reasons to worry. Because Bitfinex was having trouble getting accounts at banks, the exchange operator used a Panamanian firm, Crypto Capital, as an intermediary to wire dollars to traders, Ms James says. She claims that last year Bitfinex entrusted over $1bn to Crypto Capital, "without any written contract or assurance". When $850m of that went missing, Bitfinex sought to cover up the problem through "a series of conflicted corporate transactions" – giving itself access to up to $900m from a Tether account which the currency issuer had told investors "backed the tether virtual currency 1-to-1". (Tether and Bitfinex share the same managers and owners). She concluded that the stash of cash supposed to back Tether did exist – but that it could easily be used for other purposes without customers knowing…

[Unlike] a few years ago, [the accusations] are likely to cause no more than a short-term blip…Some 30 stablecoins are under development, with a handful operational. Many submit to know-your-customer and money-laundering checks by national regulators. TrueUSD, another dollar-pegged stablecoin, holds collateral funds in an external trust; Eidoo, whose stablecoin is backed by gold, lets customers monitor the precious metal via webcam in the vaults where it is stored. Rivals' whole market proposition is that they are not Tether…The stablecoin pioneer's fall from grace will probably make the cryptocurrency market more stable, not less.

Q11. The author's main argument in the passage is that

a) Cryptocurrency trading is always loaded with the risk of volatility.

b) Cryptocurrency markets do not have stringent regulations and checks and balances.

c) Cryptocurrencies do not maintain the collateral funds they are expected to keep.

d) The usually volatile cryptocurrency markets are evolving to get less risky.

Number of words and Explanatory notes for RC:

Number of words: 555

Option A: While this is the note on which the author starts the passage, the ending note is a little different, a hint of optimism. This can be understood from '*The stablecoin pioneer's fall from grace will probably make the cryptocurrency market more stable, not less.*' Also 'always loaded with the risk of volatility' is an extrapolation.
Option B: This has been implied but it is not the predominant theme of the passage which also talks about the new stablecoins apart from Tether. Hence, Option B is not the answer.
Option C: While some of them don't, some of them do and there are examples of both. One way or the other, this is not the overarching theme of the passage and is more a side note. Hence, Option C is not the answer.
Option D: This is the central theme of the passage, which goes on from introducing the risk in cryptocurrency markets to how the status quo is changing gradually because of Tether's fall of grace. Hence, Option D is the answer. Choice (D)

Q12. Tether claims steadiness of its 'stablecoin' owing to the fact that

a) it is unhindered by regulation and slowness of bank clearing.

b) every unit of the cryptocurrency is backed by a real dollar in a real bank account.

c) it represents 96% of daily trading volumes in cryptocurrency.

d) it was designed to avoid the volatility of the government-issued money.

Number of words and Explanatory notes for RC:

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Option A: Being unhindered by regulation and slowness of bank clearing adds to the popularity of Tether. However, that has got nothing to do with Tether being called a stablecoin – a cryptocurrency designed to hold a steady price. Hence, Option A is not the answer.
Option B: This is what helps cryptocurrency stay away from volatility – the pegging with hard currency. This can be understood from '*Like fiat, as cryptocurrency buffs call government-issued money,* ***it is pegged to hard currency, which is meant to insulate it from the worst of the volatility*** *experienced by its anchorless peers. Traders use it as a common currency.*' Hence, Option B is the answer.
Option C: The trading volume is what worries the doubters, but that isn't the cause of Tether being the 'stablecoin'. It is the other way around. Tether being pegged to hard currency makes it more reliable for cryptocurrency traders. Hence, Option C is not the answer.
Option D: We are only discussing the volatility of Tether's 'anchorless peers' meaning other cryptocurrencies. It is not being compared with government-issued currency. Hence, Option D is not the answer. Choice (B)

Q13. The author feels that the 'stablecoin pioneer's fall from grace' will probably make the cryptocurrency market more stable owing to the fact that

a) there are 30 other stablecoins under development.

b) other stablecoins now submit to auditing of hard-currency holdings.

c) other stablecoins do not have the trading volumes that Tether enjoyed.

d) other stablecoins follow practices which are more transparent than those of Tether.

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Option A: The number is not so important. It has more to do with the fact that the others would probably avoid being as risky/opaque as Tether. So, Option A is not the answer.
Option B: This may be one example of how a stablecoin can gain trust. However, this has not been explicitly mentioned. Also, it is not just about auditing. There are a lot of other things involved – that made Tether slightly risky in the eyes of the doubters. Hence, Option B is not the answer.
Option C: The trading volumes were before Tether's fall from grace. The author doesn't mention the influence of the allegations on the numbers. Hence, Option C is not the answer.
Option D: This is the reason the author thinks the stablecoin pioneer's (Tether) fall from grace will probably make the cryptocurrency market more stable. Some examples include: '*TrueUSD, another dollar-pegged stablecoin, holds collateral funds in an external trust; Eidoo, whose stablecoin is backed by gold, lets customers monitor the precious metal via webcam in the vaults where it is stored.* ***Rivals' whole market proposition is that they are not Tether***.' So, it can be understood that the author believes, the rivals have better practices thanks to the Tether controversy which is for the good. Hence, Option D is the answer. Choice (D)

Q14. The author feels that 'the allegations' against Tether 'will provide doubters some relief' because

a) they have been vindicated after proof of misuse of funds has been unearthed.

b) Tether was probably right about its claim that every coin issued is backed by a real dollar.

c) Tether will now be forced to prove its hard-currency holdings.

d) the allegations will help curb Tether's influence in the cryptocurrency market.

Number of words and Explanatory notes for RC:

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This can be understood from the following sentences: '*The currency's wide acceptance is its strength – **and a worry for everyone else** … Tether justifies the peg saying that every coin issued is backed by a real dollar in a real bank account, but has provided no audit of these hard-currency holdings. **The allegations will provide doubters some relief** – and more reasons to worry.*' So, it can be understood that the relief is largely with respect to the worry mentioned earlier (underlined above). The original worry was that doubters wondered if Tether coins were indeed backed by real dollars. The allegations prove that there are indeed dollars in the bank (allegation was about those dollars being misused – hence the new worry).

Option A: This is not apt since the doubters worried about real funds in real accounts being present. But if the allegations were true, it must mean that the doubters were wrong, and that there was actual money. So, this is not the answer.

Option B: This is why it brought relief, because the doubt is addressed, and it was proven that Tether's claim was true. If the allegations were true, then it meant Tether actually backed its coins with real dollars. Hence, Option B is the answer.

Option C: Tether didn't submit to the audit of its hard currency holdings leading to speculation that its claims about cryptocurrency coins being backed by real dollars may not be true. The author hasn't mentioned that Tether will be forced now. Hence, Option C is not the answer.

Option D: That influence of Tether, while being a worry, had nothing to do with the doubters. It was more about the enormous percentage Tether captured of the market. And the passage doesn't mention about how much that percentage will be affected or how much the doubters hope it will be affected (if their relief was about this). Hence, Option D is not the answer. Choice (B)

Q15. The author discusses the analogy of a casino to explain that

a) cryptocurrency trading exchanges are as fraudulent as casinos.

b) the volatility of cryptocurrencies makes their exchanges vulnerable to fraud.

c) the authenticity of cryptocurrencies is as doubtful as those of casino tokens.

d) critics equate trading in cryptocurrencies with gambling.

Number of words and Explanatory notes for RC:

Number of words: 555

Consider the sentences: '*To critics, predicting cryptocurrencies' value is like flipping a coin. Volatility is so high, they say,* ***that a buyer might as well place a wager at a casino****. Others see a more direct cause for daily price movements of virtual money: changes in the supply of tokens. And when the company that makes those tokens is suspected of fraud, the* ***casino itself trembles****.'*

Option A: No opinion/innuendo about whether casinos are fraudulent has been made, neither is the author asserting that cryptocurrencies or their exchanges are fraudulent. The author merely explains the impact of allegations on a company that offers cryptocurrencies. Hence, Option A is not the answer.

Option B: The volatility and the vulnerability of cryptocurrencies to fraud by an external party have not been connected or even spoken about in the para. Hence, option B is not the answer.

Option C: The author simply used a casino analogy to explain the risk factor of cryptocurrencies. That is not to suggest that cryptocurrencies function like casino tokens, quite literally. Nor is the author talking about authenticity here. Hence, Option C is not the answer.

Option D: This is the reason the casino was mentioned. Cryptocurrencies ***according to the critics*** are so volatile and hence, unpredictable that trading in them has been equated to gambling (nothing to do with fraud or fraudulent practices). Hence, Option D is the answer. Choice (D)

DIRECTIONS *for questions 16 to 20*: The passage given below is accompanied by a set of five questions. Choose the best answer to each question.

Humans can make fresh brain cells until they are well into their 90s, but the production of new neurons falls in those with Alzheimer's, even when the disease has recently taken hold, scientists have found. The findings may help doctors diagnose Alzheimer's at an earlier stage, and identify those most at risk, who may benefit from exercise and other interventions that could boost the production of new brain cells.

The work is the latest on an issue that has divided neuroscientists for decades, with some arguing [that] humans have their full quota of brain cells by the time they reach adulthood, and others claiming fresh neurons continue to be made into old age. In research that may help settle the matter, scientists in Spain ran a battery of tests on brain tissue donated by 13 individuals who died aged 43 to 87. All were neurologically healthy before their deaths.

María Llorens-Martín, a neuroscientist at the Autonomous University of Madrid and the senior scientist on the study, found that while the healthy brains contained new-born neurons, the number declined steadily with age. Between the ages of 40 and 70, the number of fresh neurons spotted in the part of the brain studied fell from about 40,000 to 30,000 per cubic millimetre.

The new cells were born in the part of the brain called the dentate gyrus. It is a part of the hippocampus which plays a central role in learning, memory, mood and emotion. The gradual reduction in new brain cells appeared to go hand-in-hand with the cognitive decline that comes with old age. It suggests that in the middle age, about 300 fewer neurons per cubic millimetre are made in the dentate gyrus with each advancing year.

The study, published in the journal Nature Medicine, suggests that part of the reason scientists disagree on whether adult brains make fresh neurons is that different tests and tissue processing give different results. “In the same brains we can detect lots of immature neurons or no immature neurons depending on the processing of the tissue,” said Llorens-Martin.

Having studied healthy brain tissue, the scientists went on to look at the brains of people who had been diagnosed with Alzheimer’s before death. This time, the researchers analysed brain tissue from 45 patients aged 52 to 97. All had fresh brain cells in the dentate gyrus, including the 97-year old, the oldest person in which “neurogenesis” has yet been seen. But while the Alzheimer’s patients showed evidence of new brain cell formation, there were stark differences with the healthy brains. Even in the earliest stages of the disease, their brains only had between half and three quarters as many fresh neurons as the healthy ones.

“This is very important for the Alzheimer’s disease field because the number of cells you detect in healthy subjects is always higher than the number detected in Alzheimer’s disease patients, regardless of their age,” Llorens-Martín said. “It suggests that some independent mechanism, different from physiological ageing, might drive this decreasing number of new neurons.” …She said brain scans might one day be able to detect newly formed brain cells and so diagnose Alzheimer’s in its earliest stages…

Q16. The first para of the passage establishes that

a) exercise can help cure Alzheimer’s.

b) production of new brain cells can reverse early-stage Alzheimer's.

c) the presence of fresh brain cells rules out the possibility of Alzheimer's.

d) a drop in the number of fresh brain cells if detected immediately can indicate Alzheimer's.

Number of words and Explanatory notes for RC:

Number of words: 527

Consider the following sentences: '*Humans can make fresh brain cells until they are well into their 90s, but the production of new neurons falls in those with Alzheimer's, even when the disease has recently taken hold, scientists have found. The findings may help doctors diagnose Alzheimer's at an earlier stage, and identify those most at risk, who may benefit from exercise and other interventions that could boost the production of new brain cells.*'

Option A: While Alzheimer's can benefit those most at risk, the author doesn't clearly state that Alzheimer's is cured by exercise. It is possible that the benefit refers to the arrest of Alzheimer's rather than its cure. Hence, Option A is not the answer.

Option B: Production of new brain cells will help with the condition, but there isn't sufficient evidence to say that it is ***reverse early-stage Alzheimer's.*** Hence, Option B is not the answer.

Option C: Fresh brain cells are there even in those who have Alzheimer's. It is the number that will suggest whether there is Alzheimer's. In other words, Alzheimer's can be detected only by observing the drop in the number of fresh neurons (because simply detecting fresh neurons won't rule out Alzheimer's). Option C is not the answer.

Option D: This is true, since the author establishes that '*Humans can make fresh brain cells until they are well into their 90s,* ***but the production of new neurons falls in those with Alzheimer's***'. So, if we can detect the drop, we could diagnose Alzheimer's at a very early stage. Hence, Option D is the answer. Choice (D)

Q17. The author mentions the 97-year old patient in the penultimate para probably to demonstrate that

a) neurogenesis takes place even at the age of 97.

b) there is new brain cell formation in Alzheimer's patients.

c) the brains of Alzheimer's patients have fewer fresh neurons than the healthy ones.

d) generation of fresh brain cells usually stops in older Alzheimer's patients.

Number of words and Explanatory notes for RC:

Number of words: 527

Consider the following sentences: '*This time, the researchers analysed brain tissue from 45 patients aged 52 to 97. All had fresh brain cells in the dentate gyrus, including the 97-year old, the oldest person in which "neurogenesis" has yet been seen. But while the Alzheimer's patients showed evidence of new brain cell formation, there were stark differences with the healthy brains.*'

Option A: This is apt since the author mentions the 97-year old subject to emphasise on the age, also specifying that this is the oldest person in which neurogenesis has been seen. Such a subject case proves that neurogenesis doesn't stop in the old age. Old age only leads to lowering of the number of neurons generated. Hence, Option A is the answer.

Option B: The study was not to prove that there is new brain cell formation in Alzheimer's patients. Rather, it was to demonstrate the drop in numbers. Either way, this option doesn't corelate to the importance of a 97-year old subject. Hence, Option B is not the answer.

Option C: While this has been mentioned by the author, later, it doesn't really highlight the significance of mentioned the age of 97. That Alzheimer's patients have fewer fresh neurons is independent of the age, since it was seen even in patients aged 52. Hence, Option C is not the answer.

Option D: Mentioning the age of 97 would have been counterintuitive if the author had wanted to demonstrate that generation of fresh brain cells usually stops in older patients. In fact, the author clearly mentions that generation of fresh neurons doesn't stop with age. Only the numbers go down. Hence, Option D is not the answer.

Choice (A)

Q18. It can be inferred from the last para of the passage that

a) an independent mechanism which drives the decrease in the number of new neurons has been discovered.

b) brain scans are currently not equipped to detect neurogenesis.

c) presently, we do not have the capability to connect a drop in the numbers of newly formed brains cells with Alzheimer's diagnosis.

d) physiological ageing is also partly responsible for a decreasing number of new neurons.

Number of words: 527

Consider the sentences: '*This is very important for the Alzheimer's disease field because the number of cells you detect in healthy subjects is always higher than the number detected in Alzheimer's disease patients, regardless of their age," Llorens-Martín said. "It suggests that some independent mechanism, different from physiological ageing, might drive this decreasing number of new neurons." …She said brain scans might one day be able to detect newly formed brain cells and so diagnose Alzheimer's in its earliest stages…*'

Option A: That would be a false inference. In Alzheimer's, a drop has been seen in the creation of fresh neurons. We do not quite know what the mechanism is except that it occurs in Alzheimer's. So, it cannot be inferred that such a mechanism has been discovered. Hence, Option A is not the answer.

Option B: This can be inferred from the sentence '*She said brain scans might **one day be able** to detect newly formed brain cells*'. It clearly suggests that we don't currently have brain scans that can detect newly formed brain cells. Hence, Option B is the answer.

Option C: Such an inference is counterintuitive because Alzheimer's and a drop in the count of neurons have already been connected. We don't have scans to detect the drop immediately to diagnose early-stage Alzheimer's. Hence, Option C is not the answer.

Option D: While it has been mentioned in an earlier para that old age is responsible for cognitive decline and drop in count of fresh neurons, such an observation is not possible from the last para of the passage. '*It suggests that some independent mechanism, **different from physiological ageing**, might drive this decreasing number of new neurons.*' This line suggests that there is some other mechanism driving the decreasing number of new neurons. It doesn't suggest in any way that physiological ageing is partly responsible. Hence, Option D is not the answer.

Choice (B)

Q19. The central argument of the passage can be weakened by a study that shows that

a) not all Alzheimer's patients show a dip in the number of immature neurons in the brain compared to healthier people.

b) not all healthy people have the same number of neuron cells generated in their brains at a particular age.

c) the drop in the generation of fresh neurons in the brains of Alzheimer's patients is not uniform.

d) brain scans currently cannot differentiate between immature and mature neurons.

Number of words and Explanatory notes for RC:

Number of words: 527

The central argument in the passage is that based on the latest findings we could say that Alzheimer's is correlated to a drop in the generation of fresh neurons, even though the generation does take place even in old age. So, in order to diagnose Alzheimer's early, our scans need to spot the drop in the count of neurons.
Option A: If a study shows that some Alzheimer's patients don't register a dip in the number of immature neurons (fresh neurons), it goes against the overall argument in the passage which is based on the finding that there is a dip in all Alzheimer's patients. Hence, Option A is the answer.
Option B: Even if there is a difference in the number of neuron cells generated in the brains of healthy people, we cannot make an inference about Alzheimer's patients from that data. Hence, Option B is not the answer.
Option C: Even if the drop is uniform, the original fact stands that there is indeed a drop in the number of fresh neurons in Alzheimer's patients. Hence, Option C will not weaken the argument which is more about differentiating Alzheimer's patients from healthier ones based on the fact that there is a drop from the normal neuron generation in the former. Hence, Option C is not the answer.
Option D: The passage suggests that if we can figure a way of finding the dip, we will be able to detect Alzheimer's at an early stage. So, currently brain scans cannot detect the dip. However, that doesn't weaken the author's argument as that has been mentioned by the author who quotes: 'brain scans might one day be able to…' in the last line. Also, the passage does explain that immature neurons are the new or fresh ones. Option D is not the answer. Choice (A)

Q20. The author mentions that 'in the middle age, about 300 fewer neurons per cubic millimetre are made in the dentate gyrus with each advancing year' to show that

a) memory, mood and emotion are all affected by the neuron count.

b) the hippocampus is responsible for cognitive learning.

c) cognitive decline is a confirmed phenomenon in advancing old age.

d) cognitive decline is correlated to a drop in the number of fresh neurons.

Number of words and Explanatory notes for RC:

Number of words: 527

Consider the sentences: '*The gradual reduction in new brain cells appeared to go hand-in-hand with the cognitive decline that comes with old age. It suggests that in the middle age, about 300 fewer neurons per cubic millimetre are made in the dentate gyrus with each advancing year.*'

Option A: No direct connection has been established by the author between memory, mood and emotion and neuron count. Memory, mood and emotion and hippocampus have been corelated. And cognitive decline and age have been connected. However, the dropping neuron count doesn't particularly show that memory, mood and emotion are connected. That is because there is clear gap between cognitive decline and mood and emotion – something the passage doesn't really connect. Option A is not the answer.

Option B: The hippocampus plays a central role in the memory, mood and emotion, along with cognitive learning. However, that has got nothing to do with the author mentioning the number of neurons and the drop based on age. Hence, Option B is not the answer.

Option C: This is not the effect. This is already known. The author connects drop in cognition and drop in neuron count to conclude that cognition goes down because of drop in neuron count. Hence, Option C is not the answer.

Option D: This is the connection the author wanted to make and therefore, the drop in the neuron count has been mentioned. The author correlates drop in neuron count with advancing age and the decline in cognition around the same time, suggesting that they are both related. Option D is the answer. Choice (D)

DIRECTIONS *for questions 21 to 24*: The passage given below is accompanied by a set of four questions. Choose the best answer to each question.

Sociological understanding leads to a considerable measure of disenchantment. The disenchanted man is a poor risk for both conservative and revolutionary movements; for the former because he does not possess the requisite amount of credulity in the ideologies of the status quo, for the latter because he will be sceptical about the Utopian myths that invariably form the nurture of revolutionaries. Such unemployability in the cadres of either present or future regimes need not, however, leave the disenchanted man in the posture of alienated cynicism. It may do that, to be sure. And we find just such postures among some younger sociologists in this country, who find themselves driven to radical diagnoses of society without finding in themselves the capacity for

radical political commitments. This leaves them with no place to go except to a sort of masochistic cult of debunkers who reassure each other that things could not possibly be worse.

This cynical stance is in itself naive and often enough grounded more in a lack of historical perspective than anything else. Cynicism about society is not the only option besides a credulous conformity to this social aeon or a credulous looking-forward to the one that is to come.

Another option is what we regard as the most plausible one to result from sociological understanding, one that can combine compassion, limited commitment and a sense of the comic in man's social carnival. This will lead to a posture vis-à-vis society based on a perception of the latter as essentially a comedy, in which men parade up and down with their gaudy costumes, change hats and titles, hit each other with the sticks they have or the ones they can persuade their fellow actors to believe in. Such a comic perspective does not overlook the fact that non-existent sticks can draw real blood, but it will not from this fact fall into the fallacy of mistaking the Potemkin village for the City of God.

If one views society as a comedy, one will not hesitate to cheat, especially if by cheating one can alleviate a little pain here or make life a little brighter there. One will refuse to take seriously the rules of the game, except insofar as these rules protect real human beings and foster real human values. Sociological Machiavellianism is thus the very opposite of cynical opportunism. It is the way in which freedom can realize itself in social action.

It was Machiavelli, after all, who wrote half a millennium ago that "there is nothing more difficult to take in hand, more perilous to conduct, or more uncertain in its success, than to take the lead in the introduction of a new order of things." And today, we need nothing less than a new order.

Q21. All of the following can be understood from the first para of the passage EXCEPT:

a) the conservative movements rely on complete belief in the existing conventions.

b) the revolutionary movements rely on the individual's wariness of Utopian ideals.

c) sociological understanding may leave one with a substantial amount of cynicism.

d) sociological understanding is likely to leave individuals too disillusioned to be of any use to the present and future political movements.

Number of words and Explanatory notes for RC:

Number of words: 458

Consider the sentences: '*The disenchanted man is a poor risk for both conservative and revolutionary movements; for the former because he does not possess the requisite amount of credulity in the ideologies of the status quo, for the latter because he will be sceptical about the Utopian myths that invariably form the nurture of revolutionaries.*'

Option A: From the expression – '*for the former (conservative movements) because he does not possess the requisite amount of credulity in the ideologies of the status quo'*, we can infer that the author believes this: a prerequisite for conservative movements is credulity (believing without doubt, not to be confused with credibility) in the ideologies (conventions) of the status quo (what's existing). Hence, Option A is true, and not the answer.

Option B: From '*for the latter (*revolutionary movements*) because he will be sceptical about the Utopian myths'* we can understand that the author believes these individuals are unfit for revolutionary movements because they are too sceptical about Utopian myths. In other words, revolutionary movements require a belief in these Utopian myths, not a disbelief or scepticism. Hence, Option B is not true. Option B is the answer.

Option C: This can be understood from the two underlined parts – '*Sociological understanding leads to a* ***considerable measure of disenchantment****. …. Such unemployability in the cadres of either present or future regimes need not, however,* ***leave the disenchanted man in the posture of alienated cynicism***.' Option C is true, and hence, not the answer.

Option D: *Such unemployability in the cadres of either* ***present or future regimes*** *need not, however,* ***leave the disenchanted man in the posture of alienated cynicism***. Unemployability refers to the uselessness of the individual in conservative and revolutionary movements. So, it can be said that sociological understanding might leave individuals with a sense of disillusionment. Option D is not the answer.

Choice (B)

Q22. The 'cynical stance' mentioned in the second para refers to

a) the utter lack of optimism about society.

b) the masochism prevalent amongst the younger disenchanted subjects of sociological understanding.

c) the lack of a capacity for radical political commitments amongst the younger sociologists.

d) the absence of credulity in the ideologies of the status quo.

Number of words and Explanatory notes for RC:

Number of words: 458

Consider the sentences: '*And we find just such postures among some younger sociologists in this country, who find themselves driven to radical diagnoses of society* ***without finding in themselves the capacity for radical political commitments***. *This leaves them with no place to go except to a sort of masochistic cult of debunkers* ***who reassure each other that things could not possibly be worse***…***This cynical stance*** *is in itself naive…*' So, the cynical stance is that taken by younger sociologists – one of believing things cannot get worse.

Option A: This is the cynical stance the author is pointing out to – that things could not possibly be worse – the lack of optimism about society in general. Hence, Option A is the answer.

Option B: The young sociologists go to a masochist cult of debunkers (non-believers in the fact that things could get any better). So, the cynicism is characteristic of these debunkers whom the young sociologists join. The masochism itself is not the cynicism. They are two different attributes. Hence, Option B is not the answer.

Option C: The lack of a capacity for radical political commitments is what leads them to a cynical stance. The lack of capacity in itself is not the cynical stance. Hence, Option C is not the answer.

Option D: This is not the cynical stance – rather it is the thinking that keeps the younger sociologists away from conservative movements. Hence, Option D is not the answer.

Choice (A)

Q23. Sociological Machiavellianism is the opposite of cynical opportunism because the former

a) involves cheating to meet one's own needs.

b) involves respecting the social rules and norms which foster real human values.

c) involves unquestioning temperament towards the status quo.

d) involves viewing society with a cynical perspective.

Number of words and Explanatory notes for RC:

Number of words: 458

Consider the sentences: '***If one views society as a comedy***, *one will not hesitate to cheat, especially if by cheating one can alleviate a little pain here or make life a little brighter there. One will refuse to take seriously the rules of the game, except insofar as these rules protect real human beings and foster real human values.* ***Sociological Machiavellianism is thus the very opposite of cynical opportunism***. *It is the way in which freedom can realize itself in social action.*' It should be understood that the author talks about two possible consequences: alienated cynicism/cynical opportunism and a comic perspective towards society, the Sociological Machiavellianism.
Option A: Sociological Machiavellianism is not cheating to meet one's own needs. It is being okay with the idea of cheating as long as it can do good (alleviating a little pain). Hence, Option A is not the answer.
Option B: It involves refusing to take the rules of the game seriously except those which foster real human values. This can be understood from: '***except insofar as these rules protect real human beings and foster real human values***'. So, there is respect for such rules in Sociological Machiavellianism. Hence, Option B is the answer.
Option C: It involves going against the rules of the game, not following them without questioning. An unquestioning temperament towards the status quo means to be a conformist, to strictly follow the rules of the game. Hence, Option C is not the answer.
Option D: The former involves viewing society with a comic perspective, and it is hence, different from cynical opportunism. This is an easy option to eliminate. Option D is not the answer. Choice (B)

Q24. The author uses the analogy of 'man's social carnival' to demonstrate that

a) there is another alternative to alienated cynicism.

b) society is essentially a tragicomedy.

c) if one views society as a comedy, one will not hesitate to cheat.

d) cynicism is nothing more than credulous conformity.

Number of words and Explanatory notes for RC:

Number of words: 458

Option A: The author presents the analogy of a comic carnival as an alternative to the cynicism adopted by some young sociologists. This involves viewing society with a comic perspective rather than with a sense of disenchantment or disillusionment. This comic carnival is an alternative to the cynicism as understood from: '***Another option is*** *what we regard as the most plausible one to result from sociological understanding,* ***one that can combine compassion, limited commitment and a sense of the comic in man's social carnival.***' Hence, Option A is the answer.
Option B: The author equates society with a comedy and not a tragicomedy. Hence, Option B is not the answer.
Option C: Talking about the comic carnival was to focus on a shift in perspective required, and not to discuss the absence of hesitation to cheat (in order to do social good), which is just a subsidiary idea, a consequence of such a perspective. Hence, Option C is not the answer.
Option D: The analogy of comic carnival is to give an alternative to cynicism, not to discuss cynicism. Also, cynicism is not the same as credulous (believing easily) conformity. Hence, Option D is not the answer. Choice (A)

Q25. DIRECTIONS *for question 25*: The sentences given in the following question, when properly sequenced, form a coherent paragraph. Each sentence is labelled with a number. Decide on the proper order for the four sentences and key in the sequence of four numbers as your answer, in the input box given below the question.

1. Without careful examination, it is not obvious what is keeping things on track.
2. Entropy ensues: in the absence of deliberate investment, relationships, institutions and collaborative enterprises can all too easily deteriorate.
3. And if the policies designed to promote cooperation are costly – financially, politically, and bureaucratically – there is a temptation to stop investing in them.
4. When success is not assessed in terms of a measurable gain but by the maintenance of a positive status quo (peace, continued cooperation), the link between effort and success may be unobservable.

Sentence 1: Sentence 1 is a general and independent sentence. It has some keywords 'without careful examination', 'not obvious' and 'keeping things on track'.
Sentence 2: Sentence 2 can be understood to be a sentence mentioning some consequences. It can be inferred that sentence 2 can be placed later in the paragraph.
Sentence 3: Sentence 3 mentions some specific points. It begins with 'And'. Hence it can only continue after another sentence. It mentions a downside of having costly policies for promoting cooperation.
Sentence 4: Sentence 4 has some valuable clues: when success is not assessed, maintenance of a positive status quo, link may be unobservable.
3 and 2 cannot be the opening sentence of the paragraph. Both sentences 2 and 3 need a precedent. Between sentences 1 and 4, 4 is a better introductory sentence as it establishes the context or background of the para.
Sentences 4 and 1 form a logical block. "not obvious what is keeping things on track" in sentence 1 links with "the causal link between effort and success may be unobservable" in sentence 4. "Without careful examination" in sentence 1 links with "when success is not assessed in terms of a measurable gain but by the maintenance of a positive status quo" in sentence 4. So, 41.
Sentence 3 follows next. "designed to promote cooperation" in sentence 3 links with "maintenance of a positive status quo (eg. peace, continued cooperation, etc.)" given earlier in sentence 4. "And if the policies designed" in sentence 3 follows from "Without careful examination, it is not obvious what is keeping things on track" (sentence 1). Hence, 413.
Sentences 3 and 2 form another logical block. "in the absence of deliberate investment" in sentence 2 links with " there is a temptation to stop investing in them" in sentence 3. So 2 concludes the para. The correct answer is 4132. Ans: (4132)

Q26. DIRECTIONS *for question 26:* Five sentences related to a topic are given in the question below. Four of them can be put together to form a meaningful and coherent short paragraph. Identify the odd one out. Choose its number as your answer and key it in.

1. English is a particularly fortified one.
2. Is there any point in resisting?
3. It is a domination that few, at least on the English-speaking side of the border, stop to question.
4. Every language is a walled entity.
5. To step outside the anglophone world is to grow aware of the near-total domination of the English language when it comes to what is being read and celebrated as literature today.

Sentence 1 needs a predecessor, because of the stress on 'particularly'. 1 is probably an example amongst other 'fortified' entities.
Sentence 2 asks a rhetorical question about whether there is a point in resisting something (which means the para talks about something strong which cannot be resisted).
Sentence 3 talks about a domination by the English language. We understand that it is the domination of English language because the second part says, 'few (meaning none, not to be confused with 'a few' which means some), at least on the English-speaking side of the border…' No one on the English-speaking side questions 'its' domination.
Sentence 4 talks about a general theory about every language being a closed entity.
Sentence 5 talks about how fortified the English wall is, and how one understands English domination only when they come out of the anglophone (English-speaking) world.
41 is a block, as the word 'fortify' connects to 'walled' emphasised using 'particularly'. 'Domination' has been introduced in 5 and has been referred to in 3. So, the order is 4153. So, the odd-one is 2. Ans: (2)

Q27. DIRECTIONS *for question 27*: The sentences given in the following question, when properly sequenced, form a coherent paragraph. Each sentence is labelled with a number. Decide on the proper order for the four sentences and key in the sequence of four numbers as your answer, in the input box given below the question.

1. Like the voyager who takes up residence in an alien country, only to find, once adjusted, that he must move on to another, we shall come to feel like 'strangers in a strange land'.
2. If transience is the first key to understanding the super-industrial society, novelty is the second.
3. This means that many members of the new society will never 'feel at home' in it.
4. The future will unfold as an unending succession of bizarre incidents, sensational discoveries, implausible conflicts and widely novel dilemmas.

Sentence 1: Sentence 1 brings in an analogy – like the voyager.
Sentence 2: Sentence 2 sounds like an introductory sentence. It mentions the background: understanding the super-industrial society.
Sentence 3: Sentence 3 has the demonstrative pronoun 'this'. It also mentions 'new society'.
Sentence 4: Sentence 4 mentions a specific point: how the future will unfold. It has the clue 'novel'.
Sentence 2 is the opening sentence of the paragraph. The other sentences can only be situated downstream of 2. Sentence 2 is followed by sentence 4. "unending succession of bizarre incidents, sensational discoveries, implausible conflicts and widely novel dilemmas" in sentence 4 links with "understanding the super-industrial society" in sentence 2. "widely novel dilemmas" in sentence 4 points to "novelty is the second" in sentence 2.
Sentence 4 is followed by sentence 3. "new society" in sentence 3 points to "super-industrial society" given in sentence 2. "many members will never 'feel at home' in it" in sentence 3 is a consequence of "bizarre incidents, sensational discoveries, implausible conflicts and widely novel dilemmas" given earlier in sentence 4. So, 243.
Sentence 1 concludes the para. It provides the analogy 'like the voyager'. "never 'feel at home' in it" in sentence 3 links with "he must move on to another, we shall come to feel like 'strangers in a strange land'" in sentence 1. hence, 2431. Ans: (2431)

Q28. DIRECTIONS *for question 28:* Five sentences related to a topic are given in the question below. Four of them can be put together to form a meaningful and coherent short paragraph. Identify the odd one out. Choose its number as your answer and key it in.

1. If it is known that working-class candidates lack the style of delivery ordained by the establishment, then any authentic attempt to support diversity would have to address this by finding alternative ways to measure competence designed to look past nerves, or a lack of experience in public speaking.
2. Despite that, it creates a dynamic by which even ascendants to the middle-class are always on the back-foot and suspicious of their own place there.
3. Really, what we're seeing in the debate about "confidence" is the preservation of elite power structures and their values – herein lies the problem with social mobility, more broadly.
4. After all, it's really not that hard to determine the intellect or drive of an eighteen-year-old who might be seen as lacking assertiveness.
5. Any solution to inequality that requires individuals to "pull themselves up" by decoding the rules of the establishment is not only unfair, but illogical.

Sentence 1 gives you a problem and a solution. To diversify (involve more working-class candidates), we have to find ways to measure actual competence (not dependent on nervousness/public speaking).
Sentence 2 starts with a contrast 'despite that' and follows it up with a negative tone for middle-class ascendants. So, the sentence in front of this must be positive.
Sentence 3 talks about preservation of elite (therefore, negative about working-class).
Sentence 4 talks about an example of 1, determinging the intellect of an 18-year old even when the same doesn't have assertiveness. 1 talks about finding a way to measure competence (intellect or drive) by looking beyond nerves and a lack of public-speaking ability (no assertiveness). So, 14 is a block, since 4 starts with 'after all'
Sentence 5 talks about a solution that is illogical – also this is countering the solution in 1 since here the solution is to not help the working-class candidates but to expect them to get better at the way the system works.
1 and 4 make one block - problem, solution and an example of the solution.
3 and 5 make one block – 'social mobility' and the unfair, illogical solution to the inequality. So, 2 is the odd one out as 'despite that' makes it difficult for us to connect this sentence to any other sentence. Ans: (2)

Q29. DIRECTIONS *for question 29:* The following question has a paragraph from which the last sentence has been deleted. From the given options, choose the one that completes the paragraph in the most appropriate way.

What social media manipulation does undermine is the dynamic between the idea of freedom of speech and manipulation. In the twentieth century we had this notion that the more 'the tongue was set free' the greater the resistance to power, whose aim was always to censor. Now, social media encourages us to express ourselves as much as we want, everyone has their own social-media megaphone, but our words and behaviour are then used to target us with propaganda. The propaganda might be relatively lame for now, but the very logic undermines trust in a whole set of assumptions and stories about the battle of freedom versus censorship, and self-expression versus authoritarianism. _____

a) It is not hard to see that, the more you speak the easier power can envelop you.

b) Yet, social media becomes a tool for authoritarianism.

c) Such propaganda helps manipulate only those who want to express themselves.

d) Manipulation of the masses is a central tenet of authoritarianism.

The para talks about how social media gave people a platform to express themselves, but eventually went on to become a tool to target people through propaganda (because the opinion one expresses on social media could give insights into a person). Since, the para is well-balanced, it only needs a conclusion line.
Option A: This has a positive connector 'It is not hard to see that, and that agrees with the tone of the para. It can be inferred from the para that the more one speaks on social media, the easier it is to target them with propaganda. Hence, Option A is the answer.
Option B: This option agrees with the tone of the para – that social media can be misused for propaganda. So, the contrast marker 'yet' is out of place. Hence, Option B is not the answer.
Option C: While this line has a connection with the propaganda discussed in the sentence preceding the blank, it makes the extrapolation that manipulation can work only with those who want to express themselves. Such a generalisation cannot be made since the idea of the para is that 'those ***who express themselves*** are generally vulnerable to manipulation'. This cannot be interpreted as 'only those' who express themselves can be manipulated. So, this line disturbs the balance of the second half of the para. Hence, Option C is not the answer.
Option D: While authoritarianism could be about manipulation of masses the second half focus predominantly on social media and how it can be used against those who express themselves. Hence, this cannot be a good last line of the para. Option D is not the answer.
Choice (A)

Q30. DIRECTIONS *for question 30:* Five sentences related to a topic are given in the question below. Four of them can be put together to form a meaningful and coherent short paragraph. Identify the odd one out. Choose its number as your answer and key it in.

1. Organic farms had more diverse populations of faeces-consuming microbes than did conventional farms.
2. Farmers often remove hedgerows, ponds and other habitats to discourage visits by wild animals and birds.
3. A researcher has speculated that an alternative way of dealing with animal dung would be to encourage dung beetles to bury it and soil bacteria to break it down.
4. That is necessarily detrimental to wildlife, and also requires the application of more pesticides because it reduces the number of insectivorous birds and mammals around.
5. Contamination of fresh produce with bacteria-laden wild-animal faeces is a problem in many places.

Sentence 1: Sentence 1 highlights a difference between organic farms and conventional farms.
Sentence 2: Sentence 2 tells us what farmers do to deal with the problem.
Sentence 3: Sentence mentions a researcher's speculation to deal with the problem. It talks about an 'alternative way'.
Sentence 4: Sentence 4 has the demonstrative pronoun 'that'. It has the negative fact 'detrimental to wildlife".
Sentence 5: Sentence 5 cites a problem and in a way, introduces the background of the story.
So sentence 5 is a general sentence that can begin the para. It speaks about the problem of contamination of fresh produce. Sentences 5 and 2 form a logical block. "discourage visits by wild animals and birds" in sentence 2 is a solution that links with the problem "contamination of fresh produce with bacteria-laden wild-animal faeces" in sentence 5. So, 52.
Sentence 2 is followed by sentence 4. "discourage visits by wild animals and birds" in sentence 2 links with "it reduces the number of insectivorous birds and mammals around" in sentence 4. Also " Farmers often remove hedgerows, ponds and other habitats" in sentence 2 is linked with " That is necessarily detrimental to wildlife" in sentence 4. Hence 524.
Sentence 3 talks about an alternative way – something different from the one given in sentence 2 – and concludes the para. So, 5243.
"faeces-consuming microbes" in sentence 1 seems to point to "soil bacteria to break it (animal dung) down" in sentence 3. But the difference between "organic farms and conventional farms", mentioned in 1 is quite a jump. This difference can be a part of another para, much later in the flow after 'organic farming' has been introduced or compared to what has been discussed in sentence 3. Ans: (1)

Q31. DIRECTIONS *for question 31:* The following question has a paragraph from which the last sentence has been deleted. From the given options, choose the one that completes the paragraph in the most appropriate way.
The principle of forward negotiation is a reminder that one way to judge the wisdom of our tactics and process choices is from the point of view of their likely impact on our ability to make progress in the days, months, and years ahead. Negotiators might sacrifice progress if they are too focused on solving short-term problems or achieving short-term gains. But progress in the current negotiation is not the only potential victim of short-terminism. _____

a) One should be psychologically, organizationally and politically prepared in case a window of opportunity opens for deal making or diplomacy.

b) What is not negotiable today may be negotiable tomorrow.

c) A myopic approach to negotiation, even if a deal is reached, can exacerbate the likelihood of future conflict, or diminish our ability to resolve it.

d) If you fail to negotiate or get clarity regarding the path ahead, you risk being blindsided later in the process.

The key idea of the paragraph revolves around the relationship between negotiation and progress. Focussing on the short-term hinders progress in the current negotiation process. The penultimate sentence of the para is negative in tone. When it states 'not the only potential victim', we can infer that the following line must talk about what the other potential victim (of short-terminism) must be.
Option A: Option A does not connect with the idea in the penultimate sentence. It is positive in tone. It talks about being prepared for a deal making opportunity and not a victim of short-terminism.
Option B: Option B again is not specific to the discussion in the para. It sounds like a positive or encouraging statement.
Option C: Option C is negative in tone. "a myopic approach to negotiation" in option C links with "too focused on solving short-term problems or achieving short-term gains" in the para. "exacerbate the likelihood of future conflict, or diminish our ability to resolve it" in option C points to the other victim of short-terminism and is parallel to "progress in the current negotiation is not the only potential victim of short-terminism". Hence option C is the correct answer.
Option D: Option D is a close choice. But it begins with "If you fail to negotiate'. This is incorrect. Negotiation has begun, albeit in a non-judicious manner with focus only on solving short-term problems or achieving short-term gains. Also "risk being blindsided later in the process" in option D is a consequence that is of a lower degree than "exacerbate the likelihood of future conflict, or diminish our ability to resolve it" mentioned in option C. So option C is a better sentence than option D in bringing the thought flow of the para to a close. Choice (C)

Q32. DIRECTIONS *for question 32*: The sentences given in the following question, when properly sequenced, form a coherent paragraph. Each sentence is labelled with a number. Decide on the proper order for the four sentences and key in the sequence of four numbers as your answer, in the input box given below the question.

1. This binary before-and-after phenomenon opens the door to abuse by people acting on inside information.

2. Unsold leases nearby become extremely valuable overnight, after discovery of oil, allowing governments to set higher rates for them, once exploration companies unearth something of value.
3. The awarding of oil leases in developing countries is one of the most secretive, competitive, and contested corners of the industry.
4. Before oil is discovered, governments typically offer royalty rates and tax incentives that are favourable to exploration companies.

Sentence 1 requires a previous sentence where two options have been considered (before-and-after phenomenon), 'this' functioning like a demonstrative adjective here.
Sentence 2 despite being grammatically independent needs a logical background about what leases we are talking about.
Sentence 3 introduces the 'lease' and hence, must precede 2 (not necessarily immediately in front).
Sentence 4 talks about the process before oil is discovered.
The binary phenomenon discussed in 1 can be understood from 4 and 2 – before oil is discovered and after oil is discovered. So, 4 and 2 precede 1. The question of 'Unsold leases' comes after discovery. That leaves us with one question – 3 before 4 or the other way around. 3 talks about the process being secretive. 4 elaborates it further to explain the process. So, 3 comes before 4. Ans: (3421)

Q33. DIRECTIONS *for question 33:* The following question has a paragraph from which the last sentence has been deleted. From the given options, choose the one that completes the paragraph in the most appropriate way.
Thinking is man's only basic virtue, from which all the others proceed. And his basic vice, the source of all his evils, is that nameless act which all of you practice, but struggle never to admit: the act of blanking out, the willful suspension of one's consciousness, the refusal to think – not blindness, but the refusal to see; not ignorance, but the refusal to know. It is the act of unfocusing your mind and inducing an inner fog to escape the responsibility of judgment – on the unstated premise that a thing will not exist if only you refuse to identify it, that A will not be A so long as you do not pronounce the verdict "It *is*." Non-thinking is an act of annihilation, a wish to negate existence, an attempt to wipe out reality. But existence exists; reality is not to be wiped out, it will merely wipe out the wiper. By refusing to say "It is," you are refusing to say "I am." By suspending your judgment, you are negating your person. _____

a) Thinking is a delicate, difficult process, which man cannot perform unless knowledge is his goal, logic is his method, and the judgment of his mind is his guiding absolute.

b) Existentially, the choice “to focus or not” is the choice “to be conscious or not”, which is nothing but the choice of life or death.

c) To maintain a contradiction is to abdicate one’s mind and to evict oneself from the realm of reality.

d) When a man declares: “Who am I to wipe out reality?” he is declaring: “Who am I to live?”

The para talks about the consequences of the suspension of one’s consciousness or judgment (the refusal to see, the refusal to know). It mentions non-thinking as an evil act of annihilation expressing a desire to wipe out reality or existence, a futile attempt since existence exists. So we look for a choice that extends the thought flow in the last three lines of the para, just before the blank.
Option A: Option A focuses on the process of thinking and its requirements. It does not discuss the consequences of suspending one’s judgment.
Option B: Non-thinking is an act of annihilation, a wish to negate existence, an attempt to wipe out reality. But existence exists; reality is not to be wiped out, it will merely wipe out the wiper. By refusing to say “It is,” you are refusing to say “I am.” **By suspending your judgment, you are negating your person.** Option B sums up the essence of the problem discussed in the para. “Existentially, the choice “to focus or not”” in option B emerges from “It is the act of unfocusing your mind and inducing an inner fog to escape the responsibility of judgment” and “Non-thinking is an act of annihilation” given in the para. “choice “to be conscious or not”, which is nothing but the choice of life or death” in option B emerges from “a wish to negate existence, an attempt to wipe out reality. But existence exists; reality is not to be wiped out, it will merely wipe out the wiper”. Option B also mirrors the ante-penultimate sentence “By refusing to say “It is,” you are refusing to say “I am.””. It talks about the link between judgment and person, knowledge and life. So option B is the correct answer.
Option C: Option C resembles reverse logic, a reversal of cause and effect. The para talks about abdicating one’s mind and evicting oneself from the realm of reality. We negate our person, our existence, our reality when we do so. So the construction given in option C “To do X is to abdicate our mind or attempt to wipe out reality (Y)” is incorrect. The para does not focus on ‘contradiction’ as such. Right at the beginning of the para, we are told about the struggle we never admit: the act of blanking out, the willful suspension of one’s consciousness, the refusal to think. So, the para should close by reiterating the consequences of suspending judgment. It should not liken something else or an unknown term to Y. So option C is not the correct answer.
Option D: Non-thinking is an act of annihilation, a wish to negate existence, an attempt to wipe out reality. **But existence exists; reality is not to be wiped out, it will merely wipe out the wiper.** The para does not emphasise on “wiping out reality”. Option D cannot be a question that can be posed at the end of the para. Option D is not the answer.
Choice (B)

Q34. DIRECTIONS *for question 34*: The sentences given in the following question, when properly sequenced, form a coherent paragraph. Each sentence is labelled with a number. Decide on the

proper order for the four sentences and key in the sequence of four numbers as your answer, in the input box given below the question.

1. But what is more surprising, suggests the science writer Angela Saini in her new book, Superior, is the possibility that science informs prejudice or can be recruited into its service.
2. Saini reiterates that the choice of theory [among scientists] may be driven as much by personal motivation as by data.
3. The likelihood of prejudice trumping reason is to be expected.
4. It has been widely accepted that Homo sapiens first appeared on the east African savannah 195,000 years ago, but some scientists in Russia, China and India, make a special claim for their region.

DI/LR

DIRECTIONS *for questions 1 to 4:* Answer the questions on the basis of the information given below.

Karthik, a sales manager, has to plan a nationwide tour in which he has to visit a certain number of cities among eight cities – A, B, C, D, E, F, G, and H. Among these eight cities, two cities, A and D, are in the northern region, two cities, B and F, are in the southern region, two cities, E and G, are in the eastern region, while C and H are in the western region. Further, it is known that

i. if he visits a city in the eastern region, he has to visit a city in the western region.
ii. City A and City D are neighbouring cities and among the two, if he visits one city, he has to visit the other city.
iii. if he visits City C, he can visit neither City E nor City H.
iv. if he visits both City D and City E, he has to visit City F.
v. if he visits City G, he cannot visit City B

Q1. DIRECTIONS *for questions 1 and 2:* Type in your answer in the input box provided below the question.
What is the maximum number of cities that Karthik can plan to visit?

The maximum number of cities that Karthik can visit is six. One way in which this can be done is A, D, B, F, E, and H. Ans: (6)

Q2. DIRECTIONS *for questions 1 and 2:* Type in your answer in the input box provided below the question.

If Karthik plans to visit exactly five cities, in how many ways can he select the five cities for the tour?

If Karthik plans to visit five cities, he has to visit both A and D. This is because, between E, G, C, and H, he can only visit two cities (E and H or G and C or G and H). Hence, he has to visit at least one city from the north. But according to (ii), he has to visit both. Also, he has to visit at least one city from the south. Using these conditions and the ones given in the question, we can arrive at the following possible cases.
(A, D, B, F, C),(A, D, B, F, H), (A, D, F, E, H), (A, D, F, C, G), (A, D, F, H, G)
Hence, a total of five cases are possible. Ans: (5)

3. DIRECTIONS *for questions 3 and 4:* Select the correct alternative from the given choices.
Which of the following conditions, if applied in conjunction with the conditions given above, will result in the maximum reduction in the maximum number of cities that Karthik can visit during the tour?

a) If Karthik visits City D, he can visit neither City C nor City H.

b) If Karthik visits City D, he can visit neither City G nor City E.

c) Karthik has to visit at least one city from each region.

d) If Karthik visits any city in the northern region, he cannot visit any city in the eastern region.

Option A will result in Karthik visiting only four cities. This can easily be verified by observing the possible cases mentioned in the previous question.
Option B will result in Karthik visiting five cities. One possible way is A, D, B, F, H.
Option C will result in Karthik visiting six cities. Hence there is no reduction.
Option D will result in Karthik visiting five cities. One possible way is A, D, B, F, C/H.
Hence, option A will result in the maximum reduction. Choice (A)

Q4. DIRECTIONS *for questions 3 and 4:* Select the correct alternative from the given choices.
How many of the following statements are definitely true, if Karthik plans to visit at least five cities in his tour?

i. If he visits a city from the western region, he has to visit a city from the eastern region.
ii. If he visits City B, he has to visit city F.
iii. If he visits City E, he has to visit city H.

a) 0

b) 1

c) 2

d) 3

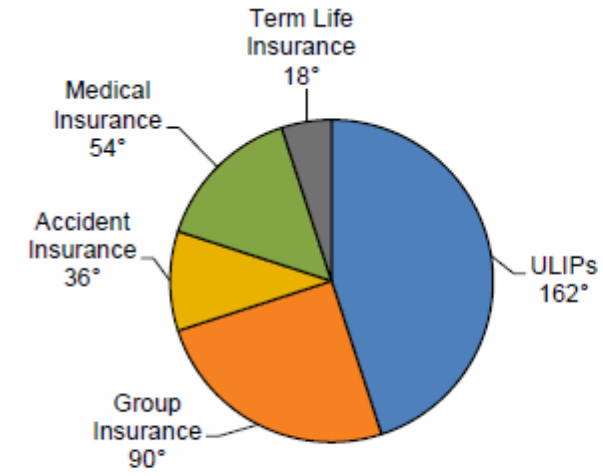
As per the conditions in the question, Karthik visits either exactly five cities or exactly six cities (the maximum possible from the first question in the set). Hence all these case have already been looked at and are listed below:
(A, D, B, F, C),(A, D, B, F, H), (A, D, F, E, H), (A, D, F, C, G), (A, D, F, H, G), (A, D, B, E, F, H) & (A, D, E, F, G, H).
Hence, we can see that only statements ii and iii are definitely true. Choice (C)

DIRECTIONS *for questions 5 to 8:* Answer the questions on the basis of the information given below.

PLC Ltd., an insurance company, has exactly five different types of insurance products – ULIPs, Group Insurance, Accident Insurance, Medical Insurance and Term Life Insurance.

The pie-chart given below provides the contribution of various types of insurance products to the total profits of PLC Ltd.

The table alongside the pie-chart shows the total sales revenue for each of the given types of products.



Type of Product	Sales Revenue (in ₹ crore)
ULIPs	350
Term Life Insurance	75
Medical Insurance	125
Accident Insurance	100
Group Insurance	400

Profit = Sales Revenue – Expenses

$$\text{Profitability} = \frac{\text{Profit}}{\text{Sales Revenue}}$$

$$\text{Expenses Ratio} = \frac{\text{Expenses}}{\text{Sales Revenue}}$$

Q5. DIRECTIONS *for questions 5 to 8:* Select the correct alternative from the given choices.
Which of the following products has the lowest expenses ratio?

a) Term Life Insurance

b) Accident Insurance

c) Group Insurance

d) ULIPs

Profit = Sales Revenue – Expenses
⇒ Expenses = Sales Revenue – Profits
⇒ Expenses ratio = 1 – Profitability
Thus the expenses ratio will be lowest for the product for which profitability is the highest.
Let the total profits be P
Profitability of the given products is

Term Life Insurance = $\left(\frac{18}{360}\times P\right)/75 = \frac{P}{1500}$

Accident Insurance = $\left(\frac{36}{360}\times P\right)/100 = \frac{P}{1000}$

Group Insurance = $\left(\frac{90}{360}\times P\right)/400 = \frac{P}{1600}$

ULIPs $\left(\frac{162}{360}\times P\right)/350 = \frac{9P}{7000}$

As $\frac{9P}{7000} > \frac{P}{1000} > \frac{P}{1500} > \frac{P}{1600}$, the expenses ratio of ULIPs would be the least.

Choice (D)

Q6. DIRECTIONS *for questions 5 to 8:* Select the correct alternative from the given choices.
If the profitability of Medical Insurance is 0.45, then the expenses on Group Insurance (in Rs. crore) are

a) 168.75.

b) 306.25.

c) 256.5.

d) Cannot be determined

Let the total profits be P.
Profitability of Medical insurance = 0.45

$\left(\frac{54}{360}\times P\right)/125 = 0.45 \Rightarrow P = \frac{0.45\times 125}{0.15} = 375$

$\therefore$ Profit of Group Insurance is $\left(\frac{90}{360}\times P\right) = 93.75$

$\therefore$ Expenses of G.I = Sales Revenue – Profit
= 400 – 93.75 = 306.25

Choice (B)

Q7. DIRECTIONS *for questions 5 to 8:* Select the correct alternative from the given choices.
If the total profit of PLC Ltd. is Rs.500 crore, then the expenses on ULIPs as a percentage of the expenses on Group Insurance are

a) 45.45%.

b) 180%.

c) 62.5%.

d) 37.5%.

Profit on ULIPs = $500 \times \frac{162}{360} = ₹225$ crore

Expenses on ULIPs = 350 – 225 = ₹125 crore
Profits on Group Insurance = ₹125 crore
Expenses on Group Insurance = 400 – 125 = ₹275 crore

Required percentage = $\frac{125}{275} \times 100 = 45.45\%$ Choice (A)

Q8. DIRECTIONS *for questions 5 to 8:* Select the correct alternative from the given choices.
If the total profitability of PLC Ltd. is 0.2, then the expenses on Term Life Insurance (in Rs. crore) are

a) 60.

b) 62.50.

c) 64.50.

d) 67.50.

Let the total profits be P. Total Sales Revenue = 1050

Given $\frac{P}{1050} = 0.2 \Rightarrow P = 210$

Expenses on Term Life Insurance
= 75 – 210 × 0.05
= ₹64.5 crores Choice (C)

DIRECTIONS *for questions 9 to 12:* Answer the questions on the basis of the information given below.

A scrap tyre recycling plant uses five types of scrap tyres – Type 1, Type 2, Type 3, Type 4 and Type 5 – and recycles them to produce Steel, Tyre Oil, Carbon Black and Toxic Residue. The recycling of the scrap tyres produce these outputs in the proportion (by weight) given in the following table:

Type of Tyre	Steel	Tyre Oil	Carbon Black	Toxic Residue
Type 1	15%	30%	35%	20%
Type 2	10%	45%	35%	10%
Type 3	5%	40%	25%	30%
Type 4	12%	35%	40%	13%
Type 5	10%	40%	45%	5%

The processing of one kilogram of scrap tyre of any type costs Rs.1 and the cost per kg of different types of scrap tyres is Rs.5 for Type 1, Rs.10 for Type 2, Rs.4 for Type 3, Rs.8 for Type 4 and Rs.10 for Type 5.

The selling price per kg of each of the byproducts is: Steel - Rs.15/kg, Tyre Oil - Rs.25/kg, Carbon Black - Rs.10/kg. The last byproduct (toxic residue) requires an expenditure of Rs.2/kg for its disposal and hence is considered as an expense.

Profit from tyre recycling = (Revenue from sales of byproducts) - (expenditure on raw material + expenditure on processing and disposal)

$$\text{Profit Percentage} = \frac{\text{Profit}}{\text{Total Expenditure}} \times 100$$

Q9. DIRECTIONS *for question 9:* Select the correct alternative from the given choices.
Which of following will give the maximum profit when 100 kg of scrap tyre is recycled?

a) Type 1

b) Type 2

c) Type 3

d) Type 4

The profit for every 100 kg of scrap tyre processed is as below for different types of tyres.

	Type 1	Type 2	Type 3	Type 4	Type 5
1. Steel	15 × 15 = 225	10 × 15 = 150	5 × 15 = 75	12 × 15 = 180	10 × 15 = 150
2. Tyre Oil	30 × 25 = 750	45 × 25 = 1125	40 × 25 = 1000	35 × 25 = 875	40 × 25 = 1000
3. Carbon Black	35 × 10 = 350	35 × 10 = 350	25 × 10 = 250	40 × 10 = 400	45 × 10 = 450
4. Toxic residue	20 × 2 = 40	10 × 2 = 20	30 × 2 = 60	13 × 2 = 26	5 × 2 = 10
5. cost of scrap tyre	100 × 5 = 500	100 × 10 = 1000	100 × 4 = 400	100 × 8 = 800	100 × 10 = 1000
6. processing cost	100	100	100	100	100
Profit (1 + 2 + 3 – 4 – 5 – 6)	685	505	765	529	490

Thus the profit is maximum for Type 3. Choice (C)

Q10. DIRECTIONS *for question 10:* Type in your answer in the input box provided below the question.
If the cost of disposal of toxic residue is brought down to zero, then for how many types of tyres, will the profit percentage be more than 100%?

If the cost of disposal of toxic residue is brought down to zero, the profit will increase by the amount which was spent on disposal of scrap. Thus the profit and expenditure are as below.

	Type 1	Type 2	Type 3	Type 4	Type 5
Profit	725	525	825	555	500
Expenditure	600	1100	500	900	1100

Thus the profit percentage is more than 100% for Type 1 and Type 3 tyres.

Ans: (2)

Q11. DIRECTIONS *for questions 11 and 12:* Select the correct alternative from the given choices.
If at least 135 kg of steel is produced by spending exactly Rs.6,500 on purchase of scrap tyres, what is the minimum possible amount spent on disposal of toxic residue produced in the process?

a) Rs.330

b) Rs.310

c) Rs.135

d) Rs.292.5

The amount of steel that can be produced by spending ₹6,500 on purchase of scrap tyre for different types of tyres is as follows.

Type 1	Type 2	Type 3	Type 4	Type 5
195 kgs	65 kgs	81.25 kgs	97.5	65 kgs.

Hence, to produce a minimum of 135 kgs of steel, some amount of type 1 tyre should definitely be purchased.
As type 3 tyre produces more toxic residue than Type 1 tyre no amount of Type 3 is processed.
As Type 2 and Type 5 tyres produce the same amount of steel and as Type 2 tyre produces more toxic residue than Type 5 tyre, no amount of Type 2 tyre is processed.
Thus a combination of Type 1 and Type 4 tyres or a combination of Type 1 and Type 5 tyres.
As Type 1 tyre produces more toxic residue than Type 4 and Type 5 tyres, the production of toxic residue is minimized when the production of steel is as low as possible i.e, 135 kgs.
For every ₹100 spent on Type 1 tyre it produce 3 kgs of steel. Similarly ₹100 spent on Type 4 tyre produces 1.5 kgs of steel and the same amount spent on Type 5 tyre produces 1 kg of steel. We need to have 135 kgs of steel from spending ₹6,500. This can be achieved by purchasing Type 1 and Type 4 by spending the amount in the following ratio

$$\frac{3}{100} \qquad \frac{1.5}{100}$$

$$\frac{135}{6500}$$

$$\frac{37.5}{6500} \qquad \frac{60}{6500}$$

Thus the ratio of amounts spent on purchasing Type 1 and Type 4 tyres is 37.5 : 60 = 5 : 8

The amount of scrap produced from Type 1 tyre used is $6500 \times \frac{5}{13} \times \frac{1}{5} \times \frac{20}{100}$

= 100 kgs

The amount of toxic residue from Type 4 tyre is $6500 \times \frac{8}{13} \times \frac{1}{8} \times \frac{13}{100}$ = 65 kgs.

Total toxic residue produced = 165 kgs.
Cost of disposal = 165 × 2 = ₹330.
Similarly for a combination of Type 1 and Type 4 tyres the ratio of amounts spent is

$$\frac{3}{100} \qquad \frac{1}{100}$$

$$\frac{135}{6500}$$

$$\frac{70}{6500} \qquad \frac{60}{6500}$$

Thus the ratio of amount spent on Type 1 and Type 5 tyres is 7 : 6.
Toxic residue produced by this combination is

$$\left[6500 \times \frac{7}{13} \times \frac{1}{5} \times \frac{20}{100}\right] + \left[6500 \times \frac{6}{13} \times \frac{1}{10} \times \frac{5}{100}\right] = 155 \text{ kgs}$$

Cost of disposal = 155 × 2 = ₹310.
Thus the minimum cost is ₹310. Choice (B)

Q12. DIRECTIONS *for questions 11 and 12:* Select the correct alternative from the given choices.
The cost per kg of Type 3 tyre increased because of which the profit percentage for Type 3 tyre became equal to that for Type 4 tyre. What is the increased cost per kg of Type 3 tyre?

a) Rs.6.83

b) Rs.7.13

c) Rs.5.27

d) Rs.9.84

Profit percentage of Type 3 tyre (for 100 kg) = $\frac{1165 - 100x}{160 + 100x}$

Profit percentage of Type 4 tyre (for 100 kg) = $\frac{529}{926}$

$\Rightarrow \frac{1165 - 100x}{160 + 100x} = \frac{529}{926}$

$\Rightarrow 145500x = 994150 \Rightarrow x = 6.83$

Hence, the cost per kg of Type 3 tyre is ₹ 6.83. Choice (A)

DIRECTIONS *for questions 13 to 16:* Answer the questions on the basis of the information given below.

Six countries, China, India, Indonesia, Japan, Pakistan, and South Korea, participated in a sports tournament which comprised ten events. For each event, the countries that stood first, second and third were awarded a gold medal, a silver medal and a bronze medal, respectively. The final standings of the countries in the tournament were calculated as follows:

- The country with a higher number of gold medals was placed higher.
- If two or more countries have the same number of gold medals, the country with a higher number of silver medals was placed higher.
- If two or more countries have the same number of gold medals and the same number of silver medals, the country with a higher number of bronze medals was placed higher.
- No two countries had the same combination of the number of gold medals, silver medals and bronze medals.

The following information is known about the final standings and the medal tally of the six countries:

i. South Korea was the only country to win an equal number of gold, silver and bronze medals, whereas Pakistan was the only country to win exactly one gold medal.
ii. China was not last in the final standings, and the number of gold medals won by China was the same as the number of bronze medals won by India.
iii. Every country won at least one silver medal and no country won more than three gold medals.
iv. The country that won the maximum total number of medals was not in the top three in the final standings.
v. The country that finished in the last place in the final standings won four bronze medals.
vi. India won the same number of gold medals as Japan but was placed immediately below Japan in the final standings.
vii. The country that was in the first place in the final standings won an equal number of bronze and silver medals.

Q13. DIRECTIONS *for questions 13 to 15:* Select the correct alternative from the given choices.
Which country won the maximum number of silver medals?

a) South Korea

b) Japan

c) India

d) Indonesia

Given that China is not in the last place from (ii). India also cannot be in the last place because if India is in the last place, it should have 4 bronze medals. From (ii), China should have 4 gold medals. This is not possible from (iii). Also, from (vi), Japan was also not in the last place. South Korea could not be in the last place because it could not have won 4 bronze medals from (v). Hence, either Pakistan or Indonesia must be in the last place.

If Pakistan is in the last place, the other 5 countries should have at least 2 gold medals each (since they cannot have 1 or 0 gold medals). This is not possible. Hence, Indonesia is in the last place with 0 gold medals and 4 bronze medals (it cannot have one gold medal from (i)).

From (i), South Korea must have won either 2 medals or 3 medals each of gold, silver and bronze. It could not have one gold because Pakistan was the only country to win one gold medal. It could not have won more than 3 gold medals from (iii).

If South Korea has 3 medals of each type, China, India, and Japan must have 6 gold medals between them. Japan and India must have the same number of gold medals. China cannot have 3 gold medals because Japan and India will not have equal number of medals. This is not possible (from (i)). If China has two gold medals, Japan and India will also have two gold medals each. In this case, South Korea will be placed first. But it will also have the maximum number of medals. India can have a maximum of 2 gold, 2 bronze (from (ii)), and 1 silver (it cannot have 2 silver because it will have same number of gold, silver and bronze medals and it cannot have 3 silver because Japan should then have 4 silver to finish above India). Indonesia can have a maximum of 0 gold, 3 silver and 4 bronze. Similarly, no other country can have more than 9 medals. Hence, this case is not possible because it violates condition (iv).

If South Korea has 2 medals of each type, China, India and Japan must have 7 gold medals between them. This is only possible if China has 3 gold medals, India and Japan have 2 gold medals each. No other combination is possible for distributing 7 gold among these three countries without violating the given conditions.

Since, China has 3 gold, India must have 3 bronze. Also, China would be placed first and hence, it should have won the remaining bronze medal and it should have 1 silver medal (from (iii) and (vii)).

The following table gives the updated information.

Country	Gold	Silver	Bronze
China	3	1	1
Japan	2		0
India	2		3
South Korea	2	2	2
Pakistan	1		0
Indonesia	0		4

Japan and India can have either 3 or 2 or 1 silver medals. If Japan has 3 silver and India has 2 silver, India will have the maximum number of total medals (7) and it will be in third place. This is not possible. If Japan has 3 silver and India has 1 silver, India will not be immediately below Japan.

If Japan has 2 silver and India has 1 silver, Japan will be third, India will be fourth and South Korea will be second.

The remaining 4 silver medals must be distributed between Pakistan and Indonesia such that one of them has at least 7 medals. This is because South Korea in second place has a total of 6 medals. Since, the country with the highest medal tally must not be in top 3, one among Pakistan and Indonesia must have 7 medals in total. Since Pakistan cannot have 7 medals in total, Indonesia must have 3 silver and Pakistan must have 1 silver.

The final medal tally and standings are presented in the table below.

Standings	Country	Gold	Silver	Bronze
1	China	3	1	1
2	South Korea	2	2	2
3	Japan	2	2	0
4	India	2	1	3
5	Pakistan	1	1	0
6	Indonesia	0	3	4

. Indonesia won the maximum number of silver medals. Choice (D)

Q14. DIRECTIONS *for questions 13 to 15:* Select the correct alternative from the given choices. Which country stood first in the final standings in the tournament?

a) China

b) Japan

c) South Korea

d) India

Given that China is not in the last place from (ii). India also cannot be in the last place because if India is in the last place, it should have 4 bronze medals. From (ii), China should have 4 gold medals. This is not possible from (iii). Also, from (vi), Japan was also not in the last place. South Korea could not be in the last place because it could not have won 4 bronze medals from (v). Hence, either Pakistan or Indonesia must be in the last place.
If Pakistan is in the last place, the other 5 countries should have at least 2 gold medals each (since they cannot have 1 or 0 gold medals). This is not possible. Hence, Indonesia is in the last place with 0 gold medals and 4 bronze medals (it cannot have one gold medal from (i)).
From (i), South Korea must have won either 2 medals or 3 medals each of gold, silver and bronze. It could not have one gold because Pakistan was the only country to win one gold medal. It could not have won more than 3 gold medals from (iii).
If South Korea has 3 medals of each type, China, India, and Japan must have 6 gold medals between them. Japan and India must have the same number of gold medals. China cannot have 3 gold medals because Japan and India will not have equal number of medals. This is not possible (from (i)). If China has two gold medals, Japan and India will also have two gold medals each. In this case, South Korea will be placed first. But it will also have the maximum number of medals. India can have a maximum of 2 gold, 2 bronze (from (ii)), and 1 silver (it cannot have 2 silver because it will have same number of gold, silver and bronze medals and it cannot have 3 silver because Japan should then have 4 silver to finish above India). Indonesia can have a maximum of 0 gold, 3 silver and 4 bronze. Similarly, no other country can have more than 9 medals. Hence, this case is not possible because it violates condition (iv).
If South Korea has 2 medals of each type, China, India and Japan must have 7 gold medals between them. This is only possible if China has 3 gold medals, India and Japan have 2 gold medals each. No other combination is possible for distributing 7 gold among these three countries without violating the given conditions.
Since, China has 3 gold, India must have 3 bronze. Also, China would be placed first and hence, it should have won the remaining bronze medal and it should have 1 silver medal (from (iii) and (vii)).
The following table gives the updated information.

Country	Gold	Silver	Bronze
China	3	1	1
Japan	2		0
India	2		3
South Korea	2	2	2
Pakistan	1		0
Indonesia	0		4

Japan and India can have either 3 or 2 or 1 silver medals. If Japan has 3 silver and India has 2 silver, India will have the maximum number of total medals (7) and it will be in third place. This is not possible. If Japan has 3 silver and India has 1 silver, India will not be immediately below Japan.
If Japan has 2 silver and India has 1 silver, Japan will be third, India will be fourth and South Korea will be second.
The remaining 4 silver medals must be distributed between Pakistan and Indonesia such that one of them has at least 7 medals. This is because South Korea in second place has a total of 6 medals. Since, the country with the highest medal tally must not be in top 3, one among Pakistan and Indonesia must have 7 medals in total. Since Pakistan cannot have 7 medals in total, Indonesia must have 3 silver and Pakistan must have 1 silver.
The final medal tally and standings are presented in the table below.

Standings	Country	Gold	Silver	Bronze
1	China	3	1	1
2	South Korea	2	2	2
3	Japan	2	2	0
4	India	2	1	3
5	Pakistan	1	1	0
6	Indonesia	0	3	4

. China stood first in the tournament. Choice (A)

Q15. DIRECTIONS *for questions 13 to 15:* Select the correct alternative from the given choices. Which of the following statements is definitely true?

a) No country won more than six medals in total.

b) The country that won the maximum number of silver medals did not win any gold medals..

c) The number of gold medals is the same as the number of silver medals for exactly two countries.

d) The country that won the maximum number of bronze medals did not win the maximum number of silver medals.

Given that China is not in the last place from (ii). India also cannot be in the last place because if India is in the last place, it should have 4 bronze medals. From (ii), China should have 4 gold medals. This is not possible from (iii). Also, from (vi), Japan was also not in the last place. South Korea could not be in the last place because it could not have won 4 bronze medals from (v). Hence, either Pakistan or Indonesia must be in the last place.

If Pakistan is in the last place, the other 5 countries should have at least 2 gold medals each (since they cannot have 1 or 0 gold medals). This is not possible. Hence, Indonesia is in the last place with 0 gold medals and 4 bronze medals (it cannot have one gold medal from (i)).

From (i), South Korea must have won either 2 medals or 3 medals each of gold, silver and bronze. It could not have one gold because Pakistan was the only country to win one gold medal. It could not have won more than 3 gold medals from (iii).

If South Korea has 3 medals of each type, China, India, and Japan must have 6 gold medals between them. Japan and India must have the same number of gold medals. China cannot have 3 gold medals because Japan and India will not have equal number of medals. This is not possible (from (i)). If China has two gold medals, Japan and India will also have two gold medals each. In this case, South Korea will be placed first. But it will also have the maximum number of medals. India can have a maximum of 2 gold, 2 bronze (from (ii)), and 1 silver (it cannot have 2 silver because it will have same number of gold, silver and bronze medals and it cannot have 3 silver because Japan should then have 4 silver to finish above India). Indonesia can have a maximum of 0 gold, 3 silver and 4 bronze. Similarly, no other country can have more than 9 medals. Hence, this case is not possible because it violates condition (iv).

If South Korea has 2 medals of each type, China, India and Japan must have 7 gold medals between them. This is only possible if China has 3 gold medals, India and Japan have 2 gold medals each. No other combination is possible for distributing 7 gold among these three countries without violating the given conditions.

Since, China has 3 gold, India must have 3 bronze. Also, China would be placed first and hence, it should have won the remaining bronze medal and it should have 1 silver medal (from (iii) and (vii)).

The following table gives the updated information.

Country	Gold	Silver	Bronze
China	3	1	1
Japan	2		0
India	2		3
South Korea	2	2	2
Pakistan	1		0
Indonesia	0		4

Japan and India can have either 3 or 2 or 1 silver medals. If Japan has 3 silver and India has 2 silver, India will have the maximum number of total medals (7) and it will be in third place. This is not possible. If Japan has 3 silver and India has 1 silver, India will not be immediately below Japan.

If Japan has 2 silver and India has 1 silver, Japan will be third, India will be fourth and South Korea will be second.

The remaining 4 silver medals must be distributed between Pakistan and Indonesia such that one of them has at least 7 medals. This is because South Korea in second place has a total of 6 medals. Since, the country with the highest medal tally must not be in top 3, one among Pakistan and Indonesia must have 7 medals in total. Since Pakistan cannot have 7 medals in total, Indonesia must have 3 silver and Pakistan must have 1 silver.

The final medal tally and standings are presented in the table below.

Standings	Country	Gold	Silver	Bronze
1	China	3	1	1
2	South Korea	2	2	2
3	Japan	2	2	0
4	India	2	1	3
5	Pakistan	1	1	0
6	Indonesia	0	3	4

. Among the given statements, only B is definitely true. Choice (B)

Q16. DIRECTIONS *for question 16:* Type in your answer in the input box provided below the question.
What is the maximum total number of medals won by any country in the tournament?

Given that China is not in the last place from (ii). India also cannot be in the last place because if India is in the last place, it should have 4 bronze medals. From (ii), China should have 4 gold medals. This is not possible from (iii). Also, from (vi), Japan was also not in the last place. South Korea could not be in the last place because it could not have won 4 bronze medals from (v). Hence, either Pakistan or Indonesia must be in the last place.

If Pakistan is in the last place, the other 5 countries should have at least 2 gold medals each (since they cannot have 1 or 0 gold medals). This is not possible. Hence, Indonesia is in the last place with 0 gold medals and 4 bronze medals (it cannot have one gold medal from (i)).

From (i), South Korea must have won either 2 medals or 3 medals each of gold, silver and bronze. It could not have one gold because Pakistan was the only country to win one gold medal. It could not have won more than 3 gold medals from (iii).

If South Korea has 3 medals of each type, China, India, and Japan must have 6 gold medals between them. Japan and India must have the same number of gold medals. China cannot have 3 gold medals because Japan and India will not have equal number of medals. This is not possible (from (i)). If China has two gold medals, Japan and India will also have two gold medals each. In this case, South Korea will be placed first. But it will also have the maximum number of medals. India can have a maximum of 2 gold, 2 bronze (from (ii)), and 1 silver (it cannot have 2 silver because it will have same number of gold, silver and bronze medals and it cannot have 3 silver because Japan should then have 4 silver to finish above India). Indonesia can have a maximum of 0 gold, 3 silver and 4 bronze. Similarly, no other country can have more than 9 medals. Hence, this case is not possible because it violates condition (iv).

If South Korea has 2 medals of each type, China, India and Japan must have 7 gold medals between them. This is only possible if China has 3 gold medals, India and Japan have 2 gold medals each. No other combination is possible for distributing 7 gold among these three countries without violating the given conditions.

Since, China has 3 gold, India must have 3 bronze. Also, China would be placed first and hence, it should have won the remaining bronze medal and it should have 1 silver medal (from (iii) and (vii)).

The following table gives the updated information.

Country	Gold	Silver	Bronze
China	3	1	1
Japan	2		0
India	2		3
South Korea	2	2	2
Pakistan	1		0
Indonesia	0		4

Japan and India can have either 3 or 2 or 1 silver medals. If Japan has 3 silver and India has 2 silver, India will have the maximum number of total medals (7) and it will be in third place. This is not possible. If Japan has 3 silver and India has 1 silver, India will not be immediately below Japan.

If Japan has 2 silver and India has 1 silver, Japan will be third, India will be fourth and South Korea will be second.

The remaining 4 silver medals must be distributed between Pakistan and Indonesia such that one of them has at least 7 medals. This is because South Korea in second place has a total of 6 medals. Since, the country with the highest medal tally must not be in top 3, one among Pakistan and Indonesia must have 7 medals in total. Since Pakistan cannot have 7 medals in total, Indonesia must have 3 silver and Pakistan must have 1 silver.

The final medal tally and standings are presented in the table below.

Standings	Country	Gold	Silver	Bronze
1	China	3	1	1
2	South Korea	2	2	2
3	Japan	2	2	0
4	India	2	1	3
5	Pakistan	1	1	0
6	Indonesia	0	3	4

Indonesia won the maximum number i.e., 7 medals in total. Ans: (7)

DIRECTIONS *for questions 17 to 20:* Answer the questions on the basis of the information given below.

Six passengers – A through F – are traveling in a train. Each of them has to alight the train at a different station among Nagpur, Ahmedabad, Bangalore, Jaipur, Meerut and Darjeeling, and speaks a different language among Hindi, English, Telugu, Tamil, Marathi and Bengali. Further, the following information is known about the passengers:

i. C alighted at Bangalore and E speaks either English or Hindi.
ii. A, who did not alight the train at Darjeeling, speaks neither Telugu nor Tamil, while B alighted the train at Meerut or Jaipur.
iii. The person who speaks Tamil alighted the train at neither Jaipur nor Meerut, while the person who speaks Marathi alighted the train at Darjeeling.
iv. D, who speaks Bengali, did not alight the train at Nagpur, while the person who alighted the train at Ahmedabad speaks English.

Q17. DIRECTIONS *for question 17:* Type in your answer in the input box provided below the question.
For how many of the six persons can both the alighting station and language be uniquely determined?

The information given in the conditions can be tabulated as follows:

Person	A	B	C	D	E	F
Station	Darjeelingx	Meerut /Jaipur	Bangalore	Nagpur x		
Language	Telugux Tamil x			Bengali	Eng/Hin	

From the table, either D or E or F is from Darjeeling. As the person from Darjeeling speaks Marathi, F must be from Darjeeling – (1) As the person from Ahmedabad speaks English, D cannot be from Ahmedabad and as F is from Darjeeling, he can also not be from Ahmedabad ⇒ D alighted either at Meerut or at Jaipur. A and E must have alighted at Ahmedabad and Nagpur in any order.

From (1), F speaks Marathi. As the person who speaks Tamil is neither from Meerut nor from Jaipur, C must be the person speaking Tamil. ⇒ B must be the person speaking Telugu. Thus, the final arrangement will be as follows:

A	B	C	D	E	F
Ahmedabad/ Nagpur	Meerut /Jaipur	Bangalore	Jaipur/ Meerut	Nagpur/ Ahmedabad	Darjeeling
Hin/Eng	Telugu	Tamil	Bengali	Eng/Hin	Marathi

From the above table, only for C and F, can both the alighting station and language be uniquely determined Ans: (2)

Q18. DIRECTIONS *for questions 18 to 20:* Select the correct alternative from the given choices.
If the person alighting the train at Meerut speaks Bengali, then the person alighting the train at Jaipur speaks

a) Hindi.

b) Tamil.

c) Telugu.

d) Cannot be determined

The information given in the conditions can be tabulated as follows:

Person	A	B	C	D	E	F
Station	Darjeelingx	Meerut /Jaipur	Bangalore	Nagpur x		
Language	Telugux Tamil x			Bengali	Eng/Hin	

From the table, either D or E or F is from Darjeeling. As the person from Darjeeling speaks Marathi, F must be from Darjeeling – (1) As the person from Ahmedabad speaks English, D cannot be from Ahmedabad and as F is from Darjeeling, he can also not be from Ahmedabad ⇒ D alighted either at Meerut or at Jaipur. A and E must have alighted at Ahmedabad and Nagpur in any order.

From (1), F speaks Marathi. As the person who speaks Tamil is neither from Meerut nor from Jaipur, C must be the person speaking Tamil. ⇒ B must be the person speaking Telugu. Thus, the final arrangement will be as follows:

A	B	C	D	E	F
Ahmedabad/ Nagpur	Meerut /Jaipur	Bangalore	Jaipur/ Meerut	Nagpur/ Ahmedabad	Darjeeling
Hin/Eng	Telugu	Tamil	Bengali	Eng/Hin	Marathi

If the person from Meerut speaks Bengali, then the person from Jaipur speaks Telugu.

Choice (C)

Q19. DIRECTIONS *for questions 18 to 20:* Select the correct alternative from the given choices. Which of the following statements is definitely false?

a) F is the person who speaks Marathi.

b) A is the person who speaks English.

c) E is the person who speaks English.

d) C is the person who speaks Hindi.

The information given in the conditions can be tabulated as follows:

Person	A	B	C	D	E	F
Station	Darjeelingx	Meerut /Jaipur	Bangalore	Nagpur x		
Language	Telugux Tamil x			Bengali	Eng/Hin	

From the table, either D or E or F is from Darjeeling. As the person from Darjeeling speaks Marathi, F must be from Darjeeling – (1) As the person from Ahmedabad speaks English, D cannot be from Ahmedabad and as F is from Darjeeling, he can also not be from Ahmedabad ⇒ D alighted either at Meerut or at Jaipur. A and E must have alighted at Ahmedabad and Nagpur in any order.

From (1), F speaks Marathi. As the person who speaks Tamil is neither from Meerut nor from Jaipur, C must be the person speaking Tamil. ⇒ B must be the person speaking Telugu. Thus, the final arrangement will be as follows:

A	B	C	D	E	F
Ahmedabad/ Nagpur	Meerut /Jaipur	Bangalore	Jaipur/ Meerut	Nagpur/ Ahmedabad	Darjeeling
Hin/Eng	Telugu	Tamil	Bengali	Eng/Hin	Marathi

From the above table, F is the person who speaks Marathi. Hence option (A) is not definitely false. A and E can speak either English or Hindi. Hence option (B) and (C) are not definitely false.
C speaks Tamil. Hence, option (D) is definitely false Choice (D)

Q20. DIRECTIONS *for questions 18 to 20:* Select the correct alternative from the given choices.
If A speaks English, then E alights at

a) Ahmedabad.

b) Jaipur.

c) Nagpur.

d) Meerut.

The information given in the conditions can be tabulated as follows:

Person	A	B	C	D	E	F
Station	Darjeelingx	Meerut /Jaipur	Bangalore	Nagpur x		
Language	Telugux Tamil x			Bengali	Eng/Hin	

From the table, either D or E or F is from Darjeeling. As the person from Darjeeling speaks Marathi, F must be from Darjeeling – (1) As the person from Ahmedabad speaks English, D cannot be from Ahmedabad and as F is from Darjeeling, he can also not be from Ahmedabad ⇒ D alighted either at Meerut or at Jaipur. A and E must have alighted at Ahmedabad and Nagpur in any order.

From (1), F speaks Marathi. As the person who speaks Tamil is neither from Meerut nor from Jaipur, C must be the person speaking Tamil. ⇒ B must be the person speaking Telugu. Thus, the final arrangement will be as follows:

A	B	C	D	E	F
Ahmedabad/ Nagpur	Meerut /Jaipur	Bangalore	Jaipur/ Meerut	Nagpur/ Ahmedabad	Darjeeling
Hin/Eng	Telugu	Tamil	Bengali	Eng/Hin	Marathi

In this case, E alights at Nagpur. Choice (C)

DIRECTIONS *for questions 21 to 24:* Answer the questions on the basis of the information given below.

Ramesh uses a mobile phone of Mobcell Network. During a particular week, he made calls to and received calls from only three different numbers, 9xxxxxxxx1, 9xxxxxxxx2, and 9xxxxxxxx3. Each call that he made/received during the week belongs to any one of the following four categories:

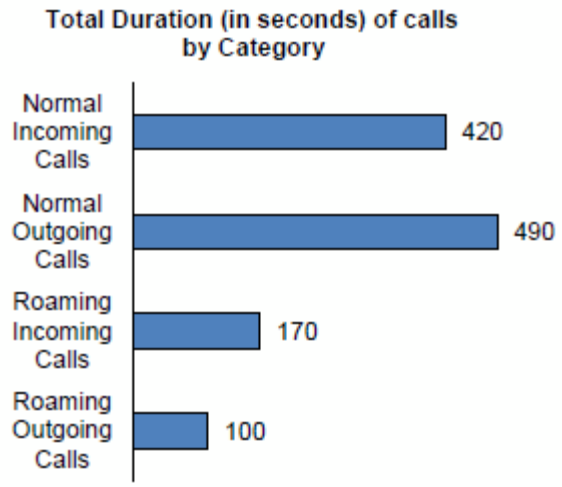
- Normal incoming call, for which Mobcell charges 10 paise per second.
- Normal outgoing call, for which Mobcell charges 25 paise per second.
- Roaming incoming call, for which Mobcell charges 50 paise per second.
- Roaming outgoing call, for which Mobcell charges 125 paise per second.

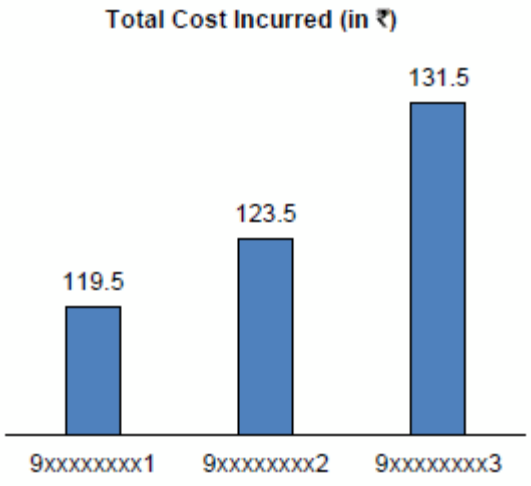
For each of the three numbers (mentioned above), there was at least one call that fell into each of the four categories. The following tables and graph give information about the duration of the calls of different categories. The table provides information on the duration (in seconds) of each call made/received by Ramesh during the week. The horizontal bar graph provides information on the

total duration (in seconds) of calls grouped by category. The second bar graph presents the total cost (in Rs.) incurred by Ramesh due to calls of all categories from/to each number.

Duration of Each Call

Number	Duration (sec)	Number	Duration (sec)
9xxxxxxxx1	120	9xxxxxxxx1	10
9xxxxxxxx2	80	9xxxxxxxx2	30
9xxxxxxxx1	120	9xxxxxxxx3	180
9xxxxxxxx1	40	9xxxxxxxx2	100
9xxxxxxxx3	20	9xxxxxxxx3	140
9xxxxxxxx3	50	9xxxxxxxx1	20
9xxxxxxxx2	160	9xxxxxxxx1	110





Q21. DIRECTIONS *for question 21:* Select the correct alternative from the given choices.
To which category does the call which had a duration of 50 seconds belong?

a) Normal Incoming call

b) Normal Outgoing call

c) Roaming Incoming call

d) Roaming Outgoing call

Let ON represent a normal outgoing call, OR represent a roaming outgoing call, IN represent a normal incoming call, and IR represent a roaming incoming call.
The calls made from/to 9xxxxxxxx3 are of 20, 50, 140, 180 seconds. Of these, the 180-second call cannot be a roaming call. The 140-second call also cannot be a roaming call because then the other 2 numbers should have made 2 roaming incoming calls with a total duration of 30 seconds. Hence, the 20-second call and the 50-second call must be roaming calls. Since the total cost incurred by Ramesh due to calls from/to this number is ₹131.5, we can find out the category of each call by calculating the total cost for some combinations of duration and call category.
If the 50-second call is IR, the 20-second call is OR, the 180-second call is ON and the 140-second call is IN, total cost incurred = 50 × 0.5 + 20 × 1.25 + 140 × 0.1 + 180 × 0.25 = 109.
Since, the cost incurred is more, swapping the 50-second call and the 20-second call, we get cost incurred
= 0 × 1.25 + 20 × 0.5 + 140 × 0.1 + 180 × 0.25 = 131.5.
Hence, the 50-second call is OR, the 20-second call, IR, the 180-second call, ON, and the 140-second call, IN.
Similarly, calculating for 9xxxxxxxx2, the 80-second call is ON, the 160-second call IN, the 30-second call is OR, and the 100-second call is IR.
The remaining duration of IN is 420 – 140 – 160 = 120 seconds.
The remaining duration of ON = 490 – 180 – 80 = 230 seconds.
The remaining duration of IR = 170 – 20 – 100 = 50 seconds.
The remaining duration of OR = 100 – 50 – 30 = 20 seconds.
The duration of all calls involving 9xxxxxxxx1 are 120, 120, 40, 10, 20, 110 seconds.
The 20-second call must be OR. The120-second call and the 110-second call must be ON, the 40-second and the 10-second calls must be IR and the 120-second call must be IN.

The 50-second call is a roaming outgoing call. Choice (D)

Q22. DIRECTIONS *for question 22 and 23:* Type in your answer in the input box provided in the question.
What is the duration of the normal incoming calls from the number 9xxxxxxxx2 as a percentage of the total duration of all calls made from or to that number?

Enter your answer rounded off to the nearest integer.

Let ON represent a normal outgoing call, OR represent a roaming outgoing call, IN represent a normal incoming call, and IR represent a roaming incoming call.
The calls made from/to 9xxxxxxxx3 are of 20, 50, 140, 180 seconds. Of these, the 180-second call cannot be a roaming call. The 140-second call also cannot be a roaming call because then the other 2 numbers should have made 2 roaming incoming calls with a total duration of 30 seconds. Hence, the 20-second call and the 50-second call must be roaming calls. Since the total cost incurred by Ramesh due to calls from/to this number is ₹131.5, we can find out the category of each call by calculating the total cost for some combinations of duration and call category.
If the 50-second call is IR, the 20-second call is OR, the 180-second call is ON and the 140-second call is IN, total cost incurred = 50 × 0.5 + 20 × 1.25 + 140 × 0.1 + 180 × 0.25 = 109.
Since, the cost incurred is more, swapping the 50-second call and the 20-second call, we get cost incurred
= 0 × 1.25 + 20 × 0.5 + 140 × 0.1 + 180 × 0.25 = 131.5.
Hence, the 50-second call is OR, the 20-second call, IR, the 180-second call, ON, and the 140-second call, IN.
Similarly, calculating for 9xxxxxxxx2, the 80-second call is ON, the 160-second call IN, the 30-second call is OR, and the 100-second call is IR.
The remaining duration of IN is 420 – 140 – 160 = 120 seconds.
The remaining duration of ON = 490 – 180 – 80 = 230 seconds.
The remaining duration of IR = 170 – 20 – 100 = 50 seconds.
The remaining duration of OR = 100 – 50 – 30 = 20 seconds.
The duration of all calls involving 9xxxxxxxx1 are 120, 120, 40, 10, 20, 110 seconds.
The 20-second call must be OR. The120-second call and the 110-second call must be ON, the 40-second and the 10-second calls must be IR and the 120-second call must be IN.

The duration of incoming calls from 9xxxxxxxx2 = 160 seconds.
Required percentage = 160/370×100 = 43.24%. Ans: (43)

Q23.
DIRECTIONS *for question 22 and 23:* Type in your answer in the input box provided in the question.

What is the average duration in seconds of each normal outgoing call made by Ramesh during the week?
Enter your answer as a decimal value, rounded off to two decimal places.

Let ON represent a normal outgoing call, OR represent a roaming outgoing call, IN represent a normal incoming call, and IR represent a roaming incoming call.
The calls made from/to 9xxxxxxxx3 are of 20, 50, 140, 180 seconds. Of these, the 180-second call cannot be a roaming call. The 140-second call also cannot be a roaming call because then the other 2 numbers should have made 2 roaming incoming calls with a total duration of 30 seconds. Hence, the 20-second call and the 50-second call must be roaming calls. Since the total cost incurred by Ramesh due to calls from/to this number is ₹131.5, we can find out the category of each call by calculating the total cost for some combinations of duration and call category.
If the 50-second call is IR, the 20-second call is OR, the 180-second call is ON and the 140-second call is IN, total cost incurred = 50 × 0.5 + 20 × 1.25 + 140 × 0.1 + 180 × 0.25 = 109.
Since, the cost incurred is more, swapping the 50-second call and the 20-second call, we get cost incurred
= 0 × 1.25 + 20 × 0.5 + 140 × 0.1 + 180 × 0.25 = 131.5.
Hence, the 50-second call is OR, the 20-second call, IR, the 180-second call, ON, and the 140-second call, IN.
Similarly, calculating for 9xxxxxxxx2, the 80-second call is ON, the 160-second call IN, the 30-second call is OR, and the 100-second call is IR.
The remaining duration of IN is 420 – 140 – 160 = 120 seconds.
The remaining duration of ON = 490 – 180 – 80 = 230 seconds.
The remaining duration of IR = 170 – 20 – 100 = 50 seconds.
The remaining duration of OR = 100 – 50 – 30 = 20 seconds.
The duration of all calls involving 9xxxxxxxx1 are 120, 120, 40, 10, 20, 110 seconds.
The 20-second call must be OR. The120-second call and the 110-second call must be ON, the 40-second and the 10-second calls must be IR and the 120-second call must be IN.

Total duration of normal outgoing calls = 180 + 80 + 110 + 120 = 490
Average duration of each call = 490/4 = 122.5 seconds. Ans: (122.5)

Q24. DIRECTIONS *for question 24:* Select the correct alternative from the given choices.
The average cost incurred per call for all the outgoing calls made by Ramesh to 9xxxxxxxx1 was

a) Rs.20.62.

b) Rs.27.50.

c) Rs.31.25.

d) Rs.29.33.

Let ON represent a normal outgoing call, OR represent a roaming outgoing call, IN represent a normal incoming call, and IR represent a roaming incoming call.
The calls made from/to 9xxxxxxxx3 are of 20, 50, 140, 180 seconds. Of these, the 180-second call cannot be a roaming call. The 140-second call also cannot be a roaming call because then the other 2 numbers should have made 2 roaming incoming calls with a total duration of 30 seconds. Hence, the 20-second call and the 50-second call must be roaming calls. Since the total cost incurred by Ramesh due to calls from/to this number is ₹131.5, we can find out the category of each call by calculating the total cost for some combinations of duration and call category.
If the 50-second call is IR, the 20-second call is OR, the 180-second call is ON and the 140-second call is IN, total cost incurred = 50 × 0.5 + 20 × 1.25 + 140 × 0.1 + 180 × 0.25 = 109.
Since, the cost incurred is more, swapping the 50-second call and the 20-second call, we get cost incurred
= 0 × 1.25 + 20 × 0.5 + 140 × 0.1 + 180 × 0.25 = 131.5.
Hence, the 50-second call is OR, the 20-second call, IR, the 180-second call, ON, and the 140-second call, IN.
Similarly, calculating for 9xxxxxxxx2, the 80-second call is ON, the 160-second call IN, the 30-second call is OR, and the 100-second call is IR.
The remaining duration of IN is 420 – 140 – 160 = 120 seconds.
The remaining duration of ON = 490 – 180 – 80 = 230 seconds.
The remaining duration of IR = 170 – 20 – 100 = 50 seconds.
The remaining duration of OR = 100 – 50 – 30 = 20 seconds.
The duration of all calls involving 9xxxxxxxx1 are 120, 120, 40, 10, 20, 110 seconds.
The 20-second call must be OR. The120-second call and the 110-second call must be ON, the 40-second and the 10-second calls must be IR and the 120-second call must be IN.

Total cost incurred due to outgoing calls made to 9xxxxxxxxx1
= 20 × 1.25 + 120 × 0.25 + 110 × 0.25 = 82.5
Average cost of each call = 82.5/3 = ₹27.5. Choice (B)

DIRECTIONS *for questions 25 to 28:* Answer the questions on the basis of the information given below.

Exactly eight persons, Amar, Bob, Charles, Dev, Eswar, Gautam, Hugh, and Imran, were standing in a queue to purchase movie tickets. However, there were only six movie tickets, comprising two VIP tickets, three first-class tickets and one second-class ticket, available at the counter when these eight persons were in the queue. Each person had a certain preference regarding the type of ticket he wanted to purchase but finally purchased any type of ticket that was available, if his preferred type of ticket was not available. Further, the following information is known:

i. Amar who wanted to buy a second-class ticket was not able to buy a second-class ticket, which happened to be the first of the three types of tickets to get sold out. He instead purchased the only type of ticket available when his turn arrived.

ii. Bob wanted a VIP ticket but was not able to purchase a VIP ticket since the last ticket of that type was sold out to the person standing immediately before him.
iii. Imran purchased a VIP ticket, which was also his preferred type of ticket, though he was not standing at the beginning of the queue.
iv. Charles, who purchased a VIP ticket, was standing behind Imran.
v. Eswar, who was not standing last in the queue, was one of the persons who could not get any ticket when his turn arrived and he was standing immediately behind Dev.

Q25. DIRECTIONS *for questions 25 to 28:* Select the correct alternative from the given choices.
Which type of ticket did Amar purchase?

a) VIP

b) First-class

c) Second-class

d) Cannot be determined

Of the eight persons, only six would have been able to purchase a ticket. From (v), Eswar must have been 7^{th} in the line and Dev must have been 6^{th}. From (i), Amar purchased the only type of ticket available. Hence, he should have been standing either 4^{th} or 5^{th}, i.e., depending on which type of ticket was left (and which other types got sold out). Since Bob could not purchase a VIP ticket, he should have been standing behind both Imran and Charles. Further, Bob must have been standing immediately behind Charles, since the person in front of Bob purchased the last VIP ticket. Therefore, Imran, Charles and Bob must have been standing 2^{nd}, 3^{rd}, and 4^{th} respectively (this is since, Amar can only stand either 4^{th} or 5^{th} and he also cannot stand between Charles and Bob). Since Imran and Charles purchased the two VIP tickets, the person standing first in line must have purchased a second class ticket (from (i), wherein the second class ticket must be one of the first three tickets to be sold). From (i), Amar must have been standing behind Bob, i.e., 5^{th}, and Bob must have purchased a first-class ticket.
One among Gautam or Hugh must be standing at the beginning and the other must be standing at the end.
The following caseis possible.

Person	Gautam/Hugh	Imran	Charles	Bob	Amar	Dev	Eswar	Hugh/Gautam
Ticket Purchased	Second	VIP	VIP	First	First	First	None	None

Amar purchased a first class ticket. Choice (B)

Q26. DIRECTIONS *for questions 25 to 28:* Select the correct alternative from the given choices.

Who among the following could have been standing at the beginning of the queue?

a) Hugh

b) Bob

c) Dev

d) More than one of the above

Of the eight persons, only six would have been able to purchase a ticket. From (v), Eswar must have been 7^{th} in the line and Dev must have been 6^{th}. From (i), Amar purchased the only type of ticket available. Hence, he should have been standing either 4^{th} or 5^{th}, i.e., depending on which type of ticket was left (and which other types got sold out). Since Bob could not purchase a VIP ticket, he should have been standing behind both Imran and Charles. Further, Bob must have been standing immediately behind Charles, since the person in front of Bob purchased the last VIP ticket. Therefore, Imran, Charles and Bob must have been standing 2^{nd}, 3^{rd}, and 4^{th} respectively (this is since, Amar can only stand either 4^{th} or 5^{th} and he also cannot stand between Charles and Bob). Since Imran and Charles purchased the two VIP tickets, the person standing first in line must have purchased a second class ticket (from (i), wherein the second class ticket must be one of the first three tickets to be sold). From (i), Amar must have been standing behind Bob, i.e., 5^{th}, and Bob must have purchased a first-class ticket.
One among Gautam or Hugh must be standing at the beginning and the other must be standing at the end.
The following caseis possible.

Person	Gautam/Hugh	Imran	Charles	Bob	Amar	Dev	Eswar	Hugh/Gautam
Ticket Purchased	Second	VIP	VIP	First	First	First	None	None

Among the given options, only Hugh could be standing first in line. Choice (A)

Q27. DIRECTIONS *for questions 25 to 28:* Select the correct alternative from the given choices.
If Hugh was not able to purchase any ticket when his turn arrived, what would have been Gautam's preferred type of ticket?

a) First-class

b) Second-class

c) VIP

d) Cannot be determined

Of the eight persons, only six would have been able to purchase a ticket. From (v), Eswar must have been 7^{th} in the line and Dev must have been 6^{th}. From (i), Amar purchased the only type of ticket available. Hence, he should have been standing either 4^{th} or 5^{th}, i.e., depending on which type of ticket was left (and which other types got sold out). Since Bob could not purchase a VIP ticket, he should have been standing behind both Imran and Charles. Further, Bob must have been standing immediately behind Charles, since the person in front of Bob purchased the last VIP ticket. Therefore, Imran, Charles and Bob must have been standing 2^{nd}, 3^{rd}, and 4^{th} respectively (this is since, Amar can only stand either 4^{th} or 5^{th} and he also cannot stand between Charles and Bob). Since Imran and Charles purchased the two VIP tickets, the person standing first in line must have purchased a second class ticket (from (i), wherein the second class ticket must be one of the first three tickets to be sold). From (i), Amar must have been standing behind Bob, i.e., 5^{th}, and Bob must have purchased a first-class ticket.
One among Gautam or Hugh must be standing at the beginning and the other must be standing at the end.
The following caseis possible.

Person	Gautam/Hugh	Imran	Charles	Bob	Amar	Dev	Eswar	Hugh/Gautam
Ticket Purchased	Second	VIP	VIP	First	First	First	None	None

If Hugh was not able purchase any ticket, Gautam would be first in line. Hence, he would have purchased his preferred ticket type. Gautam purchased a second-class ticket, which must have been his preferred ticket type. Choice (B)

Q28. DIRECTIONS *for questions 25 to 28:* Select the correct alternative from the given choices. Among Amar, Bob, Gautam, Hugh and Imran, how many people purchased first-class tickets?

a) 0

b) 1

c) 2

d) Cannot be determined

Of the eight persons, only six would have been able to purchase a ticket. From (v), Eswar must have been 7th in the line and Dev must have been 6th. From (i), Amar purchased the only type of ticket available. Hence, he should have been standing either 4th or 5th, i.e., depending on which type of ticket was left (and which other types got sold out). Since Bob could not purchase a VIP ticket, he should have been standing behind both Imran and Charles. Further, Bob must have been standing immediately behind Charles, since the person in front of Bob purchased the last VIP ticket. Therefore, Imran, Charles and Bob must have been standing 2nd, 3rd, and 4th respectively (this is since, Amar can only stand either 4th or 5th and he also cannot stand between Charles and Bob). Since Imran and Charles purchased the two VIP tickets, the person standing first in line must have purchased a second class ticket (from (i), wherein the second class ticket must be one of the first three tickets to be sold). From (i), Amar must have been standing behind Bob, i.e., 5th, and Bob must have purchased a first-class ticket.
One among Gautam or Hugh must be standing at the beginning and the other must be standing at the end.
The following caseis possible.

Person	Gautam/Hugh	Imran	Charles	Bob	Amar	Dev	Eswar	Hugh/Gautam
Ticket Purchased	Second	VIP	VIP	First	First	First	None	None

Among the names given in the question, only two persons, Amar and Bob, got first class tickets. Choice (C)

DIRECTIONS *for questions 29 to 32:* Answer the questions on the basis of the information given below.

A control panel, containing *n* switches, numbered from 1 to *n*, is used to operate *n* different machines, named M_1 to M_n, in a workshop. The control panel with *n* switches, each operating exactly one of the *n* machines, is present in one room, while the machines are all placed in another room. The laptop which contains the details of which switch on the panel operates which machine, is infected with a virus and all the relevant data was lost. Now, Mr. Rajan, the operator, wanted to match each switch on the panel with the corresponding machine that it operates by manually checking them out.

However, as the machines and the control panel are in different rooms, each time that Mr. Rajan turns on or turns off one or more of the switches, he has to go to the other room and visually identify the machine/s which has/have been turned on or turned off, and he is then said to have performed one *check*.

In the process of performing his *checks*, Mr. Rajan has no additional source of information, other than visually identifying the machine or group of machines that have been turned on or turned off. Further, in any *check*, if he identifies a group of machines that have been turned on or turned off, then he can only associate that group of machines with the corresponding group of switches that he operated (i.e., turned on or turned off) in that *check*, without necessarily being able to match each switch operated with the exact machine that it operates.

Initially all the machines are turned off.

Unless mentioned otherwise, assume that all the machines and switches are in working condition.

Q29. DIRECTIONS *for questions 29 and 30:* Select the correct alternative from the given choices.
If $n = 5$, then what is the minimum number of *checks* that Mr. Rajan has to perform to match all the switches with their corresponding machines?

a) 1

b) 2

c) 3

D) 4

Let the number of switches be 2^m, which correspond to 2^m machines. Initially Rajan switches on 2^{m-1} switches and hence can correspond these with their machines in one check simultaneously he can correspond the remaining switches with their machines.
Now 2^{m-2} switches each from the above two sets of 2^{m-1} switches are switched on. Hence he can correspond these four sets of 2^{m-2} switches with their respective machines. Similarly, 2^{m-3} from each of these sets are switched and so on until one switch from each set is switched onto find each switch and its corresponding machine.
For example consider 8 switches 1, 2, 3, 4, 5, 6, 7 and 8 which correspond to machines A, B, C, D, E, F, G and H.
At first 1, 2, 3, 4 are switched on.
1, 2, 3, 4 – A, B, C, D
5, 6, 7, 8 – E, F, G, H
Now 1, 2, 5 and 6 are switched on we get
1, 2 – A, B
3, 4 – C, D
5, 6 – E, F
7, 8 – G, H
Now 1, 3, 5 and 7 are switched on to match each switch with its corresponding machine. So, 3 checks are necessary for 2^3 switches.
$\therefore$ For 2^m switches, m checks are necessary.
For 2^{m+1} switches, $m + 1$ checks are necessary. For switches between 2^m and 2^{m+1}, $m + 1$ checks are necessary.

Since $2^2 < 5 \leq 2^3$, m = 3. Choice (C)

d

Q30. DIRECTIONS *for questions 29 and 30:* Select the correct alternative from the given choices.
In $n = 8$, then what is the minimum number of *checks* that Mr. Rajan has to perform to match all the switches with their corresponding machines?

a) 3

b) 7

c) 4

d) 5

Let the number of switches be 2^m, which correspond to 2^m machines. Initially Rajan switches on 2^{m-1} switches and hence can correspond these with their machines in one check simultaneously he can correspond the remaining switches with their machines.
Now 2^{m-2} switches each from the above two sets of 2^{m-1} switches are switched on. Hence he can correspond these four sets of 2^{m-2} switches with their respective machines. Similarly, 2^{m-3} from each of these sets are switched and so on until one switch from each set is switched onto find each switch and its corresponding machine.
For example consider 8 switches 1, 2, 3, 4, 5, 6, 7 and 8 which correspond to machines A, B, C, D, E, F, G and H.
At first 1, 2, 3, 4 are switched on.
1, 2, 3, 4 – A, B, C, D
5, 6, 7, 8 – E, F, G, H
Now 1, 2, 5 and 6 are switched on we get
1, 2 – A, B
3, 4 – C, D
5, 6 – E, F
7, 8 – G, H
Now 1, 3, 5 and 7 are switched on to match each switch with its corresponding machine. So, 3 checks are necessary for 2^3 switches.
$\therefore$ For 2^m switches, m checks are necessary.
For 2^{m+1} switches, $m + 1$ checks are necessary. For switches between 2^m and 2^{m+1}, $m + 1$ checks are necessary.

Since $2^2 < 8 \leq 2^3$, m = 3. Choice (A)

Q31. DIRECTIONS *for question 31:* Type in your answer in the input box provided below the question.
If n = 11, then what is the minimum number of *checks* that Mr. Rajan has to perform to match all the switches with their corresponding machines?

Let the number of switches be 2^m, which correspond to 2^m machines. Initially Rajan switches on 2^{m-1} switches and hence can correspond these with their machines in one check simultaneously he can correspond the remaining switches with their machines.
Now 2^{m-2} switches each from the above two sets of 2^{m-1} switches are switched on. Hence he can correspond these four sets of 2^{m-2} switches with their respective machines. Similarly, 2^{m-3} from each of these sets are switched and so on until one switch from each set is switched onto find each switch and its corresponding machine.
For example consider 8 switches 1, 2, 3, 4, 5, 6, 7 and 8 which correspond to machines A, B, C, D, E, F, G and H.
At first 1, 2, 3, 4 are switched on.
1, 2, 3, 4 – A, B, C, D
5, 6, 7, 8 – E, F, G, H
Now 1, 2, 5 and 6 are switched on we get
1, 2 – A, B
3, 4 – C, D
5, 6 – E, F
7, 8 – G, H
Now 1, 3, 5 and 7 are switched on to match each switch with its corresponding machine. So, 3 checks are necessary for 2^3 switches.
$\therefore$ For 2^m switches, m checks are necessary.
For 2^{m+1} switches, $m + 1$ checks are necessary. For switches between 2^m and 2^{m+1}, $m + 1$ checks are necessary.

Since $2^3 < 11 \leq 2^4$, m = 4. Ans: (4)

Q32. DIRECTIONS *for question 32:* Select the correct alternative from the given choices.
If n = 13 and Mr. Rajan knows that one of the machines is not in working condition, then what is the minimum number of *checks* that Mr. Rajan has to perform to match all the switches with their corresponding machines?

a) 4

b) 6

c) 7

d) 5

Let the number of switches be 2^m, which correspond to 2^m machines. Initially Rajan switches on 2^{m-1} switches and hence can correspond these with their machines in one check simultaneously he can correspond the remaining switches with their machines.
Now 2^{m-2} switches each from the above two sets of 2^{m-1} switches are switched on. Hence he can correspond these four sets of 2^{m-2} switches with their respective machines. Similarly, 2^{m-3} from each of these sets are switched and so on until one switch from each set is switched onto find each switch and its corresponding machine.
For example consider 8 switches 1, 2, 3, 4, 5, 6, 7 and 8 which correspond to machines A, B, C, D, E, F, G and H.
At first 1, 2, 3, 4 are switched on.
1, 2, 3, 4 – A, B, C, D
5, 6, 7, 8 – E, F, G, H
Now 1, 2, 5 and 6 are switched on we get
1, 2 – A, B
3, 4 – C, D
5, 6 – E, F
7, 8 – G, H
Now 1, 3, 5 and 7 are switched on to match each switch with its corresponding machine. So, 3 checks are necessary for 2^3 switches.
$\therefore$ For 2^m switches, m checks are necessary.
For 2^{m+1} switches, $m + 1$ checks are necessary. For switches between 2^m and 2^{m+1}, $m + 1$ checks are necessary.

Consider three switches 1 to 3 and each switch turns on A, B, C in that order. Suppose B is not working. 1, 2 can be switched on first and we will know that A can be operated by 1/2.
2, 3 can be switched on next and we will know C can be operated by 2/3. We can also infer that A is operated by 1. Since C cannot be operated by 2 (if it did, it would have turned on in the previous case), C will be operated by 3 and B by 2. Hence, 2 checks are required for 3 switches.
Consider there are 4 switches and B is not working. 1, 2 can be switched on and we will know that A can be operated by 1/2.
1, 3 can be switched on and we will know that A can be operated by 1 and C by 3. B and D can be operated by 2/4. Since we do not know which machine is not working, we will have to do one more check (1, 4 or 3, 4 or 3, 2) to know the exact combination. Hence we need 3 checks for 4 machines. i.e., n + 1 checks for 2^n machines if one machine is not working. Therefore for 4-7 machines, we need 3 checks and for 8-15 machines, we need 4 checks. Hence, the answer is 4. Choice (A)

QA

Q1. DIRECTIONS *for questions 1 to 4:* Select the correct alternative from the given choices.
Consider the following series:

5, 5, 5, 5, 5, 6, 6, 6, 6, 6, 6, 7, 7, 7, 7, 7, 7, 7, 8, 8, 8, 8, 8, 8, 8, 8 .....

Find the sum of the first 1000 terms of the series.

a) 33295

b) 30270

c) 32265

d) 30240

The given series is
T: 5, 5, 5, 5, 5; 6, 6, 6, 6, 6, 6; 7, 7, ……., 7; etc
If we append the terms 1, 2, 2, 3, 3, 3, 4, 4, 4, 4 at the beginning, we get the series
S: 1; 2, 2; 3, 3, 3; 4, 4, 4, 4; 5, 5, 5, 5, 5; …… etc
The required sum is $s_{1010} - \{1 + 2(2) + 3(3) + 4(4)\}$
$= s_{1010} - 30$, where s_{1010} is the sum of the first 1010 terms of S.
If the last term in S is $n + 1$

$$\frac{n(n+1)}{2} < 1010 \leq \frac{(n+1)(n+2)}{2}$$

$\Rightarrow n(n + 1) < 2020 \leq (n + 1)(n + 2)$
As (44) (45) = 1980 and (45) (46) = 2068, $n = 44$
$\therefore$ The series S is 1; 2, 2; …… ; 44, 44 ….. 44;
45….. 45 (20 times)
The number of terms is

$$\frac{44(45)}{2} + 20 = 990 + 20 = 1010$$

The sum of these terms is $1^2 + 2^2 + 3^2 + \ldots\ldots + 44^2 + 45(20)$

$$= \frac{44(45)(89)}{6} + 900 = 29{,}370 + 900 = 30{,}270$$

The required sum is 30,270 – 30 = 30,240. Choice (D)

Q2. DIRECTIONS *for questions 1 to 4:* Select the correct alternative from the given choices.
What is the sum of the digits of a two-digit number, which is 32 less than the square of the product of its digits?

a) 12

b) 9

c) 10

d) 8

As the given number is a two-digit number, it is at least 10 and at most 99.
Also, given that the two-digit number is 32 less than the square of the product of its digits.
∴ The square of the product of its digits is at least (10 + 32) and at most (99 + 32), i.e., at least 7^2 and at most 11^2.
If the product of its digits is 7, 8, 9, 10 and 11, then the number will be (49 – 32), (64 – 32), (81 – 32), (100 – 32) and (121 – 32) respectively. i.e., 17, 32, 49, 68 and 89
Only 17 satisfies the given condition.
∴ The required sum = 1 + 7 = 8. Choice (D)

Q3. DIRECTIONS *for questions 1 to 4:* Select the correct alternative from the given choices.
Ramesh and Rahul have an equal number of mangoes. If Ramesh gives *m* mangoes to Rahul then Rahul would have four times as many mangoes as Ramesh. Instead if Rahul gives *n* mangoes to Ramesh then Ramesh would have twice as many mangoes as Rahul. Find the ratio *n* : *m*

a) 5 : 9

b) 9 : 5

c) 10 : 9

d) 9 : 10

Let the number of fruits with Ramesh or Rahul = y
$y + m = 4(y - m)$ (given)
$\Rightarrow \frac{y+m}{y-m} = \frac{4}{1} \Rightarrow \frac{y}{m} = \frac{5}{3}$ ------- (1)
Similarly $y + n = 2(y - n)$ (given)
$\Rightarrow \frac{y+n}{y-n} = \frac{2}{1} \Rightarrow \frac{y}{n} = \frac{3}{1}$ ---- (2)
∴ From (1) and (2) $\frac{y}{m} \times \frac{x}{y} = \frac{5}{3} \times \frac{1}{3} = \frac{5}{9}$ Choice (A)

Q4. DIRECTIONS *for questions 1 to 4:* Select the correct alternative from the given choices.

The following four equations hold true for three real variables x, y, z numbers:

$(3P + Q)x - (4Q - P)y - (Q - 4R)z = 237$

$(7R - 5Q + 3P)y + (R + 2Q)x + (2P - 3R)z = 315$

$3(P + Q)z - (6R - P - 11Q)y - (Q - 2P)x = 114$

$5P + 2Q + R = 2$

If P, Q and R are three real numbers, find the value of the arithmetic mean of x, y and z.

a) 111

b) 222

c) 333

d) Cannot be determined

By adding all the 3 equations we get
$(5P + 2Q + R)(x + y + z) = 666 \rightarrow (1)$
$5P + Q + R = 2 \rightarrow (2)$
By substituting (2) equation (1), we get
$2(x + y + z) = 666$

$$\Rightarrow \text{A.M.} = \frac{x + y + z}{3} = \frac{666}{6} = 111$$

Choice (A)

Q5. DIRECTIONS *for question 5:* Type in your answer in the input box provided below the question.If x and y are real, find the minimum possible value of the expression $5x^2 + 7y^2 - 30x - 56y + 158$.

$5x^2 + 7y^2 - 30x - 56y + 158$
$= 5(x^2 - 6x) + 7(y^2 - 8y) + 158$
$= 5(x^2 - 6x + 9) + 7(y^2 - 8y + 16) + 158 - 45 - 112$
$= 5(x - 3)^2 + 7(y - 4)^2 + 1$
When $x - 3 = 0$ and $y - 4 = 0$, the expression has the minimum value of 1

Ans: (1)

Q6. DIRECTIONS *for questions 6 and 7:* Select the correct alternative from the given choices.

Malini and Shalini play a game in which they first write down the first n natural numbers, in a row, from left to right. Then they take turns in inserting a plus or a minus sign between pairs of consecutive numbers. When all such signs have been placed, the resulting expression is evaluated (i.e., the additions and subtractions are performed). Malini wins if the absolute value of the result is even and Shalini wins if the absolute value of the result is odd. Which of the following statements is true?

a) Malini wins if n is a multiple of 4

b) Shalini wins if n is even

c) Shalini wins if n is odd

d) Malini loses if n is a multiple of 4

The parity (even or odd) of the expression will be the same as that of the sum of the first n natural numbers. This is since, the parity of the expression remains same whether the sign used is + or –. For example,
1 + 2 + 3 = 6 (even)
1 + 2 – 3 = 0 (even)
|–1 + 2 – 3| = 2 (even)
Hence we need to check the parity of $n(n + 1)/2$
$n(n + 1)/2$ is certainly even only when n is a multiple of 4 and for no other statement can a definite conclusion be drawn.
∴ Malini wins if n is a multiple of 4.

Alternative Solution 1:

The sum of 1st n natural numbers is even whenever there are an even number of odd numbers.

For example, $\underbrace{1 + 2 + 3}_{\text{2 odd no.s}} = 6$

$$\underbrace{1 + 2 + 3 + 4 + 5 + 6 + 7}_{\text{4 odd no.s}} = 28$$

If n is a multiple of 4, the number of odd numbers is definitely even.
∴ The parity of the expression when n is a multiple of 4 is definitely even. This is the only generalisation possible. Therefore only Choice (A) can be always true.

Alternative Solution 2:

For the given choices, one could try to eliminate one or more of them by assuming a few simple cases for 'n'.
For n = 1, |1| → odd.
⇒ Shalini wins. With this information, none of the choices can be eliminated.
Similarly for n = 2, |1 + 2| = 3 → odd.
⇒ Shalini wins. None of the choices can be eliminated.
But for n = 3, |1 + 2 + 3| → even.
⇒ Malini wins. Hence, we can eliminate Choice (C).
Finally, for n = 4, |1 + 2 + 3 + 4| → even.
⇒ Malini wins. Here, we can eliminate choices (B) and (D).
Hence, only Choice (A) remains, which must be the correct answer. Choice (A)

Q7. DIRECTIONS *for questions 6 and 7:* Select the correct alternative from the given choices.
Find the value of m for which the roots of the quadratic equation $11x^2 – (3m + 5)x + 2m + 3 = 0$ are reciprocals of each other.

a) 2

b) 4

c) $\frac{3}{2}$

d) –7

A quadratic equation of the form $ax^2 + bx + c = 0$, with the roots being reciprocals of each other will have the product of its roots as 1, i.e., $\frac{c}{a} = 1$.

In, $11x^2 - (3m + 5)x + (2m + 3) = 0$, $\frac{c}{a} = \frac{2m+3}{11}$

As the roots are reciprocals of each other.

$\frac{2m+3}{11} = 1$

$\Rightarrow m = 4$ Choice (B)

Q8. DIRECTIONS *for questions 8 to 12:* Type in your answer in the input box provided below the question.

Ten points are marked on a straight line and twelve points are marked on another line parallel to it.

What is the maximum number of triangles that can be formed using these points?

We can get the triangles in two ways:

(i) Connecting two points from the line having 10 points and one point from the line having 12 points.
This can be done in ${}^{10}c_2 \times {}^{12}c_1$ $(= 45 \times 12)$ ways.

(ii) Connecting two points from the line having 12 points and one point from the line having 10 points.
This can be done in ${}^{12}c_2 \times {}^{10}c_1$ $(= 66 \times 10)$ ways.

Hence, the maximum number of triangles that can be formed = $45 \times 12 + 66 \times 10$
= 1200 Ans: (1200)

Q9. DIRECTIONS *for questions 8 to 12:* Type in your answer in the input box provided below the question.

Identify the largest among the exponents $3^{\frac{1}{2}}, 4^{\frac{1}{3}}, 5^{\frac{1}{4}}, 7^{\frac{1}{6}}$, and $13^{\frac{1}{12}}$ and enter the base of the exponent as your answer.

H.C.F. of the powers is $\frac{1}{12}$. Raising each of the given numbers to a power equal to 12 we have

$\left(3^{\frac{1}{2}}\right)^{12} = 729$

$\left(4^{\frac{1}{3}}\right)^{12} = 256$

$\left(5^{\frac{1}{4}}\right)^{12} = 125$

$\left(7^{\frac{1}{6}}\right)^{12} = 49$

$\left(13^{\frac{1}{12}}\right)^{12} = 13$

$\therefore 3^{\frac{1}{2}}$ is the largest. Ans: (3)

Q10. DIRECTIONS *for questions 8 to 12:* Type in your answer in the input box provided below the question.

In how many ways can 144 be divided into two parts, such that one part when divided by 5 leaves a remainder of 4, whereas the other part when divided by 8 leaves a remainder of 2?

Let us denote the two numbers as $8a + 2$ and $5b + 4$ respectively.
It is given that, $8a + 2 + 5b + 4 = 144$
$\Rightarrow 8a + 5b = 138$
substituting $a = 1$, we get $b = 26$.
Again, we know that successive values of a and b will change as per the coefficients of b and a respectively.
Applying this, we get the following solutions for a and b

a	1	6	11	16
b	26	18	10	2

Therefore, the numbers are $8a + 2$ and $5b + 4$
i.e, (10, 130), (50, 94), (90, 44) and (130, 14).
Thus we get a total of 4 ways Ans: (4)

Q11. DIRECTIONS *for questions 8 to 12:* Type in your answer in the input box provided below the question.

A tank, of capacity 165 litres, has N taps – numbered from 1 to N – fitted to it. At the start of the n^{th} minute, where $1 \le n \le N$, the tap numbered n, which fills the tank at the rate of n litres per minute, is opened. If it takes exactly N minutes to fill the tank in this manner, find N.

During the 1st minute, only tap 1 would be opened. So 1 litre will be filled by it. During 2nd minute, taps 1 and 2 would be opened. The taps 1 and 2 will fill 1 litre and 2 litres respectively. A total of (1 + 2) litres will be filled. Proceeding in this manner, during the n^{th} minute $(1 + 2 + 3 + \ldots.. n)$ OR $\left(\frac{n(n+1)}{2}\right)$ litres would be filled.

Now adding $\sum n$ from 1 to N
$(1) + (1 + 2) + (1 + 2 + 3) + \ldots.(1 + 2 + 3 + \ldots.N) = 165$
It can easily be checked that
$1 + 3 + 6 + 10 + 15 + 21 + 28 + 36 + 45 = 165$, i.e., $N = 9$ Ans: (9)

Q12. DIRECTIONS *for questions 8 to 12:* Type in your answer in the input box provided below the question.

In the year 1995, the average age of five brothers was 45 years. One of the brothers died in the year 2002, at the age of 40 years. Find the average age (in years) of the remaining four brothers in the year 2007.

The average age of the 5 brothers in 1995 is 45 years. If they all survive up to 2007, their average age would be 57 years in 2007.
But, since one of them died in 2002 at the age of 40 yrs, his age would have been 45 yrs in 2007. In 2007, the total age of the 5 brothers would have been 5(57)
= 285 yrs.
From this, if we subtract the age the deceased would have attained, we get the total age of the 4 surviving brothers.
So, the total age of the 4 brothers is 285 – 45 = 240 yrs.
Hence their average is 60 yrs. Ans: (60)

Q13. DIRECTIONS *for questions 13 and 14:* Type in your answer in the input box provided below the question.

What is the value of d?

The given division is

$$
\begin{array}{r}
5\,b1 \\
cd9\overline{)\,a\,h\,a\,h\,b\,i} \\
a\,g\,d\,e \\
\hline
g\,3\,b \\
f\,i\,8 \\
\hline
c\,d\,i \\
c\,d\,9 \\
\hline
0
\end{array}
$$

There are 3 multiplications and 3 subtractions shown above. From the last subtraction $i = 9$

From the second multiplication $cd9 \times b = f\,i\,8$, $b = 2$. Substituting $b = 2$ and $i = 9$ in the second subtraction, we get $c = 3$ and $d = 4$.

The complete division is

$$
\begin{array}{r}
5\,2\,1 \\
349\overline{)\,1\,8\,1\,8\,2\,9} \\
1\,7\,4\,5 \\
\hline
7\,3\,2 \\
6\,9\,8 \\
\hline
3\,4\,9 \\
3\,4\,9 \\
\hline
0
\end{array}
$$

$d = 4$ Ans: (4)

Q15.

DIRECTIONS *for questions 15 and 16:* Type in your answer in the input box provided below the question.

A solid sphere is put in a cylindrical container. How many of the following percentage values could possibly represent the ratio of the volume of the cylinder not occupied by the sphere and the volume of the sphere?

a. $33^1/_3\%$

b. $55^1/_5\%$

c. 20%

d. $44^1/_4\%$

e 50%

Let the radius of the sphere that has been put in a cylinder be R. The minimum dimensions of the cylinder can then be a radius of R and a height of 2R.

$\therefore$ Minimum Volume of the cylinder = $2\pi R^3$ and the volume of the sphere = $\frac{4\pi R^3}{3}$

$\therefore$ The minimum possible volume of the cylinder not occupied by the sphere

$= 2\pi R^3 - \frac{4\pi R^3}{3} = \frac{2\pi R^3}{3}$

$\therefore$ Remaining volume as percentage of the volume of the sphere is at least

$\frac{\frac{\pi}{3}R^3}{\frac{2\pi}{3}R^3} \times 100 = 50\%$

Only 50% and $55^1/_5\%$ are possible. Ans: (2)

16.

DIRECTIONS *for questions 15 and 16:* Type in your answer in the input box provided below the question.

If a and b are positive integers, such that $3^{b+2} - 5^a = 604$ and $3^{a+1} + 5^b = 706$, then find the sum $a + b$.

$3^{a+1} + 5^b = 706$

5^b can take only the values 1, 5, 25, 125 or 625, depending on b being 0, 1, 2, 3 or 4.

By observation, $3^{a+1} = 81$, for $5^b = 625$ works (since 5's powers end in 5, 3^{a+1} must end in 1.

$\Rightarrow a = 3$ and $b = 4$.

We check that $3^{b+2} - 5^a = 604$ is also satisfied by the above values of a and b

Therefore $a + b = 3 + 4 = 7$ Ans: (7)

Q17. DIRECTIONS *for question 17:* Select the correct alternative from the given choices.

If $4^{[\log_2 \log_3 (4x+1)]} - \log_3 (4x + 1)^6 + 8 = 0$ and $x > 4$, find $\log_4 (x - 4)$.

a) 2

b) 3

c) 4

d) 6

$4^{\log_2 \log_3 (4x+1)} = 2^{2\log_2 \log_3 (4x+1)}$

$= 2^{\log_2 [\log_3 (4x+1)]^2} = [\log_3 (4x+1)]^2$

$\therefore [\log_3 (4x+1)]^2 - 6[\log_3 (4x+1)] + 8 = 0$

$\therefore \log_3 (4x+1) = 2$ or 4.

$\therefore x = 2$ or 20. As $x > 4$, $x = 20$

$\therefore \log_4 (x-4) = 2.$ Choice (A)

Q18. DIRECTIONS *for questions 18 and 19:* Type in your answer in the input box provided below the question.

If $f(x) = 2x + 3$ and $f(f(f(x))) = 13$, then the value of x =

$f(f(f(x))) = 2(2(2x + 3) + 3) + 3 = 13$ (given)

$\Rightarrow 8x + 21 = 13$

$\Rightarrow x = -1$ Ans: (–1)

Q19. DIRECTIONS *for questions 18 and 19:* Type in your answer in the input box provided below the question.

In a group of children, each child has a certain number of pencils from 1 to *n*. If the number of children who have *i* or more pencils is 2^{n-i}, for $i = 1, 2, \ldots n$, and the total number of pencils is 511, find the maximum number of pencils with any child.

The number of children with 1 or more pencils is 2^{n-1}. This number can be considered to represent all the first pencils that the children have, (i.e., those children who have one or more pencils)
The number of children with 2 or more pencils is 2^{n-2}. Similarly, this number can be considered to represent all the second pencils that the children have, (i.e., those children who have 2 or more pencils), and so on.
Finally the number of children with n (nobody has more) pencils is 2^{n-n}. Thus the total of all the pencils that the children have is $2^{n-1} + 2^{n-2} + \ldots..2^{n-n} = 2^n - 1$
$\Rightarrow 511 = 2^n - 1 \Rightarrow n = 9$
i.e., the maximum number of pencils with any child (n) is 9

Alternative Solution:

Let $n = 1$, then the number of students having one or more pencils is $2^{1-1} = 1$. Hence,
Total number of pencils = 1
If $n = 2$, then number of students having
one or more pencils = $2^{2-1} = 2$
two or more pencils = $2^{2-2} = 1$.
Hence, there is exactly one student with two pencils and there are (2 – 1) students having one pencil each.
Hence, total number of pencils = 2 + 1 = 3
Similarly, if $n = 3$, then there is one student with 3 pencils and $(2^{3-2} - 1) = 1$ student with two pencils and $(2^{3-1} - (1 + 1)) = 2$ students with one pencil each.
That is a total of 3 + 2 + 2 = 7 pencils.
It can be observed (from the pattern) that total number of pencils = $2^n - 1$
Hence, given total no. of pencils = 511, i.e., $2^9 - 1$, we get $n = 9$. Ans: (9)

20. DIRECTIONS *for question 20:* Select the correct alternative from the given choices.

In an ideal gas undergoing an adiabatic process, $PV^{\left(\frac{4}{3}\right)}$ is constant, where P is the pressure exerted by the gas enclosed in volume V. If the volume increases by 700%, find the percentage decrease in the pressure.

a) 6.25%

b) 93.75%

c) 12.5%

d) 87.5%

$P_1V_1^{4/3} = P_2V_2^{4/3} \Rightarrow \frac{P_2}{P_1} = \left(\frac{V_1}{V_2}\right)^{4/3}$

V_2 is 700% more than V_1, i.e., $V_2 = 8V_1 \Rightarrow \frac{V_1}{V_2} = \frac{1}{8}$

$\therefore \frac{P_2}{P_1} = \frac{1}{16} = 1 - \frac{15}{16}$ or $P_2 = P_1 - \frac{15}{16}P_1$

$\therefore$ Percentage decrease in pressure

$= \frac{15P_1}{16P_1} = \frac{15}{16}(100\%) = 93.75\%$ Choice (B)

Q21. DIRECTIONS *for questions 21 and 22:* Type in your answer in the input box provided below the question.

How many three-digit even numbers which are divisible by 11 also have the sum of their digits equal to 10?

Let *abc* be the three-digit number ($a \neq 0$). Since the number is divisible by 11,
Either $a + c = b$ or $a + c = b + 11$
(since $a + c - b$ cannot be any higher multiple of 11).
Case i: If $a + c = b$, given that $a + b + c = 10$
$\Rightarrow a + c = b = 5$ and (a, c) can be (5, 0), (3, 2) or (1, 4), since the three-digit number must be even.
Case ii: If $a + c = b + 11$, given that $a + b + c = 10$
$\Rightarrow 2b + 11 = 10 \Rightarrow b = -0.5$.
Since this is not possible, case ii is not possible.
Hence, only three such numbers are possible i.e., 550, 352 and 154. Ans: (3)

Q22. DIRECTIONS *for questions 21 and 22:* Type in your answer in the input box provided below the question.

Ganesh and Sarath walk up an escalator which moves up with a constant speed. For every two steps that Ganesh takes, Sarath takes one step. Ganesh gets to the top of the escalator after having taken 30 steps, while Sarath takes only 20 steps to reach the top. If the escalator were turned off, how many steps would each of them take to reach the top?

Let us assume that, in one second, Ganesh takes 2 steps, Sharat takes 1 step, and the escalator moves by E steps.

$\therefore$ Time taken by Ganesh to reach the top = $\frac{30}{2}$ = 15 s

Steps covered by escalator = 15 E. Time taken by Sharat to reach the top $\frac{20}{1}$ = 20 s

Steps covered by escalator = 20 E. Since, the total number of steps is equal for both Ganesh and Sharat,

$15 (2 + E) = 20 (1 + E) \Rightarrow E = 2$

$\therefore$ total number of steps

$= 30 + 15 E = 20 + 20E = 60$ steps Ans: (60)

Q21. DIRECTIONS *for questions 21 and 22:* Type in your answer in the input box provided below the question.

How many three-digit even numbers which are divisible by 11 also have the sum of their digits equal to 10?

Let *abc* be the three-digit number ($a \neq 0$). Since the number is divisible by 11,

Either $a + c = b$ or $a + c = b + 11$

(since $a + c - b$ cannot be any higher multiple of 11).

Case i: If $a + c = b$, given that $a + b + c = 10$

$\Rightarrow a + c = b = 5$ and (a, c) can be (5, 0), (3, 2) or (1, 4), since the three-digit number must be even.

Case ii: If $a + c = b + 11$, given that $a + b + c = 10$

$\Rightarrow 2b + 11 = 10 \Rightarrow b = -0.5$.

Since this is not possible, case ii is not possible.

Hence, only three such numbers are possible i.e., 550, 352 and 154. Ans: (3)

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Steps covered by escalator = 20 E. Since, the total number of steps is equal for both Ganesh and Sharat,

$15 (2 + E) = 20 (1 + E) \Rightarrow E = 2$

$\therefore$ total number of steps

= 30 + 15 E = 20 + 20E = 60 steps

Ans: (60)

Q23. DIRECTIONS *for questions 23 and 24:* Select the correct alternative from the given choices.

There are exactly *n* families – F_1, F_2, ….. F_n – staying in Mr. Chari's neighbourhood. The number of members in the family F_n is *n* + 1. Mr. Chari decided to invite at most one member from each family for his birthday party. If the total number of ways in which he can invite a total of one or more members from his neighbourhood, is 2519, find *n*.

a) 5

b) 6

c) 7

d) 4

For F_1, Chari can invite 0 members (1 way) or 1 member (2 ways, $\because$ F_1 has 2 members) i.e., he can deal with F_1 in 3 ways.
For F_2, Chari can invite 0 members (1 way) or 1 member (3 ways), i.e., he can deal with F_2 in 4 ways.
Similarly, he can deal with F_n in $n + 2$ ways.
He can deal with all the n families in (3) (4) (5) ..... $(n + 2)$ ways. This includes inviting 0 members from each family. Excluding this case, the number of ways he can invite a member of at least one family is $\frac{(n+2)!}{2} - 1$.

$\therefore \frac{(n+2)!}{2} - 1 = 2519 \Rightarrow (n + 2)! = 5040 \Rightarrow n = 5$ Choice (A)

Q24. DIRECTIONS *for questions 23 and 24:* Select the correct alternative from the given choices.
Ram went to a shop to buy some synthetic and cotton sarees. Synthetic sarees cost Rs.300 each, while cotton sarees cost Rs.400 each. Ram spent a total of Rs.3600 on the sarees. If he had bought as many cotton sarees as the number of synthetic sarees he actually bought and vice versa, he would have saved an amount equal to half the cost of one saree of one of the two types. Find the total number of sarees he bought.

a) 10

b) 9

c) 8

The cost and the number (actual and 'if') of sarees are tabulated below.

	Synthetic	Cotton
Cost (in hundreds)	3	4
Number (Actual)	x	y
Number (If)	y	x

Given $3x + 4y = 36$ ------ (1)
and $(3x + 4y) - (4x + 3y) = (y - x) = 1.5$ or 2
If $y - x = 1.5$, we don't get integral values for x, y.
$\therefore y - x = 2$ ---- (2).
Solving (1), (2) we get $x = 4$, $y = 6$.
$\therefore x + y = 10$ Choice (A)

Q25. DIRECTIONS *for question 25:* Type in your answer in the input box provided below the question.

In an arithmetic progression, if the ratio of the $(r + 2)^{th}$ term and the $(r + 5)^{th}$ term is $(r + 3) : (r + 6)$ and the sum of the first $4r$ terms and the sum of the first $7r$ terms are in the ratio 1 : 3, find the value of r.

Given that

$$\frac{a+((r+2)-1)d}{a+((r+5)-1)d} = \frac{r+3}{r+6} \Rightarrow \frac{a+rd+d}{a+rd+4d} = \frac{r+3}{r+6}$$

$\Rightarrow ar + 6a + r^2d + 6rd + rd + 6d$

$= ar + 3a + r^2d + 3rd + 4rd + 12d$

$\Rightarrow 6a + 6d = 3a + 12d$

$\Rightarrow a = 2d$ ----------(1)

Given that

$$\frac{\frac{4r}{2}[2a+(4r-1)d]}{\frac{7r}{2}[2a+(7r-1)d]} = \frac{1}{3} \Rightarrow \frac{4[2a+4rd-d]}{7[2a+7rd-d]} = \frac{1}{3}$$

$$\Rightarrow \frac{4[4rd+3d]}{7[7rd+3d]} = \frac{1}{3} \text{ [from (1)]}$$

$\Rightarrow 48r + 36 = 49r + 21 \therefore r = 15$ Ans: (15)

Q26. DIRECTIONS *for questions 26 to 29:* Select the correct alternative from the given choices.

What is the value of $\cfrac{1}{4+\cfrac{1}{3+\cfrac{1}{4+\cfrac{1}{3+\ldots\ldots\ldots}}}}$?

a) $\sqrt{3}-\frac{1}{2}$

b) $2\sqrt{3}-3$

c) $\sqrt{3}+\frac{1}{2}$

d) $\sqrt{3}-\frac{3}{2}$

$$\frac{1}{4+\frac{1}{3+x}} = x$$

$$\frac{3+x}{4x+12+1} = x$$

$4x^2 + 13x = 3 + x$

$4x^2 + 12x - 3 = 0$

$$x = \frac{-12 \pm \sqrt{144+48}}{8} \Rightarrow \frac{-12 \pm 8\sqrt{3}}{8}$$

$$\frac{-3 \pm 2\sqrt{3}}{2}$$

$\sqrt{3} - \frac{3}{2}$.

Choice (D)

Q27. DIRECTIONS *for questions 26 to 29:* Select the correct alternative from the given choices.
All the internal angles of a convex polygon are distinct integers (when expressed in degrees), with the greatest of them being 110. The number of sides of the polygon is at most

a) 4.

b) 5.

c) 6.

d) 7.

The least external angle of the polygon must be 180° – 110° = 70º. For the polygon to have the maximum number of sides, the angles must be as close as possible.
As the angles are distinct, the external angles must be consecutive (as far as possible) and have a sum of 360º. So, the polygon must have 5 sides. (70º, 71º, 72º, 73º, 74º).
Choice (B)

Q28. DIRECTIONS *for questions 26 to 29:* Select the correct alternative from the given choices.
A solution of alcohol and water contains 60% alcohol. What percent of the solution must be taken out and replaced with water, so that the resultant solution contains 40% alcohol?

a) 50%

b) $33\frac{1}{3}\%$

c) $14\frac{2}{7}\%$

d) $8\frac{1}{3}\%$

If the volume of the original solution is assumed as 100 ml, then the final solution (after replacement) is also 100 ml and has 40 ml of alcohol. Now original solution had 60 ml of alcohol. Hence 60 – 40 = 20 ml of alcohol must have been removed along with $\frac{20}{60} = 33\frac{1}{3}\%$ of the solution.

Alternative solution:

Let n ml of solution be removed and replaced with water.

Hence, $60 - (0.6)n = 40 \therefore n = 33\frac{1}{3}\%$

Also, $40 - (0.4)n + n = 60$

(Choice (1) can be eliminated since 50% of the solution (with 60% alcohol) and 50% pure water (with 0% alcohol) will result in (60 + 0) ÷ 2 = 30% alcohol solution).

Choice (B)

Q29. DIRECTIONS *for questions 26 to 29:* Select the correct alternative from the given choices.

If $f(x) = \log\left(\frac{x^2+1}{x^2-1}\right)$ and $xy = 2$, then which of the following is equal to $f(x) + f(y)$?

a) $f(x + y)$

b) $\log\left(\frac{1+(x+y)^2}{1-(x-y)^2}\right)$

c) $f(xy)$

d) $\log\left(\frac{(x+y)^2+2}{(x+y)^2-1}\right)$

Given $f(x) = \log \frac{x^2+1}{x^2-1}$

$$f(x) + f(y) = \log\left(\frac{x^2+1}{x^2-1}\right) + \log\left(\frac{y^2+1}{y^2-1}\right)$$

$$= \log \frac{(x^2+1)(y^2+1)}{(x^2-1)(y^2-1)} = \log \frac{x^2y^2+x^2+y^2+1}{x^2y^2-x^2-y^2+1}$$

$$= \log \frac{2xy+x^2+y^2+1}{2xy-x^2-y^2+1} \quad (\because xy = 2)$$

$$= \log \frac{(x+y)^2+1}{1-[x^2+y^2-2xy]} = \log \frac{1+(x+y)^2}{1-(x-y)^2}$$

Alternative Solution:

Let $x = y = \sqrt{2}$

$\Rightarrow f(x) = f(y) = \log \frac{2+1}{2-1} = \log 3$

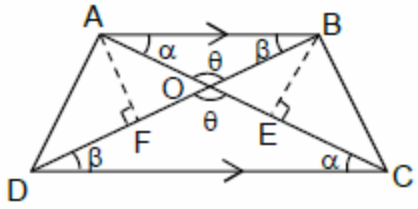
$f(x) + f(y) = 2 \log 3 = \log 9$

Only option (2) satisfies. Choice (B)

30. DIRECTIONS *for question 30:* Type in your answer in the input box provided below the question. In a trapezium ABCD, AB is parallel to CD and the diagonals AC and BD intersect at O, such that BO : OD = 2 : 3. If the area of triangle BOC is 36 sq. cm, find the area (in sq.cm) of the trapezium.

In the figure given below ΔAOB is similar to ΔCOD, since all three angles are equal.

$\therefore \frac{AO}{CO} = \frac{BO}{DO} = \frac{2}{3}$



Considering ΔABC, the ratio of the area of ΔABO to the area of ΔBOC will be same as AO : OC (since both triangles have same altitude, i.e., BE). Similarly, the ratio of Area of $\frac{\Delta ABO}{\Delta AOD} = \frac{BO}{OD}$.

Also, in any trapezium, the areas of ΔBOC = ΔAOD (since area of ΔABC = ΔABD)

Hence, area of $\Delta AOB = \frac{2}{3} \times 36 = 24$.

Area of ΔAOD = ΔBOC = 36 and Area of $\frac{\Delta COD}{\Delta AOB} = \frac{3^2}{2^2} = \frac{9}{4}$

$\Rightarrow$ Area of $\Delta COD = \frac{9}{4} \times 24 = 54$.

$\therefore$ Area of trapezium ABCD = 36 + 36 + 24 + 54 = 150. Ans: (150)

Q31. DIRECTIONS *for questions 31 and 32:* Select the correct alternative from the given choices.
Gordon, an inhabitant of Nibiru, evaluated an expression and arrived at a two-digit answer '8β'.
Which of the following could be the expression evaluated by Gordon?

a) $2\beta^2 - 5\beta + 3$

b) $2\beta^2 + 5\beta + 3$

c) $2\beta^2 + 6\beta - 1$

d) $2\beta^2 + 4\beta - 2$

Since $\beta - 5 = 6 - \beta = 1$, $\beta = 6$ in the new number system while 6, 7, 8, 9, 10 in the new number system correspond to 7, 8, 9, 10, 11 respectively in the old number system.

Value of two-digit number '8β' = $9 \times 11 + 6 = 105$.
$2\beta^2 - 5\beta + 3 = (2 \times 6^2) - 5(6) + 3 = 45$
$2\beta^2 + 5\beta + 3 = (2 \times 6^2) + 5(6) + 3 = 105$
$2\beta^2 + 6\beta - 1 = (2 \times 6^2) + 7(6) - 1 = 113$
$2\beta^2 - 4\beta + 2 = (2 \times 6^2) - 4(6) + 2 = 50$
$\therefore$ Choice (B) satisfies. Choice (B)

Q32. DIRECTIONS *for questions 31 and 32:* Select the correct alternative from the given choices.
What is the decimal equivalent of the two-digit number '7β'?

a) 83

b) 81

c) 78

d) 94

Since $\beta - 5 = 6 - \beta = 1$, $\beta = 6$ in the new number system while 6, 7, 8, 9, 10 in the new number system correspond to 7, 8, 9, 10, 11 respectively in the old number system.

'7β' = $(11 \times 8) + 6 = 94$. Choice (D)

Q33. DIRECTIONS *for question 33:* Type in your answer in the input box provided below the question.
Find the remainder when 37! is divided by 41.

By Wilson's theorem,
$(p-1)! + 1$ is divisible by p
Let $(p-1)! + 1 = pk$
$\Rightarrow (p-1)(p-2)(p-3)(p-4)! + 1 = pk$
$\Rightarrow (p^3 - 6p^2 + 11p - 6)(p-4)! + 1 = pk$
$\Rightarrow p(p^2 - 6p + 11)(p-4)! - (6(p-4)! - 1) = pk$
Hence, $(6(p-4)! - 1)$ must be a multiple of p.
Let the remainder when $(p-4)!$ is divided by p be r.
$\Rightarrow 6r - 1$ must be divisible by p.
Using the above result, for $p = 41$, we conclude that $6(r) - 1$ must be divisible by 41.
Thus we get, $6r - 1 = 41$
$\Rightarrow r = 7$
$\therefore$ 37! (i.e., $(41-4)!$)when divided by 41 leaves a remainder of 7.

Alternative Solution:

We know from Wilson's theorem that $R\left[\frac{40!}{41}\right] = 40.$.

Let $R\left[\frac{39!}{40}\right] = R_{39}.$

$\therefore R\left[\frac{(R_{39})(40)}{41}\right] = 40.$ Since $R\left[\frac{40}{41}\right] = 1,$ R_{39} must be 1.

Similarly, $R\left[\frac{(R_{38})(39)}{41}\right] = 1,$ i.e., –40.

Since $R\left[\frac{39}{41}\right] = -2,$ R_{38} must be 20.

Similarly $R\left[\frac{(R_{37})(38)}{41}\right] = 20,$ i.e., –21.

Since $R\left[\frac{38}{41}\right] = -3,$ R_{37} must be 7.

Hence $R\left[\frac{37!}{41}\right] = 7.$ Ans: (7)

Q34. DIRECTIONS *for question 34:* Select the correct alternative from the given choices.
Let P denote the set of the 55 natural numbers from 1 to 55. Q is a subset of P such that the arithmetic mean of any three elements of Q is at least $\frac{55}{3}$. The maximum number of elements in any such subset of P is

a) 36.

b) 37.

c) 38.

d) 55.

The arithmetic mean of any three elements of

$$Q = \frac{\text{Sum of those three elements}}{3}$$

Hence, the sum of any three elements ≥ 55

If the sum of the smallest 3 elements in Q is at least 55, the sum of all other triplets will exceed 55. The smallest 3 elements having a sum which is at least 55 are 18, 19 and 20. Hence Q = {18, 19, 20,..... 55}

$\therefore$ The maximum number of elements in Q = 55 – 17 = 38.

Note: The three smallest elements of Q can take multiple possible values, i.e., say (18, 19, 20); (17, 18, 20); (16, 19, 20).

However, the maximum number of elements of Q remains the same, i.e., 38.

Choice (C)