CAT 2023 Slot 2 Question Paper

Conducted by the Indian Institute of Management Lucknow (IIM Lucknow)

Time Allowed: 2 Hours | **66 Questions** | **Maximum Marks: 198**

General Instructions

(i) This paper contains **66 questions** from **CAT 2023 Slot 2**, held on **26 November 2023**. The original examination was a **computer-based test** with a **120-minute** duration.

(ii) The question groups appear in their original sequence: **Verbal Ability and Reading Comprehension** (24 questions); **Data Interpretation and Logical Reasoning** (20 questions); **Quantitative Ability** (22 questions).

(iii) Each section is timed separately: **40 minutes per section**. A candidate cannot switch between sections during the test.

(iv) The paper has **multiple choice questions (MCQs)**, each with four options and one correct answer, and **Type In The Answer (TITA)** questions.

(v) **Marking scheme: +3** for a correct answer; **-1** for an incorrect MCQ; **no negative marking** for TITA questions; and **0** for an unanswered question.

(vi) For TITA questions, enter the answer in the space provided. An on-screen calculator was available in the original test.

Questions 1 to 4

The passage below is accompanied by four questions. Based on the passage, choose the best answer for each question.

The Positivists, anxious to stake out their claim for history as a science, contributed the weight of their influence to the cult of facts. First ascertain the facts, said the positivists, then draw your conclusions from them. . . . This is what may [be] called the common-sense view of history. History consists of a corpus of ascertained facts. The facts are available to the historian in documents, inscriptions, and so on . . . [Sir George Clark] contrasted the "hard core of facts" in history with the surrounding pulp of disputable interpretation forgetting perhaps that the pulpy part of the fruit is more rewarding than the hard core. . . . It recalls the favourite dictum of the great liberal journalist C. P. Scott: "Facts are sacred, opinion is free.". . .

What is a historical fact? . . . According to the common-sense view, there are certain basic facts which are the same for all historians and which form, so to speak, the backbone of history—the fact, for example, that the Battle of Hastings was fought in 1066. But this view calls for two observations. In the first place, it is not with facts like these that the historian is primarily concerned. It is no doubt important to know that the great battle was fought in 1066 and not in 1065 or 1067, and that it was fought at Hastings and not at Eastbourne or Brighton. The historian must not get these things wrong. But [to] praise a historian for his accuracy is like praising an architect for using well-seasoned timber or properly mixed concrete in his building. It is a necessary condition of his work, but not his essential function. It is precisely for matters of this kind that the historian is entitled to rely on what have been called the "auxiliary sciences" of history—archaeology, epigraphy, numismatics, chronology, and so forth. . . .

The second observation is that the necessity to establish these basic facts rests not on any quality in the facts themselves, but on an apriori decision of the historian. In spite of C. P. Scott's motto, every journalist knows today that the most effective way to influence opinion is by the selection and arrangement of the appropriate facts. It used to be said that facts speak for themselves. This is, of course, untrue. The facts speak only when the historian calls on them: it is he who decides to which facts to give the floor, and in what order or context. . . . The only reason why we are interested to know that the battle was fought at Hastings in 1066 is that historians regard it as a major historical event. . . . Professor Talcott Parsons once called [science] "a selective system of cognitive orientations to reality." It might perhaps have been put more simply. But history is, among other things, that. The historian is necessarily selective. The belief in a hard core of historical facts existing objectively and independently of the interpretation of the historian is a preposterous fallacy, but one which it is very hard to eradicate.

1. According to this passage, which one of the following statements best describes the significance of archaeology for historians?

(A) Archaeology helps historians to locate the oldest civilisations in history.

(B) Archaeology helps historians to ascertain factual accuracy.

(C) Archaeology helps historians to carry out their primary duty.

(D) Archaeology helps historians to interpret historical facts.

2. All of the following, if true, can weaken the passage's claim that facts do not speak for themselves, EXCEPT:

(A) the truth value of a fact is independent of the historian who expresses it.

(B) a fact, by its very nature, is objective and universal, irrespective of the context in which it is placed.

(C) facts, like truth, can be relative: what is fact for person X may not be so for person Y.

(D) the order in which a series of facts is presented does not have any bearing on the production of meaning.

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3. If the author of the passage were to write a book on the Battle of Hastings along the lines of his/her own reasoning, the focus of the historical account would be on:

(A) exploring the socio-political and economic factors that led to the Battle.

(B) producing a detailed timeline of the various events that led to the Battle.

(C) deriving historical facts from the relevant documents and inscriptions.

(D) providing a nuanced interpretation by relying on the auxiliary sciences.

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4. All of the following describe the "common-sense view" of history, EXCEPT:

(A) real history can be found in ancient engravings and archival documents.

(B) only the positivist methods can lead to credible historical knowledge.

(C) history is like science: a selective system of cognitive orientations to reality.

(D) history can be objective like the sciences if it is derived from historical facts.

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5. Five jumbled up sentences (labelled 1, 2, 3, 4 and 5), related to a topic, are given below. Four of them can be put together to form a coherent paragraph. Identify the odd sentence and key in the number of that sentence as your answer.

1. The banning of Northern Lights could be considered a precursor to censoring books for "moral", world view or religious reasons.
2. Attempts to ban books are attempts to silence authors who have summoned immense courage in telling their stories.
3. Now the banning and challenging of books in the US has escalated to an unprecedented level.
4. The widely acclaimed fantasy novel Northern Lights was banned in some parts of the US, and was the second most challenged book in the US.
5. The American Library Association documented an unparalleled number of reported book challenges in 2022, about 2,500 unique titles.

Type in the answer.

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6. The passage given below is followed by four alternate summaries. Choose the option that best captures the essence of the passage. People spontaneously create counterfactual alternatives to reality when they think "if only" or "what if" and imagine how the past could have been different. The mind computes counterfactuals for many reasons. Counterfactuals explain the past and prepare for the future, they implicate various relations including causal ones, and they affect intentions and decisions. They modulate emotions such as regret and relief, and they support moral judgments such as blame. The ability to create counterfactuals develops throughout childhood and contributes to reasoning about other people's beliefs, including their false beliefs.

(A) Counterfactuals help people to prepare for the future by understanding intentions and making decisions.

(B) People create counterfactual alternatives to reality for various reasons, including reasoning about other people's beliefs.

(C) Counterfactual alternatives to reality are created for a variety of reasons and is part of one's developmental process.

(D) Counterfactual thinking helps to reverse past and future actions and reason out false beliefs.

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7. There is a sentence that is missing in the paragraph below. Look at the paragraph and decide where (option 1, 2, 3, or 4) the following sentence would best fit. Sentence: Dualism was long held as the defining feature of developing countries in contrast to developed countries, where frontier technologies and high productivity were assumed to prevail. Paragraph: ___(1)___. At the core of development economics lies the idea of 'productive dualism': that poor countries' economies are split between a narrow 'modern' sector that uses advanced technologies and a larger 'traditional' sector characterized by very low productivity.___(2)___. While this distinction between developing and advanced economies may have made some sense in the 1950s and 1960s, it no longer appears to be very relevant. A combination of forces have produced a widening gap between the winners and those left behind.___(3)___. Convergence between poor and rich parts of the economy was arrested and regional disparities widened.___(4)___. As a result, policymakers in advanced economies are now grappling with the same questions that have long preoccupied developing economies: mainly how to close the gap with the more advanced parts of the economy.

(A) Option 1

(B) Option 2

(C) Option 3

(D) Option 4

Questions 8 to 11

The passage below is accompanied by four questions. Based on the passage, choose the best answer for each question.

The Second Hand September campaign, led by Oxfam . . . seeks to encourage shopping at local organisations and charities as alternatives to fast fashion brands such as Primark and Boohoo in the name of saving our planet. As innocent as mindless scrolling through online shops may seem, such consumers are unintentionally—or perhaps even knowingly —contributing to an industry that uses more energy than aviation. . . .

Brits buy more garments than any other country in Europe, so it comes as no shock that many of those clothes end up in UK landfills each year: 300,000 tonnes of them, to be exact. This waste of clothing is destructive to our planet, releasing greenhouse gasses as clothes are burnt as well as bleeding toxins and dyes into the surrounding soil and water. As ecologist Chelsea Rochman bluntly put it, "The mismanagement of our waste has even come back to haunt us on our dinner plate."

It's not surprising, then, that people are scrambling for a solution, the most common of which is second-hand shopping. Retailers selling consigned clothing are currently expanding at a rapid rate . . . If everyone bought just one used item in a year, it would save 449 million lbs of waste, equivalent to the weight of 1 million Polar bears. "Thrifting" has increasingly become a trendy practice. London is home to many second-hand, or more commonly coined 'vintage', shops across the city from Bayswater to Brixton.

So you're cool and you care about the planet; you've killed two birds with one stone. But do people simply purchase a second-hand item, flash it on Instagram with #vintage and call it a day without

considering whether what they are doing is actually effective?

According to a study commissioned by Patagonia, for instance, older clothes shed more microfibres. These can end up in our rivers and seas after just one wash due to the worn material, thus contributing to microfibre pollution. To break it down, the amount of microfibres released by laundering 100,000 fleece jackets is equivalent to as many as 11,900 plastic grocery bags, and up to 40 per cent of that ends up in our oceans. . . . So where does this leave second-hand consumers? [They would be well advised to buy] high-quality items that shed less and last longer [as this] combats both microfibre pollution and excess garments ending up in landfills. . . .

Luxury brands would rather not circulate their latest season stock around the globe to be sold at a cheaper price, which is why companies like ThredUP, a US fashion resale marketplace, have not yet caught on in the UK. There will always be a market for consignment but there is also a whole generation of people who have been taught that only buying new products is the norm; second-hand luxury goods are not in their psyche. Ben Whitaker, director at Liquidation Firm B-Stock, told Prospect that unless recycling becomes cost-effective and filters into mass production, with the right technology to partner it, "high-end retailers would rather put brand before sustainability."

8. The central idea of the passage would be undermined if:

(A) customers bought all their clothes online.

(B) clothes were not thrown and burnt in landfills

(C) second-hand stores sold only high-quality clothes.

(D) Primark and Boohoo recycled their clothes for vintage stores

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9. According to the author, companies like ThredUP have not caught on in the UK for all of the following reasons EXCEPT that:

(A) recycling is currently not financially attractive for luxury brands.

(B) luxury brands want to maintain their brand image.

(C) luxury brands do not like their product to be devalued.

(D) the British don't buy second-hand clothing.

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10. Based on the passage, we can infer that the opposite of fast fashion, 'slow fashion', would most likely refer to clothes that:

(A) are of high quality and long lasting.

(B) do not bleed toxins and dyes.

(C) are sold by genuine vintage stores.

(D) do not shed microfibres.

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11. The act of "thrifting", as described in the passage, can be considered ironic because it:

(A) has created environmental problems.

(B) is not cost-effective for retailers

(C) offers luxury clothing at cut-rate prices.

(D) is an anti-consumerist attitude.

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12. **The passage given below is followed by four alternate summaries. Choose the option that best captures the essence of the passage.** Heatwaves are becoming longer, frequent and intense due to climate change. The impacts of extreme heat are unevenly experienced; with older people and young children, those with pre-existing medical conditions and on low incomes significantly more vulnerable. Adaptation to heatwaves is a significant public policy concern. Research conducted among at-risk people

in the UK reveals that even vulnerable people do not perceive themselves as at risk of extreme heat; therefore, early warnings of extreme heat events do not perform as intended. This suggests that understanding how extreme heat is narrated is very important. The news media play a central role in this process and can help warn people about the potential danger, as well as about impacts on infrastructure and society.

(A) Protection from heat waves is important but current reports and public policies seem ineffective.

(B) People are vulnerable to heatwaves caused due to climate change, measures taken are ineffective.

(C) Heatwaves pose an enormous risk; the media plays a pivotal role in alerting people to this danger.

(D) News stories help in warning about heatwaves, but they have to become more effective.

Questions 13 to 16

The passage below is accompanied by four questions. Based on the passage, choose the best answer for each question.

Umberto Eco, an Italian writer, was right when he said the language of Europe is translation. Netflix and other deep-pocketed global firms speak it well. Just as the EU employs a small army of translators and interpreters to turn intricate laws or impassioned speeches of Romanian MEPs into the EU's 24 official languages, so do the likes of Netflix. It now offers dubbing in 34 languages and subtitling in a few more. . . .

The economics of European productions are more appealing, too. American audiences are more willing than before to give dubbed or subtitled viewing a chance. This means shows such as "Lupin", a French crime caper on Netflix, can become global hits. . . . In 2015, about 75% of Netflix's original content was American; now the figure is half, according to Ampere, a media-analysis company. Netflix has about 100 productions under way in Europe, which is more than big public broadcasters in France or Germany. . . .

Not everything works across borders. Comedy sometimes struggles. Whodunits and bloodthirsty maelstroms between arch Romans and uppity tribesmen have a more universal appeal. Some do it better than others. Barbarians aside, German television is not always built for export, says one executive, being polite. A bigger problem is that national broadcasters still dominate. Streaming services, such as Netflix or Disney+, account for about a third of all viewing hours, even in markets where they are well-established. Europe is an ageing continent. The generation of teens staring at phones is outnumbered by their elders who prefer to gawp at the box.

In Brussels and national capitals, the prospect of Netflix as a cultural hegemon is seen as a threat. "Cultural sovereignty" is the watchword of European executives worried that the Americans will eat their lunch. To be fair, Netflix content sometimes seems stuck in an uncanny valley somewhere in the mid-Atlantic, with local quirks stripped out. Netflix originals tend to have fewer specific cultural references than shows produced by domestic rivals, according to Enders, a market analyst. The company used to have an imperial model of commissioning, with executives in Los Angeles cooking up ideas French people might like. Now Netflix has offices across Europe. But ultimately the big decisions rest with American executives. This makes European politicians nervous.

They should not be. An irony of European integration is that it is often American companies that facilitate it. Google Translate makes European newspapers comprehensible, even if a little clunky, for the continent's non-polyglots. American social-media companies make it easier for Europeans to talk politics across borders. (That they do not always like to hear what they say about each other is another matter.) Now Netflix and friends pump the same content into homes across a continent, making culture a cross-border endeavour, too. If Europeans are to share a currency, bail each other out in

times of financial need and share vaccines in a pandemic, then they need to have something in common—even if it is just bingeing on the same series. Watching fictitious northern and southern Europeans tear each other apart 2,000 years ago beats doing so in reality.

13. Based on information provided in the passage, all of the following are true, EXCEPT:

(A) European television productions have the potential to become global hits.

(B) Netflix has been able to transform itself into a truly European entity.

(C) only half of Netflix's original programming in the EU is now produced in America.

(D) national broadcasters dominate in the EU in terms of total television viewing hours.

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14. The author sees the rise of Netflix in Europe as:

(A) a unifying force.

(B) filling an entertainment gap.

(C) a looming cultural threat.

(D) an economic threat.

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15. Based only on information provided in the passage, which one of the following hypothetical Netflix shows would be most successful with audiences across the EU?

(A) An Italian comedy show hosted by an international star.

(B) An original German TV science fiction production.

(C) A murder mystery drama set in North Africa and France.

(D) A trans-Atlantic romantic drama set in Europe and America.

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16. Which one of the following research findings would weaken the author's conclusion in the final paragraph?

(A) Research shows there is a wide variance in the popularity and viewing of Netflix shows across different EU countries.

(B) Research shows that Netflix has been gradually losing market share to other streaming television service providers.

(C) Research shows that Netflix hits produced in France are very popular with North American audiences.

(D) Research shows that older women across the EU enjoy watching romantic comedies on Netflix, whereas younger women prefer historical fiction dramas.

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17. Five jumbled up sentences (labelled 1, 2, 3, 4 and 5), related to a topic, are given below. Four of them can be put together to form a coherent paragraph. Identify the odd sentence and key in the number of that sentence as your answer.

1. Self-care particularly links to loneliness, behavioural problems, and negative academic outcomes.

2. "Latchkey children" refers to children who routinely return home from school to empty homes and take care of themselves for extended periods of time.

3. Although self-care generally points to negative outcomes, it is important to consider that the bulk of research has yet to track long-term consequences.

4. In research and practice, the phrase "children in self-care" has come to replace "latchkey" in an effort to more accurately reflect the nature of their circumstances.

5. Although parents might believe that self-care would be beneficial for development,

recent research has found quite the opposite.

Type in the answer.

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18. The four sentences (labelled 1, 2, 3 and 4) given below, when properly sequenced, would yield a coherent paragraph. Decide on the proper sequencing of the order of the sentences and key in the sequence of the four numbers as your answer.

1. Contemporary African writing like 'The Bottled Leopard' voices this theme using two children and two backgrounds to juxtapose two varying cultures.
2. Chukwuemeka Ike explores the conflict, and casts the Western tradition as condescending, enveloping and unaccommodating towards local African practice.
3. However, their views contradict the reality, for a rich and sustaining local African cultural ethos exists for all who care, to see and experience.
4. Western Christian concepts tend to deny or feign ignorance about the existence of a genuine and enduring indigenous African tradition.

Type in the answer.

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19. The four sentences (labelled 1, 2, 3 and 4) given below, when properly sequenced, would yield a coherent paragraph. Decide on the proper sequencing of the order of the sentences and key in the sequence of the four numbers as your answer.

1. Like the ants that make up a colony, no single neuron holds complex information like self-awareness, hope or pride.
2. Although the human brain is not yet understood enough to identify the mechanism by which emergence functions, most neurobiologists agree that complex interconnections among the parts give rise to qualities that belong only to the whole.
3. Nonetheless, the sum of all neurons in the nervous system generate complex human emotions like fear and joy, none of which can be attributed to a single neuron.
4. Human consciousness is often called an emergent property of the human brain.

Type in the answer.

Questions 20 to 23

The passage below is accompanied by four questions. Based on the passage, choose the best answer for each question.

Over the past four centuries liberalism has been so successful that it has driven all its opponents off the battlefield. Now it is disintegrating, destroyed by a mix of hubris and internal contradictions, according to Patrick Deneen, a professor of politics at the University of Notre Dame. . . . Equality of opportunity has produced a new meritocratic aristocracy that has all the aloofness of the old aristocracy with none of its sense of noblesse oblige. Democracy has degenerated into a theatre of the absurd. And technological advances are reducing ever more areas of work into meaningless drudgery. "The gap between liberalism's claims about itself and the lived reality of the citizenry" is now so wide that "the lie can no longer be accepted," Mr Deneen writes. What better proof of this than the vision of 1,000 private planes whisking their occupants to Davos to discuss the question of "creating a shared future in a fragmented world"? . . .

Deneen does an impressive job of capturing the current mood of disillusionment, echoing leftwing complaints about rampant commercialism, right-wing complaints about narcissistic and bullying students, and general worries about atomisation and selfishness. But when he concludes that all this adds up to a failure of liberalism, is his argument convincing? . . . He argues that the essence of

liberalism lies in freeing individuals from constraints. In fact, liberalism contains a wide range of intellectual traditions which provide different answers to the question of how to trade off the relative claims of rights and responsibilities, individual expression and social ties. . . . liberals experimented with a range of ideas from devolving power from the centre to creating national education systems.

Mr Deneen's fixation on the essence of liberalism leads to the second big problem of his book: his failure to recognise liberalism's ability to reform itself and address its internal problems. The late 19th century saw America suffering from many of the problems that are reappearing today, including the creation of a business aristocracy, the rise of vast companies, the corruption of politics and the sense that society was dividing into winners and losers. But a wide variety of reformers, working within the liberal tradition, tackled these problems head on. Theodore Roosevelt took on the trusts. Progressives cleaned up government corruption. University reformers modernised academic syllabuses and built ladders of opportunity. Rather than dying, liberalism reformed itself.

Mr Deneen is right to point out that the record of liberalism in recent years has been dismal. He is also right to assert that the world has much to learn from the premodern notions of liberty as self-mastery and self-denial. The biggest enemy of liberalism is not so much atomisation but old-fashioned greed, as members of the Davos elite pile their plates ever higher with perks and share options. But he is wrong to argue that the only way for people to liberate themselves from the contradictions of liberalism is "liberation from liberalism itself". The best way to read "Why Liberalism Failed" is not as a funeral oration but as a call to action: up your game, or else.

20. The author of the passage refers to "the Davos elite" to illustrate his views on:

(A) the unlikelihood of a return to the liberalism of the past as long as the rich continue to benefit from the decline in liberal values.

(B) the way the debate around liberalism has been captured by the rich who have managed to insulate themselves from economic hardships.

(C) the hypocrisy of the liberal rich, who profess to subscribe to liberal values while cornering most of the wealth.

(D) the fact that the rise in liberalism had led to a greater interest in shared futures from unlikely social classes.

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21. All of the following statements are evidence of the decline of liberalism today, EXCEPT:

(A) "And technological advances are reducing ever more areas of work into meaningless drudgery."

(B) ". . . the creation of a business aristocracy, the rise of vast companies . . ."

(C) "Democracy has degenerated into a theatre of the absurd."

(D) "'The gap between liberalism's claims about itself and the lived reality of the citizenry' is now so wide that 'the lie can no longer be accepted,'. . ."

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22. The author of the passage is likely to disagree with all of the following statements, EXCEPT:

(A) claims about liberalism's disintegration are exaggerated and misunderstand its core features.

(B) if we accept that liberalism is a dying ideal, we must work to find a viable substitute.

(C) liberalism was the dominant ideal in the past century, but it had to reform itself to remain so.

(D) the essence of liberalism lies in greater individual self-expression and freedoms.

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23. The author of the passage faults Deneen's conclusions for all of the following reasons, EXCEPT:

(A) its repeated harking back to premodern notions of liberty.

(B) its failure to note historical instances in which the process of declining liberalism has managed to reverse itself.

(C) its extreme pessimism about the future of liberalism today and predictions of an ultimate decline.

(D) its very narrow definition of liberalism limited to individual freedoms.

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24. There is a sentence that is missing in the paragraph below. Look at the paragraph and decide where (option 1, 2, 3, or 4) the following sentence would best fit. Sentence: And probably much earlier, moving the documentation for kissing back 1,000 years compared to what was acknowledged in the scientific community. Paragraph: Research has hypothesised that the earliest evidence of human lip kissing originated in a very specific geographical location in South Asia 3,500 years ago.___(1)___. From there it may have spread to other regions, simultaneously accelerating the spread of the herpes simplex virus 1. According to Dr Troels Pank Arbøll and Dr Sophie Lund Rasmussen, who in a new article in the journal Science draw on a range of written sources from the earliest Mesopotamian societies, kissing was already a well-established practice 4,500 years ago in the Middle East.___(2)___. In ancient Mesopotamia, people wrote in cuneiform script on clay tablets.___(3)___. Many thousands of these clay tablets have survived to this day, and they contain clear examples that kissing was considered a part of romantic intimacy in ancient times.___(4)___. "Kissing could also have been part of friendships and family members' relations," says Dr Troels Pank Arbøll, an expert on the history of medicine in Mesopotamia.

(A) Option 3

(B) Option 4

(C) Option 1

(D) Option 2

Questions 25 to 29

There are nine boxes arranged in a 3×3 array as shown in Tables 1 and 2. Each box contains three sacks. Each sack has a certain number of coins, between 1 and 9, both inclusive.

The average number of coins per sack in the boxes are all distinct integers. The total number of coins in each row is the same. The total number of coins in each column is also the same.

	1st column	2nd column	3rd column
1st Row		9	6
2nd Row	2		
3rd Row	8		

Table 1

	1st column	2nd column	3rd column
1st Row	1**	2*	2*
2nd Row	1**	0*	3*
3rd Row	3*	2**	0**

Table 2

Table 1 gives information regarding the median of the numbers of coins in the three sacks in a box for some of the boxes. In Table 2 each box has a number which represents the number of sacks in that box having more than 5 coins. That number is followed by a * if the sacks in that box satisfy exactly one among the following three conditions, and it is followed by ** if two or more of these conditions are satisfied.

i) The minimum among the numbers of coins in the three sacks in the box is 1.
ii) The median of the numbers of coins in the three sacks is 1.
iii) The maximum among the numbers of coins in the three sacks in the box is 9.

25. What is the total number of coins in all the boxes in the 3^{rd} row?

(A) 36
(B) 30
(C) 15
(D) 45

26. How many boxes have at least one sack containing 9 coins?

(A) 3
(B) 4
(C) 5
(D) 8

27. For how many boxes are the average and median of the numbers of coins contained in the three sacks in that box the same?

Type in the answer.

28. How many sacks have exactly one coin?

Type in the answer.

29. In how many boxes do all three sacks contain different numbers of coins?

Type in the answer.

Questions 30 to 34

Odsville has five firms - Alfloo, Bzygoo, Czechy, Drjbna and Elavalaki. Each of these firms was founded in some year and also closed down a few years later.

Each firm raised Rs. 1 crore in its first and last year of existence. The amount each firm raised every year increased until it reached a maximum, and then decreased until the firm closed down. No firm raised the same amount of money in two consecutive years. Each annual increase and decrease was either by Rs. 1 crore or by Rs. 2 crores. The table below provides partial information about the five firms.

Firm	First year of existence	Last year of existence	Total amount raised (Rs. Crores)
Alfloo	2009	2016	21
Bzygoo	2012	2015	
Czechy	2013		9
Drjbna	2011	2015	10
Elavalaki	2010		13

30. For which firm(s) can the amounts raised by them be concluded with certainty in each year?

(A) Only Bzygoo and Czechy and Drjbna
(B) Only Czechy and Drjbna
(C) Only Drjbna
(D) Only Czechy

31. What best can be concluded about the total amount of money raised in 2015?

(A) It is either Rs. 7 crores or Rs. 8 crores or Rs. 9 crores.

(B) It is exactly Rs. 8 crores.

(C) It is either Rs. 7 crores or Rs. 8 crores.

(D) It is either Rs. 8 crores or Rs. 9 crores.

32. What is the largest possible total amount of money (in Rs. crores) that could have been raised in 2013?

Type in the answer.

33. If Elavalaki raised Rs. 3 crores in 2013, then what is the smallest possible total amount of money (in Rs. crores) that could have been raised by all the companies in 2012?

(A) 12
(B) 9
(C) 11
(D) 10

34. If the total amount of money raised in 2014 is Rs. 12 crores, then which of the following is not possible?

(A) Bzygoo raised the same amount of money as Elavalaki in 2013.

(B) Alfloo raised the same amount of money as Drjbna in 2013.

(C) Alfloo raised the same amount of money as Bzygoo in 2014.

(D) Bzygoo raised more money than Elavalaki in 2014.

Questions 35 to 39

Three participants - Akhil, Bimal and Chatur participate in a random draw competition for five days. Every day, each participant randomly picks up a ball numbered between 1 and 9. The number on the ball determines his score on that day. The total score of a participant is the sum of his scores attained in the five days. The total score of a day is the sum of participants' scores on that day. The 2-day average on a day, except on Day 1, is the average of the total scores of that day and of the previous day. For example, if the total scores of Day 1 and Day 2 are 25 and 20, then the 2-day average on Day 2 is calculated as 22.5. Table 1 gives the 2-day averages for Days 2 through 5.

Table 1: 2-day averages for Days 2 through 5

Day 2	Day 3	Day 4	Day 5
15	15.5	16	17

Participants are ranked each day, with the person having the maximum score being awarded the minimum rank (1) on that day. If there is a tie, all participants with the tied score are awarded the best available rank. For example, if on a day Akhil, Bimal, and Chatur score 8, 7 and 7 respectively, then their ranks will be 1, 2 and 2 respectively on that day. These ranks are given in Table 2.

Table 2: Ranks of participants on each day

	Day 1	Day 2	Day 3	Day 4	Day 5
Akhil	1	2	2	3	3
Bimal	2	3	2	1	1
Chatur	3	1	1	2	2

The following information is also known.
1. Chatur always scores in multiples of 3. His score on Day 2 is the unique highest score in the competition. His minimum score is observed only on Day 1, and it matches Akhil's score on Day 4.
2. The total score on Day 3 is the same as the total score on Day 4.
3. Bimal's scores are the same on Day 1 and Day 3.

35. What is Akhil's score on Day 1?

(A) 5

(B) 7

(C) 6

(D) 8

---

36. Who attains the maximum total score?

(A) Cannot be determined
(B) Akhil
(C) Bimal
(D) Chatur

37. What is the minimum possible total score of Bimal?

Type in the answer.

38. If the total score of Bimal is a multiple of 3, what is the score of Akhil on Day 2?

(A) Cannot be determined
(B) 5
(C) 6
(D) 4

39. If Akhil attains a total score of 24, then what is the total score of Bimal?

Type in the answer.

Questions 40 to 44

Anjali, Bipasha, and Chitra visited an entertainment park that has four rides. Each ride lasts one hour and can accommodate one visitor at one point. All rides begin at 9 am and must be completed by 5 pm except for Ride-3, for which the last ride has to be completed by 1 pm. Ride gates open every 30 minutes, e.g. 10 am, 10:30 am, and so on. Whenever a ride gate opens, and there is no visitor inside, the first visitor waiting in the queue buys the ticket just before taking the ride. The ticket prices are Rs. 20, Rs. 50, Rs. 30 and Rs. 40 for Rides 1 to 4, respectively. Each of the three visitors took at least one ride and did not necessarily take all rides. None of them took the same ride more than once. The movement time from one ride to another is negligible, and a visitor leaves the ride immediately after the completion of the ride. No one takes a break inside the park unless mentioned explicitly.

The following information is also known.

1. Chitra never waited in the queue and completed her visit by 11 am after spending Rs. 50 to pay for the ticket(s).
2. Anjali took Ride-1 at 11 am after waiting for 30 mins for Chitra to complete it. It was the only ride where Anjali waited.
3. Bipasha began her first of three rides at 11:30 am. All three visitors incurred the same amount of ticket expense by 12:15 pm.
4. The last ride taken by Anjali and Bipasha was the same, where Bipasha waited 30 mins for Anjali to complete her ride. Before standing in the queue for that ride, Bipasha took a 1-hour coffee break after completing her previous ride.

40. What was the total amount spent on tickets (in Rs.) by Bipasha?

(A) 90
(B) 120
(C) 110
(D) 100

41. Which were all the rides that Anjali completed by 2:00 pm?

(A) Ride-1 and Ride-3
(B) Ride-1, Ride-2, and Ride-3
(C) Ride-1, Ride-2, and Ride-4
(D) Ride-1 and Ride-4

42. Which ride was taken by all three visitors?

(A) Ride-1

(B) Ride-4

(C) Ride-3

(D) Ride-2

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43. How many rides did Anjali and Chitra take in total?

Type in the answer.

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44. What was the total amount spent on tickets (in Rs.) by Anjali?

Type in the answer.

---

45. Let a, b, m and n be natural numbers such that $a > 1$ and $b > 1$. If $a^m b^n = 144^{145}$, then the largest possible value of $n - m$ is

(A) 580
(B) 290
(C) 289
(D) 579

---

46. Any non-zero real numbers x,y such that $y \neq 3$ and $\frac{x}{y} < \frac{x+3}{y-3}$, Will satisfy the condition.

(A) $\frac{x}{y} < \frac{y}{x}$
(B) If $y < 0$, and $-x < y$
(C) If $y > 10$, and $-x > y$
(D) If $x < 0$, and $-x < y$

---

47. For any natural numbers m, n, and k, such that k divides both $m + 2n$ and $3m + 4n$, k must be a common divisor of

(A) m and n
(B) 2m and 3n
(C) m and 2n
(D) 2m and n

---

48. The sum of all possible values of x satisfying the equation $2^{4x^2} - 2^{2x^2+x+16} + 2^{2x+30} = 0$, is

(A) 3
(B) $\frac{3}{2}$
(C) $\frac{5}{2}$
(D) $\frac{1}{2}$

---

49. The number of positive integers less than 50, having exactly two distinct factors other than 1 and itself, is

Type in the answer.

---

50. For some positive real number x, if $\log_{\sqrt{3}}(x) + \frac{\log_x(25)}{\log_x(0.008)} = \frac{16}{3}$, then the value of $\log_3(3x^2)$ is

Type in the answer.

---

51. Let k be the largest integer such that the equation $(x-1)^2 + 2kx + 11 = 0$ has no real roots. If y is a positive real number, then the least possible value of $\frac{k}{4y} + 9y$ is

Type in the answer.

---

52. Pipes A and C are fill pipes while Pipe B is a drain pipe of a tank. Pipe B empties the full tank in one hour less than the time taken by Pipe A to fill the empty tank. When pipes A, B and C are turned on together, the empty tank is filled in two hours. If pipes B and C are turned on together when the tank is empty and Pipe B is turned off after one hour, then Pipe C takes another one hour and 15 minutes to fill the remaining tank. If Pipe A can fill the empty tank in less than five hours, then the time taken, in minutes, by Pipe C to fill the empty tank is

(A) 90
(B) 120
(C) 75
(D) 60

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53. Anil borrows Rs 2 lakhs at an interest rate of 8% per annum, compounded half-yearly. He repays Rs 10320 at the end of the first year and closes the loan by paying the outstanding amount at the end of the third year. Then, the total interest, in rupees, paid over the three years is nearest to

(A) 45311
(B) 51311
(C) 33130
(D) 40991

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54. Ravi is driving at a speed of 40 km/h on a road. Vijay is 54 meters behind Ravi and driving in the same direction as Ravi. Ashok is driving along the same road from the opposite direction at a speed of 50 km/h and is 225 meters away from Ravi. The speed, in km/h, at which Vijay should drive so that all the three cross each other at the same time, is

(A) 58.8
(B) 67.2
(C) 61.6
(D) 64.4

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55. Minu purchases a pair of sunglasses at Rs.1000 and sells to Kanu at 20% profit. Then, Kanu sells it back to Minu at 20% loss. Finally, Minu sells the same pair of sunglasses to Tanu. If the total profit made by Minu from all her transactions is Rs.500, then the percentage of profit made by Minu when she sold the pair of sunglasses to Tanu is

(A) 35.42%
(B) 52%
(C) 31.25%
(D) 26%

---

56. The price of a precious stone is directly proportional to the square of its weight. Sita has a precious stone weighing 18 units. If she breaks it into four pieces with each piece having distinct integer weight, then the difference between the highest and lowest possible values of the total price of the four pieces will be 288000. Then, the price of the original precious stone is

(A) 1944000
(B) 972000
(C) 1620000
(D) 1296000

---

57. In a company, 20% of the employees work in the manufacturing department. If the total salary obtained by all the manufacturing employees is one-sixth of the total salary obtained by all the employees in the company, then the ratio of the average salary obtained by the manufacturing employees to the average salary obtained by the nonmanufacturing employees is

(A) 6:5
(B) 4:5
(C) 5:4
(D) 5:6

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58. If a certain amount of money is divided equally among n persons, each one receives Rs 352. However, if two persons receive Rs 506 each and the remaining amount is divided equally among the other persons, each of them receive less than or equal to Rs 330. Then, the maximum possible value of n is

Type in the answer.

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59. Jayant bought a certain number of white shirts at the rate of Rs 1000 per piece and a certain number of blue shirts at the rate of Rs 1125 per piece. For each shirt, he then set a fixed market price which was 25% higher than the average cost of all the shirts. He sold all the shirts at a discount of 10% and made a total profit of Rs.51000. If he bought both colors of shirts, then the maximum possible total

number of shirts that he could have bought is

Type in the answer.

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60. A container has 40 liters of milk. Then, 4 liters are removed from the container and replaced with 4 liters of water. This process of replacing 4 liters of the liquid in the container with an equal volume of water is continued repeatedly. The smallest number of times of doing this process, after which the volume of milk in the container becomes less than that of water, is

Type in the answer.

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61. A triangle is drawn with its vertices on the circle C such that one of its sides is a diameter of C and the other two sides have their lengths in the ratio a : b. If the radius of the circle is r, then the area of the triangle is

(A) $\frac{abr^2}{2(a^2+b^2)}$

(B) $\frac{2abr^2}{a^2+b^2}$

(C) $\frac{4abr^2}{a^2+b^2}$

(D) $\frac{abr^2}{a^2+b^2}$

---

62. In a rectangle ABCD, AB = 9 cm and BC = 6 cm. P and Q are two points on BC such that the areas of the figures ABP, APQ, and AQCD are in geometric progression. If the area of the figure AQCD is four times the area of triangle ABP, then BP : PQ : QC is

(A) 1:2:4

(B) 1:2:1

(C) 2:4:1

(D) 1:1:2

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63. The area of the quadrilateral bounded by the Y-axis, the line x = 5, and the lines $|\,|x-y|-|x-5|\,|=2$, is

Type in the answer.

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64. Let both the series $a_1, a_2, a_3 \ldots$ and $b_1, b_2, b_3 \ldots$ be in arithmetic progression such that the common differences of both the series are prime numbers. If $a_5 = b_9, a_{19} = b_{19}$ and $b_2 = 0$, then a_{11} equals

(A) 86

(B) 79

(C) 83

(D) 84

---

65. If $p^2 + q^2 - 29 = 2pq - 20 = 52 - 2pq$, then the difference between the maximum and minimum possible value of $(p^3 - q^3)$

(A) 243

(B) 486

(C) 378

(D) 189

---

66. Let a_n and b_n be two sequences such that $a_n = 13 + 6(n-1)$ and $b_n = 15 + 7(n-1)$ for all natural numbers n. Then, the largest three digit integer that is common to both these sequences, is

Type in the answer.

- End of Question Paper -
