

Time: 120 Mins

Important Instructions

- (i) Total Number of Questions: 66
- (ii) Number of Questions in Verbal Ability and Reading Comprehension (VARC): 24
- (iii) Number of Questions in Data Interpretation and Logical Reasoning (DILR): 20
- (iv) Number of Questions in Quantitative Ability (QA): 22
- (v) 40 minutes are allotted to attempt each section.
- (vi) 4 answer options for each MCQ type question.
- (vii) Answers are typed in the given space on the computer screen for Non-MCQ.
- (viii) For each correct answer: + 3 marks
- (ix) Negative marking (Applicable for wrong answers in MCQs): - 1 mark

Verbal Ability and Reading Comprehension (VARC)

Passage 1

Directions (Q. 1 to 4): Read the following passage carefully and answer the questions that follow.

Interpretations of the Indian past... were inevitably influenced by colonial concerns and interests, and also by prevalent European ideas about history, civilisation and the Orient. Orientalist scholars studied the languages and the texts with selected Indian scholars, but made little attempt to understand the world-view of those who were teaching them. The readings therefore are something of a disjunctive from the traditional ways of looking at the Indian past...

Orientalism [which we can understand broadly as Western perceptions of the Orient] fuelled the fantasy and the freedom sought by European Romanticism, particularly in its opposition to the more disciplined Neo-Classicism. The cultures of Asia were seen as bringing a new Romantic paradigm. Another Renaissance was anticipated through an acquaintance with the Orient, and this, it was thought, would be different from the earlier Greek Renaissance. It was believed that this Oriental Renaissance would liberate European thought and literature from the increasing focus on discipline and rationality that had followed from the earlier Enlightenment.... [The Romantic English poets, Wordsworth and Coleridge,] were apprehensive of the changes introduced by industrialisation and turned to nature and to fantasies of the Orient.

However, this enthusiasm gradually changed, to conform with the emphasis later in the nineteenth century on the innate superiority of European civilisation. Oriental civilisations were now seen as having once been great but currently in decline. The various phases of Orientalism tended to mould European understanding of the Indian past into a particular pattern.... There was an attempt to formulate Indian culture as uniform, such formulations being derived from texts that were given priority. The so-called 'discovery' of India was largely through selected literature in Sanskrit. This interpretation tended to emphasise non-historical aspects of Indian culture; for example, the idea of an unchanging continuity of society and religion over 3,000 years; and it was believed that the Indian pattern of life was so concerned with metaphysics and the subtleties of religious belief that little attention was given to the more tangible aspects.

German Romanticism endorsed this image of India, and it became the mystic land for many Europeans, where even the most ordinary actions were imbued with a complex symbolism. This was the genesis of the idea of the spiritual east, and also, incidentally, the refuge of European intellectuals seeking to distance themselves from the changing patterns of their own societies. A dichotomy in values was maintained, Indian values being described as 'spiritual' and European values as 'materialistic', with little attempt to

juxtapose these values with the reality of Indian society. This theme has been even more firmly endorsed by a section of Indian opinion during the last hundred years.

It was a consolation to the Indian intelligentsia for its perceived inability to counter the technical superiority of the west, a superiority viewed as having enabled Europe to colonise Asia and other parts of the world. At the height of anti-colonial nationalism it acted as a salve for having been made a colony of Britain.

Q. 1. Which one of the following styles of research is most similar to the Orientalist scholars method of understanding Indian history and culture?

1. Reading about the life of early American settlers and later waves of migration to understand the evolution of American culture.
2. Reading 18th century accounts by travellers to India to see how they viewed Indian life and culture of the time.
3. Studying artefacts excavated at a palace to understand the lifestyle of those who lived there.
4. Analysing Hollywood action movies that depict violence and sex to understand contemporary America.

Q. 2. It can be inferred from the passage that the author is not likely to support the view that:

1. the Orientalist view of Asia fired the imagination of some Western poets.
2. Indian culture acknowledges the material aspects of life.

3. India became a colony although it matched the technical knowledge of the West.
4. India's culture has evolved over the centuries.

Q. 3. It can be inferred from the passage that to gain a more accurate view of a nation's history and culture, scholars should do all of the following EXCEPT:

1. read widely the country's literature.
2. examine their own beliefs and biases.
3. examine the complex reality of that nation's society.
4. develop an oppositional framework to grasp cultural differences.

Q. 4. In the context of the passage, all of the following statements are true EXCEPT:

1. Indian texts influenced Orientalist scholars.
2. India's spiritualism served as a salve for European colonisers.
3. Orientalists' understanding of Indian history was linked to colonial concerns.
4. Orientalist scholarship influenced Indians.

Passage 2

Directions (Q. 5 to 8): Read the following passage carefully and answer the questions that follow.

Sociologists working in the Chicago School tradition have focused on how rapid or dramatic social change causes increases in crime. Just as Durkheim, Marx, Toennies, and other European sociologists thought that the rapid changes produced by industrialisation and urbanisation produced crime and disorder, so too did the Chicago School theorists. The location of the University of Chicago provided an excellent opportunity for Park, Burgess, and McKenzie to study the social ecology of the city. Shaw and McKay found ... that areas of the city characterised by high levels of social disorganisation had higher rates of crime and delinquency. In the 1920s and 1930s, Chicago, like many American cities, experienced considerable immigration. Rapid population growth is a disorganising influence, but growth resulting from in-migration of very different people is particularly disruptive. Chicago's in-migrants were both native-born whites and blacks from rural areas and small towns, and foreign immigrants. The heavy industry of cities like Chicago, Detroit, and Pittsburgh drew those seeking opportunities and new lives. Farmers and villagers from America's hinterland, like their European cousins of whom Durkheim wrote, moved in large numbers into cities. At the start of the twentieth century, Americans were predominately a rural population, but by the century's mid-point most lived in urban areas. The social lives of these migrants, as well as those already living in the cities they moved to, were disrupted by the differences between urban and rural life. According to the social disorganisation theory, until the social ecology of the "new place" can adapt, this rapid change is

a criminogenic influence. But most rural migrants, and even many of the foreign immigrants to the city, looked like and eventually spoke the same language as the natives of the cities into which they moved. These similarities allowed for more rapid social integration for these migrants than was the case for African Americans and most foreign immigrants.

In these same decades, America experienced what has been called “the great migration”: the massive movement of African Americans out of the rural South and into northern (and some southern) cities. The scale of this migration is one of the most dramatic in human history. These migrants, unlike their white counterparts, were not integrated into the cities they now called home. In fact, most American cities at the end of the twentieth century were characterised by high levels of racial residential segregation... Failure to integrate these migrants, coupled with other forces of social disorganisation such as crowding, poverty, and illness, caused crime rates to climb in the cities, particularly in the segregated wards and neighbourhoods where the migrants were forced to live.

Foreign immigrants during this period did not look as dramatically different from the rest of the population as blacks did, but the migrants from eastern and southern Europe who came to American cities did not speak English, and were frequently Catholic, while the native born were mostly Protestant. The combination of rapid population growth with the diversity of those moving into the cities created what the Chicago School sociologists called social disorganisation.

Q. 5. A fundamental conclusion by the author is that:

1. To prevent crime, it is important to maintain social order through maintaining social segregation.
2. Rapid population growth and demographic diversity give rise to social disorganisation that can feed the growth of crime.
3. According to European sociologists, crime in America is mainly in Chicago.
4. The best circumstances for crime to flourish are when there are severe racial disparities.

Q. 6. Which one of the following is not a valid inference from the passage?

1. According to the social disorganisation theory, fast-paced social change provides a fertile ground for the rapid growth of crime.
2. The failure to integrate in-migrants, along with social problems like poverty, was a significant reason for the rise in crime in American cities.
3. According to the social disorganisation theory, the social integration of African American migrants into Chicago was slower because they were less organised.
4. The differences between urban and rural lifestyles were crucial factors in the

disruption experienced by migrants to American cities.

Q. 7. Which one of the following sets of words/phrases best encapsulates the issues discussed in the passage?

1. Rapid population growth; Heavy industry; Segregation; Crime
2. Chicago School; Native-born Whites; European immigrants; Poverty
3. Durkheim; Marx; Toennies; Shaw
4. Chicago School; Social organisation; Migration; Crime

Q. 8. The author notes that, “At the start of the twentieth century, Americans were predominately a rural population, but by the century’s mid-point most lived in urban areas.” Which one of the following statements, if true, does not contradict this statement?

1. Demographic transition in America in the twentieth century is strongly marked by an out-migration from rural areas.
2. A population census conducted in 1952 showed that more Americans lived in rural areas than in urban ones.
3. Economists have found that throughout the twentieth century, the size of the labour force in America has always been largest in rural areas.
4. The estimation of per capita income in America in the mid-twentieth century primarily required data from rural areas.

Passage 3

Directions (Q. 9 to 12): Read the following passage carefully and answer the questions that follow.

As software improves, the people using it become less likely to sharpen their own know-how. Applications that offer a lot of prompts and tips are often to blame; simpler, less solicitous programs push people harder to think, act and learn.

Ten years ago, information scientists at the Utrecht University in Netherlands had a group of people carry out complicated analytical and planning tasks using either rudimentary software that provided no assistance or sophisticated software that offered a great deal of aid. The researchers found that the people using the simple software developed better strategies, made fewer mistakes and developed a deeper aptitude for the work. The people using the more advanced software, meanwhile, would often “aimlessly dick around” when confronted with a tricky problem. The supposedly helpful software actually short-circuited their thinking and learning.

[According to] philosopher Hubert Dreyfus our skills get sharper only through practice, when we use them regularly to overcome different sorts of difficult challenges. The goal of modern software, by contrast, is to ease our way through such challenges. Arduous, painstaking work is exactly what programmers are most eager to automate—after all, that is where the immediate efficiency gains tend to lie. In other words, a fundamental tension ripples between the interests of the people doing the automation and the interests of the people doing the work.

Nevertheless, automation’s scope continues to widen. With the rise of electronic health records, physicians increasingly rely on software templates to guide them through patient exams. The programs incorporate valuable checklists and alerts, but they also make medicine more routinised and formulaic—and distance doctors from their patients.... Harvard Medical School professor Beth Lown, in a 2012 journal article... warned that when doctors become “screen-driven,” following a computer’s prompts rather than “the patient’s narrative thread,” their thinking can become constricted. In the worst cases, they may miss important diagnostic signals....

In a recent paper published in the journal *..Diagnosis..*, three medical researchers ... examined the misdiagnosis of Thomas Eric Duncan, the first person to die of Ebola in the U.S., at Texas Health Presbyterian Hospital, Dallas. They argue that the digital templates used by the hospital’s clinicians to record patient information probably helped to induce a kind of tunnel vision. “These highly constrained tools,” the researchers write, “are optimised for data capture but at the expense of sacrificing their utility for appropriate triage and diagnosis, leading users to miss the forest for the trees.” Medical software, they write, is no “replacement for basic history-taking, examination skills, and critical thinking.”...

There is an alternative. In “human-centred automation,” the talents of people take precedence.... In this model, software plays an essential but secondary role. It takes over routine functions that a human operator has already mastered, issues alerts when unexpected situations arise, provides fresh information that expands the operator’s perspective and counters the biases that often distort human thinking. The technology becomes the expert’s partner, not the expert’s replacement.

Q. 9. In the Ebola misdiagnosis case, we can infer that doctors probably missed the forest for the trees because:

1. they used the wrong type of digital templates for the case.
2. they were led by the data processed by digital templates.
3. the digital templates forced them to acquire tunnel vision.

4. the date collected was not sufficient for appropriate triage.

Q. 10. From the passage, we can infer that the author is apprehensive about the use of sophisticated automation for all of the following reasons EXCEPT that:

1. it stunts the development of its users.
2. it could mislead people.
3. it stops users from exercising their minds.
4. computers could replace humans.

Q. 11. In the context of the passage, all of the following can be considered examples of human-centred automation EXCEPT:

1. software that auto-completes text when the user writes an email.
2. software that offers interpretations when requested by the human operator.
3. a smart-home system that changes the temperature as instructed by the resident.
4. medical software that provides optional feedback on the doctor's analysis of the medical situation.

Q. 12. It can be inferred that in the Utrecht University experiment, one group of people was "aimlessly clicking around" because:

1. they wanted to avoid making mistakes.
2. they did not have the skill-set to address complicated tasks.
3. they were hoping that the software would help carry out the tasks.
4. the other group was carrying out the tasks more efficiently.

Passage 4

Directions (Q. 13 to 16): Read the following passage carefully and answer the questions that follow.

Nature has all along yielded her flesh to humans. First, we took nature's materials as food, fibres, and shelter. Then, we learned to extract raw materials from her biosphere to create our own new synthetic materials. Now, Bios is yielding us her mind—we are taking her logic.

Clockwork logic—the logic of the machines—will only build simple contraptions. Truly complex systems such as a cell, a meadow, an economy, or a brain (natural or artificial) require a rigorous nontechnological logic. We now see that no logic except bio-logic can assemble a thinking device, or even a workable system of any magnitude.

It is an astounding discovery that one can extract the logic of Bios out of biology and have something useful. Although many philosophers in the past have suspected one could abstract the laws of life and apply them elsewhere, it wasn't until the complexity of computers and human-made systems became as complicated as living things, that it was possible to prove this. It's eerie how much of life can be transferred. So far, some of the traits of the living that have successfully been transported to mechanical systems are: self-replication, self-governance, limited self-repair, mild evolution, and partial learning.

We have reasons to believe yet more can be synthesised and made into something new. Yet at the same time that the logic of Bios is being imported into machines, the logic of Technos is being imported into life. The root of bioengineering is the desire to control the organic long enough to improve it. Domesticated plants and animals are examples of technos-logic applied to life. The wild aromatic root of the Queen Anne's lace weed has been fine-tuned over generations by selective herb gatherers until it has evolved into a sweet carrot of the garden; the udders of wild bovines have been selectively enlarged in a "unnatural" way to satisfy humans rather than calves. Milk cows and carrots, therefore, are human inventions as much as steam engines and gunpowder are. But milk cows and carrots are more indicative of the kind of inventions humans will make in the future: products that are grown rather than manufactured.

Genetic engineering is precisely what cattle breeders do when they select better strains of Holsteins, only bioengineers employ more precise and powerful control. While carrot and milk cow breeders had to rely on diffuse organic evolution, modern genetic engineers can use directed artificial evolution—purposeful design—which greatly accelerates improvements.

The overlap of the mechanical and the lifelike increases year by year. Part of this bionic convergence is a matter of words. The meanings of "mechanical" and "life" are both stretching until all complicated things can be perceived as machines, and all self-sustaining machines can be perceived as alive. Yet beyond semantics, two concrete trends are happening: (1) Human-made things are behaving more life-like, and (2) Life is becoming more engineered. The apparent veil between the organic and the manufactured has crumpled to reveal that the two really are, and have always been, of one being.

Q. 13. Which one of the following sets of words/phrases best serves as keywords to the passage?

1. Complex systems; Bio-logic; Bioengineering; Technos-logic; Convergence
2. Nature; Bios; Technos; Self-repair; Holsteins

3. Complex systems; Carrots; Milk cows; Convergence; Technos-logic
4. Nature; Computers; Carrots; Milk cows; Genetic engineering

Q. 14. The author claims that, "Part of this bionic convergence is a matter of words." Which one of the following statements best expresses the point being made by the author?

1. "Mechanical" and "life" were earlier seen as opposite in meaning, but the difference between the two is increasingly blurred.
2. "Bios" and "Technos" are both convergent forms of logic, but they generate meanings about the world that are mutually exclusive.
3. A bionic convergence indicates the meeting ground of genetic engineering and artificial intelligence.
4. "Mechanical" and "life" are words from different logical systems and are, therefore, fundamentally incompatible in meaning.

Q. 15. The author claims that, "The apparent veil between the organic and the manufactured has crumpled to reveal that the two really are, and have always been, of one being." Which one of the following statements best expresses the point being made by the author here?

1. Organic reality has crumpled under the veil of manufacturing, rendering the apparent and the real as the same being.
2. The crumpling of the organic veil between apparent and manufactured reality reveals them to have the same being.
3. Scientific advances are making it increasingly difficult to distinguish between organic reality and manufactured reality.
4. Apparent reality and organic reality are distinguished by the fact that the former is manufactured.

Q. 16. None of the following statements is implied by the arguments of the passage, EXCEPT:

1. Genetic engineers and bioengineers are the same as they both seek to force evolution in an artificial way.
2. Purposeful design represents the pinnacle of scientific expertise in the service of

human betterment and civilisational progress.

3. Historically, philosophers have known that the laws of life can be abstracted and applied elsewhere.
4. The biological realm is as complex as the mechanical one; which is why the logic of Bios is being imported into machines.

Q. 17. There is a sentence that is missing in the paragraph given below. Look at the paragraph and decide in which blank (option 1, 2, 3, or 4) the following sentence would best fit.

Sentence: When people socially learn from each other, they often learn without understanding why what they're copying—the beliefs and behaviours and technologies and know-how—works.

Paragraph: __ (1) __. The dual-inheritance theorysays.... that inheritance is itself an evolutionary system. It has variation. What makes us a new kind of animal, and so different and successful as a species, is we rely heavily on social learning to the point where socially acquired information is effectively a second line of inheritance, the first being our genes.... __ (2) __. People tend to home in on who seems to be the smartest or most successful person around, as well as what everybody seems to be doing—the majority of people have something worth learning. __ (3) __. When you repeat this process over time, you can get, around the world, cultural packages—beliefs or behaviours or technology or other solutions—that are adapted to the local conditions. People have different psychologies, effectively. __ (4) __.

1. Option 1
2. Option 2
3. Option 3
4. Option 4

Q. 18. There is a sentence that is missing in the paragraph given below. Look at the paragraph and decide in which blank (option 1, 2, 3, or 4) the following sentence would best fit.

Sentence: This has meant a lot of uncertainty around what a wide-scale return to office might look like in practice.

Paragraph: Bringing workers back to their desks has been a rocky road for employers and employees alike. The evolution of the pandemic has meant that best laid plans have often not materialised. __ (1) __ The flow of

workers back into offices has been more of a trickle than a steady stream. __ (2) __ Yet while plenty of companies are still working through their new policies, some employees across the globe are now back at their desks, whether on a full-time or hybrid basis. __ (3) __ That means we're beginning to get some clarity on what return-to-office means - what's working, as well as what has yet to be settled. __ (4) __

1. Option 1
2. Option 2
3. Option 3
4. Option 4

Q. 19. The passage given below is followed by four alternate summaries. Choose the option that best captures the essence of the passage.

Tamsin Blanchard, curator of Fashion Open Studio, an initiative by a campaign group showcasing the work of ethical designers says, "We're all drawn to an exquisite piece of embroidery, a colourful textile or even a style of dressing that might have originated from another heritage. [But] this magpie mentality, where all of culture and history is up for grabs as 'inspiration', has accelerated since the proliferation of social media... Where once a fashion student might research the history and traditions of a particular item of clothing with care and respect, we now have a world where images are lifted from image libraries without a care for their cultural significance. It's easier than ever to steal a motif or a craft technique and transfer it on to a piece of clothing that is either mass produced or appears on a runway without credit or compensation to their original communities."

1. Taking fashion ideas from any cultural group without their consent is a form of appropriation without giving due credit, compensation, and respect.
2. Media has encouraged mass production; images are copied effortlessly without care or concern for the interests of ethnic communities.
3. Copying an embroidery design or pattern of textile from native communities who own them is tantamount to stealing and they need to be compensated.
4. Cultural collaboration is the need of the hour. Beautiful design ideas of indigenous people need to be showcased and shared worldwide.

Q. 20. The passage given below is followed by four alternate summaries. Choose the option that best captures the essence of the passage.

To defend the sequence of alphabetisation may seem bizarre, so obvious is its application that it is hard to imagine a reference, catalogue or listing without it. But alphabetical order was not an immediate consequence of the alphabet itself. In the Middle Ages, deference for ecclesiastical tradition left scholars reluctant to categorise things according to the alphabet — to do so would be a rejection of the divine order. The rediscovery of the ancient Greek and Roman classics necessitated more efficient ways of ordering, searching and referencing texts. Government bureaucracy in the 16th and 17th centuries quickened the advance of alphabetical order, bringing with it pigeonholes, notebooks and card indexes.

1. Unlike the alphabet, once the efficacy of the alphabetic sequence became apparent to scholars and administrators, its use became widespread.
2. The alphabetic order took several centuries to gain common currency because of religious beliefs and a lack of appreciation of its efficacy in the ordering of things.
3. The ban on the use by scholars of any form of categorisation - but the divinely ordained one - delayed the adoption of the alphabetic sequence by several centuries.
4. While the adoption of the written alphabet was easily accomplished, it took scholars several centuries to accept the alphabetic sequence as a useful tool in their work.

Q. 21. The passage given below is followed by four alternate summaries. Choose the option that best captures the essence of the passage.

"It does seem to me that the job of comedy is to offend, or have the potential to offend, and it cannot be drained of that potential," Rowan Atkinson said of cancel culture. "Every joke has a victim. That's the definition of a joke. Someone or something or an idea is made to look ridiculous." The Netflix star continued, "I think you've got to be very, very careful about saying what you're allowed to

make jokes about. You've always got to kick up? Really?" He added, "There are lots of extremely smug and self-satisfied people in what would be deemed lower down in society, who also deserve to be pulled up. In a proper free society, you should be allowed to make jokes about absolutely anything."

1. All jokes target someone and one should be able to joke about anyone in the society, which is inconsistent with cancel culture.
2. Cancel culture does not understand the role and duty of comedians, which is to deride and mock everyone.
3. Victims of jokes must not only be politicians and royalty, but also arrogant people from lower classes should be mentioned by comedians.
4. Every joke needs a victim and one needs to include people from lower down the society and not just the upper class.

Q. 22. The four sentences (labelled 1, 2, 3 and 4) given below, when property 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. Various industrial sectors including retail, transit systems, enterprises, educational institutions, event organising, finance, travel, etc. have now started leveraging these beacons solutions to track and communicate with their customers.
2. A beacon fixed on to a shop wall enables the retailer to assess the proximity of the customer, and come up with a much targeted or personalised communication like offers, discounts and combos on products in each shelf.
3. Smart phones or other mobile devices can capture the beacon signals, and distance can be estimated by measuring the received signal strength.
4. Beacons are tiny and inexpensive, micro-location-based technology devices that can send radio frequency signals and notify nearby Bluetooth devices of their presence and transmit information.

Q. 23. 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. If I wanted to sit indoors and read, or play Sonic the Hedgehog on a red-hot Sega Mega Drive, I would often be made to feel guilty about not going outside to "enjoy it while it lasts."
2. My mum, quite reasonably, wanted me and my sister out of the house, in the sun.
3. Tales of my mum's idyllic-sounding childhood in the Sussex countryside, where trees were climbed by 8 am and streams navigated by lunchtime, were passed down to us like folklore.
4. To an introverted kid, that felt like a threat - and the feeling has stayed with me.

Q. 24. 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. The more we are able to accept that our achievements are largely out of our control, the easier it becomes to understand that our failures, and those of others, are too.
2. But the raft of recent books about the limits of merit is an important correction to the arrogance of contemporary entitlement and an opportunity to reassert the importance of luck, or grace, in our thinking.
3. Meritocracy as an organising principle is an inevitable function of a free society, as we are designed to see our achievements as worthy of reward.
4. And that, in turn, should increase our humility and the respect with which we treat our fellow citizens, helping ultimately to build a more compassionate society.

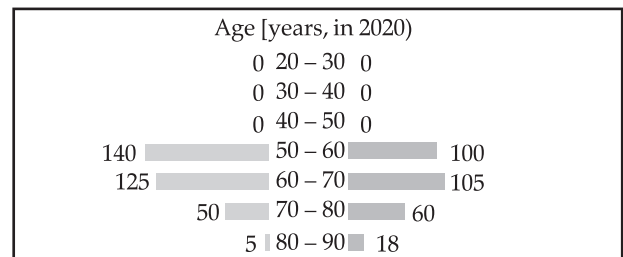
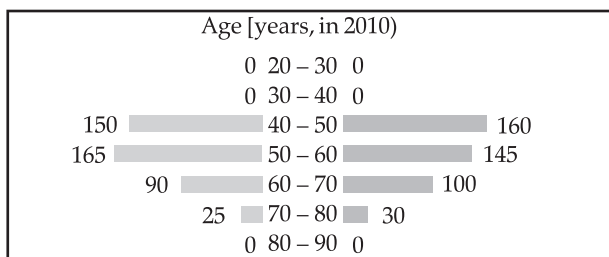
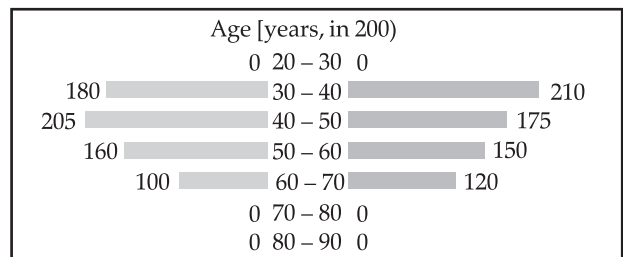
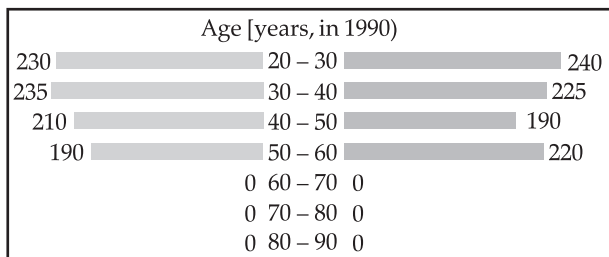
Data Interpretation and Logical Reasoning (DILR)

Directions (Q. 1 to 5): Read the following passage carefully and answer the questions that follow.

In the following, a year corresponds to 1st of January of that year.

A study to determine the mortality rate for a disease began in 1980. The study chose 1000 males and 1000 females and followed them for forty years or until they died, whichever came first. The 1000 males chosen in 1980 consisted of 250; each of ages 10 to less than 20, 20 to less than 30, 30 to less than 40, and 40 to less than 50. The 1000 females chosen in 1980 also consisted of 250; each of ages 10 to less than 20, 20 to less than 30, 30 to less than 40, and 40 to less than 50.

The four figures given below depict the age profile of those among the 2000 individuals who were still alive in 1990, 2000, 2010, and 2020. The blue bars in each figure represent the number of males in each age group at that point in time, while the pink bars represent the number of females in each age group at that point in time. The numbers next to the bars give the exact numbers being represented by the bars. For example, we know that 230 males among those tracked and who were alive in 1990 were aged between 20 and 30.



- Q. 1.** In 2000, what was the ratio of the number of dead males to dead females among those being tracked?
1. 129 : 131
 2. 71 : 69
 3. 109 : 107
 4. 41 : 43
- Q. 2.** How many people who were being tracked and who were between 20 and 30 years of age in 1980 survived until 2010?
1. 90
 2. 310
 3. 190
 4. 110
- Q. 3.** How many individuals who were being tracked and who were less than 30 years of

age in 1980 survived until 2020?

1. 580
 2. 470
 3. 240
 4. 230
- Q. 4.** How many of the males who were being tracked and who were between 20 and 30 years of age in 1980 died in the period 2000 to 2010?
- Q. 5.** How many of the females who were being tracked and who were between 20 and 30 years of age in 1980 died between the ages of 50 and 60?

Directions (Q. 6 to 10): Read the following passage carefully and answer the questions that follow.

Pulak, Qasim, Ritesh, and Suresh participated in a tournament comprising eight rounds. In each round, they formed two pairs, with each of them being in exactly one pair. The only restriction in the pairing was that the pairs would change in successive rounds. For example, if Pulak formed a pair with Qasim in the first round, then he would have to form a pair with Ritesh or Suresh in the second round. He would be free to pair with Qasim again in the third round. In each round, each pair decided whether to play the game in

that round or not. If they decided not to play, then no money was exchanged between them. If they decided to play, they had to bet either ₹1 or ₹2 in that round. For example, if they chose to bet ₹2, then the player winning the game got ₹2 from the one losing the game.

At the beginning of the tournament, the players had ₹10 each. The following table shows partial information about the amount that the players had at the end of each of the eight rounds. It shows every time a player had ₹10 at the end of a round, as well as every time, at the end of a round, a player had either the minimum or the maximum amount that he would have had across the eight rounds. For example, Suresh had ₹10 at the end of Rounds 1, 3, and 8 and not after any of the other rounds. The maximum amount that he had at the end of any round was ₹13 (at the end of Round 5), and the minimum amount he had at the end of any round was ₹8 (at the end of Round 2). At the end of all other rounds, he must have had either ₹9, ₹11, or ₹12. It was also known that Pulak and Qasim had the same amount of money with them at the end of Round 4.

	Pulak	Qasim	Ritesh	Suresh
Round 1		₹8	₹10	₹10
Round 2	₹13	₹10		₹8
Round 3				₹10
Round 4				
Round 5	₹10	₹10		₹13
Round 6				
Round 7		₹12	₹4	
Round 8	₹13			₹10

- Q. 6. What BEST can be said about the amount of money that Ritesh had with him at the end of Round 8?
- Exactly ₹6
 - Exactly ₹5
 - ₹5 or ₹6
 - ₹4 or ₹5
- Q. 7. What BEST can be said about the amount of money that Pulak had with him at the end of Round 6?
- ₹12 or ₹13
 - ₹11 or ₹12
 - Exactly ₹12
 - Exactly ₹11
- Q. 8. How much money (in ₹) did Ritesh have to the end of Round 4?
- Q. 9. How many games were played with a bet of ₹2?
- Q. 10. Which of the following pairings was made in Round 5?
- Pulak and Qasim
 - Pulak and Suresh
 - Pulak and Ritesh
 - Qasim and Suresh

Directions (Q. 11 to 15): Read the following passage carefully and answer the questions that follow.

All the first-year students in the computer science (CS) department in a university take both the courses: (i) AI and (ii) ML. Students from other departments (non-CS students) can also take one of these two courses, but not both. Students who fail in a course get an F grade; others pass and are awarded A or B or C grades depending on their performance. The following are some additional facts about the number of students who took these two courses this year and the grades they obtained.

- The numbers of non-CS students who took AI and ML were in the ratio 2 : 5.
- The number of non-CS students who took either AI or ML was equal to the number of CS students.
- The numbers of non-CS students who failed in the two courses were the same and their total is equal to the number of CS students who got a C grade in ML.
- In both the courses, 50% of the students who passed got a B grade. But, while the numbers of students who got A and C grades were the same for AI, they were in the ratio 3 : 2 for ML.
- No CS student failed in AI, while no non-CS student got an A grade in AI.
- The numbers of CS students who got A, B and C grades, respectively in AI were in the ratio 3 : 5 : 2, while in ML, the ratio was 4 : 5 : 2.

7. The ratio of the total number of non-CS students failing in one of the two courses to the number of CS students failing in one of the two courses was 3:1.
8. 30 students failed in ML.

Q. 11. How many students took AI?

1. 90 2. 60
3. 270 4. 210

Q. 12. How many CS students failed in ML?

Q. 13. How many non-CS students got an A grade in ML?

Q. 14. How many students got an A grade in AI?

1. 63 2. 42
3. 84 4. 99

Q. 15. How many non-CS students got a B grade in ML?

1. 75 2. 25
3. 90 4. 165

Directions (Q. 16 to 20): Read the following passage carefully and answer the questions that follow.

There are only four neighbourhoods in a city - Levmosto, Tyhrmosto, Pesmisto and Kitmosto. During the onset of a pandemic, the number of new cases of a disease in each of these neighbourhoods was recorded over a period of five days. On each day, the number of new cases recorded in any of the neighbourhoods was either 0, 1, 2 or 3.

The following facts are also known:

1. There was at least one new case in every neighbourhood on Day 1.
2. On each of the five days, there were more new cases in Kitmosto than in Pesmisto.
3. The number of new cases in the city in a day kept increasing during the five-day period. The number of new cases on Day 3 was exactly one more than that on Day 2.
4. The maximum number of new cases in a day in Pesmisto was 2, and this happened only once during the five-day period.
5. Kitmosto is the only place to have 3 new cases on Day 2.
6. The total numbers of new cases in Levmosto, Tyhrmosto, Pesmisto and Kitmosto over the five-day period were 12, 12, 5 and 14, respectively.

Q. 16. Which BEST can be concluded about the total number of new cases in the city on Day 2?

1. Exactly 8 2. Either 7 or 8
3. Exactly 7 4. Either 6 or 7

Q. 17. What BEST can be concluded about the number of new cases in Levmosto on Day 3?

1. Either 0 or 1 2. Either 2 or 3
3. Exactly 2 4. Exactly 3

Q. 18. On which day(s) did Pesmisto not have any new case?

1. Both Day 2 and Day 3
2. Only Day 3
3. Only Day 2
4. Both Day 2 and Day 4

Q. 19. Which of the two statements given below is/are necessarily false?

Statement A: There were 2 new cases in Tyhrmosto on Day 3.

Statement B: There were no new cases in Pesmisto on Day 2.

1. Both Statement A and Statement B
2. Statement B only
3. Neither Statement A nor Statement B
4. Statement A only

Q. 20. On how many days did Levmosto and Tyhrmosto have the same number of new cases?

1. 4 2. 5
3. 3 4. 2

Quantitative Aptitude (QA)

- Q. 1.** A donation box can receive only cheques of ₹100, ₹250, and ₹500. On one good day, the donation box was found to contain exactly 100 cheques amounting to a total sum of ₹15250. Then, the maximum possible number of cheques of ₹500 that the donation box may have contained is:
- Q. 2.** If $c = \frac{16x}{y} + \frac{49y}{x}$ for some non-zero real numbers x and y , then c cannot take the value:
- Q. 3.** If $(3 + 2\sqrt{2})$ is a root of the equation $ax^2 + bx + c = 0$, and $(4 + 2\sqrt{3})$ is a root of the equation $ay^2 + my + n = 0$, where a, b, c, m and n are integers, then the value of $\left(\frac{b}{m} + \frac{c - 2b}{n}\right)$ is:
- Q. 4.** Suppose the medians BD and CE of a triangle ABC intersect at a point O. If the area of triangle ABC is 108 sq. cm., then, the area of the triangle EOD, in sq. cm., is:
- Q. 5.** Bob can finish a job in 40 days, if he works alone. Alex is twice as fast as Bob and thrice as fast as Cole in the same job. Suppose Alex and Bob work together on the first day, Bob and Cole work together on the second day, Cole and Alex work together on the third day, and then, they continue the work by repeating this three-day roster, with Alex and Bob working together on the fourth day, and so on. Then, the total number of days Alex would have worked when the job gets finished is:
- Q. 6.** A glass contains 500 cc of milk and a cup contains 500 cc of water. From the glass, 150 cc of milk is transferred to the cup and mixed thoroughly. Next, 150 cc of this mixture is transferred from the cup to the glass. Now, the amount of water in the glass and the amount of milk in the cup are in the ratio:
- Q. 7.** Consider six distinct natural numbers such that the average of the two smallest numbers is 14, and the average of the two largest numbers is 28. Then, the maximum possible value of the average of these six numbers is:
- Q. 8.** Let r be a real number and $f(x) = \begin{cases} 2x - r & \text{if } x \geq r \\ r & \text{if } x < r \end{cases}$. Then, the equation $f(x) = f(f(x))$ holds for all real:
- Q. 9.** Two ships are approaching a port along straight routes at constant speeds. Initially, the two ships and the port formed an equilateral triangle with sides of length 24 km. When the slower ship travelled 8 km, the triangle formed by the new positions of the two ships and the port became right-angled. When the faster ship reaches the port, the distance, in km, between the other ship and the port will be:
- Q. 10.** Nitu has an initial capital of ₹20,000. Out of this, she invests ₹8,000 at 5.5% in bank A, ₹5,000 at 5.6% in bank B and the remaining amount at $x\%$ in bank C; each rate being simple interest per annum. Her combined annual interest income from these investments is equal to 5% of the initial capital. If she had invested her entire initial capital in bank C alone, then her annual interest income, in rupees, would have been:
- Q. 11.** The minimum possible value of $\frac{x^2 - 6x + 10}{3 - x}$, for $x < 3$, is:
- Q. 12.** In an examination, the average marks of students in sections A and B are 32 and 60,

respectively. The number of students in section A is 10 less than that in section B. If the average marks of all the students across both the sections combined is an integer, then the difference between the maximum and minimum possible number of students in section A is:

Q. 13. If $\left(\sqrt{\frac{7}{5}}\right)^{3x-y} = \frac{875}{2401}$ and $\left(\frac{4a}{b}\right)^{y-6x}$, for all non-zero real values of a and b , then the value of $x + y$ is:

Q. 14. A group of N people worked on a project. They finished 35% of the project by working 7 hours a day for 10 days. Thereafter, 10 people left the group and the remaining people finished the rest of the project in 14 days by working 10 hours a day. Then, the value of N is:

1. 150
2. 36
3. 140
4. 23

Q. 15. Moody takes 30 seconds to finish riding an escalator if he walks on it at his normal speed in the same direction. He takes 20 seconds to finish riding the escalator if he walks at twice his normal speed in the same direction. If Moody decides to stand still on the escalator, then the time, in seconds, needed to finish riding the escalator is:

Q. 16. In a triangle ABC, $AB = AC = 8$ cm. A circle drawn with BC as diameter passes through A. Another circle drawn with centre at A passes through B and C. Then the area, in sq. cm, of the overlapping region between the two circles is:

1. $16(\pi - 1)$
2. 32π
3. $32(\pi - 1)$
4. 16π

Q. 17. Suppose k is any integer such that the equation $2x^2 + kx + 5 = 0$ has no real roots

and the equation $x^2 + (k - 5)x + 1 = 0$ has two distinct real roots for x . Then, the number of possible values of k is:

1. 7
2. 9
3. 8
4. 13

Q. 18. The arithmetic mean of all the distinct numbers that can be obtained by rearranging the digits in 1421, including itself, is:

1. 2442
2. 3333
3. 2592
4. 2222

Q. 19. The lengths of all four sides of a quadrilateral are integer valued. If three of its sides are of length 1 cm, 2 cm and 4 cm, then the total number of possible lengths of the fourth side is:

1. 5
2. 4
3. 3
4. 6

Q. 20. Two cars travel from different locations at constant speeds. To meet each other after starting at the same time, they take 1.5 hours if they travel towards each other, but 10.5 hours if they travel in the same direction. If the speed of the slower car is 60 km/hr, then the distance travelled, in km, by the slower car when it meets the other car while travelling towards each other, is:

1. 100
2. 90
3. 150
4. 120

Q. 21. A school has less than 5000 students and if the students are divided equally into teams of either 9 or 10 or 12 or 25 each, exactly 4 are always left out. However, if they are divided into teams of 11 each, no one is left out. The maximum number of teams of 12 each that can be formed out of the students in the school is:

Q. 22. The average of all 3-digit terms in the arithmetic progression 38, 55, 72, ..., is:

Answer Key

Verbal Ability and Reading Comprehension (VARC)

1. (4)	2. (3)	3. (4)	4. (2)	5. (2)	6. (3)	7. (4)	8. (1)	9. (2)	10. (4)
11. (1)	12. (3)	13. (1)	14. (1)	15. (3)	16. (1)	17. (2)	18. (2)	19. (1)	20. (2)
21. (1)	22. 4312	23. 2314	24. 3214						

Data Interpretation and Logical Reasoning (DILR)

1. (2)	2. (3)	3. (2)	4. 40	5. 30	6. (1)	7. (3)	8. 6	9. 6	10. (2)
11. (3)	12. 12	13. 27	14. (1)	15. (1)	16. (1)	17. (4)	18. (2)	19. (1)	20. (2)

Quantitative Aptitude (QA)

1. 12	2. (2)	3. (3)	4. 9	5. 11	6. (1)	7. (1)	8. (1)	9. (3)	10. (2)
11. (2)	12. 63	13. 14	14. (3)	15. 60	16. (3)	17. (2)	18. (4)	19. (1)	20. (2)
21. 150	22. 548								

Answers and Explanations

Verbal Ability and Reading Comprehension (VARC)

1. **Option (4) is correct.**

From the lines: "There was an attempt to formulate Indian culture as uniform, such formulations being derived from texts that were given priority. The so-called 'discovery' of India was largely through selected literature in Sanskrit. This interpretation tended to emphasize non-historical aspects of Indian culture, for example, the idea of an unchanging continuity of society and religion over 3,000 years," we can understand that the view of the west towards India was too myopic and selective. We need to select an option that is similar to this approach. Option (4) exhibits similar limited observation of trying to understand contemporary America by watching Hollywood action movies.

2. **Option (3) is correct.**

You have to select the option that the author is not likely to support. Refer to the lines: "It was a consolation to the Indian intelligentsia for its perceived inability to counter the technical superiority of the west, a superiority viewed as having enabled Europe to colonize Asia and other parts of the world." Though the passage criticises the western attitude towards India and believes the west underestimated India, it can't be deduced that India matched the technical skill of the west. Hence, the author is not likely to approve the view stated in option (3). Thus, it is the correct answer.

From the line, "Orientalism [which we can understand broadly as Western perceptions of the Orient] fuelled the fantasy and the freedom sought by European Romanticism," option (1) can be easily deduced. Hence, option (1) is ruled out.

From the line, "It was believed that the Indian pattern of life was so concerned with metaphysics and the subtleties of religious

belief that little attention was given to the more tangible aspects," it is clear that the author is criticizing the west for not paying attention to the other tangible aspects. Thus, he is more likely to support option (2). Hence, option (2) is ruled out.

The author will support Option 4's point of view because he has criticised the English for their consistent approach to understanding Indian culture.

3. **Option (4) is correct.**

From the lines: "A dichotomy in values was maintained, Indian values being described as 'spiritual' and European values as 'materialistic', with little attempt to juxtapose these values with the reality of Indian society," it can be understood that the author would not support the measure mentioned in option (1). Hence, option (1) is the correct answer.

The passage primarily seeks to investigate the western perspective on India, and it criticises the framework that the west has used to understand Indian culture. Hence, the author would promote the reading of the country's literature in an unbiased manner to understand the country's culture. Thus, option (1) can't be the answer.

For the same reason, the author would support examining their own beliefs and biases. Hence, option (2) is also ruled out.

The author will support this view that can give a more accurate picture of a nation's history and culture, and to do so, there is no better way than examining the complex reality of a nation's society.

4. **Option (2) is correct.**

From the very first paragraph of the passage, all the three options, option (1), (3), and (4) can be derived. Only option (2) can not be deduced

from the passage. Hence, option (2) is the answer.

5. Option (2) is correct.

The passage starts with the study of the sociologists at the Chicago School, who focus on how rapid or dramatic social change causes increase in crime. The passage focuses on the effects of social disorganization on crime in Chicago. Option (2) best sums up this idea. Hence, option (2) is the answer.

The passage doesn't suggest anything about controlling crime. Hence, option (1) is ruled out.

There is no comparison in the crime ratio of the states. Hence, option (3) is ruled out.

The passage talks about a lack of social cohesion, not particularly about racial discrimination. Hence, option (4) also out of scope. Hence, it is eliminated.

6. Option (3) is correct.

Explanation: We have to select the option that is incorrect, as per the passage. The passage does not quote the reason for the slower integration of African American migrants. Hence, option (3) is the correct answer.

"According to social disorganization theory, until the social ecology of the "new place" can adapt, this rapid change is a criminogenic influence." This makes option (1) correct.

"Failure to integrate these immigrants, coupled with other forces of social disorganization such as crowding, poverty, and illness, caused crime rates to climb in the cities, particularly." This makes option (2) correct. Hence, it is not the answer.

"These migrants, unlike their white counterparts, were not integrated into the cities they now called home. In fact, by the end of the twentieth century, most American cities had high levels of racial residential segregation." This makes option 4 correct. Hence, it is not the answer.

7. Option (4) is correct.

The passage starts with the study of the sociologists at the Chicago School, who focus on how rapid or dramatic social change causes increases in crime. The passage delves into the relationship between immigration and the changes in social structure caused by immigration, as well as the impact on crime

rates. Thus, the option that best encapsulates these ideas is option (4).

Option (1) includes an external factor, 'heavy industries', thus, option (1) is ruled out. Option (2) misses out an important idea: "crime." Hence, option (2) is also ruled out.

8. Option (1) is correct.

We have to select the option that does not contradict the given fact. The facts assert that at the start of the 20th century, most of the American population was rural, and by the middle of the century, the population was predominantly urban. This supports option (1), which says that during the 20th century there was a strong outward migration from rural America.

9. Option (2) is correct.

The passage states that the use of digital templates might have led to the ebola patient's incorrect diagnosis. The templates' content may have contributed to creating tunnel vision, making it difficult to identify the infection during diagnosis. Furthermore, the passage implies that tools are primarily used to collect data at the expense of accurate diagnosis. Therefore, the main offender in this situation is the less significant information that the doctors recorded, which caused them to think in the wrong direction.

10. Option (4) is correct.

The idea that the software can take the place of people is not expressed or even hinted at in the passage. The example from the diagnosis research paper, on the other hand, demonstrates the shortcomings of these ostensibly complex software systems. Thus, this can't be deduced from the passage. Hence, option (4) is the answer.

From the very first paragraph, options (1) and (3) can be deduced. Hence, both are ruled out. From the example of ebola disease, option (2) can be deduced. Hence, option (2) is also ruled out.

11. Option (1) is correct.

From the first line of the last paragraph, it is clear that, with human-centred automation, the author wants to present a situation where technology plays a secondary role and the human mind plays a primary role.

In all the options except for option (1) human instruction takes precedence. Hence, options (2), (3), and (4) can be ruled out. In option (1) the technology automatically acts without the instruction of a human being. Thus, it is not an example of human-centered automation.

12. Option (3) is correct.

“The people using the more advanced software, meanwhile, would often “aimlessly click around” when confronted with a tricky problem. The supposedly helpful software actually short-circuited their thinking and learning.” From the above lines we can deduce that the users, when provided with advance technology, rather than trying to develop a strategy for the problem, were expecting it to get done by the software.

13. Option (1) is correct.

The passage starts with the description of the complexity of the biosphere and difficulty in developing thinking device without biologic. In the next lines, the author explains how it has been possible to incorporate these characteristics into mechanical systems as a result of the growing complexity of human-made systems (though not until it was similar to live creatures). Bioengineering and genetic engineering are two examples of this. The author then analyses the convergence of these two logics in the last paragraph (Biologic and Techno logic). Only option (1) encapsulates the thought flow of the passage aptly.

14. Option (1) is correct.

“The overlap of the mechanical and the lifelike increases year by year. Part of this bionic convergence is a matter of words. The meanings of “mechanical” and “life” are both stretching until all complicated things can be perceived as machines, and all self-sustaining machines can be perceived as alive.” From the above lines it is clear that the difference between these two has blurred and is going to blur further. This is aptly stated in option (1). Hence, it is the answer.

Option (2) is exact opposite to the facts given in the paragraph. Hence, option (2) is ruled out.

The author is talking about life and machines, not about genetic engineering and artificial intelligence. Hence, option (3) is ruled out.

Option (4) is also contradictory to the facts stated in the passage. Hence, this is also eliminated.

15. Option (3) is correct.

The author's major point in the final paragraph is that manufactured and organic (lifelike) realities are becoming more and more comparable. The author claims that the rising similarities (caused by technological advancements) have warped our perception of reality and led us to believe that perhaps these two are and always have been the same. This is translated into option (3).

The rest of the options are distorted, so they can be easily eliminated.

16. Option (1) is correct.

We have to select the option that can be implied in the passage. From the lines, “Genetic engineering is precisely what cattle breeders..... directed artificial evolution—purposeful design—which greatly accelerates improvements,” it can be deduced that both endeavour to artificially evolve the product. Thus, option (1) can be deduced from the passage.

Option (2) is not mentioned in the passage. Hence, it is eliminated.

From the line: “Although many philosophers in the past have suspected one could abstract the laws of life and apply them elsewhere,” we can say that the option contradicts the fact given in the passage. Hence, option (3) is ruled out.

Option (4) is too generic from the perspective of the passage. Also, it distorts the information given in the passage. Hence, it is ruled out.

17. Option (2) is correct.

The paragraph describes the dual inheritance theory. The theory is stated by the author in the first two lines. The sentence that follows develops the thought and provides the theory's implication. With the line following blank 2, the author illustrates the implication made in the sentence (problem phrase). The given sentence elaborates that people learn without knowing the reason. This is continued in the sentence after the blank 2. As a result, the given sentence is the best fit for the blank.

18. Option (2) is correct.

The paragraph talks about the problems of getting the employees back in the office in post pandemic time. The first two lines elaborate on the problems. The line before blank 2 states that the flow of workers is more of a trickle. In continuation with this idea, the blank will be filled with the given sentence because, after the blank, the author changes the idea and talks about the current steps taken by the companies.

19. Option (1) is correct.

The key ideas of the paragraph are as follows: i) In the age of social media, there is an increase in the copying of fashion trends that are specific to particular cultures or heritages. ii) When the original communities' original concepts are used, neither credit nor compensation is given to them. Option (1) includes both key ideas. Hence, it is the best summary of the paragraph. Option (2) distorts the truth by claiming that mass production has been encouraged by the media. Hence, option (2) is ruled out.

There is no mention of stealing or compensating anywhere in the passage. Hence, option (3) is also eliminated.

Option (4) is ruled out because it is out of scope.

20. Option (2) is correct.

The paragraph states that the invention of alphabets did not immediately lead to alphabetical order. During the middle ages, scholars were hesitant to categorise the alphabet for fear of undermining the divine order. The categorization took place in later centuries. With the rediscovery of the Greek and Roman classics and the emergence of government bureaucracy, which necessitated a more systematic way of ordering and searching texts. This is aptly summed up in Option 2.

21. Option (1) is correct.

The paragraph explains that a joke's purpose is to offend its target (victim), regardless of status. Jokes regarding those viewed as inferior in society are improper, according to the cancel

culture. This is encompassed aptly in option (1). Hence, (1) is the answer. The rest of the options are distorted. Hence, they are eliminated.

22. Correct answer is [4312].

The paragraph is about beacons and their applications. Statement 4 introduces the subject hence; it will be the obvious opener. Statement 3 carries forward the idea by stating about working of beacons. Sentences 1 refers to the utility of these beacons in different industrial sectors and statement 2 explains how the beacon would help retailers. Thus 1 will be followed by 2. Hence, the sequence will be 4312.

23. Correct answer is [2314].

We can tell that sentences 1 and 4 are a pair by a close reading. The author explained in paragraph 1 how he or she was made to feel bad for staying inside and not going outside. For an introverted child, it felt like a danger, as stated in Statement 4. 1-4 is a pair as a result. Out of sentences 2 and 3, sentence 2 introduces the subject of discussion—namely, how the author's mother forced her to spend time in the sun. The information regarding the stories and folklore used to motivate the author is provided in Statement 2. 2-3 is therefore a pair. 1 immediately follows 3. Hence, the sequence is 2314.

24. Correct answer is [3214].

(3) is definitely the first sentence, as it introduces the concept of meritocracy that enables to see our achievements as worthy of reward. (2) follows next, owing to the use of 'but' as it presents a contradicting idea on meritocracy—reasserting the importance of luck and grace. This makes it clear that our achievements and failures are often out of our control (because of luck, grace). So (1) is the next statement and (4) the last one, which clarifies that as a result of accepting the logic of (1), it increases one's respect for other fellow citizens. Hence the possible answer is 3214.

Data Interpretation and Logical Reasoning (DILR)

Solution for Questions 1 to 5:

Total numbers of males and females are chosen in 1980 are 1000 each.

Age group in 1980	Males alive in 1990	Males alive in 2000	Males alive in 2010	Males alive in 2020
10–20	230	180	150	140
20–30	235	205	165	125
30–40	210	160	90	50
40–50	190	100	25	5

Age group in 1980	Females alive in 1990	Females alive in 2000	Females alive in 2010	Females alive in 2020
10–20	240	210	160	100
20–30	225	175	145	105
30–40	190	150	100	60
40–50	220	120	30	18

1. Option (2) is correct.

The total number of males alive in 2000
 $= 180 + 205 + 160 + 100 = 645$

\therefore Total number of dead males in 2000
 $= 1000 - 645 = 355$

Total number of females alive in 2000
 $= 210 + 175 + 150 + 120 = 655$

\therefore Total number of dead females in 2000
 $= 1000 - 655 = 345$

Ratio of dead males and females

$$= \frac{355}{345} = 71 : 69$$

2. Option (3) is correct.

The total number of males in the age group of 30–40 (in 1980) alive till 2010 = 90

The total number of females in the age group of 30–40 (in 1980) alive till 2010 = 100

Thus, total number of people of age group 30–40 alive till 2010
 $= 100 + 90 = 190$

3. Option (2) is correct.

Number of males less than 30 years of age in 1980 survived until 2020 = $140 + 125 = 265$

Number of females less than 30 years of age in 1980 survived until 2020 = $100 + 105 = 205$

Total number of people = $265 + 205 = 470$

4. Correct answer is [40].

Total number of males age between 20 and 30 years in 1980 active in 2000 = 205

Total number of males age between 20 and 30 years in 1980 alive in 2010 = 165

Thus, total number of males age between 20 and 30 years in 1980 died in the period 2000 to 2010 = $205 - 165 = 40$

5. Correct answer is [30].

There are 250 females from age 20–30 in 1980 and in 2000 these females age are from 40–50 but only 175 are alive. In 2010, these females age becomes 50–60 and 145 alive.

\therefore Number of females are died in 50–60
 $= 175 - 145 = 30$

Solution for Questions 6 to 10:

Everyone started with ₹10 and the total amount ₹40 in each round remains the same. So, we get the following table:

	Pulak	Qasim	Ritesh	Suresh
Round 1	₹12	₹8	₹10	₹10
Round 2	₹13	₹10	₹9	₹8
Round 3				
Round 4				
Round 5	₹10	₹10	₹7	₹13
Round 6				
Round 7		₹12	₹4	
Round 8	₹13			₹10

Given that, at the end of fourth round the amount of Pulak and Qasim had same and that amount possible is only ₹11.

Possible amount of Qasim at the end of round 6 is ₹11.

	Pulak	Qasim	Ritesh	Suresh
Round 1	₹12	₹8	₹10	₹10
Round 2	₹13	₹10	₹9	₹8
Round 3				
Round 4	₹11	₹11		
Round 5	₹10	₹10	₹7	₹13
Round 6		₹11		
Round 7		₹12	₹4	
Round 8	₹13			₹10

Amounts of Pulak and Qasim is decreased by 1 from round 4 to round 5. So, amounts with Ritesh and Suresh is increased by 1 from round 4 to round 5.

	Pulak	Qasim	Ritesh	Suresh
Round 1	₹12	₹8	₹10	₹10
Round 2	₹13	₹10	₹9	₹8
Round 3				
Round 4	₹11	₹11	₹6	₹12
Round 5	₹10	₹10	₹7	₹13
Round 6		₹11		
Round 7		₹12	₹4	
Round 8	₹13			₹10

Since, amount of Suresh at the end of round 2 is ₹8 and at the end of round 4 is ₹12, therefore, amount of Suresh at the end of round 3 is ₹10.

Amount of Qasim at the end of round 3 may be ₹9 or ₹11. If the amount is 9 then amount of Ritesh has to be ₹10 or amount with Pulak has to be ₹14 which are not possible. Therefore, amount with Qasim at the end of round 3 is ₹11.

	Pulak	Qasim	Ritesh	Suresh
Round 1	₹12	₹8	₹10	₹10
Round 2	₹13	₹10	₹9	₹8
Round 3		₹11		₹10
Round 4	₹11	₹11	₹6	₹12
Round 5	₹10	₹10	₹7	₹13
Round 6		₹11		
Round 7		₹12	₹4	
Round 8	₹13			₹10

Now, Qasim has the same amount at the end of round 3 and round 4, so, there must be another person whose amount is also same at the end of round 3 and round 4. This person can only be Pulak. So, at the end of round 3 Pulak and Ritesh has 11 and 8 respectively.

The only possible amount of Qasim and Ritesh at end of round 8 will be ₹11 and ₹6 respectively.

	Pulak	Qasim	Ritesh	Suresh
Round 1	₹12	₹8	₹10	₹10
Round 2	₹13	₹10	₹9	₹8
Round 3	₹11	₹11	₹8	₹10
Round 4	₹11	₹11	₹6	₹12
Round 5	₹10	₹10	₹7	₹13
Round 6		₹11		
Round 7		₹12	₹4	
Round 8	₹13	₹11	₹6	₹10

Since, amount of Qasim decrease by 1 and Ritesh increase by 2 from round 7 to round 8.

So, only possible of Suresh is ₹12 and Pulak is ₹12.

	Pulak	Qasim	Ritesh	Suresh
Round 1	₹12	₹8	₹10	₹10
Round 2	₹13	₹10	₹9	₹8
Round 3	₹11	₹11	₹8	₹10
Round 4	₹11	₹11	₹6	₹12
Round 5	₹10	₹10	₹7	₹13
Round 6		₹11		
Round 7	₹12	₹12	₹4	₹12
Round 8	₹13	₹11	₹6	₹10

The amount of Qasim increase by 1 from round 6 to round 7. It is only possible to Ritesh as same and possible value Suresh and Pulak at the end of 6 round is ₹12 and ₹12 respectively.

	Pulak	Qasim	Ritesh	Suresh
Round 1	₹12	₹8	₹10	₹10
Round 2	₹13	₹10	₹9	₹8
Round 3	₹11	₹11	₹8	₹10
Round 4	₹11	₹11	₹6	₹12
Round 5	₹10	₹10	₹7	₹13
Round 6	₹12	₹11	₹5	₹12
Round 7	₹12	₹12	₹4	₹12
Round 8	₹13	₹11	₹6	₹10

6. **Option (1) is correct.**
So, amount of money that Ritesh had with him at the end of round 8 is ₹6.
7. **Option (3) is correct.**
So, amount of money that Pulak had with him at the end of round 6 is ₹12.
8. **Correct answer is [6].**
So, amount of money that Ritesh have at the end of round 4 is ₹6.
9. **Correct answer is [6].**
Number of games were played with a bet ₹2 is 6.
10. **Option (2) is correct.**
For round 6, the pairs formed are Pulak-Ritesh and Qasim-Suresh. For round 4, the pairs formed are Pulak-Qasim and Ritesh-Suresh. Hence, e for round 5, pairs formed are Pulak-Suresh and Qasim-Ritesh.

Solution for Questions 11 to 15:

Let number of students in non-CS, whose taking AI is $2x$ and ML is $5x$.

From statement 5: No CS student failed in AI, while no non-CS student got an A grade in AI. So, takes value 0.

From statement 6: Let number of CS students who get A, B and C grades be $3a$, $5a$ and $2a$ in AI and $4b$, $5b$ and $2b$ in ML.

From statement 3: The number of non-CS students who failed in AI and ML are b in each category.

From statement 8: The number of CS students who failed in ML is equal to $30-b$.

		A	B	C	F	Total
CS	AI	$3a$	$5a$	$2a$	0	$10a$
	ML	$4b$	$5b$	$2b$	$30-b$	$10b+30$
Non-CS	AI	0			b	$2x$
	ML				b	$5x$

From statement 7: Given that, $\frac{2b}{30-b} = \frac{3}{1}$

$$\Rightarrow 2b = 90 - 3b \Rightarrow b = 18$$

Since, CS students take both AI and ML courses, therefore, $10a = 10b + 30$.

\Rightarrow

$$10a = 180 + 30 = 210$$

\Rightarrow

$$a = 21$$

From statement 2: We have $10a = 7x$

\Rightarrow

$$210 = 7x$$

\Rightarrow

$$x = 30$$

Substituting the values of a , b and x , we get

		A	B	C	F	Total
CS	AI	63	105	42	0	210
	ML	72	90	36	12	210
Non-CS	AI				18	60
	ML				18	150

It is clear from above table that total of 270 students took AI out of which 252 students passed and total of 360 students took ML out of which 330 students passed.

From statement 4: Since, 252 students who passed in AI, out of which 126 of them got grade B and 63 got grade A and 63 got grade C.

Similarly, 330 students who passed in ML, out of which 165 of them got grade B and 99 got grade A and 66 got grade C.

Hence, find table is

		A	B	C	F	Total
CS	AI	63	105	42	0	210
	ML	72	90	36	12	210
Non CS	AI	0	21	21	18	60
	ML	27	75	30	18	150

11. Option (3) is correct.

Number of students of AI = $210 + 60 = 270$

12. Correct answer is [12].

Number of CS students failed in ML = 12.

13. Correct answer is [27].

Number of non-CS students got A grade in ML = 27.

14. Option (1) is correct.

Number of students got A grade in AI = 63

15. Option (1) is correct.

Number of non-CS students got B grade in ML = 75

Solution for Questions 16 to 20:

From statement 6: Given that, total number of new cases in Levmosto, Tyhrmosto, Pesmosto and Kitmosto over the five day period were 12, 12, 5, and 14 respectively.

\therefore Total numbers of new cases = $12 + 12 + 5 + 14 = 43$.

Since, the total number of cases in Kitmosto is 14. It can be concluded that the number of new cases in each day is either 2 or 3. Given that, from statement 5, three new cases on day 2.

From statement 4: Total new cases in Pesmosto is 5 and the maximum number of new cases is 2. It can be concluded that the number of new cases in 5 days will be 0, 1, 1, 1 and 2 in any order.

From statement 3: Number of new cases increasing during the 5-day period.

Now, we know that maximum number of cases for Pesmosto is 2. So, maximum number of cases in day-5 will be less than 12.

\therefore Let the number of cases on day 5 will be 11.

Since, new cases on day-3 was exactly one more than that on day 2.

\therefore Maximum possible total new cases in day-1, day-2, day-3 and day-4 will be 5, 8, 9 and 10 respectively.

Neighbourhoods	Day-1	Day-2	Day-3	Day-4	Day-5	Total
Levmosto						12
Tyhrmosto						12
Pesmosto						5
Kitmosto						14
Total	5	8	9	10	11	43

From statement 1: At least one new case in every neighbourhood on day-1.

So, the only possible combination will be 1, 1, 1 and 2 for Levmosto, Tyhrmosto, Pesmosto and Kitmosto respectively.

Now, for the other 4 days the number of cases in Kitmosto will be 3.

For day-5: The number of possible cases will be 3, 3, 2 and 3 in Levmosto, Tyhrmosto, Pesmosto and Kitmosto respectively.

For day-4: The number of possible cases will be 3, 3, 1 and 3 for Levmosto, Thyrmisto, Pesmisto and Kitmisto respectively.

For day-2: Since Kitmisto have 3 cases therefore the number of possible cases will be 2, 2, 1 and 3 in Levmosto, Thyrmisto, Pesmisto and Kitmisto respectively.

Now, for day-3: The number of possible cases will be 3, 3, 0 and 3 in Levmosto, Thyrmisto, Pesmisto and Kitmisto respectively.

Thus, the final table will be

Neighbourhoods	Day-1	Day-2	Day-3	Day-4	Day-5	Total
Levmisto	1	2	3	3	3	12
Tyhrmisto	1	2	3	3	3	12
Pesmisto	1	1	0	1	2	5
Kitmisto	2	3	3	3	3	14
Total	5	8	9	10	11	43

16. Option (1) is correct.

The total number of new cases in the city on day-2 is 8.

17. Option (4) is correct.

The number of new cases in Levmosto on day-3 is 3.

18. Option (2) is correct.

On day-3 Pesmisto not have any new cases.

19. Option (1) is correct.

There were 3 new cases in Thyrmisto on day-3, therefore statement A is false. There were one new cases in Pesmisto on day-2, therefore statement B is false.

20. Option (2) is correct.

All 5-days did Levmosto and Thyrmisto have the same number of new cases.

Quantitative Aptitude (QA)

1. Correct answer is [12].

Let number of cheques ₹ 100, ₹ 250 and ₹ 500 be x , y and z respectively.

A.T.Q

$$x + y + z = 100 \quad \dots(i)$$

$$100x + 250y + 500z = 15250$$

$$2x + 5y + 10z = 305 \quad \dots(ii)$$

From (ii) $- 2 \times (i)$

$$3y + 8z = 105 \quad \dots(iii)$$

Since y and z are integer

($z = 3, y = 27$), ($z = 9, y = 11$) and ($z = 12, y = 3$) satisfy the equation (iii)

\therefore Maximum value of $z = 12$

2. Option (2) is correct.

$$\text{Let } \frac{x}{y} = P$$

$$\therefore c = 16P + \frac{49}{P} \Rightarrow 16P^2 - cP + 49 = 0$$

$\therefore x$ and y are non-zero real numbers, so, P is also non-zero real

$$\therefore b^2 - 4ac > 0$$

$$c^2 - 4 \times 16 \times 49 > 0$$

$$c^2 > 4 \times 16 \times 49$$

$$\therefore c > 56 \text{ and } c < -56$$

So, $c \neq -50$

3. Option (3) is correct.

Since $3 + 2\sqrt{2}$ and $3 - 2\sqrt{2}$ are roots of equation $ax^2 + bx + c = 0$

$$\therefore \frac{-b}{a} = 6 \quad \dots(i)$$

$$\frac{c}{a} = 1 \quad \dots(ii)$$

$4 + 2\sqrt{3}$ and $4 - 2\sqrt{3}$ are roots of equation $ay^2 + my + n = 0$

$$\frac{-m}{a} = 8 \quad \dots(iii)$$

$$\frac{n}{a} = 4 \quad \dots(iv)$$

From (i) and (iii)

$$\frac{b}{m} = \frac{6}{8} = \frac{3}{4}$$

From (ii) and (iv)

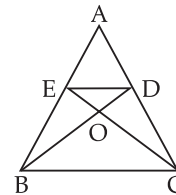
$$\frac{c}{n} = \frac{1}{4}$$

From (i) and (iv)

$$\frac{-b}{n} = \frac{6}{4} = \frac{3}{2} \Rightarrow \frac{-2b}{n} = \frac{6}{2}$$

$$\begin{aligned} \text{Now, } \frac{b}{m} + \frac{c-2b}{n} &= \frac{3}{4} + \frac{1}{4} + \frac{6}{2} \\ &= \frac{3+1+12}{4} = 4 \end{aligned}$$

4. Correct answer is [9].



Since, median of triangle divides in two equal parts.

$$\begin{aligned} \therefore \text{Area of } \triangle ABD &= \frac{1}{2} \times 108 \\ &= 54 \text{ cm}^2 \end{aligned}$$

In $\triangle ABD$, ED is median

$$\begin{aligned} \therefore \text{Area of } \triangle EBD &= \frac{1}{2} \times \text{Area of } \triangle ABD \\ &= \frac{1}{2} \times 54 = 27 \text{ cm}^2 \end{aligned}$$

Since, median divides each other in ratio 2 : 1.

$$\therefore \frac{OB}{OD} = \frac{2}{1}$$

$$\therefore \frac{\text{Area of } \triangle BEO}{\text{Area of } \triangle EOD} = \frac{2}{1}$$

$$\begin{aligned} \therefore \text{Area of } \triangle EOD &= \frac{1}{3} \times \text{Area of } \triangle BED \\ &= \frac{1}{3} \times 27 = 9 \text{ cm}^2 \end{aligned}$$

5. Correct answer is [11].

Let Bob can do a job 3 units/day.

\therefore Alex can do a job 6 units/day.

and Cole can do a job 2 units/day.

Since, Bob can finish a job in 40 days.

\therefore Total job = $40 \times 3 = 120$ units

1st days do job = $6 + 3 = 9$ units

2nd day do job = $3 + 2 = 5$ units

3rd day do job = $6 + 2 = 8$ units

Total job in 3 days cycle = $9 + 5 + 8 = 22$ units

After five cycle do a job = $5 \times 22 = 110$ units.

Total days = $5 \times 3 = 15$ days

Remaining job = $120 - 110 = 10$ units.

On 16th day = $110 + 9 = 119 < 120$

∴ Job finish on 17th day.

Total days of Alex Job.

= 2×5 (3 days cycle) + 1 (on 16th day)

= $10 + 1 = 11$ days

6. Option (1) is correct.

A glass contains 500 cc of milk and a cup contains 500 cc of water.

Case 1: When 150 cc of milk of glass is transferred to the cup.

A glass contains = 350 cc of milk

A cup contains = 650 cc of mixture

Ratio of water and milk in cup

$$= \frac{500}{150} = \frac{10}{3} = 10 : 3$$

Case 2: When transfer 150 cc of mixture from cup to the glass.

Remaining mixture in cup = 500 cc

∴ Water in glass = $\frac{10}{13} \times 150$

Milk in cup = $\frac{3}{13} \times 500$

Ratio = $\frac{10}{13} \times 150 : \frac{3}{13} \times 500 = 1 : 1$

7. Option (1) is correct.

Let six distinct natural numbers be a, b, c, d, e and f in ascending order.

A.T.Q

$$a + b = 2 \times 14 = 28$$

$$e + f = 2 \times 28 = 56$$

For maximum value of c and d .

∴ $e + f = 50$, so possible value of $e = 27, f = 29$

∴ Maximum value of $c = 25$ and $d = 26$.

Maximum possible value of average

$$= \frac{a + b + c + d + e + f}{6}$$

$$= \frac{28 + 25 + 26 + 56}{6} = \frac{135}{6}$$

= 22.5

8. Option (1) is correct.

Case 1: When $x < r$; $f(x) = r$

Now, $f(x) = f(f(x))$

$$r = f(r) = 2r - r$$

⇒ $r = r$

∴ $x < r$... (i)

Case 2: When $x \geq r$;

$$f(x) = 2x - r$$

Now, $f(x) = f(f(x))$

$$2x - r = f(2x - r)$$

$$\Rightarrow 2x - r = 2(2x - r) - r$$

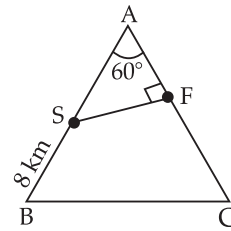
$$\Rightarrow 2x - r = 4x - 3r \Rightarrow x = r \quad \dots (ii)$$

From (i) and (ii), we get

$$x \leq r$$

9. Option (3) is correct.

Since, ABC is equilateral triangle, so, $\angle A = 60^\circ$



$$AS = 24 - 8 = 16 \text{ km}$$

$$\cos 60^\circ = \frac{AF}{AS}$$

$$\Rightarrow \frac{1}{2} = \frac{AF}{16} \Rightarrow AF = 8 \text{ km}$$

$$\therefore CF = 24 - 8 = 16 \text{ km}$$

So, when S travelled 8 km then F travelled 16 km at same time.

∴ Ratio of speed of faster and slower ships = 2 : 1

Hence, when faster ships travelled from C to A that is 24 km then slower ships travelled is 12 km.

∴ Distance between slower ships and port = 12 km

10. Option (2) is correct.

$$\text{Investment in C} = 20,000 - (8000 + 5000) = 7000$$

A.T.Q

$$\frac{5.5 \times 1 \times 8000}{100} + \frac{5.6 \times 1 \times 5000}{100} + \frac{x \times 1 \times 7000}{100}$$

$$= \frac{5 \times 1 \times 20000}{100}$$

$$\Rightarrow 440 + 280 + 70x = 1000$$

$$\Rightarrow x = 4\%$$

$$\text{Interest} = \frac{20000 \times 4 \times 1}{100} = ₹ 800$$

11. Option (2) is correct.

Given that, $x < 3 \Rightarrow 3 - x > 0$

$$\text{Now, } \frac{x^2 - 6x + 10}{3 - x} = \frac{x^2 - 6x + 9 + 1}{3 - x}$$

$$= \frac{(3-x)^2 + 1}{3-x}$$

Let $3-x = P$

$$\Rightarrow \frac{(3-x)^2 + 1}{3-x} = \frac{P^2 + 1}{P} = P + \frac{1}{P}$$

The value of $P + \frac{1}{P}$ for $P > 0$ is minimum at $P = 1$

\therefore Minimum value = $1 + 1 = 2$

12. Correct answer is [63].

Let number of students in section A be x

\therefore Number of students in section B be $x + 10$

$$\begin{aligned} \text{Combined average} &= \frac{32x + 60(x + 10)}{x + x + 10} \\ &= \frac{32x + 60x + 600}{2x + 10} = \frac{46x + 300}{x + 5} \\ &= 46 + \frac{70}{x + 5} = \text{Integer} \end{aligned}$$

\therefore Possible values of x are = 2, 5, 9, 30, 65

Difference maximum and minimum

$$= 65 - 2 = 63$$

13. Correct answer is [14].

Given that, $\left(\sqrt{\frac{7}{5}}\right)^{3x-y} = \frac{875}{2401}$

$$\Rightarrow \left(\frac{7}{5}\right)^{\frac{3x-y}{2}} = \frac{125}{343}$$

$$\Rightarrow \left(\frac{7}{5}\right)^{\frac{3x-y}{2}} = \left(\frac{7}{5}\right)^{-3}$$

$$\Rightarrow \frac{3x-y}{2} = -3$$

$$\Rightarrow 3x - y = -6 \quad \dots(i)$$

And $\left(\frac{4a}{b}\right)^{6x-y} = \left(\frac{2a}{b}\right)^{y-6x}$

Since, base is not equal

$$\begin{aligned} \therefore 6x - y &= y - 6x = 0 \\ y &= 6x \quad \dots(ii) \end{aligned}$$

From (i) and (ii)

$$3x - 6x = -6 \Rightarrow x = 2$$

From (i), $y = 12$

Now, $x + y = 2 + 12 = 14$

14. Option (3) is correct.

Since, N people worked 7 hours a day for 10 days.

The work done by N people

$$= N \times 7 \times 10 = 70 N$$

Let total work done in x hours

$$\therefore x \times \frac{35}{100} = 70 N \Rightarrow x = 200 N$$

The work left = $200 N - 70 N = 130 N$

A.T.Q

$$130 N = (N - 10) \times 14 \times 10$$

$$\Rightarrow N = 140$$

15. Correct answer is [60].

Let normal speed of Moody be x steps/s, and speed of escalator be y steps/s.

Since, Moody finish a ride at normal speed in 30 seconds.

$$\therefore \text{Total steps} = 30(x + y)$$

When speed of Moody be twice of normal speed, he finish a ride in 20 seconds

$$\therefore \text{Total steps} = 20(2x + y)$$

$$\therefore 30(x + y) = 20(2x + y)$$

$$\Rightarrow 30x + 30y = 40x + 20y$$

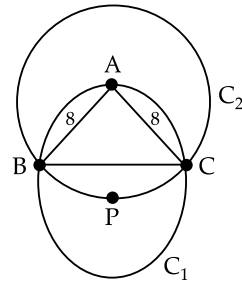
$$\Rightarrow x = y$$

$$\text{Total steps} = 30(y + y) = 60y$$

$$\begin{aligned} \text{Time taken by escalator} &= \frac{60y}{y} \\ &= 60 \text{ s.} \end{aligned}$$

16. Option (3) is correct.

Since, angle at semicircle is right angle.



$$\therefore \angle BAC = 90^\circ$$

$$\begin{aligned} \therefore BC &= \sqrt{8^2 + 8^2} \\ &= 8\sqrt{2} \end{aligned}$$

$$\text{Radius of } C_1 = \frac{1}{2} \times 8\sqrt{2} = 4\sqrt{2} = r_1$$

Given that, A is centre of C_2 ,

\therefore Radius of C_2 (r_2) = 8 cm

Area of overlapping region

= Area of semicircle of C_1 + Area of minor segment.

$$= \frac{1}{2} \pi (4\sqrt{2})^2 + \text{Area of sector ABPC} - \text{Area of } \triangle ABC$$

$$= \frac{1}{2} 32\pi + \frac{1}{4} \times \pi(8)^2 - \frac{1}{2} \times 8 \times 8$$

$$= 16\pi + 16\pi - 32 = 32\pi - 32 = 32(\pi - 1) \text{ cm}^2$$

17. Option (2) is correct.

Given that, $2x^2 + kx + 5 = 0$ has no real roots.

$$\therefore k^2 - 4 \times 2 \times 5 < 0 \Rightarrow k^2 - 40 < 0$$

$$\Rightarrow -\sqrt{40} < k < \sqrt{40}$$

$$\Rightarrow k \in (-\sqrt{40}, \sqrt{40}) \quad \dots(i)$$

And equation $x^2 + (k - 5)x + 1 = 0$ has two distinct real roots.

$$\therefore (k - 5)^2 - 4 \times 1 > 0$$

$$k^2 - 10k + 25 - 4 > 0$$

$$\Rightarrow k^2 - 10k + 21 > 0$$

$$\Rightarrow (k - 3)(k - 7) > 0$$

$$\begin{array}{ccccccc} & & + & & - & & + \\ & & | & & | & & | \\ & -\infty & & 3 & & 7 & & \infty \end{array}$$

$$k \in (-\infty, 3) \cup (7, \infty) \quad \dots(ii)$$

From (i) and (ii) the possible value of k are $-6, -5, -4, -3, -2, -1, 0, 1, 2$.

\therefore Total 9 value of k .

18. Option (4) is correct.

The number of 4-digit number that can be formed by digits 1, 1, 2 and 4 is $\frac{4!}{2!} = 12$.

Number of repetition of digits in all place is

$$\frac{12}{4} = 3$$

Sum of digit in each place

$$= 3(1) + 3(1) + 3(2) + 3(4) = 24$$

Sum of all numbers

$$= 1000(24) + 100(24) + 10(24) + 24 = 26664$$

$$\text{Mean} = \frac{26664}{12} = 2222$$

19. Option (1) is correct.

We have sum of three sides of quadrilateral is greater than fourth side.

Let fourth side is x

$$\therefore 1 + 2 + 4 > x \Rightarrow x < 7 \quad \dots(i)$$

$$1 + 2 + x > 4 \Rightarrow x > 1 \quad \dots(ii)$$

\therefore Possible integral value of x is 2, 3, 4, 5, 6.

Total number of possible values of fourth side is 5.

20. Option (2) is correct.

Given that, speed of slower car is 60 km/h and they meet each other after 1.5 hours when travel towards each other.

\therefore Distance travelled by slower car before they meet = $60 \times 1.5 = 90$ km

21. Correct answer is [150].

L.C.M of 9, 10, 12 and 25 = 900

Since, total students divided by 9, 10, 12 and 25 gets remainder 4.

$$\therefore \text{Total students} = 900k + 4$$

A.T.Q,

$$900k + 4 < 5000$$

$$\Rightarrow k < 5.5 \text{ and } k \in \mathbb{N}$$

\therefore Possible value of k is 1, 2, 3, 4, 5.

But number $900k + 4$ is divisible by 11 so it is possible when $k = 2$

\therefore Maximum number of teams of 12 each

$$= \frac{900 \times 2}{12} = 150$$

22. Correct answer is [548].

Given, A.P. 38, 55, 72

$$\therefore a_n = 38 + (n - 1) 17 = 17n + 21$$

When we put $k = 5$

We get first three digit number

$$\text{First 3-digit number} = 17 \times 5 + 21 = 106$$

All 3-digit number are 106, 123, 140, ... 990

$$\text{Now, } 990 = 106 + (n - 1) 17$$

$$\Rightarrow n = 53$$

Sum of 3-digit numbers

$$= \frac{53}{2} (106 + 990) = 53 \times 548$$

$$\text{Average} = \frac{53 \times 548}{53} = 548$$