Directions (Q.1-Q.4): The passage below is accompanied by a set of questions. Choose the best answer to each question.

Nature has all along yielded her flesh to humans. First, we took nature's materials as food, fibers, 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 reason to believe yet more can be synthesized 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 selfsustaining machines can be perceived as alive. Yet beyond semantics, two concrete trends are happening: (1) Human-made things are behaving more lifelike, 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.

1. None of the following statements is implied by the arguments of the passage, EXCEPT:
   (a) historically, philosophers have known that the laws of life can be abstracted and applied elsewhere.
   (b) purposeful design represents the pinnacle of scientific expertise in the service of human betterment and civilisational progress.
   (c) the biological realm is as complex as the mechanical one; which is why the logic of Bios is being imported into machines.
   (d) genetic engineers and bioengineers are the same insofar as they both seek to force evolution in an artificial way.

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

3. 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?

(a) "Mechanical" and "life" are words from different logical systems and are, therefore, fundamentally incompatible in meaning.

(b) "Bios" and "Technos" are both convergent forms of logic, but they generate meanings about the world that are mutually exclusive.

(c) A bionic convergence indicates the meeting ground of genetic engineering and artificial intelligence.

(d) "Mechanical" and "life" were earlier seen as opposite in meaning, but the difference between the two is increasingly blurred.

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

(a) Complex systems; Bio-logic; Bioengineering; Technos-logic; Convergence

(b) Nature; Computers; Carrots; Milk cows; Genetic engineering

(c) Complex systems; Carrots; Milk cows; Convergence; Technos-logic

(d) Nature; Bios; Technos; Self-repair; Holsteins

Directions (Q.5-Q.8): The passage below is accompanied by a set of questions. Choose the best answer to each question.

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 industrialization and urbanization 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 characterized by high levels of social disorganization 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 disorganizing 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 social disorganization 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 characterized by high levels of racial residential segregation . . . Failure to integrate these migrants, coupled with other forces of social disorganization such as crowding, poverty, and illness, caused crime rates to climb in the cities, particularly in the segregated wards and neighborhoods 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 disorganization.

5. 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?

(a) Economists have found that throughout the twentieth century, the size of the labour force in America has always been largest in rural areas.

(b) Demographic transition in America in the twentieth century is strongly marked by an out-migration from rural areas.

(c) A population census conducted in 1952 showed that more Americans lived in rural areas than in urban ones.

(d) The estimation of per capita income in America in the mid-twentieth century primarily required data from rural areas.

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

(a) According to social disorganisation theory, the social integration of African American migrants into Chicago was slower because they were less organised.

(b) According to social disorganisation theory, fast-paced social change provides fertile ground for the rapid growth of crime.

(c) The failure to integrate in-migrants, along with social problems like poverty, was a significant reason for the rise in crime in American cities.

(d) The differences between urban and rural lifestyles were crucial factors in the disruption experienced by migrants to American cities.

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

(a) Rapid population growth; Heavy industry; Segregation; Crime

(b) Chicago School; Social organisation; Migration; Crime

(c) Chicago School; Native-born Whites; European immigrants; Poverty

(d) Durkheim; Marx; Toennies; Shaw

8. A fundamental conclusion by the author is that:

(a) rapid population growth and demographic diversity give rise to social disorganisation that can feed the growth of crime.

(b) to prevent crime, it is important to maintain social order through maintaining social segregation.

(c) the best circumstances for crime to flourish are when there are severe racial disparities.

(d) according to European sociologists, crime in America is mainly in Chicago.

Directions (Q.9-Q.12): The passage below is accompanied by a set of questions. Choose the best answer to each question.

As software improves, the people using it become less likely to sharpen their own know-how. Applications that offer lots 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 Utrecht University in the 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 click 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 routinized 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 optimized 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-centered 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.

9. It can be inferred that in the Utrecht University experiment, one group of people was "aimlessly clicking around" because:
   (a) the other group was carrying out the tasks more efficiently.
   (b) they did not have the skill-set to address complicated tasks.
   (c) they wanted to avoid making mistakes.
   (d) they were hoping that the software would help carry out the tasks.

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:
    (a) it could mislead people.
    (b) it stops users from exercising their minds.
    (c) it stunts the development of its users.
    (d) computers could replace humans.

11. In the context of the passage, all of the following can be considered examples of human☐ centered automation EXCEPT:

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

12. In the Ebola misdiagnosis case, we can infer that doctors probably missed the forest for the trees because:
    (a) they were led by the data processed by digital templates.
    (b) the data collected were not sufficient for appropriate triage.
    (c) the digital templates forced them to acquire tunnel vision.
    (d) they used the wrong type of digital templates for the case.

Directions (Q.13-Q.16): The passage below is accompanied by a set of questions. Choose the best answer to each question.

Interpretations of the Indian past . . . were inevitably influenced by colonial concerns and interests, and also by prevalent European ideas about history, civilization 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 disjuncture 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 industrialization 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 civilization. Oriental civilizations 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 emphasize 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 refugeof 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 colonize 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.

13. Which one of the following styles of research is most similar to the Orientalist scholars' method of understanding Indian history and culture?
(a) Studying artefacts excavated at a palace to understand the lifestyle of those who lived there.
(b) Reading about the life of early American settlers and later waves of migration to understand the evolution of American culture.
(c) Analysing Hollywood action movies that depict violence and sex to understand contemporary America.
(d) Reading 18th century accounts by travellers to India to see how they viewed Indian life and culture of the time.

14. 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:
(a) examine the complex reality of that nation's society.
(b) examine their own beliefs and biases.
(c) develop an oppositional framework to grasp cultural differences.
(d) read widely in the country's literature.

15. It can be inferred from the passage that the author is not likely to support the view that:
(a) the Orientalist view of Asia fired the imagination of some Western poets.
(b) India became a colony although it matched the technical knowledge of the West.
(c) Indian culture acknowledges the material aspects of life.
(d) India's culture has evolved over the centuries.

16. In the context of the passage, all of the following statements are true EXCEPT:
(a) India's spiritualism served as a salve for European colonisers.
(b) Orientalist scholarship influenced Indians.
(c) Indian texts influenced Orientalist scholars.
(d) Orientalists' understanding of Indian history was linked to colonial concerns.

17. **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.

(a) Unlike the alphabet, once the efficacy of the alphabetic sequence became apparent to scholars and administrators, its use became widespread.
(b) While 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.

(c) 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.

(d) 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.

18. **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."

(a) Cancel culture does not understand the role and duty of comedians, which is to deride and mock everyone.

(b) Victims of jokes must not only be politicians and royalty, but also arrogant people from lower classes should be mentioned by comedians.

(c) Every joke needs a victim and one needs to include people from lower down the society and not just the upper class.

(d) All jokes target someone and one should be able to joke about anyone in the society, which is inconsistent with cancel culture.

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."

(a) Cultural collaboration is the need of the hour. Beautiful design ideas of indigenous people need to be showcased and shared worldwide.

(b) Taking fashion ideas from any cultural group without their consent is a form of appropriation without giving due credit, compensation, and respect.

(c) Media has encouraged mass production; images are copied effortlessly without care or concern for the interests of ethnic communities.

(d) Copying an embroidery design or pattern of textile from native communities who own them is tantamount to stealing and they need to be compensated.

20. **The four sentences (labelled 1, 2, 3 and 4) 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:**

(a) 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".

(b) My mum, quite reasonably, wanted me and my sister out of the house, in the sun.

(c) 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.

(d) To an introverted kid, that felt like a threat – and the feeling has stayed with me.

21. **The four sentences (labelled 1, 2, 3 and 4) 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.

22. **There is a sentence that is missing in the paragraph 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 theory ....says. 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)_.

(a) Option 1   (b) Option 2
(c) Option 3   (d) Option 4

23. **There is a sentence that is missing in the paragraph 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)

(a) Option 1   (b) Option 2
(c) Option 3   (d) Option 4

24. **The four sentences (labelled 1, 2, 3 and 4) 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. Various industrial sectors including retail, transit systems, enterprises, educational institutions, event organizing, 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 personalized 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 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.

Directions (Q.25-Q.29): Pulak, Qasim, Ritesh, and Suresh participated in a tournament comprising of 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 amounts 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		Rs. 8	Rs. 10	Rs. 10
Round 2	Rs. 13	Rs. 10		Rs. 8
Round 3				Rs. 10
Round 4				
Round 5	Rs. 10	Rs. 10		Rs. 13
Round 6				
Round 7		Rs. 12	Rs. 4	
Round 8	Rs. 13			Rs. 10

25. What BEST can be said about the amount of money that Ritesh had with him at the end of Round 8?
    (a) Exactly ₹5
    (b) ₹5 or ₹6
    (c) ₹4 or ₹5
    (d) Exactly ₹6

26. What BEST can be said about the amount of money that Pulak had with him at the end of Round 6?
    (a) ₹11 or ₹12
    (b) ₹12 or ₹13
    (c) Exactly ₹12
    (d) Exactly ₹11

27. How much money (in ₹) did Ritesh have at the end of Round 4?

28. How many games were played with a bet of ₹2?

29. Which of the following pairings was made in Round 5?
    (a) Pulak and Suresh
    (b) Pulak and Qasim
    (c) Qasim and Suresh
    (d) Pulak and Ritesh

Direction (Q.30-Q.34): There are only four neighbourhoods in a city - Levmisto, Tyhrmisto, Pesmisto and Kitmisto. 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 Kitmisto 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. Kitmisto is the only place to have 3 new cases on Day 2.
6. The total numbers of new cases in Levmisto, Tyhrmisto, Pesmisto and Kitmisto over the five-day period were 12, 12, 5 and 14 respectively.

30. What BEST can be concluded about the total number of new cases in the city on Day 2?
(a) Exactly 7   (b) Either 7 or 8
(c) Either 6 or 7   (d) Exactly 8

31. What BEST can be concluded about the number of new cases in Levmisto on Day 3?
(a) Either 2 or 3   (b) Exactly 3
(c) Either 0 or 1   (d) Exactly 2

32. On which day(s) did Pesmisto not have any new case?
(a) Both Day 2 and Day 3
(b) Only Day 2
(c) Only Day 3
(d) Both Day 2 and Day 4

33. Which of the two statements below is/are necessarily false? Statement A: There were 2 new cases in Tyhrmisto on Day 3.Statement B: There were no new cases in Pesmisto on Day 2.
(a) Statement B only
(b) Statement A only
(c) Both Statement A and Statement B
(d) Neither Statement A nor Statement B

34. On how many days did Levmisto and Tyhrmisto have the same number of new cases?
(a) 5   (b) 4
(c) 3   (d) 2

Directions (Q.35-Q.39): Answer the next 5 questions based on the information given below:

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 than20, 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 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 representedby the bars. For example, we know that 230 males among those tracked and who were alive in 1990 were aged between 20 and 30.
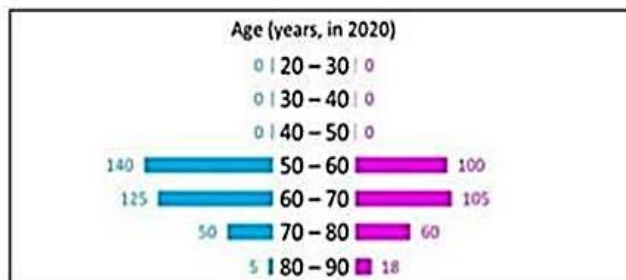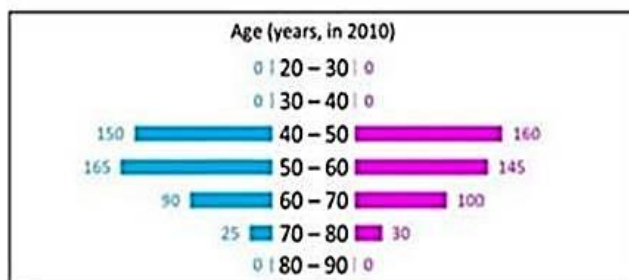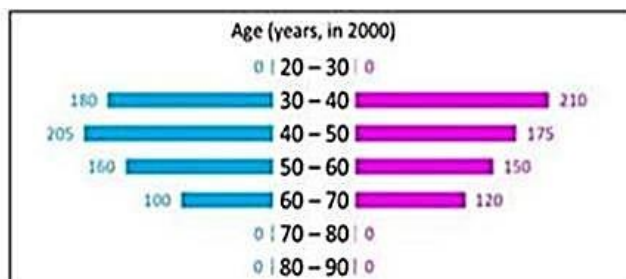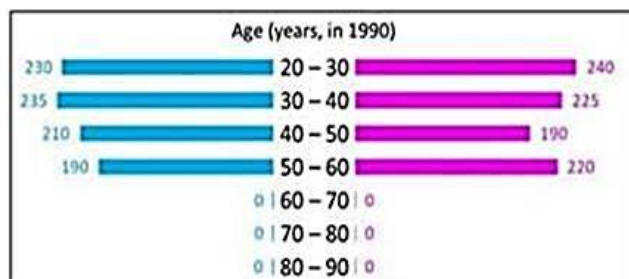
35. In 2000, what was the ratio of the number of dead males to dead females among those being tracked?
(a) 109 : 107   (b) 41 : 43
(c) 129 : 131   (d) 71 : 69

36. How many people who were being tracked and who were between 30 and 40 years of age in 1980 survived until 2010?
(a) 190   (b) 310
(c) 90   (d) 110

37. How many individuals who were being tracked and who were less than 30 years of age in 1980 survived until 2020?
(a) 240   (b) 470
(c) 580   (d) 230

38. 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?

39. 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?[**Note**: There is an ambiguity in this question and hence was discarded by IIM Bangalore.]

Directions (Q.40-Q.44): All the first-year students in the computer science (CS) department in a university take both the courses (i) AI and (ii) ML. Studentsfrom 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 factsabout the number of students who took these two courses this year and the grades they obtained.

1. The numbers of non-CS students who took AI and ML were in the ratio 2 : 5.
2. The number of non-CS students who took either AI or ML was equal to the number of CS students.
3. 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 studentswho got a C grade in ML.
4. 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 gradeswere the same for AI, they were in the ratio 3 : 2 for ML.
5. No CS student failed in AI, while no non-CS student got an A grade in AI.
6. 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 thetwo courses was 3 : 1.
8. 30 students failed in ML.

40. How many students took AI?
(a) 90   (b) 60
(c) 210   (d) 270

41. How many CS students failed in ML?

42. How many non-CS students got A grade in ML?

43. How many students got A grade in AI?
(a) 84   (b) 63
(c) 99   (d) 42

44. How many non-CS students got B grade in ML?
(a) 75   (b) 165
(c) 25   (d) 90

45. The minimum possible value of $\dfrac{x^3-6x+10}{3-x}$, for x < 3, is

(a) -2   (b) $\dfrac{1}{}$

(c) 2   (d) $-\dfrac{1}{2}$

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

(a) 16(π - 1)   (b) 32(π - 1)

(c) 16π   (d) 32π

47. 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 groupand the remaining people finished the rest of the project in 14 days by working 10 hours a day. Then the value of N is

(a) 23   (b) 140

(c) 36   (d) 150

48. If $\left(\sqrt{\dfrac{7}{5}}\right)^{3x-y} = \dfrac{875}{2401}$ and $\left(\dfrac{4a}{b}\right)^{6x-y} = \left(\dfrac{2a}{b}\right)^{y-6x}$, for all

non-zero real values of a and b, then value of x+y is

49. 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

50. 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

51. 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 traveling towards each other, is

(a) 90   (b) 120

(c) 100   (d) 150

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

(a) 2222   (b) 2592

(c) 2442   (d) 3333

53. 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 Then, the number of possible values of k is

(a) 8   (b) 7

(c) 9   (d) 13

54. 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 ofpossible lengths of the fourth side is

(a) 5   (b) 4

(c) 3   (d) 6

55. 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

(a) 6   (b) 8

(c) 12   (d) 4

56. If $c = \dfrac{16x}{y} + \dfrac{49y}{z}$ for some non-zero real numbers x and y, then c cannot take the value

(a) -60   (b) -70

(c) 60   (d) -50

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

58. 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

59. 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

(a) 23   (b) 22.5
(c) 24   (d) 23.5

60. 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 values of x where

(a) $x \neq r$ (b) $x \geq r$
(c) $x > r$ (d) $x \leq r$

61. Suppose the medians BD and CE of a triangle ABC intersect at a point O. If area of triangle ABC is 108 sq. cm., then, the area of the triangle EOD, in sq.cm., is

62. 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

(a) 1   (b) 0
(c) 4   (d) 3

63. 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

64. Nitu has an initial capital of Rs. 20,000. Out of this, she invests Rs. 8,000 at 5.5% in bank A, Rs. 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

(a) 800   (b) 700
(c) 900   (d) 1000

65. 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

(a) 10 : 13   (b) 10 : 3
(c) 3 : 10   (d) 1 : 1

66. 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 chequesamounting to a total sum of ₹15250. Then, the maximum possible number of cheques of ₹500 that the donation box may have contained, is

VERBAL ABILITY AND READING COMPREHENSION

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

DATA INTERPRETATION AND LOGICAL REASONING

25. **(d)** Whenever a player has Rs. 10, it is already mentioned in the table. Their can be no other entry of Rs. 10.Also, Highest and Lowest amounts of a player are also already mentioned. E.g.: Pulak's highest and lowest amount is Rs. 13 and Rs. 10 respectively in rounds 2, 8, 1 and 5. . Pulak cannot have Rs. 13 or more andRs. 10 or less in any other round. Hence, the only amount Pulak can have at the end of any round is Rs. 11 or Rs. 12.

    Allowed entries forPulak: 11 or 12

    Qasim: 9 or 11

    Ritesh: 5 or 6 or 7 or 8 or 9

    Suresh: 9 or 11 or 12

    Total amount at the end of any round should be same as the total amount initially i.e., Rs. 40.

    Round 1: Amount with Pulak = 40 – (8 + 10 + 10) = Rs. 12 Ritesh and Suresh did not lose/gain, hence they paired up and decided not to play.while, Qasim lost Rs. 2 to Pulak.

    Round 2: Amount with Ritesh = 40 – (13 + 10 + 8) = Rs. 9 Pulak gained Rs. 1 while Ritesh lost Rs. 1. Hence, Pulak and Ritesh paired and bet Rs. 1.while, Suresh paired up with Qasim for Rs. 2.

    Round 5: Amount with Ritesh = 40 – (10 + 10 + 13) = Rs. 7

    Round 7: Amount with Pulak and Suresh together = 40 – 12 – 4 = Rs. 24Amount with Suresh and Pulak in Round 7 should be less than 13.

    Only way this is possible is that both Pulak and Suresh have Rs. 12.

    Round 8: Suresh loses Rs. 2. The only one who could gain Rs. 2 is Ritesh. Hence, Suresh paired with Ritesh and Pulak with Qasim.

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

Round 4: Pulak and Qasim had same amount. This amount can only be Rs. 11.

Now Pulak and Qasim lose Rs. 1 each Round 5, hence Ritesh and Suresh must gain Rs. 1 in round 5.

⇒ Ritesh and Suresh had Rs. 1 less in round 4 than round 5.

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

Round 3: Since Suresh paired with Qasim in round 2, he will pair with either Pulak or Ritesh in round 3.

If Suresh pairs with Ritesh, Ritesh will have Rs. 7 in round 3. Hence, Pulak + Qasim will have Rs. 23. This is possible when Pulak has Rs.12 and Qasim has Rs. 11.

But that would mean that only Qasim doesn't bet in round 4 which is not possible.

∴ Suresh pairs with Pulak in round 3. Hence, Pulak will have Rs. 12 in round 3.

⇒ Qasim and Ritesh have together Rs. 18. This is possible when Qasim has Rs. and Ritesh has Rs. .

⇒ Pulak paired with Qasim in round 4 and Ritesh with Suresh.

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

Round 6: Highest amount with Pulak, Qasim and Suresh in round 6 can be 12 + 11 + 12 = 35.In that case Ritesh will have Rs. 5.

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

Had the amount with Ritesh been Rs. 6 at the end of round 6. Other three will have a total of Rs. 34. In this case, we would not getproper arrangement for round 7.
Therefore, the final table is as follows:

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

∴ The amount of money that Ritesh had with him at the end of Round 8 is Rs. 6.
Hence, option (d).

26. **(c)** Consider the solution to first questions of this set.
∴ The amount of money that Pulak had with him at the end of Round 6 is Rs. 12.
Hence, option (c).

27. **(6)** Consider the solution to first questions of this set.
∴ The amount of money (in ₹) Ritesh has at the end of Round 4 is Rs. 6.Hence, 6.

28. **(6)** Consider the solution to first questions of this set.
Number of games with bet of Rs. 2 are:
P vs. Q in round 1Q vs. S in round 2P vs. S in round 3R vs S in round 4 P vs. R in round 6R vs S in round 8
∴ There are 6 games with bet of Rs. 2.
Hence, 6.

29. **(a)** Consider the solution to first questions of this set.
Pulak paired with Suresh while Qasim paired with Ritesh in round 5.
Hence, option (as).

30. **(d)** We can make the following table:
There was at least one new case in every neighborhood on Day 1.
On each of the five days, there were more new cases in Kitmisto than in Pesmisto.

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 wasexactly one more than that on Day 2.
5. Kitmisto is the only place to have 3 new cases on Day 2.

	≥ 5	x	x + 1		
	Day 1	Day 2	Day 3	Day 4	Day 5
Levmisto	≥ 1				
Tyhrmisto	≥ 1				
Pesmisto	≥ 1				
Kitmisto	≥ 2	3			

From (6): The total numbers of new cases in Levmisto, Tyhrmisto, Pesmisto and Kitmisto over the five-day period were 12, 12, 5 and 14respectively.
Total cases during the 5 days = 12 + 12 + 5 + 14 = 43
On day 5, neighborhoods L, T and K can have maximum 3 cases each, while P can have maximum 2 cases. Hence, maximum possibletotal cases on day 5 = 3 + 2 + 3 + 3 = 11.
⇒ Maximum possible cases on day 4 = 10.
∴ Maximum possible cases on day 4 + day 5 = 10 + 11 = 21.
Since on day 1 there will be at least 5 cases in the city and every day total cases increase, hence on day 2 total cases must be 6 or more.Case 1: Total cases on Day 2 = 6
⇒ Total cases on Day 3 = 7
⇒ Total cases on Day 1 = 5
∴ Total cases on day 4 + day 5 = 43 – (5 + 6 + 7) = 25
This is not possible as maximum cases possible on day 4 + day 5 is 21.Case 2: Total cases on Day 2 = 7
⇒ Total cases on Day 3 = 8
⇒ Total cases on Day 1 = 5 or 6
∴ Total cases on day 4 + day 5 = 43 – (5/6 + 7 + 8) = 23 or 22
This is not possible as maximum cases possible on day 4 + day 5 is 21.Case 3: Total cases on Day 2 = 8
⇒ Total cases on Day 3 = 9
Since total cases on day 4 cannot be more than 10, hence total cases on day 4 = 10.Since total cases on day 5 cannot be more than 11, hence total cases on day 5 = 11.
⇒ Total cases on Day 1 = 43 – (8 + 9 + 10 + 11) = 5

	5	8	9	10	11
	Day 1	Day 2	Day 3	Day 4	Day 5
Levmisto	1				
Tyhrmisto	1				
Pesmisto	1				
Kitmisto	2	3			

Only possibility for total cases of 11 on day 5 is: L – 3, T – 3, P – 2, K – 3.Only possibility for total cases of 11 on day 5 is: L – 3, T – 3, P – 1, K – 3.
[Note: There is only 1 day when Pesmisto had 2 cases. On

remaining days P will have less than 2 cases.]
Total cases in Kitmisto is 14. This is possible when there are 3 cases on 4 days each and 2 cases on the remaining 5th day.

	5	8	9	10	11
	Day 1	Day 2	Day 3	Day 4	Day 5
Levmisto	1			3	3
Tyhrmisto	1			3	3
Pesmisto	1			1	2
Kitmisto	2	3	3	3	3

Levmisto and Tyhrmisto have total 12 cases.
Total cases on day 2 + day 3 for these two neighborhoods = 12 – (1 + 3 + 3) = 55 cases in 2 days are possible when there are 2 and 3 cases in these 2 days.
On day 2 only Kitmisto had 3 cases, hence we can fill the table accordingly.

	5	8	9	10	11
	Day 1	Day 2	Day 3	Day 4	Day 5
Levmisto	1	2	3	3	3
Tyhrmisto	1	2	3	3	3
Pesmisto	1			1	2
Kitmisto	2	3	3	3	3

Now the remaining 2 slots can be filled.

	5	8	9	10	11
	Day 1	Day 2	Day 3	Day 4	Day 5
Levmisto	1	2	3	3	3
Tyhrmisto	1	2	3	3	3
Pesmisto	1	1	0	1	2
Kitmisto	2	3	3	3	3

∴ The total number of new cases in the city on Day 2 = 8
Hence, option (d).
31. **(b)** Consider the solution to first question of this set.
∴ The number of new cases in Levmisto on Day 3 = 3.
Hence, option (b).
32. **(c)** Consider the solution to first question of this set.
∴ The number of new cases in Levmisto on Day 3 = 3.
Hence, option (b).
33. **(c)** Consider the solution to first question of this set.
Both Statement A and Statement B are false.
Hence, option (c).
34. **(a)** Consider the solution to first question of this set.
Levmisto and Tyhrmisto have the same number of new

cases on all 5 days.
Hence, option (c).
35. **(d)** Total number of males/females in 1980 = 1000 each.
Total number males in 2000 = 180 + 205 + 160 + 100 = 645
∴ Number of dead males = 1000 – 645 = 355
Total number females in 2000 = 210 + 175 + 150 + 120 = 655
∴ Number of dead males = 1000 – 655 = 345
⇒Ratio of dead males to females = 355 : 345 = 71 : 69.
Hence, option (d).
36. **(a)** Those who were in the age range 30-40 in 1980 will be in the age range 60-70 in 2010.Number of people alive in age range 60-70 in 2010 = 90 + 100 = 190
Hence, option (a).
37. **(b)** Those who were less than 30 years old in 1980 will be less than 70 years old in 2020.
∴ Number of people alive below 70 in 2020 = 140 + 100 + 125 + 105 = 470
Hence, option (b).
38. **(40)** 1980 age range 20-30 (500 males) is same as
2000 age range 40-50 (205 males) is same as
2010 age range 50-60 (165 males)
∴ Number of required males dying between 2000 and 2010 = 205 – 165 = 40.
Hence, 40.
39. **(30)** 1980 age range 20-30 (500) is same as
2000 age range 40-50 (175) is same as
2010 age range 50-60 (145 females)
30 people from this category died from 2000 to 2010, but it is not necessary that they were between 50-60 years old. Someone who was 41 years old in 2000 may have died before he/she attains the age of 50.
The answer to this question should be cannot be determined.
Hence, this question was discarded.
Note: Answer provided in Candidate response sheet is 30.
40. **(d)** From (1) and (2): Let the number of non-CS students who took AI and ML are 2x and 5x respectively.
⇒Number of CS students = 2x + 5x = 7x.

	CS		Non-CS	
	AI	ML	AI	ML
Total	7x	7x	2x	5x
A				
B				
C				
F				

From (3): Let the number of non-CS students failing in two courses is 'a' each and CS students who got a C in ML = '2a'

	CS		Non-CS	
	AI	ML	AI	ML
Total	7x	7x	2x	5x
A				
B				
C		2a		
F			a	a

From (6): Let number of CS students who got A, B and C grades respectively in AI are 3y, 5y, 2y.

While number of CS students who got A, B and C grades respectively in ML are 4a, 5a, 2a.From (5): No CS student failed in AI, while no non-CS student got an A grade in AI.

	CS		Non-CS	
	AI	ML	AI	ML
Total	7x	7x	2x	5x
A	3y	4a	X	
B	5y	5a		
C	2y	2a		
F	X		a	a

From (4): The numbers of students who got A and C grades were the same for AI

$\Rightarrow 3y + 0 = 2y +$ non-CS students in AI with C grade

$\Rightarrow$ non-CS students in AI with C grade $= 3y - 2y = y$

	CS		Non-CS	
	AI	ML	AI	ML
Total	7x	7x	2x	5x
A	3y	4a	X	
B	5y	5a		
C	2y	2a	y	
F	X		a	a

From (8): 30 students failed in ML hence CS students failing in ML = 30 – a.

	CS		Non-CS	
	AI	ML	AI	ML
Total	7x	7x	2x	5x
A	3y	4a	X	
B	5y	5a		
C	2y	2a	y	
F	X	30 – a	a	a

From (7):

$$\Rightarrow \frac{a + a}{30 - a} = \frac{3}{1}$$

$\Rightarrow 2a = 90 - 3a$

$\Rightarrow a = 18$

	CS		Non-CS	
	AI	ML	AI	ML
Total	7x	7x	2x	5x
A	3y	72	X	
B	5y	90		
C	2y	36	y	
F	X	12	18	18

$\Rightarrow 7x = 72 + 90 + 36 + 12 = 210$

$\Rightarrow x = 30$

	CS		Non-CS	
	AI	ML	AI	ML
Total	210	210	60	150
A	3y	72	X	
B	5y	90		
C	2y	36	y	
F	X	12	18	18

$\Rightarrow 210 = 3y + 5y + 2y$

$\Rightarrow y = 21$

$\Rightarrow 60 = 0 +$ (non-CS student in AI getting B grade) $+ 21 + 18$

	CS		Non-CS	
	AI	ML	AI	ML
Total	210	210	60	150
A	63	72	X	
B	105	90		
C	42	36	21	
F	X	12	18	18

$\therefore$ non-CS student in AI getting B grade = 60 – 39 = 21

	CS		Non-CS	
	AI	ML	AI	ML
Total	210	210	60	150
A	63	72	X	
B	105	90	21	
C	42	36	21	
F	X	12	18	18

From (4): In both the courses, 50% of the students who passed got a B gradeNumber of students passing in ML = 72 + 90 + 36 + (150 - 18) = 330

$\Rightarrow$ Number of students receiving B grade in ML = 330/2 = 165.

$\Rightarrow$ non-CS students with B grade in ML = 165 – 90 = 75

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

Let number of non-CS students with A grade in ML = c, hence number of non-CS students with C grade in ML = 150 – 75 – 18 – c = 57 – c

	CS		Non-CS	
	AI	ML	AI	ML
Total	210	210	60	150
A	63	72	X	c
B	105	90	21	75
C	42	36	21	57 – c
F	X	12	18	18

From (4): the numbers of students who got A and C grades were in the ratio 3 : 2 for ML.

$$\Rightarrow \frac{72 + c}{30 + 57 - c} = \frac{3}{2}$$

$\Rightarrow 144 + 2c = 279 - 3c$

$\Rightarrow 5c = 135$

$\Rightarrow c = 27$

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

∴ Number of students taking AI = 210 (CS students) + 60 (non-CS students) = 270.

Hence, option (d).

41. **(12)** Consider the solution to first question of this set. Number of CS students failing in ML = 12.
Hence, 12.

42. **(27)** Consider the solution to first question of this set. Number of non-CS students who got A grade in ML = 27.
Hence, 27.

43. **(b)** Consider the solution to first question of this set. Number of students who got A grade in AI = 63 + 0 = 63
Hence, option (b).

44. **(a)** Consider the solution to first question of this set. Number of non-CS students who got B grade in ML = 75
Hence, option (a).

QUANTITATIVE APTITUDE

45. **(c)** We have $\frac{x^{2-6x+10}}{3-x}$

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

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

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

Here, since x < 3, 3 – x > 0

Also, we know that sum of a positive number and its reciprocal is always greater than or equal to 2.

$$\Rightarrow (3 - x) + \frac{1}{3-x} \geq 2$$

46. **(b)** Since AB is the diameter of the smaller circle ⇒ $\angle ACB = 90^0$.
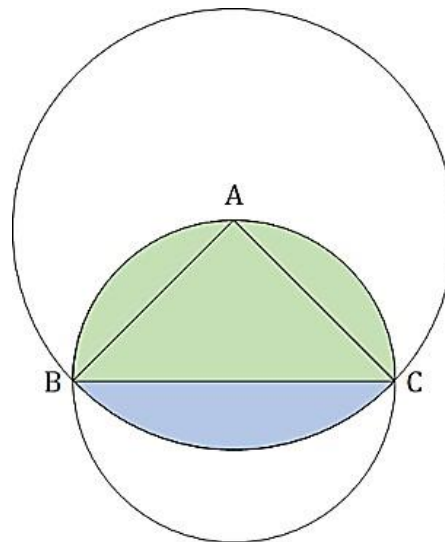
In △ ACB, $AC^2 + BC^2 = AB^2$

$\Rightarrow AB = \sqrt{(8^2 + 8^2)} = 8\sqrt{2}$

∴ Radius of smaller circle is $1/2 \times 8\sqrt{2} = 4\sqrt{2}$

Diameter of larger circle = 8

Smaller Circle:

Area of green part = $1/2 \times \pi \times (4\sqrt{2})^2 = 16\pi$

Larger Circle:

Area of blue part = Area of sector CAB − Area of △ CAB

Area of blue part = $1/4 \times \pi \times 8^2 - 1/2 \times 8 \times 8 = 16\pi - 32$

∴ Required area = $16\pi + (16\pi - 32) = 32(\pi - 1)$

Hence, option (b).

47. **(b)** Let the efficiency of each person be 'e' units/hour. Given, 35% work is done by N men in 10 days working for 7 hours/day, while

65% work is done by N-10 men in 14 days working for 10 hours/day

$$\Rightarrow \frac{N \times 10 \times 7}{0.35} = \frac{(N - 10) \times 14 \times 10}{0.65}$$

$$\Rightarrow \frac{N \times 7}{7} = \frac{(N - 10) \times 14}{13}$$

$$\Rightarrow N = \frac{(N - 10) \times 14}{13}$$

$\Rightarrow 13\,N = 14\,N - 140$

$\Rightarrow N = 140$

Hence, option (b).

48. **(14)** Given $(\sqrt[7]{\frac{7}{5}})^{-3x-y} = \frac{875}{2401}$

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

$\Rightarrow 3x - y = -6$

$\Rightarrow y = 3x + 6$ ... (1)

Also, $(\frac{4a}{b})^{6x-y} = (\frac{2a}{b})^{y-6x} = (\frac{b}{2a})^{6x-y}$

$\Rightarrow (\frac{4a}{b} \times \frac{2a}{b})^{6x-y} = 1$

$\Rightarrow (\frac{8a^2}{b^2})^{6x-y} = 1$

This is true for all values of a and b. This is only possible when 6x-y = 0

$\Rightarrow y = 6x$..........(2)

Solving (1) and (2), we get x = 2 and y = 12,
⇒ x + y = 2 + 12 = 14.
Hence, 14.

49. **(60)** Let speed of Moody and escalator be 'm' and 'e' steps/sec and total number of steps in the escalator be 'N'. We will assume that Moody is going in the same direction as the escalator. If that is not the case value of e will come out to benegative.
Moody takes 30 seconds at normal speed ⇒ N = 30m + 30 × e ... (1)
Moody takes 20 seconds at twice the speed ⇒ N = 20 × 2m + 20 × e ... (2) 4 × (1) – 3 × (2)
N = 60e
⇒ N/e = 60
∴ If someone was standing on the escalator, he/she will take 60 seconds to climb the escalator.Hence, 60.

50. **(63)** Let the number of students in section B is x and that in A is (x – 10).
⇒ $\frac{(x-10)\times 32 + x\times 60}{92x-320}$ = integer
⇒ $\frac{2x-10}{2x-10}$ = integer
⇒ $\frac{46x-160}{x-5}$ = integer
⇒ $\frac{46(x-5)+70}{x-5}$ = integer
⇒ $(x-5) + \frac{70}{x-5}$ = integer
⇒ $\frac{70}{x-5}$ should be an integer
∴ (x – 5) should be a factor of 70 while x > 10
⇒ Highest possible value of $x = 75$ while lowest possible value is 12
∴ Difference between highest and lowest values of x = 75 – 12 = 63.
Hence, 63.

51. **(a)** When travelling towards each other, the two cars take 1.5 hours to meet.
⇒ The distance travelled by slower car in this case till they meet = 1.5 × 60 = 90 kms.
Hence, option (a).

52. **(a)** Let us consider the sum of unit's digit of all such numbers.
‾‾‾‾x
If 1 occupies the units digit, number of such numbers = 3! = 6
Sum of all the units digit of such numbers = 6 × 1 = 6
If 2 occupies the units digit, number of such numbers = 3!/2! = 3
Sum of all the units digit of such numbers = 3 × 2 = 6
If 4 occupies the units digit, number of such numbers = 3!/2! = 3
Sum of all the units digit of such numbers = 3 × 4 = 12
∴ Sum of unit's digits of all possible numbers = 6 + 6 + 12 = 24
Similarly,
Sum of ten's digits of all possible numbers = 24 × 10 = 240
Sum of hundred's digits of all possible numbers = 24 × 100 = 2400 Sum of thousand's digits of all possible numbers = 24 × 1000 = 24000
⇒ Sum of all such numbers = 24 + 240 + 2400 + 24000 = 26664
Also, number of such numbers = 4!/2! = 12
∴ Average of all such numbers = 2664/12 = 2222

Hence option (a)

53. **(c)** $2x^2$ + kx + 5 = 0 has no real roots ⇒ D < 0
⇒ k^2 – 4 × 2 × 5 < 0
⇒ k^2 < 40
⇒ $-\sqrt{40} < k < \sqrt{40}$
∴ Possible integral values of k are -6, -5, -4, ..., 0, ...4, 5, 6 ...(1)
Also, x^2 + (k - 5)x + 1 = 0 has two distinct roots ⇒ D > 0
⇒ $(k - 5)^2$ – 4 × 1 × 1 > 0
⇒ k^2 + 25 – 10k – 4 > 0
⇒ k^2 – 10k + 21 > 0
⇒ (k - 7)(k - 3) > 0
⇒ k ∈ (-∞, 3) ∪ (7, ∞) ...(2)
The integral value of k satisfying both (1) and (2) are
-6, -5, -4, -3, -2, -1, 0, 1, 2 i.e., 9 values.
Hence, option (c).

54. **(a)** In a quadrilateral, the longest side is less than the sum of other three sides and greater than the least of the difference of any 2 of theother three sides.
Let the fourthe sides of the quadrilateral be x.
⇒ 2 - 1 < x < 1 + 2 + 4
⇒ 1 < x < 7
∴ x can be 2, 3, 4, 5 or 6
Hence, x can take 5 integral values.
Hence, option (a).

55. **(c)** Initially both ships are at a distance of 24 kms from the port (A).
Let the distance travelled by faster ship be F kms when slower ship travels 8 kms.
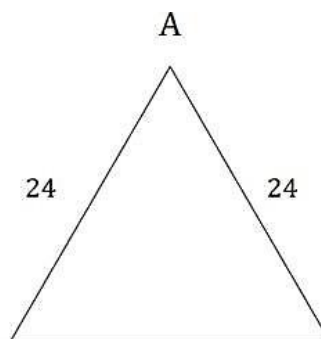
Now, ΔABC is a right triangle when ∠BAC = 60°
⇒ AC = ½ × AB = 8 kms.
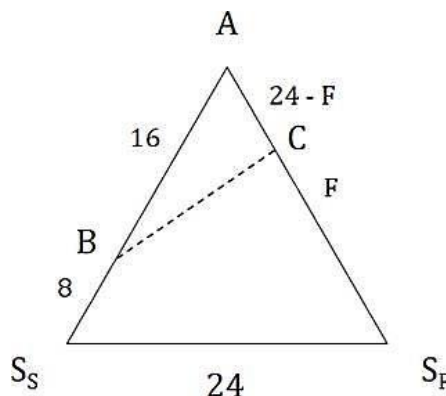
∴ 24 – F = 8
⇒ F = 16 kms
Ratio of speeds of faster and slower ships = 16 : 8 = 2 : 1
Now, when the faster ships reaches port it would have travelled 24 kms
and the slower ship would have travelled 12 kms.
∴ Slower ship will be 24 – 12 = 12 kms from the port.Hence, option (c).

56. **(d)** Given, $C = \frac{16x}{y} + \frac{49y}{x}$

Let $\frac{x}{y} = a$

⇒ $c = 16a + \frac{49}{a}$

Now, for two Positive numbers, AM ≥ GM

If a > 0

⇒ $\frac{16a + \frac{49}{a}}{2} \geq \sqrt{16a \times \frac{49}{a}}$

⇒ $\frac{c}{2} \geq 28$

⇒ $c \geq 56$

∴ option (c) is rejected.

Now, for two negative numbers, AM ≤ −GM If a < 0

⇒ $\frac{16a + \frac{49}{a}}{2} \geq -\sqrt{16a \times \frac{49}{a}}$

⇒ $\frac{c}{2} \leq -28$

⇒ $c \leq -56$

∴ option (a) and (b) are rejected.
∴ c cannot be equal to -50
Hence, option (d).

57. **(548)** 38, 55, 72, ... forms an AP whose first term is 38 and common difference is 17.
∴ T_n = 38 + (n - 1) × 17
To find the average we need to find the highest and lowest 3-digit numbers of this sequence.
Lowest: 38 + (n - 1) × 17 > 99
⇒ 17n - 17 > 61
⇒ 17n > 78
⇒ n > 4
∴ Least possible value of n = 5
⇒ Least such number = 38 + 4 × 17 = 106
Highest : 38 + (n - 1) × 17 < 999
⇒ 17n - 17 < 961
⇒ 17n < 978
⇒ n < 56.5
∴ Highest possible value of n = 56
⇒ Highest such number = 38 + 56 × 17 = 990
∴ The average of the sequence (AP) is same as the average of lowest and
highest terms = $\frac{106+990}{2} = 548$
= 548
Hence, 548.

58. **(150)** The number of students will be of the form = LCM(9, 10, 12, 25) × k + 4 = 900k + 4
The number of students is less than 500 and also completely divisible by
11. This is possible when k = 2 and hence the number the students = 1804.
Maximum number of groups of 12 students that can be formed =
Quotient of [1804 / 12] = 150
Hence, 150.

59. **(b)** The average of lowest two number is 14, hence their sum = 28 The average of highest two number is 28, hence their sum = 56
To maximize the average of these six numbers, we need to maximize the middle two numbers.
But it is also given that all the numbersare distinct.
Since all numbers are distinct out of the two highest numbers, one must be greater than 28 (a)
and the other less than 28 (b).To maximize the middle two numbers we need to maximize 'b'.
The maximum value 'b' can take is 27.
∴ Maximum value of the two middle numbers can be 25 and 26.
⇒ Maximum sum of the six numbers = 28 + 25 + 26 + 56 = 135
⇒ Maximum average of the six numbers = 135/6 = 22.5
Hence, option (b).

60. **(d) Case 1**: x < r
⇒ f(x) = r
⇒ f(f(x)) = f(f(r)) = 2r – r = r
∴ f(x) = f(f(x))
Case 2: x = r
⇒ f(x) = 2r – r = r
⇒ f(f(x)) = f(f(r)) = 2r – r = r
∴ f(x) = f(f(x))
Case 3: x > r
⇒ f(x) = 2x – r > r
⇒ f(f(x)) = f(f(2x - r)) = 2(2x - r) – r = 4x - 3r
∴ f(x) ≠ f(f(x))
⇒ f(x) = f(f(x)) when x ≤ r
Hence, option (d).

61. **(9)** BD, CE and AF are medians of the triangle ABC.
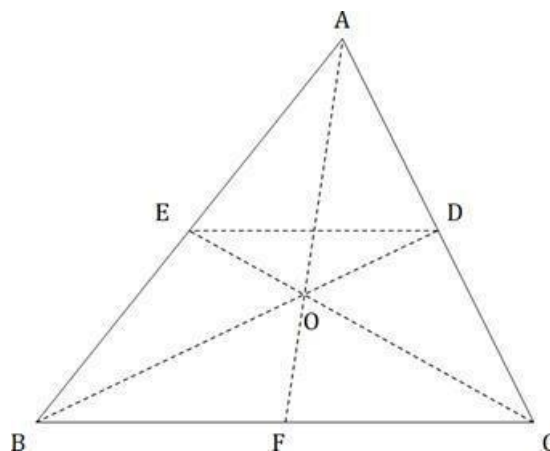
We know centroid (O) divides the triangle in 6 smaller triangles of equal area.
⇒ Area(ΔEOB) = Area(ΔBOF) = Area(ΔFOC) = Area(ΔCOD) = 1/6 × 108 = 18.
ΔAED ~ ΔABC
⇒ $\frac{Area (\Delta\ AED)}{Area (\Delta\ ABC)} = \left(\frac{AE}{AB}\right)^2 = \frac{1}{4}$
⇒ Area(EBCD) = ¾ × 108 = 81
Now,
Area (ΔEOD) = Area(EBCD) – [Area(ΔEOB) + Area(ΔBOF) + Area(ΔFOC) + Area(ΔCOD)]
= 81 – 72 = 9

Hence, 9.

62. **(c)** $(3 + 2\sqrt{2})$ is a root of the equation $ax^2 + bx + c = 0$ whose coefficients are integers
⇒ Since coefficients are rational the other root will be $(3 - 2\sqrt{2})$
∴ Sum of roots = 6 = -b/a
⇒ b = -6a   ...(1)
∴ product of roots = 1 = c/a
⇒ c = a   ...(2)
$(4 + 2\sqrt{3})$ is a root of the equation $ay^2 + my + n = 0$ whose coefficients are integers
⇒ Since coefficients are rational the other root will be $(4 - 2\sqrt{3})$

∴ Sum of roots = 8 = -m/a
⇒ m = -8a   ...(3)
∴ product of roots = 4 = n/a
⇒ n = 4a   ...(4)
$Now, \left(\dfrac{b}{m} + \dfrac{c - 2b}{n}\right)$
$= \left(-\dfrac{6a}{-8a} + \dfrac{a + 12a}{4a}\right)$
$= \dfrac{3}{4} + \dfrac{13}{4} = 4$
Hence, option (c).

63. **(11)** Bob takes 40 days to finish the work. Alex takes is twice as fast as Bob and hence will take half the time taken by Bob i.e., 20 days. Alexis also thrice as fast as Cole, hence Cole will take thrice the time taken by Alex, i.e., 60 days.
Time take by Alex = 20 days
Bob = 40 days
Cole = 60 days
Let the total work to be done = 120 units.
∴ Efficiency of
Alex = 6 units/day
Bob = 3 units/day
Cole = 2 units/day

	1st Cycle			2nd Cycle				6th Cycle		
	Day 1	Day 2	Day 3	Day 1	Day 2	Day 3		Day 1	Day 2	Day 3
	A + B	B + C	C + A	A + B	B + C	C + A		A + B	B + C	C + A
Work done	9 units	5 units	8 units	9 units	5 units	8 units		9 units	1 unit	

Work done/cycle = 22 units.
∴ Work done in 5 cycles = 5 × 22 = 110 units
Work left after 5 cycles (15 days) = 120 – 110 = 10 units.
On 16th day Alex and Bob will together complete 9 units of work while remaining 1 unit of work will be completed by Bob and Cole on17th day.
∴ Alex worked for 10 days in 5 complete cycles + on 16th day i.e., total 11 days.Hence, 11.

64. **(a)** Rs. 8000 is invested at 5.5% earning yearly interest of 8000 × 5.5% = Rs. 440
Rs. 5000 is invested at 5.6% earning yearly interest of 5000 × 5.6% = Rs. 280Rs. 7000 is invested at x% earning yearly interest of 7000 × x% = Rs. 70x
Overall, 20,000 is invested which earns 5% yearly interest
= 5% of 20000 = 1000
⇒ 440 + 280 + 70x = 1000
⇒ 70x = 1000 – 720 = 280
⇒ x = 4%
∴ If she had invested her entire initial capital in bank C alone, then her annual interest income = 4% of 20000 = Rs. 800
Hence, option (a).

65. **(d)** When two containers contain equal amount of milk and water respectively and then equal amounts are transferred from 1st to 2nd andthen from 2nd to 1st.

The amount of milk in 1st becomes equal to amount of water in 2nd whileamount of water in 1st becomes equal to amount of milk in 2nd.
Hence, option (d).

66. **(12)** Let the number of 100, 250 and 500 notes be a, b and c respectively.
⇒ a + b + c = 100   ...(1)
⇒ 100a + 250b + 500c = 15250
⇒ 2a + 5b + 10c = 305   ...(2)
(2) – 2 × (1)
⇒ 3b + 8c = 105
⇒ 3b + 8c = 105
$\Rightarrow C = \dfrac{105 - 3b}{8} = \dfrac{104 + 1 - 3b}{8} = 13 + \dfrac{1 - 3b}{8}$
C will be maximum when b is minimum. The least value b can take such that c is integer is 3.
$\therefore C = 13 + \dfrac{1 - 9}{8} = 12$
Hence, 12.