

(Key and Solutions for AIMCAT2001)

Key

SECTION – I

1. C	8. B	15. A	22. A	29. B
2. C	9. C	16. D	23. A	30. 3421
3. D	10. B	17. C	24. C	31. 4132
4. D	11. B	18. B	25. 2143	32. D
5. B	12. D	19. C	26. 1	33. 1
6. D	13. A	20. B	27. 2	34. B
7. D	14. A	21. D	28. 3421	

SECTION – II

1. D	8. D	15. B	22. 8	29. A
2. C	9. 476	16. C	23. D	30. D
3. C	10. B	17. B	24. 4	31. 0
4. B	11. A	18. D	25. B	32. 1200
5. 604	12. 5	19. C	26. A	
6. 729	13. D	20. C	27. C	
7. C	14. A	21. D	28. C	

SECTION – III

1. 3	8. B	15. D	22. 13	29. 272
2. B	9. B	16. D	23. 210	30. B
3. 600	10. A	17. C	24. B	31. D
4. 1093	11. B	18. A	25. A	32. D
5. 4	12. B	19. B	26. 6	33. 4
6. 1	13. 49	20. D	27. D	34. B
7. D	14. D	21. 44	28. 3	

Solutions

SECTION – I

Solutions for questions 1 to 5:

Number of words and Explanatory notes for RC:

Number of words: 560

- Option A: We cannot generalise from the passage that all singing insects are nonthreatening plants. Co-relation doesn't mean causation, and just because the insect was a singing insect and it was mentioned earlier as a nonthreatening insect, we cannot infer that non singing insect produces a response from the plants. Option A is not the answer.
Option B: The plants are primed to identify threats and based on 'So, they make more defences, faster, when they've been primed by these feeding vibrations', it can be said that their defences get more efficient. So, the plants need not be primed for the stimuli for them to identify dangers. They can do so on their own, and if anything, the priming makes them sharper. So, Option B is not the answer.
Option C: The acoustic perception of plants is complicated because it doesn't respond based on pitch but based on the perceived threat. That is why for the same pitch, the plant responds on certain occasions and doesn't in other

cases. In other words, plants don't just stop at differentiating between pitches, but perceive deeper to check for threats. Hence, they didn't respond in case of the singing insect. Option C is the answer.

Option D: Whether it was of the same pitch as the wind or of a different pitch doesn't really answer the question as to why the plants didn't respond to that pitch. So, being of the same pitch as the wind isn't relevant enough. They didn't respond because of the threat level which is non-existent as perceived by the plants in this case. Also please note that it doesn't matter whether the herbivores are those the plants have encountered before or not in this case. Option D is not the answer. Choice (C)

- Option A: From the passage it can be understood that plants do respond to chemicals in the soil and in the air as seen in: 'we know they pay attention to a vast array of chemicals both in the soil and in the air around them'. Hence, Option A is not the answer.
Option B: Plants do respond to light and temperature of the environment as understood from 'Plants have long been known to react to changes in their environment, and may respond to light, temperature, and touch'. Hence, Option B is not the answer.
Option C: Plants are primed to react faster to some threats. Similarly, plants do listen and respond to vibrations which are ecologically relevant to their environment. However,

this is completely different from what the option seems to suggest which is that plants are primed to consider those vibrations which are a threat to the ecology (not to them). That is something not mentioned in the passage. Plants understand a threat to them, not necessarily to the ecology around them. Hence, Option C is the answer.

Option D: That plants respond to variations in the environment around the plants can be understood from 'Plants have long been known to react to changes in their environment'. So, Option D is not the answer.

Choice (C)

3. Option A: While this is about plant behaviour, it also connects to another important question raised in the para about commercial agriculture – 'It is too early, they say, to speculate on what applications their finding may have for commercial agriculture.' So, the answer to this question will have bearing on the applications of these findings about commercial agriculture (definitely connected to the 'yield' of the plants). Hence, Option A is a valid question, and therefore, not the answer.

Option B: Since one of the speculations is about the response of other plants and other herbivores, this is a valid question. This can be understood from 'Appel and Cocroft predict that although their research focused on one plant and one predator, their results suggest a widespread response throughout the plant kingdom. The next phase of research will explore the phenomenon with other types of plants and herbivores. It is too early, they say, to speculate on what applications their finding may have for commercial agriculture.' So, the next phase will explore other types of plants and herbivores (predators as far as plants are concerned). So, this choice is a question that needs to be answered since the response of plants to various herbivores is not understood. It is a valid question to ask if they react differently to different herbivores/predators. Option B is not the answer.

Option C: This is different from the previous option in that here we are trying to address the response of all plants for the same stimuli – similar herbivores. In the previous option it was the response of one plant to different herbivores, but here, it is about the response of different plants to the same herbivore. Both these questions help understand plant behaviour vis-à-vis different predators/herbivores. Option C is not the answer.

Option D: Consider this: 'Appel and Cocroft predict that although their research focused on one plant and one predator, their results suggest a widespread response throughout the plant kingdom.' So, changing the caterpillar doesn't change the species and it has already been established how this plant reacts to this particular species of caterpillars. This question will not add depth to the argument. Hence, Option D is the answer. Choice (D)

4. The conclusions of the study conducted by Cocroft and Appel are two-fold: they produce more oil in the face of a perceived threat, and pitch of the sound has got nothing to do with their increased production of mustard oil.

Option A: The passage states that the mustard plants produce an increased amount of oil when there is a threat (increased amount suggests that there is oil produced even during normal times). According to this option there is no increased amount in case of silence or in case of nonthreatening insects. This is expected as there is no threat. Hence, there is no increase in amount of oil produced. So, this option doesn't undermine the conclusion of the study. Option A is not the answer.

Option B: It is open to speculation, according to the passage, as to what the response of various plants will be with respect to various caterpillar species/herbivores. So, if this research finding is true, it continues to strengthen the conclusion of the study that these plants produce oil in response to a perceived threat. The quantity of the oil was discussed with respect to whether the plants were primed with those vibrations (used to them) or not. However, the quantity was not discussed with respect to differing types of caterpillar species/herbivores. This research finding will not

undermine the conclusions. Hence, Option B is not the answer.

Option C: This sits well with the second finding of the study that as the plants are primed towards the vibrations of the perceived threat, they start producing more oil, as a sign of their increasingly perceptive defence. This can be understood from "[The vibrations] trigger them to be better prepared for subsequent attacks," said Appel. "So, they make more defences, faster, when they've been primed by these feeding vibrations." So, their making less oil (as long as they are making) in response to unfamiliar herbivores compared to what they make in response to familiar herbivores doesn't undermine the study, rather buttresses it (that defences are faster when they are primed). Hence, Option C is not the answer.

Option D: The study simply establishes that the mustard plants produce 'an increased amount of oil' dubbed as the response to the threat. So, producing same amount of oil in case of a perceived threat (even if they have not been primed to it) and in case of nonthreatening insects undermines the conclusion of the study, as it means that there was no response to the threat. Option D is the answer. Choice (D)

5. Consider the sentences: 'And now we know that acoustic information is something they're also balancing. It suggests that plants, in some ways, are listening.' By listening, it is implied that plants can differentiate between what is a threat and what isn't, which is why the acoustic information is being discussed (a reference to an earlier discussion in the passage where it is mentioned that 'the plants' acoustic perception is more complicated than simply looking for a particular pitch of sound').

Option A: From the passage it can be understood that the mustard plants could differentiate between the threat from a specific caterpillar and sounds which weren't threats. However, we have not discussed whether they can differentiate between two different pitches from two different threats. Hence, Option A is not the answer.

Option B: This difference is the perceived threat and this difference is what the passage establishes as the difference that plants can spot and respond to. Hence, when it is mentioned that plants are listening, it implies that plants are looking for the acoustic information beyond pitch, the information that helps them respond to a threat. Hence, Option B is the answer.

Option C: Neither of these factors is a threat and the passage doesn't help us infer the response of plants to nonthreatening situations. Also, the last two lines of the passage definitely don't allude to nonthreatening situations. Hence, Option C is not the answer.

Option D: Plants do distinguish between these two types of vibrations as understood from the passage. When they are primed their defences are more alert. So, this statement is true. However, the last two lines don't imply this difference. The aim of the passage was not to discuss the ability of plants in responding to threats they are used to and threats they are not used to. It was more about their response to threats and their response to non-threats. Hence, Option D is not the answer. Choice (B)

Solutions for questions 6 to 10:

Number of words and Explanatory notes for RC:

Number of words: 564

6. Consider the sentences: '[However], conflict will soon bore the audience if the playwright hasn't instilled a vivid sense of why it matters. So, despite my distaste for the word, because it reminds me of Wall Street and equestrian contests, we must talk of stakes, of risk and cost, of the propulsive value and captivating power of a prize won or lost, and how conflict without stakes is mere spectacle.'

Option A: The author doesn't really mention anywhere that the conflict is not worth discussing if there are no stakes. The author never really ventures into the territory of when a conflict is worth discussing and when it isn't.

The discussion is from the perspective of what's in it for the audience. So, Option A is not the answer.

Option B: The author mentions that the word 'stakes' has to be used despite his distaste for the word (because of its association with Wall Street and equestrian contests) because it is important to understand the risk and loss. So, others having a distaste for the word is not the reason why the word 'stakes' should be used; it is quite contrary to what the author is conveying. Hence, Option B is easy to eliminate.

Option C: While the author calls conflict without stakes 'a mere spectacle' (something that is interesting to gaze at but nothing beyond), this is not the reason why the author wants to discuss stakes. The author in the last sentence clearly says we must talk of a. stakes b. of risk and cost c. of the propulsive value and captivating power of a prize and d. how conflict without stakes is mere spectacle. The author says we must talk of all these because of what has been mentioned in the previous sentence - that audiences will be bored if it is not instilled in them as to why all of the conflict matters. Hence, Option C is not the answer.

Option D: This according to the author is the reason why we must discuss stakes - to make sure the audience is not bored, that the audience understands, quite vividly, why the conflict matters. Only that will keep them interested. Hence, Option D is the answer. Choice (D)

7. Consider the sentences: *'Love stories are dual-protagonist stories in which our main characters share the same objective – though inner and external conflicts, [and] conflicts with secondary and tertiary characters, will undoubtedly get in the way. Multi-protagonist plays, [or] ensemble plays, are the more difficult to write because they tend to bloat or dissipate with characters and their conflicts rambling and ranging every which way. Writing an ensemble play requires the deft knitting together of equally important conflicts so that they escalate and resonate and culminate with one another.'*

Option A: While it is mentioned clearly that characters in ensemble stories have several important conflicts and all of them need to be deftly managed, we cannot really say that there is only one conflict in case of a love story. Yes, the main characters share an objective according to the para, but there are several conflicts possible with secondary and tertiary characters. Hence, Option A is not the answer.

Option B: The main characters share an objective in a love story. And there are conflicts that get in the way. From these two pieces of information, we cannot really infer that the main characters have similar conflicts. Also, the characters in ensemble plays may have conflicts that are aligned with each other, as understood from last line of the para (mentioned above) where the author says conflicts should escalate and resonate and culminate with one another. Hence, Option B is not the answer.

Option C: In case of an ensemble play, distinction has not been made between main and tertiary characters. So, this option is incorrect. Also, it has not been mentioned that the conflicts are between main and secondary characters in case of a love stories. All that is said is that there are conflicts which get in the way of the shared objective. Option C is not the answer.

Option D: This is apt since the main characters share the same objective in case of love stories. So, it can be understood that the objective is singular and clear. However, in case of ensemble plays, there are multiple conflicts which need to resonate with each other (should be done deftly by the playwright according to the author of the passage). So, it can be said that the objective of the characters may not be clear. And even if they are, there could be multiple objectives/conflicts that may or may not resonate with one another. Option D is the answer.

Choice (D)

8. Consider the sentences: *'The modern American theatre seems to have largely abandoned the antagonist. Playwrights may write a relative or structural antagonist, a less sympathetic character whose wants and needs and, therefore, actions, conflict with what our protagonist is after;*

but the villain of old is often nowhere to be found. The neoliberal theatre seems to believe that an antagonist is simply a protagonist we have not yet understood... But it can be useful as a playwright to remember, [...] the truth that dramatic conflict is in its purest form the depiction of the struggle between good and evil. Us and them. Protagonist versus antagonist [...]; theirs is the essential conflict. If we can believe in an enemy, then our attention will be total.'

Option A: It can be clearly understood from the lines above (*'The neoliberal theatre seems to believe that an antagonist is simply a protagonist we have not yet understood... But it can be useful as a playwright to remember, [...] the truth that dramatic conflict is in its purest form the depiction of the struggle between good and evil'*) that the author doesn't really agree with the neoliberal theatre's idea of an antagonist. The author's idea has more to do with the good old-fashioned antagonist who is the evil compared to the good represented by the protagonist. Hence, Option A is not the answer.

Option B: This is true, since the author doesn't believe in the neoliberal theatre's idea that the antagonist is just a protagonist who has been misunderstood. The author differs from such a perspective. According to the author, the antagonist represents evil or bad. Hence, this option can be inferred from the author's opinion.

Option C: The author mentions that it is the modern American theatre which has abandoned the antagonist and playwrights treat the antagonist as just a character less sympathetic than the protagonist. However, it can be inferred from the para that the author doesn't buy the standpoint of the modern American theatre as understood from the last para of the passage. (This option can also be eliminated on tone because it says 'akin' to what the modern American theatre believes, but the author doesn't really agree with that version.) Hence, Option C is not the answer.

Option D: *The modern American theatre seems to have largely abandoned the antagonist. Playwrights may write a relative or structural antagonist, a less sympathetic character whose wants and needs and, therefore, actions, conflict with what our protagonist is after...* From this it can be understood that the author's idea of an antagonist is not someone whose needs and actions conflict with that of the protagonist. This is the case with playwrights who subscribe to the modern American theatre (that the author does not quite agree with). Option D is not the answer.

Choice (B)

9. Option A: From *'any compelling play is composed of many strains of struggle in concert, feeding and enforcing and intensifying one another'* (first para) it can be understood that a compelling play has several conflicts that feed from each other and intensify each other. Hence, Option A is not the answer.

Option B: From *'At the conclusion of the psychologically well-made play, the resolution of the exterior conflict has resolved the interior'*, we can understand that a well-made play has an external conflict that is resolved leading to the resolution of the inner conflicts of the characters. Hence, Option B is not the answer.

Option C: *If theirs is a truly happy ending, then your characters retire from the field of battle blissfully unconflicted in all spheres of life...* The characters retire without any conflicts if theirs is a truly happy ending. However, the author doesn't state that well-made plays need to have a happy ending, which means this is not a necessary aspect of a well-made/compelling play. Option C is the answer.

Option D: This can also be understood from the author clarifying that at the end of a psychologically well-made play, the resolution of the exterior conflict resolves the interior one. Hence, Option D is not the answer.

Choice (C)

10. Option A: The author doesn't really mean that audiences find peace if they disagree with the ending of the story.

For that matter, the word 'peace' has been used differently here than in the passage. The audiences look for an ending that gives them a sense of justice or peace (not that they find peace based on how they feel about the play or its ending). Also, the authors believe that the audience should be invested in a compelling play. It is never mentioned that they have to agree with the conflict resolution. Option A is not the answer.

Option B: This can be understood by combining 'At the conclusion of the psychologically well-made play, the resolution of the exterior conflict has resolved the interior' and 'Our objective in the audience is to vicariously achieve a resolution to the story that will feel like justice, maybe even like peace.' So, it can be understood that a psychologically well-made play resolves its exterior conflicts resulting in the resolutions of the interior conflicts of the characters. And this is furthered in the last line of the passage where the author brings in the objective of the audience – which is to vicariously (indirectly, through someone else, in this case characters of the play) get a sense of justice and peace. Hence, Option B represents the essence of what the author thinks about the ending of a compelling play.

Option C: The author never really draws a line connecting the two. All the author says is that the audience's objective is to vicariously achieve a resolution to the story that feels like justice, maybe even like peace. Since it is vicarious, it is through what they feel with the play. We do not have enough information to differentiate between whether this vicarious sense of resolution is only achieved when they agree and what would happen in the case when they disagree. So, it is hard to believe the author wrote this passage to argue that the sense of justice of the audience has to align with that of the playwright. It is more about how a playwright should give the characters conflicts and then resolve them. Option C is not the answer.

Option D: The author doesn't indicate whether every compelling play must end with complete conflict resolution of all the characters. All the author talks about is what should happen in plays with happy endings, where characters walk away unconflicted. So, Option D is not the answer. Choice (B)

Solutions for questions 11 to 15:

Number of words and Explanatory notes for RC:

Number of words: 573

11. Option A: The author's main idea in the passage was not to talk about how the Versailles Treaty 'failed' in its objective to humiliate Germany. Firstly, that the Treaty's objective was to humiliate Germany was something not established in the passage. Secondly, the author's tone throughout the passage is sympathetic towards the peacemakers who chalked out the Versailles Treaty as understood from 'The peacemakers [...] certainly made mistakes, but they deserve a sympathetic hearing. At the end of the first world war the Allies were not too harsh on Germany. If anything, they were not harsh enough.' Hence, Option A is not the answer.
- Option B: The author clearly states that the Versailles Treaty failed (leading to the loss of peace and the next war) because it was expected to finish the unfinished business of the Allied Forces. The Versailles Treaty as understood from the passage was primarily about the reparations Germany was expected to pay, as the cost of peace. However, its failure was owing to the incorrect assessment, since the author clearly states that 'At the end of the first world war the Allies were not too harsh on Germany. If anything, they were not harsh enough.' In other words, the author disagrees with the punishment meted out to Germany and connects the consequences to the eventual war. The author opines that the terms were not harsh enough allowing Germany to be in a position to wage a war again. Option B is the answer.
- Option C: While it is true that the author does eventually derive how the shortcomings of the Versailles Treaty play a

role in the next major war, it cannot really be understood that the author attributed the cause of the Second World War to the failure of the Versailles Treaty alone. Secondly, that the treaty was aimed at reining in the imperial ambitions of Germany can easily be ruled out as such a point hasn't been made in the passage. Option C is not the answer.

Option D: The tone of the passage nowhere supports the conjecture that the author suggests that Weimar Germany should have been crushed. The passage doesn't really put it in a straightforward manner either, that the Allied Forces didn't do enough to crush Germany. The closest the author gets to it is in mentioning that 'Versailles failed chiefly because it was being asked to finish the job that the exhausted Allied armies had left unfinished'. However, that the unfinished business was akin to crushing Germany is something we cannot infer from the passage. Option D is not the answer. Choice (B)

12. Consider this: 'In fact, Germany's behaviour had less to do with its capacity to pay than its incentives. Article 234 of the Versailles treaty said that the reparations should be adjusted if Germany could show that it could not afford them.' So, the author brought it up at the point where we discuss Germany's behaviour (not paying the reparations and missing schedules on time) and the possible reasons.
- Option A: The author wouldn't agree to this since it is clearly mentioned by the author that Germany hadn't been asked to pay too much in 1921, and in fact, the Allied Forces should've been harsher with Germany. Article 234 was about possible readjustments of the reparations if Germany couldn't afford to pay what was originally demanded of it. However, the author didn't bring it up to show that what was demanded of it was too much, because in that case, the author wouldn't mention that Germany's behaviour had less to do with its capacity. Option A is not the answer.
- Option B: The author was largely in favour of stricter sanctions against Weimar Germany and has clearly mentioned that Germany got away lightly. So, we can be sure that the author doesn't support the allegation that the Treaty was unjust to Germany. It was a narrative fanned by the Germans (something the author had pointed out as well). Option B is not the answer.
- Option C: It is the other way around. Germany, according to the author, didn't pay up because it didn't have an incentive to do so. Its missed schedules for paying the reparations according to the author were less out of incapacity and more out of a lack of incentive. So, it is incorrect to state that the Article was mentioned to show that Germany's behaviour was influenced by the incentive it had for paying the reparations. The focus was on proving that lack of capacity was not the reason for missing payments. Option C is not the answer.
- Option D: The Article 234 ensures Germany is not overpressed to pay something it cannot afford to pay. In other words, it is like a lifeline for Germany. So, the only reason why the author would mention something that favours Germany is to show that it is not the lack of capacity that caused Germany's missed payments. It is the lack of incentive, or in other words, encouragement to default on the payments, so that the conditions can be relaxed further. This also sits in tone with the data that Germany was in fact doing quite well during those years with increased production capacities. Hence, Option D is the answer. Choice (D)
13. Option A: This is apt since this is what has been mentioned in the first para. Consider this: 'The blame, it is often said, lay with the leaders of America, Britain and France, who imposed a vengeful "Carthaginian" peace on Germany, visiting a punishment that crushed the fragile Weimar Republic. If only Versailles had been more generous, the second world war might never have taken place.' From this it can be understood that whatever Carthaginian peace stands for is negative – 'vengeful' and 'visiting a punishment that crushed the fragile Weimar Republic'.

So, something negative has been implied by the critics of the treaty, which is rightly described as brutal peace. Option A is the answer.

Option B: If this were the case, the critics wouldn't call it 'vengeful' or crushing. So, the critics were of the opinion that the severe penalty imposed by the Allied Forces was what led to the war again. So, this is opposite in tone to what the critics believed (and is similar in tone to what the author believed). Hence, Option B is not the answer.

Option C: While the peace was an unstable one, there is nothing to indicate that the critics called it unstable, for the critics commented about the nature of the peace achieved – that it was vengefully imposed by the Allied Forces. Nothing in the nature of the peace was described as unstable. The critics applied the term 'less generous'. Hence, Option C is not the answer.

Option D: The two words here that stand out which cannot be attributed to the critics were 'humiliated economically' and 'misused' neither of which was referred to in any way in the first para of the passage. There was nothing about the Treaty that talks about what is proper usage and what is misuse. Also, the critics blamed the Allied Forces for the next war, but not for humiliation of Germany. Hence, Option D is not the answer. Choice (A)

14. Option A: The author's opinion about 52 bn marks or 160% of Germany's GDP is that it was below what Germany had offered to pay. However, nowhere has the author mentioned that this amount was 'comfortably' within Germany's range or that this is below what Germany could 'afford to pay'. Those two terms are ill-defined and cannot really be compared with hard numbers mentioned in the passage. All we know is that the author calls these numbers 'large but not impossibly so'. Option A is the answer.

Option B: Consider this: '*The reparations imposed in 1921, in what Germans called the "London ultimatum", were large, but not impossibly so. Germany was asked to pay 132bn German marks, but this included 82bn marks in bonds that were never likely to become payable. The remaining 50bn marks—worth about \$12.5bn then – was less than what Germany itself had earlier offered to pay. It was about 160% of the country's GDP...*' It can be understood from this that the payable part was just about 50 billion marks or 160% of the country's GDP. The author clearly says that this (equivalent of \$12.5bn) was less than what Germany itself had offered to pay. So, Option B was mentioned by the author to prove that the economic consequences of the peace (or reparations imposed on Germany) weren't too high. Option B is not the answer.

Option C: This was directly mentioned by the author to point out that while the reparations look large, they weren't indeed impossible to pay. The author also clearly points out that 82bn of the 132bn that Germany was asked to pay was in bonds which was never really going to become payable. So, this was part of the author's explanation that the economic ramifications weren't dire. Option C is not the answer.

Option D: This option is basically reiterating what the sentence '*Moreover, Versailles also gave Germany a "peace dividend" by limiting its military spending, which was by some calculations, worth about as much as the reparations cost*' means. Peace dividend being a positive term implies it was a saving for Germany whose military spending was limited by the treaty as understood from the above sentence. Hence, Option D is not the answer. Choice (A)

15. The information about Keynes can be found here: '*Critics of Versailles got their attack in early. Just six months after the treaty was signed John Maynard Keynes published "The Economic Consequences of the Peace" ... Keynes combined intricate tabulations of German coal consumption [...] to show that Germany could not afford large reparations, that weakness, vanity and vindictiveness blinded the Allies to German suffering and [the] reparations would poison European relations. ...*'

Option A: This clearly shows that Keynes' numbers were not correct. Also, it proves that Keynes' criticism of the Versailles Treaty (that it was too harsh towards Germany and reeked of vanity and vindictiveness) is unjust. It repudiates Keynes' theory because the numbers Keynes called unfair weren't even the right/final numbers. Hence, this option weakens/repudiates Keynes' theory about how the treaty was unfair to the Germans. Option A is the answer.

Option B: If this is true, it feeds what Keynes mentions about the treaty as understood from '*that weakness, vanity and vindictiveness blinded the Allies to German suffering*'. This option strengthens such an argument made by Keynes – that the Allied Forces were unnecessarily and unfairly harsh to the Germans largely because of the attitude of the Allied Forces - and hence, this is not the answer.

Option C: If the Versailles Treaty imposed large reparations on Germany despite the Allied Forces knowing and understanding that Germany's manufacturing capacity is low (it is not low, but the question stem says 'if true') the Treaty could be called unfair. That will strengthen Keynes' argument. Option C is not the answer.

Option D: While this is more in line with Keynes' theory (and doesn't weaken it), it is easily to eliminate since Keynes said nothing of the war it will lead to or German discontent. Keynes only criticised what was in the treaty from a German perspective. Option D is not the answer. Choice (A)

Solutions for questions 16 to 19:

Number of words and Explanatory notes for RC:

Number of words: 498

16. "...the most remarkable thing about innovations is the way they precipitate unanticipated changes that reverberate far and wide beyond the field or discipline or problem at the epicentre of the particular innovation."

Choice (A): It is stated in the first paragraph that the remarkable thing about innovations is the way they lead to unanticipated changes that influence changes in different disciplines and domains. From this, it can be understood that innovations often trigger changes in other fields and not seldom, as mentioned in this choice. Hence, this is not true.

Choice (B): It is mentioned in the first paragraph that "...they precipitate unanticipated changes...". From this, it can be understood that the changes that follow an innovation are something unexpected and something that cannot be predicted beforehand. Hence, this is not true.

Choice (C): The author is setting the tone for what is termed as "hummingbird effect" in the first paragraph of the passage and the author mentions how an innovation in one field can trigger innovations in other fields, something that is discussed in the fifth paragraph of the passage. Whether these innovations drive changes in that very domain has not been discussed. Also, it has been stated in the fifth paragraph that the traces of the original invention remain obscure. But this is in the context of different domains. Whether this is true in the case of innovations leading to innovations within the same domain has not been discussed in the passage. Hence, this cannot be said to be true.

Choice (D): "...the most remarkable thing about innovations is the way they precipitate unanticipated changes that reverberate far and wide beyond the field or discipline or problem at the epicentre of the particular innovation." From this, it can be inferred that innovations in one field can, indeed, lead to breakthroughs or drive significant changes in other fields, that are not even closely related to each other. Hence, this is the answer. Choice (D)

17. Choice (A): The practice of reading in Europe led to a surge in demand for spectacles, which in turn led to experimenting with lenses, which led to the invention of

microscope. The practice of reading itself, cannot be ascribed as being directly responsible for the invention of the microscope, because had there been no surge in demand for spectacles, none of the events that followed may not have occurred. Hence, this is not the answer.

Choice (B): The surge in demand for spectacles itself cannot be said to be directly responsible for the invention of the microscope. Had there been no experimenting with the lenses, the surge in demand for spectacles would not have led to the invention of the microscope. Hence, this is not mainly responsible for the invention of the microscope.

Choice (C): There is no mention of any other event or breakthrough that could have happened between the experiments with lenses and the invention of the microscope. Also, it is mentioned in the passage that the market demand for spectacles encouraged a growing number of people to produce and experiment with lenses, which led to the invention of the microscope. Therefore, we can say that this is directly responsible for the invention of the microscope. Hence, this is the answer.

Choice (D): It has not been mentioned anywhere in the passage that it was the discovery of magnification that led to the invention of the microscope. This cannot be inferred from the passage. Hence, this is not the answer.

Choice (C)

18. In the fifth paragraph of the passage, the author states that under the "hummingbird effect," an innovation in one field can trigger unexpected breakthroughs in wholly different domains, but the traces of those original influences often remain obscured. So we need to look for a situation where innovation in one field has led to the innovation in a wholly different domain.

Choice (A): This does not talk about any innovation. In fact, this is similar to how a change as imperceptible as the flap of a butterfly's wings can result in an effect as grand as a hurricane far away several weeks later. This can be said to exemplify the butterfly effect and not the hummingbird effect. Also, 'moving a grain of sand' cannot be called an innovation, which is integral to the hummingbird effect. Hence, this is not the answer.

Choice (B): Here, a breakthrough in one domain (measuring time) triggered a breakthrough in an altogether different domain (finding out the age of the earth) and it might be difficult to establish that it was the first breakthrough that led to the second one because both the events are not directly connected and that means, various other events might have occurred in between the two. This is a good example of the hummingbird effect, wherein an innovation in one field can trigger unexpected breakthroughs in wholly different domains, but the traces of those original influences often remain obscured. Hence, this is the answer.

Choice (C): The number of restaurants in the country increasing can be a consequence of the entry of businesses like Swiggy and Zomato. Had their entries led to some kind of an innovation or a breakthrough in the restaurant business, we may have a case for attributing it to the hummingbird effect. But that did not happen. Hence, this does not exemplify the hummingbird effect.

Choice (D): Although the 'Stories' feature on Snapchat was an innovation, in this particular example, it did not trigger any unexpected breakthroughs in different domains. All the platforms mentioned fall more or less under the same domain, even though each of them has its own USP. This feature was merely added to the other platforms. Hence, this is not the answer.

Choice (B)

19. The difference in between the butterfly effect and the hummingbird effect has been discussed in the fourth paragraph of the passage.

Choice (A): Under the butterfly effect, there is a virtually unknowable chain of causality. Also, there is no mention of 'origin' in the passage in the context of the butterfly effect. Since no link can be established between different events, it is not possible to narrow down on some kind of an origin for any event. Besides, this is at odds with the hummingbird

effect because the origin can be traced. Hence, this is not the answer.

Choice (B): Under the butterfly effect, it is stated that "...but it is beyond our capacity to parse those connections...". From this, it can be understood that the link between two events cannot be mapped. Therefore, this is not an attribute of the butterfly effect. Hence, this is not the answer.

Choice (C): From the fourth paragraph, it can be understood that this is an attribute of the butterfly effect because the chain of causality cannot be established. Under the hummingbird effect, it has been mentioned that traces of the original influence often remain obscured. Although connections can be established once these traces are illuminated, it can be understood that at first glance, these connections are not immediately obvious. Therefore, this is an attribute of the butterfly effect that is not at odds with the hummingbird effect. Hence, this is the answer.

Choice (D): The chain of causality between different events cannot be established for events ascribed to the butterfly effect but this can be done for events that can be ascribed to the hummingbird effect. Although this is an attribute of the butterfly effect, this is at odds with the hummingbird effect. Hence, this is not the answer.

Choice (C)

Solutions for questions 20 to 24:

Number of words and Explanatory notes for RC:

Number of words: 663

20. In the third paragraph of the passage, the author talks about free agents suggesting a future for work is somewhat akin to the functioning of the immune system and extends this to the organizational context.

Choice (A): From "...where roaming cells spot a pressing need..." mentioned in the third paragraph, we can infer that the author is talking about situations where the demand is more. It does not suggest that the demands on the organization are greater than normal. Hence, this is not the answer.

Choice (B): From "...where roaming cells spot a pressing need..." mentioned in the third paragraph, we can infer that the author is talking about situations where the demand is more. In such cases, the author says that "...such groups may arise.....cease to exist once the task is accomplished." From this, it can be understood that the groups coming together is a requirement to deal with the situational exigencies in the organization. Hence, this is the answer.

Choice (C): The passage does not suggest that the demands of the top echelons in the organization are unwieldy. This cannot be inferred from the passage. Hence, this is not the answer.

Choice (D): The question is related to why there is a need for an agglomeration of the emotional intelligence of workers. It does not have anything to do with the assessment of the workers. Hence, this is not the answer.

Choice (B)

21. The author mainly talks about the present times in the sixth paragraph of the passage.

Choice (A): This means that high paying jobs are pretty common or abundant. But there has been no mention of high paying jobs in the passage. Therefore, this cannot be inferred. Hence, this is not the answer.

Choice (B): It has not been stated anywhere in the passage that there are jobs abound. This cannot be inferred. Hence, this is not the answer.

Choice (C): In the sixth paragraph, from "...at a time when 'job stability' seems like a quaint oxymoron", it can be understood that the time the author refers to is the present times where job stability feels like an oxymoron. As in job and stability allude to things that are opposite in nature. From this, it can be inferred that one cannot take one's job for granted because it does not come with a guarantee. This choice contradicts the same. Hence, it is not the answer.

Choice (D): In the sixth paragraph, from “...at a time when “job stability” seems like a quaint oxymoron”, it can be understood that the time the author refers to is the present times where job stability feels like an oxymoron. As in job and stability allude to things that are opposite in nature. From this, it can be inferred that one cannot take one’s job for granted because it does not come with a guarantee. Hence, the phrase ‘job guarantee’ is a misnomer. Hence, this is the answer. Choice (D)

22. Choice (A): In the sixth paragraph of the passage, from “Individually, we can add these skills to our toolkit for survival at a time...”, it can be understood that improving emotional intelligence will help one to achieve the security of employment. Hence, this is the answer.

Choice (B): With respect to emotional intelligence at an individual level, the author only looks upon it as a means to survival and not as something that will provide a competitive edge. Hence, this is not the answer.

Choice (C): It is mentioned that they are skills that we can add to our toolkit for survival. From this, it can be understood that emotional intelligence is more of an add-on than a normal job requirement. Hence, this is not the answer.

Choice (D): The passage does not talk about how emotional intelligence will help one scale the hierarchy. Hence, this is not the answer. Choice (A)

23. The importance of emotional intelligence is mainly discussed in the first two paragraphs of the passage.

Choice (A): It is mentioned in the first paragraph that the premium on emotional intelligence will only increase because organizations are increasingly becoming dependent on independent agents. In the second paragraph, it is given that this autonomy is an accelerating trend. From this, it can be understood that it is because of this growing autonomy that the demand for emotional intelligence is going up. Hence, this is the answer.

Choice (B): It has not been suggested anywhere in the passage as to how the rapid expansion of the business world is related to emotional intelligence. Hence, this is not the answer.

Choice (C): It has not been mentioned anywhere in the passage that globalization will bring greater interpersonal encounters. Also, how globalization is related to emotional intelligence has not been discussed. Hence, this is not the answer.

Choice (D): There is nothing in the passage to suggest that there is a causality between the requirements of technological advancement and emotional intelligence. Hence, this is not the answer. Choice (A)

24. The author mentions Intelligence Quotient in the sixth paragraph of the passage.

Choice (A): It is mentioned that IQ changes little after our teen years. From this it can be understood that IQ hardly changes or does not change at all after our teen years. It does not develop little in teens. Hence, this is not an answer.

Choice (B): From “Unlike IQ, which changes little after our teen years”, we can say that it develops either during the teen years or before that. It need not necessarily mean early childhood. Hence, this is not the answer.

Choice (C): From “Unlike IQ, which changes little after our teen years”, we can say that it develops either during the teen years or before that. This means that it is mostly before adulthood. Hence, this is the answer.

Choice (D): IQ changes little after our teen years. This implies that it will not continuously develop throughout our lives. Hence, this is not the answer. Choice (C)

Solutions for question 25:

25. Sentence 1: Sentence 1 has a reference to ‘the basis’.
Sentence 2: Sentence 2 is an independent sentence that can begin the paragraph.
Sentence 3: Sentence 3 explains the reason for something as it begins with ‘for’.

Sentence 4: Sentence 4 begins with the contrast marker ‘yet’. It has the ‘If then’ sequence.

On a careful reading of the sentences, it can be observed that sentence 2 is a general sentence that can begin the paragraph. It establishes the background “society fast fragmenting”. It talks about ‘a new basis’ for reconstitution of the fast fragmenting society. Sentences 2 and 1 form a mandatory pair. “not yet found the basis” in sentence 1 contrasts “cries out for a new basis for reconstitution” in sentence 2.

Sentence 1 is followed by sentence 4. Even though there is no overlapping clue between sentences 1 and 4, we can understand that there is a flow of idea between sentences 2→1→4. “face disturbing problems of social integration, we shall confront even more agonising problems of individual integration” in sentence 4 links with “challenges all the old integrative mechanisms” given earlier in sentence 2.

Sentence 4 is followed by sentence 3. “For the multiplication of life styles” in the conclusion sentence 3 links with “fragmenting at the level of values and life styles” in the introductory sentence 2. “challenges our ability to hold the very self together” in sentence 3 points to “agonising problems of individual integration”. So, 2143.

Ans: (2143)

Solutions for questions 26 and 27:

26. Sentence 1 talks about a movement of ‘so many stones’ thus indicating that there has been a mention of stone movement earlier in the para. This sentence talks about the negative consequences of the movement of so many stones.

Sentence 2 is an independent sentence about the origins of stone stacks.

Sentence 3 elaborates on the idea of stone stacks (balancing of stones) explaining or rather, beginning to explain why someone may want to stack up stones over each other.

Sentence 4 has a pronoun ‘they’ and talks about Neolithic burial grounds. It is not hard to see that 24 is a block since 2 talks about history and 4 gives the example of something from history.

Sentence 5 has the conclusion indicator ‘then’ as if to say ‘in a way’ or ‘therefore’ and talks about what contemporary stone stackers aim to achieve. There is a mention of an ancient and artistic tradition, thus connecting to the 24 block. So, 5 follows 24.

1 talks about negative consequences while 3 introduces the idea of stone stacking (balancing of stones). So, 1 is the odd one out and 3245 is the rest of the para.

Ans: (1)

27. Sentence 1: Sentence 1 has the clue ‘surprise’. It has the possessive pronoun ‘it’.

Sentence 2: Sentence 2 mentions what governments in the rich world want to achieve.

Sentence 3: Sentence 3 has the demonstrative pronoun ‘these’.

Sentence 4: Sentence 4 begins with the contrast marker ‘but’. Towards the end of this sentence, there is a reference to the subjective pronoun ‘it’.

Sentence 5: Sentence 5 has some proper nouns. It can begin the paragraph.

So sentence 5 is a general sentence that can begin the para. “pine cladding” in sentence 4 links with “looks like a naked tree” in sentence 5. “world’s tallest wooden skyscraper” in sentence 4 links with “The Mjostarnet tower rising spectacularly above Brumunddal’s low-rise concrete housing” in sentence 5. So sentence 4 follows sentence 5.

Sentence 4 is contrasted by sentence 1. “The surprise is that” in sentence 1 contrasts “But it is not that makes it special” in sentence 4. So sentence 1 follows sentence 4.

Sentence 1 is followed by sentence 3. “glulam – wooden beams laminated together” in sentence 1 links with “These are lighter...” in sentence 3. Sentence 3 concludes the para. So 5413.

Sentence 2 is the odd sentence out. It mentions the goal of the governments in the rich world. It can be a part of another para. "want to reduce greenhouse gas emissions from construction and using buildings" in sentence 2 may seem to overlap with "emits few greenhouse gases" in sentence 3 but sentence 2 does not specifically relate to the description of the Mjostarnet tower in Norway, in terms of its construction.

Ans: (2)

Solutions for question 28:

28. Sentence 1 refers to a person ('his') and also talks about 'the form'. So we need to know what form has been introduced in the para.
Sentence 2 talks about the creation of Russian ballet – the form specified in Sentence 1. Also, 2 comes after 4 because it uses first name (Petipa). So, 2 comes after 4 but comes before 1.
Sentence 3 talks about a Frenchman who shaped Russian classical dance as we know it today. Such a sentence has to come ahead of any mention of this particular person. So, 3 comes first because the remaining three sentences talk about Marius Petipa directly.
Sentence 4 is an independent sentence that introduces the Frenchman – full name given. So, the order is 3421.

Ans: (3421)

Solutions for question 29:

29. Option A: This option seems to indicate that our endeavours are targeted against things (but they are not) and whatever has survived our attempts goes down in history. That's not what the author meant in the para. The author talks about history being the survivor of all the negative consequences of our choices and judgments, which we busy ourselves with. Option A is not the answer.
Option B: This resonates with the author's opinion which is that we don't make history, our records don't construct history, and not our choices. History is what has survived all these things. In other words, history is what survives or isn't killed by all our choices and judgments (which the author conveys are mostly wrong) to make/construct something (metaphorically speaking). Option B is the answer.
Option C: This option is totally off the target by attributing false causation. The para doesn't talk about what constitutes the difference between chance and choice. It simply states that we mistake chance for choice (we think we have control, but we don't is what the para is trying to convey). So, our inability to differentiate between chance and choice – our false perception doesn't create history. History is what survives our false perception, according to the para. Option C is not the answer.
Option D: This completely removes the correlation between our actions and history by stating that history happens separately from what we are doing or trying to do. The para however connects what we are doing to the existence of history by conveying that history 'survives' our judgment. History is not what happens when we are looking or focussing elsewhere. Option D is not the answer.

Choice (B)

Solutions for questions 30 and 31:

30. Sentence 1 starts with a negative connector – 'but' followed by something that suggests a protest/fight – call to arms.
Sentence 2 talks about how imagining something bad happening to children is just an act of imagination – contrasting with how it should be more. That is what justifies Sentence 1 – should not just be imagination, but a call of arms.
Sentence 3 talks about our response to scenarios – instigating/participating/ignoring (turning a blind eye) and how we will be remembered for those responses.
Sentence 4 asks a question – about the consequences of negative acts towards the smallest humans – connecting to Sentence 2 – children.
Sentence 3 and 4 raise the question about how we would

respond to something bad. 4 follows 3 because 3 is more generic/upstream while 4 talks specifically about children.
21 is a block because of the connector in 1. Once, the discussion moves to call of arms, it can't lead to the questions in 3 and 4. Also, 4 raises the question, while 2 talks about empathy by bringing the action closer from any children, to 'one's own children'. So, 3421.

Ans: (3421)

31. Sentence 1: Sentence 1 talks about the use of a Pareto chart analysis.
Sentence 2: Sentence 2 begins with 'this. It sounds like a sentence mentioning a consequence.
Sentence 3: Sentence 3 mentions how managers can apply the results of the Pareto chart analysis.
Sentence 4: Sentence 4 sounds like a general sentence. It begins with 'Imagine'.
So sentence 4 is a general sentence that can begin the paragraph. It begins with the starter 'Imagine that' and mentions the goal of the retail chain.
Sentences 4 and 1 form a logical block. "maintain the inventory at an optimum level for fast moving goods and only stock minimum levels of slow moving products" in sentence 4 links with "classify the stock into fast moving and slow moving categories, or essential and non-essential categories" in sentence 1. So sentence 1 which talks about the use of a Pareto chart follows sentence 4.
Sentence 1 is followed by sentence 3. "A Pareto chart analysis can help one classify" in sentence 1 links with "Based on the results of a Pareto chart analysis" in sentence 3. "the managers" in sentence 3 points to "retail chain" in sentence 4. "better inventory control" in sentence 3 points to "maintain the inventory at an optimum level" in sentence 4. So 413.
Sentence 2 concludes the para. "bring down the overall investment on inventory and reduce costs" in sentence 2 is a consequence of the step(s) mentioned in sentence 3. Hence 4132.
Ans: (4132)

Solutions for question 32:

32. Option A: This option has two parts: techies do not much beyond and technical details of the systems they help to build. The para talks about the second part by admitting that techies know about the systems they build. However, the para mentions that this doesn't lead us to believe that they have knowledge in arenas far from what they know, 'far from' being the key term. The option here takes the extreme extrapolation that they do not know anything beyond what they build. That is not apt. Hence, Option A is not the answer.
Option B: There are two problems in this option. Firstly, techies are not 'expected' to know a lot. The author is trying to convey the idea that they do not have expertise in areas far beyond the systems they build. Secondly, the author doesn't talk about their expertise only in technology. The author mentions that techies may not have the training to hold unique comprehension about various arenas of knowledge (not necessarily just technology). Option B is not the answer.
Option C: The para talks about the knowledge and unique expertise of the techies who build some of the technological systems. The para doesn't mention the gullibility of the techies in any way. The para only talks about the lack of knowledge of the techies, not about how easily they can be made to believe wrong stuff (gullible). Hence, Option C is easy to eliminate.
Option D: This option mentions both the parts that make up the author's position in the para – that they are not trained for expertise in arenas of knowledge far beyond (1) those systems that they help to build and are expected to know about (2). Option D is the answer.
Choice (D)

Solutions for question 33:

33. Sentence 1: Sentence 1 has the adverb 'indeed'. It is negative in tone.

Sentence 2: Sentence 2 begins with the conjunctive adverb 'however'. It mentions a conclusion of some research.

Sentence 3: Sentence 3 has a reference to 'that assertion'.

Sentence 4: Sentence 4 mentions a supposition. It sounds like an ideal introductory sentence.

Sentence 5: Sentence 5 has the adverb 'indeed'. It talks about how people leaving university have more inquiring minds than those who work or engage themselves in vocational training.

Between sentences 4 and 5, sentence 4 is a more general sentence that can begin the para. Sentence 4 talks about 'going to university'. Sentence 5 compares the benefits of 'going to university' vis-a-vis 'vocational training for work'. So there has to be a sentence introducing 'training for work' before sentence 5.

Hence sentence 4 begins the para. It mentions the supposition: university education is a mind-broadening experience. Sentence 4 is followed by sentence 3. "That assertion" in sentence 3 points to the supposition given in sentence 4. We understand from sentences 4 and 3 that "going to university" is a different experience than "training for work". "supposed to be a mind-broadening experience" in sentence 4 contrasts "might not be so stimulating" in sentence 3.

Sentence 3 is followed by sentence 5. "do indeed seem" in sentence 5 reiterates the point made in sentence 3. "seem to leave with broader and more inquiring minds" in sentence 5 points to "mind-broadening experience" in sentence 4 and contrasts "might not be so stimulating" in sentence 3.

Sentence 5 is followed by sentence 2 which concludes the para. "it was not the case that university broadened minds; rather, work seemed to narrow them" is an outcome that contradicts the supposition "supposed to be a mind-broadening experience" in the opening sentence 4. So, 4352.

Sentence 1 is the odd sentence out. It needs a precedent and more substantiation. It runs tangent to the thought flow.

Ans: (1)

Solutions for question 34:

34. Option A: Niall Ferguson's prediction is not central to the author's position and is not accurate either, with respect to what the para is trying to convey. Also, Niall Ferguson wrote about what happened, and didn't 'make a prediction' that takes this option farther away from the essence of the para. Hence, Option A is not the answer.

Option B: This option represents all the attributes of what the author is trying to convey – realists foreseeing an atmosphere of conflict caused by the likelihood of China tweaking rules to suit its own interests, while there is a decline in the powers of America. Hence, Option B rightly depicts the author's position.

Option C: The para doesn't really convey information as presented by the 'realists', who believe that there will be an atmosphere of conflict. It is not explicitly stated that China will go against other countries. Rather, China will use its power to manipulate the system to suit its own interests. Hence, Option C is not the answer.

Option D: The rise of the Chinese hegemony isn't a 'consequence' of the decline of the American era. It is something, the realists believe will happen. Also, this option misses out on an important aspect of what the author states – the reason for the possible conflict between China and other countries. Hence, Option D is not the answer.

Choice (B)

Difficulty level wise summary - Section I	
Level of Difficulty	Questions
Very Easy	–
Easy	2, 17, 21, 24
Medium	1, 5, 6, 7, 8, 9, 12, 13, 14, 16, 19, 20, 22, 23, 26, 27, 28, 31, 32
Difficult	3, 4, 10, 11, 15, 18, 25, 29, 33, 34
Very Difficult	30

SECTION – II

Solutions for questions 1 to 4:

Since the six statements given can be a little cumbersome to deal with, it is recommended to pick a statement of the form "If A is NOT X, then B IS Y". This type of statement maximizes the information available in both cases, i.e., "If A is X" or "If A is NOT X". With these two cases, all other statements can be systematically cross verified and a consistent pattern of distribution can be obtained, to the extent possible.

For instance, we could start with statement (ii).

From (ii), we can say that the cobbler cannot be the commander and the peasant cannot be the priest.

From (v), we can say that the druid cannot be the minister and the peasant cannot be the king

⇒ The peasant is either commander or minister

Case a:

Let the peasant be the commander

From (v), the druid is the king

Hence, the blacksmith and the cobbler are the minister and the priest (in any order). This satisfies all the remaining conditions.

Case b:

Let the peasant be the minister

From (ii), the cobbler is the priest

From (vi), the blacksmith is the commander and the druid is the king, which contradicts (iii).

Hence,

the peasant is the commander

the blacksmith is the minister/priest

the cobbler is the priest/minister

the druid is the king

1. The minister could have been either the blacksmith or the cobbler. Choice (D)

2. The peasant disguise was worn by the commander. Choice (C)

3. The four persons could have disguised themselves in 2 ways. Choice (C)

4. From choice (B), the blacksmith cannot be the priest.
⇒ the blacksmith is the minister
the cobbler is the priest
Hence choice (B) is sufficient. Choice (B)

Solutions for questions 5 to 8:

Here, all the small cubes are painted in pink and the medium sized cubes are painted in black and then the large cube is painted in pink.

5. Consider the medium sized cube which is at the centre of the larger cube:

It has only one small cube (at the centre of it) painted in pink.

∴ Number of small cubes with at least one face painted black = 26.

Consider the middle block of each face of the larger cube. In each of these six blocks, there is only one small cube which initially has only one face painted black. (Now it is painted pink)

∴ Number of small cubes with at least one face painted black = $6 \times (27 - 2) = 150$. (of the 2, another one is that at the centre of the cube)

There are twelve edges.

Consider the middle medium sized cube of each edge:

in each of these twelve cubes, the small cube which is at the middle of the edge, the two small cubes which are at the centre of the outer surface and the one which is at the centre of the cube are painted fully pink.

∴ Number of small cubes with at least one face painted black = $12 \times (27 - 4) = 276$.

Consider the eight medium sized cubes at each of the corners of the large cube. In each of these cubes eight small cubes are painted fully pink.
 \therefore Number of small cubes with at least one face painted black = $8 \times (27 - 8) = 152$.
 \therefore Total number of small cubes with at least one face painted black = $26 + 150 + 276 + 152 = 604$.
 Ans: (604)

6. For each of the small cubes, there are at most three faces painted black. Hence at least three faces are painted pink. As the total number of small cubes is 729, the required answer is 729.
 Ans: (729)
7. Each corner cubelet of the medium size cubes that is to the inside of the large cube will have three faces in pink and three in black. The total number of corners = $8 \times 27 = 216$. Those not exposed = $(1 \times 8) + (12 \times 2) + (6 \times 4) + (8 \times 1) = 64$.
 Choice (C)
8. From the above solution, the number of cubes that have at least one face painted black = 604
 Total number of cubes = 729
 Number of cubes with no face painted Black = Number of cubes with all the faces painted pink = Total number of cubes – Number of cubes that have at least one face painted black = $729 - 604 = 125$
 Choice (D)

Solutions for questions 9 to 12:

9. From C to K = 0
 From K to O = 476
 Minimum total cost = ₹476.
 Ans: (476)
10. The minimum cost is when sending from A to H, 1555 and then H to T = 0
 \therefore Total minimum cost = ₹1555.
 Choice (B)
11. Minimum cost is for sending from A to I and then from I to N
 $₹2255 + ₹1572 = ₹3827$.
 Choice (A)
12. Since the truckload can pass through any wholesale dealer, we can consider each wholesale dealer and identify the number of sub-dealers for whom the cost exceeds ₹9000.
 From D to G, the cost is ₹2949. Hence, for any sub-dealer, if the cost of transportation from G is more than ₹9000 – ₹2949 = ₹6051, those sub-dealers can be a possibility.
 By observation, we can see that for G, no such possibility exists.
 From D to H, the cost is ₹3799. From H, the cost must be more than ₹5201. No possibility exists.
 Similarly, for I, the cost from I must be greater than ₹5099. No such sub-dealer exists.
 For J, the cost from J must be greater than ₹5249. No such sub-dealer exists.
 For K, the cost from K must be greater than ₹3212. The possibilities are S, T, U and V.
 For L, the cost from L must be greater than ₹3671. The only possibilities is N.
 For M, the cost from M must be greater than ₹3534. No such possibility exists.
 Hence, five possibilities exist for X (N, S, T, U and V).
 Ans: (5)

Solutions for questions 13 to 16:

Sales – Expenses = Gross Profit
 Gross Profit – Taxes = Net Profit \Rightarrow Sales > Gross Profit > Net Profit
 Hence, for each company, among the given three values for each year, the largest value will be of the sales, the second largest value will be of the gross profit and the lowest value, the net profit.
 Also, the difference between the gross profit (i.e., second highest value) and the net profit (lowest value) would give the taxes paid.

13. As profitability = Net Profit/Sales
 $\Rightarrow \frac{\text{Net profit}}{\text{Sales}}$ is to be the highest,
 $\Rightarrow \frac{\text{Sales}}{\text{Net profit}}$ is to be the least.

This value is less than 4 for only company T.

Choice (D)

14. As Taxes Paid = Gross Profit – Net Profit, it can be found that taxes paid as a percentage of gross profit are the highest, if the net profit as a percentage of the gross profit is the least. This is so for company X, (i.e. slightly more than 60%).
 Choice (A)

15. Expenses = Sales – Gross Profit

Expenses	2017	2018
P	95	169
Q	255	292
R	49	76
S	443	631
T	162	173
U	226	161
V	293	382
X	77	87

For companies P, R, S, V the expenses increased by more than 30%.
 Choice (B)

16. The taxes paid by the companies in 2011 and 2012 are given in the table below:

Company	Taxes Paid	
	2017	2018
P	8	6
Q	13	11
R	3	5
S	17	22
T	2	8
U	6	22
V	17	16
X	0	11

The taxes paid in 2018 was less than that in 2017 for three companies, i.e., P, Q and V.
 Choice (C)

Solutions for questions 17 to 20:

Let us refer to each person by the first letter of his name.
 First, let us find the possible scores of the contestants
 As the values given by five persons are correct, the sum of the values of these five people will be the sum of the five contestants score multiplied by 4. [because each got a different sum]
 Let us add all the values given by the six persons.
 $\Rightarrow 220 + 260 + 230 + 240 + 210 + 250 = 1410$.
 Assume A made the mistake. So, $1410 - 220 = 1190$
 Then, the sum of the five contestants = $\frac{1190}{4} = 297.5$ which is not possible.
 Assume B made the mistake. So, $1410 - 260 = 1150$
 Then the sum of the five contestants = $\frac{1150}{4} = 287.5$ which is not possible.
 Assume C made the mistake. So, $1410 - 230 = 1180$
 Then the sum of the five contestants = $\frac{1180}{4} = 295$
 Now, the possible scores are
 $295 - 210 = 85$, $295 - 220 = 75$, $295 - 240 = 55$, $295 - 250 = 45$ and $295 - 260 = 35$.
 Assume D made the mistake. So, $1410 - 240 = 1170$.
 Then the sum of the five contestants = $\frac{1170}{4} = 292.5$ which is not possible.

Assume E made the mistake. So, $1410 - 210 = 1200$

Then, the sum of the five contestants = $\frac{1200}{4} = 300$.

Now, the possible scores are $300 - 220 = 80$, $300 - 230 = 70$, $300 - 240 = 60$, $300 - 250 = 50$ and $300 - 260 = 40$

Assume F made a mistake. So, $1410 - 250 = 1160$

Then the sum of the five contestants = $\frac{1160}{4} = 290$

Now, the possible scores are $290 - 210 = 80$, $290 - 220 = 70$, $290 - 230 = 60$ and $290 - 260 = 30$ and $290 - 240 = 50$

17. If C made the mistake, then a maximum score of 85 is obtained. So, $85 \times 10,000 = ₹8.5$ lakh. Choice (B)

18. If E made the mistake a total sum of ₹30 lakh is possible with one contestant receiving ₹5 lakhs. Also, if F made the mistake, then a total sum of ₹29 lakh is possible with one contestant receiving ₹5 lakhs. Choice (D)

19. If E made a mistake, $80 + 70 = 150$, and hence a sum of ₹15 lakh is possible
If F made a mistake, $80 + 70 = 150$ and hence a sum of 15 lakh is possible
But if C made a mistake, the sum of no two candidates' scores equals 150.
Hence from the choices given, E could have made the mistake. Choice (C)

20. Since C_1 was awarded half of C_3 , the score of C_1 must have been half of C_3 . This is possible only if Ehsaan or Fardeen made the mistake.
Further, if Ehsaan made the mistake, then C_1 must have scored 40 points, while C_3 must have scored 80 points. But it is given that C_5 received more than $C_3 \Rightarrow C_5$ scored more than C_3 . However, this is not possible in this case because C_3 scored the highest.
If Fardeen made the mistake, C_1 must have scored 30 points and C_3 must have scored 60 points. C_5 could have received more than C_3 by scoring 70 or 80 points.
Hence, Fardeen is the only person who could have made the mistake in counting. Choice (C)

Solutions for questions 21 to 24:

Given,

Runs scored : 96, 112, 64, 72, 80

Balls faced : 16, 20, 24, 28, 32, 36

As runs scored per ball is an integer and is not more than 4, hence,

Runs scored	Balls faced	Runs per ball
64	16/32	4/2
72	24/36	3/2
80	20	4
96	24/32	4/3
112	28	4

\therefore From the above discussion, we can see that the batsmen who scored 80 and 112 runs faced 20 and 28 balls respectively.

From (i), we can conclude that the batsman of Mumbai scored 96 runs and C scored 72 runs.

From (iv), B faced either 16 or 20 balls.

But, if B scored 16 balls, then his score must be 64, which contradicts (iv) as no one scored $64 - 8$ i.e., 56 runs.

\therefore B faced 20 balls and scored 80 runs and C is not from Bangalore.

\therefore Every other player faced more than 20 balls.

\Rightarrow The player who scored 64 runs faced 32 balls and scored at 2 runs per ball.

From (iii) and the above discussion, the player of team Kolkata must have scored 80 runs.

\therefore The runs scored by the players of teams Bangalore and Rajasthan are any two among 64, 72 and 112.

Also, the runs scored by D and E are any two among 64, 96 and 112.

For condition (ii) to be satisfied, the only possibility is that, the players of teams Bangalore and Rajasthan scored 64 and 72 runs in any order and D and E scored 96 and 112 runs in any order. From (iii), as E is not from Mumbai (96 runs), D must be from Mumbai and scored 96 runs.

\therefore E scored 112 runs.

\Rightarrow A scored 64 runs.

As C (72 runs) is not from Bangalore, C must be from Rajasthan and the player from Bangalore scored 64 runs.

\therefore E is from Punjab.

We get the final distribution as follows:

Batsman	Team	Runs scored	Balls faced
A	Bangalore	64	32
B	Kolkata	80	20
C	Rajasthan	72	36/24
D	Mumbai	96	24/32
E	Punjab	112	28

21. E belongs to Punjab. Choice (D)

22. The required difference = $80 - 72 = 8$. Ans: (8)

23. It is either 24 or 36. Choice (D)

24. The difference between the number of balls faced by the batsman of team Bangalore and E is 4. Ans: (4)

Solutions for questions 25 to 28:

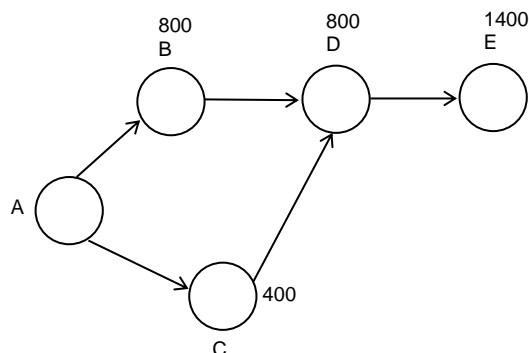
25. By observation, amongst all the high income countries, the region which has the maximum share of FDI outflows in the three years put together is Europe. It may be noted that except in 1995, Europe had, by far, the highest share in outflows. The excess in 2005 and 2015 more than compensates for the minor shortfall in 1995. Choice (B)

26. It can be seen that the statement "FDI inflows into the USA have risen by almost 4.5 times in two decades is false". The total figure has risen by about eight fold (from 118 to 911) and the percentage figure has increased by about 70% (from 10.9% to 18.5%). Hence, there would be a rise of about 13 times. Choice (A)

27. It can be seen that though inflows have increased for developing and transition countries, outflows have increased at a much faster rate. Choice (C)

28. By observation, only Europe and Japan have positive Net FDI. Further, the total FDI Outflow is around 2% less than the total FDI Inflow. Japan has 13.1 percentage points difference between Outflow and Inflow while Europe has 11.3 percentage points difference. Combining the two points, we can infer that Japan has the highest Net FDI. Choice (C)

Solutions for questions 29 to 32:



29. Since $D + E = 2200$ and only 600 is flowing from B to D, quantity flowing from C to D must be $2200 - 600 = 1600$ and that from A to C is $1600 + 400 = 2000$
Choice (A)
30. $2000 - (800 + 600) = 600$
Choice (D)
31. The free capacity in the pipeline connecting A and C = 0.
Ans: (0)
32. To maximize the free capacity in the pipeline connecting D and E, we need to minimize its flow. Hence, we can maximize the flow in the new pipeline.
2000 units will flow from A to B. After satisfying the demand of B, there will be 1200 units left. Of these 1200 units, 600 units flow from B to D. Hence, 600 units will flow from B to E.
From C, 200 units must flow to D and 800 units ($1400 - 600$) must flow to E. Since C has a demand of 400, from A to C, 1400 units will flow. From C to D, 1000 units will flow and from D to E, 800 units will flow.
Hence, the maximum possible free capacity of the pipeline connecting D and E is $2000 - 800 = 1200$ units.
Ans: (1200)

Difficulty level wise summary - Section II	
Level of Difficulty	Questions
Very Easy	–
Easy	25, 26, 27, 28
Medium	9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32
Difficult	1, 2, 3, 4, 5, 6, 7, 8
Very Difficult	–

SECTION – III

Solutions for questions 1 to 34:

1. It is given that $x = |2x - |120 - 3x||$
If $120 - 3x \geq 0$, then $|120 - 3x| = 120 - 3x$
i.e. $x \leq 40$
 $x = |2x - 120 + 3x|$
 $\Rightarrow x = |5x - 120|$
if $5x - 120 \geq 0$
 $\Rightarrow x \geq 24$
for $24 \leq x \leq 40$, we get
 $x = 5x - 120$
 $\Rightarrow x = 30$
if $5x - 120 < 0$
i.e. $x < 24$
 $x = 120 - 5x \Rightarrow x = 20$
again, if $120 - 3x < 0$ i.e. $x > 40$
 $x = |2x + 120 - 3x|$
 $x = |120 - x|$
Now, if $120 - x > 0$ i.e. $x < 120$
 $46 < x < 120$
 $x = 120 - x \Rightarrow x = 60$
If $120 - x < 0$ i.e. $x > 120$, we get
 $x = x - 120$ (Which is inadmissible)
Therefore, if $x < 24$, we get $x = 20$
For $24 \leq x \leq 40$, we get $x = 30$ and
for $40 < x < 120$, we get $x = 60$
Thus, three integer values of x satisfy the given equation.
Ans: (3)
2. It is given that, $81^{(t+1)} = 27^{(t-1)} \times 243^{(t-1)}$
 $\Rightarrow (3^4)^{(t+1)} = (3^3)^{(t-1)} \times (3^5)^{(t-1)}$
 $\Rightarrow 3^{(4t+4)} = 3^{(3t-3)} \times 3^{(5t-5)}$
 $\Rightarrow 3^{(4t+4)} = 3^{(8t-8)}$
Equating the powers (as the bases are same), we get
 $4t + 4 = 8t - 8$
 $\Rightarrow 4t = 12$
 $\therefore t = 3$
Choice (B)
3. Sum of the elements of $X = 31$ ----- (1)
 X has 7 elements. Six-digit numbers divisible by 3 have to be formed.
 \therefore Only 6 elements of X have to be used i.e., 1 element has to be eliminated. The sum of the digits of each number formed must be divisible by 3.
(1) \Rightarrow Only possible element which can be eliminated is 1.
The six-digit numbers have the digits 0, 2, 5, 6, 8 and 9.
The number of possible digits in the first, second, third, fourth, fifth and sixth positions are 5, 5, 4, 3, 2 and 1 respectively.
 \therefore Number of numbers which can be formed = $5(5)(4)(3)(2)(1) = 600$
Ans: (600)
4. $pqr + s$ will be even when both pqr and s are even, or when both pqr and s are odd.
 pqr will be odd when each of p, q and r is odd
No. of ways pqr is odd = $(4)(4)(4) = 64$
(\therefore Each of p, q and r is an integer among 1, 3, 5 and 7)
Therefore, the number of ways when pqr is even = $(7)(7)(7) - (4)(4)(4) = 279$
Therefore, pqr and s are both odd in (64×4) ways and pqr and s are both even in (279×3) ways.
Thus, the number of ways in which $pqr + s$ is even is $64(4) + 279(3) = 1093$ ways.
Ans: (1093)
5. Let the measure of the third side be x
By triangle inequality,
 $x + 7 > 12$ and $7 + 12 > x$
 $\Rightarrow x > 5$ and $\Rightarrow x < 19$
Therefore, the perimeter of the triangle, $P > 7 + 12 + 5$, i.e., $P > 24$ and $P < 7 + 12 + 19$, i.e., $P < 38$.
 $\therefore 24 < \text{perimeter} < 38$.
The perimeter of the triangle cannot be equal to 22 or 24 or 38 or 39, i.e., four values.
Ans: (4)
6. Let the three digit number be denoted by abc .
Now, $abc + cba = 1232$
 $(100a + 10b + c) + (100c + 10b + a) = 1232$
 $101(a + c) + 20b = 1232$.
Now, $20b$ will always end in a zero. Hence $101(a + c)$ must end in a 2. Only $(a + c) = 2$ or 12 are possible.
Of these two possibilities, only $(a + c) = 2$ doesn't satisfy the required condition, since for $a + c = 2$, b cannot be a single-digit number.
 \therefore Only for $a + c = 12$, we get $b = 1$.
 $\therefore b = 1$
Ans: (1)
7. Let us consider the existing number of workers as n
The total work in man days = $12n$
Similarly, the total work = $(n + 20)10$
 $\Rightarrow 12n = (n + 20)10$
 $\Rightarrow 2n = 200$
 $\therefore n = 100$
Therefore a single worker will take $12 \times 100 = 1200$ days to complete the work.
Choice (D)
8. Given $t_n = (t_{n-1} - 1)^2 + 1$
 $t_1 = 3 = 2^1 + 1$
 $t_2 = 2^2 + 1$
 $t_3 = 2^4 + 1$
 $t_4 = 2^8 + 1$
 $t_5 = 2^{16} + 1$
 $\therefore t_n = 2^{2^{n-1}} + 1$
So let P be the required product of the first ten terms.
 $P = (2^1 + 1)(2^2 + 1)(2^4 + 1) \dots (2^{512} + 1)$
By multiplying both sides by $(2^1 - 1)$, we get
 $(2^1 - 1)P = (2^1 - 1)(2^1 + 1)(2^2 + 1)(2^4 + 1) \dots (2^{512} + 1)$
 $\Rightarrow P = (2^2 - 1)(2^2 + 1)(2^4 + 1) \dots (2^{512} + 1)$
 $= (2^4 - 1)(2^4 + 1) \dots (2^{512} + 1)$
 $= (2^{512} - 1)(2^{512} + 1) = 2^{1024} - 1$
 \therefore The required product is $2^{1024} - 1$.
Alternative Solution:
Given $t_1 = 3$, we first evaluate the first few terms as $t_2 = 5$, $t_3 = 17, \dots$

Now, the product

$$\text{of first term} = 3 = 2^2 - 1$$

$$\text{of the first two terms} = 3 \cdot 5 = 2^4 - 1$$

$$\text{of the first three terms} = 17 \cdot 15 = 2^8 - 1$$

Hence, a pattern is established as product of first n terms

$$= (2^n) - 1$$

$$\text{Hence, product of first 10 terms} = (2^{10}) - 1 = 2^{1024} - 1,$$

i.e., option (B)

Choice (B)

$$\begin{aligned} 9. \quad (6561)^{-2^{-3}} &= (6561)^{\frac{1}{(-2)^3}} = (6561)^{-\frac{1}{8}} = \frac{1}{(6561)^{\frac{1}{8}}} \\ &= \frac{1}{(3^8)^{\frac{1}{8}}} = \frac{1}{3} \end{aligned}$$

Choice (B)

10. The volume of water that fills up the pipe in 3 minutes is $= \pi r^2 (400) \text{ cm}^3$

$$= \frac{22}{7} (7)(7)(400) \text{ cm}^3 = (22)(7)(400) \text{ cm}^3$$

The time taken is 3 minutes

Let the speed of the water in the inlet pipe be S (cm/sec)

$$\therefore (100)(3)(60) S = (22)(7)(400)$$

$$\Rightarrow S = \frac{22(7)(4)}{3(60)} = \frac{154}{45} \text{ cm/sec}$$

$$\approx 3.42 \text{ cm/sec}$$

Choice (A)

11. Let the initial number of type-I and type-II bacteria be denoted by a and b respectively.

As type-I bacteria doubled every 4 minutes, so at the end of

20 minutes we would get $2^{\left(\frac{20}{4}\right)} \times (a) = 2^5 \times (a) = 32a$ bacteria.

The number of type-II bacteria at the end of 20 minutes

$$\text{would be } 3^{\left(\frac{20}{5}\right)} \times (b) = 3^4 \times (b) = 81b.$$

It is given that,

$$32a + 81b = 2000$$

$$\Rightarrow 81b = 2000 - 32a$$

$$\Rightarrow 81b = 16(125 - 2a)$$

Therefore $81b$ is a multiple of 16, which implies that b is a multiple of 16.

Therefore the minimum possible value of b is 16.

$$\text{Hence, } 32a + 81(16) = 2000$$

$$\Rightarrow 32a = 704$$

$$\therefore a = 22$$

The next multiple of 16 is 32, but 81×32 gives 2592 which is more than 2000.

$$\therefore a = 22 \text{ and } b = 16$$

Thus, the initial difference between the number of bacteria of the two types taken is 6.

Choice (B)

12. Let P_i and I_i denote the principal at the beginning of the i^{th} year respectively.

$$\text{Given } P_5 = 1.2 P_4$$

$$\text{But we know that } P_5 = (1 + r) (P_4)$$

$$\Rightarrow r = 0.2$$

$$\text{Now, } I_8 = r \cdot P_8 \text{ and } I_{11} = r \cdot P_{11}, \text{ where } P_{11} = (1 + r)^3 P_8$$

$$\Rightarrow \frac{I_{11}}{I_8} = \frac{P_{11}}{P_8} = (1 + r)^3 = (1.2)^3 = 1.728$$

Hence, I_{11} is 72.8% more than I_8 .

Choice (B)

13. Since the form of the equation given in the question does not lend itself to any standard approach for simplification, we will need to check if it corresponds to any standard result/expression. The first possibility is to check if it can be reduced to the form $(x + y)^3 = k^3$. Since $\sqrt[3]{110592} = 48$ (using calculator), we proceed further.

$$\text{Hence } x^3 + y^3 + 3xy(x + y) = 48^3, \text{ i.e., } 3(x + y) = 144$$

(by comparing the coefficient of xy .)

$$\therefore \text{Given equation is simply } (x + y)^3 = 48^3, \text{ i.e., } x + y = 48.$$

Hence (x, y) can be $(0, 48), (1, 47), (2, 46) \dots (48, 0)$.

\therefore 49 ordered pairs (x, y) are possible.

Alternative Solution:

$$x^3 + y^3 + 144xy = 48^3 [\because 11052 = 48^3]$$

$$\Rightarrow x^3 + y^3 - 48^3 + 144xy = 0$$

$$\Rightarrow x^3 + y^3 - (48)^3 - 3(x)(y)(-48) = 0$$

$$\text{now, } a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ac)$$

$$\therefore x^3 + y^3 + (-48)^3 - 3(x)(y)(-48) = (x + y - 48)$$

$$\left[\frac{1}{2} \left((x-y)^2 + (x+48)^2 + (y+48)^2 \right) \right]$$

$$\therefore (x + y - 48) \left[\frac{1}{2} \left((x-y)^2 + (x+48)^2 + (y+48)^2 \right) \right] = 0$$

$$\Rightarrow (x + y - 48) = 0 \text{ or } x = y = -48$$

As x, y are non negative integers $x = y = -48$ is not possible

$x + y - 48 = 0$ will give us 49 solutions

$$\begin{array}{ccccccc} x & 0 & 1 & 2 & \dots & \dots & 48 \\ y & 48 & 47 & 46 & \dots & \dots & 0 \end{array}$$

Therefore, the number of ordered pairs (x, y) is 49.

Ans: (49)

14. It is given that, $p, p + 2q, 3p + q$ and 30 are in Arithmetic Progression.

$$\therefore p + (3p + q) = 2(p + 2q)$$

$$2p = 3q$$

Therefore the terms (in terms of q) are $\frac{3q}{2}, \frac{7q}{2}, \frac{11q}{2}$ and

$$\frac{15q}{2}$$

But $\frac{15q}{2}$, i.e., the fourth term = 30 (given)

$$\Rightarrow q = 4 \text{ and } p = 6, \text{ i.e., } 1^{\text{st}} \text{ term} = 6$$

$$\text{and common difference} = 2p = 8.$$

$$\text{Thus the } 2016^{\text{th}} \text{ term} = 6 + (2016 - 1)8 = 16126$$

Choice (D)

15. Net Speed of the boat upstream = v

$$\text{Net Speed of the boat downstream} = 4v$$

$$\text{Time taken Upstream} = \frac{d}{v}$$

$$\text{Time take Downstream} = \frac{d}{4v}$$

$$\text{Total time} = \frac{d}{v} + \frac{d}{4v} = 2 \times 60 \text{ minutes (given)}$$

$$\Rightarrow \frac{5d}{4v} = 120 \Rightarrow \text{difference of time} = \frac{3d}{4v} = \left(\frac{5d}{4v} \right) \times \frac{3}{5}$$

$$= 120 \times \frac{3}{5} = 72$$

Therefore, the boat took 72 minutes more while travelling upstream than what it took to travel downstream.

Choice (D)

16. OB = OD = 65 (Given)

$$\text{In } \triangle OND, ND = \frac{1}{2} (120) = 60$$

$$\therefore ON = \sqrt{65^2 - 60^2} = 25$$

$$\text{In } \triangle OMB, MB = \frac{1}{2}(108) = 52$$

$$\therefore OM = \sqrt{65^2 - 52^2} = 39$$

Thus the distance between the two chords is $25 + 39 = 64$.
Choice (D)

17. It is given that, $\sqrt{x} > 3x$

$$\text{Let } x = t^2, \text{ so } t > 3t^2$$

$$\Rightarrow 3t^2 - t < 0$$

$$\Rightarrow t(3t - 1) < 0$$

Therefore $0 \leq t \leq \frac{1}{3}$ satisfies the above inequality.

The maximum value of t is $\frac{1}{3}$ and the maximum value of

$$x \text{ is } \frac{1}{9} \quad (\because x = t^2) \quad \text{Choice (C)}$$

18. Let the cost price of the article be ₹100

$$\Rightarrow \text{Its marked price} = ₹160$$

$$\text{Its selling price} = \frac{3}{4}(160) = ₹120$$

$$\therefore \text{Profit percentage on the article}$$

$$= 100 \times \frac{(120 - 100)}{100} = 20\% \quad \text{Choice (A)}$$

19. A person doesn't win a prize if all the 5 tickets that he picked are not prized. The probability that the person wins

$$\text{no prize is } \frac{{}^7C_5}{{}^{12}C_5} = \frac{1}{132}$$

$$\therefore \text{the probability that the person wins at least one prize}$$

$$= 1 - \frac{1}{132} = \frac{131}{132} \quad \text{Choice (B)}$$

20. Let the number of sons and daughters of Shankerlal be denoted by s and d respectively. The number of brothers and sisters of Lajwanti and Bhola are as follows

	Brothers	Sisters
Lajwanti	s	$(d-1)$
Bhola	$(s-1)$	d

$$\text{It is given that, } (d-1) = 2s \text{ and } d = 3(s-1)$$

$$\Rightarrow 2s + 1 = 3(s-1)$$

$$\Rightarrow s = 4 \text{ and } d = 9$$

Thus, Shankerlal has 13 children in all. Choice (D)

21. For the average score per test at the end of each test to be an integer, the sum of the scores in the first two tests must be even, the sum of the scores at the end of three tests must be divisible by 3 and the sum of the scores at the end of four tests must be divisible by 4.

We start by considering his score at the end of three tests. We determine the remainders when the scores are divided by 3.

Score	104	125	133	148	175
Remainder	2	2	1	1	1

For the sum of the three scores to be divisible by 3, we need to take the first three scores such that the sum of the remainders is divisible by 3. Thus the scores to be taken are 133, 148 and 175, with the exact order not yet known. Again, for the sum of the first two scores to be even, we need to take 133 and 175, in any order. Therefore, the third

score is 148. Sum of the first three scores = $133 + 175 + 148 = 456$. For the sum of the first four scores to be divisible by 4, the fourth score must therefore be 104, and the fifth score will be 125.

	1 st	2 nd	3 rd	4 th	5 th
Scores	(133/175)	(175/133)	148	104	125

Therefore, the difference between the scores in the third and the fourth test is $148 - 104 = 44$.
Ans: (44)

$$\begin{aligned} 22. \quad & 8^{672} \times 25^{1010} = (2^3)^{672} (5^2)^{1010} \\ & = (2^{2016}) (5^{2020}) \\ & = 5^4 (10^{2016}) \\ & = 625(10^{2016}) \end{aligned}$$

This gives us 625 followed by 2016 zeroes.

Therefore, the sum of the digits will be $6 + 2 + 5 = 13$.

Ans: (13)

23. One can wear the rings in 3 ways.

1. One ring on each of the 3 fingers.
2. 2 rings on one finger and 1 ring on another.
3. All 3 rings on a single finger.

Case I: (111) The 3 fingers can be chosen in 5C_3 ways.

Now 3 rings can be arranged in those 3 fingers in $3!$ ways.

Total $3! {}^5C_3 = 60$ ways.

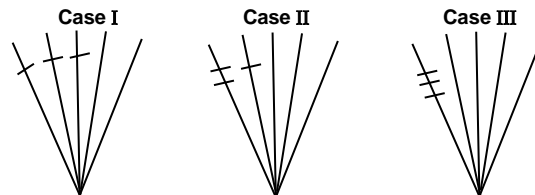
Case II: (2, 1, 0) The 2 fingers with rings can be chosen 5C_2 ways. Among them the finger with 2 rings in 2C_1 or 2 ways. Then the 2 rings on that finger can be chosen in 3C_2 ways and arranged in that finger in $2!$ ways.

Total ${}^5C_2 {}^2C_1 {}^3C_2 (2!) = 120$ ways.

Case III: (3, 0, 0) The finger can be chosen in 5C_1 ways and the 3 rings arranged on it in $3!$ ways.

Total = ${}^5C_1 3! = 30$ ways

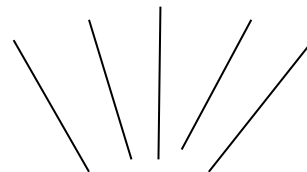
Total number of ways = $120 + 60 + 30 = 210$



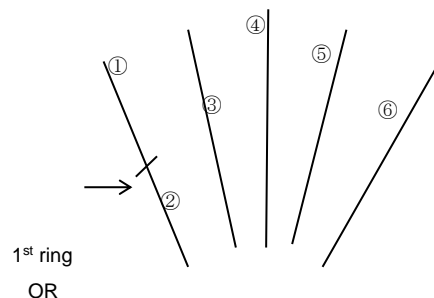
Alternative Solution 1:

There are 5 places for the first ring.

Now for each way in which one wears the 1st ring, the second ring can be worn in 6 ways, for there are 6 places for the 2nd ring.



Similarly after wearing 2 rings, the situation would be as either.



1st ring
OR

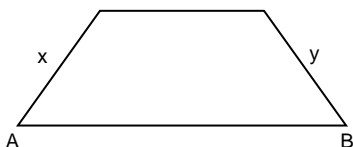
Five-digit numbers in base 5 : are 5^4 to $5^5 - 1$ i.e., 625 to 3124.

Six-digit numbers in base 4 : are 4^5 to $4^6 - 1$ i.e., 1024 to 4095.

So, the numbers that satisfy all the three conditions are 1024 to 1295 i.e., $1295 - 1024 + 1 = 272$ numbers.

Ans: (272)

30. Let us denote the total distance, the uphill distance and the downhill distance by d , x and y respectively.



The distance covered on level ground = $d - (x + y)$

On his onward journey, $\frac{x}{40} + \frac{d - (x + y)}{48} + \frac{y}{60} = 3$

On his return journey, $\frac{x}{60} + \frac{d - (x + y)}{48} + \frac{y}{40} = 3 \frac{2}{3}$

Adding the two equations, we get

$$\left(\frac{x}{40} + \frac{x}{60}\right) + \frac{2d}{48} - \frac{2(x+y)}{48} + \left(\frac{y}{40} + \frac{y}{60}\right) = 6 \frac{2}{3}$$

$$\Rightarrow \frac{x}{24} + \frac{d}{24} - \frac{x}{24} - \frac{y}{24} + \frac{y}{24} = \frac{20}{3}$$

$$\Rightarrow \frac{d}{24} = \frac{20}{3} \Rightarrow d = 160 \text{ km.}$$

Choice (B)

31. Given that the vessel contains a mixture of 70 kg of A and 30 kg of B.

Let the densities of A and B be $2d$ and d (kg/litre) respectively.

\therefore Volumes of X and Y in the vessel are $\frac{70}{2d}$ l and $\frac{30}{d}$ l

respectively.

\therefore The (initial) density of the mixture

$$= \frac{\text{total weight}}{\text{total volume}} = \frac{100}{\frac{35}{d} + \frac{30}{d}} = \frac{100d}{65}$$

After the mixture is evaporated for n hours,

Weight $\begin{matrix} X & Y \\ (70-n) & (30-2n) \end{matrix}$

$$\text{Volume} \begin{pmatrix} \frac{70-n}{2d} \\ \frac{30-2n}{d} \end{pmatrix}$$

\therefore The (new) density of the mixture

$$= \frac{100 - 3n}{35 - \frac{n}{2} + 30 - 2n} \dots\dots\dots (1)$$

$$\text{But it is given that the new density} = 1.04 \left(\frac{100d}{65} \right) \dots\dots\dots (2)$$

Equating (1) and (2)

$$\frac{100 - 3n}{65 - \frac{5n}{2}} = \frac{8}{5} \Rightarrow 5(100 - 3n) = 8 \left(65 - \frac{5n}{2} \right)$$

$$\Rightarrow n = 4$$

Alternative Solution:

This question can also be solved using the options given.

Let the densities be 2 kg/litre and 1 kg/litre.

Original mass = $70 + 30 = 100$ kg

$$\text{Original volume} = \frac{70}{2} + \frac{30}{1} = 65 \text{ litres}$$

$$\text{Original density} = \frac{100}{65} \text{ and}$$

$$\text{Final density} = \frac{100}{65} \times 1.04 = 1.6$$

Option (A): After 2.5 hours

$$\text{Mass} = 70 - (2.5)(1) + 30 - (2.5)(2) = 92.5$$

$$\text{Volume} = \frac{67.5}{2} + \frac{25}{1} = 58.75$$

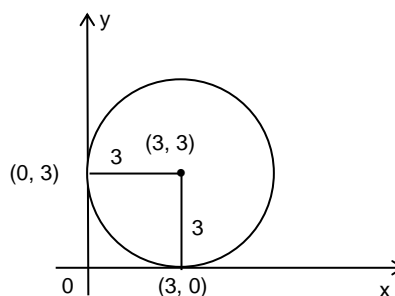
$$\Rightarrow \text{Density} = \frac{92.5}{58.75} \approx 1.57, \text{ i.e., not } 1.6.$$

Hence, option (A) is not the answer.

In this manner each of the other choices can be evaluated for the density and checked if the value is equal to 1.6. Only for choice (D) we get density = 1.6.

Choice (D)

32. Given the circle touches the coordinate axes at $(3, 0)$ and $(0, 3)$.



\Rightarrow centre of the circle is $(3, 3)$ and radius = 3 units.

\therefore Equation of the required circle is

$$(x - 3)^2 + (y - 3)^2 = 3^2$$

$$\text{i.e., } x^2 + y^2 - 6x - 6y + 9 = 0.$$

Choice (D)

33. $16200 = 2^3 \times 3^4 \times 5^2$

The number of prime factors is 3 (i.e. 2, 3, 5)

Then, the number of ways in which it can be expressed as a product of 2 co-primes = $2^{3-1} = 2^2 = 4$ ways.

Ans: (4)

34. The nine consecutive even numbers ending with y are as follows:

$y - 16, y - 14, \dots$ up to $y - 2, y$

Their average will be the middle value i.e., $y - 8$.

It is given that, $y - 8 = x$

Now, the average of 17 consecutive natural numbers starting with x (i.e., $y - 8$) will be the 9th number starting with x , out of $y - 8, y - 7, y - 6, \dots, y - 1, y, y + 1, \dots, y + 7, y + 8$. Hence the required answer is y .

Alternative Solution:

Considering a simple case of nine consecutive even numbers, say from 2 to 18, we get $x = \text{average} = 10$ and $y = 18$. Now, the average of 17 consecutive natural numbers, starting from x , i.e., 10, upto 26, we get average

$$= \left(\frac{10 + 26}{2} \right) = 18, \text{ (i.e., } y \text{ itself). Only option (B) fits.}$$

Choice (B)

Difficulty level wise summary - Section III	
Level of Difficulty	Questions
Very Easy	9, 18
Easy	2, 5, 7, 10, 12, 14, 17, 20, 26, 34
Medium	1, 3, 4, 6, 8, 11, 15, 16, 19, 22, 24, 25, 27, 32, 33
Difficult	21, 28, 29, 30, 31
Very Difficult	13, 23