

(Key and Solutions for AIMCAT1810)

Key**SECTION – I**

1. 42513	7. C	13. 21534	19. C	25. A
2. D	8. 35142	14. 3	20. 4	26. D
3. C	9. 54132	15. A	21. B	27. 2
4. B	10. D	16. C	22. 13	28. 1
5. D	11. A	17. D	23. 35	
6. A	12. B	18. 1	24. C	

SECTION – II

1. 5	6. A	11. 2	16. B	21. A
2. B	7. D	12. A	17. C	22. C
3. C	8. C	13. 160	18. D	23. D
4. 2197300	9. 5	14. B	19. B	24. C
5. B	10. D	15. C	20. A	

SECTION – III

1. D	7. 600	13. 87	19. 1250	25. 70
2. D	8. A	14. -600	20. A	26. 2222
3. C	9. C	15. D	21. D	27. A
4. A	10. 2353	16. B	22. 35	28. D
5. A	11. C	17. C	23. 70	
6. D	12. 693	18. A	24. D	

Solutions**SECTION – I****Solutions for question 1:**

1. On a careful reading of the sentences, it can be observed that sentence 4 is a general sentence that begins the paragraph. It introduces the topic and establishes the background: Autism disability severely afflicted. Sentence 4 is followed by sentence 2. "disability and difficulty" in sentence 4 links with "struggle to communicate, anxious in situations and behave in repetitive ways that disturb others" in sentence 2. Sentence 2 is followed by sentence 5. "as children" in sentence 2 is followed by "As adults" in sentence 5. Sentence 1 which speaks about "therapies" follows sentence 5. "training an autistic child directly to behave in desirable ways" in sentence 1 mirrors "may behave in repetitive ways that disturb others" given earlier in sentence 2. Sentence 3 follows sentence 1. "All this" in sentence 3 connects with "Drugs have limited effects" and "the evidence they actually do so (work) is poor" in sentence 1. Sentence 3 concludes the para.
Ans: (42513)

Solutions for questions 2 to 7:**Number of words and Explanatory notes for RC:**

Number of words: 704

2. Refer to the last two paras. Semantics refers to the meaning of symbols, to what a symbol is about. Syntax

refers to the structure of a language (or a system of formal logic), semantics to its content. Syntax is the outside of a sentence, semantics its innards.

Option A: In all speech, Ben Johnson wrote, words and sense are as the body and soul. The sense is as the life and soul of language without which all words are dead. The dualism of body and soul may be unfashionable but the dualism of which Johnson speaks, the dualism of words and sense, is the one we cannot do without. Choice A is not the answer for the question. Choice A should have read: ... illustrates that the two cannot be separated, as in the case of body and soul. (Note: in the line in the last paragraph: ... The dualism of body and soul may be unfashionable, "Unfashionable" would only mean that it's not currently popular to think of them as 'one', and cannot extend to mean that they are not 'one').

Option B: A computer, when it computes, manipulates symbols. Its programme specifies a set of rules or algorithms, which tell it how to transform one set of symbols into another. But it does not specify what those symbols mean. Indeed, to a computer meaning is irrelevant. While choice B is true, it is not the reason for the question.

Option C: Perhaps in 50 years time, we will have unraveled the mysteries of neuronal connections, as Minsky and Kurzweil believe, and managed to build machines equally complex. We (or our children) will then wonder how humans could possibly have thought the brain too complex to comprehend. But choice C is not specifically connected to the question.

Option D: Charles Jonscher has questioned whether it is technically feasible to understand the human brain, let alone

- reproduce it in artificial form. A computer programme restructures the outside of a symbolic string, without worrying too much about what is on the inside. For humans, however, the inside is crucial. This shows that the human mind is unique and cannot be replicated. Choice D is the answer.
- Choice (D)
3. Charles Jonscher does not believe that a sentient machine can be made, others believe it can be made. Others agree that the distinction between mind and machine is blurred. Option A: For Daniel Dennett, 'Conscious human minds are more-or-less serial virtual machines implemented a suitably programmed robot, with a silicon based computer brain, would be conscious, would have a self. There would be a conscious self whose body was a robot and whose brain was a computer.' Option B: Ray Kurzweill concurs "By the third decade of the 21st century, we will be in a position to create complete, detailed maps of the computationally relevant features of the human brain and to re-create these designs in advanced neural computers...." Option D: Marvin Minsky argues that in time we will understand the structure of the human brain sufficiently well to reproduce it in machine form. So choices A, B and D form a group. Option C: Charles Jonscher strongly disagrees with such claims. He has questioned whether it is technically feasible to understand the human brain, let alone reproduce it in artificial form. He points to the complexity of the human brain as compared to the computer (in paras 3 and 4). According to Jonscher, the most powerful computers cannot compare with the simplest of living cells. Choice C is the answer.
- Choice (C)
4. The complexity of the human brain is discussed in paras 3 and 4 and the author's argument is highlighted in para 5. The author says that complexity in itself is not an argument against creating a thinking machine. Perhaps in 50 years time, we will have unraveled the mysteries of neuronal connections, as Minsky and Kurzweill believe, and managed to build machines **equally complex**. We will then wonder how humans could possibly have thought the brain too **complex** to comprehend. Choice B is the answer. Choice A is the opinion of one of the scientists quoted, and the remaining choices are far-fetched.
- Choice (B)
5. Option A: The human mind, Steven Pinker has written, is nothing but a system of organs of computation. For Daniel Dennett, 'Conscious human minds are more-or-less serial virtual machines implemented – **inefficiently** – on the parallel hardware that evolution has provided for us. Choice A is not the answer. Option B: Choice B is negated by the penultimate sentence of para 2. Option C: Choice C is beside the point and is not specific to the question. Option D: And if all the phenomena of human consciousness are explicable as just the activities of a virtual machine realized in the astronomically adjustable connections of a human brain, then a suitably programmed robot, with a silicon based computer brain, would be conscious, would have a self. There would be a conscious self whose body was a robot and whose brain was a computer. Choice D is the answer.
- Choice (D)
6. (a) – Jonscher believes that there exists a cultural divide between biology and computer science: "Computer engineers talk of matching the power of the brain. Biologists look into their microscopes and wonder if we have matched the computational power of a single one of its cells. "From this, we cannot say that biologists and computer engineers are at loggerheads with each other when it comes to establishing the supremacy of the brain over the computer and vice versa. So (a) cannot be inferred.
- (b) – Marvin Minsky argues that in time we will understand the structure of the human brain sufficiently well to reproduce it in machine form. ...Perhaps in 50 years time, we will have unraveled the mysteries of neuronal connections, as Minsky and Kurzweill believe, and managed to build machines equally complex. So (b) is true. (c) – What does the distinction between syntax and semantics means for the question of machine sentience? A computer, when it computes, manipulates symbols. Its programme specifies a set of rules or algorithms, which tell it how to transform one set of symbols into another. But it does not specify what those symbols mean. Indeed, to a computer meaning is irrelevant. A computer programme restructures the outside of a symbolic string, without worrying too much about what is on the inside. For humans, however, the inside is crucial. Statement (c) can be understood. (d) – (d) is extreme. In 50 years time, we will have managed to build machines equally complex. We (or our children) will then wonder how humans could possibly have thought the brain too **complex** to comprehend. We cannot say that the brain adds meaning to **EVERYTHING** given to it. Hence statements (b) and (c) are correct.
- Choice (A)
7. The penultimate para provides a distinction between syntax and semantics. These terms are defined in the penultimate para. Semantics refers to the meaning of symbols, to what a symbol is about. Syntax refers to the structure of a language (or a system of formal logic), semantics to its content. The last para begins with the question: What does the distinction between syntax and semantics means for the question of machine sentience? The last para leads us to understand that when we communicate, we communicate meaning but to a computer, meaning is irrelevant. Hence choice C is the answer.
- Choice (C)

Solutions for question 8

8. On a careful reading of the sentences, it can be observed that sentence 3 is a general sentence that begins the paragraph. It introduces the topic and establishes the background: Ask some Germans how people should react to terrorism. Sentence 3 is followed by sentence 5. "heroic calmness (which is the attitude of the Germans)" in sentence 3 contrasts "declaration of wars on terrorism and near-permanent states of emergency (which is the attitude of/ stance adopted by other countries)" in sentence 5. The pronoun 'they' in sentence 5 (they say) refers to "some Germans" in sentence 3 (Ask some Germans). The first two sentences 3 and 5 (given in simple present tense) set the tone for the rest of the para where the author explains that Germans are trying to stay balanced in spite of recent provocation. Sentence 5 is followed by sentence 1. "that talk was cheap" in sentence 1 refers to what "they say" in sentence 5. Also "major incidents struck America, France, Turkey and other countries" in sentence 1 links with "let other countries declare war on terrorism" in sentence 5. So, 351. Sentence 4 follows sentence 1. "That changed Germany suffered Munich and elsewhere" in sentence 4 contrasts "Germany which had been spared major incidents of the sort that have struck America, France, Turkey and other countries" in sentence 1. So, 3514. Sentences 1 and 4 are given in simple past tense. Sentence 2 with the contrast conjunction 'but' concludes the para. The 'but' in sentence 2 means that the sentence remains relevant till the present. The 'but' would indicate that, in spite of recent provocation, mentioned in sentence 4, the Germans remind themselves that they should remain balanced. Sentence 2 uses the present perfect tense. It makes a statement about Germany's lessons from history (remaining so till the present). "not to over-react" in the conclusion sentence 2 also mirrors the introduction sentence 3 ("how people should react to terrorism best attitude is heroic calmness"). So, 35142.

Ans: (35142)

Solutions for question 9:

9. 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 and establishes the background: Workers digging struck upon one of the greatest archaeological discoveries in the world. Sentence 5 is followed by sentence 4. "Workers digging" in sentence 5 links with "the diggers notified" in sentence 4. "The site" in sentence 4 links with "a well outside the city of Xi'an, China" in sentence 5. "government archaeologists" in sentence 4 points to "archaeological" in sentence 5. Sentence 1 follows sentence 4. "They" in sentence 1 points to "government archaeologists" in sentence 4. "They found not one, but thousands of clay soldiers" in sentence 1 (discovery by the government archaeologists) contrasts "a life-size clay soldier poised for battle" mentioned earlier in sentence 5 (discovery by the workers digging a well). So, 541. Sentence 3 gives additional details about the clay soldiers and follows sentence 1. Sentence 2 concludes the paragraph by telling us about the purpose of the army of clay soldiers. "The terra-cotta army elaborate mausoleum or form of funerary art" in sentence 2 refers to "soldiers who are in trenchlike, underground corridors" given in sentence 3.

Ans: (54132)

Solutions for questions 10 to 12:**Number of words and Explanatory notes for RC:**

Number of words: 431

10. Refer to the second paragraph. Social aesthetics starts with a consideration of the extent to which one's membership in community – one's social identity – shapes one's approach to art appreciation. This approach is exemplified by French sociologist Pierre Bourdieu.

Option A: The net effect of Bourdieu's intervention is **repudiation** of a universalist aesthetic hierarchy in which the cultural preferences of the elite class are judged as better than those of the working class. So choice A is not correct.

Option B: French sociologist Pierre Bourdieu's critical rebuttal of Kantian aesthetics on the grounds that "taste" is not a universal trait which identifies a single standard of artistic merit but is instead indexed to one's class position. Bourdieu argues that what we find beautiful is indeed demonstrably shaped by our class positions and trajectories. Choice B is distorted.

Option C: "taste" is not a universal trait which identifies a single standard of artistic merit but is instead indexed to one's class position. Hence choice C is not true.

Option D: Bourdieu argues that what we find beautiful is indeed demonstrably shaped by our class positions and trajectories. This reveals aesthetic preferences as socially-inflected. , in favor of a relativist indexing of artistic productions to class positions. Choice D is the answer.

Choice (D)

11. Option A: Social aesthetics starts with a consideration of the extent to which one's membership in community – one's social identity – shapes one's approach to art appreciation. This approach is exemplified by French sociologist Pierre Bourdieu. Bourdieu argues that what we find beautiful is indeed demonstrably shaped by our class positions and trajectories. Hence choice A is the answer.

Option B: While the research into musical tastes that explicitly engages the notion of class is being done in the European context, it is not hard to see how this discourse asserts itself in American accounts of taste. When one considers para 3, one sees that the author indicates that connections similar to those made in Europe can be observed in America too, where education and income levels are the measures of 'class' and 'social structure'. So, choice B is incorrect.

Option C: Bourdieu argues that what we find beautiful is indeed demonstrably shaped by our class positions and

trajectories. This reveals aesthetic preferences as socially-inflected. The converse of this point of view as given in choice C is not true. Choice C is incorrect.

Option D: While the first part of choice D is true about jazz music from a reading of the last para of the passage, the second part is not entirely true. There is a link between artistic taste and education/ income levels. There is no specified link between the whole spectrum of social identity and education/ income levels. Choice D in any case does not form the central idea of the passage.

Choice (A)

12. Option A: The author's style is not contentious (causing or likely to cause an argument; controversial) nor is it critical (expressing adverse or disapproving comments or judgements). Choice A is not the answer.

Option B: The author explains in a descriptive style how social classes and trajectories influence cultural preferences and discusses French sociologist Pierre Bourdieu's stance in this regard. The author also explains how music tastes in America are linked to education and income levels, which appear in the American lexicon as stand-ins for the concept of class. Choice B is the answer.

Option C: The author of the passage does not get involved in any deliberation, close inspection or reconsideration of views or facts. So 'reflective' and 'scrutinizing' are incorrect as choices.

Option D: If the passage had limited itself to a discussion of one person's views alone, either Bourdieu's or the author's, then it could have been termed as 'pedagogic' or 'scholarly'. Choice D is not the answer. The passage explains Bourdieu's argument and considers its relevance.

Choice (B)

Solutions for question 13:

13. On a careful reading of the sentences, it can be observed that sentence 2 is a general sentence that begins the paragraph. It introduces the topic and establishes the background: For climate researchers, forams are doubly valuable. Sentence 2 also tells us what forams are. Sentence 2 is followed by sentence 1. Sentence 1 tells us the first reason that forams are valuable. So "doubly valuable" in sentence 2 links with "First, regardless of their age" in sentence 1. Sentence 1 is followed by sentence 5. "the ratio within them of two stable isotopes of oxygen (16O and 18O)" in sentence 1 links with "cause water molecules containing different oxygen isotopes to evaporate from the sea at different rates" in sentence 5. "what the average temperature was when they were alive" in sentence 1 links with "different temperatures what gets left behind is what the shells are formed from" in sentence 5. Sentence 5 is followed by sentence 3. Sentence 3 (second ...) tells us the second reason that forams are valuable. "the ratio of an unstable, and therefore radioactive, isotope of carbon (14C) to that of stable 12C" in sentence 3 parallels "the ratio within them of two stable isotopes of oxygen (16O and 18O)" given earlier in sentence 1. "indicates when they were alive" in sentence 3 is the second reason that forams are valuable. So sentence 3 (what the average temperature was when they were alive) and sentence 1 (when they were alive) explicitly state the usefulness of forams to climate researchers. Sentence 4 concludes the para. So, 21534.

Ans: (21534)

Solutions for question 14:

14. On a careful reading of the sentences, it can be observed that sentence 2 is a general sentence that begins the paragraph. It introduces the topic: ironclad consensus in the techno-societies about the future of freedom. Sentence 2 is followed by sentence 4. "future of freedom" in sentence 2 links with "Maximum individual choice" in sentence 4. Sentence 5 follows sentence 4 with the contrast conjunction 'yet'. "this ideal" in sentence 5 points to "the democratic ideal" in sentence 4. "we shall move further and

further from this ideal" in sentence 5 contrasts "maximum individual choice is regarded as the democratic ideal" in sentence 4. Sentences 5 and 1 form a mandatory pair. "They conjure up" in sentence 1 points to "most writers predict" in sentence 5. Also "standardised goods, standardised schools, standardised mass culture, standardised styles of life" in sentence 5 contrasts "maximum individual choice" in sentence 4. So, 2451. Sentence 3 is the odd sentence out. It needs a precedent and further elaboration. "this syllogism" needs further substantiation.

Ans: (3)

Solutions for Questions 15 to 17:

Number of words and Explanatory notes for RC:

Number of words: 526

15. The idea is that the consequences of policy should not privilege any conception of the good or conceptions of ultimate values. This conception, which has been attributed to some liberals, is incoherent. Through examples, the author reiterates that a policy of indifference would necessarily privilege one side or the other, as there is no third way. Hence a policy outcome cannot clearly be neutral as it is bound to favour one or the other side of the divide in any contested area of public policy. Choice A is the answer. Option B: Choice B may be the fallout of what is mentioned in para 2 but it is not a statement about the error in ideology.

Option C: Choice C may seem a cliché but is inadequate as an answer as it does not indicate what the impracticability is (This is done in choice A).

Option D: This is a distortion of the author's statement about a liberal policy of toleration (not of neutrality): A liberal policy of toleration has the effect of privileging the views of tolerant liberals over those of non-tolerant non-liberals. Liberal egalitarians are more concerned with neutrality in justification.

Choice (A)

16. Option A & D: Choices A and D cannot be inferred from the passage. These do not refer to the expression mentioned in the passage.

Option B: Choice B is incorrect. The expression "neutral about ultimate ends" in the passage means the ends delivering no particular privilege to anyone.

Option C: Choice C is the most correct. "Because the liberal state does not take a substantive view neutral about ultimate ends." It does not presuppose any basic values or conceptions of the good.

Choice (C)

17. Option A: If people are allowed to enter the agreement with full knowledge of their own position in society, then they will have a tendency to bargain to maximize their own advantage. The author also refers to the bias of 'self-preference'. Choice A can be inferred.

Option B: Liberalism does take a view on the core ethical significance of individuals (para 3). Liberalism must give priority to equality of concern and the idea of the separatedness of persons – that individuals have ultimate moral significance and cannot be sacrificed for the good of others (para 4). Choice C can be inferred.

Option C: Rawls' basic intuition is that fairness or impartiality can be achieved by combining ignorance with self-interest. If we do not know who we are, but we are motivated to improve our condition in life, we will choose Rawls' principles of justice. Choice C is correct.

Choice (D)

Solutions for question 18:

18. 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: The birth of a new fact. Sentence 5 is followed by sentence 4. "wonderful thing to experience" in sentence 5 links with "wonderful 'discovery'" in sentence 4. Sentence 4 tells us why the birth of a new fact should be referred to as a 'discovery': it has an

existence independent of anyone's awareness of it. Sentence 3 follows sentence 4. "When it comes along" in sentence 3 links with "existence independent of anyone's awareness of it" in sentence 4. Sentence 3 is followed by sentence 2. "it always has, at first, a low value" in sentence 3 is followed by "its value increases, either slowly or rapidly, or the value wanes and the fact disappears" in sentence 2. Sentence 2 concludes the para. So, 5432. Sentence 1 which relates 'value' with 'structure' is the odd sentence out. It will need a precedent and more substantiation.

Ans: (1)

Solutions for Questions 19 to 21:

Number of words and Explanatory notes for RC:

Number of words: 556

19. Option A: Like the Monetarists, Rational Expectations proponents believe that stabilization policy is destabilizing and inflationary. However, by asserting that only unexpected changes in monetary policy have real effects, Choice A is incomplete and is not specific to the question.

Option B: Choice B is negated by the last two sentences of the fourth para of the passage: especially in terms of explaining the source of large economic contractions such as the Great Depression.

Option C: However, by asserting that only unexpected changes in monetary policy have real effects, the Rational Expectations model raises significant questions about how monetary policy can be the primary source of business cycles in a world where economic information is widely available ... The Rational Expectations model, with its assertion that only unexpected changes in policy can have rare effects on output, both supports and diverges from the Monetarist model. Hence choice C is the answer.

Option D: "in a world where economic information is widely available" in the last sentence of the fourth para makes choice D incorrect. Choice D is not specific to the question.

Choice (C)

20. Choice 1 is incorrect. In para 2, the Keynes/ Keynesian and Monetarist models, agree that fluctuations in aggregate demand are the source of business cycles.

Choice 2 is incorrect. In para 4, The Rational Expectations model, with its assertion that only unexpected changes in policy can have rare effects on output ... In the last para, laissez-faire policies are preached by Real Business Cycle economists.

Choice 3 is incorrect. It presents an inversion of ideas in the first few lines of para 2.

Choice 4 is correct. Monetarists believe that control destabilizes and laissez-faire policies are preached by Real Business Cycle economists. On the other side, the Keynesians and The Rational Expectationists both believe that government intervention does play a positive role, though in different ways.

Choice 5 is incorrect. It is the contradiction of the idea of laissez-faire.

Ans: (4)

21. Refer to para 1. However, the best way to judge our understanding of recessions and depressions, just like the best way to judge economies themselves, is to evaluate their long-run record of growth. By this measure there has been real and significant progress. All one has to do is look back at the first models of business cycles, which centered around things such as sun spots and weather fluctuations, to understand just how far the study of economic contractions has come. These early models were simple and focussed on a single cause of business cycles. Hence choice B is the answer. The yawning gap between these models and the latest models show the progress achieved in our understanding of the cause of the business cycles.

Choice (B)

Solutions for questions 22 and 23:

22. The usage of the word 'hit' is incorrect in sentences (1) and (3). In sentence 1, "hit at me" is incorrect. One should say "hit me" (The reason for his moody behaviour hit me). This means "to become suddenly apparent to (a person)". In sentence (3), 'hit it out' is incorrect. The correct usage is "hit it off". This implies to become immediately compatible, to get along.
The other sentences have the correct usage of the word 'hit'.
In sentence (2), "score a hit" is an idiom which means to make a favourable impression. "hitting the high points" is an idiom which means to direct attention to the most important points or places.
In sentence (4), "hit the nail on the head" is an idiom which means "to be absolutely right".
In sentence (5), "hit the town" means "to land on or arrive in".
Ans: (13)
23. The usage of the word 'turn' is incorrect in sentences (3) and (5). In sentence (3), 'turn the scales' is a wrong idiom. It should be replaced by 'tilt the scales' which means "offset the balance of the situation". "done him an ill turn" is another idiom which means "a deed or action having a good or bad effect on another".
In sentence (5), "cooked by a turn" is incorrect. We should say "cooked to a turn". This idiom is usually used for solid foods and means "cooked to a right degree".
The other sentences have the correct usage of the word 'turn'.
In sentence (1), the phrasal verb 'turn to' means "begin to work".
In sentence (2), 'turn a hair' is an idiom which means "become afraid".
In sentence (4), 'turn of phrase' is an idiom which means "distinctive style of expression or idiom"
Ans: (35)

Solutions for Questions 24 to 26:**Number of words and Explanatory notes for RC:**

Number of words: 515

24. The paragraph initially dwells on the interrelationship between language and thought and then goes on to discuss the multifarious functionalities and usefulness of language. The paragraph is all praise of language and there is no negative aspect related to the influence of language in the paragraph. The penultimate sentence of the para focuses on "understanding and knowledge" and "theorize or make predictions about matters they would otherwise be completely unable to grasp". So choice C (escape cognitive imprisonment) aptly concludes the paragraph by linking with the penultimate sentence and summarizing the main points about language.
Option A: Choice A digresses to a new viewpoint but this has been negated by the sentence "Language enables one to imagine counterfactual objects, events, and states of affairs; it is intimately related to intentionality". So, Language is related to intentionality. We cannot say that language can hence be used to separate imagination from intentionality. Choice A cannot complete the first para of the passage.
Option B: Choice B, even if presented with the contrast conjunction 'but' cannot close the paragraph as it is negative by nature. Reasons and explanation would need to be given for the point mentioned in choice B.
Option D: Choice D is out of scope of the discussion relevant to the given paragraph. It is not at all related to the penultimate sentence in the paragraph. It needs a precedent and more substantiation. The first sentence of para 3 has this line of thought.
Ans: (C)
25. Refer to the second para.
Option A: Systems of representation, "maps" or "models" of

the world, can be encoded in nonlinguistic form. Similarly, among human adults, artistic or musical thought does not demand specifically linguistic expression: it may be purely visual or auditory. Whatever may be the powers of nonlinguistic representation that human adults share with human infants and some other animals, those powers are immensely increased by the use of language. Choice A can be inferred.

Option B: Choice B may seem true but has not been specifically mentioned in the second para. It is incomplete and not reflective of the reasonable hypothesis regarding the connection between language and thought mentioned in para 2.

Option C: Choice C may be reason for the author to say: Language can be potentially misleading as evident from the misinterpretation of political statements, works of literature, legal documents, and scientific treatises. Choice C cannot be deduced from the second para.

Option D: Choice D is negated from the explanation given for choice A. Choice D is extreme and incorrect.

Ans: (A)

26. Option A: The rapid development of modern mathematical logic similarly inspired the idea of a language in which grammatical form would be a sure guide to meaning, so that the inferences that could legitimately be drawn from propositions would be clearly visible on their surface. But this is not "According to the author". Also "Confucius held that when words go wrong, there is no limit to what else may go wrong with them; "the civilized person is anything but casual in what he says. This view is often associated with pessimism about the usefulness of natural language as a tool for acquiring knowledge." Choice A cannot be inferred to be the author's view.

Option B: It has also inspired efforts by some linguists to construct an "ideal" language, one that would be semantically or logically "transparent." Gottfried Wilhelm Leibniz envisioned a "universal characteristic" that would enable people to settle their disputes through a process of pure calculation, analogous to the factoring of numbers. Choice B cannot be inferred to be the author's view.

Option C: Outside philosophy there have often been calls for replacing specialized professional idioms with "plain" language, which is always presumed to be free of obscurity and therefore immune to abuse. George Orwell, Again choice C is not the author's viewpoint.

Option D: The author does not comment on what ideal language is according to him. He discusses the views of other people but his own views are not mentioned in the passage. Choice D is the answer.

Ans: (D)

Solutions for questions 27 and 28:

27. Choice 1 is a summary of the paragraph and seems like a repetition rather than a sentence that logically connects two other sentences. Though choice 3 contains a description of what the physical world consists of, it does not connect with the next sentence. Choice 4 is completely out of context. Choice 5 mentions some scientific technicalities related to what happens during meditation. But choice 5 does not connect well with the last sentence of the paragraph. The use of the pronoun 'we' in choice 2, in the sentence before and after the blank tends to give the paragraph a logical connection. The preceding sentence talks about 'cutting off the senses'. Choice 2 mentions what these senses are – sight, hearing, taste, touch and smell. Choice 2 is the correct answer.

Ans: (2)

28. 'Loquacious' (choice 2) means 'talking excessively about inane matters'. Capricious (choice 5) means "given to sudden and unaccountable changes of mood or behaviour, variable, inconsistent and fitful". Since the paragraph is about a popular radio show host, these can be eliminated. Also while 'conservative' may be used to describe the host of the radio show, 'reestablish' cannot fit in for the second blank given that 'helped establish' has been mentioned in the latter half of the sentence. So choice 3 is eliminated.

Also 'heterodoxical' which indicates dissent, dissidence, heresy, nonconformity does not fit the context. Hence we can eliminate choice 4. Upon reading the paragraph, we can infer that the second blank is best filled by a synonym of 'elicit' which means to evoke or draw out a reaction or answer from someone. That word is 'educe'. 'Educe' means to bring out or develop (something latent or potential). 'Evince', meaning, 'prove' or 'show clearly' or 'indicate' as given in choice 4 is contextually inappropriate. Thus, the blanks in the paragraph can be best filled by (volute educe). The correct answer is choice (1).

Ans: (1)

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

SECTION – II

Solutions for questions 1 to 4:

If the population (or number of literates) was at least 20000, he wrote it in thousands and if it is less than 20000, he wrote it in hundreds.

Any value in the table, which is more than 200, will be greater than 20000, whether it is considered in hundreds or thousands. Hence, any value which is greater than 200 is definitely being represented in thousands.

For District 1, the population must be 1,560,000 and the number of literates must be 280,000.

Similarly, we can determine the population and the number of literates for District 3, District 5, District 6 and District 9.

For District 2, the population can be $150 \times 100 = 15000$ or $150 \times 1000 = 150,000$. However, the number of literates can be 18,000 or 180,000. In either case, the population cannot be 15,000. Hence, the population of District 2 must be 150,000 and the number of literates must be 18,000.

For District 4, the population can be 18,000 or 180,000. The number of literates can be 19,500 or 195,000. In either case, the population cannot be 18,000. Hence, the population is 180,000 and the number of literates is 19,500.

For District 7, the population can be 10,000 or 100,000. The number of literates can be 35,000 or 350,000. In either case, the population cannot be 10,000. Hence, the population is 100,000 and the number of literates is 35,000.

For District 8, the population can be 19000 or 190,000. The number of literates can be 15,000 or 150,000. In this case, we cannot determine the population and the number of literates accurately.

In District 10, the population can be 19,500 or 195,000. The number of literates can be 19,800 or 198,000. Hence, the population must be 195,000 and the number of literates must be 19,800.

The following table provides the population, number of literates and literacy rate for each district (with all the possibilities for District 8):

District	Population	Number of Literates	Literacy Rate
District 1	1,560,000	280,000	17.95%
District 2	150,000	18,000	12%
District 3	1,240,000	380,000	30.65%
District 4	180,000	19,500	10.83%
District 5	1,210,000	480,000	39.67%
District 6	560,000	350,000	62.5%
District 7	100,000	15,000	15%
District 8	190,000/19,000	150,000/15,000	78.95%/7.895%
District 9	1,100,000	620,000	56.36%
District 10	195,000	19,800	10.15%

- Five districts – District 2, District 4, District 7, District 8 (in either case) and District 10 – have less than 180,000 literates.
Ans: (5)
- We can ignore District 8 as it does not satisfy the given condition. Among the other districts, District 10 has the sixth highest number of literates. Choice (B)

3. The number of literates in District 2 must be lower than that in District 8. Hence, the number of literates in District 8 must be 150,000. In this case, the least literacy rate is 10.15% for District 10. Choice (C)
4. The total number of literates across all the ten districts is at least 2,197,300. Ans: (2197300)

Solutions for questions 5 to 8:

From the teams given above, we can see that If A is in a team, then J and K are not in the team. If B is in the team, F is the only player who is not in the team. If C is in the team, D and H are not in the team. If D is in the team, C and K are not in the team. If E is in the team, no one is out of the team. If F is in the team, B and K are the only persons not in the team. If G is in the team, no one is out of the team. If H is in the team, C and K are not in the team. If I is in the team, K is the only person not in the team. If J is in the team, A is the only person not in the team. If K is in the team, A, D, F, H and I are not in the team. For E and G, no one is out of the team when they are part of the team. This is possible only if they are both Point Guards. If they are of any other type, at least one person must not be in the team with them. For each of the other types, two players are available, out of which one is selected. Hence, for each of the other types, if one of the two players is present, the other must definitely not be present. Since this is not the case for each of E and G, they must be Point Guards.

In Team 2 and Team 4, both E and G are present. Hence, anyone who is a part of these two teams cannot be Point Guards.

Therefore, A, B, C, F, I, J and K cannot be Point Guards.

Since B is not a Point Guard, B must be of a type in which there are exactly two players. If B is in the team, one of the other players (who is of the same type as B) must definitely not be in the team. If B is in the team, F is the only one who is not in the team. Hence, B and F must be of the same type. (Consider the case that B and F are of different type. In this case, B is in the team with everyone else except F. Hence, none of them can be the same type of player as B.)

Similarly, if I is part of the team, K is not a part of the team. Hence, I and K must be of the same type.

If J is in the team, A is not in the team. Hence, J and A must be of the same type.

The third Point Guard can only be D/H. If D is the third Point Guard, C and H must be of the same type. If H is the third Point Guard, C and D must be of the same type.

Therefore, the following combinations are possible: (A,J); (I,K); (B,F); (C,D/H); (E,G,H/D)

5. E is a Point Guard. Choice (B)
6. A and J are of the same type. Choice (A)
7. In the given case, A or J or I or K can be the Centre. Hence, the answer is option D. Choice (D)
8. Players who were picked in three teams are E, G and I. Of these three, I is the only player who can be a Centre (as E and G are Point Guards). If I is a Centre, K must also be a Centre. Choice (C)

Solutions for questions 9 to 12:

Let 1 to 7 represent the relative positions of the seven persons.

Given that no two doctors were standing next to each other. From (iii), C was standing behind at least two doctors. Hence, C

cannot be at 1 or 2. Further, the two doctors in front of C cannot be adjacent to each other. Hence, they will need at least three places. Therefore, C cannot be at 3 as well.

From (ii), G is a doctor and is standing behind a female. Since no two doctors are adjacent to each other, G must be standing behind a female engineer. Also, there can only be one female engineer and one female doctor (from (i)). From (ii), C must be in front of this female engineer.

Hence, G, the female engineer and C must be one behind the other with C in front.

Since C cannot be at 1/2/3, C can be at 4/5. G can be 6/7.

Also, E is not standing in front of an engineer (from (iii)). Hence, E must be between two doctors, with F immediately in front. As C is standing behind at least two doctors, C must be behind E and the two doctors adjacent to E.

From (iv), the number of persons between B and D must be 2. If C is at 4, G must be at 6. E must be at 2 and F must be at 1. There must be another doctor at 3. In this case, there cannot be two persons between B and D. Hence, this case is not possible.

Therefore, C is at 5 and G is at 7. In this case, F and E can be at (1, 2) OR (2, 3).

If they are at (1, 2), B and D must be at 3 and 5 respectively. In this case, B, F and G are the three doctors and none of the three will be standing between B and D. Hence, this is not possible.

If F and E are at (2, 3), B and D must be at 1 and 4 respectively. A must be at 6 and must be a female engineer. Since E is standing between two doctors, he must be an engineer. Also, as A is a female engineer, A must be a male engineer. Similarly, B is also a male engineer (since there are three doctors, and one female engineer). Between B and D, there is one male engineer (i.e., E). Hence, there must be a female doctor between the two. The other person standing between them is F and must be a female doctor. D must be a male doctor and C, a male engineer. Hence, this case is possible.

Hence, only one case is possible and this is presented in the following table:

Position	Person	Gender	Profession
1	B	Male	Engineer
2	F	Female	Doctor
3	E	Male	Engineer
4	D	Male	Doctor
5	C	Male	Engineer
6	A	Female	Engineer
7	G	Male	Doctor

9. Five persons are standing behind F. Ans: (5)

10. A is the female engineer. Choice (D)

11. The only two doctors of the same gender are D and G. There are two persons standing between them. Ans: (2)

12. B is standing immediately next to the female doctor, F. Choice (A)

Solutions for questions 13 to 16:

13. To minimize the toll paid, a person must not visit the same city twice. For travelling from B to G, the following routes are possible:

B-D-F-G; B-D-F-C-G; B-D-F-E-C-G; B-D-E-F-G; B-D-E-C-G; B-D-E-F-C-G; B-D-E-C-F-G; B-A-C-G; B-A-C-E-F-G; B-A-C-E-D-F-G; B-A-C-F-G;

Since we are minimizing the toll, we can eliminate a few routes. For example, F-G is less costly than F-C-G and F-E-C-G. Similarly, E-F-G is less costly than E-C-G, E-F-C-G and E-C-F-G. Similarly, C-G is less costly than C-E-F-G, C-E-D-F-G and C-F-G.

The tolls for the remaining routes are given below:

B-D-F-G— 170

B-D-E-F-G — 160

B-A-C-G — 180

Hence, the minimum toll that a person has to pay for travelling from B to G is ₹160. Ans: (160)

14. By observation, we can see that the shortest route from A to F is A-B-D-F. The minimum distance that a person has to travel = 27 km
Choice (B)
15. The following table provides the possible routes between A and G, along with the distance and toll for each route:

Route	Distance	Toll	Expenditure per km
A-B-D-F-E-C-G	58	370	6.38
A-B-D-E-F-C-G	63	330	5.24
A-B-D-E-C-F-G	73	340	4.66

Hence, the lowest Expenditure per km is 4.66.
Choice (C)

16. Since he has only ₹120 with him, he can reach C, G, E, B, D.
To travel to C, he has to travel for 19 km. Hence, this is possible.
To travel to G, he has to travel for 32 km. Hence, this is not possible.
To travel to E, he has to travel for 31 km (along A-C-E). Hence, this is possible.
He can travel to B and D by travelling for 8 km and 17 km respectively.
Hence, he can reach four cities – C, E, B and D.
Choice (B)

Solutions for questions 17 to 20:

Given that the revenue of the company in 2016 = ₹254 mn
The revenue of the company in 2015 = Revenue in 2016 - DR1 of 2016 = 254 - 4 = 250
Similarly, we can find the revenues of the company in each year from 2010 to 2016.

Revenue of the company in 2014 = Revenue in 2015 - DR1 of 2015 = 250 - 12 = 238

Revenues of the company in 2013, 2012, 2011 and 2010 are 242, 246, 237 and 232 respectively.

We can find the revenues in the previous years using the values of DR2, DR3, DR4 and DR5.

DR5 in 2011 = 9.

Hence, DR4 in 2010 = DR4 in 2011 - DR5 in 2011 = 6 - 9 = -3.

DR3 in 2010 = DR3 in 2011 - DR4 in 2011 = 10 - 6 = 4

DR3 in 2009 = DR3 in 2010 - DR4 in 2010 = 4 - (-3) = 7

DR2 in 2010 = DR2 in 2011 - DR3 in 2011 = -8 - 10 = -18

DR2 in 2009 = DR2 in 2010 - DR3 in 2010 = -18 - 4 = -22

DR2 in 2008 = DR2 in 2009 - DR3 in 2009 = -22 - 7 = -29

DR1 in 2010 = DR1 in 2011 - DR2 in 2011 = 5 - (-8) = 13

Solutions for questions 21 to 24:

From (iii), Scroll can be ranked 1/2 in Processor Speed.

From (ii), Leaf received a different rank in each parameter.

From (iv), Leaf was ranked worse than Scroll in all parameters except Rear Camera. Leaf must have been ranked first in Rear Camera. Only then Scroll will be ranked better than Leaf in all the other parameters.

Year	Revenue (in ₹mn)
2006	53
2007	135
2008	188
2009	219
2010	232
2011	237
2012	246
2013	242
2014	238
2015	250
2016	254

17. Average revenue per year from 2006 to 2010

$$= \frac{53+135+188+219+232}{5} = 165.4$$

Choice (C)

18. With the value of DR5 in 2010, we can find the revenue of one more year, i.e., revenue in 2005. It is not possible to find the revenue in 2004 with the given data.

Choice (D)

19. DR2 of 2006 = DR1 of 2006 – DR1 of 2005.

Since DR2 and DR1 in 2006 are the same, DR1 of 2005 will be zero.

Similarly, we get that the DR2, DR3, DR4 and DR5 of 2005 will be zero.

Also, since DR4 of 2005 is zero, DR3 of 2004 will also be 0.

DR3 of 2004, 2005 will be zero.

DR2 of 2003, 2004, 2005 will be zero.

DR1 of 2002, 2003, 2004, 2005 will be zero.

Hence, the revenue of the company from 2001 to 2005 will be the same.

Choice (B)

20. Let the revenue of the company in 2005 be x. Since revenue in 2006 was 53, DR1 in 2006 will be 53 - x.

DR2 of 2007 = 82 - (53 - x)

DR3 of 2008 = -29 - (82 - (53 - x))

DR4 of 2009 = 7 - (-29 - (82 - (53 - x)))

DR5 of 2010 = -3 - (7 - (-29 - (82 - (53 - x))))

= -3 - 7 - 29 - 82 + 53 - x = -68 - x

Since $x \geq 0$, DR5 must have a maximum value of ₹-68 mn.

Choice (A)

From (v), Flat was ranked fifth in Rear Camera. Flat was ranked better than Scroll and Sheet in Screen Size and Front Camera, but was not ranked first in these two parameters. Hence, Flat can be ranked 2/3 in these parameters. Scroll and Sheet cannot be ranked 1/2 in these parameters. Since Leaf has worse rank than Scroll, Leaf must also be ranked worse than Flat in Screen Size and Front Camera. Hence, Flat must be ranked second in these two parameters. Leaf can be ranked only 4/5 in these parameters. From (iv), Sheet was ranked better than Scroll in Screen Size. Hence, Sheet must be ranked third, Scroll fourth and Leaf fifth. Since Flat is ranked second in Front Camera, Scroll and Sheet must be ranked third and fifth in any order. But Sheet is ranked 3rd in Screen Size. From (i), Sheet cannot be ranked 3rd in Front Camera. Hence, Scroll must be ranked 3rd and Sheet must be ranked 5th in Front Camera.

Since rank of Leaf in the five parameters are distinct, Leaf must be ranked fourth in Front Camera, in any order, and it must be ranked 2 and 3 in Processor Speed and Battery Life in any order. In Screen Size and Front Camera, only Paper can be ranked 1st. Hence, Paper is ranked first in each of Screen Size and Front Camera. From (ii), Paper cannot be ranked first in any other parameter. From (i), two models were not ranked first in any parameter. Hence, the other three models must be ranked first in the five parameters. But from (ii), no model received the same rank in more than two parameters. Hence, the three models must have received first rank in two parameters, two parameters and one parameter. Paper received first rank in two parameters. Leaf received first rank in one parameter (It cannot receive first rank in any other parameter). Hence, one other model should receive first rank in two parameters.

Flat can be ranked first only in Battery Life. Hence, this is not the model that can receive first rank in two parameters.

Sheet cannot receive first rank in Screen Size, Front Camera, Rear Camera (as Leaf is ranked first in Rear Camera) and Battery Life (from (iii)). Hence, Sheet can be ranked first only in one parameter. Hence, this is not the model.

The only model that can be ranked first in two parameters is Scroll. It cannot be ranked first in Screen Size, Front Camera and Rear Camera. Hence, it must be ranked first in Processor Speed and Battery Life.

Flat is ranked second, fourth, second and fifth in Screen Size, Processor Speed, Front Camera and Rear Camera. Since it must be ranked third in one parameter, it must be ranked third in Battery Life. Leaf must be ranked second in Battery Life and third in Processor Speed.

Sheet is ranked second in two parameters. Hence, Sheet must be ranked second in Processor Speed and Rear Camera. Scroll will be ranked fourth in Rear Camera (it cannot be ranked 3 because it is ranked 3 in Front Camera). Paper must be ranked third in Rear Camera and fifth in Processor Speed. Since Sheet is not ranked fifth in Battery Life, it must be ranked fourth in Battery Life and Paper must be ranked fifth in Battery Life.

The following table provides the ranks of the five models in each parameter:

	Screen Size	Processor Speed	Front Camera	Rear Camera	Battery Life
Paper	1	5	1	3	5
Sheet	3	2	5	2	4
Scroll	4	1	3	4	1
Leaf	5	3	4	1	2
Flat	2	4	2	5	3

21. Sheet was ranked fourth in Battery Life.
Choice (A)
22. Two models were ranked better than Scroll in Front Camera.
Choice (C)
23. Rank of Scroll in Front Camera is 3. In Rear Camera, Paper has the same rank.
Choice (D)
24. The sums of the ranks for Paper, Sheet, Scroll, Leaf and Flat are 15, 16, 13, 15 and 16 respectively. Hence, Lalit will purchase Scroll.
Choice (C)

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

SECTION – III

Solutions for questions 1 to 28:

1. Given equation is,
 $5x + 6y = 138$, for which, $x = 24$ and $y = 3$ is one solution.
 $\Rightarrow y = 5k + 3$, where k is an integer
 $\text{and } x = 24 - 6k, k \in \mathbb{Z}$
The problem can be solved by elimination of choices method.

Choice (A):

If $k = -1$, $x = 30$ and $y = -2$ is a solution of the equation $5x + 6y = 138$. So, choice (A) is false.

Choice (B):

$$\begin{aligned} x > 150 &\Rightarrow 24 - 6k > 150 \\ \Rightarrow 6k &< -126 \\ \Rightarrow k &< -21 \dots (1) \\ \text{Now, } y &> -120 \\ \Rightarrow 5k + 3 &> -120 \Rightarrow 5k > -123 \\ \Rightarrow k &> \frac{-123}{5}, \text{ i.e., } -24.6 \dots (2) \\ \therefore \text{from (1) and (2),} \\ k &= -24, -23, -22 \end{aligned}$$

When $k = -24$, $x = 168$ and $y = -117$, which is a solution of the equation $5x + 6y = 138$.
 \therefore choice (B) is false.

Choice (C):

For $k = 10$, $x = -36$ and $y = 53$ is a solution of the equation $5x + 6y = 138$
Since $x = 24 - 6k$, i.e., x changes only in intervals of 6, there cannot be a solution for
 $-36 < x < -30$

\therefore Choice (C) is false

Choice (D):

Since $y = 5k + 3$, i.e., y changes in intervals of 5, there must exist a solution for $43 < y < 70$
For example,
 $y = 48$ and $x = -30$ is a solution of the equation
 $5x + 6y = 138$
 \therefore choice (D) is true.

Alternative Solution:

Since there are no other constraints on the values of x and y , it is easy to check for the last two options.
The value of y increases or decreases in an arithmetic progression with a common difference of 5. Therefore, there will always be a value between 43 and 70. Hence, choice (D).

Choice (D)

2. Since the four expressions (say A_1, A_2, A_3 and A_4) are in A.P, the sum of the first and the fourth expressions equals the sum of the second and the third expressions
 $\Rightarrow (a_1 - 2a_2) + (4a_4 - a_1) = (2a_2 - 3a_3) + (3a_3 - 4a_4)$
 $\Rightarrow a_2 = 2a_4 \quad \dots (1)$
Also, $A_2 - A_1 = A_3 - A_2$
 $\Rightarrow (2a_2 - 3a_3) - (a_1 - 2a_2) = (3a_3 - 4a_4) - (2a_2 - 3a_3)$
 $\Rightarrow 8a_2 - 9a_3 = a_1 \quad \dots (2)$

Any other relationship between A_1, A_2, A_3, A_4 that we can write will not be independent of the above two relationships. For example, consider the relationship.

$$\begin{aligned} A_4 - A_1 &= 3(A_3 - A_2) \\ \Rightarrow (4a_4 - a_1) - (a_1 - 2a_2) &= 3[(3a_3 - 4a_4) - (2a_2 - 3a_3)] \\ \Rightarrow 16a_2 - 18a_3 &= 2a_1 \\ \Rightarrow 8a_2 - 9a_3 &= a_1 \quad \dots (3) \end{aligned}$$

Both the equations (2) and (3) are the same.

Hence, we cannot get a unique value for $a_1 : a_2$.

Choice (D)

3. If two persons individually do a work in $(t + t_1)$ and $(t + t_2)$ days then, they together finish the work in t days, which is equal to $\sqrt{t_1 t_2}$ i.e., $t = \sqrt{t_1 t_2}$

$$\Rightarrow \text{Rohan and Sohan take } t = \sqrt{d \times \frac{16}{9} d} = \frac{4}{3} d \text{ days.}$$

$$\therefore \text{Rohan and Sohan take } \left(\frac{4}{3} + 1\right)d = \frac{7}{3} d \text{ days and} \\ \left(\frac{4}{3} + \frac{16}{9}\right)d = \frac{28}{9} d \text{ days respectively.}$$

$$\therefore \text{Rohan's share} = \frac{\left(\frac{28}{9}\right)}{\left(\frac{28}{9}\right) + \left(\frac{7}{3}\right)} \times 7000 = ₹4000$$

Alternative Solution:

Since Rohan is more efficient than Sohan, only options (B) and (C) are possible. Considering option (B), the ratio of their capacities will be $4200 : 2800$, i.e., $3 : 2$, and if they do the work in, say, 1 day, then Rohan takes $5/3$ days and Sohan, $5/2$ days. Or, Rohan takes $2/3$ more days and Sohan $3/2$ days more. This does not satisfy the data of d and $16/9d$ given in the question.

Hence, choice (C) must be correct.

Choice (C)

4. Let x, y and t be the number of 1 rupee, 2 rupee and 5 rupee coins respectively. Then,
 $x + y + z = 200 \quad \dots (1)$
 $x + 2y + 5z = 450 \quad \dots (2)$
After interchanging the 1 rupee and 2 rupee coins, we have
 $2x + y + 5z = 325 \quad \dots (3)$
Solving (1), (2), and (3), we get $x = 25$, $y = 150$ and $z = 25$.
Hence, the number of 5 rupee coins is 25.

Choice (A)

5. I) $\angle PQR = \frac{360^\circ - \angle PSR}{2}$
 $2\angle PQR + \angle PSR = 360^\circ \dots (1)$
If PQRS is a cyclic quadrilateral,
 $\angle PQR + \angle PSR = 180^\circ \dots (2)$
Subtracting (2) from (1), $\angle PQR = 180^\circ$, which cannot be true since P, Q and R lie on a circle.
 \therefore I is definitely false.

Alternative Solution:

For PQRS to be cyclic the circle drawn through P, Q and R must pass through S. However, S does not lie on the circle drawn through P, Q and R.

Note: Only one circle can be drawn through any set of three (non-collinear) points on a plane.

- II) Angles in the same segment are equal
 $\therefore \angle RPT = \angle QST \dots (1)$
In ΔPTR and ΔQTS ,
 $\angle T$ is common $\dots (2)$
From (1) and (2), ΔRPT and ΔQST are similar
 \therefore II is not false.
 \therefore Only statement I is definitely false.

Choice (A)

6. Let the total age of the 5 members other than Bunti and Babli be T .
 \Rightarrow on January 1st 1986, $\frac{T + 70 + 63}{7} = 33$
 $\Rightarrow T = 231 - 133 = 98$
 N years later, Bunti died, but Mona was born, i.e., the number of members remained 7.
After a few more years, (say x) Babli died and Rohan was born, i.e., the number of members remained 7. Another N years later (i.e., January 1st 2007) Raj was born. Now the total age, on 1st January 2008, of the five members of the family, other than Bunti, Babli, Mona, Rohan and Raj = $98 + (22 \times 5) = 208$ years.
The age of Mona = $(x + N + 1)$ years
The age of Rohan = $(N + 1)$ years
The age of Raj = 1 year
But we also know that from 1st January 1986 to 1st January 2007 was a period of $(N + x + N)$ years
 $\Rightarrow (2N + x) = 21$ years.
 \Rightarrow The total age of the family of eight members on 1st January 2008 is
 $208 + (x + N + 1) + (N + 1) + 1$ years
 $= 208 + (2N + x) + 3$ years = $211 + 21 = 232$ years
 $\therefore \frac{232}{8} = 29$ years

Choice (D)

7. Given a 5×5 grid with cells having distinct identity. Now the first coin can be placed in any of the 25 cells. i.e., in 25 ways.
Now we cannot place the second coin (or the third coin) in the row or column containing the first coin. So, the second coin can be placed in any of the remaining 16 cells i.e., in 16 ways. Now the third coin cannot be placed in the rows and columns in which the first two coins are placed. So, the third coin can be placed in any of the remaining 9 cells i.e.,

in 9 ways. Since the three coins are identical, the total number of ways of placing them = $\frac{25 \times 16 \times 9}{3!} = 600$
Ans: (600)

8. When 5^1 is divided by 13, the remainder is 5.
When 5^2 is divided 13, the remainder is 12.
When 5^3 is divided by 13, the remainder is 8.
When 5^4 is divided by 13, the remainder is 1.
When 5^5 is divided by 13, the remainder is 5.
We find that the remainder gets repeated after every 4 steps.
Since $50 = 4 \times 12 + 2$, therefore the remainder when 5^{50} is divided by 13 will be 12. (Same as that when 5^2 is divided by 13.)

Alternative Solution:

$$5^{50} = (5^2)^{25}$$

$$\text{Rem}\left(\frac{5^{50}}{26}\right) = \text{Rem}\left(\frac{25^{25}}{26}\right) = \text{Rem}\left[\frac{(26-1)^{25}}{26}\right]$$

∴ Remainder = $(-1)^{25} = -1$ or 25 when it is divided by 26, but since we are dividing by 13, it should be $13 - 1$ i.e., 12.
Choice (A)

9. Let the initial speeds of Bhagat and Chandu be 3 and 2 respectively. Let the time taken by Bhagat to reach from X to Y be t.
⇒ total time taken by Chandu to cover his journey = t
⇒ Total distance $\overline{XY} = 3t$.

Time taken by Chandu to cover the first one fourth of XY

$$= \frac{\left(\frac{3t}{4}\right)}{2} = \frac{3t}{8}$$

Time taken by Chandu to cover the second part = $\frac{t}{3}$

Time taken by Chandu to cover the remaining part
 $= t - \left(\frac{3t}{8} + \frac{t}{3}\right) = \frac{7t}{24}$

Let the speed of Chandu for the third part of the journey be v. Now equating the total distances covered by Bhagat and Chandu

$$\Rightarrow 3t = \frac{3t}{4} + 3\left(2\left(\frac{t}{3}\right)\right) + \sqrt{\left(\frac{7t}{24}\right)}$$

$$\Rightarrow \sqrt{\left(\frac{7t}{24}\right)} = 3t - \left(\frac{3t}{4} + 2t\right) = \frac{t}{4}$$

$$\Rightarrow v = \frac{6}{7}$$

∴ The ratio of their final speeds = 3 : $\frac{6}{7}$

= 7 : 2. Choice (C)

10. The shortest median is the median drawn on to the largest side.

Let AC be the hypotenuse and AB be the shortest side.

$$AC = 2 \times 25 = 50 \text{ cm}$$

$$\text{Area} = \frac{1}{2} \times AB \times BC = 336$$

$$\begin{aligned} AB^2 + BC^2 &= 2500 \quad \text{--- (1)} \\ AB \times BC &= 672 \quad \text{--- (2)} \end{aligned}$$

Solving (1) and (2)

We get, AB = 14 cm and BC = 48 cm

Length of the longest median

$$= \sqrt{(AB/2)^2 + BC^2}$$

$$= \sqrt{49 + 2304} = \sqrt{2353}$$

$$\therefore m = 2353$$

Ans: (2353)

11. Let the free luggage allowance be k kgs. Let the weight of Mohan's luggage be x kg.

Weight of Sohan's luggage = $(50 - x)$ kg

Excess luggage charge would vary directly with the excess luggage Excess luggage of Mohan = $(x - k)$ kg.

Excess luggage of Sohan = $(50 - x - k)$ kg.

Excess luggage if the entire luggage belongs to one of them = $\left(50 - \frac{k}{2}\right)kg$

$$\frac{2800}{1400} = \frac{x - k}{50 - x - k} \Rightarrow 3x + k = 100 \dots\dots(1)$$

$$\frac{2800}{6300} = \frac{x - k}{50 - \frac{k}{2}} \Rightarrow 9x - 7k = 200 \dots\dots(2)$$

Solving (1) and (2), $x = 30$

Choice (C)

12. Given, $N = 2^{33} \times 3^{21}$.

Total number of factors of N = $(33+1)(21+1) = 748$
 $N^2 = 2^{66} \times 3^{42}$

Total number of factors of $N^2 = 67 \times 43 = 2881$

Out of these 2881 factors, N is one of the factors.

Excluding N, out of the remaining 2880 factors, there will be exactly 1440 factors which are less than N (since for every factor less than N, say n_1 , there will be another factor greater than N, say n_2 , such that $n_1 \times n_2 = N^2$)

Hence 1440 factors of N^2 are less than N.

The number of factors of N excluding N is 747. Out of these 1440 factors of N^2 , which are all less than N, 1440 - 747, i.e., 693 factors of N^2 do not divide N.

Ans: (693)

13. The numbers can be categorized as

$3k + 1$	$3k + 2$	$3k$
1, 4, 7	2, 5, 8	3, 6

Consider $3k + 1$ and $3k + 2$ form of numbers.

$3k + 1$	$3k + 2$	Number of ways
1	1	${}^3C_1 \times {}^3C_1$
2	2	${}^3C_2 \times {}^3C_2$
3	3	${}^3C_3 \times {}^3C_3$
3	0	${}^3C_3 \times {}^3C_0$
0	3	${}^3C_0 \times {}^3C_3$
0	0	${}^3C_0 \times {}^3C_0$

∴ Total number of ways in which numbers of the first two categories can be selected.

$= [{}^3C_1 \times {}^3C_1 + {}^3C_2 \times {}^3C_2 + {}^3C_3 \times {}^3C_3 + {}^3C_3 \times {}^3C_0 + {}^3C_0 \times {}^3C_3]$. Each number of form $3k$ has 2 choices.

∴ The total number of subsets of the required kind

$$= [9 + 9 + 1 + 1 + 1] \times 2^2 = 22 \times 4 = 88$$

∴ Excluding the one case when the subset is a null set, we get $88 - 1 = 87$ subsets.

Ans: (87)

14. $A + B + C + D = 4$

$\frac{1}{A} + \frac{1}{B} + \frac{1}{C} + \frac{1}{D}$ must be minimum. This would be minimum, if its magnitude is maximum and sign is negative.

These conditions would be satisfied if three of A, B, C and D are -1 each. The fourth would be 7.

$$\therefore R = \frac{1}{A} + \frac{1}{B} + \frac{1}{C} + \frac{1}{D} \text{ would then be } -2\frac{6}{7}.$$

$$\therefore 210 R = -600 \quad \text{Ans: } (-600)$$

15. Since a, b, c are in A. P let us consider them as A, $A+d$ and $A+2d$ respectively. Where A is the first term and d the common difference of the AP under consideration

Now,

$$ax + by + c = 0 \\ Ax + (A+d)y + A + 2d = 0 \\ A(x + y + 1) + d(y + 2) = 0$$

The above equation represents a pair of straight lines viz $x + y + 1 = 0$ and $y - 2 = 0$, whose point of intersection is $P = (1, -2)$ [By solving the two equations].

The distance of P from the origin

$$= \sqrt{(1)^2 + (-2)^2} = \sqrt{5} \text{ units.}$$

Alternative Solution:

Assume $(a, b, c) = (-1, 0, 1)$ and $(0, 1, 2)$. This gives $-x + 1 = 0$ and $y + 2 = 0$. Now it is easy to check and choose from the given options.

Choice (D)

16. Let the number of chocolates = N
and number of children = n

$$\therefore N = kn + 3 \quad \text{--- (1)} \\ \text{where } k = \text{number of chocolates per child in the first case.} \\ \text{Also,} \\ N = l(4n) + 10 \quad \text{--- (2)} \\ \text{Where } l = \text{number of chocolates per child in the second case.} \\ \therefore \text{from (1) and (2)} \\ n(k - 4l) = 10 - 3 \\ \Rightarrow n.m = 7 \\ \text{Where both } n \text{ and } m \text{ are natural numbers} \\ \Rightarrow n = 7 \text{ and } m = 1 \quad \text{Choice (B)}$$

17. Let the number be x.

$$\text{Given } \frac{4}{5}x - x^2 = x^3 - \frac{4}{15}x^2.$$

$$\text{Hence, } x^3 + \frac{11}{15}x^2 - \frac{4}{5}x = 0$$

$$\Rightarrow \left(x^2 + \frac{11}{15}x - \frac{4}{5} \right) \text{ OR } (x = 0)$$

$$\Rightarrow 15x^2 + 11x - 12 = 0 \text{ OR } x = 0$$

$$15x^2 + 20x - 9x - 12 = 0 \text{ OR } x = 0$$

$$\Rightarrow 5x(3x + 4) - 3(3x + 4) = 0 \text{ OR } x = 0$$

$$\Rightarrow (5x - 3)(3x + 4) = 0 \text{ OR } x = 0$$

$$\Rightarrow x = \frac{3}{5} \text{ OR } \frac{-4}{3} \text{ OR } 0$$

Only $\frac{-3}{5}$ and 0 lie in the interval $[-1, 1]$.

Hence only two values.

Choice (C)

18. Given $g(xy) = g(x) + g(y) - 2$
Observe that $72 = 2^3 \times 3^2$

Consider $x = 3; y = 2$

$$g((3)(2)) = g(3) + g(2) - 2$$

$$g(6) = a + b - 2$$

Consider $x = 6; y = 6$

$$g(36) = g(6) + g(6) - 2 = 2g(6) - 2$$

$$= 2a + 2b - 4 - 2 = 2a + 2b - 6$$

$$g(72) = g((36)(2)) = g(36) + g(2) - 2$$

$$= 2a + 2b - b + a - 2 = 3a + 2b - 8$$

Alternative solution:

Given the form of $g(xy)$, we can infer that the powers of the factors will appear on the RHS. Hence, as $72 = 2^3 \cdot 3^2$, $3(g(2))$ and $2(g(3))$ will definitely appear on the RHS. Hence

$3a + 2b$ must be present in the correct answer choice. Only choice (A) satisfies.

Choice (A)

19. The terms of the given AP are

$$-50d, -49d, \dots, -d, 0, d, \dots, 49d, 50d$$

or equivalently $-50, -49, \dots, -1, 0, 1, \dots, 49, 50$

There are 3 ways of choosing 3 numbers such that their sum is zero.

First way : 2 positive and 1 negative.

E.g. $d + 2d - 3d; 2d + 48d - 50d$

Second way : 2 negative and 1 positive (same as above with a change of sign)

Third way : 1 negative, zero and 1 positive.

E.g. $-35, 0, 35$

First way :

Consider the positive numbers. The possible values of the first number, the corresponding values of the second number and the number of values of the second number are tabulated below.

First Number	Values of the Second Number	Number of values of the Second Number	of Corresponding third numbers
1	2, 3, ..., 49	48	-3, -4, ..., -50
2	3, 4, ..., 48	46	-5, -6, ..., -50
.	-----	.	-----
.	-----	.	-----
.	-----	.	-----
24	25, 26	2	-49, -50
25		0	0

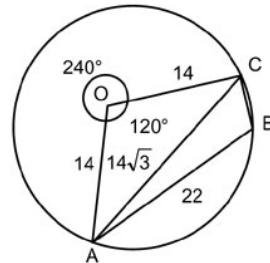
The total number of ways of selecting 2 positive (and 1 negative number corresponding to the sum of the two positive numbers) is $2 + 4 + \dots + 46 + 48 = 2(24)(25)/2 = 600$

Similarly, from symmetry, 2 negative and 1 positive numbers can also be selected in 600 ways and 1 positive, 1 negative and zero can be selected in 50 ways.

\therefore The total number of ways is $600 + 600 + 50 = 1250$

Ans: (1250)

20. Three sides of the hexagon are of length a ($a = 22$ cm) and the other 3 sides are of length b . If α and β are the angles that each side of length a and b subtend at the centre $\alpha + \beta = 120^\circ$ ($\because 3(\alpha + \beta) = 360^\circ$)



At least one side of length a and one of length b have to be adjacent. Say $AB = a$ and $BC = b$.

Since $\angle COA = 240^\circ, \angle ABC = 120^\circ$

$$\therefore AC = \sqrt{3}(\text{radius}) = 14\sqrt{3} \text{ cm}$$

$$\text{In } \triangle ABC, AB^2 + BC^2 - 2(AB)(BC) \cos 120^\circ = AC^2$$

$$\Rightarrow a^2 + b^2 + ab = (14\sqrt{3})^2 = 588$$

$$\Rightarrow b^2 + 22b - 104 = 0$$

$$\Rightarrow (b + 26)(b - 4) = 0$$

$$\Rightarrow b = 4 \quad (\because b > 0)$$

Choice (A)

21. $|x + 3| = 4 \Rightarrow x = 1 \text{ or } x = -7$
 $\therefore y = 7 - |1 - 2| = 6 \text{ or } 7 - |-7 - 2| = -2$
 $\therefore xy \text{ can be } 1(6) \text{ or } (-7)(-2). \text{ The greatest value is } 14.$
 Choice (D)

22. Let the number of boys be n .
 So, the total number of marbles that were pooled in the bag
 $= n(n + 2)$.
 Since some of the marbles were lost on the way,
 $n(n + 2) > 288 \Rightarrow n^2 + 2n - 288 > 0$
 $\Rightarrow (n + 18)(n - 16) > 0$
 $\Rightarrow n < -18, n > 16$
 As $n > 0$, the minimum value of $n = 17$.
 \therefore The minimum number of marbles in the bag initially
 $= 17(17 + 2) = 323$
 \therefore The minimum number of marbles that could have fallen
 on the way $= 323 - 288 = 35$.
 Ans: (35)

23. N marbles are distributed among P children, where $P \neq 1$ or N. Hence any number "N" below hundred which has at least one factor "P" other than the number itself and which satisfies the condition $2 < N + P < 100$, can be a possible value of N. First, from the first 99 natural numbers, we eliminate all primes below 100. $99 - 25 = 74$. Further 1, 99, 98 and 95 also do not qualify, since for these numbers the smallest values of P, do not satisfy $2 < N + P < 100$. Hence, N can take 74 – 4 or 70 values.
 Ans: (70)

24. Number of packs bought by customer = 12

$$\text{Number of gift cakes received} = \text{Integer part of } \left(\frac{12}{5}\right) = 2.$$

Total number of cakes received by the customer
 $= (4)(12) + 2 = 50$.
 Total money paid by the customer $= 12(3s)$, where s is the listed price of each cake.
 For 50 cakes, the listed price $= 50s$.
 Actual amount paid is 36s.
 Hence, discount is 14s.

$$\text{Discount percentage} = \left(\frac{14s}{50s}\right)(100\%) = 28\%$$

Choice (D)

25. In such cases, it would be advisable to identify the number of ways of selection and arrangement independently and then multiply.
 The toppings can be selected and arranged on the pizza in the following ways.
 (1) All the four slices have distinct toppings.
 (2) Two of the slices have identical topping while the other two have distinct toppings.

27. The SI and CI for the first 3 years are tabulated below.
 We take P = 1 and rate = r p.a. = $100r\% \text{ p.a.}$

Year	Principal	Interest for n^{th} year	Interest upto n years	Amount	Principal	Interest for n^{th} year	Interest upto n years	Amount
1	1	r	r	$1 + r$	1	r	r	$1 + r$
2	1	r	$2r$	$1 + 2r$	$1 + r$	$r + r^2$	$2r + r^2$	$(1 + r)^2$
3	1	r	$3r$	$1 + 3r$	$(1 + r)^2$	$r + 2r^2 + r^3$	$3r + 3r^2 + r^2$	$(1 + r)^3$

The difference between CI and SI for the second year is 3600.

$$\therefore P[(r + r^2) - r] = Pr^2 = 3600 \dots\dots\dots(1)$$

The difference between CI and SI for the third year is 7740

$$\therefore P(2r^2 + r^3) = 7740 \dots\dots\dots(2)$$

$$(2) \div (1) \Rightarrow 2 + r = \frac{774}{360}$$

$$\Rightarrow r = \frac{54}{360} = \frac{3}{20} = \frac{3}{20}(100\%) = 15\%$$

$$(1) \Rightarrow P = 3600 \left(\frac{100}{15}\right) \left(\frac{100}{15}\right) = ₹1,60,000.$$

- (3) Two of the slices have one identical topping while the other two have another identical topping distinct from the one used previously.

Case 1: All four different toppings.

Selection – 4 toppings can be selected out of 5 in 5C_4 ways
 Arrangement – 4 distinct toppings can be arranged in $3!$ ways.

\therefore Total number of ways of having 4 distinct toppings on a four-slice pizza is ${}^5C_4 \times 3! = 30$

Case 2: Two identical and two distinct.

Selection: The identical topping to be used on two slices can be selected in 5C_1 ways and the toppings to be used on the remaining two slices can be selected in 4C_2 ways.

\therefore Selection can be done in ${}^5C_1 \times {}^4C_2 = 30$ ways.

Arrangement: Once the toppings are selected, there is only one way to arrange the slices in which no two adjacent slices have identical toppings.

\therefore Total number of ways in this case $= 30 \times 1 = 30$.

Case 3: Two identical and two identical.

Selection: The two toppings to be used on the four slices can be selected in 5C_2 ways.

Arrangement: There is only one way to arrange the slices in which no two adjacent slices have identical toppings.

\therefore Total number of ways in this case $= {}^5C_2 \times 1 = 10$

\therefore For all the three cases combined, total number of ways $= 30 + 30 + 10 = 70$
 Ans: (70)

26. $(12)_n = n + 2$

$$(34)_n = 3n + 4$$

$$\dots\dots\dots\dots$$

$$[(2m - 1)(2m)]_n = (2m - 1)n + 2m$$

$$\therefore X = (1 + 3 + 5 + \dots + (2m - 1))n + (2 + 4 + 6 + \dots + 2m)$$

$$= nm^2 + m(m + 1)$$

$$= (2m + 1)m^2 + m^2 + m = 2m^3 + 2m^2 + m$$

$$\therefore X + m + 2 = 2m^3 + 2m^2 + 2m + 2 = (2222)_m$$

Alternative solution:

Since it is given that $m > 2$, without loss of generality, say $m = 3 \Rightarrow n = 7$

$$\therefore X = (12)_7 + (34)_7 + (56)_7 = 7(1 + 3 + 5) + (2 + 4 + 6) = 75$$

$$\therefore X + m + 2 = 75 + 5 = 80$$

$$\text{Now, } (80)_{10} = (3^3 \times 2) + (3^2 \times 2) + (3 \times 2) + (2) = (2222)_3$$

Ans: (2222)

Alternative Solution:

The difference is SI and CI for third year
 $= (\text{difference in second year}) + (\text{difference in second year and the interest on this difference})$

$$\Rightarrow 3600 + 3600 + 3600 \times \frac{r}{100} = 77440$$

i.e., $r = 15\%$

$$\text{Hence, sum} = \frac{100 \times 100 \times 3600}{15 \times 15} = 160000$$

Choice (A)

28. Let the contestant mentally decide upon two of the three boxes but choose only one of the two in his first chance. If he fails to win the prize in the first chance, he then chooses the second box he had decided upon earlier. On the whole, the contestant has a choice of two boxes out of the three.

$$\therefore \text{The required probability} = \frac{2}{3}$$

i.e., $\frac{1}{3}$.

$$\therefore \text{The required probability} = \frac{1}{3} + \frac{1}{3} = \frac{2}{3}$$

Choice (D)

Alternative solution:

The contestant can win the prize in two ways.

Case 1: He wins in the first guess.

For this to happen, the probability is $\frac{1}{3}$.

Case 2: He fails in the first guess and wins in the second guess.

For this to happen, the probability is $\frac{2}{3} \times \frac{1}{2}$

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