T.I.M.E.
Triumphant Institute of Management Education Pvt. Ltd.

(Key and Solutions for AIMCAT1814)

Key

SECTION – I

1. A	8. D	15. B	22. 5	29. 1352
2. B	9. C	16. B	23. D	30. 5243
3. D	10. B	17. B	24. 4	31. 3215
4. C	11. B	18. C	25. 249	32. 1
5. B	12. D	19. C	26. 367	33. 3
6. C	13. D	20. A	27. 4215	34. 5
7. C	14. C	21. B	28. 2431	

SECTION – II

1. C	8. 7	15. 82	22. 13	29. C
2. A	9. A	16. D	23. A	30. A
3. B	10. C	17. A	24. D	31. D
4. C	11. C	18. B	25. 14	32. B
5. 2804	12. B	19. A	26. B	
6. D	13. 40	20. C	27. B	
7. B	14. 42	21. 9	28. B	

SECTION – III

1. 282	8. C	15. D	22. C	29. 80
2. A	9. 1	16. C	23. 2	30. A
3. D	10. A	17. C	24. C	31. D
4. B	11. A	18. A	25. D	32. 5
5. 3.5	12. 8120400	19. A	26. B	33. B
6. B	13. D	20. A	27. D	34. C
7. 30	14. C	21. D	28. C	

Solutions

SECTION – I

Solutions for questions 1 to 6:

Number of words and Explanatory notes for RC:

Number of words: 676

1. The author mentions that Daniel Fogarty's work affirms "the continuing need for a viable rhetoric" and sketches "in the broad outlines of a "new" rhetoric that would meet that need".
Option A: When the author mentions that Daniel Fogarty's work provides "the broad outlines of a "new" rhetoric that would meet that need", he implies that the need is currently not met. Hence, we can infer that the author opines that the classical rhetoric has become unviable. Also the "metaphorical crossroads" refer to the fact that the classical rhetoric is no longer viable and there is a need for a new rhetoric. Hence, this is the correct answer.
Option B: While the excerpt from Daniel Fogarty's work provides the outlines of the new rhetoric, this is not the reason why the author states that the work stands at a "metaphorical crossroads". The crossroads refers to the unviability of the classical rhetoric and the need for a new rhetoric. Hence, while the statement given in the option may be true, it does not provide an answer to the question.
Option C: We cannot infer from the passage whether Daniel Fogarty's work identified the shortcomings of the classical rhetoric. Further, *Roots for a New Rhetoric* (1959) provides an outline for a new rhetoric but this does not imply that it "paved the way" for the development of a new rhetoric. Hence, choice C is not the correct answer.
Option D: The author does not mention that *Roots for a New Rhetoric* (1959) talks about the differences between classical rhetoric and "new" rhetoric. Further, we can infer that the "new" rhetoric was not completely developed at the time of this work. Hence, choice D is not the correct answer.
Therefore, the correct answer is option A. Choice (A)

2. The author provides four distinctions between modern rhetoric and classical rhetoric in the passage.
Option A: The passage mentions that according to Young, Becker and Pike, "[For classical rhetoricians], logical argument … was the heart of persuasive discourse". Hence, a rhetoric which appeals to the logic of the audience cannot be an example of modern rhetoric.

Option B: The passage mentions that "modern rhetoric stresses emotional or psychological proofs". Hence, a modern rhetoric would involve sensibility (the quality of being able to appreciate and respond to complex emotional or aesthetic influences).
Option C: In the penultimate paragraph of the passage, classical rhetoric is said to be characterized by "manipulative, antagonistic, one-way or unidirectional communication". The example provided in this option is also of the same type and, hence, is not an appropriate example of modern rhetoric.
Option D: The example mentioned in this option talks about unidirectional communication as the orator does not listen to the audience. Classical rhetoric is characterized by "one-way or unidirectional communication". Hence, this is also not an appropriate example of modern rhetoric.
So, among the given options, the most appropriate example of modern rhetoric is the one mentioned in option B.
Choice (B)

3. When discussing the distinction between the classical and modern rhetoric, the author mentions that the fourth distinction that he talks about is related to the third distinction.
Option A: The third distinction talks about the difference in the roles of the rhetor and the audience while the final distinction talks about the difference in goals. Hence, the final distinction mentioned in the passage does not pertain to the roles of the rhetor and the audience. Choice A is not the answer.
Option B: The author mentions that the rhetor-audience relationship has changed between the two periods. When talking about the fourth distinction, he also mentions that classical and modern rhetoric have different goals. But we cannot infer from the passage that the change in roles has resulted in the modification of the goals of classical and modern rhetoric. It is possible that the goals of the modern rhetoric have been defined first which led to a change in the roles of the rhetor and the audience. Hence, choice B cannot be inferred from the passage.
Option C: The rhetor-audience relationship and the goal of the rhetoric mentioned in the option are related to the modern rhetoric and not classical rhetoric. Further, this option does not provide any reason as to why the two distinctions are related.
Option D: The goals of classical and modern rhetoric are persuasion and communication respectively. The roles of the rhetor and the audience are also defined in the classical and modern rhetoric in line with the goals of the two types of rhetoric. This is the reason that the author mentions that the two distinctions are related. Hence, this is the correct answer. Choice (D)

4. The author talks about Rogerian rhetoric in the penultimate paragraph of the passage. He talks about the work of Young, Becker and Pike, *In Rhetoric: Discovery and Change*, in which they reject classical rhetoric for being "skilful verbal coercion" and introduce instead a "Rogerian rhetoric" of "enlightened cooperation." However, from this, we cannot infer that Rogerian rhetoric has all the characteristics of modern rhetoric.
Option A: The first distinction that the author talks about refers to the society that man belongs to. However, we cannot infer whether this is a characteristic of Rogerian rhetoric.
Option B: The rhetor persuading the audience to agree with him is similar to manipulative or unidirectional communication which is a characteristic of classical rhetoric. Hence, this cannot be a characteristic of Rogerian rhetoric.
Option C: The penultimate paragraph of the passage mentions that in modern rhetoric, the relation between the rhetor and audience is based on "empathy, understanding, mutual trust, and two-way or "dialogic" communication". Further, "enlightened cooperation" is a characteristic of Rogerian rhetoric. Hence, we can infer that any situation in which the rhetor and audience have a mutual understanding can be a feature of Rogerian rhetoric. Hence, this is the correct answer.
Option D: The passage does not mention that the rhetor does not express views which are against the sentiment of the audience. The rhetor has to understand the emotions of the audience and project these sentiments so that there is a two-way communication. Hence, this option is extreme and is not the correct answer.
Therefore, the correct answer is option C. Choice (C)

5. The excerpt in the last paragraph of the passage talks about why pleadings and persuasions are important in classical rhetoric (because it was an offspring of dispute).
Option A: The last paragraph does not mention that mutual understanding is important in classical rhetoric. It only talks about why pleadings and persuasions are important in classical rhetoric.
Option B: The last paragraph mentions that old Rhetoric is an "offspring of dispute". And persuasion is important in classical rhetoric because "it developed as the rationale of pleadings and persuadings". Hence, the excerpt answers the question mentioned in this option.
Option C: The excerpt does not talk about the role of disputes in classical rhetoric. It only mentions that the old rhetoric is an offspring of dispute. It does not provide any explanation about the role played by dispute. Hence, this is not the correct answer.
Option D: While the excerpt makes a passing reference to Aristotle, it does not provide any reason that Aristotle advocated classical rhetoric.
Hence, the correct answer is option B. Choice (B)

6. The passage talks about the modern society when discussing the first distinction between classical and modern rhetoric. The passage states that the modern man lives in "an aleatoric universe in which generally agreed upon values and unifying norms are scarce or non-existent." 'Aleatoric' in this context means unpredictable.
Option A: The passage mentions that in modern society "generally agreed upon values and unifying norms are scarce or non-existent". This is the reason for the unpredictability of man. However, this does not imply that the rules keep changing. Hence, this is not the correct answer.
Option B: While the first part of this option is correct, we cannot say that there are tacit rules that everybody follows. The passage mentions that there are no (or not many) generally agreed upon values. Hence, this is not the correct answer.
Option C: The modern man is said to live in an unpredictable (aleatoric) universe and generally agreed upon values and norms are scarce. Aleatoric means characterized by or dependent on chance, luck, or an uncertain outcome. Hence, modern society can be inferred to be characterized by randomness. Therefore, this is the correct answer.
Option D: In Aristotle's time, society was characterized by a unified cultural ideal. But this is not true of the modern society. Hence, this option 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: 682

7. The author starts the passage by asking what the origin of *Kunstwollen* is. He then says that "Its starting point is the recognition of "style.""
Option A: The third paragraph of the passage does not talk about the meaning of *Kunstwollen*. It only talks about how a style can be recognizes with the help of forms. Hence, this is not the correct answer.
Option B: In the second paragraph, the author talks about grouping diverse works of art into groups and subgroups according to their "purely external appearance." The author

does not talk about the relation between styles and forms in the second paragraph and hence, in the third paragraph, the word 'this' cannot indicate the relation between styles and forms.
Option C: The author states that "Its starting point is the recognition of "style."" In the third paragraph, the author mentions that there "rigorous procedures for this". Hence, we can infer that "this" refers to the recognition of style. Hence, this is the correct answer.
Option D: The author does not talk about *Kunstwollen* in the second and third paragraphs. Hence, this is not the correct answer.
Therefore, the correct answer is option C. Choice (C)

8. The question that author poses is "What is changing at a fundamental level, when the surface style changes?" The Semperians' answer to this question is "purpose, material and techniques". But the author feels that his "question only has the appearance of having been answered".
Option A: The Semperians' consider purpose, material and technique to be determinants of style. The author is of the opinion that these three factors are not the determinants of style and style can remain unchanged even with changes in the above three factors. This option is incorrect because it mentions that Semperians assumed that style can remain unchanged with changes in purpose, material and technique which implies that these three factors cannot be the determinants of style.
Option B: While the author does mention that ignoring intellectual factor is a mistake, this is not the reason that the author calls their answer an apparent answer. We can infer from the passage that including an intellectual factor in the Semperians' answer will not answer the author's question because he considers that purpose, material and technique are not the determinants of style (with or without the inclusion of an intellectual factor). Hence, this is not the correct answer.
Option C: The reason why the author believes that his "question only has the appearance of having been answered" is because "style means something quite different from what it meant in our question". The author does not call their answer an "apparent answer" because they did not consider the influence of *Kunstwollen*.
Option D: The author mentions that "according to this answer, style means something quite different from what it meant in our question, and that our question only has the appearance of having been answered". Hence, the concept of style according to Semperians is different and the answer that they provided is in line with the concept of style according to their definition. But it is not the same as the concept of style according to the author. Hence, this is the correct answer. Choice (D)

9. The author talks about the relation between art drive and purpose, material and technique in the last paragraph of the passage.
Option A: The author mentions that "purpose, the material and the technique also change, but they are negative factors, mere "frictional coefficients," which have to be subtracted in order to recognize the pure "direction of the art drive"". Further, he also mentions that two of them, material and technique, are "partly dependent on the direction of the art drive". Hence, this option is incorrect as it states the vice versa.
Option B: The author mentions that two of them depends on art drive. He also calls the direction of art drive as "the positive determining factor". Hence, this is not the correct answer.
Option C: The author mentions that the influence of purpose, material and technique must be "subtracted" to recognize the pure "direction of the art drive". We can infer from this that the influence of purpose, material and technique are more of an interference which obscure the direction of the art drive. Hence, this is the correct answer.
Option D: The author mentions that material and technique are "**partly dependent** on the direction of the art drive". He does not mention that purpose is dependent on the direction of the art drive. Even for the other two variables, we cannot say that they are dependent on art drive (since the author mentions that they are only partly dependent). Hence, this is not the correct answer.
Therefore, the correct answer is option C. Choice (C)

10. The author talks about Reigl in the penultimate paragraph of the passage.
Option A: Further, in the fifth paragraph of the passage, the author asks "We know the dependent variable factor, namely the style of works of art; what is the variable independent of all others?". According to Reigl, the independent variable is the direction of *Kunstwollen*. Hence, we can infer that this independent variable is independent of the "style of works of art". Therefore, Reigl would most probably not agree with this statement.
Option B: According to Reigl, *Kunstwollen* is the independent variable. This is independent of the style of works of art. Hence, Reigl will most probably agree with this statement.
Option C: The author mentions that the variations of similar form can be observed across in different places and at different times in the third paragraph. From the last paragraph, we can infer that the direction of *Kunstwollen* drives these changes in forms and styles but we cannot infer whether this will help identify forms across space and time. Hence, this is not the correct answer.
Option D: In the fourth paragraph, the author mentions that the concept of style "described through highlighting individual stylistic characteristics is by its very nature extremely erratic and uncertain". However, the author does not talk about *Kunstwollen* in this context. Hence, this is not the correct answer.
Therefore, the correct answer is option B. Choice (B)

11. The author talks about the relation between style and form in the first half of the passage.
Option A: The author mentions in the third paragraph that "The same form persists, as it were, through various styles." Hence, this is not the correct answer.
Option B: The author mentions at different points in the passage that identical forms can persist "through various styles" and can be "executed with different materials and techniques and for different purposes". Hence, this is the correct answer.
Option C: In the sixth paragraph, the author mentions that "forms that have been executed with different materials and techniques and for different purposes can remain unchanged". Hence, this option is also incorrect.
Option D: The first part of this statement is correct but the second part of this is incorrect.
Hence, the correct answer is option B. Choice (B)

12. In the fourth paragraph of the passage, the author opines that the "concept of style as something grasped intuitively and described through highlighting individual stylistic characteristics is by its very nature extremely erratic and uncertain".
Option A: The author mentions that "The purely empirical depiction of styles by their individual characteristics is not scientific". Using empirical depiction results in "extremely erratic and uncertain" definition of concept of style. Hence, defining it in a scientific manner will not result in an erratic and uncertain definition. Therefore, this is not the correct answer.
Option B: The author mentions that "The purely empirical depiction of styles by their individual characteristics is not scientific, in the proper sense of the word. It stops with merely outward description." However, he does not mention that empirical depiction of styles, which can be inferred to mean forms, should not be used to define the concept of style. We can infer that this alone is not sufficient because it "stops with merely outward description." Hence, this is not the correct answer.
Option C: The author does not refer to the direction of art drive in this paragraph. Hence, this is not the correct answer.

Option D: The empirical depiction (i.e., outward appearance) is not scientific. This definition will be erratic and uncertain. Therefore, this will not result in a comprehensive definition of the concept of style.
Hence, the correct answer is option D. Choice (D)

Solutions for Questions 13 to 18:

Number of words and Explanatory notes for RC:

Number of words: 545

13. The author talks about combinatorics throughout the passage.
Option A: The seventh paragraph mentions that "talented mathematicians in all fields routinely use and invent combinatorial arguments". Hence, this option is incorrect.
Option B: The sixth paragraph of the passage states that "Combinatorial arguments tend to ignore this knowledge" of mathematics. However, the passage does not state that they use knowledge which is "contradictory" to conventional knowledge. Hence, this statement is also incorrect.
Option C: The passage mentions that "Combinatorial arguments ***tend*** to ignore this knowledge". It also states that combinatorics solves the problems in which "systematic developments of past knowledge are ***relatively useless*** in attaching present problems". We cannot infer from this that combinatorics do not use ***any knowledge of mathematics.*** This option is extreme and is not the correct answer.
Option D: In the sixth paragraph, the passage mentions "Combinatorics can be attempted by inspired amateurs and dilettantes who know little of formal mathematics, and ***much of it was developed by such people***". Hence, we can infer that combinatorics is developed mostly by people who are not professional mathematicians.
Therefore, the correct answer is option D. Choice (D)

14. The author talks about the differences between combinatorial argument and knowledge-based argument in the fifth paragraph of the passage.
Option A: The example presented in the fifth paragraph talks about how the same problem can be solved using knowledge-based argument and combinatorial argument. Hence, this option is incorrect.
Option B: In the sixth paragraph of the passage, the author mentions that "Combinatorics therefore represents the areas of mathematics that are failures in this sense, those for which systematic developments of past knowledge are relatively useless in attaching present problems". Hence, there are problems which can be solved using combinatorial arguments but not by knowledge-based arguments. Therefore, this is not the correct answer.
Option C: From the sixth paragraph, we can infer that the scope of combinatorics includes those problems for which "systematic developments of past knowledge are relatively useless". Hence, combinatorial arguments can be used for solving such problems. Hence, this is the correct answer.
Option D: The author mentions that combinatorics were developed by amateurs and dilettantes. But by definition, understanding knowledge-based arguments requires prior knowledge of mathematics, which the layman will most probably not possess. Hence, this is not the correct answer.
Therefore, the correct answer is option C. Choice (C)

15. The author mentions that traditional mathematicians spent "much of their lives learning lore about their subject" and "Combinatorial arguments tend to ignore this knowledge".
Option A: Combinatorics "represents the areas of mathematics that are failures in this sense, those for which systematic developments of past knowledge are relatively useless in attaching present problems.". However, we cannot infer from the passage that it does ***highlights*** the failures of traditional mathematicians. Hence, this is not the correct answer.
Option B: Combinatorics tends to ignore the knowledge which mathematicians spent much of their lives learning. This is the primary reason why combinatorics was not popular among mathematicians. Therefore, this is the correct answer.
Option C: The author mentions that "One goal of formal mathematics is to systematize the structure of mathematical knowledge to abolish the need for intricate reasoning and thought". But we cannot infer from this that traditional mathematicians are not comfortable with intricate reasoning and thought.
Option D: While the passage mentions that much of combinatorics was developed by amateurs and dilettantes, we cannot infer from the passage that traditional mathematicians are not comfortable using this subject because of this. Hence, this is not the correct answer.
Therefore, the correct answer is option B. Choice (B)

16. The author talks about honorary combinatorists and true combinatorists in the penultimate paragraph of the passage.
Option A: The author calls the talented mathematicians who "use and invent combinatorial arguments" as honorary combinatorists. However, true combinatorists need not always be amateur mathematicians. Much of combinatorics was developed by such people but it was not developed only by amateur mathematicians. Hence, this is not the correct answer.
Option B: Honorary combinatorists work on problems that are "far more heavily imbedded in the structure of mathematics". In the previous paragraph, the author mentions that "Combinatorics therefore represents the areas of mathematics… for which systematic developments of past knowledge are relatively useless in attaching present problems." We can infer from this that true combinatorists solve problems relatively unconnected to existing knowledge in mathematics. Hence, this is the correct answer.
Option C: The author does not mention that honorary combinatorists do not mention combinatorics in their research. Hence, this is not the correct answer.
Option D: The author does not mention that the problems true combinatorists solve are not crucial to mathematics. Hence, this is not the correct answer.
Therefore, the correct answer is option B. Choice (B)

17. In the last paragraph, the author talks about how the nature of any subject changes as it matures. It also talks about how a combinatorial subject changes.
Option A: The author states that "As a subject matures in this way it becomes necessary for a newcomer in that field to learn more and more existing results to develop the ability to attach problems of less and less interest." Hence, as a subject matures, a newcomer will have to learn more and not less. Therefore, this is not the correct answer.
Option B: The author states that in a combinatorial subject, "knowledge of past results inevitably grows in importance". This will lead to that knowledge becoming "as important as ingenuity, and the subject ceases to be combinatorics". That knowledge will become "one more area of mathematics." Hence, in a combinatorial subject, the more the result of combinatorial research, the less extensive the subject will become.
Option C: The author does not mention specifically how a newcomer will feel as more research happens in a combinatorial subject. But from the passage, we can infer that since past knowledge is not as important in a combinatorial subject, the impact that the subject will have on a newcomer will probably not change as the subject matures. Hence, this is not the correct answer.
Option D: The author does not talk about whether a combinatorial subject will grow in importance as more research happens. Hence, this is not the correct answer.
Therefore, the correct answer is option B. Choice (B)

18. The author provides an example regarding the difference between knowledge-based argument and combinatorial argument. The same problem can be solved using knowledge-based argument or combinatorial argument.

Option A: It is given that the problem can be solved using the results of three theorems. A theorem by definition can be derived ad recreated. Hence, if a person, who is ignorant of the theorems, solves the problem by recreating these theorems, he would have, effectively, solved this problem using combinatorial argument. Hence, this is not the correct answer.
Option B: Since it is given that the problem can be solved using the results of the three theorems, it can be solved using knowledge-based argument (i.e., with the knowledge of the results of the three theorems). Hence, this option is also incorrect.
Option C: As mentioned in the explanation for option A, it can be solved using knowledge-based argument or by using combinatorial argument. Hence, this is the correct answer.
Option D: It is possible that true combinatorists also can solve the problem if they recreate the three theorems. Hence, this is not the correct answer.
Therefore, the correct answer is option C. Choice (C)

Solutions for Questions 19 to 21:

Number of words and Explanatory notes for RC:

Number of words: 453

19. Refer to the first para.
Option A: Refer to the opening lines of the first paragraph. The foundations of good governance of a nation usually include the maintenance of law and order and the implementation of sound fiscal policies. No doubt, these are the keystones of governance, but the failure of good governance (the main crisis is the .....). Also refer to the sentence "The neglect of the basics of good governance is not a sudden phenomenon." So while the first part of choice A is true, the second part is not. Hence choice A is not the answer.
Option B: Choice B (recent phenomenon) is incorrect. The neglect of the basics of good governance is not a sudden phenomenon.
Option C: ..... gradual edging them out by the politicians, resulting in the "premier civil servants distancing themselves from their jobs." The major culprits are the politicians, plurality or multiplicity of laws and the "steel frame" distancing itself in the sphere of governance. The neglect of the basics of good governance is not a sudden phenomenon. It has been overtaking the polity right from the day "we the people of India" adopted a Constitution to govern ourselves. Hence choice C is the correct summary.
Option D: The first part of choice D cannot be inferred from the passage. The second part is true from "the failure is building a house without a mason to lay the foundation and concentrating only on plans for interior decoration" but choice D is incomplete as a summary of the first paragraph.
Choice (C)

20. The Goldilocks principle is the idea that there is an ideal amount of some measurable substance, an amount in the middle or mean of a continuum of amounts, and that this amount is "just right" for a life-supporting condition to exist. The analogy is based on the children's story, *The Three Bears*, in which a little girl named Goldilocks tastes three different bowls of porridge, and she finds that she prefers porridge which is neither too hot nor too cold, but has just the right temperature.
Option A: The makers of the Constitution, in their eagerness to provide a model edifice, borrowed ideas from all over the world without assessing their suitability, acceptability and adaptability to the "genius loci." ..... Constitutional morality is not a natural instinct. It has to be cultivated. Democracy in India is only a top dressing on the Indian soil. This makes choice A the correct answer.
Option B: The first part of the first sentence of choice B (Democracy is the best form of governance) is out of scope. The makers of the Constitution, in their eagerness to provide a model edifice, borrowed ideas from all over the world. So "British models of governance in India" in choice B is too specific. Choice B is not the answer as it does not explain the "Goldilocks Dilemma".
Option C: The trinity that was enjoined by the Constitution to achieve this – the Legislature, the Executive and the Judiciary – can be likened to the masons who are needed to lay the foundation of a building. But choice C is not specific to the question.
Option D: Choice D mentions that various systems of government have been tested, (not implemented). But this is not true. There have been models of governance which have been implemented. So choice D is not the answer.
Choice (A)

21. Option A: Refer to para 2. The trinity that was enjoined by the Constitution to achieve this – the Legislature, the Executive and the Judiciary – can be likened to the masons who are needed to lay the foundation of a building. .... Although the governing trinity is mentioned in paragraph 2, it is not stated to have sowed the seeds of "neglect of the basics of good governance". So choice A is not the answer.
Option B: Choice B is true from the middle of the last para: If they have no natural inclination for liberty and no natural respect for law, if they lack good humour and tolerate foul play, ... if corruption does not repel them. Hence choice B is the answer.
Option C: Refer to the concluding part of para 3. (A country, for a whole generation, had practised a certain technique of opposition to *the government*. It is not easy to make people think differently now. It may be *their own government*, but people still have the habit of opposing the government.) "The government" in the underlined part refers to the British government. Under the British rule, people opposed the British and now, though the Indian government is in power, people continue to oppose it. Choice C is not true.
Option D: The 'orphaning of the civil services' is true from ..... premier civil servants distancing themselves from their jobs. But choice D has an incorrect cause-effect sequence which is not true from the passage. Choice (B)

Solutions for Questions 22 to 24:

Number of words and Explanatory notes for RC:

Number of words: 392

22. The boldfaced part of the passage states that we enjoy good conversations with people with whom we have something in common. The boldfaced part is followed by: An artist with low imagination, who does not originate verbally, does not communicate visually either. ..... Hence (5) is the answer. (5) is a poetic line which means that someone who is not capable of warm emotions will not be able to form or forge great friendships. If one looks at the overall context, (5) works.
The other proverbs or quotes are incorrect.
(1) implies: Just saying that you'll do something doesn't mean much. Actually doing it is harder and more meaningful.
(2) means: It is more effective to be polite and flattering than to be hostile or demanding.
(3) means: You can't live completely independently. Everyone needs help from other people.
(4) is judgmental and means that our character is reflected in our choice of friends.
(6) is an inspirational message but does not apply to the boldfaced part of the passage. Ans: (5)

23. The statement given in the question draws parallels between conversationalists and artists. The passage also states that visual arts follow the same basic principles of verbal communication in its success or failure. According to the passage, an artist with a high imagination can originate visual messages. An artist with low imagination, who does not originate verbally, does not communicate visually either and originates no visual messages. This implies that people who have high imagination can create conversations and

people with low imagination will have trouble bringing forth their conversation skills.
Option A: This absence of expression, is mainly due to the artist's heavy reliance upon the interpretation of his audience – as an external force – to bring about an interaction with his art, while his own message remains "silent." Choice A follows.
Option B: If the artist has a low imagination, he cannot create or originate a message in his visual art. (An artist with low imagination originates no visual messages in his art.). Choice B is correct.
Option C: An artist with low imagination, who does not originate verbally, does not communicate visually either. He originates no visual messages in his art, or when he does, it is so vaguely done, that it stirs up no interaction with his audience. ... No emotional interaction takes place between the observer and the painting. Hence choice C also follows.
So choices A, B and C bring forth the correct relation between the visual arts and communication as the question statement requires. Hence choice D is the answer.
Choice (D)

24. Statement (a) is correct. Refer to the last two sentences of the last para. The visual message does not have to be the same for every viewer. The message serves only as a visual or artistic "code," to be subjectively decoded by each viewer. Hence (a) is true.
Statement (b) talks about using a medium and does not relate to communication. Statement (b) is incorrect.
Statement (c) is true. The more refined the artist's creative impulses, the clearer are his visual messages in sharing his thoughts, feelings, perceptions and other creative faculties with his audience. It is our own creative impulses, perceptions and recognition of the aesthetic expressions within the art that allows us to experience what is being resonating to us from the artist; and thus, becoming engaged in a dialogue and exploration with the artist through his art. Therefore (c) is true.
Statement (d) is correct. Imagination is the prior cause, which precedes the expression of art as its effect. The conception of art is superior to its execution. The magic of art does not exist in its execution, or presentation of feelings and mental imagery independently exterior to the mind of its creator. Execution of the art is only the mechanical expertise; the externalization by which the art is expressed. The magic of art resides within the intellectual awareness of the mind, in conceiving and forming of ideas.
Statement (e) can also be inferred from the passage. The creation process is limited by the physical possibilities available with the material universe. ... It is our own creative impulses, perceptions and recognition of the aesthetic expressions within the art that allows us to experience what is being resonating to us from the artist; and thus, becoming engaged in a dialogue and exploration with the artist through his art; the art is a spiritual connection to the artist.
Hence statements (a), (c), (d) and (e) are correct. The answer is 4. Ans: (4)

Solutions for Questions 25 and 26:

25. From the phrase "new and innovative firms displace" in the first sentence, we know that the first blank will take an opposite of 'innovative'. That key word is "stodgy". Stodgy means dull, unimaginative, commonplace, old-fashioned and stuffy. 'rhapsodized' means expression of oneself in an immoderately enthusiastic manner. 'beleaguered' means harassed or experiencing difficulties, opposition or criticism. But 'beleaguered' is not the exact opposite of 'innovation' and hence is not the answer. 'Stodgy' best describes the companies that can be displaced by the 'economic reinvention' mentioned in the second sentence of the paragraph. So (2) "stodgy" best fills the first blank.
The second sentence of the paragraph states that economic reinvention is out of fashion at the moment. So "creative disruption" will be controlled. Refer to the part "who are in turn looking to rein in the disruption." "Rein in" means to control. So the second blank will take the word that means 'To join or side with for better or worse' or 'to decide to support or work with a particular person or group of people'. We can say that the unhappy workers are casting their lot with populist politicians, who are in turn looking to control the disruption .... "casting their lot with" means "to choose to share in whatever happens to another person or a group". 'sidelining' has a number of usages, one of which is 'to remove from the centre of activity or attention; place in a less influential position; to remove or keep from active participation'. 'sidelining' does not fit the context. 'throwing down the gauntlet' is an idiom which means to challenge or confront someone. 'throwing down the gauntlet' is contextually inappropriate. Hence (4) is the answer for the second blank.
To fill the third blank, refer to the phrases: Economists understandably **worry** that this **backlash**", "what looks **like sclerosis**" in the second half of the para. The third blank needs a negative word that means 'spoils'. 'gum up' means to make something inoperable; to ruin someone's plans. 'gum up' is the answer for the last blank. 'Foment' means to encourage or instigate (trouble, discord, etc); stir up; to arouse or incite. 'Foment' would be the opposite of the blank word required. 'Vituperate' is a negative word but it means 'to rebuke or criticize harshly or angrily; berate'. 'Vituperate' does not collocate with 'the economy's operation' and is inappropriate. Therefore (9) is the answer for the third blank. So, 249. Ans: (249)

26. Refer to the second, third and fourth sentence of the para. Their work in making war not only unthinkable but _____ has borne fruit. There has been no armed conflict in western Europe since. So 'materially impossible' is the only phrase that can fill the first blank. Quixotic is a near synonym of 'unthinkable'. It means extremely idealistic; unrealistic and impractical. But 'quixotic' does not fit in the first blank. It is incorrect for the 'not only ..... but also' construction mentioned in the second sentence of the para. Blank (i) needs a stronger word such as 'impossible' and not just 'unrealistic' or 'idealistic' which is what 'quixotic' also means. 'contumacious' means stubbornly or wilfully disobedient to authority. 'contumacious' is incorrect for the first blank. So (3) is the answer for the first blank.
Globalization now seems to be receding. Most economists have been _____ by the backlash. A few saw it coming. The opposite of 'saw it coming' would be 'blindsided' which means 'to be caught unawares, especially with harmful or detrimental results'. There is nothing in the middle of the paragraph to suggest the use of 'quelled' or 'contravened'. 'quelled' means to put an end to (a rebellion or other disorder), typically by the use of force. 'contravened' means break, breach, fail to comply with, fail to observe, violate, infringe. Hence (6) is the answer for the first blank.
To fill the last blank, we need to focus on the lines 'globalization now seems to be receding' and 'whether a retrenchment is inevitable or might be avoided'. Retrenchment implies the reduction of costs or spending in response to economic difficulty. So the correct word for the last blank will be 'hard sell'. 'Hard sell' means 'concept that people are reluctant to buy or accept'. 'retribution' does not fill the last blank. 'Retribution' means punishment administered in return for a wrong committed. 'irreproachable anachronism' sounds like a fancy term but it cannot fill the last blank. 'irreproachable' means 'perfect or blameless in every respect; faultless'. 'anachronism' means 'one that is out of its proper or chronological order, especially a person or practice that belongs to an earlier time'. Therefore (7) is the answer for the last blank.
Ans: (367)

Solutions for Questions 27 to 31:

27. On a careful reading of the sentences, it can be observed that sentence 4 is a general sentence that begins the para. It introduces the topic of discussion: presidential oath.

Sentence 2 tells us when the presidential oath is normally taken and follows sentence 4. "words have been spoken" in sentence 2 links with "presidential oath" in sentence 4. Sentence 2 is followed by sentence 1. Sentence 1 has the contrast conjunction 'yet'. "rising tides of prosperity and the still waters of peace" in sentence 2 contrasts "gathering clouds and raging storms" in sentence 1. Sentence 1 is followed by sentence 5. "at these moments" in sentence 5 points to "amidst gathering clouds and raging storms" in sentence 1. Sentence 5 concludes the para. America has carried on during bad times not just because of its presidents who take the oath but because of its people. So, 4215. Sentence 3 is the odd sentence out. "Less measurable but no less profound" in sentence 3 needs a precedent. The rest of sentence 3 needs further substantiation. Sentence 3 can be placed in another para, later in the flow. Ans: (4215)

28. Sentence 2 is a general sentence that opens the para. It tells us about the easiest way of storing electricity for later use. Sentences 2 and 4 form a mandatory pair. "pump water uphill with it" in sentence 2 links with "pumped storage" in sentence 4. So sentence 2 is followed by sentence 4. Sentences 4 and 3 form another mandatory pair. "two basins, at different heights, to act as reservoirs, and a supply of water to fill them" in sentence 4 links with "the two ..... tunnel ..... water flow between them" in sentence 3. Sentence 1 concludes the para by telling us about the features of the tunnel – the tunnel must house turbines ..... So, 2431. Sentence 5 leaves the thought flow incomplete. It can be a part of another para and can serve as a starting sentence of that para. "search for alternatives" would need further elaboration. Ans: (2431)

29. Sentence 1 is a general sentence that begins the para. It has a number of proper nouns: Dwight MacAuley, Manitoba. Sentence 1 is followed by sentence 3. No one in the audience disagrees with "most people would give anything to trade places with them". Sentence 5 follows sentence 3. "86 immigrants from 31 countries are becoming citizens of the greatest, freest, richest nations that has ever existed" in sentence 5 links with "most people would give anything to trade places with you" mentioned earlier in sentence 1. (Sentence 5 cannot begin the para as it has the half name of Mr. Dwight MacAuley.) Sentence 2 follows sentence 5 and concludes the para. "take the oath of citizenship" in sentence 2 links with "becoming citizens" in sentence 5. "greatest, freest, richest nations that has ever existed" in sentence 5 points to "Canada" in sentence 2. "Some crowned with turbans, others with hijab" in sentence 2 refers to "the immigrants" in sentence 5. So 1352. Sentence 4 runs tangent to the text. It would need further (historical) elaboration. Sentence 4 can be a part of another paragraph – later in the text. Ans: (1352)

30. On a careful reading of the sentences, it can be observed that sentence 5 is a general sentence that begins the paragraph. It introduces the topic of discussion: the ancient Khmer temple of Vat Phou. Sentence 5 is the first sentence of the narrative flow. Sentence 5 is followed by sentence 2. "Deep in the folds of the hill" in sentence 5 links with "we faced the mountain ridge" in sentence 2. "inner sanctum of the ancient Khmer temple of Vat Phou" in sentence 5 links with "looking for the chamber" in sentence 2. Sentences 2 and 4 form a mandatory pair. "looking for the chamber. From this angle, it was hidden" in sentence 2 links with "But other parts of the temple had begun revealing themselves to us" in sentence 4. Sentence 4 is followed by sentence 3. "a few carvers chipped away" in sentence 4 links with "Through their hands flowed" in sentence 3. So, 5243. Sentence 1 is the odd sentence out. It does not belong to the introductory paragraph consisting of the remaining sentences. It can come much later in the flow. It needs further elaboration. Ans: (5243)

31. On a careful reading of the sentences, it can be seen that sentence 3 is a general sentence that begins the paragraph. It introduces the concept of thought control in democratic societies. Sentence 3 is followed by sentence 2. "democratic society" in sentence 3 links with "a society is democratic to the extent" in sentence 2. Sentence 2 provides a condition for a democratic society. Sentence 2 is followed by sentence 1. "its citizens" in sentence 2 links with "their thought ..... their options ..... they are not playing" in sentence 1. Also "their options narrowly restricted" in sentence 1 parallels "the structuring of options" mentioned earlier in sentence 3. Sentence 1 is followed by sentence 5. "The rest" in sentence 5 explains what has been mentioned in sentence 1: If their thought is controlled ..... Also "they are not playing a meaningful role" in sentence 1 links with "sham, formal motions without meaning" in sentence 5. "So, a contradiction" in sentence 5 concludes what has been mentioned in the introductory sentence 3: "seems contradictory on its face". So, 3215. Sentence 4 is the odd sentence out as "such expectations" is out of scope of the given discussion. Sentence 4 needs a precedent and more elaboration. It is a very generalized sentence and can be left out of the para. Ans: (3215)

Solutions for Questions 32 to 34:

32. On a careful reading of the paragraph, it can be inferred that the highlighted sentence does not belong to blank (2). The sentence is completely out of place in blank (2), as it interrupts the flow of thought. "Or envisage autonomous corporations ..... not just when the board of directors has had a good lunch" in the sentence after blank (2) needs to continue after the sentence preceding blank (2) (Imagine contracts ..... not subject to interpretation by rent-seeking lawyers).

The highlighted sentence is a misfit in blank (3). The sentence preceding blank (3) has some facts "futurist backers of the blockchain, the technology that underpins bitcoin, a digital currency". The highlighted sentence interferes with the thoughtflow if placed in blank (3). "These are pieces of software" needs to be placed immediately after the sentence "smart contracts are all the rage among futurist backers of the blockchain, the technology that underpins bitcoin, a digital currency." The first three sentences of the paragraph need to run continuously without any extraneous sentences being placed in locations (2) and (3).

The highlighted sentence cannot be a part of blank (4). If the highlighted sentence is placed in blank (4), then there will be a complete distortion of thoughtflow as "some see them" in the penultimate sentence would incorrectly refer to "those pesky humans" in the highlighted sentence. "some see them" in the penultimate sentence needs to refer to "pieces of software" or "smart contracts" mentioned earlier.

The highlighted sentence would make the most sense when placed at the beginning of the paragraph. The remaining sentences of the paragraph justify the viewpoint mentioned in the highlighted sentence. {"Imagine contracts that enforce themselves", "Or envisage autonomous corporations, made up of bundles of autonomous agreements, which could send their investors dividends", "software that represent a business arrangement and execute themselves automatically" and "bypass human decision-making altogether"} further the opinion that "Business ..... weren't for those pesky humans".
The highlighted sentence would be redundant if placed after the paragraph. Ans: (1)

33. On a cursory reading of the paragraph, one can understand that the paragraph talks about Russia's military alliance.

The highlighted sentence is a poor example of an introductory statement of the paragraph or even as an upstream statement. The paragraph best begins with the general sentence: It was a single remark in an interview with the New York Times .... the world has ever seen. The

highlighted sentence can only be placed after a reference to views such as "should the Baltic states be attacked by Russia ....." as given in the second sentence of the para.

The highlighted sentence does not belong to blank (2). The highlighted sentence would interfere with the thoughtflow if placed in blank (2). The sentence preceding blank (2) talks about Donald Trump coming to the aid of the Baltic states only if he felt they had met their obligations. Also "That would contravene Article 5 which holds that an attack on one member is an attack on all" as mentioned in the sentence following blank 2 links very well with "he would come to their aid only if he felt they had met their obligations" as given in the sentence preceding blank 2. So (2) is not the answer.

The sentences preceding blank 3 talk about Article 5 (An attack on one member is an attack on all) and Jens Stoltenberg's comment "solidarity among allies is a key value for NATO". The sentence succeeding blank 3 starts with "Russia is fast modernising its armed forces, building a hard-hitting, flexible military". The highlighted sentence best fits in blank 3 serving as a bridge between '"solidarity among allies is a key value for NATO" and the new line of thought "Under Vladimir Putin, Russia is fast modernising its armed forces ....."'

The highlighted sentence does not fit in blank (4) as it would interfere with the thought flow. The last three sentences of the paragraph need to run continuously. "near abroad" given in the sentence preceding blank (4) refers to "Estonia, Latvia, Lithuania and Poland" given in the sentence succeeding blank (4). Ans: (3)

34. The highlighted sentence is too specific to be upstream of the given para. So (1) is not the answer.

The highlighted sentence is a misfit if placed in blank (2). "But it takes time for a human to inspect each scan for anything suspicious like weapons." as given in the sentence preceding blank (2) cannot be abruptly followed by "... but there will still be a need for people to check inside containers and bags with suspicious contents" as given in the highlighted sentence. Also "takes time for a human to inspect each scan" as given in the sentence preceding blank (2) needs to be followed immediately by "To increase this inspection rate".

The highlighted sentence will disrupt the thoughtflow if placed in blank (3). "To increase this inspection rate would require a small army of people." needs to be immediately followed by "computer scientists at University College London, may soon speed up the process by employing artificial intelligence."

The highlighted sentence cannot be a part of blank (4). The last three sentences of the para need to run continuously. The comparison given in the last two sentences need to immediately follow the sentences preceding blank (4).
So, (2), (3) and (4) are not the answers.

The highlighted sentence would come downstream of the given paragraph. The highlighted sentence sounds futuristic "In time, automated screening systems may go from being ....". "there will still be a need for people to check inside containers and bags with suspicious contents" is a reassuring sentence for humans given the automation of screening systems. So the highlighted sentence which needs a precedent is best positioned in a paragraph that come later in the flow, after the question paragraph. So (5) is the answer. Ans: (5)

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

SECTION – II

Solutions for questions 1 to 4:

Let a, b, c and d represent the total number of cars sold in 2013, 2014, 2015 and 2016 respectively. The number of BUVs sold in 2013, 2014, 2015 and 2016 are $0.3a$, $0.2b$, $0.35c$ and $0.15d$ respectively.

Given that 0.3a : 0.2b : 0.35c : 0.15d = 2 : 3 : 7 : 4

$0.3a : 0.2b = 2 : 3 \Rightarrow b = \frac{9a}{4}$

$0.3a : 0.35c = 2 : 7 \Rightarrow c = 3a$

$0.3a : 0.15d = 2 : 4 \Rightarrow d = 4a$

Hence, the total number of automobiles sold by Autorola in 2013, 2014, 2015 and 2016 are a, $\frac{9a}{4}$, $3a$ and $4a$ respectively.

The following table provides the number of cars sold in each year by type of car, in terms of a:

Year	BUV	Mayback	Densa	GP
2013	$0.3a$	$0.2a$	$0.1a$	$0.4a$
2014	$0.45a$	$0.225a$	$0.9a$	$0.675a$
2015	$1.05a$	$0.45a$	$0.75a$	$0.75a$
2016	$0.6a$	$1.6a$	a	$0.8a$

1. Number of BUVs sold = $0.3a + 0.45a + 1.05a + 0.6a = 2.4a$
Number of Maybacks sold = $0.2a + 0.225a + 0.45a + 1.6a = 2.475a$
Number of Densas sold = $0.1a + 0.9a + 0.75a + a = 2.75a$
Number of GPs sold = $0.4a + 0.675a + 0.75a + 0.8a = 2.625a$
Hence, the number of cars sold is the highest for Densa. Choice (C)

2. Number of BUVs sold in 2015 = $1.05a$
Number of Densas sold in 2016 = a
The required ratio = 1.05:1 = 21:20 Choice (A)

3. Number of GPs sold in 2015 = $0.75a = 600 \Rightarrow a = 800$
Number of Maybacks sold in 2014 = $0.225 \times 800 = 180$
Choice (B)

4. In 2015, the numbers of Maybacks, Densas and GPs sold were less than that in 2016. BUVs were the only type of car for which a greater number were sold in 2015 as compared to 2016.
Let p, q, r and s be the price of the four types of cars.
Since the revenues in 2015 is greater than in 2016,
$1.05p + 0.45q + 0.75r + 0.75s > 0.6p + 1.6q + r + 0.8s$
$\Rightarrow 0.45p > 1.15q + 0.25r + 0.05s$
$\Rightarrow p > 2.55q + 0.55r + 0.11s$

From this, we can see that p is definitely greater than $2.55q$ and is greater than $0.55r$, and is greater than $0.11s$.
Hence, we can definitely say that p is greater than q, i.e., the price of a BUV is greater than the price of a Mayback.
Choice (C)

Solutions for questions 5 to 8:

From (ii), J visited in March and C visited in April. Both J and C visited on the same day and J visited at least 50 days before C. If they visited on the same day of the week, then the number of days between J's visit and C's visit must be a multiple of 7.
Hence, J must have visited 56 days before C (he could not have visited 63 days before C as they visited in March and April and there can be a maximum of 60 days gap). Hence, J could have visited between March 1st and March 5th. C would have visited between April 26th to April 30th.

From (iii), D and G visited together. From (iv), E and I visited together. From (i), F did not visit with A or B. If F visited with J, A must have visited after J which violates (i). Hence, F could not have visited with J. Also, F could not have visited with C as C visited between April 26th and April 30th and A has to visit 28 days after F and C.

Hence, F must have visited with H.

From (ii), C visited after J. From (i), A did not visit after J. Hence, he must have visited with J. B must have visited with C.

Hence, B and C must have visited between April 26th and April 30th. J and A visited between March 1st and March 5th.

Since F and H visited 28 days before A, F and H must have visited between February 1st and February 5th. From (iv), E visited on February 10th and he visited on the same day of the week as H. Hence, F and H must have visited on February 3rd.

J and A must have visited on March 3rd. B and C must have visited on April 28th.

Since D visited 10 days before H, D and G must have visited on January 24th.

The following table provides who visited the city with whom and on which dates:

Persons	Visited on
D, G	January 24th
F, H	February 3rd
E, I	February 10th
J, A	March 3rd
B, C	April 28th

5. B visited the city on April 28th. Hence, the answer in 'ddmm' format is 2804. Ans: (2804)

6. A visited the city in March. Choice (D)

7. Four persons visited after February 15th. Choice (B)

8. I visited the city 7 days after F visited the city.
Ans: (7)

Solutions for questions 9 to 12:

The two persons who participated in the 10K run finished first, the three persons who participated in the Half Marathon finished next and the three persons who participated in the Full Marathon finished last. Hence, we can order the eight persons from 1 to 8 such that 1st and 2nd participated in the 10K run, 3rd, 4th and 5th participated in the Half Marathon and 6th, 7th and 8th participated in the Full Marathon.

From (i), Pavan could have finished third or above. Since he finished before Omar, Omar would have finished fourth or above.

From (v), Lalit participated in the Half Marathon and finished his race after Omar. Lalit could be third, fourth or fifth. Since Omar finished before him and Omar can only be fourth or above (from (i)), Omar must be fourth and Lalit must be fifth. From (i), Pavan must be third. Hence, Pavan, Lalit and Omar participated in the Half Marathon.

From (ii), Jacob did not participate in the Full Marathon. Hence, Jacob must have participated in the 10K run. Tilak must also have participated in the 10K run since Jacob has to finish immediately after Tilak. Since Jacob finished immediately after Tilak (from (ii)), Jacob must have been second and Tilak must have been first (both of them participated in the 10K run).

From (iii), Karan was the fastest among all the persons who participated in the same race as him. Hence, Karan must have participated in full Marathon and would have finished sixth (among the eight persons). From (iv), Hugh must have been seventh and Bill eighth.

The following table provides the order in which they finished and the race in which each person participated:

Order of finishing	Person	Race
1	Tilak	10K
2	Jacob	10K
3	Pavan	Half Marathon
4	Omar	Half Marathon
5	Lalit	Half Marathon
6	Karan	Full Marathon
7	Hugh	Full Marathon
8	Bill	Full Marathon

9. Pavan was the first person to finish the Half marathon.
Choice (A)

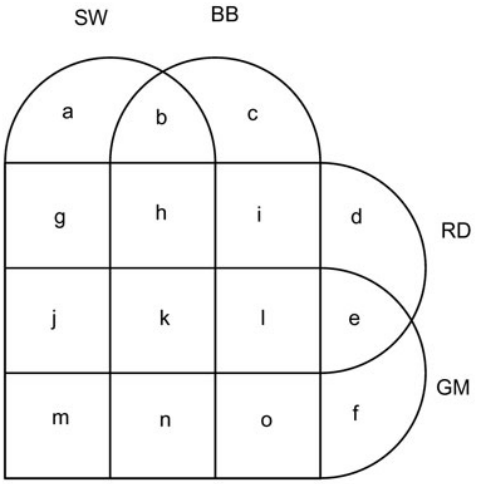
10. Six persons finished their races before Hugh did.
Choice (C)

11. Hugh and Bill participated in the same race.
Choice (C)

12. Lalit was the last person to finish the race that he participated in. Choice (B)

Solutions for questions 13 to 16:

Let the following Venn diagram represent the number of persons who watched the four movies.



From (i), $b = h = k = n = 0$.
From (iii), $f = o = n = m = 0$
From (ii), $g + j = i + l + 48$
From the first graph,
$a + g + j + c + i + l + d + e = 295$
$g + i + e + j + l = 182 \Rightarrow a + c + d = 113$
$j + l = 50 \Rightarrow e + g + i = 132$

From the second graph, the average number of movies watched by the persons who watched Snow White is 2.

The persons who watched Snow White are represented by a, g, j. Of them, a watched only 1 movie, g watched 2 movies, j watched 3 movies.

Hence, $\frac{a+2g+3j}{a+g+j} = 2 \Rightarrow a = j$

Similarly, $\frac{c+2i+3i}{c+i+l} = 1.8 \Rightarrow i+6l=4c$

For Red Dragon, $\frac{d+2i+2g+2e+3l+3j}{d+i+g+e+l+j} = 2 \Rightarrow d = l+j$

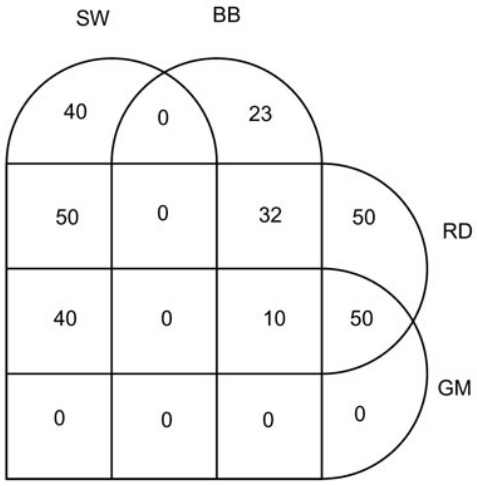
For Green Mile, $\frac{2e+3l+3j}{e+l+j} = 2.5 \Rightarrow e = l+j$

Hence, $e = d = l + j$
Since $l + j = 50$, $e = d = 50$,
Since $e + g + i = 132$, $g + i = 82$
Since $d = 50$ and $a + c + d = 113$, $a + c = 63$
Let $c = 63 - a$
$a = j$ and $l + j = 50 \Rightarrow l = 50 - a$
Also,
$i + 6l = 4c \Rightarrow i + 6 \times (50 - a) = 4 \times (63 - a) \Rightarrow i = 2a - 48$
$g + l = 82 \Rightarrow g = 82 - (2a - 48) \Rightarrow g = 130 - 2a$

Since $g + j = i + l + 48$,
we get

$130 - 2a + a = 2a - 48 + 50 - a + 48 \Rightarrow a = 40$
Hence, $j = 40$, $g = 50$, $i = 32$, $l = 10$, $c = 23$

The following Venn diagram shows the values:



13. 40 persons watched only Snow White. Ans: (40)

14. Among the persons who watched Red Dragon, 42 persons also watched Snow White. Ans: (42)

15. The number of persons who watched exactly two movies but did not watch Snow White = $i + e = 32 + 50 = 82$.
Ans: (82)

16. The number of persons who watched only Snow White and Red Dragon = 50
This is the same as the number of persons who watched only Red Dragon. Choice (D)

Solutions for questions 17 to 20:

Let $a1$, $a2$ and $a3$ be the number of persons in the hotel on April 1st, 2nd and 3rd respectively.

The price of a room on April 4th = $2 \times \frac{a_1 + a_2 + a_3}{3}$

Number of persons in a room on April 4th
$= 1000 - \frac{3}{2} \times 2 \times \frac{a_1 + a_2 + a_3}{3} = 1000 - (a_1 + a_2 + a_3)$

Hence, the number of persons in a room on any day after April 4th = 1000 – Sum of the number of persons in the previous three days.
Number of persons on April 5th
$= 1000 - a_2 - a_3 - (1000 - (a_1 + a_2 + a_3)) = a_1$

Similarly, number of persons on April 6th = a_2
The number of persons on April 7th = a_3
The number of persons in the hotel follows a similar pattern for the rest of the month.

17. The number of persons who stayed in the hotel on April 4th = 1000 – 250 – 200 – 220 = 330
The price of a room will be the highest when the average number of persons in the hotel in the past three days is the highest.
The number of persons staying in the hotel on each day will be 250, 200, 220, 330, 250, 200, 220…
The highest average number of persons would have stayed in the hotel on April 6th, since on the previous three days, 220, 330 and 250 persons would have stayed.
Highest price of a room = $2 \times \frac{220 + 330 + 250}{3} = 533.33$
Choice (A)

18. The total number of persons who stayed in the hotel during April

$= 7 \times (a_1 + a_2 + a_3 + 1000 - (a_1 + a_2 + a_3)) + a_1 + a_2 = a_1 + a_2$
Hence, $7000 + a_1 + a_2 = 7500 \Rightarrow a_1 + a_2 = 550$

Further, the number of persons who stayed in the hotel on any day cannot be negative. Since the number of persons who stayed in the hotel on April 4th was $1000 - (a_1 + a_2 + a_3)$, $a_1 + a_2 + a_3$ must be less than 1000.
Hence, the maximum number of persons who could have stayed in the hotel on April 3rd = 1000 – 550 = 450.
Choice (B)

19. Let the number of persons in the hotel on April 1st be a.
The number of persons in the hotel on April 2nd and 3rd will be $2a$ and $3a$ respectively.
Number of persons in the hotel on April 4th = $1000 - 6a$
The price of a room on April 16th will be the same as that on April 4th.

Price of a room on April 4th = $2 \times \frac{a + 2a + 3a}{3} = 4a$

Price of a room on April 17th will be the same as that on April 5th.
Price of a room on April 5th =

$$2 \times \frac{2a + 3a + 1000 - 6a}{3} = \frac{2000 - 2a}{3}$$

Difference in prices must be greater than 400. However, we do not know whether the price of a room on April 16th was greater or less than that on April 17th.
Considering the price of room on April 17th to be greater, we get

$$\frac{2000 - 2a}{3} - 4a > 400$$

$\Rightarrow 2000 - 2a - 12a > 1200$
$\Rightarrow 14a < 800$
$\Rightarrow a < 57.14$

If the price of a room on April 16th was greater, we get

$$4a - \frac{2000 - 2a}{3} > 400 \Rightarrow a > 228.57$$

However, if $a > 228.57$, then $6a$ will be more than 1000 which is not possible as $1000 - 6a$ will become negative.
Hence, the maximum number of persons who could have stayed in the hotel on April 1st = 57. Choice (A)

20. If the price of a room remained the same on two consecutive days, then the average number of persons who stayed in the hotel on the previous three days for two consecutive days must be the same.
We need to find possible values for the number of persons who stayed in the hotel on April 14th which is the same as the number of persons who stayed in the hotel on April 2nd.
Let a be the number of persons who stayed in the hotel on April 2nd.
The number of persons who stayed in the hotel on consecutive days starting from April 1st will be 150, a, 200, $650 - a$, 150, a, 200…
Let the average number of persons who stayed on April 1st, 2nd and 3rd be the same as the number of persons who stayed on April 2nd, 3rd and 4th.
$\therefore 150 + a + 200 = a + 200 + 650 - a \Rightarrow a = 500$

Let the average number of persons who stayed on April 2nd, 3rd and 4th be the same as the number of persons who stayed on April 3rd, 4th and 5th.
$\therefore a + 200 + 650 - a = 200 + 650 - a + 150 \Rightarrow a = 150$

Let the average number of persons who stayed on April 3rd, 4th and 5th be the same as the number of persons who stayed on April 4th, 5th and 6th.
$\therefore 200 + 650 - a + 150 = 650 - a + 150 + a \Rightarrow a = 200$

Let the average number of persons who stayed on April 4th, 5th and 6th be the same as the number of persons who stayed on April 5th, 6th and 7th.
$\therefore 650 - a + 150 + a = 150 + a + 200 \Rightarrow a = 450$
∴Hence, a can take 4 distinct values. Choice (C)

Solutions for questions 21 to 24:

Since the rat cannot pass through the diagonals of the unit cubes, the rat can only go along the unit cubes which are either horizontal or vertical to the unit cube that the rat is in.

21. To go from the cube at the top right corner to the cube at the bottom left corner through the minimum number of cubes, the rat must go along the diagonal. But since this is not possible, it can go as close to the diagonal as possible, i.e., the rat can go one cube down, one left, one down, one left… But this is the same as passing along the edge downwards until it reaches the bottom right cube and then going left until it reaches the bottom left cube. Hence, the rat has to pass through a minimum of 5 + 4 = 9 unit cubes.
Ans: (9)

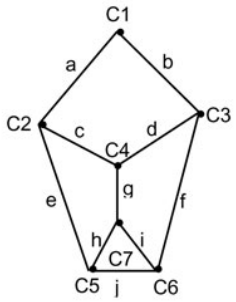
22. Since the rat cannot travel along the diagonals, to minimize the number of unit cubes that it passes through, it can travel along the edges. Hence, from the bottom right corner of a face, the rat can go left to reach the bottom left corner. From here, it can go upwards and reach the top left corner of the same face. To reach the top left corner of the opposite face, it can go along one of the edges and reach the top left corner of the opposite face.
Hence, the rat will travel through 5 + 4 + 4 = 13
Ans: (13)

23. In this case, the rat can reach the bottom left corner of the same face by going two unit cubes down and two unit cubes to the left. It can reach the opposite face by going along one of the edges.
Hence, the total number of unit cubes = 3 + 2 + 4 = 9
Choice (A)

24. Assume that the rat is introduced in the bottom left corner of one of the faces. To travel through the minimum number of cubes, the rat can go to the three cubes on the three remaining corners of the bottom face and then go to the four cubes at the four corners of the top face.
Hence, the minimum number of cubes that the rat must pass through = 5 + 4 + 4 + 4 + 4 +4 +4 = 29
Choice (D)

Solutions for questions 25 to 28:

Let the length of the roads be as shown below:



From (iii), we have C4 – C7 = g = 3 and from (vi), we have C3 – C6 = $f > 11$

From (ii), C4 – C6 = 9
The possible routes are C4 - C7 -C6 and C4 - C3 - C6
For the route C4 - C7 - C6
$g + i = 9$
For the route C4 - C3 - C6
$d + f = 9$. But this is not possible since the value of f is greater than 11.
Therefore, the route C4 - C7 - C6 is taken.
Now $g + i = 9 \Rightarrow i = 6$

From (i), C2 – C6 = 3
Shortest route is C2 - C5 - C6
i.e., $e + j = 3$
$\Rightarrow (e, j) = (1, 2)$ or $(2, 1)$

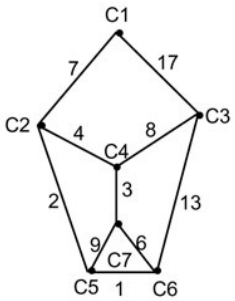
From (v), C3 – C7 = 11
The possible routes are C3 - C4 - C7 and C3 - C6 - C7
For the route C3 - C4 - C7
$d + g = 11$
For the route C3 - C6 - C7
$i + f = 11$. But this is not possible since the value of f is greater than 11.
Therefore, the route C3 - C4 - C7 is taken
Now, $d + g = 11 \Rightarrow d = 8$

From (iv), C5 – C6 + C5 – C7 = 10
i.e., $h + j = 10$
Since j can only be 2 or 1, the possibilities for (h, j) are only (9, 1) and (8, 2).
But the lengths 8, 3 and 6 are already taken and the length of the roads are distinct integers.
So, the only possible case is $(h, j) = (9, 1)$
implies $e = 2$.

From (v), C7 – C2 = 7
The possible routes are C7 - C4 - C2 and C7 - C5 - C2
For the route C7 - C4 - C2
$g + c = 7 \Rightarrow c = 4$
For the route C7 - C5 - C2
$e + h = 7$. But this is not possible since the value of $e + h$ is 11
Therefore, C7 – C2 $\Rightarrow$ the route C7 - C4 - C2 is taken

From (vi), C1 – C4 = 11
The possible routes are C1 - C2 - C4 and C1 - C3 - C4
For the route C1 - C2 – C4,
$a + c = 11 \Rightarrow a = 7$
For the route C1 - C3 - C4
$b + d = 11 \Rightarrow b = 11 - 8 = 3$. But this is not possible since the length of each road is unique
Therefore, the route C1 - C2 - C4 is taken
From (vii), C2 – C3 = 24
The possible routes are C2 - C1 - C3 and C2 - C4 - C3
For the route C2 - C1 – C3,
$a + b = 24 \Rightarrow b = 17$
For the route C2 - C4 - C3
$c + d = 24$. But this is not possible since the value of $c + d$ is 12.
Therefore, the route C2 - C1 - C3 is taken

From (ii), C1 – C7 = 36 (Longest path)
The possible routes for this are
C1 – C2 – C4 – C7 $\Rightarrow a + c + g = 36$. But $a + c + g = 14$. Not the longest path
C1 – C2 – C5 – C7 $\Rightarrow a + e + h = 36$. But $a + e + h = 18$. Not the longest path
C1 – C3 – C4 – C7 $\Rightarrow b + d + g = 36$. But $b + d + g = 28$. Not the longest path.
Only possibility is C1 – C3 – C6 – C7.
$\Rightarrow b + f + i = 36 \Rightarrow f = 13$.
The final network is as follows:



25. Jack would take the shortest path from C1 – C7 which is C1 – C2 – C4 – C7.
Length of the shortest path = 7 + 4 + 3 = 14 Ans: (14)

26. MPD between C2 – C5 = 2, C5 – C6 = 1
C4 – C7 = 3, C2 – C3 = 24 Choice (B)

27. The highest Possible Distance between C3 and C7 is for the route C3 - C6 - C7, i.e., 13 + 6 = 19 km Choice (B)

28. The MPD should be more than the length of the shortest routes. For C2, C3, C4, C5 and C7, the distance along the shortest route & MPD is the same.
However, for C6, the shortest route is C1 – C2 – C5 – C6, which has a length of 10 km. But this route will not pass through the minimum number of cities. Hence, Jack would have travelled through the route C1 – C3 – C6 covering a total of 30 km. And only one city satisfies the given condition. Choice (B)

Solutions for questions 29 to 32:

Since the shares owned by the shareholders who voted in favour of a proposal must be more than 50%, for a proposal to be accepted, the sum of the shares of the shareholders who voted in favour must be more than 250,000.

We can calculate, for each proposal, the number of shares of the shareholders who cast a favourable vote. We can calculate the total approximately (i.e., in terms of thousands) and calculate the exact sum only if the approximate value falls close to 250,000.

For Proposal 1, the total shares in favour = 43290 + 21570 + 124580 + 57410 $\cong$ 245000
For Proposal 2, the total shares in favour = 84570 + 65840 + 57410 + 32580 + 70160 $\cong$ 320000
Similarly, we can calculate the approximate values for each proposal.
For Proposal 3, the total shares in favour $\cong$ 150000
For Proposal 4, the total shares in favour $\cong$ 300000
For Proposal 5, the total shares in favour $\cong$ 265000
For Proposal 6, the total shares in favour $\cong$ 220000
For Proposal 7, the total shares in favour $\cong$ 340000
For Proposal 8, the total shares in favour $\cong$ 230000
For Proposal 9, the total shares in favour $\cong$ 225000
For Proposal 10, the total shares in favour $\cong$ 360000

Hence, five proposals, Proposal 2, Proposal 4, Proposal 5, Proposal 7 and Proposal 10, will be accepted.

29. Five proposals were accepted during the given year.
Choice (C)

30. Irene Gaiman voted in favour of Proposal 1, Proposal 4, Proposal 5 and Proposal 7. Of these four proposals, three proposals were accepted and one was rejected.
Choice (A)

31. Any shareholder who voted only for Proposal 2, Proposal 4, Proposal 5, Proposal 7 and Proposal 10 satisfy the given condition. Only Kirk Armstrong did not vote for any other proposal other than the above five. Hence, he is the only shareholder who satisfies the given criteria.
Choice (D)

32. Proposal 1 needs less than 5000 shares more. Even if one additional shareholder votes in favour of this proposal, it will be accepted.
Proposal 3 was voted against by RW, IG, KA and GJ. If KA, the persons with the least votes among the four, votes in favour, it will not be accepted. Hence, this will not be definitely accepted.
Proposal 6 was voted against by IG, KA, JW and PO. The total number of shares in favour of Proposal 6 = 219590.
If PO votes in favour, the number of shares will increase to 219590 + 32580 = 252170.
Hence, this proposal will definitely be accepted.
Proposal 8 was voted against by JC, IG, KA and PO. Even if PO votes in favour, it will be accepted. Hence, this will also be definitely accepted.

Proposal 9 was voted against by RW, IG and KA. Even if one among them votes in favour of this proposal, it will be accepted. Hence, this will also be definitely accepted.
Hence, of the five proposals which were rejected last year, four will definitely be accepted. Choice (B)

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

SECTION – III

Solutions for questions 1 to 34:

1. $n(A \cup B) = n(A) + n(B) - n(A \cap B)$
$\therefore n(7 \text{ or } 5) = n(7) + n(5) - n(5 \& 7)$
The three-digit numbers which are divisible by 7 are 105, 112, ... 994
Let the number of such numbers be n.
$\therefore 105 + (n-1)\,7 = 994$
$\frac{889}{7} = n-1 \Rightarrow 127 = n-1 \Rightarrow 128 = n$ - - - - - (1)
Similarly, the numbers which are divisible by 5 are 100, 105, ... 995
Let the number of such numbers be k.
$\therefore 100 + (k-1)\,5 = 995$
$\Rightarrow (k-1)\,5 = 895$
$\Rightarrow k - 1 = 179 \Rightarrow k = 180$ - - - - - (2)
The numbers which are divisible by 35 are 105, 140, ... 980
Let number of such numbers be p
$\therefore 105 + (p-1)\,35 = 980$
$\Rightarrow p - 1 = \frac{875}{35} \Rightarrow p = 26$ - - - - - (3)
The required answer = 128 + 180 – 26
= 308 – 26 = 282 Ans: (282)

2. Given, $x - \frac{1}{x} = 3$
Also, we know that
$$x^3 - \frac{1}{x^3} = \left(x - \frac{1}{x}\right)^3 + 3(x)\left(\frac{1}{x}\right)\left(x - \frac{1}{x}\right)$$
Substituting $x - \frac{1}{x} = 3$,
we get $x^3 - \frac{1}{x^3} = (3)^3 + 3(3) = 27 + 9 = 36$
Choice (A)

3. Let there be N men initially in the group. The total work is equal to MN man-hours. But since after every eight hours, the work force becomes half, the work done in the successive 8-hour periods also becomes half the previous work.
Work done in the first eight hours = 8N man-hours.
Work done in the second eight hour period = $\frac{8N}{2} = 4N$
Similarly the work done in next three eight hour period is 2N, N and $\frac{N}{2}$ man-hours.
Since the work is completed in exactly 40 hours, i.e., 5 eight-hour periods, MN
$= 8N + 4N + 2N + N + \frac{N}{2} = \frac{31}{2}N \Rightarrow M = \frac{31}{2} = 15\frac{1}{2}$
Choice (D)

4. Let the numbers a and b be $7k$ and $10k$ respectively.
Let the number subtracted be x.
$\therefore \frac{7k-x}{10k-x} < \frac{5}{9}$
$\Rightarrow 63k - 9x < 50k - 5x$
$\Rightarrow 4x > 13k \Rightarrow x > \frac{13k}{4}$
For x to be minimum, $k = 1 \Rightarrow x > \frac{13}{4}$, $\Rightarrow x = 4$
Choice (B)

5. $\frac{x^2 - \frac{2x}{3} + 1}{ax^2 + bx + 1} > 0 \Rightarrow \frac{\left(x - \frac{1}{3}\right)^2 + \frac{8}{9}}{ax^2 + bx + 1} > 0$
As $\left(x - \frac{1}{3}\right)^2 + \frac{8}{9}$ is positive, $ax^2 + bx + 1 > 0$
The inequality with the solution set $x < -2$ or $x > -\frac{1}{2}$ is
$(x+2)\left(x + \frac{1}{2}\right) > 0$
$\Rightarrow x^2 + \frac{5}{2}x + 1 > 0$
$\Rightarrow ax^2 + bx + 1 > 0$ and $x^2 + \frac{5}{2}x + 1 > 0$ have the same solution.
Now, since the constant term is the same in both quadratic expressions (i.e., L.H.S.), the two expressions must be identical.
$\Rightarrow a = 1$ and $b = \frac{5}{2}$
$\therefore a + b = 3.5$ Ans: (3.5)

6. $2x + 8 - 3x = 6x - 4 - 2x - 8$
$\Rightarrow 8 - x = 4x - 12$
$\Rightarrow x = 4$
$\therefore$ Sum of 10 terms = $10\,(2 \times 12 + 9 \times 4)/2 = 300$
Choice (B)

7. In order for none of them to get adjacent parts, two of them must have taken exactly two parts each and the third must have taken one part.
There are ${}^5C_2$ ways of selecting two parts by the first person. Of these, 5 ways will be ways of selecting adjacent parts.
$\therefore {}^5C_2 - 5 = 5$ ways will be ways of selecting non-adjacent parts for the first person.
Among the remaining three parts, two parts will be adjacent. Hence, the second person can choose two non-adjacent parts in only two ways. The third person gets the remaining part.
Also, the order of the first, second and third persons can be taken in ${}^3P_3 = 6$ ways, of which all the cases where the two persons receive two pieces each will get repeated once.
Hence, only $\frac{6}{2} = 3$ distinct orders of persons are possible.
$\therefore$ Total number of ways = (3) (5) (2) = 30. Ans: (30)

8. Let the cost of 2 pens = cost of 3 erasers = cost of 4 sharpeners = ₹12
$\Rightarrow$ Cost of 1 pen = ₹6, 1 eraser = ₹4 and 1 sharpener = ₹3.
Therefore cost of 6 pens, 4 erasers and 3 sharpeners = $6 \times 6 + 4 \times 4 + 3 \times 3$ = ₹61.
Now, new prices after the increase are 1 pen = ₹6, 1 eraser =₹.4.8, 1 sharpener = ₹3.9.
Therefore new cost of 6 pens, 4 erasers and 3 sharpeners = $6 \times 6 + 4 \times 4.8 + 3 \times 3.9$ = ₹66.9

$\Rightarrow$ Percentage increase required = $\frac{66.9-61}{61} = \frac{5.9}{61}$ which is slightly less than 10% Choice (C)

9. $1309 = 11 \times 7 \times 17$

$\text{Rem}\left[\frac{15^{400}}{11}\right] = \text{Rem}\left[\frac{4^{400}}{11}\right] = \text{Rem}\left[\frac{(32)^{160}}{11}\right]$

$= \text{Rem}\left[\frac{(-1)^{160}}{11}\right] = 1$

Similarly, $\text{Rem}\left[\frac{15^{400}}{7}\right] = \text{Rem}\left[\frac{1^{400}}{7}\right] = 1$

Similarly, $\text{Rem}\left[\frac{15^{400}}{17}\right] = \text{Rem}\left[\frac{(-2)^{400}}{17}\right]$

$= \text{Rem}\left[\frac{16^{100}}{17}\right] = \text{Rem}\left[\frac{(-1)^{100}}{17}\right] = 1$

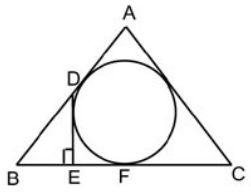
$\therefore 15^{400} = 11k_1 + 1 = 17k_2 + 1 = 7k_3 + 1$

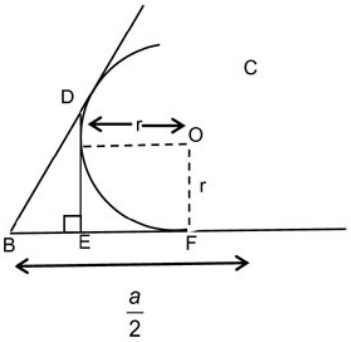
$\therefore 15^{400} - 1 = [\text{LCM of } (11, 17, 7)]k_4 = 1309k_4$

$\therefore 15^{400} = 1309k_4 + 1$

$\therefore$ Required remainder = 1 Ans: (1)

10.





$BE = BF - EF = \frac{a}{2} - r$, where r is the inradius.

$DE = BE \tan 60° = \left(\frac{a}{2} - r\right) \tan 60°$

$\therefore$ Area of triangle BDE = $\frac{1}{2}BE \cdot DE = \frac{1}{2}\left(\frac{a}{2} - r\right)^2 \tan 60°$

In an equilateral triangle, inradius $r = \frac{a}{2\sqrt{3}}$

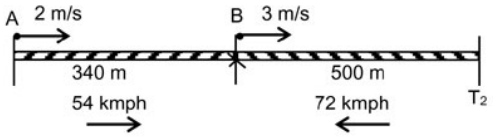
$\therefore$ Area of Δle BDE = $\frac{1}{2}\left(\frac{a}{2} - \frac{a}{2\sqrt{3}}\right)^2 \tan 60°$

$= \frac{\sqrt{3}\,a^2}{12}\left(2 - \sqrt{3}\right)$

Since $a = 6$, area = $\frac{\sqrt{3}}{12} \times 6^2\left(2 - \sqrt{3}\right) = 3\sqrt{3}\left(2 - \sqrt{3}\right)$

Choice (A)

11. Let the two persons be A and B, as shown below.



The initial distance between the two persons is 340 m.
The speed of person A, with respect to the tracks

$= \frac{5}{18}(54) + 2 = 17$ m/s (to the right)

The speed of person B, with respect to the tracks

$= \frac{5}{18}(72) - 3 = 17$ m/s (to the left)

$\therefore$ Time taken = $\frac{\text{Relative distance}}{\text{Relative speed}} = \frac{340}{(17+17)}$

= 10 seconds. Choice (A)

12. $6 + (6 + 12) + (6 + 12 + 18) + \ldots + (6 + 12 + 18 + \ldots + 6 \times n)$

$= 6[1 + 1 + 2 + 1 + 2 + 3 + \ldots + 1 + 2 + 3 + \ldots n]$

$= 6\sum_{n=1}^{n} \frac{n(n+1)}{2} = n(n+1)(n+2)$

Given, $n = 200$, $n(n + 1)(n + 2) = 200 \times 201 \times 202$

= 8120400 Ans: (8120400)

13. Since one needs to go through exactly 7 cities including the cities 5, 8, and 12 and excluding the cities 7 and 9 we need to select 4 cities from the remaining 20 – (2 + 3 + 2), i.e., 13 cities we need to select 4 cities form the cities 1, 2, 4, 6, 10, 11, 13, 14, 15, 16, 18, 19, and 20.
Now 4 cities can be selected from the remaining 13 cities in $^{13}C_4$ ways i.e., $\frac{(13)(12)(11)(10)}{(4)(3)(2)(1)}$ or 715 ways

Say cities C_1, C_2, C_3, C_4 are selected. Now we have a total of 7 cities to be covered in each path from city 3 to city 17.
The 7 cities can be arranged in 7! ways. ($\because$ change in order results in a different path). Choice (D)

14. Let $a = x^4 + x$ and $b = x^3 + x^2$
We desire $a - b < 0$
$x^4 + x - x^3 - x^2 < 0$
$\Rightarrow x^3(x - 1) - x(x - 1) < 0$
$\Rightarrow (x - 1)(x^3 - x) < 0$
$\Rightarrow x(x - 1)^2(x + 1) < 0$
as $(x - 1)^2 > 0$
$x(x + 1) < 0$

+ve –ve +ve

$\therefore x \in (-1, 0)$

Alternative Solution:
Checking for $x = 0$, eliminates Choices, (A), (B) and (D).
Hence, Choice (C). Choice (C)

15. In order to minimise the value of k, we need to construct the given cuboid using smaller cubes, but each of which is as large as possible. This construction is diagrammatically explained below:

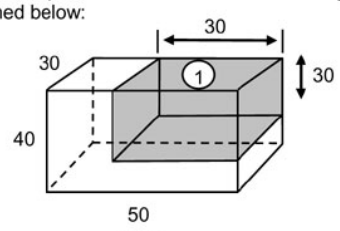


Fig (i)

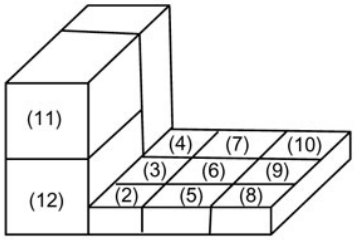


Fig (ii)

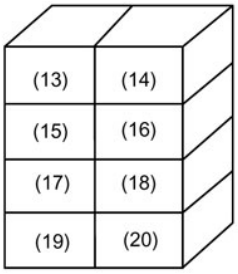


Fig (iii)

In fig (i) a cube of size 30 cm [Cube (1)] is removed and the remaining portion of the cube is shown in fig (ii). In fig (ii) there are 9 small cubes of size 10 cm each. [Cubes (2-10)] and two cubes of size 20 cm [Cube (11) and Cube (12)] are removed and the remaining portion is shown in fig (iii), which consists of exactly 8 small cubes of size 10 cm each, as shown [Cubes (13-20)]
$\therefore$ We get a minimum of 20 cubes. Choice (D)

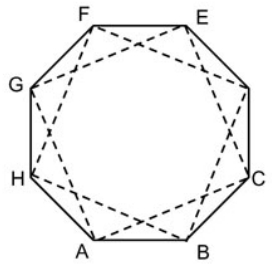
16. Roots are real $\Rightarrow \Delta \geq 0$
$\Rightarrow q^2 - 4p^2 \geq 0 \Rightarrow (q - 2p)(q + 2p) \geq 0$ ----- (i)

Sum of roots $= \frac{-q}{p} > 0$ [$\because$ Both roots are positive]

But given $p > 0 \Rightarrow q < 0$
$\therefore q - 2p < 0$ --- (ii) $\Rightarrow$ Also, from (i) and (ii), we get $q + 2p \leq 0$
Now, observing the answer choices only choice (C) is true.
Choice (C)

17. Let the four persons be A, B, C and D.
Let the times taken by them be 3, 7, 11 and 17 minutes respectively.
The required condition is that the total time taken shall be the best
$\Rightarrow$ the faster person is chosen to drive the boat.
Another condition is that no person can drive more than two trips.
So, in the first trip, A takes D and leaves him on the other side.
Time taken = 3 minutes. ..... (1)
A returns in 3 minutes ..... (2); two trips of A are over.
Now, B takes A to the other bank in 7 seven minutes, leaves him there and returns. .....(3);
B completes his two trips.
Now C takes B to the other bank in 11 minutes, and all four crossed the stream.
Total time taken = 3 + 3 + 7 + 7 + 11 = 31 minutes.
Choice (C)

18.



Total number of quadrilaterals that can be formed using the 8 vertices of a regular octagon = ${}^8C_4 = 70$
Among the quadrilaterals formed,
Only ACEG and BDFH only form squares.
Hence, required probability $= \frac{2}{70} = \frac{1}{35}$ Choice (A)

19. $y = x^3 + 5x^2 + 6x + 8$ —— (1)
$y = x^3 + 4x^2 + 10x + 4$ —— (2)
(1) – (2) $\Rightarrow x^2 - 4x + 4 = 0$
$\Rightarrow (x - 2)^2 = 0 \Rightarrow x = 2$ (i.e., the graphs intersect only at x = 2)
But when, $x = 2$, $x^3 + 5x^2 + 6x + 8 \neq 0$ and
$x^3 + 4x^2 + 10x + 4 \neq 0$
(Roots of an equation are the values of x for which the curve intersects x axis, i.e., $y = 0$)
$\therefore$ No common roots exist. Choice (A)

20. Let us consider the amount borrowed by Paresh to be ₹P and let each instalment be ₹x.
After 1 year, the amount becomes P(1.1)
He pays the first instalment of x at the end of the first year, so the balance amount is P(1.1) – x.
Proceeding in a similar manner, we get the following equation:
((P(1.1) – x) 1.1 – x) 1.1 – x = 0

$\Rightarrow (P(1.1) - x)1.1 - x = \frac{10}{11}x$

$\Rightarrow (P(1.1) - x)\frac{11}{10} = \frac{21}{11}x$

$\Rightarrow 1.1P - x = \frac{210}{121}x$

$\Rightarrow 1.1P = \frac{331x}{121}$

$\therefore P = \frac{3310}{1331}x$

It is given that the amount borrowed was ₹23170.

$\therefore x = \frac{1331}{3310}(P) = \frac{1331}{3310}(23170) = 9317$.

Thus the value of each instalment was ₹9317.
Choice (A)

21. Given $Y = \{1, 3^{\frac{1}{2}}, 3, 3^{\frac{3}{2}}, \ldots\ldots 3^9, 3^{\frac{19}{2}}, 3^{10}\}$
We can observe that the given numbers are in G.P. we want the number of ways of selecting 2 numbers such that their product is not less than 3^{10}.
When one number is m let k be the number of ways of selecting the other numbers such that $m < n$.

m	k	n
1	1	3^{10}
$3^{1/2}$	2	$3^{19/2}, 3^{10}$
3	3	$3^9, 3^{19/2}, 3^{10}$
$3^{5/2}$	4	$3^{17/2}, 3^9, 3^{19/2}, 3^{10}$
.		
.		
.		
.		
$3^{9/2}$	10	$3^{1/2}, 3^6, ..., 3^{10}$
3^5	10	$3^{1/2}, 3^6, ..., 3^{10}$
$3^{11/2}$	9	$3^6, 3^{13/2}, ..., 3^{10}$
.		
.		
.		
.		
3^9	2	$3^{19/2}, 3^{10}$
$3^{19/2}$	1	3^{10}

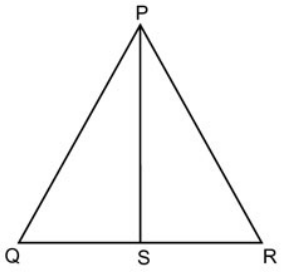
∴ The total number of ways of selecting two numbers from Y such that their product is greater than or equal to 3^{10}.
= (1 + 2 + 3 + ... + 10) + (10 + 9 + ... + 2 + 1)

$= 2 \times \frac{10(11)}{2} = 110$

Alternative Solution:
There are a total of 21 elements in the set S. The largest element, i.e., 3^{10}, can be paired with 20 other elements. The next largest element, i.e., $3^{19/2}$, can be paired with 18 other elements (not counting that with 3^{10}). Similarly 3^9 can be paired with 16 other elements, and so on. Hence a total of 20 + 18 + 16 + ... 2 (for $3^{11/2}$) = 110 ways.

Choice (D)

22.



Area of $\Delta PSR = \frac{1}{2}$ (PQ) (PR) sin ∠QPR

$= \frac{1}{2}(PQ)(PS)\sin\angle QPS + \frac{1}{2}(PS)(PR)\sin\angle SPR$ and RS bisects ∠QPR.
As ∠QPR = 60° ∠QPS = ∠SPR = 30°.
Hence

$\frac{1}{2}(6)(5)\sin 60° = \frac{1}{2}(6)(PS)\sin 30° + \frac{1}{2}(PS)(5)\sin 30°$ PS

$= \frac{30\sqrt{3}}{11}$ Choice (C)

23. Let the two digit number be '*xy*', which is 18 less than square of the sum of the digits.
∴ $10x + y = (x + y)^2 - 18$
⇒ $(x + y)^2 = (10x + y) + 18$
Since $10x + y$ is a 2 digit number, it can be at most 99.
∴ $(x + y)^2$ can be at most 99 + 18 = 117.
$(x + y)^2$ could represent all perfect squares below 117.
The possible two – digit numbers which are 18 less than 100, 81, 64, 49, 36, 25 are as follows:
$100 - 18 = 82 = (8 + 2)^2 - 18$
$81 - 18 = 63 = (6 + 3)^2 - 18$
$64 - 18 = 46 \neq (4 + 6)^2 - 18$
$49 - 18 = 31 \neq (3 + 1)^2 - 18$
$36 - 18 = 18 \neq (1 + 8)^2 - 18$
25 – 18 = 7 is not a two digit number.
∴ There exist only two such numbers, 82 and 63.

Ans: (2)

24. The difference between two quadratic expression can be a quadratic expression, a linear expression or a constant.
Let us consider the difference between $f(x)$ and $g(x)$
i.e, $f(x) - g(x) = ax^2 + bx + c$
∴ $f(1) - g(1) = a + b + c = 1$ ——(1)
$f(2) - g(2) = 4a + 2b + c = 2$ ——(2)
$f(3) - g(3) = 9a + 3b + c = 5$ ——(3)
(2) – (1) gives $3a + b = 1$ where as (3) – (2) gives
$5a + b = 3$
$3a + b = 1$ ——(4)
$5a + b = 3$ ——(5)
Solving (4) and (5), we get $a = 1$ and $b = -2$
Substituting $a = 1$ and $b = -2$ in eqn - (1) we get
$c = 1 - a - b$
⇒ $c = 1 - 1 - (-2)$
∴ $c = 2$
∴ $f(x) - g(x) = x^2 - 2x + 2$
∴ $f(4) - g(4) = (4)^2 - 2(4) + 2 = 10$ Choice (C)

25. A part of each of the 12 edges of the cube is retained as an edge in the remaining solid (given that each face is now an octagon). In addition, at each of the eight corners of the cube three new edges are formed due to the cuts.
Therefore, the total number of edges will be 12 + 3(8) = 36

Alternative solution:
Euler's result says that for any solid V + F = E + 2, where V, F and E denote the number of vertices, faces and edges of the solid. Now each cut at a corner gives one extra face and two extra vertices. Hence, F = 6 + 1 × 8 and V = 8 + 2 × 8.
⇒ E = F + V – 2 = 14 + 24 – 2 = 36 Choice (D)

26. Let the normal speed of the bird be u km/hr and the speed at which the wind blows be v km/hr.

$\frac{15}{u-v} - \frac{15}{u+v} = 9$ and $\frac{15}{2u-v} - \frac{15}{2u+v} = \frac{3}{2}$

Let $u = kv$

$\frac{1}{k-1} - \frac{1}{k+1} = \frac{3v}{5}$ ----- (1) and

$\frac{1}{2k-1} - \frac{1}{2k+1} = \frac{v}{10}$ ------- (2)

Dividing (1) by (2) we get $\left(\frac{2}{k^2-1}\right)\left(\frac{4k^2-1}{2}\right) = 6$

⇒ $4k^2 - 1 = 6(k^2 - 1)$ ⇒ $2k^2 - 5$ ⇒ $k^2 = 5/2$
Putting $k^2 = 5/2$ in (1),
we get $\frac{3v}{5} = \frac{2}{\frac{5}{2}-1} \Rightarrow v = \frac{20}{9} = 2\frac{2}{9}$ km/hr

Choice (B)

27. The volume of the mixture of A and C = V + 100 ml
The volume of the mixture of B and C = V + 100 ml
But the mixture of B and C has 5 ml more pure alcohol than A and C. For this 5 ml to translate into a 2 percentage point difference in concentration

∴ $(V + 100) = \frac{5}{2} \times 100$

⇒ V = 150 Choice (D)

28. The point P is not important here, but AB is a chord of length = $4\sqrt{6}$ cm (given).

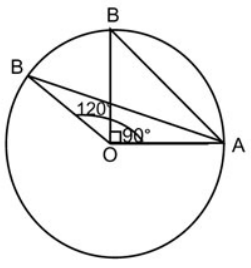
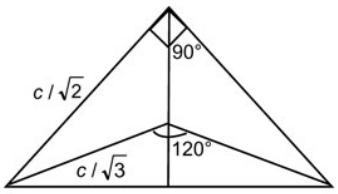


Fig A



For a circle of a given radius r, as the angle subtended by a chord at the centre increases from 90° to 120°, the chord length increases from $\sqrt{2}r$ to $\sqrt{3}r$.

For a chord of a given length c, as the angle subtended at the centre increases from 90° to 120°, the radius decreases from $c/\sqrt{2}$ to $c/\sqrt{3}$. As $c = 4\sqrt{6}$,

we get $\frac{4\sqrt{6}}{\sqrt{3}} < r < \frac{4\sqrt{6}}{\sqrt{2}}$ i.e. $4\sqrt{2} < r < 4\sqrt{3}$

i.e. $5.66 < r < 6.93$

Among the options, 6 is the only possible value.

Choice (C)

29. $[R(x) - (5x + 1)]\,[R(x) - (x - 4)]\,[R(x) - 2x] = 0$

$\therefore R(x) = 5x + 1$ or $x - 4$ or $2x$

If $R(x) = 5x + 1$, then $(x, (R(x)) = (1, 6)$, $(2, 11)$, $(3, 16)$, $(4, 21)$, $(5, 26)$, $(6, 31)$, $(7, 36)$, $(8\ 41)$, or $(9, 46)$. $\therefore$ There are 9 solutions.

If $R(x) = x - 4$, then $(x, R(x)) = (5, 1)$, $(6, 2)$, ...or $(50, 46)$. $\therefore$ There are 46 solutions.

If $R(x) = 2x$, then $(x, R(x)) = (1, 2)$, $(2, 4)$, ...or $(25, 50)$. $\therefore$ There are 25 solutions.

Total number of solutions = 9 + 46 + 25 = 80.

Ans: (80)

30. For $|x| - |y|$ to be maximum, $|x|$ must be maximum and $|y|$ minimum.

For $|x|$ to be maximum given $|2x - 5| \le 9$, $-9 \le (2x - 5) \le 9$

i.e., $-2 \le x \le 7 \Rightarrow |x| \le 7$ and $|y|$ can be zero, which still satisfies $|4y - 7| \le 21$.

(i.e., $|-7| \le 21$)

$\therefore$ maximum value of $|x| - |y| = 7 - 0 = 7$

Choice (A)

31. Let his cost price be ₹X and selling price be ₹Y.

If he purchased for 12% less then cost price will be 88% of X and if he sells at 24% more his selling price will be 124% of Y.

Given that

$$\frac{124\%Y - 88\%X}{88\%X} = \frac{5}{2}\left[\frac{Y - X}{X}\right]$$

$$\Rightarrow \frac{124Y}{88X} - 1 = \frac{5Y}{2X} - \frac{5}{2} \Rightarrow \frac{5Y}{2X} - \frac{62Y}{44X} = \frac{3}{2}$$

$$\Rightarrow \frac{48Y}{44X} = \frac{3}{2} \Rightarrow 16Y = 22X$$

$$\Rightarrow \frac{Y}{X} = \frac{11}{8}$$

$\therefore$ His actual profit percentage is $\frac{3}{8}(100\%) = 37.5\%$

Choice (D)

32. $N = 5 \times 10 \times 15 \times 20 \times \ldots\ldots 500$

$= 5^{100}(1 \times 2 \times 3 \times 4 \times \ldots 100)$

$= 5^{100} \times (2^{97} \times 5^{24} \times k)$

($\because$ Highest powers of 2 and 5 in 100! are 97 and 24 respectively, and k is an odd number.)

$\Rightarrow 5^{97} \times 2^{97} \times (k \times 5^{27})$

$N = (10)^{97} \times (k \times 5^{27}) \Rightarrow$ There are 97 zeros at the right end of N.

The first two non-zero digits from the right of N will be 25 or 75. ($\because k$ is odd). And therefore the first non-zero digit from the right will always be 5. Ans: (5)

33. Given that $x_1 + x_2 + x_3 + x_4 + x_5 = 35$

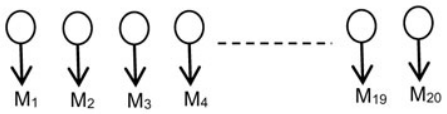
Also x_n is odd say $x_n = 2K_n - 1$ [$K_n \ge 1$]

$\Rightarrow 2K_1 - 1 + 2K_2 - 1 + 2K_3 - 1 + 2K_4 - 1 + 2K_5 - 1 = 35$

$\Rightarrow 2[K_1 + K_2 + K_3 + K_4 + K_5] = 40$

$\therefore K_1 + K_2 + K_3 + K_4 + K_5 = 20$

Imagine 20 marbles placed one beside the other



Now there will be 19 gaps between the marbles, out of which, if we select any 4 gaps, that will divide the marbles into 5 parts, corresponding to each boy.

Hence, the number of ways in which this can be done is $^{19}C_4$.

(Choice (A) can be eliminated as $^{39}C_4$ would be the number of ways, if there is no condition that each boy gets an odd number of marbles.)

Alternative solution:

Consider the even numbers among 1 to 39. If we select any two even numbers, say, 2 and 10, there will be an ODD number of numbers between them i.e., 3, 4, 5 ....., 8, 9 (> numbers).

Now, the task is to select even numbers from out of 2, 4, 6, ..., 36, 38, i.e., 19 even numbers. Hence, $^{19}C_4$.

Choice (B)

34. Clearly, logarithm to the base 1 is not defined, hence neither 'b' nor 'a' can be equal to 1. Choice (D) has $a = 1$. Hence choice (C) definitely cannot satisfy the equation.

Alternative Solution:

Given that

$a^{\log_b c} = c^{\log_a b}$

Consider logarithm to the base d on both sides where d > 0 and c ≠ 1.

$(\log_b c)\,(\log_d a) = (\log_a b)\,(\log_d c)$

$$\frac{\log_k c}{\log_k b} \times \frac{\log_k a}{\log_k d} = \frac{\log_k b}{\log_k a} \times \frac{\log_k c}{\log_k d}$$

$\log_k c\,[(\log_k a)^2 - (\log_k b)^2] = 0$

$\Rightarrow \log_k c = 0$ or $\log_k a = \pm(\log_k b)$

$\Rightarrow c = 1$ or $a = b$ or $a = \frac{1}{b}$

In the choices, except (C), i.e., (1, 2, 2), all other choices satisfy one or more of the above conditions.

Choice (C)

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