T.I.M.E.
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(Key and Solutions for AIMCAT1815)

Key

SECTION – I

1. B	8. D	15. D	22. A	29. 24
2. C	9. B	16. 245	23. B	30. 426135
3. D	10. C	17. B	24. D	31. 346215
4. B	11. 12356	18. 51432	25. 3	32. 526143
5. B	12. A	19. C	26. 4	33. 3
6. C	13. A	20. D	27. 56	34. 4
7. B	14. C	21. 12	28. 135	

SECTION – II

1. A	8. D	15. A	22. D	29. C
2. 103	9. B	16. B	23. A	30. D
3. 31	10. A	17. D	24. D	31. C
4. 347	11. D	18. B	25. 40	32. 3
5. B	12. C	19. D	26. 45	
6. A	13. B	20. B	27. 15	
7. C	14. B	21. A	28. D	

SECTION – III

1. B	8. A	15. B	22. D	29. B
2. A	9. C	16. 852	23. 123	30. B
3. 315	10. A	17. 666	24. D	31. –456
4. C	11. C	18. D	25. 5250	32. 3
5. B	12. B	19. B	26. B	33. B
6. D	13. C	20. A	27. C	34. 454
7. 49	14. B	21. B	28. A	

Solutions

SECTION – I

Solutions for Questions 1 to 3:

Number of words and Explanatory notes for RC:

Number of words: 362

1. The author talks about negative freedom in the second paragraph of the passage. He states "We abolished censorship; so, too, the midnight knock at the door. Everyone has a right to travel abroad; no one is persecuted because of his or her beliefs.". We can infer that these are the features of negative freedom. Further, the author states that "But somehow we no longer want to read the very books that our struggles freed from the censor's imprisoning mind." We can infer from this that even if there were no constraints they are not making use of the freedom that they achieved.
Option A: The steps that the author mentions does not relate to the capacity to act on one's free will. Further, in the same paragraph, the author mentions that "We are free, but what are we to do with this freedom except dream of riches?" The definition mentioned in this option correlates to this statement, which in turn, can be inferred to be positive freedom. Hence, this is not the correct answer.
Option B: Abolishing censorship, right to travel abroad and not persecuting anyone based on their beliefs convey freedom from external restraints. Hence, this can be a definition of negative freedom.
Option C: The author does not talk about forming the government when discussing negative freedom. Hence, this cannot be the definition of negative freedom.
Option D: The author mentions this as one of the steps that they undertook. But this cannot be called a definition of negative freedom because it also involves other steps (abolishing censorship, freedom from persecution based on beliefs).
Among the given options, the best definition of negative freedom as can be inferred from the passage is the one in option B. Choice (B)

2. In the third paragraph, the author says "I doubt that Berlin, Taylor and others would suggest that we be satisfied with this level of liberty and nothing more."
Option A: We can infer from the passage that the Poles have attained negative freedom but have not yet attained positive freedom. However, Berlin and Taylor do not state that positive freedom can be attained without negative freedom. Hence, this is not the correct answer.
Option B: Berlin and Taylor do not mention the importance of education in attaining positive freedom. The author only

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provides the opinion of John Stuart Mill regarding education. Hence, this is not the correct answer.
Option C: The author states that Berlin and Taylor would not suggest that they be satisfied with "this level of liberty", i.e., satisfied with negative freedom. Further, the author states that "when we resign ourselves to thinking about freedom only as negative freedom, we forget the innate, if moderate, optimism of the classic liberal writers". Hence, Berlin and Taylor would have suggested that the people should strive for positive freedom. Hence, this is the correct answer.
Option D: This is exactly what Berlin, Taylor and others would not suggest and is not the correct answer.
Therefore, the correct answer is option C. Choice (C)

3. According to the author, "This enlightened idea of education was, more or less, at the base of liberal thinking. It remained there until recently, when we began to fear education for the demanding choices it placed before us".
Option A: According to Mill, "there existed an antidote to this "natural" inequality – education – which would lift people above their "lower" pleasures". However, this is not the reason that the Poles fear education.
Option B: The Poles fear education because it places a hierarchy of choices before them and they are "deeply afraid of being hierarchic". However, we cannot infer that this hierarchy is not the hierarchy of a society. This refers to hierarchy of choices. Further, we cannot infer that this reminds them of the hierarchy in their society before getting freedom. Hence, this is not the correct answer.
Option C: The author does not talk about the role of education in dividing the continent. He only mentions that the continent was once divided. Hence, this is not the correct answer.
Option D: The Poles feared education because it placed choices before them. It makes them "recognize a hierarchy in our choices". And they are "deeply afraid of being hierarchical." Hence, this is the correct answer.
Choice (D)

Solutions for Questions 4 to 6:

Number of words and Explanatory notes for RC:

Number of words: 364

4. The question put forward by Nagel was "What is it like for a bat to be a bat?".
Option A: The first paragraph, which talks about the views of Bekoff and Jamieson, does not provide any outline for answering the question put forward by Nagel. Hence, this is not the correct answer.
Option B: Bekoff and Jamieson mention that "it is not possible to simulate the mental state of animals by using a mental structure which evolved for a different purpose and gained its experience in a different environment". We can infer from this that it is not possible for humans to simulate the mental state of animals. As humans, we cannot know what it is like **for a bat** to be a bat. Hence, Bekoff and Jamieson opine that Nagel's answer cannot be answered. Therefore, this is the correct answer.
Option C: Bekoff and Jamieson's claim is related to the question that Nagel asked (from the above explanation). Therefore, this is not the correct answer.
Option D: According to Bekoff and Jamieson, 'good ethologists think themselves into the minds of the animals'. But "at the same time they dismiss simulation theory because it is not possible to simulate the mental state of animals by using a mental structure which evolved for a different purpose". From these two statements, we can infer that good ethologists can probably answer the question "What is it like for us to be a bat?" but not the question that Nagel put forward. Hence, this is not the correct answer.
Therefore, the correct answer is option B. Choice (B)

5. According to the author, "functional anthropomorphism could be a valid way for generating hypotheses on the functional aspects of behaviour because it lets one assume overlaps in roles played by certain behavioural systems".
Option A: The last paragraph mentions that there can be functional similarity between "the parent-infant and the owner-dog relationship" because there are similarities in behaviour patterns. However, we can infer that these similarities in behaviour are between the infant and the dog but not between the parent and infant. Hence, this does not support the given statement.
Option B: This statement mentions that there are similarities in the roles played by the group members (i.e., the dog and the infant). Behaviour in a relationship is the playing of a role. So, B supports the statement given in the question because it talks about the roles that they play in the relationship. Hence, this is the correct answer.
Option C: This statement is not related to functional anthropomorphism and is not the correct answer.
Option D: "Functional anthropomorphism could be a valid way for generating hypotheses on the functional aspects of behaviour because it lets one assume overlaps in ***roles played by certain behavioural systems.***" Hence, the reason why functional anthropomorphism can be valid is because it allows for overlaps in the roles played by behavioural system. This statement mentions that the behavioural pattern of a dog has similarities to that of an infant in certain roles, namely in the relationship with a owner/parent. However statement D errs in not limiting itself to the relationship with owner/parent.
Therefore, the correct answer is option B. Choice (B)

6. The second and third paragraphs of the passage talks about functional anthropomorphism.
Option A: The second paragraph mentions that "Functional anthropomorphism could be a useful tool in answering questions about the function or evolution of behaviour". It does not specify that this can be used only for the species that exist in close contact with humans. Even though it says in the passage that "In case of a social mammal like the dog… one might be entitled to use a functional anthropomorphic stance…", this does not imply that it can be used only in these species. Hence, this is not the correct answer.
Option B: From the third paragraph, we can infer that, in functional anthropomorphism, similar patterns of behaviour observed in other species can be argued to have the same function as they do in humans. However, it does not assume that the behaviour is similar (it assumes that the function can be similar). Hence, this is not the correct answer.
Option C: Functional anthropomorphism "assume that a similar pattern of behaviour in another species may have the same function". Hence, a behaviour is observed in a species first and its function is deduced based on the function that similar behaviour in humans serve. Therefore, this is the correct answer.
Option D: In the second paragraph, the author mentions that "the answers to the second question are usually regarded as demonstrating anthropomorphism". The second question is "What is it like for us to be a bat?" Hence, functional anthropomorphism is useful for understanding what it is like for us to be a dog (or a bat) and not what it is like for a dog to be a dog. Hence, this answer is incorrect.
Therefore, the correct answer is option C. Choice (C)

Solutions for Questions 7 to 12:

Number of words and Explanatory notes for RC:

Number of words: 726

7. Option A: Open borders – eliminating the undocumented status – could do more than closed borders in reducing the extreme wage inequality between borders. Many immigrants would go back and forth to their native countries, counteracting the potential brain drain by sharing knowledge and investment capital. So the first part of

choice A is true but the second part cannot be ascertained from the passage. Hence choice A is not the answer.
Option B: Refer to the last para. At the very least, citizens of the wealthiest nations have an obligation to examine numerous military, environmental, education, population and economic-growth policies – all of which set the conditions for inequality and displacement, creating a bleak world for so many. Hence choice B is correct.
Option C: Choice C is incorrect. Naturalization refers to a process by which a non-citizen in a country may acquire citizenship or nationality of another country.
Option D: Choice D is out of scope and is not the answer. It is probably not true. Choice (B)

8. Option A: The ambitious poor in this unequal world are willing to risk their lives .... For now, ordinary citizens can only witness the rising inequality and degrading values that accompany a `two-tier class society, one group with "rights" and the other without. Hence choice A is true and is not the answer.
Option B: A strong point in Toby Shelley's book is its exposure of the blatant unfairness of point-based systems that create classes of workers with different sets of rights, institutionalizing inequality and encouraging criminality. Hence choice B is true and is not the answer.
Option C: Citizens in wealthy nations are divided between those who want to close the gates on immigration and those who welcome the newcomers. That attitude .... wealthy nation as victim .... The wealthy respond as though their communities are under attack by those fleeing poverty in their homelands. Hence choice C is true and is not the answer.
Option D: The book will disappoint those who long for a specific plan of action. So choice D has not been discussed in the book. Choice (D)

9. Statement (a): Governments easily claim that the newcomers from other countries have "no rights," so the migrants become a convenient foe in the politics of enforcement. Hence statement (a) is correct and is not the answer.
Statement (b): The wealthy respond as though their communities are under attack by those fleeing poverty in their homelands. That attitude – wealthy nation as victim – suggests that the labor is not forced, that the workers don't mind a lack of standing in communities. Statement (b) is correct and is not the answer.
Statement (c): "The 'hunger' for work, the 'reliability' and 'flexibility' of migrant labour are employers' terms for long hours, lack of overtime pay, unpaid duties, zero hour contracts… and disposability of migrant labour." Hence statement (c) is true and is not the answer.
Statement (d): Choice 4 is untrue. Government policies do encourage unfair treatment of migrants – A strong point in Shelley's book is its exposure of the blatant unfairness of point-based systems that create classes of workers with different sets of rights, institutionalizing inequality and encouraging criminality. Hence statement (d) is not correct and is the answer.
Statement (e): Employers, large and small, take advantage of undocumented workers willing to toil for <u>low wages</u>. Immigrants do low skilled tasks. The employers claim to value the migrants' worth ethic, otherwise known as a willingness to <u>accept low pay</u> and horrendous conditions. ... The skilled native is able to focus on the most valuable tasks like skilled work and customer relations, while the immigrants with limited education focus on support tasks but help bring the price down for the overall project. Hence (e) is correct and is not the answer. Choice (B)

10. A government enforcement policy that focuses more on immigration status than workplace rights sets the stage for abuse of all workers, and Shelley concludes that "the government has chosen to promote a narrative in which migration is associated with law and order rather than rights." Hence while the other choices may be true, choice C is the main reason.
Option A: Employers, large and small, take advantage of undocumented workers willing to toil for low wages. Immigrants help bring the price down for the overall project. Choice A is not the primary reason.
Option B: Choice B can be surmised from "Yet the wealthy respond as though their communities are under attack by those fleeing poverty in their homelands." Again, choice B is not the chief reason.
Option D: Choice A can be surmised from "the pressures of competing with lower-cost rivals abroad may have made employers in some sectors more likely to take on cheaper, undocumented labour". This is not the main reason for the question. Choice (C)

11. (1): The ambitious poor in this unequal world, Shelly says, are willing to risk their lives to improve their lot. .... Shelley reveals that people jump through hoops of horror to live in lands that offer opportunity. Hence (1) is the reason and is an answer.
(2): Most voluntarily set out on long journeys, counting on jobs nonexistent in their homelands and anticipating tedious, revolting or dangerous work. Hence (2) is also a reason for the question.
(3): "Experience shows that the more managed, restricted and hedged about with regulatory barbed wire a migrant labour is, the less control authorities have over it," Shelley notes. Hence (3) is also true.
(4): The passage does not cite global warming and political stability as factors for the migration of labour. Hence (4) is not the answer.
(5): Citizens of the wealthiest nations have an obligation to examine numerous military, environmental, education, population and economic-growth policies – all of which set the conditions for inequality and displacement, creating a bleak world for so many. So (5) is a reason and is the answer.
(6): Trade liberalization… has created a bigger pool of people desperate to improve their circumstances through migration. Hence (6) is a reason. Ans: (12356)

12. Refer to the penultimate para of the passage. The US writer and one-time slave Frederick Douglass commented: "No man can put a chain about the ankle of his fellow man without at last finding the other end fastened about his own neck."
The lines preceding the quote show that we harm ourselves more when we brutalize others. Most worrisome is how "keep-illegals-in-their-place," "they-do-the-dirty-work," "I'm-helping-this-nanny-by-paying-her-half-the-minimum-wage" attitudes <u>weaken our moral compass</u>. Communities can no longer throw up their hands, accepting tired excuses that industries depend on cheap immigrant labor and human rights have less priority, because the entrenched inequality – hardly temporary – <u>brutalizes the controllers and controlled alike.</u> This makes choice A the correct answer. The passage does not discuss negative consequences of migration as such. So choice C is not the answer. Choice B sounds like a moralistic warning but it is not the answer to the question, because it addresses all segments of society, and not just the exploiters. Again choice D is not the answer. The natives do not suffer because of the migrants. Choice (A)

Solutions for Questions 13 to 18:

Number of words and Explanatory notes for RC:

Number of words: 791

13. Refer to the first para of the passage.
Option A: Whatever touches us, whatever moves us, does touch and does move us. We recognize the reality of it, as we do that of a hand in the dark. We might as well say that a sight which makes us laugh, or a blow which brings tears into our eyes, is imaginary, as that anything else is imaginary that makes us laugh or weep. Hence choice A is the reason.

not be moved." Hence idea number 1 will be placed second in the sequence.
Para 3 has the examples "An ox knocked down by a butcher, and a man knocked down by a fit of apoplexy, equally feel themselves compelled to drop. The tickling of a straw and of a comedy equally move the muscles about the mouth." Two different causes can result in the same effect. (How far does this differ in effect from the impression .....). So, idea number 4 will be placed third in the sequential order.
Para 4: When a stone trips us up, we do not fall to disputing its existence: we put it out of the way. The causes themselves are removable. Therefore, idea number 3 will be placed fourth in sequence.
In para 5, we naturally conclude that the imaginations in question are at least not of the same lasting or prevailing description. So, idea number 5 will be placed last in the sequence. The correct answer is 51432.

Ans: (51432)

Solutions for Questions 19 to 24:

Number of words and Explanatory notes for RC:

Number of words: 694

19. Refer to paras 4 and 5 of the passage. Two physicists, Van Savage of Harvard Medical School and Geoff West of Santa Fe Institute, have analyzed how sleep varies across mammals of different species. Mice sleep longer than elephants, not shorter – about fourteen hours a day compared to four.
Option A: Normally physiological time ticks slower for bigger animals. It is sleep that behaves differently from all other physiological times. It's backward. So the second part of choice A which states that 'elephants are an exception' is incorrect.
Option B: The lifetimes and pulse times of both elephants and mice scale in the same way with their body mass. The second part of choice B does not emerge from the studies by Van Savage and Geoff West. That sleep is required for tissue repair, or immune function, or for consolidating learning and memory are some popular theories for explaining the sleep-deprivation experiments conducted on rats, as mentioned in para 3 of the passage. So choice B is not specific to the question.
Option C: Savage and West interpret the fact (that mice sleep for a longer duration than elephants) as evidence that sleep is related to cellular repair. They note that cells produce destructive byproducts, such as free radicals, in the course of normal metabolism, and they hypothesize that sleep somehow helps repair the damage that ensues. Therefore choice C is the answer.
Option D: Choice D (metabolism speeds up during sleep in case of mice) is out of scope and distorts the information given in para 5 of the passage. Choice (C)

20. Option A: While the passage begins by saying 'witness a breakthrough in our understanding of what sleep is for', there is no discussion on the nature of sleep and its types. Neither does the author question any explanation regarding the same. Choice A is incorrect.
Option B: The passage does describes sleep-related research conducted on various animals like rats, mice, elephants etc. However, the passage does not suggest that there is any difference in their sleep (apart from the number of hours they sleep). In any case, 'discrediting the idea ....' as given in choice B is incorrect. Choice B is not the focus or objective of the author in this passage.
Option C: While the first two paras suggest that sleep is indeed important, the whole passage is not about the importance of sleep, so choice C is eliminated.
Option D: Choice D is correct. The author raises pertinent questions in the first para: So why do we need to sleep? what exactly does sleep do for us? The author of the passage then attempts to answer these questions. .... sleep-deprivation studies done in the early 1980s ..... The new development, and the cause for optimism, is an original approach to the problem that makes the first quantitative, testable predictions about the function of sleep. Hence choice D is the answer. Choice (D)

21. (1): When you read the last 2 paras together, it is clear that mice and elephants are being compared as examples of small and large animals, and there is enough in those 2 paras to infer statement (1). Sleep duration should vary with an animal's size. Sleep behaves differently from all other physiological times. It's backward. Mice sleep longer than elephants, not shorter – about fourteen hours a day compared to four. Hence (1) can be inferred and is the answer.
(2): The first half of (2) is true from para 2. ... Scientists observed a long time ago that if you keep a sheep awake continuously for several days and then inject some of its cerebrospinal fluid into another, well-rested sheep, that sheep will fall right asleep, presumably because some naturally-occurring sleep substance had reached a soporific level in the donor. The second half of (2) is correct from para 3. ... Rats were kept awake for weeks until they died from a lack of sleep. One then investigated the precise cause of death. Such studies (now outlawed) could not pinpoint any specific culprits. Hence (2) can be inferred and is the answer.
(3): (3) is out of scope. A mention of putative sleep substances has been made only in para 2 but not in connection with rats, mice or elephants.
(4): One striking observation, however, was that the rats ate much more than normal and yet wasted away. So sleep deprivation led to an increased appetite in rats. ... Other popular theories are that sleep is required for tissue repair, or immune function, or for consolidating learning and memory. So, while the second part of (4) is probably true, the first part of (4) is definitely false.
(5): There is no mention about 'better quality' of sleep in the passage. Hence (5) is not correct. Ans: (12)

22. Option A: The body needs sleep in order to keep looking beautiful. This is the idea that is invalidated in the boldfaced part of the passage. The quoted remark appears at the end of the passage, after the author states Savage and West's conclusion that "Sleep is mainly for repairing the brain, not the body." Hence choice A is the answer.
Option B: Choice B is positive and is not the answer. There is no difference of opinion in the last para. Some findings of research are mentioned.
Option C: Refer to the last few sentences of the last para. If sleep is for repairing the brain, Savage and West derive one prediction; if it's for repairing the body, they derive a different prediction. When they finally confront their model with the available data, they infer that sleep is mainly required for repairing the brain, not the body. Though the penultimate sentence of the last para does present a problem in a way, the last sentence is not a solution to the problem. Choice C is not the answer.
Option D: The author implies that an idea or viewpoint is ill advised, but does not say that it is controversial. Choice D is not the central role of the boldfaced sentence given at the end of the passage. Choice (A)

23. Option A: Choice A distorts some sentences from the last para: But which size is most relevant – brain size or body size? The key is that they are not proportional. If sleep is for repairing the brain, Savage and West derive one prediction; if it's for repairing the body, they derive a different prediction. Choice A does not correctly pinpoint the final conclusion of the passage.
Option B: When they finally confront their model with the available data, they infer that sleep is mainly required for repairing the brain, not the body. Choice B is the conclusion and is the answer.
Option C: Choice C is out of scope. "sleepy gas" is mentioned in para 2. ... some naturally-occurring sleep substance had reached a soporific level in the donor. But this line of research never quite solved the puzzle. Although a number of putative sleep substances have now been

Option B: Choice B repeats some lines from the paragraph. There is nothing imaginary in the common acceptation of the word. The logic of Moses in the *Vicar of Wakefield* is good argument here: – "Whatever is, is." Whatever touches us, whatever moves us, does touch and does move us. But it is not an adequate reason for the question. It just rephrases the question without fully answering it. Choice B is not the answer.
Option C: Choice C is contradicted by the author when he says "We recognize the reality of it." In the second para, he reiterates the fact that "our reception of their effect is a different matter." The effects cannot be denied by us or cannot be termed imaginary. Reality is judged in terms of the effects on us (and on our neighbors). Choice C is not the answer.
Option D: "Yet pain and pleasure can be real and might still be there; Must be so, as long as we are mortal." can be gathered from the verse given before the first paragraph. " and **therefore** to be got rid of or under-valued accordingly" is a consequence and not the reason for calling certain pains and pleasures imaginary. Hence choice D is not the answer to the question. Choice (A)

14. Refer to the second paragraph. People feel things differently.
Option A: The first sentence in choice A is correct. But the second sentence, which is similar to the second sentence of para 2, is incorrect as it is not suggested that materialists or immaterialists follow this theory. Hence choice A is not an apt summary.
Option B: Refer to the second sentence of para 2. The first sentence in choice B is incorrect. It is materialists who may think that the sun is a substance while the immaterialists may think that the sun is the image of a divine thought. The second sentence of choice B is also wrong. What we have to do is <u>not to deny their effect</u>, because we do not feel in the same proportion, or whether we even feel it at all; but to see whether our neighbors may not be moved. Hence choice B is not the correct answer.
Option C: Whether we are **materialists** or *<u>immaterialists</u>*, whether things be **about us** or *<u>within us</u>*, whether we think the sun is a **substance**, or only the *<u>image of a divine thought, an idea, a thing imaginary</u>*, we are equally agreed as to the notion of its warmth. But on the other hand, as this warmth is felt <u>differently</u> by <u>different</u> temperaments, so what we call imaginary things affect <u>different</u> minds. What we have to do is <u>not to deny their effect</u>, because we do not feel in the same proportion, or whether we even feel it at all; but to see whether our neighbors may not be moved. So choice C is the correct answer.
Option D: Whether we are materialists or immaterialists, we may **disagree** on the causes of events but **agree** on the effects observed (We are equally agreed as to the notion of its warmth). So the first sentence of choice D is wrong. The second and third sentences of choice D are also rendered incorrect due to the words 'similar', 'uniformly' and 'same effect' in choice D. Choice (C)

15. Refer to paragraph 3. An ox knocked down by a butcher, and a man knocked down by a fit of apoplexy, equally feel themselves compelled to drop. The tickling of a straw and of a comedy equally move the muscles about the mouth.
Option A: The first part of choice A is irrelevant. "We can only judge of things by their effects" has been mentioned in the first sentence of para 2. Choice A is not specific to the question.
Option B: "The butcher and the fit of apoplexy" are <u>two different causes</u> which result in the <u>same effect</u>: the knocking down of the ox and the man respectively. Similarly, the tickling of a straw and of a comedy are <u>two different causes</u> which result in the <u>same effect</u>: moving the muscles about the mouth. So while the second part of choice B is true, the converse of the first part of choice B is correct. Hence choice B is not the answer.
Option C: Choice C is absurd and does not explain the role of the two examples mentioned in the question. The mention of philosophers happens in the lines after the two examples given in the third para: The look of a beloved eye will so thrill the frame, that old philosophers have had recourse to a doctrine of beams and radiant particles flying from one sight to another. In fine, what is contact itself, and why does it affect us? ….. Hence choice C is not the answer.
Option D: "The butcher and the fit of apoplexy" are <u>two different causes</u> which result in the <u>same effect</u>: the knocking down of the ox and the man respectively. Similarly, the tickling of a straw and of a comedy are <u>two different causes</u> which result in the <u>same effect</u>: moving the muscles about the mouth. So the first part of choice D is true. …. In fine, what is contact itself, and why does it affect us? There is no one cause more mysterious than another, if we look into it. …. So the second part of choice D is true. Choice (D)

16. Refer to paragraph 4.
(1): Our sole business is to remove those second causes, which always accompany the original idea. ... If people were to say that the causes themselves were removable, they would be nearer the truth. So (1) is what we should be concerned with. (1) is not the answer.
(2): When a stone trips us up, we do not fall to disputing its existence: we put it out of the way. In like manner, when we suffer from what is called an imaginary pain, our business is not to canvass the reality of it. Whether there is any cause or not in that or any other perception, or whether everything consist not in what is called effect, …. Hence (2) is not what we should be concerned with. (2) is the answer, since it is not our concern whether or not something is real, so long as its effect is real and felt.
(3): It is sufficient for us that the effect is real. Therefore (3) is what we should be concerned with. (3) is not the answer.
(4): If, instead of saying that the causes which moved in us this or that pain or pleasure were imaginary, … (4) is not what we should be concerned with. (4) is the answer.
(5): In like manner, when we suffer from what is called an imaginary pain, our business is not to canvass the reality of it. (5) is not what we should be concerned with. (5) is also the answer. Ans: (245)

17. Option A: "As in deliriums, for instance, it would be idle to go about persuading the patient that he did not behold the figures he says he does ….." But choice A (The ground-work of all happiness …. avoid the abuse of health) is out of scope.
Option B: Our sole business is to remove those second causes, which always accompany the original idea. As in deliriums, ….. he might reasonably ask us, if he could, how we know anything about the matter; or how we can be sure that in the infinite wonders of the universe certain realities may not become apparent to certain eyes, whether diseased or not. There is no one cause more mysterious than another. Our business would be to put him into that state of health in which human beings are not diverted from their offices and comforts by a liability to such imaginations. So choice B is correct. "the imaginary causes which cannot be adequately described" follows from the last sentence of the passage.
Option C: The first sentence in choice C is far-fetched and out of scope. The second sentence in choice C can be inferred from the last para. Choice C is not the answer.
Option D: Choice D is incorrect. "how we can be sure that in the infinite wonders of the universe certain realities may not become apparent to certain eyes, whether diseased or not" renders the first part of choice D wrong. The second and third sentences of choice D are absurd. Choice (B)

18. Para 1 deals with the theme: "Whatever is, is." We recognize the reality of it. Hence idea number 5 will come first in the sequence.
Para 2 talks about "We can only judge of things by their effects. …. What we have to do is not to deny their effect, because we do not feel in the same proportion, or whether we even feel it at all; but to see whether our neighbors may

identified, we're not sure how they might work biochemically, or how sleep (as opposed to mere rest) might break them down. The second part of choice C is incorrect.
Option D: Savage and West analyzed how sleep varies across mammals of different species. ..... Savage and West derived mathematical predictions about how sleep duration should vary with an animal's size. But which size is most relevant – brain size or body size? ... So one hypothesis that Savage and West used was: The brain size of an animal is related to the amount it sleeps. It can be seen that choice D distorts the hypothesis. Choice D is a wrong hypothesis. In any case, it is not the conclusion.
Choice (B)

24. Refer to the last para. Sleep behaves differently from all other physiological times. It's backward. Mice sleep longer than elephants, not shorter – about fourteen hours a day compared to four. The number of hours an animal sleeps is inversely proportional to its size.
Option A: An animal that sleeps 10.5 hours a day – i.e. more than an elephant but less than a mouse – must be smaller than an elephant and larger than a mouse. So choices A (Animal Y is larger than an elephant) is ruled out, though it is correct that animal Z is smaller than a mouse. Also while the passage does say that the size of the animal's brain is connected to the number of hours it sleeps, the precise relationship between these factors is not mentioned. So choice A is not correct.
Option B: Refer to the explanation given for choice C. We cannot say that Animal Y is almost half the size of an elephant. Animal Z will be smaller than a mouse, not larger. While the passage does say that the size of the animal's brain is connected to the number of hours it sleeps, we cannot arrive at the brain size relation for animals Y and Z as given in choice B. Choice B is not correct.
Option C: Normally physiological time ticks slower for bigger animals. For example, elephants live much longer than mice and their hearts beat much slower. We cannot really draw a correlation between sleep duration and heart size for all animals. But as explained above, we know that the size of Animal Y lies in a range between the sizes of a mouse and an elephant, while animal Z is smaller than a mouse. So animal Y's heart should beat faster than an elephant. But animal Z's heart will beat faster than a mouse. Hence choice C is not correct.
Option D: We can say with certainty that the size of Animal Y lies in a range between the sizes of a mouse and an elephant, while animal Z is smaller than a mouse. Choice D is the answer. Choice (D)

Solutions for Questions 25 and 26:

25. On a careful reading of the sentences, it can be observed that sentence 2 is a general sentence that begins the paragraph. It tells us what fiction allows us to do. Sentence 2 is followed by sentence 4. "Fiction allows us" in sentence 2 is followed by "And then in the tale" in sentence 4. Also "slide into ....., look out through ...." in sentence 2 links with "stop before we die" in sentence 4. Sentence 4 continues to tell us what happens as we progress through a work of fiction. "vicarious" means in a way that is experienced in the imagination through the actions of another person. So "look out through other eyes" as mentioned earlier in sentence 2 also points to "vicariously" in sentence 4. So, 24. Sentence 4 is followed by sentence 1. "And then in the tale" in sentence 4 links with "And, in the world beyond the tale" in sentence 1. Also "close the book, and we resume our lives" in sentence 1 links with "we stop before we die" in sentence 4. Sentences 1 and 4 form a mandatory pair. "we resume our lives" in sentence 1 links with " Lives that are ...." in sentence 5. So, 2415. Sentence 3 is the odd sentence out. It needs a precedent and more substantiation. It runs tangent to the remaining text as it brings in the context of 'pain' and how we tackle it. Ans: (3)

26. On a careful reading of the sentences, it can be observed that sentence 3 is a general sentence that begins the paragraph. It begins with Adam Smith's comment and establishes the background of the paragraph. Sentence 3 is followed by sentence 1. "The father of free-market economics" in sentence 1 refers to "Adam Smith" in sentence 3. " this paradox" in sentence 1 refers to the paradox given in sentence 3: "Nothing is more useful than water" **but** "scarcely anything can be had in exchange for it." Sentence 5 follows sentence 1 as it gives a sceanario where Adam Smith's comment will still hold true. "Scotland, as rain-sodden and damp then as it is today" in sentence 1 links with "Where water is in ample supply" in sentence 5. Sentence 2 follows sentence 5 with the contrast conjunction 'but'. "Where water is in ample supply" in sentence 5 contrasts "dry seasons; drought and deluge" in sentence 2. So, 3152. Sentence 4 is the odd sentence out as it will need further elaboration and substantiation. It deals with courses of action for alleviating water scarcity. Sentence 4 can come later in the thoughtflow. Ans: (4)

Solutions for Questions 27 to 29:

27. The usage of the word 'fret' is incorrect in sentences (5) and (6).
In sentence (5), 'fret' is used as a noun and should be preceded by the article 'a' ("get themselves in a fret").
In sentence (6), the phrasal verb 'frets out' is incorrect. It should be replaced with 'frets away'. This means 'to become eaten, worn, or corroded'.
The other statements have the correct usage of the word 'fret'.
In sentence (1), 'fretted' means 'interlaced angular design'.
In sentence (2), 'fretted' refers to a rubbing or gnawing action (i.e. a hole or worn spot made by abrasion).
In sentence (3), 'fretting' refers to moving in agitation or commotion (eg. movement of water).
In sentence (4), the first reference to 'fretting' indicates "to agitate" while the second reference to 'fretting' indicates wearing away or consuming by gnawing or friction.
Ans: (56)

28. The usage of the word 'lay' is incorrect in sentences (1), (3) and (5).
In sentence (1), "laid in" is incorrect. The correct phrasal verb usage is "laid aside" which means "To save for the future".
In sentence (3), "laid me up" is wrong. The correct phrasal verb usage is "laid me out for ...." which means to rebuke harshly.
In sentence (5), the correct usage is "The Villa Bon Abri lies ...." (not 'lays')
The other statements have the correct usage of tthe word 'lay'.
In sentence (2), "lay up supplies" means "to stock for future use".
In sentence (4), the word 'Lay' is correctly used in the title of J. R. R. Tolkien's poem
In sentence (6), 'laid low' is an idiom which means "to cause to be dead or unable to get up from a lying position".
Ans: (135)

29. The usage of the word 'flush' is incorrect in sentences (2) and (4).
In sentence (2), it should read 'flush with the ground'. Here 'flush' means 'of a surface exactly even with an adjoining one'; being level, straight or regular without variation. In sentence (4), the usage should be 'In a flush of patriotism' or 'Flushed with patriotism'. This means a rush of strong feeling or emotion.
The other statements have the correct usage of the word 'flush'.
In sentence (1), "flushed out" means "driven out or dislodged", "to drive or force into the open." Another example can be: The rabbits were flushed out from the wooded area before the logging began.
With respect to sentence (3), for a person to "flush" is to become markedly red in the face and often other areas of the skin, from various physiological conditions like embarassment.

In sentence (5), "flush blow to the jaw" refers to a direct, straightforward or solid attack.
In sentence (6), 'flush times' means 'plentiful, marked by abundance'. Ans: (24)

Solutions for Questions 30 to 32:

30. On a careful reading of the sentences, it can be observed that sentence 4 is a general sentence that begins the paragraph. It refers to a testament similar to the opening lines of the first chapter of the first book (i.e. Genesis) of the Old Testament (Bible). Sentences 4 and 2 form a mandatory pair. "write their own Testament, these might be the opening lines" in sentence 2 refers to the lines mentioned in sentence 4. Sentence 2 is followed by sentence 6. "unerring faith of millions of followers" in sentence 6 links with "technophiles" in sentence 2. Also "redefine the appeal" in sentence 6 points to "without it was not anything made that was made" mentioned earlier in sentence 4. So, 426. Sentence 1 justifies "redefine the appeal of whole categories of computing" mentioned in sentence 6 and follows sentence 6. Sentence 1 is followed by sentence 3. "Recently .... pull it off again" in sentence 3 follows from "popularised existing technologies four times" given in sentence 1. Sentences 3 and 5 form a mandatory pair. "its smartwatch" in sentence 3 links with " the category .... wrist-based devices" in sentence 5. "pull it off again" in sentence 3 contrasts "so far the category has remained a niche plaything for geeks and athletes" in sentence 5. So, 426135. Ans: (426135)

31. On a careful reading of the sentences, it can be observed that sentence 3 is a general sentence that begins the paragraph. The remaining sentences need a precedent. Sentence 3 provides the background or the theme of the discussion: .... refugees who have fled the ghastly war in Syria will not be able to return home anytime soon. Sentences 3 and 4 form a mandatory pair. "It is unlikely that ..." in sentence 3 is followed by "Nor are many likely" in sentence 4. Sentence 4 is followed by sentence 6. The pronouns "they" and "their" in sentence 6 refer to the noun "the refugees" in sentence 3. "their future is bleak" in sentence 6 links with "they live in camps or shared rooms in neighbouring countries" in sentence 2. So sentence 2 follows sentence 6. Sentence 1 follows sentence 2 by mentioning other problems. Sentence 5 concludes the para with the comment of Yasser Jani. "has been in a camp in southern Turkey" in sentence 5 links with "live in camps or shared rooms in neighbouring countries" mentioned earlier in sentence 2. So, 346215 is the correct sequence, since the 'they' in 6 would refer to 'the refugees' (in 3) who may not be able to start a new life abroad (in 4) and whose future is bleak (in 6). The bleakness follows in (2) and (1), and is confirmed by the closing quote in (5).
Ans: (346215)

32. On a careful reading of the sentences, it can be observed that sentence 5 is a general sentence that begins the paragraph. It introduces "Charles Miller" to us. The full name has been mentioned in sentence 5. Sentence 2 follows sentence 5. "Here he is then" in sentence 5 links with "preserved in mahogany bust form ..... peering from his private mausoleum in Brazil's largest city" in sentence 2. "Bust" means a sculpture of a person's head, shoulders, and chest. Sentence 2 introduces the fact that Miller had imported football from across the Atlantic to Brazil. ('paterfamilias' in sentence 2 literally means the male head of a family or household but here it refers to 'father-mentor-instigator of football' as given in sentence 6). Sentence 6 follows sentence 2. 'here' in sentence 6 refers to 'Brazil's largest city, São Paulo' in sentence 2. "paterfamilias of Brazilian football" in sentence 6 links with "father-mentor-instigator of football in Brazil" in sentence 2. "recognisably the same activity Miller himself imported across the Atlantic 120 years ago" in sentence 2 links with "famously set sail from Southampton in 1894 with two leather footballs and a copy of the Hampshire Football Association's rules of the game" in sentence 6. Sentence 6 is followed by sentence 1. "who from there set up .... grand, glorious, essential sporting future" in sentence 1 follows after "set sail with two leather footballs and a copy of the Hampshire Football Association's rules of the game" in sentence 1. So, 5261. Sentence 4 introduces a new sport 'rugby' and states that it was also Miller's import from another country but that it had less appeal. Sentence 4 is followed by sentence 3. "played at a few posh boarding schools and almost nowhere else" in sentence 3 justifies "less appeal" in sentence 4. Sentence 4 concludes the para. Ans: (526143)

Solutions for Questions 33 and 34:

33. The given sentence has errors related to parallelism and punctuation. 'The college' is incorrect. We are not referring to a particular college but we are referring to 'college' in general. So 'a college' should be used at the start of the sentence. {'prison house' would refer to ignorance or the limitations of our prejudice. The battle refers to one of the battles. The sentence implies that one will go through many battles. Existence of college life is one such battle.} We need to say, "The battle is not yet lost" since the other parts have the word 'yet' in them. The present perfect "battle has not yet been lost" is incorrect (in choices 1 and 4) as it is not parallel to "hope has not yet died" and "the prison house has not yet closed". Also in the final part, the word 'here' has to be placed before "we assert, endow and defend as final reality.....". 'where' in choice 1 is incorrect inspite of the semicolon before it. Without the semicolon, it would have been wrong altogether. 'in final reality' in choice 4 is incorrect. With respect to punctuation, we would also need to introduce a semicolon after the word 'lost'. (We want to bring in another statement to be seen with an earlier one but it is an independent thought. We have ended a thought and are starting a new thought with a different emphasis). So the correction is, "A college is a corner of our hearts where hope has not yet died, the prison house has not yet closed, the battle is not yet lost; here we assert, endow and defend as final reality, the best of our dreams." In choice 1, the presence of a comma after 'hearts' and the absence of a semicolon after 'lost' renders it incorrect. Also the wrong tense "the prison house was not yet closed" is used. Only choice 3 is free from errors and provides the correct sentence construction. Ans: (3)

34. It can be inferred that choice (1) is the same as the question statement. There are a number of errors in statement choice (1). 'Books' and 'twelve years' in (1) need to be preceded by the definite article 'the'. The word 'only' is misplaced. It should read as: "the only subject worth writing about". The date '1945' needs to be followed by a 'colon'. The word 'where' in the phrase "from where Hitler" is incorrect. We are referring to a time point. So we should use 'when' in place of 'where'. The part should read: .... the twelve years from 1933 to 1945: from when Hitler took power to the end .... Also it is better to say "Second World War" i.e. in capital letters. "return back" is redundant. We should say, "return to it to try .....
In statement choice (2), 'second world war' should be in capitals. 'return again' is incorrect. One should just say 'return'. The word 'incomprehensible' needs to be preceded by the article 'the'.
In statement choice (3), 'twelve years' needs to be preceded by the article 'the'.
Only statement choice (4) is free of errors. (4) is the only choice which also correctly has a comma after 'Second World War'. Ans: (4)

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

SECTION – II

Solutions for questions 1 to 4:

1. Seven companies have D/E ratio greater than 0.896 – C_3, C_4, C_6, C_7, C_8, C_9, C_{10}.
Of these seven companies, four companies have ATR greater than 1.52 – C_3, C_4, C_6, C_7.
The share prices of these four companies are 41, 39, 51 and 70 respectively.
The total amount Jacob would have spent
= 13 × (41 + 39 + 51 + 70) = 13 × 201 = 2613.
Choice (A)

2. Six companies have EPS more than 12 – C_2, C_3, C_5, C_8, C_9, C_{10}.
Of these six companies, three companies have RoA less than 0.4 – C_2, C_8, C_9.
Let the number of shares that he purchased of each company be *n*.
n × (37 + 24 + 36) = 10000
⇒ n = 103.1
Hence, he could have purchased a maximum of 103 shares of each company. Ans: (103)

3. Seven companies have ATR less than 1.65 – C_1, C_2, C_4, C_5, C_8, C_9, C_{10}
Of these seven companies, five companies have EPS greater than 12 – C_2, C_5, C_8, C_9 and C_{10}.
The share prices of these companies are 37, 47, 24, 36 and 68 respectively.
Since we have to maximize the number of shares of a single company, we can select the lowest share price, i.e., 24.
He must purchase at least one share of all the other companies spending a total of 188.
The remaining amount = 1000 – 188 = 812
The remainder when 812 is divided by 24 is 20. Since he cannot spend exactly 812, he must purchase one or more of the other shares.
Hence, he has to spend an additional 24k + 20 in purchasing the other shares. Hence, he can spend an additional 20 or 44 or 68 or 92… in purchasing the other shares. The least that he can spend is Rs. 68, if he purchases one share of C_8. Hence, he can buy one share worth 68, which leaves 812 – 68 = 744 and he can buy 31 shares of C_8 for this Rs. 744.
Hence, the maximum number of shares of any company that he can purchase = 31. Ans: (31)

4. Three companies – C6, C7 and C10 – satisfy the given criteria. The share price of the three companies are Rs. 51, Rs. 70 and Rs. 68. Since he spent an equal amount in purchasing the shares, he must have spent LCM (51, 70, 68) in purchasing the shares of each company. Hence, he must have spent at least Rs. 7140 in purchasing the shares of each company.
The minimum total number of shares that he would have purchased =

$$\frac{7140}{51}+\frac{7140}{70}+\frac{7140}{68} = 140 + 102 + 105 = 347.$$

Ans: (347)

Solutions for questions 5 to 8:

Let a, b, c, d and e be the GDP of the country in 2012, 2013, 2014, 2015 and 2016 respectively.
Since the GDP of CB did not change from 2012 to 2016, we get
0.2a = 0.4b = 0.25c = 0.5d = 0.4d
Hence, the GDP of the country in 2012, 2013, 2014, 2015 and 2016 must be in the ratio 10 : 5 : 8 : 4 : 5.
Let 10x be the GDP of the country in 2012. The following table provides the GDP of each state in each of the five years in terms of x:

State	2012	2013	2014	2015	2016
LN	1.5x	x	2.4x	0.6x	x
OP	2.5x	0.75x	2.8x	0.8x	1.25x
WN	4x	1.25x	0.8x	0.6x	0.75x
CB	2x	2x	2x	2x	2x

5. The GDP of LN increased in two years, 2014 and 2016.
Choice (B)

6. The required ratio = 0.8/2.5 = 0.32 Choice (A)

7. In 2013, the GDP of LN, OP and WN decreased.
In 2015, the GDP of LN, OP and WN decreased.
In the other two years, the GDP did not decrease for at least 2 states. Choice (C)

8. Highest percentage increase in GDP of any state was for OP in 2014, which is equal to $\frac{2.8-0.75}{0.75}\times 100$ = 273.33%
Choice (D)

Solutions for questions 9 to 12:

From (i), the Mansion is Red in colour and from (iii), the Apartment is Blue. From (i), Alan lives in the Black house. From (ii), Bob lives in the Cottage. From (iv), Dave does not live in Apartment or Mansion.
From (v) Harry lives in the Orange house.
Hence, Chris and Gary live in the Mansion or Apartment in any order.
The colour of the house in which Bob lives must be Yellow. Hence, the colour of the house that Dave lives in must be Green. Since the Bungalow is not Green, Dave must be living in Villa or Ranch.
From (i), Alan must be in Villa/Bungalow. Harry must be in Bungalow/Ranch.
The following table provides the type of house and the colour of the house that each person lives in:

Person	House Type	House Colour
Alan	Villa/Bungalow	Black
Bob	Cottage	Yellow
Chris	Mansion/Apartment	Red/Blue
Dave	Ranch/Villa	Green
Gary	Apartment/Mansion	Blue/Red
Harry	Bungalow/Ranch	Orange

9. Dave lives in the Green house. Choice (B)

10. If Alan lives in the Villa, Harry lives in the Bungalow.
Choice (A)

11. None of the statements will be sufficient to determine the type of house and the colour of the house that each person lives in. Choice (D)

12. For Chris and Gary, there are two possibilities. For Alan, Dave and Gary, there are two possibilities. Hence, the total number of ways = 4. Choice (C)

Solutions for questions 13 to 16:

Since each item was sold to the highest bidder, for each item, only some possibilities exist for the person who could have purchased it. For example, Item 1 could have been purchased by D (from the data given for the four persons, D has the highest bid) or by B (since we do not know how much B bid).

The following table provides the possibilities for each item:

Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9	Item 10
B/D	A/B/C	A/E	C/D	D	A/D/E	C/E	C/E	C/D	B/D

E bid 70 for Item 10. This implies that he had at least 70 with him when the auction for Item 10 started. Since he had a total of 143, he could have spent at most 73 for purchasing any of the previous 9 items.
Hence, E could not have purchased Item 8 as he bid 74 for it (if E's bid was the winning bid, he cannot have 70 at the start of the auction of Item 10). Hence, **C purchased Item 8.**
D bid 75 for Item 10. Hence, D must have at least 75 at the start of the auction of Item 10. Since D has a total of 120, D could have spent a maximum of 45 for the previous nine items. But D purchased Item 5 for 40. Hence, D could not have purchased any of the remaining items among the first nine items.
Hence, **Item 1 was purchased by B. Item 4 and Item 9 were purchased by C. Item 10 was purchased by B.**
C purchased Item 4, Item 8 and Item 9. Hence, C must have bid at least 33 for Item 4, at least 75 for Item 8, at least 35 for Item 9. Hence, C spent at least 143 before the auction of Item 10 and she has at most 75 (i.e., 218 – 143) at the start of auction of Item 10. Since C bid 74 for Item 10, C could not have purchased any other item.
Hence, **Item 7 must be purchased by E** by bidding at least 37.
E bid 74 for Item 8. Hence, E could have spent at most 143 – 74 = 69 for the previous seven items. Since we know that E purchased Item 7 for at least 37, E could have spent at most 32 for purchasing any of the first six items.
Hence, E cannot purchase Item 3 (because A bid 42). Hence, **A won the auction for Item 3.** A bid 69 for Item 10. Hence, A could have spent at most 121 – 69 = 52 for the previous nine items. As A purchased Item 3 for 42, A could not have purchased any other item. Hence, **Item 2 must have been purchased by B and Item 6 by E.**
Since B purchased Item 1 and Item 2, B would have spent at least 25 + 37 = 62. For Item 10, B can bid a maximum of 136 – 62 = 74. Hence**, D must have won the auction for Item 10.**
The following table provides the bids that were submitted by the five persons and the winning bid highlighted in grey:

Bids submitted (in ₹ '000)

Person	Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9	Item 10
A	21	≤ 36	42	30	12	≤ 31	29	45	30	69
B	≥ 25	≥ 37	41	25	31	26	35	62	21	≤ 74
C	23	36	36	≥ 33	21	28	36	≥ 75	≥ 35	74
D	24	34	38	32	40	≤ 31	31	68	34	75
E	12	31	≤ 41	31	34	32	≥ 37	74	29	70

13. Two items (Item 6 and Item 7) were sold to E. Choice (B)

14. B bid the highest amount for Item 2. Choice (B)

15. E will have a maximum of 143 – 32 – 37 = 74
C will have a maximum of 218 – 33 – 75 – 35 = 75
B will have a maximum of 136 – 25 – 37 = 74
A will have 121 – 42 = 79
Hence, A will have the maximum amount with him. Choice (A)

16. The number of items sold to B is 2. Choice (B)

Solutions for questions 17 to 20:

Since the average age of all the persons in an age group in Country A is greater than that of Country B, in the scatter graph, for each interval, the point that is to the right will represent the people from Country A and the point that is to the left will represent the people from Country B.

For example, in the age group 0 – 10, the people from Country A spent Rs. 50,00,000 in restaurants (i.e., the rightmost point in the age group 0-10), while the people from Country B spent Rs. 25,00,000.

Similarly, we can determine the amount spent by the persons from each age group for each country. This is presented in the following table:

Age Group	Amount Spent in Restaurants (in Rs. '000)	
	Country A	Country B
0 – 10	5000	2500
11 – 20	5000	25000
21 – 30	30000	15000
31 – 40	10000	35000
41 – 50	30000	20000
51 – 60	35000	50000
61 – 70	55000	60000
71 – 80	45000	25000
81 – 90	15000	5000
91 – 100	2500	10000

17. The total amount spent (in Rs. '000) in restaurants by all the persons of Country A whose age is at least 31 years = 10000 + 30000 + 35000 + 55000 + 45000 + 15000 + 2500 = 192500 Choice (D)

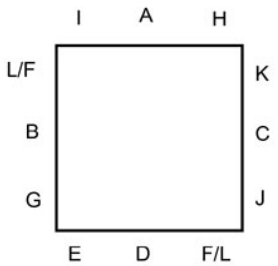
18. The total amount spent by all the persons of Country B whose age is at least 31 years and at most 70 years = 165000
The total amount spent by all the persons of Country B whose age is at least 41 years and at most 60 years = 70000
Hence, the total amount spent by all the persons of Country B whose age is between 36 and 65 years must be between 70000 and 165000. From the given options, only II and III fall in this range. Hence, 2 values can be the total amount spent by all the persons of Country B whose age is between 36 and 65 years. Choice (B)

19. The required ratio is the highest for 81 to 90 years. Choice (D)

20. The amount spent per person in Country B is 25% more than that in Country A for four age groups: 11 – 20, 31 – 40, 51 – 60 and 91 – 100. Choice (B)

Solutions for questions 21 to 24:

From (i), A was sitting exactly opposite D. B was to the left of D and sitting opposite C. All four occupied the seats at the centre of each side.
From (iii), E must be adjacent to D. From (v), I must be sitting adjacent to A. From (ii), I must be to A's right and H must be to A's left. From (iii), E must be to D's left. From (vi), J must be sitting adjacent to C. From (iii), K must also be adjacent to C. From (vi), G must be to B's right and J must be to C's left. Therefore, K must be to C's right. F and L can be to B's left and D's right in any order.
The following diagram shows their positions.



21. H was sitting on the same side as A. Choice (A)

22. J and C were sitting on the same side of the table. Choice (D)

23. F was sitting on the same side of B. Choice (A)

24. J and K are sitting on the same side of the table but not adjacent to each other. Choice (D)

Solutions for questions 25 to 28:

Given that Tim purchases rice at Rs. 20 per kg. Let the profit that Uday makes be x. From (i), the profit that Tim makes will be x + 5.
From (v), the profit per kg of Vir will be x – 5 (since Tim's profit is x + 5).
From (vi), Ratan's profit must be x + 20.
From (ii), Ratan sells rice at Rs. 50 per kg. Hence, Ratan must be purchasing rice at 50 – x – 20 = 30 – x
From (ii), Vir must be purchasing rice at 25 – x.

Person	Cost Price	Selling Price	Profit
Ratan	30 – x	50	x + 20
Tim	20	x + 25	x + 5
Uday			x
Vir	25 - x	20	x - 5
Wasim			

Since cost price, selling price and profit are all positive integral multiples of 5, x can be a maximum of 20 (since Vir purchases at 25 – x) and can be a minimum of 10 (since profit for Vir is x – 5). Hence, x can take only three values: 10/15/20.
Since Tim purchases rice at Rs. 20 per kg, x cannot be 10 (as Ratan will also purchase at the same price). Hence, x can only be 15/20.
From (vi), Uday sells at Rs. 35 per kg. If x is 15, the Uday must make a profit of Rs. 15. Hence, he must be purchasing at Rs. 20 per kg. But this is not possible as Tim also purchases at the same price. Hence, x cannot be 15 as well. Hence, x must be 20.
Hence, the Cost Price and Profit of Ratan must be Rs. 10 and Rs. 40 respectively.
Profit of Tim will be Rs. 25 and Selling Price will be Rs. 45.
Cost Price and Profit of Uday will be Rs. 15 and Rs. 20 respectively.
From (iii) and (iv), the selling Price of Wasim must be Rs. 55.
The Cost Price can be 25/30/35/40. The Profit in each case will be 30/25/20/15 respectively. But Tim, Uday and Vir have profits of Rs. 25, Rs. 20 and Rs. 15 respectively. Hence, the profit of Wasim must be Rs. 30 and the Cost Price must be Rs. 25.
The following table provides the Cost Prices, Selling Prices and Profits of each of the five persons:

Person	Cost Price	Selling Price	Profit
Ratan	10	50	40
Tim	20	45	25
Uday	15	35	20
Vir	5	20	15
Wasim	25	55	30

25. The highest profit made by any person is Rs. 40 (by Ratan). Ans: (40)

26. Tim sells one kg of rice at Rs. 45. Ans: (45)

27. Uday purchases one kg of rice at Rs. 15. Ans: (15)

28. Profit per kg for Mr. X = Rs. 25
Hence, Mr. X is Tim. Choice (D)

Solutions for questions 29 to 32:

Since two out of C, E and F must be selected, only C and E can be selected (and F is not selected); only C and F can be selected (and E is not selected); only E and F can be selected (and C is not selected); C, E and F can be selected.
Consider that only C and E are selected. From (iv), G must be selected. From (iii), F must be selected. Hence, only C and E cannot be selected.
Consider that only C and F are selected. From (iv), G must be selected. The fourth person can be A. In this case, the fifth person cannot be B (since D is not selected), E (from (i)) or H (from (v)). Hence, the fourth person can only be D. Hence, **(A, C, D, F, G)** is one possibility.
The fourth person can be B. From (ii), the fifth person has to be D. Hence, **(B, C, D, F, G)** is another possibility.
The fourth person can be D. The fifth person can be A or B (both these cases are mentioned above). E cannot be selected since only C and F are selected. Hence, there are no more possibilities.
The fourth person can be E. The fifth person can only be D, which is already mentioned above.
Consider that only E and F are selected. Since only E and F are selected, C cannot be selected. Since E is selected, A cannot be selected. Since C cannot be selected, G also cannot be selected. For B to be selected, both C and D must be selected. Since C cannot be selected, B also cannot be selected. From (v), H also cannot be selected. Hence, only D can be selected and, in this case, it is not possible to select five friends.
Consider that C, E and F are selected. Since C is selected, G must be selected. The fifth friend cannot be A, since E is selected (from (i)). It cannot be B, since D is not selected (from (ii)). The fifth friend can be D. The fifth friend cannot be H since B is not selected. Hence, there is only one possibility in this case: **(C, D, E, F, G).**
Hence, there are a total of three ways in which Amar can select: (A, C, D, F, G); (B, C, D, F, G); (C, D, E, F, G).

29. Amar can select a maximum of 3 girls. Choice (C)

30. Four friends, C, D, F and G, will definitely be selected. Choice (D)

31. H will definitely not be selected. Choice (C)

32. Amar can select the five friends in three ways. Ans: (3)

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

SECTION – III

Solutions for questions 1 to 34:

1. The amount received by each person = $\frac{10001}{17}$, which is a rational number, but not a natural number.
As the denominator (17) in the lowest terms is not a power of 2 or 5, $\frac{10001}{17}$ will be a non-terminating decimal.
Again, since it is a rational number, it cannot be a non-terminating non-recurring decimal. So, it must be a non-terminating recurring decimal.
Now $\frac{10001}{17} = 588.\overline{2941176470588235}$, which is a non-terminating recurring decimal. Choice (B)

2. Volume of a cone = $\frac{1}{3}\pi r^2 h = V$
As the radius decreases by 20% and the height increases by 50%, new volume
= previous volume × $(0.8)^2$ (1.5) = V(0.96)
Therefore, there is a 4% decrease. Choice (A)

3. Let the initial number of workers be n and let the number of workers who were removed from the assignment at the end of every hour be t.
∴ Total number of puppets made in 4 hours and 20 minutes
$= 5n + 5(n - t) + 5(n - 2t) + 5(n - 4t) \times \frac{20}{60}$
It is given that,
$5n + 5(n - t) + 5(n - 2t) + 5(n - 3t) + 5(n - 4t) \times \frac{1}{3} = 395$
$\Rightarrow 20t - 30t + \frac{5}{3}(n - 4t) = 395$
$\Rightarrow 65n - 110t = 1185$
$\Rightarrow 13n - 22t = 237$
$\therefore 13n = 237 + 22t$
$13n = 234 + 13t + 9t + 3$
As left hand side is divisible by 13, right hand side must also be divisible by 13
Therefore $9t + 3$ must be divisible by 13
The minimum value of t is 4 and the corresponding value of n is 25.
We can check that this is the only possible solution as remaining solutions for n and t give a negative value for $n - 4t$. (The other solutions for (n, t) are of the form $(25 + 22k, 4 + 13k)$ for $k = 1, 2, 3$ .....)
Therefore, the number of puppets finished in 3 hours
$= 5 \times 25 + 5(25 - 4) + 5(25 - 8) = 315$ Ans: (315)

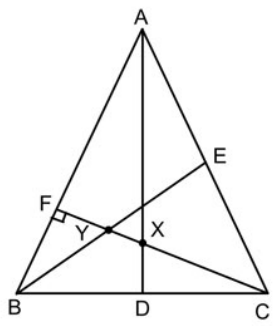
4. Let the escalator have a total of n steps and let it have moved through m steps by the time Raju took 20 steps. Therefore, since Rajat walks twice as fast as Raju, the time Rajat takes 30 steps is equal to the time in which Raju takes 15 steps
$\Rightarrow$ the escalator moved $m \times \frac{15}{20} = \frac{3}{4}$m steps.
$\therefore m + 20 = n$ and $\frac{3}{4}m + 30 = n$
$\Rightarrow \frac{1}{4}m = 10 \Rightarrow m = 40$ steps
$\Rightarrow n = 60$ steps. Choice (C)

5. If Rajesh walks half as fast as Raju, then let him take 't' times the time Raju takes ⇒ escalator would move through 40 x t steps and he would take $\left(\frac{t}{2}\right)$ x 20 steps
$\Rightarrow 40t + 10t = 60 \Rightarrow 50t = 60$
$\Rightarrow t = 1.2$ times
∴ Rajesh would take 12 steps. Choice (B)

6. Let us denote the number by x
Its reciprocal = $\frac{1}{x}$
As the difference between the number and its reciprocal is 3
$\therefore x - \frac{1}{x} = 3$ or $\frac{1}{x} - x = 3$
$x^2 - 3x - 1 = 0$ $\Rightarrow x^2 + 3x - 1 = 0$
$\therefore x = \frac{3 \pm \sqrt{13}}{2}$ $\therefore \frac{-3 \pm \sqrt{13}}{2}$
As x is a positive number, the possible values of x are $\frac{3+\sqrt{13}}{2}$ and $\frac{\sqrt{13}-3}{2}$
The product of the above two values of x is $\frac{(\sqrt{13}+3)}{2}\frac{(\sqrt{13}-3)}{2} = \frac{(13-9)}{4} = 1$

Alternative Solution:
Given $\left|x - \frac{1}{x}\right| = 3.$
For every x that satisfies the above equation, so does $\frac{1}{x}$.
Hence, the product of all the roots will be 1.
Choice (D)

7. Area of the triangle with sides 13, 14 and 15 is obtained by applying Heron's formula, A = $\sqrt{s(s-a)(s-b)(s-c)}$.
Now, s = $\frac{13+14+15}{2} = 21$
∴ Area = $\sqrt{21(21-13)(21-14)(21-15)} = 84$



Now, area = $\frac{1}{2}$(AB) (CF) = 84
$= \frac{1}{2}(14)(CF) = 84$
$\Rightarrow CF = 12$
$\therefore BF = \sqrt{BC^2 - CF^2} = \sqrt{13^2 - 12^2} = 5$
[∵ ΔCFB is rightangled at F]

$\therefore$ AF = 14 – 5 = 9
Now, in triangle AFC, by internal angle bisector theorem,

$$\frac{FX}{XC} = \frac{AF}{AC}$$

$$\Rightarrow FX = \frac{9}{(9+15)}(FC) = \frac{3}{8}(12) = \frac{9}{2} \text{ cm.}$$

Again, in triangle BFC, by angle bisector theorem,

$$\frac{FY}{YC} = \frac{BF}{BC}$$

$$\Rightarrow FY = \frac{5}{(5+13)}(FC) = \frac{5}{18}(12) = \frac{10}{3} \text{ cm.}$$

$$\therefore m = XY = FX - FY = \frac{9}{2} - \frac{10}{3} = \frac{7}{6} \text{ cm.}$$

$\therefore 42m = 49$ Ans: (49)

8. $a^2 + b^2$ will be minimum when $a = b = 3$ [$\because a + b = 6$]
$\therefore$ The minimum value of $a^2 + b^2 = 3^2 + 3^2 = 18$
Choice (A)

9. Let the total amount be T.
Given, Akash gained Rs.2000 due to the error, we get

$$\left(\frac{4}{4+3+2}\right)T - \left(\frac{1}{1+2+3}\right)T = \text{Rs.2000}$$

$$\Rightarrow \frac{4}{9}T - \frac{1}{6}T = \text{Rs.2000}$$

$\Rightarrow$ T = Rs.7200. Choice (C)

10. $(2x^2 + 13)(x - 3) + (2x^2 + 13)(x - 5) = 0$
$\Rightarrow (2x^2 + 13)(2x - 8) = 0$
$\Rightarrow 2(2x^2 + 13)(x - 4) = 0$
$\Rightarrow (2x^3 - 8x^2 + 13x - 52) = 0$
Therefore, the product of the roots of the above equation

$$= -\left(\frac{-52}{2}\right) = 26$$

Alternative Solution:
The product of the roots of any polynomial of degree n

$$= (-1)^n \left(\frac{\text{constant term}}{\text{coefficient of } x^n}\right).$$

Given $n = 3$, we only need the leading coefficient (2 + 2 = 4) and the constant ((13) × (–3) + (13) × (–5) = –104). Hence

required product $= -\left(\frac{-104}{4}\right) = 26.$ Choice (A)

11. Let the cost of each mango be m.
Let the customer purchase 12 mangoes.

$\therefore$ M.P. = $66\frac{2}{3}$% mark up over 12 m = 20 m

and S.P. = 10% discount on 20 m = 18 m.
Given 18 m is 20% more than the shopkeeper's effective cost price (i.e., his final profit after given n mangoes free)

Hence, shopkeeper's effective cost price is $\frac{18m}{1.2} = 15\,m$,

i.e., $15m - 12m = 3m$ more than the C.P. of the 12 mangoes purchased.
These three mangoes were given free.
$\therefore n = 3$.

Alternative Solution:
Let the cost price of 12 mangoes be Rs.300, i.e., CP of each mango = Rs.25.

Now, MP of 12 mangoes = $\left(100 + 66\frac{2}{3}\right)$% of 300 = 500

After 10% discount, SP = 500 – 50 = 450.
Now, let another n mangoes be given free of cost (for the 12 mangoes purchased)

$\therefore$ Total cost of shopkeeper = 300 + 25(n), on which he made a 20% profit, by selling at Rs.450.
$\therefore$ 450 = 1.2(300 + 25n)
$\Rightarrow$ n = 3. Choice (C)

12. $F(r) = 8[1 + r + r^2 + \ldots..] = \frac{8}{1-r}$

$$F(-r) = \frac{8}{1-(-r)} = \frac{8}{1+r}$$

$$\therefore \frac{F(r)F(-r)}{F(r)+F(-r)} = \frac{\left(\frac{8}{1-r}\right)\left(\frac{8}{1+r}\right)}{\left(\frac{8}{1-r}\right)+\left(\frac{8}{1-r}\right)} = \frac{\frac{64}{1-r^2}}{\frac{16}{1-r^2}} = 4$$

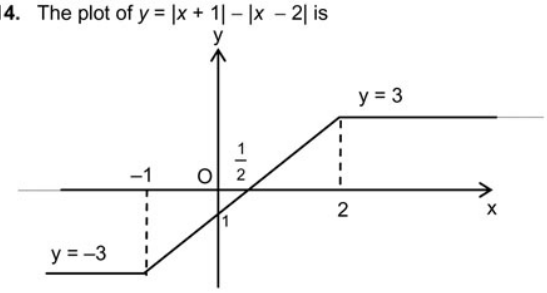
Alternative Solution:
Since the answer is independent of r, we can, for convenience, take $r = \frac{1}{2}$.

Therefore, $F(r) = 16$ and $F(-r) = \frac{16}{3}$.

$$\therefore \frac{16\times\frac{16}{3}}{16+\frac{16}{3}} = \frac{16\times16}{3} \times \frac{3}{64} = 4.$$ Choice (B)

13. Let us denote the three consecutive natural numbers by a – 1, a and a + 1 respectively.
It is given that,
(a – 1) a (a + 1) = 16(a – 1) + (a) + (a + 1)
$(a^2 - 1)a = 48a$
$a^2 - 1 = 48$ [$\because a \neq 0$]
$\Rightarrow$ a = 7 and the three numbers are 6, 7, 8.
Therefore, the sum of squares of the three numbers = 36 + 49 + 64 = 149. Choice (C)

14. The plot of $y = |x + 1| - |x - 2|$ is



So the range of $y = -3 \le y \le 3$.

Alternative Solution:

Since $|x - a|$ is simply the distance between 'x' and 'a' on the number line, $y = |x + 1| - |x - 2|$ is (the distance of x from '–1') minus (the distances of x from '2').
Clearly for all $x \le -1$, this difference is –3 and for all $x \ge 2$, it is 3.
For $-1 < x < 2$, the difference is less than 3.
Hence, $-3 \le y \le 3$. Choice (B)

15. Since for the first 20% of the distance, he drove at normal speed, the time taken = 20%(150) = $\frac{1}{5}(15)$ = 30 minutes.

The time remaining, if he had continued at his normal speed = 150 – 30 = 120 min.
But it is given that the remaining distance was covered in 190 – 30 = 160 minutes.
That is, the time remaining became 4/3 times the original remaining time. This implies that the speed (after a

decrease of 15 kmph) became 3/4th of the original. That is 15 kmph = $\left(\frac{1}{4}\right)^{th}$ of original speed.

Hence, original speed = $\frac{15}{\left(\frac{1}{4}\right)}$ = 60 kmph

Therefore, the total distance between his house and his in–law house = 60 kmph × $\left(\frac{150}{60}\right)$ hrs = 150 km

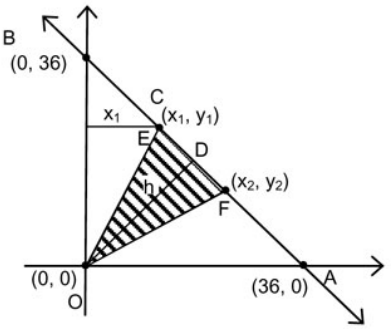
Choice (B)

16. 2020 in base 5 is $(31040)_5$
Now, the numbers in base 5 can have a single digit or two digits or three digits or four digits or five digits, but without an zeroes in it.
If it is a five-digit number, it can start with 1 or 2 (∵ starting with 3, the minimum possible value is $(31111)_5$ which is greater than $(31040)_5$)
∴ No. of five-digit numbers

= $\underset{(2\text{ways})}{___}\ \underset{(4\text{ways})}{___}\ \underset{(4\text{ways})}{___}\ \underset{(4\text{ways})}{___}\ \underset{(4\text{ways})}{___}$

Which gives 512 numbers.
Similarly, the number of four-digit numbers in base 5 without any 0 is 4^4, i.e., 256.
The number of three-digit numbers = 4^3 or 64.
The number of two-digit numbers = 4^2 i.e. 16.
The number of single digit numbers = 4
Therefore, the total number of positive integers satisfying the given conditions
= 4 + 16 +64 + 256 + 512
= 852. Ans: (852)

17. The intercepts of the line x + y = 36 on the coordinate axes are (36, 0) and (0, 36)



Let us denote the vertices of the base of the triangle by (x_1, y_1) and (x_2, y_2) respectively. It is given that these two vertices must have integral co-ordinates.
Number of points (x, y) with integral coordinates, which lie on the line x + y = 36 are (0, 36), (1, 35), (2, 34), (3, 33), (4, 32), ….. (36, 0), i.e., a total of 37 points.
The maximum possible length of the base = $\sqrt{36^2+36^2} = 36\sqrt{2}$ and each pair of successive possible points on the base is separated by a distance of $\sqrt{2}$ units.

The height of the triangle (irrespective of the exact values of (x_1, y_1) and (x_2, y_2)) is the perpendicular distance of (0, 0) from the line x + y = 36

which is h = $\left|\frac{0+0-36}{\sqrt{1^2+1^2}}\right| = \frac{36}{\sqrt{2}}$ (This can also be arrived at by using the area of ΔABC as $\frac{1}{2}(OB)(OA) = \frac{1}{2}(h)(AB)$

Now, the area of the triangle = $\frac{1}{2}\times\left(\frac{36}{\sqrt{2}}\right)(b)$, where 'b' is the length of the base.
This will yield a positive integral value, if b is a multiple of $\sqrt{2}$.
Now for the area of the triangle to be an integer, we can take any two points from the above mentioned 37 points. (and the distance will be a multiple of $\sqrt{2}$).

Two points can be chosen from these 37 points in $^{37}C_2 = \frac{37\times36}{2}$ = 666 ways.

Alternative Solution:
In the figure given above, the area of the big triangle, ΔABO is an integer. Also, consider the area formed by B, O and E = (x_1, y_1), i.e., ΔBOE. The area of ΔBOE will also be an ineteger, as $\frac{1}{2}\times$ base $= \frac{1}{2}$OB and height = x_1 (∵ x_1 and y_1 are integers) are both integers. Hence, sets of integers (x_1, y_1) and (x_2, y_2) will satisfy. That is, we need to choose 2 points out of 37 points.
This can be done in $^{37}C_2$ = 666 ways. Ans: (666)

18. Total number of ways in which one can go from A to C
= (A to C via B) + (Directly from A to C)
= n(n + 2) + 2n
It is given that, n(n + 2) + 2n = 60
$n^2 + 4n - 60 = 0$
(n + 10) (n – 6) = 0
As n ≠ –10, n = 6

Alternative Solution:

This question can also be solved by substituting each answer choice and checking if the value of n satisfies. Only choice (D) works. Choice (D)

19. Let each filling tap fills the tank at 1 unit/min. Then, the volume of the tank is 200 units and each emptying tap empties $\frac{1}{3}$ unit/min.

The first $\frac{1}{5}$ th of the tank can be filled in $\frac{200}{5\times2}$ = 20 minutes

Next $\frac{1}{5}$ th of the tank can be filled in $\frac{200}{5\left[2-\frac{1}{3}\right]}$ = 24 minutes

Similarly, the remaining part of the tank can be filled in
$\frac{200}{5\left[2-\frac{2}{3}\right]}+\frac{200}{5\left[2-\frac{3}{3}\right]}+\frac{200}{5\left[2-\frac{4}{3}\right]}$
= 30+ 40 + 60 = 130 minutes
∴ The total required time = 20 + 24 + 130 = 174 minutes
Choice (B)

20. The given equations are 6*x* + 9*y* = 24 and *kx* + 6*y* = 16
The above mentioned pair of equations will have infinite numbers of solutions,
if $\frac{6}{k}=\frac{9}{6}=\frac{24}{16}$
$\Rightarrow \frac{6}{k}=\frac{3}{2}=\frac{3}{2}$
∴ *k* = 4 Choice (A)

21. Let the number of brown sarees be *x*. let the number of shirts not having a design be *y*.

Shirts	Sarees				
Having Design	$3y$	Yellow	$5x$	Hand spun	$4k$
		Black	$2x$		
Not having Design	y	Brown	x	Not Hand spun	k
Total	$4y$		$8x$		$5k$

Hence total number of sarees, say N = $8x = 5k$
The least such number is $8 \times 5 = 40$.
Given $4y + N = 72$
$\Rightarrow$ N = 40 itself and $4y = 32$
$\Rightarrow$ Shirts not having design = $y = 8$. Choice (B)

22. Let the initial price per unit and the initial consumption be denoted by 10 and 100 respectively.

	Price	Consumption	Expenditure
Initial	10	100	1000
Final	13	C(?)	910

$\therefore C = \dfrac{910}{13} = 70$

Therefore, the consumption reduces from 100 to 70, i.e. it decreases by 30%. Choice (D)

23. Let us denote his scores in the ith AIMCAT by $120 + x_i$ where x_i = 1 or 2 or 3 or ….. 10.

Now, in each test, Nagesh gets 120 plus an integer from 1 to 10.

Let us consider his scores as only from 1 to 10 and then we can always add 120 in the end to get the actual answer.
As he scored 7 in the sixth test, so in each of the first five tests he scored one of the following possible values: 1, 2, 3, 4, 5, 6, 8, 9, 10.

So we need to pick five numbers from the possible values, which when added with 7 must be divisible by 6.
The possible sum of the five numbers must be from 1 + 2 + 3 + 4 + 5 = 15 to 10 + 9 + 8 + 6 + 5 = 38

We next find multiples of six from 15 + 7 to 38 + 7
i.e. 22 to 45.

The possible values are 24, 30, 36 and 42.

$\therefore$ He scored 17 or 23 or 29 or 35 in the first five tests (deducting 7).
Again the sum of the first five numbers must also be divisible by 5. So, only 35 is possible.

In a similar way, the sum of the scores in the first four tests must be from 1 + 2 + 3 + 4 = 10 to 10 + 9 + 8 + 6 = 33.

Further the sum must be divisible by 4

$\therefore$ He could have scored 12 or 16 or 20 or 24 or 28 or 32.
Only 32 is possible, as 28 will imply he scored 7 in the fifth test (but it is known that he scored 7 in the sixth test) and further, any number below 28 (i.e., 24 or 20 or 16 or 12) will imply that he scored more than 10. Therefore, he scored 35 – 32 = 3 in the fifth test. Thus, his actual score in the fifth test is 120 + 3 = 123.

Alternative Solution:

Given that Nagesh scored 127 in the sixth test, the sum of his scores in the first five tests can be a minimum of 120 + 121 + 122 + 123 + 124, i.e., 610 and a maximum of 130 + 129 + 128 + 126 + 125, i.e., 638.

Now, the sum upto the first five tests, say F, must be divisible by five and the sum upto the first six tests, i.e., F + 127 must be divisible by 6.

$\therefore$ F must be a multiple of 5 and F + 127 must be multiple of 6.
$\Rightarrow$ F = 5k and F = 6p – 1 (since, 127 is of the form 6n + 1)

Now 5 is the least possible value of F.
$\therefore$ F must be of the form (30k + 5) and also 610 < F < 638
$\Rightarrow$ F = 635.

Now, let Nagesh's score in the 5th test be 'f'.
And let the sum upto the first four tests be 'E'.
$\therefore$ E = 4a (i.e., E must be a multiple of 4) and E + f = 635, i.e., 4b + 3
$\therefore$ f must be of the form 4(b – a) + 3, i.e., f = 4c + 3.

Now, from the given possible scores, only 123 and 127 are the form 4c + 3, and 127 is the score in the sixth test.
Hence f must be 123. Ans: (123)

24. The number of ways in which any natural number 'N' can be written as the sum of two or more consecutive positive integers is simply equal to [the number of odd factors of 'N'] minus one. Since 195 = 3 × 5 × 13, all of its factors are odd and there are 2 × 2 × 2 – 1 = 7 ways.

Note: We subtract the case for one since 195 must be expressed a sum of two or more positive integers.

Alternative Solution:

Let 195 = Sum of n consecutive positive integers, with the first being 'k'.

$\Rightarrow \dfrac{n}{2}(2k + n - 1) = 195$

$\Rightarrow n(2k + n - 1) = 390$

Now, n and $[n + (2k - 1)]$ are of opposite parties (since $(2k - 1)$ is odd), i.e., exactly one of them is even and the other is odd.
Also, $n \times [n + (2k - 1)] = 390$, i.e., they are also factors of 390.

Further, we know that $[n + (2k - 1)] < n$, since $(2k - 1)$ is positive.
Hence, we get exactly as many solutions as the number of odd factors of 390.
However, since $n = 1$ is not admissible, we need to subtract one from the number of odd factors of 390 = 2 × 3 × 5 × 13.
Hence (2 × 2 × 2) – 1 = 7 ways. Choice (D)

25. There are three cases where all three red ink pens are in the same pen stand

Case I: The three red ink pens are in the pen stand which can hold six pens.
Total number of ways = ${}^{10}C_3 \times {}^{7}C_4 = 4200$

Case II: The three red ink pens are in the pen stand which can hold four pens.
Total number of ways = ${}^{10}C_1 \times {}^{9}C_3 = 840$

Case III: The three red ink pens are in the pen stand which can hold three pens.
The total number of ways = ${}^{10}C_4 \times {}^{6}C_6 = 210$

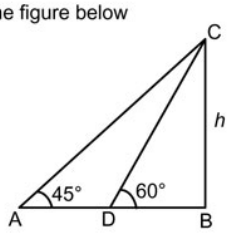
Therefore the total number of ways
= 4200 + 840 + 210 = 5250 Ans: (5250)

26. It is given that,
$b^2 = a^2 + 64a + 1188$
$b^2 = (a + 32)^2 + 164$
$\therefore b^2 - (a + 32)^2 = 164$
(b + a + 32) (b – z – 32) = 164
Now, 164 = (4 × 41) OR (2 × 82)
But (b + a + 32) and (b – a – 32) must have the same parity and their product is even.
So they must both be even.

Therefore, b + a + 32 = 82 and b – a – 32 = 2, which gives b = 42 and a = 8.
Thus, b – a = 42 – 8 = 34 Choice (B)

27. It is given that $(\log_y x)^{101} = \log_y(x^{101})$
Let $\log_y x = t$
$\therefore t^{101} = 101t$
$\Rightarrow t(t^{100} - 101) = 0$
$\therefore t = 0$ or $t = 101^{\frac{1}{100}}$ or $t = -(101^{\frac{1}{100}})$
$\log_y x = t \Rightarrow x = y^t$
Now, for y taking values from 1001 to 1999, we get values of x for the three possible values of t.
For t = 0, we get x = 1
For $t = 101^{\frac{1}{100}}$, we get a unique value of x for each value of y.
Similarly, for $t = -(101^{\frac{1}{100}})$, we get a unique value of x for each value of y.
Therefore, the total number of possible values that x can assume is 1 + 999 + 999 = 1999 Choice (C)

28. Consider the figure below



Let the height of the building BC be *h* and DB = *x*
$h = \sqrt{3}\,x$ and AB = $\sqrt{3}\,x$
$\therefore$ AD = $(\sqrt{3} - 1)x$
To cover $(\sqrt{3} - 1)x$, the time taken is 10 minutes.
$\therefore$ To cover *x*, the time required is $\frac{10}{\sqrt{3}-1}$ minutes
$= 5(\sqrt{3} + 1)$ minutes Choice (A)

29. Let the number of students preparing for IIT JEE and AIEEE be denoted by M and N respectively.
It is given that,
$75\%(240) \le M \le 85\%(240)$
$180 \le M \le 204$
Similarly, $35\%(240) \le N \le 45\%(240)$
$84 \le N \le 108$
We need to find the maximum and the minimum value of $M \cap N$, given $M \cup N = 240$.
Minimum value of $(M \cap N)$, i.e., B = 180 + 84 – 240 = 24
Maximum value of $(M \cap N)$, i.e., A = 204 + 108 – 240 = 72
$[\because M \cup N = M + N - M \cap N]$
$\therefore$ A + B = 72 + 24 = 96 Choice (B)

30. n(n + 1) (n + 2) (n + 3 + 4) = n(n + 1) (n + 2) (n + 3) + 4n(n + 1) (n + 2)
as n(n + 1) (n + 2) (n + 3) is product of four consecutive natural numbers and so it must be divisible by 4!, i.e., 24
similarly, n(n + 1) (n + 2) is the product of three consecutive natural numbers and so it is divisible by 3! or 6.
$\therefore$ n(n + 1) (n + 2) (n + 3) + 4n(n + 1) (n + 2)
$= 24K_1 + 4 \times 6K_2 = 24(K_1 + K_2)$
therefore, the largest number by which the expression is always divisible is 24.

Alternative Solution:
Trying *n* = 1, 2 and 3, we can observe that the largest number by which the given product is always divisible is 24.
Choice (B)

31. Let the roots of the equation f(x) = 0 be r_1, r_2 and r_3 respectively,
Now, $r_1 + r_2 + r_3 = -1$ → (1)
$r_1r_2 + r_1r_3 + r_2r_3 = a$ → (2)
$r_1r_2r_3 = 10$ → (3)
Now, let the roots of F(x) = 0 be r_1, r_2, r_3 and r_4 respectively (since the roots of f(x) = 0 are also the roots of F(x) = 0).

Now, $r_1 + r_2 + r_3 + r_4 = -b$
$\Rightarrow r_4 = 1 - b$ (From equation 1)

Also, $r_1r_2 + r_1r_3 + r_2r_4 + r_2r_3 + r_2r_4 + r_3r_4 = 43$
i.e., $r_1r_2 + r_1r_3 + r_2r_3 + r_4(r_1 + r_2 + r_3) = 43$ → (4)
$\Rightarrow a + (1 - b)(-1) = 43$ (From eq. (1), (2) and (4))
$\Rightarrow a + b = 44$ → (5)

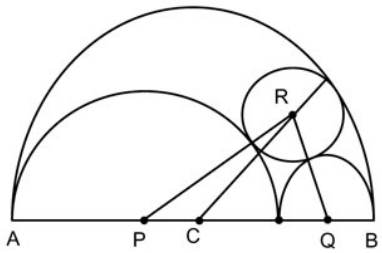
And $r_1r_2r_3 + r_1r_2r_4 + r_2r_3r_4 + r_1r_3r_4 = 360$
$\Rightarrow 10 + r_4(r_1r_2 + r_2r_3 + r_1r_3)$ 360 (from eq (3))
$10 + (1 - b)(a) = 360$
$a - ab = 350$ → (6)

Substituting b = 44 – a from eq. (5), we get
$a - a(44 - a) = 350$
$a^2 - 43a - 350 = 0$
$\Rightarrow (a - 50)(a + 7) = 0$

Since a< 0, we get a = –7
$\therefore b = 44 - a = 44 - (-7) = 51$
$r_4 = 1 - b = 1 - (51) = 50$
$\therefore C = r_1r_2r_3r_4 = (r_1r_2r_3)(r_4) = (10)(-50) = -500$
therefore, a + b + c = 44 – 500 = –456 Ans: (–456)

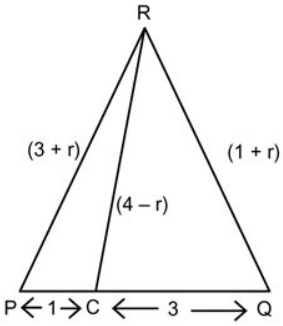
32. $\log_{6\cos x}(6\sin x) = \frac{3}{2}$
$\Rightarrow 6\sin x = 6^{\frac{3}{2}}(\cos x)^{\frac{3}{2}}$
$\Rightarrow \sin x = 6^{\frac{1}{2}}(\cos x)^{\frac{3}{2}}$
Squaring both sides, we get
$\sin^2 x = 6\cos^3 x$
$1 - \cos^2 x = 6\cos^3 x$ $(\because \sin^2 x = 1 - \cos^2 x)$
$\Rightarrow 6\cos^3 x + \cos^2 x - 1 = 0$
Now, since $\cos x = \frac{1}{2}$ satisfies the above equation,
$(2\cos x - 1)$ must be a factor of the LHS.
$\Rightarrow (2\cos x - 1)(3\cos^2 x + 2\cos x + 1) = 0$
$\therefore \cos x = \frac{1}{2}$
$(\because 3\cos^2 x + 2\cos x + 1 = 0$ gives imaginary roots)
Therefore, $x = 60°$ $\left(\because x \in \left[0, \frac{\pi}{2}\right]\right)$
and $\tan^2 x = (\tan 60)^2 = \left(\sqrt{3}\right)^2 = 3$ Ans: (3)

33.



Let the centre of the largest semicircle be denoted by C and let the radius of the circle be r.
Now, we get two triangles ΔRPC and ΔRCQ
PR = 3 + r, PC = 1 ($\because$ AC = 3 + 1 = 4) and RC = 4- r
Semiperimeter of ΔRPC,

$S_1 = \frac{(3+r)+(1)+(4-r)}{2} = 4$



$\Rightarrow$ Area of $\Delta RPC = \sqrt{4(r)(3)(1-r)}$ [By Heron's formula]

Similarly, semiperimeter of ΔRCQ,

$S_2 = \frac{(4-r)+(3)+(1+r)}{2} = 4$

$\Rightarrow$ Area of $\Delta RCQ = \sqrt{4(r)(1)(3-r)}$

Now, the ratio of the area of the two triangles ΔRPC and ΔRXQ is 1 : 3 [$\because$ triangles with same height and bases in the ration 3 : 1]

$\therefore \frac{\sqrt{4(r)(3)(1-r)}}{\sqrt{4(r)(1)(3-r)}} = \frac{1}{3}$

$\Rightarrow \frac{\sqrt{3(1-r)}}{\sqrt{(3-r)}} = \frac{1}{3}$

Squaring, we get $\frac{3-3r}{3-r} = \frac{1}{9}$

$\Rightarrow 27 - 27r = 3 - r$

$\Rightarrow r = \frac{12}{13}$

Alternative solution:

ΔRPC and ΔRPQ have a common angle P

Using Cosine rule

$\cos P = \frac{(3+r)^2+(1)^2-(4-r)^2}{2(3+r)(1)} = \frac{(3+r)^2+(4)^2-(1+r)^2}{2(3+r)(4)}$

$\Rightarrow 4[(3 + r)^2 + 1 - (4 - r)^2] = (3 + r)^2 + 4^2 - (1 + r)^2$

$\Rightarrow 3(3 + r)^2 + 4 - 4(4 - r)^2 - 16 + (1 + r)^2 = 0$

$\Rightarrow 3(r^2 + 9 + 6r) + 4 - 4(r^2 - 8r + 16) - 16 + (r^2 + 2r + 1) = 0$

$\Rightarrow 52r - 48 = 0$

$\therefore r = \frac{48}{52} = \frac{12}{13}$ Choice (B)

34. We can form the committee by selecting students from the four sections in the following ways:

Case I:

BG BG BG BG

From each section, we can select a boy and a girl in $^2C_1 \times {}^2C_1 = 4$ ways.

Therefore the committee can be formed in (4) (4) (4) (4) = 256 ways

Case II:

BB BB GG GG

From a section, two boys can be selected in $^2C_2$ or 1 way.

Similarly, two girls can be selected from a section in $^2C_2$ or 1 way. Now, to decide the sections from which both the students selected are boys can be chosen in $^4C_2$ or 6 ways.

Therefore, the committee can be formed in 6 ways.

Case III:

BB GG BG BG

The two sections from each of which one girl and one boy is selected can be selected in $^4C_2$ = 6 ways. Of the remaining two sections, we can select the one from which both are boys in 2 ways. Therefore, the committee can be formed in 6 × 2 × 4 × 4. = 192 ways

Thus, the total number of ways in which the committee can be formed = 256 + 6 + 192 = 454 ways.

Ans: (454)

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