

(Key and Solutions for AIMCAT1804)

Key**SECTION – I**

1. D	8. 35421	15. D	22. C	29. D
2. B	9. 1	16. A	23. D	30. B
3. D	10. C	17. C	24. B	31. A
4. C	11. D	18. 25143	25. 135	32. C
5. B	12. B	19. 5	26. 3	33. A
6. A	13. 4	20. D	27. 45	34. D
7. 762	14. 359	21. B	28. 53214	

SECTION – II

1. 13	8. 90	15. D	22. A	29. B
2. 64	9. B	16. B	23. C	30. D
3. 3	10. C	17. A	24. A	31. B
4. 4	11. C	18. A	25. B	32. C
5. A	12. A	19. C	26. D	
6. 360	13. D	20. B	27. D	
7. A	14. C	21. B	28. B	

SECTION – III

1. A	8. B	15. 465	22. B	29. 0.60
2. C	9. A	16. C	23. C	30. A
3. 0	10. C	17. C	24. 48	31. B
4. B	11. B	18. 28	25. A	32. C
5. 20480	12. D	19. 50	26. D	33. D
6. B	13. C	20. A	27. D	34. A
7. D	14. C	21. B	28. 2211	

Solutions**SECTION – I****Solutions for questions 1 to 6:****Number of words and Explanatory notes for RC:**

Number of words: 631

1. The “great divergence” is explained in para 1. That Mr. Joel Mokyr’s book about the “great divergence” is not conventional economic history has been mentioned in para 2.

Option A: For Mr Mokyr, “culture” means beliefs, values and preferences. But choice A is not an adequate reason for the author’s viewpoint that Mr. Joel Mokyr’s book about the “great divergence” is not conventional economic history. Hence choice A is not the answer.

Option B: And he argues that all three (elements of culture viz beliefs, values and preferences) changed fundamentally in Europe after 1500. But choice B (vicious cycle of newness and obsolescence) cannot be inferred from the passage. Choice B is not a reason for the question.

Option C: The author says that the “great divergence” is not conventional economic history but this is not because conventional economic models have become obsolete. The passage does not state that the European social milieu was

analyzed or needs to be analyzed using the principles of modern economic theories. The passage does not compare or contrast modern economic theories vs conventional economic models. Hence choice C which is a very general choice is not the answer.

Option D: The book’s content is not a conventional economic history. The book contains few numbers, let alone regressions. This is because Mr Mokyr focuses on culture. Hence we can assume here that culture cannot be easily quantified. Hence choice D is the answer.

Choice (D)

2. Everyone from Christopher Wren to Robert Boyle battled over ideas. The motto of the Royal Society was “nullius in verba” – roughly, “take nobody’s word for it”. The greatest mathematical mind of his age, challenged by a nobody: what better example of what Mr Mokyr calls the “principle of contestability”? Option A: Choice A (it went against all known teachings at that time) would defeat the idea of “take nobody’s word for it”. Hence choice A is not the correct answer. Option B: There were no sacred cows. This went along with a reassessment of what science was. Bacon pushed scientific inquiry away from the mindless piling up of facts and towards making a difference to people’s lives. So choice B is a correct representation of the application of

- "nullius in verba" and "principle of contestability" as can be inferred from the passage. Geneticist Barbara McClintok's findings were accepted though they went against prevalent knowledge. Hence choice B is the answer.
- Option C: Choice C (was thus never challenged but readily accepted) does not use the motto "nullius in verba" or the "principle of contestability". Hence choice C is not the correct answer.
- Option D: Choice D refers to a situation where the "market for ideas" will fail. Upstarts were stopped by the people in power from challenging received wisdom. For most of history, for potential intellectual innovators, the fear of being called a heretic (or worse) created a disincentive to think big. Choice D will oppose the motto "nullius in verba" and the "principle of contestability". Choice (B)
3. The Royal Society in London started a journal in which everyone from Christopher Wren to Robert Boyle battled over ideas. Its motto was "nullius in verba" – roughly, "take nobody's word for it". A transnational community known as the "Republic of Letters" sprang up.
- Option A: Choice A is correct. There were no sacred cows. "Sacred cows" is an idiom which means an idea, custom, or institution held to be above criticism. "No member or idea was above scrutiny" reiterates that there were no sacred cows.
- Option B: There were no sacred cows. When Leonhard Euler, a mathematician, thought that Isaac Newton had erred, the Royal Society asked a self-taught optician to see who was right. The greatest mathematical mind of his age, challenged by a nobody: what better example of what Mr Mokyr calls the "principle of contestability". Choice B is also true.
- Option C: Bacon was a poor scientist and knew no mathematics, says Mr Mokyr. But he pushed scientific inquiry away from the mindless piling up of facts and towards making a difference to people's lives. "The true and legitimate goal of the sciences is to endow human life with new discoveries and resources," Bacon said. With this sort of science, useful, wealth-creating things were invented. Hence choice C is also correct. Choice (D)
4. Option A: Choice A is a theory of why Europe grew first, but it is not according to Mr Mokyr. Mr Mokyr barely considers other theories of why Europe grew first – that its people were relatively immune from disease. Hence choice A is not the answer.
- Option B: Choice B is a theory of why Europe grew first, but again it is not according to Mr Mokyr. Mokyr barely considers other theories of why Europe grew first – that it was the first region systematically to colonise others. So choice B is not the answer.
- Option C: To structure his argument, Mr Mokyr speaks of a "market for ideas", a system in which people "try to persuade an audience of the correctness of their beliefs". Then, almost by accident, Europe stumbled into an arrangement whereby the "market for ideas" flourished. The Royal Society, a club for scientific exchange founded in London in 1660, started a journal Why Europe, and not anywhere else, developed in this way is tricky to answer. Luck is surely part of it. Another explanation concerns Europe's geography. With Europe fragmented into lots of states, an intellectual who challenged received wisdom, and thus incurred the wrath of the authorities, could move elsewhere. for years, René Descartes lived in the Netherlands. Hence choice C is the answer.
- Choice (C)
5. In a new book, Joel Mokyr of Northwestern University offers his own take on the "great divergence".
- Option A: For potential intellectual innovators, the fear of being called a heretic (or worse) created a disincentive to think big. Choice A is true but it is incomplete. It is not the central idea of the passage.
- Option B: Mr Mokyr's book is not a conventional economic history. The book contains few numbers, let alone regressions. This is because Mr Mokyr focuses on culture.
- For Mr Mokyr, "culture" means beliefs, values and preferences. And he argues that all three changed fundamentally in Europe after 1500. Also refer to the last sentence of the passage: It is refreshing that an economist is taking seriously the idea that ideas and culture make a difference to economic growth. Hence choice B is the answer.
- Option C: Choice C is inverted. The converse of what has been mentioned in choice C may serve as the answer.
- Option D: Mr Mokyr barely considers other theories of why Europe grew first – that its people were relatively immune from disease; or that it was the first region systematically to colonise others. And his arguments are often highly abstract. Those familiar with the historiography will have their own grumbles. When he asserts that Bacon "was of unique importance to the development of the West", it is impossible to prove otherwise. So choice D is true from the latter half of the passage. But it is not the central idea of the passage.
- Choice (B)
6. Explaining the reasons behind this "great divergence" has occupied many an economic historian. In a new book, Joel Mokyr of Northwestern University offers his own take. This book is not for someone looking for a general introduction to the "great divergence". Mr Mokyr barely considers other theories of why Europe grew first. He assigns monumental importance to the "Republic of Letters" but offers frustratingly little detail on how it actually worked. The sheer elegance of Mr Mokyr's theory, however, has much to commend it. And it is refreshing that an economist is taking seriously the idea that ideas and culture make a difference to economic growth. From these sentences, it can be inferred that the statement in the question is definitely true.
- Choice (A)

Solutions for question 7:

7. From the words 'offenses', 'lack of exposure' and the facts "economists missed the 2008 crash, and make bizarre assumptions that cannot hold true", we know that economists are being targeted in the paragraph. Hence the first blank will take the phrase 'easy sport' as the remaining lines substantiate on why economists are mocked. 'Implausible' means difficult to believe; not plausible. 'Implausible' cannot fill the first blank as reasons are mentioned for targeting economists. 'a tall order' is a misfit. Choices 1, 2, 4, 6 and 8 are contextually inappropriate. Hence the correct answer for the first blank is (7) "easy sport".
- On a careful reading of the paragraph, we can infer that the second blank can be filled by one word among {(8) privations, (4) cynicism and (6) outlook}. The remaining words sound incorrect. We need a neutral word here (since it is characterized by the negative word 'narrow'). One can say narrow 'outlook' or focus (lack of exposure to the "real world" of business). Hence the word 'outlook' fills the second blank. 'Privations' is out of context. Privations means lack of the basic necessities or comforts of life. 'cynicism' cannot be combined with 'narrow'. So choice 6 fills the second blank.
- The third blank needs a negative word. 'Impugn' is a verb and cannot fill the third blank, which needs a noun. 'Impugn' means to attack as false or questionable; challenge in argument. The third blank needs a word to refer to "mocking" for "other offences on the checklist". So 'onslaught' which refers to 'a violent attack' best fills the last blank. Choice 2 is correct.
- Ans: (762)
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 background: evolution of the eye which is complex and which would be rendered useless by any imperfection. Sentence 3 is followed by sentence 5. "as how a **complex object** could have evolved when the imperfection of any part of it would cause the whole thing to be useless" points to "silly argument" in sentence 5 and links with "confusing imperfection with

"simplicity" in sentence 5. Sentence 4 follows sentence 5 as it provides a reason for the point given in sentence 5. "Simpler eyes than a human's can work perfectly well" (sentence 4) corrects "confusing imperfection with simplicity" (sentence 5) and it also contrasts "imperfection of any part of it (*human eye*) would cause the whole thing to be useless" (sentence 3). Sentence 2 takes the discussion on another plane: the simplest imaginable eye Sentence 1 concludes the para. "it" in sentence 1 points to "simplest eye imaginable" in sentence 2. So, 35421.

Ans: (35421)

9. On a careful reading of the sentences it can be observed that sentence 3 is a general sentence that begins the para. It introduces the background: the only kind of human in the modern world is *Homo sapiens*. Sentence 3 expands on this point and follows sentence 5. "modern world" in sentence 3 links with "recently true" in sentence 5. "that" in sentence 5 points to "the only kind of human in the modern world is *Homo sapiens*". Sentences 5 and 2 form a mandatory pair. "But that is only recently true" in sentence 5 (the only kind of human in the modern world is *Homo sapiens*) contrasts "*Homo sapiens*'s 200000-year history it shared the planet with several cousins" in sentence 2. Sentence 2 (cousins) is followed by "The most famous were the Neanderthals" in sentence 4. So 3524. Sentence 1 runs tangent to the discussion and can be a part of another para. "just because something is bad" in sentence 1 needs a precedent. Sentence 1 needs further elaboration.

Ans: (1)

Solutions for questions 10 to 12:

Number of words and Explanatory notes for RC:

Number of words: 451

10. Option A: Choice A is extreme. While malfeasance means wrongdoing, 'graft' usually implies the existence of theft, corruption, fraud, and the lack of integrity that is expected in any transaction involving a public official. We only know from the passage that Luxembourg facilitated tax avoidance. Hence choice A is not the answer.

Option B: The "LuxLeaks" affair has highlighted the role played by certain European Union countries, including Ireland and the Netherlands as well as Luxembourg, in facilitating tax avoidance. The passage does not attempt to focus on corruption as such, neither does it say that fighting corruption makes it more visible. So choice B cannot be inferred about Luxembourg.

Option C: An appropriate view of a tax haven is "a jurisdiction that offers favorable tax or other conditions to its taxpayers as relative to other jurisdictions. There is no generally accepted definition of what renders a country or jurisdiction a tax haven, but activities that are commonly associated with such places range far beyond tax". Refer to the second para. But its tax authority in effect sold tax-avoidance services to large firms by rubber-stamping opaque arrangements that helped them to cut their tax bills dramatically in both their countries of residence and their countries of operation. Hence we can say that Luxembourg was a tax haven by administrative practice. Luxembourg has helped many MNCs to evade taxes in their country of origin as well as their countries of operation. Hence choice C is the correct answer.

Option D: Choice D is out of scope. Choice (C)

11. The leaks helped propel multilateral efforts to overhaul international corporate taxation, led by the OECD. Its mostly rich members and a dozen developing countries agreed last year to a raft of reforms.

Option A: These include increased country-by-country reporting by multinationals of profits, taxes paid and so on. Hence choice A is correct.

Option B: There will be tighter rules on transferring intellectual property between subsidiaries as a means of parking profits in tax havens. Hence choice B is also true.

Option C: In June the European Union agreed on an anti-avoidance directive that incorporates parts of the OECD's agenda. The EU's executive, the European Commission, has launched numerous probes targeting cushy tax deals offered by the bloc's own members to firms such as Apple, Fiat and Starbucks. Hence choice C is also correct.

So choices A, B and C are true.

Choice (D)

12. Option A: The EU's executive, the European Commission, has launched numerous probes targeting cushy tax deals offered by the bloc's own members to firms such as Apple, Fiat and Starbucks. It argues these could amount to illegal state aid. Choice A would defeat the purpose. A weakening of the anti-avoidance measures would make them more palatable to Apple. Hence choice A is not the answer.

Option B: The commission is expected to announce the results of its probe into Apple's tax arrangements in Ireland in July. The firm could be forced to pay billions of euros to Dublin. Apple denies breaking any laws. It has a point when it says the problem is not corporate illegality or immorality but disparities between national tax systems, which invite gaming. Hence the need for a multilateral approach. An "internationally accepted and implemented corporate tax structure" would remove many of the national differences that multinationals have exploited to pay less tax. Hence choice B applies.

Option C: Choice C is not specific to the question. An American official complained recently that they are based on "expansive reinterpretations" of European competition law and have created an "extraordinary mess". Choice C does not apply to Apple and is not the answer.

Choice (B)

Solutions for question 13:

13. In part (1), we need the verb form 'honoured' and not the adjective form 'honourable'.

Part (2) needs "run for" and not "run with". "run for" means to stand for election for a particular post. (We get the clue from the use of the word 'campaign' in sentence 2).

In part (3), we need the phrasal verb "took on". "Took on" means to undertake or begin to handle: (eg. took on extra responsibilities). "Took to" is incorrect and needs to be replaced with "took on".

Part (4) is error-free.

Part (5) needs "cover expenses" (not "covered up" expenses) and "drained his account" (not "drained up his account").

Ans: (4)

Solutions for question 14:

14. The para attempts to correct a misconception. Science is not amoral or coldly logical. It generates a host of values. A list of such values is provided in the second half of the first sentence of the para.

The first blank needs a synonym of 'respect for', 'stress on the importance of', 'deep respect of (a positive trait). So 'acute regard' is the best word that can fill the best blank. Approval which means 'approval' is normally followed by 'of' and not 'for'. 'Appositeness' means highly pertinent or appropriate and is contextually inapt. Hence 3 is the answer for the first blank.

A clue for the second blank is provided in the latter half of the second sentence of the para. The values arise directly out of the pursuit of science. The scientist must cultivate a deep respect for the truth. This makes choice 5 the correct answer for the first blank. 'Extras' mean items in addition to what is usual or strictly necessary. Choice 4 does not exactly fill the first blank. Vicarious means secondary, derivative, substitute, experienced in the imagination through the feelings or actions of another person. The values are not explained in the light of 'responsibilities or actions which are done for another'. Similarly, choice 6 is incorrect. 'Contradistinct' means 'distinguished by opposite qualities.' The values indicated in the second sentence of the para are positive attributes and not opposing ideas.

One of the scientific values that is generated out of a pursuit of science is an unusually acute regard for honesty.

The second blank needs a word or adjective to describe 'liar'. (Note: Even the most ...) The best word among the options for the second blank is 'inveterate' which means persisting in an ingrained habit; habitual, firmly and long established; deep-rooted; chronic. Hence choice 9 is the answer for the third blank. Choice 8 is incorrect. 'chicane' means to resort to tricks or subterfuges; to trick or deceive. But 'chicane' does not collocate with 'liar'. Choice 7 is also contextually inappropriate. Meretricious (which means false or insincere; specious) can be used to describe arguments, praise, relationships etc but not a person.

Ans: (359)

Solutions for questions 15 to 17:

Number of words and Explanatory notes for RC:

Number of words: 485

15. Option A: This collective unconscious consists of pre-existent forms, the archetypes, which can only become conscious secondarily and which give definite form to certain psychic contents. So choice A is true and is not the answer.

Option B: The collective unconscious had profound influence on the lives of individuals, who lived out its symbols and clothed them in meaning through their experiences. It is the matrix of all conscious psychic occurrences, and hence it exerts an influence that compromises the freedom of consciousness in the highest degree. Hence choice B is true and is not the answer.

Option C: Collective unconscious refers to structures of the unconscious mind which are shared among beings of the same species. The collective unconscious comprises in itself the psychic life of our ancestors right back to the earliest beginnings. It is the matrix of all conscious psychic occurrences. There exists a second psychic system of a collective, universal, and impersonal nature which is identical in all individuals. Therefore choice C is also true and is not the answer.

Option D: These "primordial images" or "archetypes," belong to the basic stock of the unconscious psyche and cannot be explained as personal acquisitions. This collective unconscious does not develop individually but is inherited. Hence choice D is not true and is the answer.

Choice (D)

16. Option A: In the first para, we are told that Jung considered the collective unconscious to underpin and surround the unconscious mind, **distinguishing** it from the personal unconscious of Freudian psychoanalysis. Jung's 1916 essay, "The Structure of the Unconscious" **criticizes** the reductive monotony of Freudian dream interpretation. He distinguishes between "Freudian" unconscious, **limited** to sexual fantasies and repressed images, and the "collective" unconscious encompassing the soul of humanity at large. He also goes on to say that beyond sex and repression, it can be understood from the unbidden background that features in dreams that there is a collective unconscious at work. Clearly, Jung believed that there was more to dreams than Freud's limited view. So choice A is true.

Option B: Choice B cannot be attributed to the Freudian theory of dream interpretation. 'Autochthonous' is a term attributed to "archetypes". In dreams, fantasies, and other exceptional states of mind the most far-fetched mythological motifs and symbols can appear autochthonously at any time, often, apparently, as the result of particular influences, traditions, and excitations working on the individual, but more often without any sign of them. These "primordial images" or "archetypes," Choice B is not the answer.

Option C: Jung linked the collective unconscious to 'what Freud called "archaic remnants" – mental forms whose presence cannot be explained by anything in the individual's own life. But we are not told in the passage how "archaic remnants" may be related to Freudian's theory of dream interpretation: limited to sexual fantasies and repressed images. Hence choice C is not the answer.

Option D: Choice D is negated by the sentence: Jung's 1916 essay, "The Structure of the Unconscious" criticizes the reductive monotony of Freudian dream interpretation. Carl Jung credited Freud for developing his "primal horde" theory in *Totem and Taboo*. Choice D is not the answer. Choice (A)

17. Option A: Refer to the last para of the passage. Carl Jung credited Freud for developing his "primal horde" theory in *Totem and Taboo* and continued further with the idea of an archaic ancestor maintaining its influence in the minds of present-day humans. Hence choice A is true and is not the exception.

Option B: The collective unconscious comprises in itself the psychic life of our ancestors right back to the earliest beginnings. It is the matrix of all conscious psychic occurrences, and hence it exerts an influence that compromises the freedom of consciousness in the highest degree. Hence choice B can be a statement from Carl Jung's lectures or essays on the "collective unconscious". Choice B is not the exception.

Option C: The passage only mentions that the psychotherapeutic practice of analytical psychology revolves around examining the patient's relationship to the collective unconscious. Choice C will not find a place in either Carl Jung's lectures or essays on the "collective unconscious". Hence choice C is the exception and is the correct answer.

Option D: In addition to our immediate consciousness, which is of a thoroughly personal nature and which we believe to be the only empirical psyche (even if we tack on the personal unconscious as an appendix), there exists a second psychic system of a collective, universal, and impersonal nature which is identical in all individuals. This collective unconscious does not develop individually but is inherited. Choice D is not the exception. Choice (C)

Solutions for question 18:

18. 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 background: Britain's most trying time, its darkest hour. Sentence 2 is followed by sentence 5. "retreat of the British army across the English Channel at Dunkirk during World War II" in sentence 2 links with "England stood alone against Hitler, nearly defenseless to invasion" in sentence 5. Sentence 5 is followed by sentence 1. "England stood alone against Hitler, nearly defenseless to invasion" in sentence 5 links with "British troops possessed only a handful of bullets each, and volunteers were in short supply" in sentence 1. Sentence 4 continues the thoughtflow. "Germany torpedoed a British ship" in sentence 4 links with "invasion" mentioned earlier in sentence 5. Sentence 5 is the larger political and geographic situation. Sentence 1 reduces focus to the general state of the army, and sentence 4 reduces focus further to a specific event of helplessness. Sentence 4 is followed by sentence 3. In sentence 3, saying only Churchill knew the full extent of peril, the writer means that only Churchill envisioned the larger picture, putting all circumstances together. "an incident not disclosed to the British people until after the war" in sentence 4 is parallel to "Only prime minister Winston Churchill knew the full extent of his nation's peril" in sentence 3. "help save the day" in the conclusion sentence 3 mirrors the introduction sentence "darkest hour, occurred in the days following retreat of the British army across the English Channel" in sentence 2. So, Ans: (25143)

Solutions for question 19:

19. On a careful reading of the sentences, it can be observed that sentence 3 is the only general sentence that can begin the paragraph. The remaining sentences need a precedent. It introduces the background: the society as a whole will still be caught on a runaway treadmill. Sentence 3 is followed by sentence 1. "until we can capture control of the accelerated thrust itself" in sentence 3 links with "Till then, there will be a high velocity of change, of future shock," as

given in sentence 1. Sentence 1 is followed by sentence 4. The contrast conjunction 'yet' separates the many factors of future shock mentioned in sentence 1 from the 'critical factor – technological advance' mentioned in sentence 4. "technological advance is clearly a critical node" in sentence 4 contrasts "traced to population growth, urbanization, the shifting proportions of young and old and other factors" in sentence 1. Sentences 4 and 2 form a mandatory pair. "technological advance..... may be the node that activates the entire net" in sentence 4 links with "preventing mass future shock, therefore, involves the conscious regulation of technological advance" given in sentence 2. So 3142. Sentence 5 is the odd sentence out as it does not refer to "future shock" or "technological advance" or any key element that the remaining sentences touch upon. Sentence 5 is a vague and redundant sentence.

Ans: (5)

Solutions for Questions 20 to 25:

Number of words and Explanatory notes for RC:

Number of words: 653

- 20.** Option A: The author is not explaining the reasons for apathy among citizens in democratic societies. He does discuss characteristics of the new middle class which contrast those of the old working class. But choice A (analyse the reasons) is wrong. Choice A is not the primary concern of the author.

Option B: The author is not criticizing the politicians in the passage. Hence choice B is not the answer.

Option C: The author is not listing the reasons for degradation in politics. Therefore choice C is not the answer.

Option D: Refer to the introductory line of the passage. Most people today want to keep their engagements with the state and public affairs to the minimum. The author is merely reporting a state of affairs. He is essentially discussing the characteristics of a liberal state ever since its emergence two centuries back. So choice D is the best answer.

So choices A, B, C are far-fetched and are not the answers.

Choice (D)

- 21.** Option A: There came a time when the success of postwar capitalism had created a middle class larger than the old working class, in large part a new middle class which was far more individualistic than the older middle class, more self-and-family centered (therefore micro in outlook) ... parties focussed their efforts on them (therefore macro in significance) Hence choice A is true and is not the answer.

Option B: The new middle class cut adrift from the old world of essentials, bare necessities, and hard saving against emergencies. "cutting adrift" means abandoning the ideas as guiding principles. Hence choice B which says "did not abandon the old world concepts of essentials, bare necessities, and hard saving against emergencies" is not correct and is the answer.

Option C: The new middle class had less feeling for public service. Party leaders and managers became openly and unashamedly more interested in immediate election tactics, projection of personality, and in media presentation than in thinking through and advocating ideas and policies related to long term social needs. So choice C is correct and is not the answer.

Option D: The new middle class had less belief that rights entail duties and responsibilities. meaning, they were more interested in their rights and entitlements than they were in the concomitant duties and responsibilities. Hence choice D is true and is not the answer.

Choice (B)

- 22.** Refer to the last para, where the issue is discussed. Many of those urban intellectuals who were once so influential in social democratic politics now take up big small causes such as 'Save the whale', 'Focus on animal rights' etc but not poverty or economic injustice. They will attack racism

as, indeed, an affront to human dignity and any kind of democracy but not face up to the root cause of discrimination – stark poverty, economic disadvantage, and even relative deprivation.

Option A: We cannot infer that the campaigns are non-political. They will attack racism as, indeed, an affront to human dignity and any kind of democracy but **not face up to** the root cause of discrimination – stark poverty, economic disadvantage, and even relative deprivation. So the second part of choice A is also rendered incorrect. Hence choice A is not the answer.

Option B: 'With no political stakes' in choice B renders it incorrect. "Many of those urban intellectuals who were once so influential in social democratic politics" does not imply that they have no political stakes. Hence choice B is not the answer.

Option C: Many of those urban intellectuals who were once so influential in social democratic politics now take up big small causes such as 'Save the whale', 'Focus on animal rights' etc but not poverty or economic injustice. The last para of the passage suggests that urban intellectuals who once supported long term social needs are now focussing on big small causes (popular but not significant). Hence choice C is the correct answer.

Option D: Choice D is distorted. Choice (C)

- 23.** Option A: Choice A cannot be inferred. "They could now win elections without bothering too much about welfare" only refers to one aspect of electioneering. It tells us that they didn't have to pay too much attention to the working class but it doesn't give us enough to infer whether they had an easy (or difficult) time winning elections. Choice A is not the answer.

Option B: In Britain, the cooperative stores were replaced by the supermarkets. This was the consumer society. Thatcherism and Reaganism did not create it. They were products of it. Hence choice B is incorrect.

Option C: Choice C cannot be inferred. "They could now win elections without bothering too much about welfare" only tells us that they didn't have to pay too much attention to the working class - it doesn't give us enough to infer whether they actually paid attention (and if so, how much) to them or not. Choice C is not the answer.

Option D: Choice D is the answer. They could now win elections without bothering too much about the welfare of a working class who were no longer, for the first time in history, the majority class; they were indeed rapidly becoming an under-class – depolitized, unorganized and no longer protected by the competitive party systems of democracy.

Choice (D)

- 24.** The liberal state as it developed in the last two centuries in Europe and North America created a framework within which people could lead their private and commercial lives with a minimum of interference. That political class consisted sometimes of democratic socialists representative of a majority working-class movement or sometimes of Conservatives or Christian democrats accepting or developing enough of a welfare state to defuse discontent with the system.

Option A: "They could not win elections without bothering too much about the welfare of a working class" is true of Britain and not necessarily of North America.

Option B: Between them there were serious policy differences centering on attempts to redistribute income, somewhat – but **never to kill the goose that laid the golden eggs, the capitalist market system**. Hence choice B is the answer.

Option C: Business interests resented higher taxation for political or moral ends and often talked hysterically about the very system of private enterprise being near collapse, which was never so. But choice C is not specific to the question and is not the answer.

Option D: Choice D is negated by the last para of the passage. Political leaders in Britain who had been wont on platforms and in memoirs to ascribe British democracy and freedoms to the great traditions of service in local government and in voluntary bodies, suddenly began to

downgrade and even rubbish local government as a wild card in national politics and election strategies a further undercutting of local government which was not so long ago believed to be at the very roots of democracy. Hence choice D is not the answer.

Choice (B)

25. Statement 1: The parties concentrated their efforts on the middle ground: lower taxation replaced public expenditure as election cries. So 1 is true.
 Statement 2: Party leaders and managers became openly and unashamedly more interested in immediate election tactics, projection of personality, and in media presentation than in thinking through and advocating ideas and policies related to long term social needs. Hence 2 is not true.
 Statement 3: ... make speeches aimed at reviving volunteering – good for the soul, certainly, but also for savings on government services. Therefore 3 is true.
 Statement 4: Political leaders in Britain who had been wont on platforms and in memoirs to ascribe British democracy and freedoms to the great traditions of service in local government and in voluntary bodies, suddenly began to downgrade and even rubbish local government as a wild card in national politics and election strategies further undercutting of local government which was not so long ago believed to be at the very roots of democracy. Hence 4 is not true.
 Statement 5: The parties concentrated their efforts on the middle ground: lower taxation replaced public expenditure as election cries. Considering limits on or cuts in public expenditure with a view to thereby lower taxes would also amount to 'a relook at public expenditure'. So, 5 is true.
 The answer is 135. Ans: (135)

Solutions for questions 26:

26. In part 1, the word 'tronie' needs to be preceded by the article 'a'. (The 17th century Dutch word for a head would imply that 'tronie' is a noun.)
 In part 2, the adjective 'improbable' needs to be replaced with the adverb 'improbably'. The adverb, here, modifies the adjective 'large'.
 Part 3 is error-free.
 In part 4, we could say: it looks like polished tin rather than like pearl OR it looks more like polished tin than like pearl...! Both would be appropriate comparisons. The error is in the sequence that follows, where we could have either: the specular reflection, the pear shape and the large size of the earring OR, ... the specular reflection, pear shape and large size of the earring
 Part 5 has an error of subject verb agreement. The plural subjects 'subtle colour scheme' and 'intimacy of the girl's gaze' need a plural verb 'have'. So 'has' needs to be replaced with 'have'. Ans: (3)

Solutions for questions 27:

27. The pulse of the patient could not be felt. Stertorous is characteristic of breathing having a heavy snoring sound. Convulsive means resembling a convulsion in being sudden and violent; resembling a spasm. Choices 4 and 5 make the sentence equivalent and are the answers.
 'onerous' has a connotation of 'labour-intensive, burdensome, troublesome or oppressive' but cannot be used to describe breathing. One can only say onerous task, onerous duties, onerous agreement etc. Execrable means hateful, very bad. Oppugnant means combative, antagonistic, or contrary. 'Preternatural' means being outside of nature; supernatural; extraordinary. 'Preternatural' does not point to a problem in breathing. Ans: (45)

Solutions for questions 28:

28. On a careful reading of the sentences, it can be observed that sentence 5 is a general sentence that begins the paragraph. It describes a personal mission statement as a personal constitution. Sentences 5 and 3 form a mandatory

pair. "not something that you write overnight" in sentence 5 links with "many rewrites to produce it in final form" in sentence 3. Sentence 3 is followed by sentence 2. "many rewrites to produce it in final form" in sentence 3 links with "several weeks or even months before you feel really comfortable with it" in sentence 2. Also "deep introspection, careful analysis, thoughtful expression" in sentence 3 links with "complete and concise expression of your innermost values and directions" in sentence 2. Sentence 1 follows sentence 2. "Even then, you will want to review it regularly and make minor changes" in sentence 1 follows "final form" in sentence 3 and "comfortable with it, complete and concise expression" in sentence 2. So, 5321. Sentence 4 concludes the para. "fundamentally, your mission statement becomes the solid expression of your vision and values, the criterion ..." is a standalone sentence and it also mirrors the introduction. Hence, 53214.

Ans: (53214)

Solutions for Questions 29 to 34:

Number of words and Explanatory notes for RC:

Number of words: 683

29. Option A: Some classifications seem to be organic or natural because they have existed and been acknowledged for a very long time; such, for instance, is the classification of the Hindu population of India into its castes. So choice A is a parameter used for the classification of people in an Indian society. Hence it is not the answer.
 Option B: Some classifications seem to be organic or natural because they have existed and been acknowledged for a very long time; such, for instance, is the classification of the Hindu population of India into its subcastes. So choice B is a parameter used for the classification of people in an Indian society. Hence it is not the answer.
 Option C: Other classifications appear to be rational rather than natural because they are based on the kinds of impersonal criteria we feel ought to be used for making significant distinctions among people; such, for instance, is the classification of people according to their occupation. So choice C is a parameter used for the classification of people in an Indian society. Hence it is not the answer.
 Option D: There is pervasive inequality in India because of its all-round poverty, its general economic backwardness, and its slow rate of economic growth. Extremes of wealth and poverty are characteristic features of economically backward societies. So choice D is a reason for the presence of inequality in a nation. It is not a parameter used for the classification of people in an Indian society. Hence choice D is the answer.

Choice (D)

30. Refer to the last para of the passage.

Option A: We often use a geological metaphor and speak of social stratification, as if the whole of society were divided into layers or strata, arranged one on top of another in the way in which the layers of the earth are arranged. But the second part of choice A does not explain the question. Hence choice A is not the answer.

Option B: But this is only a metaphor which can never do full justice to the complex and fluid patterns in which groups, classes and categories are arranged in a real human society. Hence choice B is the correct answer.

Option C: The author does say - "Other classifications appear to be rational rather than natural because they are based on the kinds of impersonal criteria we feel ought to be used for making significant distinctions among people; such, for instance, is the classification of people according to their occupation." However, since this situation coexists with "Some classifications seem to be organic or natural because they have existed and been acknowledged for a very long time; such, for instance, is the classification of the Hindu population of India into its castes and subcastes", the situation is complex. So, choice C presents only one part of the complexity, not all of it.

Option D: If it is true that discrimination is the essence of classification then a great deal will hinge around the

classification which determines who the weaker sections are. It would be a mistake to assume that such a classification is self-evident, or that it is natural. But choice D is not specific to the question.

Choice (B)

31. Option A: An encyclopedia contains articles on various topics, often arranged in alphabetical order, dealing either with the whole range of human knowledge or with one particular subject. This passage is penned by an author who is fully focussed on discussing a single topic viz inequality in India. Hence choice A is not likely the source of the passage and is the answer.

Option B: The passage is, most likely, an extract from a book that deals with the reasons for inequality in the Indian society. The passage also provides us with the author's point of view at a number of places. Hence choice B can be a likely source and is not the correct answer.

Option C: The purpose of a magazine is to report news of some kind, or even fiction, in a longer form than a newspaper but much more flexible than a book. Serious journals that cater to special interest areas (for instance, a magazine of sociological review) could present content such as this. Hence choice C can be a likely source and is not the correct answer.

Option D: Even the op-ed pages of a newspaper, or a weekly supplement with social and cultural content could present such content as this passage has. Hence choice D can be a likely source and is not the correct answer.

Choice (A)

32. All the answer choices except choice D inform us why there are inequalities in India. But the question is about its being more visible. Refer to the first para of the passage which reads "Even though inequalities exist in all societies, they are in general more visible in agrarian as compared to industrial societies". India being an agrarian society, the inequalities are more visible. Refer to the third para of the passage. When we look at our traditional agrarian hierarchy, we are struck equally by the number of intermediaries that stood between the landlord and the tiller of the land. The proliferation of invidious distinctions is a feature also of our modern social life. Hence choice C is the answer.

Option A: **It has been said** that many of these new distinctions are an artefact of colonial rule; even so, colonial rule found in our society a fertile soil for generating distinctions of rank... A stagnant agrarian economy, long under colonial domination, has had very little scope for the loosening of its social rigidities. **They would say that** there is pervasive inequality in India because of its all-round poverty, its general economic backwardness, and its slow rate of economic growth. There is little mobility, and the barriers between the classes and strata appear to be almost insurmountable. In a society characterized by immobility, an individual's personal qualities appear to be of less account than the group of which he is a part. But choice A is not specific to the question.

Option B: Again choice B is not specific to the question. It

has only been mentioned in the passage that some classifications seem to be organic or natural because they have existed and been acknowledged for a very long time. Option D: Choice D is out of scope. It can be true of any nation and not India only. It does not answer the question.

Choice (C)

33. According to the passage (Last sentence in the second para), 'the subordination of the individual to the group is a feature of our traditional social order; it is a feature that does not harmonize very easily with 'our new legal order'. This implies that the new legal order upholds an individual's prominence over the group to which he or she belongs.

Option B: Individuals tend to live and die in the station of life into which they are born; marriage also is fairly strictly regulated. But we cannot infer from the passage that in the new legal order, acceptance of inter-caste marriage is a fait accompli. Fait accompli means a thing that has already happened or been decided before those affected hear about it, leaving them with no option but to accept it. So choice B is not the answer.

Option C: In a society characterized by immobility, an individual's personal qualities appear to be of less account than the group of which he is a part. The new legal order upholds an individual's prominence over the group to which he or she belongs. Hence choice C is not the answer,

Option D: Choice D is a feature of the traditional social order and not of the new legal order. So choice D is not the answer.

Choice (A)

34. Refer to the end of the fourth para, where the author talks about the paradox and where it becomes evident. The last two sentences "For there is kind" explains how the process to end discrimination is based on discriminating rules. This brings out a paradox inherent in the process of discrimination itself. {For there is all the difference in the world between a form of protective discrimination from which a disprivileged community, class or section as a whole benefits, and one from which only a few of its individual members benefit. A great deal of what passes for protective discrimination or affirmative action is in fact of the latter rather than the former kind.} Hence choice D is the correct answer. The remaining choices do not apply.

Choice (D)

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

SECTION – II

Solutions for questions 1 to 4:

Given that the number of books with each of them was a distinct prime number less than 25. Hence, they can have 2, 3, 5, 7, 11, 13, 17, 19 or 23 books. Further, the total number of books with the five of them was an even number. Hence, there must be four odd number of books and one even number of books. Hence, one of them definitely has 2 books.

Also, the number of books with any two of them was not a prime number. Since one of them has 2 books, no one else can have 3 books (because the sum of 2 and 3 will be a prime number), 5 books, 11 books, 17 books. Hence, the remaining prime numbers are 2, 7, 13, 19, 23.

Since we are left with only five numbers, the number of books with the five of them must be 2, 7, 13, 19 and 23 (we need not check for sum of any other numbers because sum of any other pair of prime numbers will always be even and, therefore, will not be a prime).

Given that Kishore had more than double the number of books that Praveen had. Hence, Praveen can have 2/7 books, while Kishore can have 13/19/23 books.

Also, Rajesh had less than one third the number of books that Trived had. Hence, Rajesh can have $\frac{2}{7}$ books, while Trived can have $\frac{7}{13}/19/23$ books.

Since both Rajesh and Praveen can have only $\frac{2}{7}$ books, one of them must have 2 books and the other 7 books. Also, Rajesh had more number of books than Praveen. Hence, Rajesh must have 7 books and Praveen, 2 books.

Since Rajesh has 7 books, Trived must have 23 books. Since Praveen has 2 books, Kishore can have $\frac{13}{19}$ books. Also, Ankit had less number of books than Kishore. Hence, Ankit must have 13 books and Kishore, 19 books.

The following table provides the number of books each person has:

Person	Praveen	Rajesh	Ankit	Kishore	Trived
Number of Books	2	7	13	19	23

1. Ankit has 13 books. Ans: (13)
2. The total books with the five of them = 64. Ans: (64)
3. For three pairs of numbers – (2, 7); (2, 13); (2, 19) – the given condition is satisfied. Ans: (3)
4. The difference between the number of books with Kishore and Trived = 4. Ans: (4)

Solutions for questions 5 to 8:

Let the marks deducted for each incorrect answer be m . The marks awarded for each correct answer will be $4m$.

Let the number of questions that A through F answered correctly be $5a$, $5b$, $5c$, $5d$, $5e$ and $5f$ respectively. The number of questions that they answered incorrectly will be $4a$, $4b$, $4c$, $4d$, $4e$ and $4f$.

For A, $5a \times 4m - 4a \times m = 256 \Rightarrow am = 16$

The number of questions that A answered correctly will be $\frac{80}{m}$ and those that A answered incorrectly will be $\frac{64}{m}$.

Similarly for B, $bm = 8$

The number of questions that B answered correctly will be $\frac{40}{m}$ and those that A answered incorrectly will be $\frac{32}{m}$.

Similarly, $cm = 14$, $dm = 12$, $em = 18$ and $fm = 10$.

We can find the number of questions answered correctly and incorrectly for the six students.

This is provided in the table below.

Student	Correct Answers	Incorrect Answers
A	$\frac{80}{m}$	$\frac{64}{m}$
B	$\frac{40}{m}$	$\frac{32}{m}$
C	$\frac{70}{m}$	$\frac{56}{m}$
D	$\frac{60}{m}$	$\frac{48}{m}$
E	$\frac{90}{m}$	$\frac{72}{m}$
F	$\frac{50}{m}$	$\frac{40}{m}$

Since $4m$ is an integer, m can take values of $\frac{1}{4}, \frac{1}{2}, 1, 1.25, 1.5, 2\dots$

However, since the number of correct and incorrect answers must be integers for all the students, m cannot take values 1.25 or 1.5 (as at least one value in the table when divided by these numbers will not be integers). Similarly, for any value greater than 2, all the values in the table will not be integers.

Hence, m can take values of $\frac{1}{4}, \frac{1}{2}, 1$ or 2 and $4m$ can only be 1, 2, 4 or 8.

5. To minimize the number of questions in the test, we need to take the maximum possible value of m .

Hence, for $m = 2$, the minimum possible number of questions can be found by using the data for E, since the number of questions answered correctly (or incorrectly) is the maximum for E.

The number of questions answered correctly by E = 45 and the number of questions answered incorrectly = 36.
Minimum total number of questions in the test = 81

Choice (A)

6. The student who can attempt all the questions in the test can only be E (since he attempted the maximum number of questions).

To maximize the number of questions unattempted by any student, we need to maximize the number of questions attempted by E.

To maximize this, we need to consider the least possible value of m , i.e., $\frac{1}{4}$.

For $m = \frac{1}{4}$, number of questions attempted by E (which is the same as the number of questions in the test)

$$= \frac{162}{\frac{1}{4}} = 648$$

The student who answered the least number of questions is B.

$$\text{Number of questions answered by B} = \frac{72}{\frac{1}{4}} = 288$$

$$\text{Number of questions left unattempted by B} = 360 - 288 = 72$$

Ans: (360)

7. The difference between the number of questions attempted correctly and number of questions attempted incorrectly is the maximum for E. This is because for any student, the number of questions attempted correctly and incorrectly are in the ratio 5:4. For E, the number of questions attempted correctly and that answered incorrectly is the maximum and hence, the difference will also be maximum.

For $m = 2$, required difference = $45 - 36 = 9$

For $m = 1$, required difference = $90 - 72 = 18$

For $m = \frac{1}{2}$, required difference = $180 - 144 = 36$

For $m = \frac{1}{4}$, required difference = $360 - 288 = 72$

From the given condition, $m = 2$.

Hence, the number of marks awarded to a question answered correctly = $4m = 8$

Choice (A)

8. Let A be the total number of questions attempted by a student.

Let U be the total number of questions not attempted by the student.

$$\text{From the given ratio, } \frac{A+U}{U} = \frac{5}{2} \Rightarrow U = \frac{2A}{3}$$

$$\text{Total number of questions in the test} = A + \frac{2A}{3} = \frac{5A}{3}$$

Since one of the students did not attempt $2A/3$ questions, we can start with the person who attempted the least number of questions. For this case, we can check whether the total number of questions in the test is greater than the maximum number of questions that any one attempted.

B attempted the minimum number of questions = $72/m$

$$\text{Total number of questions in the test} = \frac{5}{3} \times \frac{72}{m} = \frac{120}{m}$$

However, E attempted $162/m$ questions. Hence, this is not possible.

Consider F (as F attempted the second lowest number of questions).

Number of questions attempted by F = $90/m$

Number of questions in the test = $150/m$

Hence, this is also not possible.

Consider D (as D attempted the third lowest number of questions).

Number of questions attempted by D = $108/m$

Total number of questions in the test = $180/m$

In this case, E can attempt $162/m$ questions.

Hence, the minimum possible number of questions in the test = $180/m$.

The minimum value of this is obtained when $m = 2$.

Hence, minimum possible number of questions in the test = 90

Ans: (90)

Solutions for questions 9 to 12:

Given that the distance travelled per trip by the five trains are in the ratio 1:2:3:4:5. Let d be the distance travelled by Train A. Train B, C, D and E travel $2d$, $3d$, $4d$ and $5d$ respectively.

Total variable cost corresponding to distance travelled for Train A = $8d$

For Train B, C, D and E, the variable cost corresponding to distance will be $4d$, $18d$, $18d$ and $17.5d$ respectively.

9. Given that 100 passengers travelled in Train A and Train C.

Total cost of the trip for Train A = $600 + 500 + 8d$

Total cost of the trip for Train C = $450 + 250 + 18d$

Given that the total cost was the same.

Hence, $1100 + 8d = 700 + 18d \Rightarrow d = 40$

Distance per trip for Train A = $d = 40$

Choice (B)

10. Let the number of passengers in Train C be x .

Total cost of a trip for Train C = $450 + 2.5x + 18d$

Total cost of a trip for Train D = $650 + 425 + 18d$

Given that $450 + 2.5x + 18d = 1075 + 18d \Rightarrow x = 250$

Choice (C)

11. Let p be the number of passengers that travelled in any train.

Total cost for a trip for Train E = $750 + 6.5p + 17.5d$

This has to be greater than the total cost for each of the other trains.

Comparing with cost of Train A,

$750 + 6.5p + 17.5d > 600 + 5p + 8d \Rightarrow 1.5p > -150 - 9.5d$

Comparing with cost of Train B,

$750 + 6.5p + 17.5d > 500 + 7p + 4d \Rightarrow p < 500 + 27d$

Comparing with the cost of Train C,

$750 + 6.5p + 17.5d > 450 + 2.5p + 18d \Rightarrow p > 0.5d - 300$

Comparing with the cost of Train D,

$750 + 6.5p + 17.5d > 650 + 8.5p + 18d \Rightarrow p < 50 - 0.25d$

Since the distance is always positive, the number of passengers must be less than 50.

Choice (C)

12. Given that the cost of Train B is greater than that of Train D.

The fixed cost of Train B is less than that of Train D.

The variable cost per km of Train B is less than that of Train D.

The distance travelled by Train B is less than that of Train D.

The variable cost per passenger of Train B is less than that of Train D.

The only possibility for the total cost of Train B to be greater than that of Train D is if there are more number of passengers in Train B.
Choice (A)

Solutions for questions 13 to 16:

13. Number of persons who attended the classes in June
 $= 160 + 200 \times 0.5 + 120 \times 0.25 = 290$
 Number of persons who attended the classes in July
 $= 140 + 160 \times 0.5 + 200 \times 0.25 = 270$
 Number of persons who attended the classes in August
 $= 180 + 140 \times 0.5 + 160 \times 0.25 = 290$
 Number of persons who attended the classes in September
 $= 220 + 180 \times 0.5 + 140 \times 0.25 = 345$
 Number of persons who attended the classes in October
 $= 100 + 220 \times 0.5 + 180 \times 0.25 = 255$
 Hence, the maximum number of persons attended the classes in September.
Choice (D)
14. Let the number of persons who joined in January, February and March be j, f and m respectively.
 Number of persons who attended the classes in January = j (since the classes started from January 2016).
 Number of persons who attended the classes in February
 $= f + \frac{j}{2}$
 Since the number of persons who attended in January and February are the same, $f + \frac{j}{2} = j \Rightarrow f = \frac{j}{2}$
 Number of persons who attended the classes in March
 $= m + \frac{j}{2} + \frac{j}{4} = m + \frac{j}{4} + \frac{j}{4} = m + \frac{j}{2}$
 Also, $m + \frac{j}{2} = j \Rightarrow m = \frac{j}{2}$
 Number of persons who attended the classes in April
 $= 120 + \frac{m}{2} + \frac{j}{4} = 120 + \frac{j}{4} + \frac{j}{8} = 120 + \frac{3j}{8}$
 Also, $120 + \frac{3j}{8} = j \Rightarrow \frac{5j}{8} = 120 \Rightarrow j = 192$
Choice (C)

15. Number of persons who attended the classes in June, July, August, September and October are 290, 270, 290, 345 and 255 respectively.
 Percentage decrease in the number of persons who attended the classes was the highest for October.
Choice (D)

16. Let the number of persons who joined in November and December be n and d respectively.
 Number of persons who attended classes in November
 $= n + 105$
 Number of persons who attended classes in December
 $= d + \frac{n}{2} + 25$
 The number of persons who attended classes in December is at least 10% and at most 20% more than the number of persons who attended in November.
 Hence, to maximize the value of d, we can consider an increase of both 10% and 20%.
 For 10% increase, $d + \frac{n}{2} + 25 = 1.1 \times (n + 105)$
 $\Rightarrow d = 0.6n + 90.5$
 For 20% increase,
 $d + \frac{n}{2} + 25 = 1.2 \times (n + 105) \Rightarrow d = 0.7n + 101$
 We can see that d is higher for 20% increase and for d to be high, n should also be high.
 We can consider that the increase in the number of students be 20% in each month.
 Number of students who attended in November = $255 \times 1.2 = 306$
 In this case, n = 201. But n has to be divisible by 4 (information given in the question).
 Hence, n can be 200.
 The value of d can be $305 \times 1.2 - 100 - 25 = 241$
 Since d must also be a multiple of 4, the maximum value of d is 240.
Choice (B)

Solutions for questions 17 to 20:

Let 1 to 7 represent the positions in which the seven persons were standing, from left to right.
 From (iii), there were four persons to the left of Karan and to the right of the heaviest person.
 Karan can be at 6 or 7 and the heaviest person can be at 1 or 2.
 Consider that Karan is at 6. The heaviest person must be at 1. From (i), Mahi can be at 7 or 6 or 5. But Mahi cannot be at 6 since Karan is at 6. If Mahi is at 5, the fourth heaviest person must be at 1. This is not possible because the heaviest person is at 1. Hence, Mahi must be at 7 and the fourth heaviest person must be at 3. From (ii), Yusuf must be at 5 and the third heaviest person must be at 2.
 From (vii), there must be at least one person to the left of Gaurav and to the right of the fourth heaviest person. Since the fourth heaviest person is at 3, Gaurav must be at 5 or 6 or 7. Since Gaurav cannot be at 5 or 6 or 7, this case is not possible.

Consider that Karan is at 7 and the heaviest person is at 2. From (i), Mahi must be at 5 and the fourth heaviest person must be at 1. From (ii), Yusuf must be at 6 and the third heaviest person must be at 3.

From (v), Pavan can be at position 1 or 2. Consider that Pavan is at 1. The sixth heaviest person must be Yusuf. From (iv), Rahul must be at 3 and the second heaviest person must be Karan. From (vi), Gaurav must be at 2 and the seventh heaviest person must be Mahi. But in this case, no one is standing to the left of Gaurav and to the right of the fourth heaviest person. Hence, this case is not possible.

Consider that Pavan is at 2. The sixth heaviest person must be Karan. From (iv), Rahul must be at 1 and Mahi must be the second heaviest person. From (vi), Gaurav must be at 3 and Yusuf must be at seventh heaviest person. Lokesh must be at 4 and must be the fifth heaviest person. Only in this case, at least one person is standing to the left of Gaurav and to the right of the fourth heaviest person.

The order in which they were standing and the ranks of their weights in ascending order from 1 to 7 is given in the following table:

Position	1	2	3	4	5	6	7
Person	Rahul	Pavan	Gaurav	Lokesh	Mahi	Yusuf	Karan
Rank of Weight	4	1	3	5	2	7	6

17. Three persons are standing to the left of Lokesh.
Choice (A)
18. Pavan is the heaviest person.
Choice (A)
19. Four persons are standing to Mahi's left. Of the four, three persons are lighter than him.
Choice (C)
20. The given condition is satisfied only for Gaurav.
Choice (B)

Solutions for questions 21 to 24:

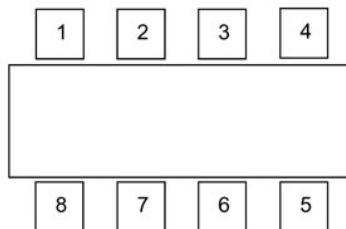
From the cumulative runs scored by each player, we can calculate the number of runs scored in each year by each player. This is presented in the following table:

Player	2010	2011	2012	2013	2014	2015	2016
MD	700	500	700	400	200	300	500
KV	600	800	600	200	100	500	800
PJ	800	400	400	500	600	900	100

21. In only one year (2012) did MD score more than each of KV and PJ.
Choice (B)
22. The total runs scored by the three players was the least in 2014 (900 runs).
Choice (A)
23. In 2015, for KV, the percentage increase was the highest at 400%.
Choice (C)
24. Given that in the seven years, the three players won the award six times. MD could have been awarded at most 1 time. KV could have been awarded at most two times. PJ could have been awarded at most 4 times. Even if PJ was not awarded in one year, he would still have won more number of times than the other two players. Hence, PJ would have won the award the maximum number of times.
Choice (A)

Solutions for questions 25 to 28:

Let 1 to 8 represent the eight chairs around the table as shown the following figure:



From (i), the chairs opposite at least two empty chairs were occupied. In total, there are only three empty chairs. Hence, all the chairs opposite empty chairs were occupied.

From (ii), two chairs which were not at extreme ends were occupied. We can take 6 and 7 to be empty or 2 and 3 to be empty. It will result in the same case (rotated by 180 degrees). Let us consider that 6 and 7 were empty. Hence, chairs 2 and 3 must be occupied. Also, one chair among 1 and 4 must be empty (since there was at least one empty chair on each side).

From (iii), D can be at 8 or at 4. He cannot be at 2 or 3 because the chair opposite him is not empty. Also he cannot be at 1 because he cannot be to the left of any one. Similarly, he cannot be at 5 for the same reason.

Consider that D is at 8. The person sitting at 1 must be wearing a Black hat. The person wearing Green hat must be at 5. Since one chair among 1 and 4 must be empty, 4 must be empty.

From (v), B and the person wearing the Yellow hat must be at 3 and 2 (the person wearing the Yellow hat cannot be at 1 because the person sitting at 1 is wearing a Black hat).

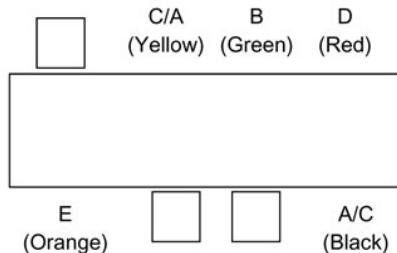
From (iv), E is not wearing a Yellow hat and the chair opposite E is empty. Hence, E must be at 5. Since D is sitting to the left of the person wearing a Green hat, E must be wearing a Green hat.

Since E is wearing a Green hat, B must be wearing an Orange hat which violates condition (v). Hence, this case is not possible.

Consider that D is at 4. The person sitting at 5 must be wearing a Black hat. Since one chair among 1 and 4 must be empty, 1 must be empty. The person wearing Yellow hat and B can only be at 2 and 3.

Since D is sitting to the left of the person wearing a Green hat, B must be wearing a Green hat. E is not wearing a Yellow hat and the chair opposite him is empty. Hence, E must be at 8 and must be wearing an Orange hat. C and A must be at 2 and 5 in any order.

The following figure shows the positions of the persons around the table, with a blank box representing an empty chair:



25. E was wearing an Orange hat. Choice (B)
26. The chair opposite B, who was wearing the Green hat was empty. Choice (D)
27. For none of the persons given in the options can it be said that they were definitely not sitting opposite an empty chair.
Choice (D)
28. A must be sitting opposite D. The person sitting to the left of C must be wearing a Green hat.
Choice (B)

Solutions for questions 29 to 32:

From (i), Flower A is not Red and not Blue. Also, Flower A can have 4/5/6/7 petals and the Blue flower can have 2/3/4/5 petals. From (ii), Red flower has 4 petals. Hence, the Blue flower can have 2/3/5 petals. Also, Flower A is not Red and hence, Flower A can have 5/6/7 petals. Combining the possibilities for Flower A and Blue flower, we get that the Blue flower can have 3/5 petals and Flower A can have 5/7 petals.

From (ii), Flower D has three petals more than Green flower. Hence, Flower D can have 5/6/7 petals and Green flower can have 2/3/4 petals. Since the Red flower has 4 petals, Flower D can have 5/6 petals and Green flower can have 2/3 petals.

From (iii), Yellow flower has one petal more than Flower E. Hence, Yellow flower can have 3/5/6/7 petals (4 petals is not possible). Flower E can have 2/4/5/6 petals.

From (iv), Flower B has three petals more than Yellow flower. Hence, Yellow flower cannot have 5/6/7 petals. Hence, Yellow flower has 3 petals. Flower E has 2 petals and Flower B has 6 petals.

Since Flower B has 6 petals, Flower D has 5 petals. Flower A must have 7 petals.

Also, from (i), Blue flower must have 5 petals. Hence, Flower D must be the Blue Flower.

Since Green flower can have 2/3 petals, and Yellow flower has 3 petals, Green flower must have 2 petals. Flower E must be the Green flower.

From (iv), Flower C is not red. Flower C can only have 3/4 petals. Since Flower C is not red and red flower has 4 petals, Flower C must have 3 petals. Hence, Flower C must be Yellow.

From (iv), Flower B is not Black and Flower B has 6 petals. Flower B can only be Orange (because all the other colours have different number of petals). Hence, orange flower has 6 petals and Black flower has 7 petals. Flower A must be Black. Hence, Flower F must be Red.

The following table provides the colour of each flower and the number of petals in each flower:

Flower	Colour	Number of Petals
Flower A	Black	7
Flower B	Orange	6
Flower C	Yellow	3
Flower D	Blue	5
Flower E	Green	2
Flower F	Red	4

29. Flower A is black. Choice (B)
30. Flower F is red. Choice (D)
31. The Orange flower has 6 petals. Choice (B)
32. The difference between the number of petals that the Yellow flower has and the number of petals that Flower D has is 2.
Choice (C)

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

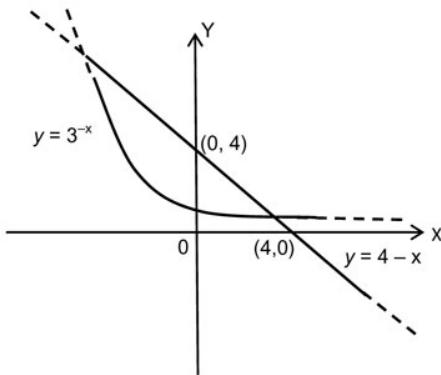
SECTION – III

Solutions for questions 1 and 2:

1. If the smaller of two numbers is a and the greater is b , the possible values of a and the corresponding values of b (such that $a + b \geq 20$) and the number of ordered pairs (a, b) are given below.
If $a = 1, 3, 5, 7, 9$, there are respectively 1, 2, 3, 4, 5 values of b such that $a + b \geq 20$, i.e. a total of 15 pairs (a, b) .
If $a \geq 11$, there are 5C_2 i.e. 10 values of (a, b) . Thus, in all, there are 25 pairs (a, b) such that $a + b \geq 20$.

Choice (A)

2. We have $3^{-x} = 4 - x$
The graphs of $y = 3^{-x}$ and $y = 4 - x$ are shown below



We can see that there will be exactly 2 points of intersection of $y = 3^{-x}$ and $y = 4 - x$.

Alternative Solution:

Consider x to be negative.
Clearly for $x < -2$, $3^{-x} > 9$ and $(3^{-x} + x) > 9 - 2$, i.e., 7. Also, for $0 > x > -1$, $1 < 3^{-x} < 3$, and $0 < (3^{-x} + x) < 2$.
Hence, there must be one point when $-2 < x < -1$, where $(3^{-x} + x)$ becomes equal to 4 (when x is negative). Using similar analysis, we can show that there is exactly one point when $2 < x < 3$ where $3^{-x} + x = 4$ (when x is positive). Hence, two roots.

Choice (C)

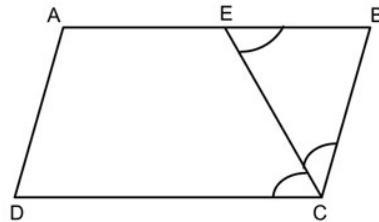
Solutions for question 3:

3. $4^{57} + 8^{57}$ is divisible by $(4 + 8) = 12$.
 $5^{57} + 7^{57}$ is divisible by $(5 + 7) = 12$.
 6^5 is divisible by 12.
∴ The given expression is divisible by 12.
Units digits of 4^{57} , 5^{57} , 6^{57} , 7^{57} and 8^{57} are 4, 5, 6, 7, 8 respectively.
Sum of units digits = $4 + 5 + 6 + 7 + 8 = 30$.
∴ Sum of the powers ends is zero.
 $\Rightarrow 4^6 + 5^6 + 6^6 + 7^6 + 8^6$ is also divisible by 10.
∴ The expression is divisible by both 10 and 12
 \Rightarrow It is divisible by 60 and hence by 15.
∴ Remainder is zero.

Ans: (0)

Solutions for question 4:

4.



$$\angle ECB = \angle ECD \quad (\because ED \text{ bisects } \angle C)$$

also $\angle ECB = \angle ECD \quad (\because AB \parallel CD)$

$$\therefore \angle ECB = \angle ECB$$

i.e., $\triangle CED$ is isosceles

$$\therefore BE = BC = 4$$

Note: ED = AE is not needed

Choice (B)

Solutions for question 5:

5. Given that for every ₹4 increase in the selling price per bottle, the number of bottles sold decreases by 20.
∴ if selling price of each bottle is increased by ₹4 k times, then the selling price per bottle is ₹ $48 + 4k$.
∴ Profit per bottle = $(48 + 4k) - 40 = 8 + 4k$
Number of bottles sold = $600 - 20k$
∴ Profit obtained = $(8 + 4k)(600 - 20k)$
= $80(2 + k)(30 - k)$
= $80[60 + 28k - k^2]$
= $80[256 - 196 + 28k - k^2]$
= $80[256 - (k - 14)^2]$
Profit obtained is maximum when $k = 14 = 0$
∴ $k = 14$
Hence selling price of each bottle = $48 + 56 = ₹104$ and the number of bottles sold = $600 - 280 = 320$, and maximum profit = $(104 - 40)(320) = 64 \times 320 = 20480$

Ans: (20480)

Solutions for question 6:

6. $a = 6^{1/2}, b = 6, c = 6^{3/2}, d = 6^2, e = 6^{5/2}$
 $(a \times b \times c \times d \times e)^{20} = \left(6^{\frac{1}{2}} + 1 + \frac{3}{2} + 2 + \frac{5}{2}\right)^{20} = 6^{150}$
 $\log 6^{150} = 150 \log 6 = 150(\log 2 + \log 3) = 150(0.7781) = 116.715$
So the number of digits is 116 + 1 = 117.

Choice (B)

Solutions for questions 7 to 9:

7. Given in MS
 $2N = D(k) + 10$ ————— (1)
(where k is a natural number)
 $\Rightarrow D > 10$ ————— (a)

Consider statement I:

$$N = 2D(p) + 26 \quad (2)$$

(where p is a natural number)

$$\Rightarrow 2D > 26, \text{i.e., } D > 13 \quad (b)$$

Now (1) – 2 × (2)

$$\Rightarrow D(k - 4p) = 42$$

$$\Rightarrow D \times (\text{some natural number}) = 42$$

$$\Rightarrow D = 42 \text{ or a factor of } 42 \quad (c)$$

Now, considering the conclusions (a), (b) and (c) together, there is a set of possible values of D , where $D = 42$ or 21 or 14.

∴ There is no contradiction.

∴ MS is not inconsistent with I.

Consider statement II:

$$N = D(m) + 17 \quad (3)$$

(where m is a natural number)

$$\Rightarrow D > 17 \quad (\text{d})$$

$$\text{Now, } (1) = 2 \times (3)$$

$$\Rightarrow D(k - 2m) = 24 \Rightarrow D \times (\text{some natural number}) = 24$$

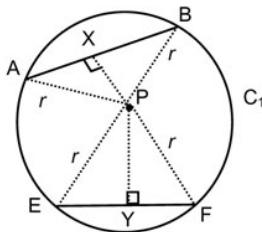
$$\Rightarrow D = 24 \text{ or a factor of } 24 \quad (\text{e})$$

Now, considering conclusions (a), (d) and (e) together, there is a possible values for D, where D = 24.

\therefore There is no contradiction. \therefore MS is not inconsistent with II. Hence MS is inconsistent with neither I nor II.

Choice (D)

8.



The basic situation given in the MS is shown in the diagram above. Now, if AB and EF are chords of the same circle C_1 and their perpendicular bisectors intersect at P.

\Rightarrow P is the centre of the circle C_1 .

$$AP = BP = EP = FP = r(\text{radius of circle}) \quad (\text{a})$$

Also given, EF = 6 cm and AB = 14 cm

Consider statement I:

Given PY = 11 cm and PX = 9 cm

$$\Rightarrow PA = \sqrt{AX^2 + PX^2} = \sqrt{\left(\frac{14}{2}\right)^2 + 9^2} = \sqrt{130} \text{ cm}$$

$$\text{Similarly, we get } PA = PB = PE = PF = \sqrt{130} \text{ cm} \quad (\text{b})$$

Since the conclusions (a) and (b) are not contradicting each other, MS is not inconsistent with I.

Consider statement II:

Given PY = 7 cm and PX = 6 cm

$$\text{Now } PA = PB = \sqrt{AX^2 + PX^2}$$

$$= \sqrt{\left(\frac{14}{2}\right)^2 + 6^2} = \sqrt{85} \text{ cm}$$

$$\text{But } PE = PF = \sqrt{EY^2 + PY^2} = \sqrt{\left(\frac{6}{2}\right)^2 + 7^2} = \sqrt{58} \text{ cm}$$

$$\text{Hence, } PA = PB \neq PE = PF \quad (\text{c})$$

Since the conclusions (a) and (c) contradict each other, MS and II are inconsistent with each other.

Hence, MS is inconsistent with II but not inconsistent with I.

Choice (B)

9. Consider statement I:

Since Bunty attempted a total of 49 questions, his maximum possible net score = $49 \times 4 = 196$ marks. Now, for each question (out of the 49) that he answered incorrectly his net score will go down by 5 marks.

Hence his score must be of the form $196 - 5w$, where $w = 0, 1, 2, 3, \dots$

But according to the information given in the MS, the net score of Bunty was 124, which is not of the form $196 - 500$. Hence MS is inconsistent with I.

Consider statement II:

For twenty mistakes Bunty would earn a penalty of 20 marks. Hence if he attempted 'a' question in total, then his net score will be $(a - 20)4 - 20$ marks

$$\Rightarrow 4a - 100 \text{ marks.}$$

\Rightarrow He attempted 20 or more question and his final score is of the form $(4a - 100)$, where $a \geq 20$.

According to the MS, his net score is 124, which can be of the form $4a - 100$, for $a \geq 20$. Hence there is no contradiction and MS is not inconsistent with II.

Choice (A)

Solutions for questions 10 to 13:

10. Consider

$$\begin{aligned} S &= a + ar + ar^2 + \dots + ar^{n-2} + ar^{n-1} \\ S - a &= ar + ar^2 + \dots + ar^{n-3} + ar^{n-2} \\ &= r(a + ar + \dots + ar^{n-3} + ar^{n-2}) \\ &= r(S - ar^{n-1}) \\ \Rightarrow r &= \frac{S - a}{S - ar^{n-1}} = \frac{S - T_1}{S - T_n} \\ \Rightarrow r &= \frac{3069 - 3}{3069 - 1536} = \frac{3066}{1533} = 2 \end{aligned}$$

Alternative Solution:

Given $ar^{n-1} = 1536$ and $a = 3$.

$$\Rightarrow r^{n-1} = \frac{1536}{3} = 512.$$

Now, by looking at the choices, none of the values of r given, except 2, when raised to a natural number can give 512.

Choice (C)

11. Had both P and Q belonged to the same gender, they should have stated the same ratio of females in the class.

But $\frac{7}{11} \neq \frac{12}{19} \Rightarrow$ one of P and Q is a male and the other is a

female. Clearly since $\frac{7}{11} > \frac{12}{19}$, P must be male and Q

female. [Note that the basic reasoning is itself sufficient to eliminate both choices (A) and (D)]

Now, the 'number of classmates' is same for both P and Q, and equal to $N - 1$, where N is the total number of students in the class. For easy comparison we should try to convert

$\frac{7}{11}$ and $\frac{12}{19}$ into ratios with the same denominator.

$$\therefore \frac{7}{11} = \frac{7 \times 19x}{11 \times 19x} = \frac{133x}{209x}$$

$$\text{and } \frac{12}{19} = \frac{12 \times 11x}{19 \times 11x} = \frac{132x}{209x}$$

The difference between the number of female classmates as stated by P and Q should be one (since P and Q belong to different genders)

$$133x - 132x = 1 \Rightarrow x = 1 \text{ and}$$

No. of classmates = $N - 1 = 209$

$$\Rightarrow N = 210$$

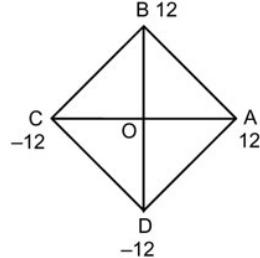
\therefore No. of students in the class is 210.

\therefore Only statement I is true.

Choice (B)

12. Given $|x - 7| + |y - 9| = 12$

The graph of the equation $|x| + |y| = 12$ is as follows



$$\text{The area of the } \triangle OAB = \frac{1}{2} (OA)(OB) = \frac{1}{2} (12)(12) = 72$$

\therefore The area of the ABCD = $4 \times \Delta OAB = 4 \times 72 = 288$
The graph of $|x - 7| + |y - 9| = 12$ graph is the same, except that the centre of the square is (7, 9) instead of (0, 0).
 \therefore The area enclosed by the graph of $|x - 7| + |y - 9| = 12$ is the same as that by $|x| + |y| = 12$.

\therefore Hence the area is 288 sq.units. Choice (D)

13. The difference must be divisible by 9, and further must be of the form $9 \times m \times AB$ (or CD) where m is between 0 to 8 (both inclusive) and AB (or CD) is any 2-digit number. Only Choice (C) satisfies these two conditions.

Choice (C)

Solution for question 14:

14. Let number of students in the batch be = x
Then number of male students are = $0.3x$ and 0% of females have work experience
 $\Rightarrow 0.07x$ females have work experience.
Using I alone, $0.2x$ have work experience
 \Rightarrow The number of male who have work experience is $0.13x$
Hence I alone is sufficient.
Using II alone, the number of males having work experience is 1.25 times $0.07x = 0.0875x$.
Hence II alone is also sufficient. Choice (C)

Solutions for question 15:

15. Let $x = \overline{8p1} = 0.8p18p18p1\dots$

$$1000x = 8p1 \cdot \overline{8p1}$$

$$\Rightarrow 999x = 8p1 \Rightarrow x = \frac{8p1}{999}$$

$$\text{Given } \frac{n}{540} = 0.8p1 = \frac{8p1}{999}$$

$$\Rightarrow n = \frac{540}{999} \times 8p1 = \frac{20}{37} \times 8p1$$

Since n is an integer, 8p1 should be a multiple of 37. The only number between 800 and 900 ending in 1 which is a multiple of 37, is 851.

$\therefore p = 5$. ($851 = 37 \times 23$)

$$\therefore n = \frac{20}{37} \times 851 = 460$$

$$\therefore n + p = 460 + 5 = 465$$

Ans: (465)

Solutions for questions 16 and 17:

16. Since $x = \text{some non-negative quantity} + 1$
 \Rightarrow The graph cannot touch the line $x = 0$
i.e., the y-axis (it must be completely to the right of y-axis)
 \therefore Choices (A) and (B) are eliminated.
Further, if $y = 0$, then $x = 1$, and if $x = 1$, then $y = 0$ or 2 hence the graph cuts or touches $x = 1$ at two places. Also, (by observation) the least possible value of $x = 1$.
 \Rightarrow Choice (D) is also eliminated. Choice (C)

17. It is given, that $f(x+y) - f(x) - f(y) = 6xy + 3$

Putting $x = 1$ and $y = 0$, we get

$$f(1-0) - f(1) - f(0) = 3$$

$$\Rightarrow f(0) = -3$$

Putting $x = 1$ and $y = -1$ we get,

$$f(1-1) - f(1) - f(-1) = 6(1)(-1) + 3$$

$$f(1) + f(-1) = 0$$

$$\Rightarrow f(1) = -f(-1)$$

Putting $x = 2$ and $y = -1$ we get

$$f(2-1) - f(2) - f(-1) = 6(2)(-1) + 3$$

$$f(1) - f(-1) = f(2) - 9$$

$$\therefore f(2) = 2f(1) + 9 [\therefore -f(-1) = f(1)]$$

Putting $x = 2$ and $y = 1$, we get

$$f(2+1) - f(2) - f(1) = 6(2)(1) + 3$$

$$\Rightarrow f(3) = 15 + f(2) + f(1)$$

$$\Rightarrow f(3) = 15 + 3f(1) + 9$$

$$f(-1) = 6 \therefore f(1) = -6$$

$$\therefore f(3) = 3f(1) + 24 = 3(-6) + 24 = 6$$

Choice (C)

Solutions for questions 18 and 19:

18. Volume of the cuboid = $(42 \times 6) = 96$

$$\text{Volume of the cylinder} = \pi r^2 h = \pi (2\sqrt{2})^2 (6) = 48\pi$$

$$\text{Unoccupied volume} = 48\pi - 96$$

$$\text{The gap between the cylinder and cube} = (4\sqrt{2}) - \frac{4}{2}$$

i.e. ≈ 0.8 inches. Hence in the gap only one cylinder can be placed by considering the diameter. As the height is 6 inches, a total of $4 \times \left[\frac{6}{0.8} \right]$ i.e. 28 spheres can be placed.

Ans: (28)

$$19. \left(1 - \frac{1}{4}\right) \left(1 - \frac{1}{9}\right) \left(1 - \frac{1}{16}\right) \dots \left(1 - \frac{1}{n^2}\right)$$

$$= \left(1 + \frac{1}{2}\right) \left(1 - \frac{1}{2}\right) \left(1 + \frac{1}{3}\right) \left(1 - \frac{1}{3}\right) \left(1 + \frac{1}{4}\right) \left(1 - \frac{1}{4}\right) \dots \left(1 + \frac{1}{n}\right) \left(1 - \frac{1}{n}\right)$$

$$= \left(1 + \frac{1}{2}\right) \left(1 + \frac{1}{3}\right) \left(1 + \frac{1}{4}\right) \dots \left(1 + \frac{1}{n}\right) \times \left(1 - \frac{1}{2}\right) \left(1 - \frac{1}{3}\right) \left(1 - \frac{1}{4}\right) \dots \left(1 - \frac{1}{n}\right)$$

$$= \left(\frac{3}{2} \cdot \frac{4}{3} \cdot \frac{5}{4} \dots \frac{n}{n-1} \cdot \frac{n+1}{n}\right) \cdot \left(\frac{1}{2} \cdot \frac{2}{3} \cdot \frac{3}{4} \dots \frac{n-2}{n-1} \cdot \frac{n-1}{n}\right)$$

$$= \frac{n+1}{2} \cdot \frac{1}{n} = \frac{n+1}{2n}$$

$$\text{If } \frac{n+1}{2n} \geq 0.51 \Rightarrow \frac{1}{2} + \frac{1}{2n} \geq 0.51$$

$$\Rightarrow \frac{1}{2n} \geq 0.01$$

$$\Rightarrow n \leq \frac{1}{2 \times 0.01} \Rightarrow n \leq \frac{1}{0.02} \Rightarrow n \leq 50$$

Ans: (50)

Solutions for questions 20 to 22:

20. Given,

$$\log_4 3 + \log_4 \left(3^x - \frac{8}{3}\right) = 2 \log_4 (3^x - 2)$$

$$\Rightarrow \log_4 \left[3 \left(3^x - \frac{8}{3}\right) \right] = \log_4 (3^x - 2)^2$$

$$\Rightarrow 3 \left(3^x - \frac{8}{3}\right) = (3^x - 2)^2$$

$$= 3 \cdot 3^x - 8 = (3^x)^2 - 4 \cdot 3^x + 4$$

$$\Rightarrow (3^x)^2 - 7 \cdot 3^x + 12 = 0$$

$$\Rightarrow (3^x - 3)(3^x - 4) = 0$$

$$\therefore 3^x = 3 \text{ or } 3^x = 4$$

$$\therefore x = 1 \text{ or } x = \log_3 4$$

Choice (A)

21. $-x - x - x - x - x - x - x -$

In an eight digit number, there are nine gaps. The digit crossed out could be from any of these nine gaps. The digit crossed out can be any of the ten digits 0 – 9 except in the 1st gap. Where zero is not allowed.

\therefore Total nine-digit numbers that exist satisfying the given condition is $9 \times 10 - 1 = 89$

Choice (B)

22. In the calculation of relative speeds, the effect of the speed of current will be nullified. Hence, it will be similar to the situation of them travelling on the ground.

∴ The time taken by them, even when they swap their directions, is 24 minutes only.
Choice (B)

Solutions for questions 23 and 24:

23. The concentration of milk in the jar at the end of day 2 would be maximum if $\frac{(120-x)}{120} \times \frac{x}{120} \times 100\%$ is maximum

i.e., $x(120-x)$ is maximum
let A = x and B = 120 - x
 $A + B = 120$ (A constant)
Alternately if $f(x) = 120x - x^2$
 $f(x)$ will be maximum when $f'(x) = 0$

$$\text{i.e., } 120 - 2x = 0$$

$$\Rightarrow x = 60$$

Therefore the maximum possible concentration of milk in the jar at the end of day 2

$$= \left(\frac{(120-x)}{120} \right) \left(\frac{x}{120} \right) \times 100\%$$

$$= \left(\frac{120-60}{120} \right) \left(\frac{60}{120} \right) \times 100\% = 25\%$$

Choice (C)

24. The concentration of milk in the jar at the end of day 1
 $= \left(\frac{120-x}{120} \right) \times 100\%$

The concentration of milk in the jar at the end of day 2

$$= \frac{x}{120} \left(\frac{120-x}{120} \right) \times 100\%$$

The concentration of milk in the jar at the end of the day 3

$$= \left(\frac{120-x}{120} \right) \left(\frac{x}{120} \right) \left(\frac{120-x}{120} \right) \times 100\%$$

Proceeding like this, the concentration of milk in the jar at the end of day 5

$$= \left(\frac{120-x}{120} \right) \left(\frac{x}{120} \right) \left(\frac{120-x}{120} \right) \left(\frac{x}{120} \right) \left(\frac{120-x}{120} \right) \times 100\%$$

The above concentration will be maximum when $(120-x)^3 (x)^2$ is maximum

$$\text{Let } 120-x = A \text{ and } x = B$$

Now, $A^3 B^2$ is to be maximum where

$A + B = 120$ (i.e., constant)

$A^3 B^2$ will be maximum when $\frac{A}{3} = \frac{B}{2}$

Alternatively, let us re-write

$$(120-x)^3 (x)^2 \text{ as } \left(\frac{120-x}{3} \right) \left(\frac{120-x}{3} \right) \left(\frac{120-x}{3} \right) \left(\frac{x}{2} \right) \left(\frac{x}{2} \right) (108)$$

We know that for a given sum, the product is maximum when the variables have the same value.

$$\frac{120-x}{3} + \frac{120-x}{3} + \frac{120-x}{3} + \frac{x}{2} + \frac{x}{2} = 120 \quad [\text{A constant}]$$

Product of the above terms will be maximum when all the terms are equal

$$\therefore \frac{120-x}{3} = \frac{x}{2}$$

$$\Rightarrow 240 - 2x = 3x$$

$$\Rightarrow 5x = 240$$

$$\therefore x = 48$$

Thus the concentration of milk at the end of day 5 will be maximum when $x = 48$.
Ans: (48)

Solutions for questions 25 to 27:

25. Let the base of the number system be n and the two-digit number be ab .

$$\text{Given } 2(ab)_n = (ba)_n$$

$$\Rightarrow nb + a = 2na + 2b$$

$$\Rightarrow a(2n-1) = b(n-2)$$

$$\Rightarrow \frac{a}{b} = \frac{n-2}{2n-1}$$

Now the maximum possible value of a or b is $(n-1)$ (i.e., in base n)

for $n = 3$ we get $\frac{a}{b} = \frac{1}{5}$, which is not possible.

Similarly, $n = 4$ is not possible, but for $n = 5$

We get $\frac{a}{b} = \frac{3}{9}$, i.e., $\frac{1}{3}$. Hence, the least possible value of n is 5.

$\therefore a = 1, b = 3$ is the only number possible when n is the least possible.

$$\therefore \text{The correct wage} = (13)_5 = (8)_{10}$$

$$\text{The actual wage paid} = (31)_5 = (16)_{10}$$

$$\therefore \text{Excess wage paid} = (8)_{10} \quad \text{Choice (A)}$$

26. Given that 1 and -2 are two of the roots of

$$\ell x^3 + mx^2 + nx + p = 0$$

$$\Rightarrow \ell + m + n + p = 0 \quad \dots (1) \text{ and}$$

$$-8\ell + 4m - 2n + p = 0 \quad \dots (2)$$

$$(1) - (2) \Rightarrow 9\ell - 3m + 3n = 0$$

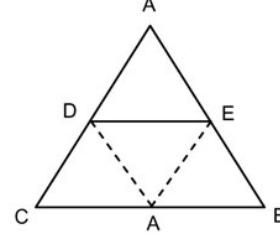
$$\Rightarrow 3\ell - m + n = 0 \quad \dots (3)$$

Given that $\ell x + my + n = 0$ represents a family of straight lines passing through a fixed point. So, the point which satisfies the equation of each of these lines is the fixed point.

But from (3) we have $\ell(3) + m(-1) + n = 0$

$\therefore (3, -1)$ is the fixed point. Choice (D)

27. Height of the trapezium DEBC = Height of ADE.



$\therefore D$ & E are midpoints of AC & AB respectively.

$$\therefore \frac{AD}{AC} = \frac{1}{2} = \frac{AE}{EB} \text{ and}$$

$$\frac{h_{ADE}}{h_{ABC}} = \frac{1}{2} \Rightarrow \frac{\Delta_{ADE}}{\Delta_{ABC}} = \frac{1}{4} \Rightarrow \frac{\text{Area of } ADE}{\text{Area of } ADEBC} = \frac{1}{3}$$

As the area of trapezium DEBC is 45, the area of $\triangle ADE$ = 15 and the area of the $\triangle ABC$ = 60 Choice (D)

Solutions for questions 28 and 29:

28. Let the set be $A = \{a_1, a_2, \dots, a_n\}$

$$Y = a_1a_2 + a_1a_3 + \dots + a_1a_n + a_2a_3 + \dots + a_2a_n + \dots + a_{n-1}a_n$$

All the a 's are odd. Therefore all the terms of Y are also odd. The number of terms in Y is $(n-1)n/2$

The possibilities for n , $n(n-1)/2$, and the parity (odd/even nature) of Y are tabulated below.

N	$\frac{n(n-1)}{2}$	Parity of Y
4k	$2k(4k-1)$	Even
4k + 1	$(4k+1)(2k)$	Even
4k + 2	$(2k+1)(4k+1)$	Odd
4k + 3	$(4k+3)(2k+1)$	Odd

We see that

I is not necessarily true.

- II is not necessarily true.
 III is necessarily true.
 IV is necessarily true.

Ans: (2211)

29. Time taken by P to fill
- $\frac{3}{4}$
- th of the tank

$$= 12 \left(\frac{3}{4} \right) = 9 \text{ minutes}$$

Time taken by Q to empty upto $\frac{1}{4}$ th of the tank from $\frac{3}{4}$ th of the tank = $\frac{1}{2}(20) = 10$ minutes
 Time taken for P again to fill upto $\frac{3}{4}$ th of the tank from $\frac{1}{4}$ th of the tank = 6 minutes.

This cycle will continue:

$$(9 + 10) + (6 + 10) + (6 + 10) + (6 \dots \dots)$$

In the remaining three minutes Q will empty $\frac{3}{20}$ of the tank.

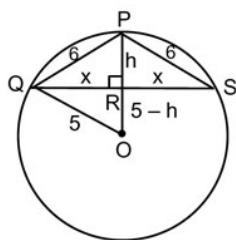
$$\therefore \frac{3}{4} - \frac{3}{20} = \frac{15-3}{20} = \frac{12}{20} = \frac{3}{5}$$

The water in the tank is $\frac{3}{5}$ th of the tank.

Ans: (0.60)

Solutions for questions 30 and 31:

30.



Since P is equidistant from both Q and S, P will lie on the perpendicular bisector of \overline{QS} . Similarly, O also lies on the perpendicular bisector of \overline{QS} .

Hence, OP is perpendicular to QS and bisects QS.

Let QR = x and PR = h

$$\text{In } \triangle PQR, x^2 + h^2 = 36 \quad \dots \dots (1)$$

$$\text{In } \triangle OQR, (5-h)^2 + x^2 = 25 \quad \dots \dots (2)$$

$$(1) - (2) : h^2 - (5-h)^2 = 11$$

$$\Rightarrow h = 3.6 \text{ cm}$$

As $h = 3.6 \text{ cm}$, $[6(0.6) \text{ and } PQ = 6 = 10 (0.6)]$, $x = 8(0.6) \text{ or } 4.8 \text{ cm}$

Hence the length of the chord QS = $2x = 9.6 \text{ cm}$.

Choice (A)

31. To minimize the number of students who received at least one gift, assume that all the students except a certain group of
- k
- students give gifts to that group of
- k
- students.

Also, among this group of k students, each student would have given gifts to all other students of the group.Now, these k students gave gifts to $k-1$ students. Each student of this group has to give a gift to one more student, that student must be from other than this group. \therefore At least $(k+1)$ students received at least one gift.

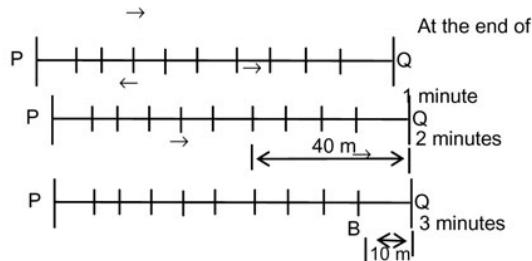
Alternative Solution:

By assuming $n = 3$, $k = 1$ and $n = 3$, $k = 2$, we can easily eliminate the choices and arrive at the answer.

Choice (B)

Solutions for questions 32 and 33:

32. Let us divide the length of the pool into ten parts and their respective positions after every minute are

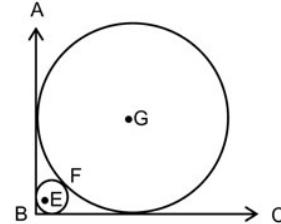


At the beginning of the third minute B is 20 m behind A. For every 3 m covered by A, B will gain 4 m on A. Hence, for B to gain 20 m on A and to meet him (i.e., for the second time) A must cover $20 \times \frac{3}{4} = 15$ m. Hence A and B will be $40 - 15 = 25$ m from Q. Choice (C)

33. It can be seen from the third figure that they meet for the third time at 10 m from Q.
-
- Now A travelled
- $100 - 10 = 90$
- m by now. The time taken was
- $90/30 = 3$
- minutes. Choice (D)

Solutions for question 34:

34.



Let the centres of the bigger and smaller circles be denoted by G and E respectively.

Let F be the point of contact of the two circles.

$$BE = \sqrt{2}r$$

$$BG = \sqrt{2}R$$

$$BE + EF + FG = \sqrt{2}R$$

$$\sqrt{2}r + r + R = \sqrt{2}R$$

$$r = \frac{\sqrt{2}-1}{\sqrt{2}+1}R = (3-2\sqrt{2})R$$

$$\therefore r : R = 3 - 2\sqrt{2}$$

Alternative solution:

Clearly $(r : R) < 1$. Choices (B), (C) and (E) can be eliminated since they are greater than 1. Also, choice (D) evaluates to approximately 0.76, which can be rejected intuitively, since, from observing the figure, we can conclude that $r : R$ is definitely less than 0.5. Hence, choice (A).

Choice (A)

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

Solutions for questions 32 and 33:

32. Let us divide the length of the pool into ten parts and their respective positions after every minute are