

## (Key and Solutions for AIMCAT1820)

**Key****SECTION – I**

1. D	8. C	15. D	22. D	29. 52143
2. 2	9. D	16. C	23. B	30. 35142
3. B	10. A	17. C	24. C	31. 42513
4. C	11. C	18. B	25. 3	32. 25143
5. A	12. D	19. D	26. 1	33. 2
6. 1	13. B	20. 25	27. 4	34. 3
7. B	14. D	21. B	28. 24153	

**SECTION – II**

1. C	8. C	15. B	22. D	29. B
2. A	9. D	16. D	23. C	30. 5
3. 10	10. C	17. D	24. A	31. B
4. 17	11. C	18. C	25. D	32. A
5. 246	12. B	19. B	26. C	
6. D	13. 73	20. B	27. D	
7. B	14. 86	21. C	28. D	

**SECTION – III**

1. B	8. 159	15. D	22. D	29. A
2. D	9. A	16. B	23. B	30. C
3. 72	10. D	17. A	24. -22	31. 270
4. D	11. 60	18. C	25. B	32. B
5. B	12. B	19. C	26. 4	33. C
6. B	13. B	20. 12	27. A	34. A
7. C	14. A	21. B	28. 52	

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

Number of words: 679

1. Option A: The author begins the passage by saying: In the U.S., where the dialogue of inclusion is relatively advanced, even the mention of the word "diversity" can lead to anxiety and conflict. But choice A is not the focus or objective of the author in the passage.

Option B: It has been stated in the last sentence of para 1 that the leadership ranks of the business world remain predominantly white and male. But choice B is not the focus or objective of the author in the passage.

Option C: In the penultimate para, it has been mentioned that when members of a group notice that they are socially different from one another, they change their expectations. They anticipate differences of opinion and perspective. They assume they will need to work harder to come to a consensus. But choice C is not the primary focus of the author as he does not 'prove' that social diversity leads to differences.

Option D: Choice D is correct. The author discusses the impact of diversity of disciplinary backgrounds, gender diversity, racial diversity, ethnic diversity etc and also cites a number of parameters and variables. He mentions empirical evidence, for the conclusions made, at various points in the passage.

2. (1): Diversity enhances creativity. It encourages the search for novel information and perspectives, leading to better decision making and problem solving. So (1) is a benefit of diversity and is not the answer.  
 (2): Social diversity in a group can cause discomfort, rougher interactions, a lack of trust and greater perceived interpersonal conflict. Hence 'more harmony within groups' has not been mentioned as a benefit of diversity. Hence (2) is the answer.  
 (3): Refer to the last sentence of para 2. Diversity can lead to unfettered discoveries and breakthrough innovations. Also refer to para 4. They also measured the firms' "innovation intensity" through the ratio of research and development expenses to assets. They found that companies that prioritized innovation saw greater financial gains when women were part of the top leadership ranks. ... For 177 innovation-focused U.S banks, increases in racial diversity were clearly related to enhanced financial performance. We can

- understand that gender and racial diversity plays a role in increasing innovation and performance. Therefore (3) is a benefit of diversity and is not the answer.
- (4): Refer to the last two paras of the passage. Socially different people assume they will need to work harder to come to a consensus. People work harder in diverse environments both cognitively and socially, leading to better outcomes. ... This is how diversity works: by promoting hard work and creativity; by encouraging the consideration of alternatives even before any interpersonal interaction takes place. Hence (4) is a benefit of diversity and is not the answer.  
Ans: (2)
3. Refer to para 7. The researchers wrote dissenting opinions and had both black and white members deliver them to their groups.
- Option A: There is no talk in the passage of a different person being accepted by the group. This makes choice A incorrect.
- Option B: When a black person presented a dissenting perspective to a group of whites, the perspective was perceived as more novel and led to broader thinking and consideration of alternatives than when a white person introduced *that same dissenting perspective*. The lesson: when we hear dissent from someone who is different from us, it provokes more thought than when it comes from someone who looks like us. This makes choice B the correct answer.
- Option C: Choice C is very generalized and does not correctly summarize the conclusion of the experiment as mentioned in para 7. The choice ignores diversity of people. It does not explain what happens when we hear dissent from someone who is different from us.
- Option D: While mention is made in choice D about the presenters being 'white people', there is no mention about the audience being different or 'black'. Hence choice D is not the correct answer.  
Choice (B)
4. Refer to para 4. Business professors Cristian Deszö of the University of Maryland and David Ross of Columbia University studied the effect of gender diversity on the top firms in Standard & Poor's Composite 1500 list, a group designed to reflect the overall U.S. equity market. First, they examined the size and gender composition of firms' top management teams from 1992 through 2006. Then they looked at the financial performance of the firms. They also measured the firms' "innovation intensity" through the ratio of research and development expenses to assets.
- Choice A: Choice A is a distortion and does not reflect the conclusion of the experiment conducted by the professors of the Universities of Maryland and Columbia. The word 'highest' in choice A also renders it extreme.
- Choice B: Choice B does not talk about gender diversity in the same vein as para 4 discusses the same. Choice B refers to the diversity of disciplinary backgrounds as discussed in para 3. It is not related to the question.
- Choice C: On average, "female representation in top management leads to an increase of \$42 million in firm value." They found that companies that prioritized innovation saw greater financial gains when women were part of top leadership ranks. Hence choice C is the correct answer.
- Choice D: Choice D contradicts the conclusion of the professors. Hence choice D is not the answer.  
Choice (C)
5. Refer to the third para and the penultimate para.
- Option A: When people are brought together to solve problems in groups, they bring different information, opinions and perspectives. This makes sense when we talk about diversity of disciplinary background. When members of a group notice that they are socially different from one another, they change their expectations. They anticipate differences of opinion and perspective. They assume they will need to work harder to come to a consensus. This is how diversity works: by promoting hard work and creativity; by encouraging the consideration of alternatives even before any interpersonal interaction takes place. Hence choice A is correct.
- Option B: It has been mentioned in the penultimate para that people work harder in diverse environments both cognitively and socially. But '.... in ways homogeneity simply cannot' as mentioned in choice B is extreme and out of scope.
- Option C: Choice C is contradicted by the information in the penultimate para.
- Option D: Choice D is a contradiction as can be inferred from the information in the penultimate para. When disagreement comes from a socially different person, people would be prompted to work harder. Choice (A)
6. What about social diversity? What good comes from diversity of **race, ethnicity, gender** and sexual orientation? Hence (2) and (5) apply and are not the answers. A mention of these types of diversities has also been made in other parts of the passage.
- Diversity of *expertise* confers benefits that are obvious – you would not think of building a new car without engineers and quality-control experts. ... When people are brought together to solve problems in groups, they bring different information, opinions and perspectives. This makes sense when we talk about diversity of disciplinary backgrounds – think again of the interdisciplinary team building a car. Refer to para 8. Moreover, they found that stronger papers were associated with a greater number of author addresses; **geographical diversity**, and a larger number of references, is a reflection of more **intellectual diversity**. Therefore (3) and (4) are true and are not the answers.
- Historical diversity has not been mentioned in the passage.  
Ans: (1)

#### Solutions for questions 7 to 9:

#### Number of words and Explanatory notes for RC:

Number of words: 444

7. In para 2, it is mentioned that the researchers analyzed and compared available genome sequences from two mammoth specimens. Para 3 mentions: Compared to the older mammoth genome and to available elephant sequences, the team saw a jump in gene-altering deletions and retrogenes in the Wrangel Island mammoth genome ..... Hence we can say that para 2 mentions the methodology or details of the experiment and para 3 provides the results. Therefore choice B is the answer.
- Option A: The relationship between paras 2 and 3 cannot be said to be one of cause and consequence. Hence choice A is not the answer.
- Option C: The first part of choice C is correct i.e. Para 2 talks about the methodology of the research. But the second part of choice C is incorrect.
- Option D: Choice D is very general and is not specific to paras 2 and 3 of the passage.  
Choice (B)
8. Option A: Choice A is not the complete summary. Also choice A sounds very conclusive. The last sentence of the passage states: "Thus, we **might expect** genomes affected by genomic meltdown to show lasting repercussions that will impede population recovery." Para 4 talks about "a warning for continued efforts to protect current endangered species with small population sizes."
- Option B: The first part of choice B is correct. From the first para we know that the genome of the woolly mammoth began taking on ever more potentially deleterious mutations as populations dwindled and the species got closer to extinction. The later half of the passage suggests that mammoth genome analysis points to pre-extinction genome declines. The second half of choice B is incorrect. In the penultimate para, the author says that the research finding points to the possibility of tapping genomic data for future conservation efforts in the Indian elephant and other species. Hence choice B is not the apt summary.

Option C: Choice C is the correct and complete summary. It mentions the correct finding as given in para 3 (The apparent "genomic meltdown" in the waning island population included pseudogenized olfactory genes, along with a loss of genes coding for urinary proteins related to elephant mate choice, and mutations in genes implicated in mammoth coat features.) and para 6 (The Wrangel Island mammoth genome contained more overall deletions, gene deletions, retrogene content, and stop codon-causing point mutations relative to the genome of the Oimyakon mammoth.). The last sentences of the fourth paragraph, the last paragraph and the penultimate paragraph are also summarized correctly in this choice.

Option D: Choice D is a finding from the research but does not adequately capture the main conclusion of the author. Choice D is not the complete summary. Choice (C)

9. Option A: Choice A has not been discussed in the passage. Option B: Choice B is a distortion. On comparing these sequences to sequences from an Indian elephant and an African bush elephant reference genome, the researchers found that the Wrangel Island mammoth genome contained more overall deletions, gene deletions, retrogene content, and stop codon-causing point mutations relative to the genome of the Oimyakon mammoth.

Option C: Choice C is contradicted by information in the third and sixth paras. Hence choice C is not the answer. Option D: Compared to the older mammoth genome and to available elephant sequences, the team saw a jump in gene-altering deletions and retrogenes in the Wrangel Island mammoth genome, and stop codon-causing point mutations relative to the genome of the Oimyakon mammoth along with new point mutations predicted to upset protein function .... The apparent "genomic meltdown" in the waning island population included pseudogenized olfactory genes, along with a loss of genes coding for urinary proteins .... mammoth coat features. Hence choice D is the correct answer. Choice (D)

#### Solutions for questions 10 to 15:

##### Number of words and Explanatory notes for RC:

Number of words: 690

10. Option A: A narrative passage tells a story, usually from one person's viewpoint. A narrative passage has details which relate in some way to the main point the writer is making. The author narrates the Viking discovery of North America and other related events. Hence choice A is the answer.

Option B: The author is not describing facts with a view to make the passage vivid or memorable. A descriptive passage evokes emotions making the discussion vivid. This passage is not descriptive. The passage follows a story telling format (account) rather than a description of emotions, feelings and images. Hence choice B is incorrect.

Option C: The passage is more matter-of-fact than analytical. Analysis involves examining aspects of a situation in its pluses and minuses, and making an evaluation at the end of it. In this passage, the author is not making an analysis of the activities of the Vikings. Hence choice C is not the answer.

Option D: The passage is not argumentative. There is no debate i.e. the passage does not present arguments and counterarguments for any idea or concept. The author refrains from delivering an argument; neither does he try to convince people of an argument. Hence choice D is incorrect.

Choice (A)

11. Option A: The exploits of the Vikings had positive effects on Europe as well as negative ones, and their accomplishments were essential in shaping the course of European history. Hence choice A is not true.

Option B: The Viking raids began in the ninth century. The second part of choice B cannot be inferred from the passage.

Option C: The Viking warriors swept down from the north like ravenous wolves, spreading terror and bloodshed wherever they went. From their Scandinavian homelands ... And around the turn of the millennium, Viking sailors from Iceland discovered North America and established settlements on its coast – the first Europeans to do so. Hence choice C is true and is the answer.

Option D: Throughout Europe, people trembled in fear at the very mention of their name. .... spreading terror and bloodshed wherever they went. ... The destruction they wrought greatly contributed to the turmoil experienced by western Europe during the Dark Ages. So choice D is not correct.

Choice (C)

12. Refer to the third para.

Option A: Across Scandinavia, the pagan worshipers of Odin and Thor began to convert to Christianity; as good Christians, they became reticent to attack the churches and monasteries that they had once plundered with abandon. While we can infer from the passage that the pagan worshipers of Odin and Thor are the Vikings, choice A is a distortion. It has not been stated in the text that the converted Vikings eschewed **all** forms of violence. They only became reticent to attack the churches and monasteries. Hence choice A is not the answer.

Option B: By the middle of the eleventh century, the glory days of the Viking raiders had faded into twilight, never to return. Hence choice B is wrong.

Option C: As Scandinavia became increasingly civilized, its kings discouraged the activities of roaming warrior bands, and its social environment gave rise to a more humdrum life. So choice C is incorrect.

Option D: The growth of strong centralized monarchies in Norway, Denmark, and Sweden also "ultimately resulted in taming the Viking spirit." Therefore choice D is the answer.

Choice (D)

13. Refer to para 3. "As Scandinavia became increasingly civilized, its kings discouraged the activities of roaming warrior bands, and its social environment gave rise to a more humdrum life." By the middle of the eleventh century, the glory days of the Viking raiders had faded into twilight, never to return. Hence choice B is the correct answer. The remaining choices do not apply in the given context.

Choice (B)

14. Leif called the place Vinland (i.e. Wine-land). Night and day in this land were of more equal length than in Greenland.

Option A: Night and Day in this land were of **more equal length** than in Greenland. Hence choice A is wrong.

Option B: Night and Day in this land were of **more equal length** than in Greenland. Hence choice B is incorrect.

Option C: Night and Day in this land (Vinland) were of more equal length than in Greenland. But one cannot specifically say that Vinland had 12 hours of daylight whereas Greenland had 11. Therefore choice C is incorrect.

Option D: The difference between the lengths of night and day in Vinland was less than that of Greenland. This can be inferred from the given statement in the question.

Choice (D)

15. Option A: The *Greenlanders' Saga*, the earlier of the two was committed to writing in the twelfth century and has about it a primitive crudeness which, while not particularly attractive literally, adds to its historical credibility. The *Eric Saga* has a more polished appearance. So choice A is incorrect.

Option B: The earliest written source having this information is not the saga accounts. The earliest written source is *The History of the Archbishops of Hamburg*. So 'Hamburg's saga' as given in choice B is incorrect. 'Flatey's saga' as given in choice B is also incorrect. The Flatey Book, compiled towards the end of the fourteenth century in northern Iceland, contains the earliest extant text of the Greenlander's saga. The Greenlander's saga and the Eric's saga are the only two sagas mentioned in the passage. Hence choice B is not correct.

Option C: *Greenlanders' Saga*, the earlier of the two was committed to writing in the twelfth century and has about it a primitive crudeness which, while not particularly attractive literally, does add to its historical credibility. The *Eric Saga*, on the other hand, has a more polished appearance. So the first part of choice C is correct. The *Greenlanders' Saga* is more reliable and its text and story more faithful to an oral original. So the second half of choice C is not true.

Option D: The *Greenlanders' Saga* and the *Eric Saga* tell essentially the same story, yet in some places they complement and in other places they contradict one another. Hence choice D is true. Choice (D)

#### Solutions for questions 16 to 21:

##### Number of words and Explanatory notes for RC:

Number of words: 663

16. Option A: It has not been mentioned in the passage that vaccines based on whole pathogens pose a threat of autoimmunity. Whole tumour cell vaccines have a potential for causing autoimmunity. The second sentence in choice A cannot be inferred from the passage. In fact, "whole tumour cell vaccines ..... increasing the risk of carcinogenesis" sounds incorrect. Hence choice A is not the answer.

Option B: The first part of choice B is incorrect. It has been mentioned in the last paragraph that "to elicit strong immunity, the tumour cell vaccine must include substances that **activate** DCs or dendritic cells. There is no link mentioned in the passage between whole pathogen vaccines and autoimmune diseases. Hence choice B is not correct.

Option C: Vaccines that are based on whole pathogens are associated with risks of reactivation and development of disease, whole tumour cell vaccines present significant health risks. The most serious is the potential for causing autoimmunity. Hence choice C is the answer.

Option D: Choice D has information that is out of scope of the given passage. Hence it is not the answer.

Choice (C)

17. The said T.S. Eliot quote in this passage is preceded by: One needs to address the common and the unique challenges to cancer vaccines and the progress that has been made in meeting them. Considering how refractory cancer has been to standard therapy, efforts to achieve immune control of this disease are well justified.

Option A: Choice A is too general and does not refer to cancer vaccines. Common challenges with respect to any vaccine (not necessarily only cancer vaccines) need to be faced, such as what antigen and what adjuvant to use, what type of immune response to generate and how to make it long lasting.

Option B: "infinite risks and real benefits" in making cancer vaccines falls outside the scope of the given passage. Hence choice B is incorrect.

Option C: The quote hints at the trials and errors in the process of making the cancer vaccine. .... The successes from the past and an ever-increasing level in our understanding of basic immune mechanisms, and the ability to manipulate them, predict future victories. .... Considering how refractory cancer has been to standard therapy ..... Refractory means unmanageable or stubborn. Hence choice C is the answer.

Option D: The reference to clinical tests and tests on animals in the passage is in respect to the harmful side effects of the cancer vaccine and not in its overall effectiveness. Hence choice D is incorrect. Choice (C)

18. Option A: Choice A is not true from the last para. Immature dendritic cells (DCs) that reside in tissues take up and process dying cells and self antigens, but in the absence of strong activating signals, such as those given by pathogens, no immune response to these antigens is generated. To elicit strong immunity, the tumour cell vaccine must include substances that activate DCs.

Option B: In the case of whole tumour cells, however, it should be expected that in addition to presenting tumour specific antigens, activated DCs would prime immunity to many other antigens (autoantigens) that are otherwise subject to peripheral tolerance. The most serious health risk of whole tumour cell vaccines is the potential for causing autoimmunity. Hence choice B is the answer.

Option C: The term 'produce only' in choice C is vague and out of scope. Immature dendritic cells (DCs) that reside in tissues take up and process dying cells and self antigens .... In addition to presenting tumour specific antigens, **activated DCs** would prime immunity to many other antigens (autoantigens) that are otherwise subject to peripheral tolerance. Therefore choice C is not correct.

Option D: Choice D is a clever distortion. Nothing has been mentioned in the passage about 'deactivating dendritic cells'. Choice (B)

19. Refer to the first para.

Option A: If used for cancer prevention, vaccines must elicit effective long-term memory without the potential of causing autoimmunity. "increasing autoimmune responses" is incorrect as autoimmunity is not desirable.

Option B: Nothing has been mentioned about harsh immuno-suppressive regimens for tackling autoimmune diseases and "a less toxic" requirement for cancer vaccines. Hence choice B is not the answer.

Option C: While the first part of choice C is out of scope, the second part is wrong. "should simultaneously induce the same responses that underlie autoimmunity" as mentioned in choice C is not desirable.

Option D: Cancer vaccines must overcome immune suppression exerted by the tumour, by previous therapy or by the effects of advanced age of the patient. This makes choice D the correct answer.

Choice (D)

20. Statement 1) The passage states that thirty one infectious diseases have been prevented through vaccines, not that thirty one vaccines have been tested. Hence statement 1 is not true.

Statement 2) Statement 2 follows from the last sentence of the passage. "Murine models" means "mouse models".

Statement 3) Statement 3 sounds like a warning and is futuristic in tone. But (3) is out of scope of the given passage.

Statement 4) Edward Jenner's landmark publication in 1798, that describes a vaccine against small pox, is considered to be the official beginning of the science of immunology. But we cannot say that the small pox vaccine has been successful in the eradication of smallpox in 1798. We are not told in the passage about the year when small pox was eradicated. So statement 4 is not correct.

Statement 5) From the fifth para, one can say that statement 5 is correct. Traditionally, successful vaccines have consisted of live attenuated pathogens .... effective at the population level ..... on the basis of the successes of attenuated pathogen vaccines .....

Statement 6) Malaria, Dengue fever, Zika virus disease, Lyme disease, Chikungunya, Cytomegalovirus infection, and several others still don't have proper vaccines for their cure. Modern times have also brought new diseases such as AIDS and cancer. While malaria has been mentioned as one for which there's no vaccine, there is no mention made at all about Chagas, tuberculosis and Hepatitis B.

Statement 6 is not correct.

Statements 2 and 5 are consistent with the information presented in the passage.

Ans: (25)

21. Option A: While the second and third paras of the passage are dedicated to vaccine development, choice A is not the primary concern of the author. Hence choice A is not the answer.

Option B: Whether vaccines are designed to prepare the immune system for the encounter with a pathogen or with cancer, certain **common challenges** need to be faced, such as what antigen and what adjuvant to use, what type of immune response to generate and how to make it long

lasting. Cancer, additionally, presents several unique hurdles. Cancer vaccines must overcome immune ..... One needs to address the **common and the unique challenges to cancer vaccines** and the progress that has been made in meeting them. Choice B summarizes the main concern of the author.

Option C: Choice C is too specific and narrow in focus. It is not the answer. The author does not discuss only whole tumour cell vaccine. He also discusses challenges related to vaccines that are based on whole pathogens.

Option D: The author does not make a case for the prophylactic use of cancer vaccines as such. The issue of use of vaccines does not really arise in the passage. The author analyses the problems associated with cancer vaccines in particular.

Choice (B)

#### Solutions for questions 22 to 24:

##### Number of words and Explanatory notes for RC:

Number of words: 448

22. The passage is an objective description of Said's contribution to Post-Colonial studies.

Option A: Choice A is irrelevant/ out of scope and cannot be inferred from the bold-faced segments of the text.

Option B: Choice B (internalize colonial assumptions about the inferiority of the conquered peoples) seems contrary to "Said calls into question the underlying assumptions that form the foundation of Orientalist thinking." "constructing the Orient through the lens of Europeans" contradicts "Scholarship from afar and second-hand representation must take a back seat." given in the last paragraph.

Option C: The first part of choice C though true [from the term "postcolonial (studies)"] does not emerge from the boldfaced portions of the passage. Also "analyze the western ways of depicting the Eastern world" is the old way of studying the East (as given in paras 2 and 3) which is what is argued against in the last para of the passage. .... Said calls into question the underlying assumptions that form the foundation of Orientalist thinking. A rejection of Orientalism entails ..... Hence choice C is not correct.

Option D: The passage contextualises Said's work as a background for postcolonial studies. Said's studies both challenge the Western dominance (Scholarship from afar and second-hand representation must take a back seat.) and encourage an Eastern participation in literature about it. ('The Oriental' must be given a voice.). Choice (D)

23. Option A: The Orient signifies a system of representations framed by political forces that brought the Orient into Western learning, Western consciousness and Western empire. The first 'Orientalists' were 19th century scholars who translated the writings of 'the Orient' into English, based on the assumption that a truly effective colonial conquest required knowledge of the conquered peoples. Hence choice A is true and is not the answer.

Option B: Rejection of Orientalist thinking does not entail a denial of the differences between 'the West' and 'the Orient', but rather an evaluation of such differences in a more critical and objective fashion. Hence choice B is false and is the answer.

Option C: What is considered the Orient is a vast region, one that spreads across a myriad of cultures and countries. Said argues that Orientalism can be found in current Western depictions of 'Arab' cultures. .... A historian and a scholar would turn not to a panoramic view of half of the globe. .... 'The Orient' cannot be studied in a non-Orientalist manner; rather, the scholar is obliged to study more focussed and smaller culturally consistent regions. So choice C is correct and is not the answer.

Option D: Choice D is true from the last two sentences of the passage. Hence it is not the answer. Choice (B)

24. Refer to the second para.

Option A: Choice A has not been mentioned in the passage.

Option B: Choice B is an exaggeration and does not correctly represent what the sentence in quotes in the question implies.

Option C: The Orient exists for the West, and is **constructed by** and in relation to the West. It is a mirror image of what is inferior and alien ('Other') to the West. Hence choice C is the correct answer.

Option D: While the first part of choice D may be true, the second part is irrelevant in the given context. Hence choice D is not correct.

Choice (C)

#### Solutions for questions 25 to 27:

25. On a careful reading of the sentences, it can be observed that sentence 2 is a general sentence that can begin the paragraph. It has a number of proper nouns: The English Channel, Paul MacCready and Solar Challenger; and provides the year of the journey made (1981). Sentence 4 follows sentence 2. "this aircraft used an electric motor" in sentence 4 links with "the electric plane *Solar Challenger*" in sentence 2. Sentences 4 and 1 form a mandatory pair. "This aircraft did not have a battery ..... obtained its power directly from solar cells" in sentence 4 links with "Another solar aircraft (this time equipped with batteries)" in sentence 1. Sentence 5 concludes the paragraph by providing more details about the solar aircraft: its name (*Solar Impulse 2*), the journey made by it (five days and nights crossing the Pacific from Japan) and the fact that its batteries overheated. So, 2415. Sentence 3 is the odd sentence out as "E-Fans" needs a precedent and further elaboration.

Ans: (3)

26. On a careful reading of the sentences, it can be observed that sentence 4 is a general sentence that can begin the paragraph. It introduces the background: Bitcoin is the world's worst-performing currency. Sentence 4 is followed by sentence 3 as sentence 3 provides a reason for Bitcoin to be the world's worst-performing currency. Sentence 5 with the contrast conjunction "but" follows sentence 3. "bitcoin is top of the pile, it has inspired a number of new books" in sentence 5 contrasts "In 2014 it lost more than half of its value against the dollar" in sentence 3 and "world's worst-performing currency" in sentence 4. Sentences 5 and 2 form a mandatory pair. "number of new books it has inspired" in sentence 5 links with "Nearly 200 titles about the crypto-currency came out last year" in sentence 2. So, 4352. Sentence 1 (This philosophical division...) needs a precedent and more substantiation.

Ans: (1)

27. On a careful reading of the sentences, it can be observed that sentence 3 is a general sentence that begins the paragraph. It introduces the background (the order of adjectives) and poses a question. Sentence 2 follows sentence 3 as the former is a reply to the query posed in the latter. "opinion, size, age, shape, colour, origin, material, purpose and then Noun" in sentence 2 provides the order of adjectives. Sentence 2 has the full name of the person "Mark Forsyth". Sentence 5 exemplifies the order of adjectives through the use of a correct sentence "So you can have a.....". Here 'lovely' represents 'opinion', 'little' represents 'size', 'old' refers to 'age', 'rectangular' represents 'shape', 'green' represents 'colour', 'French' points to 'origin', 'silver' refers to 'material', 'whittling' points to 'purpose' and 'knife' is a noun. Hence sentence 5 follows sentence 2. The second part of sentence 5 provides a word of caution or caveat: But if you mess ..... sound like a maniac. Sentence 1 follows sentence 5 with the conclusion: Mr Forsyth's little nugget is broadly true, and it has delighted people .... " may have exaggerated how fixed adjective order is" in sentence 1 links with "this word order" and the example provided in sentence 5. "but his little nugget is broadly true, and it has **delighted** people" in sentence 1 is contradicted by "if you mess with this word order in the slightest you'll sound like a **maniac**" in sentence 5. So, 3251. Sentence 4 does not discuss the order of adjectives. It focuses on "discipline of linguistics".

Sentence 4 needs a precedent and more substantiation. Sentence 4 is the odd sentence out.

**Note:** Whittling (sentence 5) may refer either to the art of carving shapes out of raw wood using a knife or a time-consuming, non-artistic process of repeatedly shaving slivers from a piece of wood.

**Nugget** (sentence 1) here refers to a valuable idea or fact.

Ans: (4)

#### Solutions for questions 28 to 32:

28. On a careful reading of the sentences, it can be observed that sentence 2 is a general sentence that can begin the paragraph. It has the date (February 2012) and the location (University of Michigan's C. S. Mott Children's Hospital, in Ann Arbor) and introduces the background: medical team carried out an unusual operation on a three-month-old boy. Sentence 2 is followed by sentence 4. "three-month-old boy" in sentence 2 links with "The baby" in sentence 4. Sentences 4 and 1 form a mandatory pair. "tracheobronchomalacia: the tissue of one portion of his airway was so weak that it persistently collapsed" in sentence 4 links with "This made breathing very difficult ...." in sentence 1. Sentence 5 follows sentence 1. "This made breathing very difficult ...." in sentence 1 links with "The infant was placed on a ventilator ...." in sentence 5. Sentence 5 is followed by sentence 3 which concludes the paragraph. "medical team set about figuring out ..." links with "The team consulted with the baby's doctors ...." in sentence 3. "they soon agreed that they had just the right tool for this delicate, lifesaving task: a 3-D printer" is a standalone part which would need further elaboration and substantiation. So, 24153.

Ans: (24153)

29. On a careful reading of the sentences, it can be observed that sentence 5 is a general sentence that can begin the paragraph. It begins with a comment by Iain Trickett's grandfather. "Iain Trickett's grandfather told" in sentence 5 is followed by "The old man was half right" in sentence 2. Sentence 1 justifies why the old man was half right (sentence 2). "the county in northwest England" in sentence 1 refers to "Lancashire" mentioned earlier in sentence 5. "pioneered machinery that churned out manufactured goods by the ton; other countries copied it" in sentence 1 is a reason for saying "The old man was half right" in sentence 2. Sentence 4 follows sentence 2 as sentence 4 (Traces of that past glory linger) hints at a positive current situation. Sentence 3 follows sentence 4 and concludes the para. "highly skilled workers produce top-of-the-range jackets and jeans for companies..." in sentence 3 links with "pioneered machinery that churned out manufactured goods by the ton; other countries copied it" mentioned earlier in sentence 1. So, 52143.

Ans: (52143)

30. On a careful reading of the sentences, it can be observed that sentence 3 is a general sentence that begins the paragraph. It introduces the background: Disaster struck Malaysia Airlines. Sentence 3 is followed by sentence 5. It talks about an air mishap in March related to a flight of Malaysia Airlines. Sentence 1 continues after sentence 5: Four months later .... there was another mishap. So, 351. Sentences 4 and 2 in that order talk about the present situation and complete the para. "Malaysia's struggling national carrier ..... financial health remains under scrutiny" in sentence 4 link with "deserted the airline and flyers fear it is jinxed" in sentence 2. Hence 35142.

Ans: (35142)

31. On a careful reading of the sentences, it can be observed that sentence 4 is a general sentence that begins the paragraph. It mentions the time period (more than 7000 years ago), location (Middle East) and introduces the background: they could ferment grapes to make wine. Sentences 4 and 2 form a mandatory pair. "they could ferment grapes to make wine" in sentence 4 links with "The yeast that they unknowingly harnesses for the purpose" in sentence 2. Sentence 5 introduces another point of view (the processing of coffee beans and cacao also requires fermentation) through the comparison "as with wine" and follows sentence 2. "also requires some fermentation" in

sentence 5 links with "ferment grapes to make wine" mentioned earlier in sentence 4. Sentence 1 continues after sentence 5 with the contrast conjunction 'but'. "coffee and cacao yeasts are far more genetically diverse than wine strains" is a difference when considering the fermentation of grapes (to make wine) and the fermentation of coffee beans and cacao (used to make chocolate). Sentence 1 is followed by sentence 3. "coffee and cacao yeasts are far more genetically diverse than wine strains" in sentence 1 links with "intriguing possibility of imparting entirely new tastes to the terroir of coffee and chocolate" in sentence 3. Sentence 3 concludes the para. So, 42513.

Ans: (42513)

32. On a careful reading of the sentences, it can be observed that sentence 2 is a general sentence that begins the paragraph. It introduces the person addressed "(you) Theresa May" and provides the background: the government would not be defined by Brexit. Sentence 5 can only be placed after sentence 2 as placing it after any other sentence would amount to a disruption of the thoughtflow. "Good luck with that" (sentence 5) sarcastically points to the positive sounding "your government would not be defined by Brexit" in sentence 2. Sentence 1 paints a negative picture and talks about the daunting task faced by Theresa May (therefore, the "good luck wishes" mentioned earlier). Sentence 1 follows sentence 5. "Britain's tortured relationship with the European Union has felled most recent Conservative prime ministers" in sentence 1 negates "your government would not be defined by Brexit" in sentence 2. Sentence 1 is followed by sentence 4. "Britain's tortured relationship with the European Union" in sentence 1 links with "Disentangling Britain from the EU". "none faced a task remotely as daunting as the one that confronts you" in sentence 1 links with "like extracting one glue-slathered octopus from a basket of 27 other ones" in sentence 4. Sentence 3 concludes the paragraph. So, 25143.

Ans: (25143)

#### Solutions for questions 33 and 34:

33. Choice (1) is incomplete. It also does not mention the names of the types of animals: 'bingers' and 'frequent feeders'. It wrongly mentions hedgehogs and foxes. Choice (2) is an apt summary as it covers the main points succinctly. Choice (3) is incorrect. 'At one end of the spectrum' and 'at the other end of the spectrum' does not imply that animals are of two types. The remaining part of the choice is also unnecessarily wordy. Choice (4) wrongly uses the term 'grazer' instead of 'frequent feeders'. It also does not explain the terms 'bingers' and 'frequent feeders'. It is incomplete as a summary. The last sentence in choice (4) is out of scope.

Ans: (2)

34. Choice (1) is incorrect. The para has not mentioned that Israel owns the world's most sophisticated weapons. Choice (2) distorts the main point of the paragraph which is: Relations between India and Israel have become more friendly. The second sentence in choice (2) is also incorrect. Choice (3) is an apt summary as it covers the main points succinctly. Choice (4) is again wrong. "become just slightly closer" in choice 4 is incorrect. Choice 4 does not mention that India wishes to befriend the United States.

Ans: (3)

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

## SECTION – II

## Solutions for questions 1 to 4:

1. If their first trip starts at 5:00 AM, they will reach the destination by 7:00 PM. Their next trip will be from 8:00 PM to 12 noon. The next trips will be from the following times:

From 1:00 PM to 3:00 AM  
From 4:00 AM to 6:00 PM  
From 7:00 PM to 11:00 AM  
From 12 noon to 2:00 AM.

We can see that from this point onwards, the start time and end time follow the same pattern as in the previous solution. Hence, the times taken for the first six trips are 14 hours, 16 hours, 14 hours, 14 hours, 16 hours and 14 hours respectively. For the next three trips, the time taken will be 14 hours, 16 hours and 15 hours respectively. This will repeat for all the subsequent trips.

Hence, the average time taken for the first 50 trips =

$$\frac{14 + 16 + 14 + 14 + 16 + 14 + 14 \times (14 + 16 + 15) + 14 + 16}{50} \\ = \frac{748}{50} = 14.96$$

Choice (C)

2. Since they started in Mumbai at 6:00 PM, they will reach Bangalore by 10:00 AM. The next trip will be from 11:00 AM to 2:00 AM. The next one will be from 3:00 AM to 5:00 PM. We can see that, from the above solution, that the next two trips will be from 6:00 PM and 11:00 AM and the pattern will repeat every third trip. But of these trips, every alternate trip is from Bangalore to Mumbai. Of the first two trips, the one from Bangalore to Mumbai took 15 hours.

The time taken for the remaining trips (irrespective of origin city) are 14, 16 and 15 hours. The alternate values in this series will be 16, 14, 15, 16, 14, 15... In the first 100 trips, only 50 trips will be from Bangalore. Hence, we need a total of 50 value.

Average time per trip =

$$\frac{15 + 16 \times (16 + 14 + 15) + 16}{50} = 15.02 \text{ hours}$$

Choice (A)

3. Since they started from Bangalore at 2:00 PM, they will reach Mumbai at 4:00 AM.

The subsequent trips will have the following timings:

From 5:00 AM to 7:00 PM  
From 8:00 PM to 12 noon  
From 1:00 PM to 3:00 AM  
From 4:00 AM to 6:00 PM  
From 7:00 PM to 11:00 AM  
From 12 noon to 2:00 AM  
From 3:00 AM to 5:00 PM

We can see that the timings will repeat from here on. However, since they start at 3:00 AM on the 8<sup>th</sup> trip, they will start from Mumbai in this case. The next time they start at 3:00 AM will be on his 11<sup>th</sup> trip and this trip will start from Bangalore, i.e., after 10 trips, they will start at 3:00 AM from Bangalore.

Ans: (10)

4. The timings of his trip are given below:

4:00 PM to 6:00 AM  
7:00 AM to 9:00 PM  
10:00 PM to 12 noon  
1:00 PM to 3:00 AM  
4:00 AM to 6:00 PM  
7:00 PM to 11:00 AM  
12 noon to 2:00 AM  
3:00 AM to 5:00 PM

From here on, the pattern will repeat as we have observed in the previous solutions.

Since the first trip is from Mumbai, among his first seven trips, only his second trip starts during the given time and starts from Bangalore.

Among the next trips, every time they start from Bangalore at 11:00 AM should be counted. Their 10<sup>th</sup> trip, 13<sup>th</sup> trip, 16<sup>th</sup>

trip... will start at 11:00 AM. But only his 10<sup>th</sup> trip, 16<sup>th</sup> trip, 22<sup>nd</sup> trip... will start from Bangalore. Hence, from the 10<sup>th</sup> trip till the 100<sup>th</sup> trip, only 16 trips will satisfy the given conditions. Combining this with the second trip that they make, they will make a total of 17 trips starting from Bangalore between 6:00 AM and 12 noon during his first 100 trips.

Ans: (17)

## Solutions for questions 5 to 8:

Given that A paid Rp 102. He could have paid in denominations of 2/3/17.

B paid Rp 357. He could have paid in denominations of 3/7/17.

C paid 399. He could have paid in denominations of 3/7/19.

D paid 238. He could have paid in denominations of 2/7/17.

E paid 147. He could have paid in denominations of 3/7.

Since only C could have paid in denominations of 19, he must have paid in Rp 19. The number of notes that he would have paid will be 21.

If E paid in Rp 7, he must have paid 21 notes. This is not possible. Hence, E paid in Rp 3 notes.

B could not have paid in Rp 17 notes, as he would have to have paid 21 notes. Hence, B must have paid in Rp 7 notes. He must have paid 51 notes. A could not have paid Rp 2 notes as he would have then paid 51 notes. Hence, A must paid in Rp 17 notes. D must have paid in Rp 2 notes.

The following table provides the denomination and the number of notes paid by each of the five persons:

Person	Denomination	Number of Notes
A	17	6
B	7	51
C	19	21
D	2	119
E	3	49

5. The total number of notes that the five friends paid the shopkeeper = 246

Ans: (246)

6. The shopkeeper returned 2 notes to A. None of these two notes can be Rp 17 notes.

If the price of the product was Rp 76, the shopkeeper must have returned Rp 26 to A. This must be done by returning one Rp 19 note and one Rp 7 note. Hence, this is possible.

If the price of the product was Rp 92, the shopkeeper must have returned one Rp 3 note and one Rp 7 note.

If the price of the product was Rp 80, the shopkeeper must have returned one Rp 3 note and one Rp 19 note.

If the price of the product was Rp 82, the shopkeeper must have returned Rp 20 to A. This can be done only if he returns Rp 3 and Rp 17 note. Since this is not possible, the price of the product that A purchased cannot be Rp 82.

Choice (D)

7. The shopkeeper returned 2 notes for the product that A purchased. The price of the product that A purchased can be odd if the shopkeeper returned one odd denomination note and one even denomination note. The price of the product that A purchased can be even if the shopkeeper returned two odd denomination notes.

The shopkeeper returned 4 notes for the product that B purchased. The price of the product that B purchased can be odd if the shopkeeper returned four odd denomination notes. The price of the product that B purchased can be even if the shopkeeper returned three odd denomination notes and one even denomination note.

The shopkeeper returned 1 note for the product that C purchased. The price of the product that C purchased can be odd if the shopkeeper returned one even denomination note. The price of the product can be even if the shopkeeper returned one odd denomination note.

The shopkeeper returned 2 notes for the product that D purchased. The price of the product that D purchased can be odd if the shopkeeper returned one odd denomination note and one even denomination note. However, the shopkeeper cannot return a note of even denomination since there is only one denomination which is even and this

person paid using that denomination. Therefore, the price of the product that D purchased must be even. Hence, only statement IV is definitely true. Choice (B)

8. Since E paid Rp 147 for his product and the shopkeeper returned one note in return, the price of this product can be 145 or 140 or 130 or 128. (It cannot be 144 because E paid using Rp 3 notes.) From the given statements, the statement given in option C is sufficient to determine the price of the product that E purchased. Choice (C)

#### Solutions for questions 9 to 12:

Let 1, 2, 3, .... to n represent the positions of the chairs around the table in the clockwise direction.

9. Given that n = 6.

Let the person wearing Red shirt be at 1. The person at 2 must be wearing a Grey shirt. The person at 5 cannot be wearing a Red shirt. If this person wears a Black shirt, the person at 4 cannot be wearing a Red shirt (since he is to the right of a person wearing a Black shirt) or a Black shirt (since he is adjacent to a person wearing a Black shirt) or a Grey shirt (since he is opposite a person wearing a Red shirt).

Hence, the person at 5 must be wearing a Grey shirt. The person at 4 can be wearing Red/Black shirt. If the person at 4 wears a Black shirt, the person at 3 cannot wear a Black shirt or a Red shirt or a Grey shirt. Hence, the person at 4 wears a Red shirt.

The persons at 3 and 6 must be wearing black shirts, since they are adjacent to persons wearing a Red shirt and a Grey shirt.

This is the only possibility for n = 6.

In this arrangement, only option D is true. Choice (D)

10. Given that n = 8. Let the person at 1 be wearing a Black shirt.

Let the person at 5 (opposite the person at 1) be wearing a Red shirt. The person at 6 must be wearing a Grey shirt. The person at 8 must also be wearing a Grey shirt. The person at 2 (opposite the person at 6) must be wearing a Grey shirt. The person at 3 and 7 can be wearing Black shirts. The person at 4 must be wearing Grey shirt. In this arrangement, a person wearing a Black shirt is sitting opposite another person wearing a Black shirt and a person wearing a Red shirt is sitting opposite a person wearing a Black shirt. Hence, option (A) and option (B) are both possible.

Let the person at 5 be wearing a Grey shirt.

The person at 8 must be wearing a Grey shirt. The person at 4 must be wearing a Black shirt. The person at 3 must be wearing a Grey shirt. The person at 7 must be wearing a Black shirt. The person at 6 cannot be wearing a Red shirt because he is to the right of a person wearing a Black shirt. He cannot be wearing either Black or Grey because the persons adjacent to him are wearing those colours. Hence, this case is not possible.

Therefore, it is not possible for a person wearing a Black shirt to be sitting opposite a person wearing a Grey shirt.

Choice (C)

11. Let us consider n = 8.

Let the person at 1 be wearing a Black shirt.

Let the person at 5 (opposite the person at 1) be wearing a Red shirt. The person at 6 must be wearing a Grey shirt. The person at 8 must also be wearing a Grey shirt. The person at 2 (opposite the person at 6) must be wearing a Grey shirt. The person at 3 and 7 can be wearing Black shirts. The person at 4 must be wearing Grey shirt. In this arrangement, a person wearing a Black shirt is sitting opposite another person wearing a Black shirt and a person wearing a Red shirt is sitting opposite a person wearing a Black shirt.

In this arrangement, there aren't any pair of persons wearing Red shirts and sitting opposite each other.

In the same arrangement, replacing the person at 3 with a person wearing a Red shirt, will result in an arrangement in which there aren't any pair of persons wearing Black shirts and sitting opposite each other.

However, for any value of n, if a person wearing a Red shirt is at 1, there must be a person wearing a Grey shirt at 2. Opposite this person, i.e., at  $n/2 + 2$ , there must be a person wearing Black or Grey. If this person is wearing Black, then at  $n/2 + 1$ , there must be a person wearing Grey (since this person cannot be wearing Red as he is to the right of a person wearing black). But this person will be opposite the person wearing Red (at 1) and hence, he cannot be wearing Grey. Since the person at  $n/2 + 1$  cannot be wearing Red, Black or Grey, the person at  $n/2 + 2$  must be wearing Grey.

Therefore, there will be at least one pair of persons wearing Grey and sitting opposite each other. Choice (C)

12. Given that n = 8. Let the person at 1 be wearing a Black shirt.

Let the person at 5 (opposite the person at 1) be wearing a Red shirt. The person at 6 must be wearing a Grey shirt. The person at 8 must also be wearing a Grey shirt. The person at 2 (opposite the person at 6) must be wearing a Grey shirt. The person at 3 and 7 can be wearing Black shirts. The person at 4 must be wearing Grey shirt. The persons at 3, 7 and 1 can be wearing black shirts. Hence, a maximum of 3 persons can be wearing a black shirt.

Choice (B)

#### Solutions for questions 13 to 16:

13. The average selling price of the first 50 tacos = Rs. 17  
For selling each additional taco, his average selling price will increase.

Average selling price of the first 60 tacos =

$$\frac{17 \times 50 + 19 \times 10}{60} = \frac{1040}{60} = \text{Rs. } 17.33$$

Since his average selling price could not have been more than Rs. 17.33 by selling less than 60 tacos, we can check the average selling price for the first 70 tacos.

Average selling price for the first 70 tacos =

$$\frac{1040 + 21 \times 10}{70} = \frac{1250}{70} = 17.86$$

Average selling price for the first 80 tacos =

$$\frac{1250 + 23 \times 10}{80} = \frac{1480}{80} = 18.5$$

Hence, he must have sold between 70 and 80 tacos.

Let the number of tacos that he sold in excess of the initial 70 tacos be x.

$$\frac{1250 + 23x}{70+x} > 18$$

$$\Rightarrow 1250 + 23x > 1260 + 18x \Rightarrow x > 2$$

Hence, he must have sold at least 3 tacos at the price of Rs. 23.

The total number of tacos sold = 73.

Ans: (73)

14. The profit per taco for the first 50 tacos = Rs. 7

Since we calculated the average selling price for the first 60, 70 and 80 tacos, the average profit per taco will be Rs. 10 less than the average selling price (since the cost of making each taco is Rs. 10).

Profit per taco for the first 60, 70 and 80 tacos are Rs. 7.33, Rs. 7.86 and Rs. 8.5 respectively.

Profit per taco for the first 90 tacos =

$$\frac{(1480 + 25 \times 10)}{90} - 10 = \text{Rs. } 9.22$$

Hence, he must have sold between 80 and 90 tacos.

Let the number of tacos that he sold in excess of the initial 80 tacos be x.

$$\frac{1480 + 25x}{80+x} - 10 < 9 \Rightarrow x < 6.67$$

Hence, he could have sold at most 86 tacos. Ans: (86)

15. Revenue from selling 95 tacos =  $1480 + 250 + 5 \times 27 = 1865$

The cost of making each taco should be less than this.

Hence,  $95 \times y < 1865 \Rightarrow y < 19.63$

The percentage increase in cost = 96.3% Choice (B)

16. The number of tacos that Pavan sold can be maximized in one of two ways:

- He could have sold all the tacos at the minimum possible selling price, i.e., Rs. 17. In this case, he cannot offer a discount to any customer because no one could have purchased for more than Rs. 950 from him.
- He could have offered a discount to all the customers who purchased from him. In this case, each customer must purchase for at least Rs. 950 from him. However, the average price is not the lowest possible (since he must sell more than 50 tacos, i.e., at more than Rs 17 per taco). Further, to maximize the number of tacos sold, only one customer must have visited the stall on any day. If, on any day, a second customer visited the stall, the average price at which he sells a taco will increase and this will decrease the maximum number of tacos that he can sell.

Let R be the revenue that he would have made if there was no discount.

Let  $R_d$  be the revenue that he made if he sold all the tacos at a discount.

Now, consider the case when no discount was given to any customer. In this case, he sold tacos worth R.

$R = \text{Number of tacos sold} \times \text{Average Price of each Taco}$

To maximize the number of tacos sold, the average price of each taco must be minimum.

We will consider the case when on each day he sells at most 50 tacos. In this case, average selling price will be the minimum (i.e., Rs. 17) and no discount will be offered to any customer.

He will sell a total of  $\frac{73746}{17} = 4338$  tacos.

In the second case, he has to sell 50 tacos at Rs. 17 and 6 tacos at Rs. 19 so that the total worth of tacos that he sells to each customer will be Rs. 964.

If he sells 56 tacos to each customer, then the revenue excluding the discount will be  $\frac{73746}{0.9} = 81940$

Total number of tacos sold =  $\frac{81940}{964} \times 56 = 4760$

Hence, the maximum number of tacos that he could have sold = 4760. Choice (D)

#### Solutions for questions 17 to 20:

17. Quantity of rice sold in January =  $\frac{756000}{47 - 42.5} = 168000$  kg

Quantity of rice sold in February

$$= \frac{234000}{43 - 41.5} = 156000 \text{ kg}$$

Quantity of rice sold in April

$$= \frac{410000}{43 - 40.5} = 164000 \text{ kg}$$

Quantity of rice sold in May

$$= \frac{616000}{47 - 43.5} = 176000 \text{ kg}$$

Hence, the quantity of rice sold was the highest in May, among the given months. Choice (D)

18. The following table provides the quantity of rice sold by Jai in each month:

Month	Quantity
January	168
February	156
March	190
April	164
May	176
June	180
July	188
August	176

The average quantity of rice sold in a month

$$= \frac{1398000}{8} = 174750 \text{ kg} \quad \text{Choice (C)}$$

19. The average selling price per kg increased by at least 10% in March and July.

The average profit per kg increased by at least 10% in April, May and July.

Hence, both increased by at least 10% each in only one month, July. Choice (B)

20. From the previous solution, we can see that the highest percentage increase in the quantity of rice sold was in March.

$$\text{Percentage increase} = \frac{34}{156} \times 100 = 21.79\% \quad \text{Choice (B)}$$

#### Solutions for questions 21 to 24:

Given that Method A, B, C and D take 6 hours, 4 hours, 12 hours and 3 hours respectively. In order to compare the four methods, we can see the level of purification that each method can achieve in 12 hours (i.e., the LCM of 6, 4, 12 and 3).

Method A can be used twice in 12 hours. When it is used the first time, 70% purity is achieved. i.e., 30% of the impurities remain. When used the second time,  $30 \times 30\% = 9\%$  of the impurities remain. Hence, a purity of 91% can be achieved in 12 hours.

Similarly, Method B can be used thrice and the level of purity will be  $1 - 0.4 \times 0.4 \times 0.4 = 93.6\%$

Method C can be used only once and the level of purity will be 80%.

Method D can be used four times and the level of purity will be  $1 - (0.5)^4 = 93.75\%$

Hence, Method D is the most efficient among the four.

21. Since it has to be at least 90% pure, he can use Method D four times and achieve a purity of 93.75%. The time taken in this case = 12 hours.

To minimize the time, we can check whether he can use Method D twice, in addition to using Method B once. The purity will be  $1 - 0.5 \times 0.5 \times 0.4 = 90\%$

In this case, the time taken =  $3 + 3 + 4 = 10$  hours.

We can also check for the case when he uses Method D once and Method A once (as this is the only case in which the time taken will be less). But this will result in a purity of 85% only.

Hence, the minimum time that he will take = 10 hours. Choice (C)

22. As we have seen, in 12 hours, the maximum purity was achieved using Method D.

In the next four hours, Method D can be used once OR Method B can be used once. Since Method B is better than Method D, the purity achieved by using Method B will be better.

Maximum purity that can be achieved =  $1 - (0.5)^4 \times 0.4 = 97.5\%$  Choice (D)

23. Since he used the four methods exactly five times, the options must be of the form  $1 - a^p b^q c^r d^s$ , where a, b, c and d are 0.3, 0.4, 0.2 and 0.5 for Method A, Method B, Method C and Method D respectively. Further,  $p + q + r + s$  must be equal to 5 (since he used the method exactly five times).

$$\text{Option A: } a^p b^q c^r d^s = 1 - 0.98 = 0.02$$

We can take a, b, c and d to be 3, 4, 2 and 5 and multiple 0.02 by  $10^5$ . Hence, we must express 2000 as in terms of 2, 3, 4 and 5.

$2000 = 2^4 \times 5^3 = 4^2 \times 5^3$  Hence, this level of purity can be achieved by using Method B twice and Method D thrice. Therefore, this is possible.

$$\text{Option B: } a^p b^q c^r d^s = 1 - 0.9872 = 0.0128$$

Hence, 1280 must be expressed in terms of 2, 3, 4 and 5.

$$1280 = 2^8 \times 5 = 4^4 \times 5$$

Hence, this level of purity can be achieved by using Method B four times and Method once.

$$\text{Option C: } a^p b^q c^r d^s = 1 - 0.99919 = 0.00081$$

In this case, 81 must be expressed in terms of 2, 3, 4 and 5.

$$81 = 3^4$$

This level of purity can be achieved by using Method A four times. Hence, this level of purity is not possible by using the four methods five times.

$$\text{Option D: } a^p b^q c^r d^s = 1 - 0.9973 = 0.0027$$

270 can be expressed as  $2 \times 3^3 \times 5$ . Hence, this level of purity is possible by using Method A thrice, Method C once and Method D once.

Hence, only the value given in option C is not possible.

Choice (C)

24. Since Method D is the most effective, we can find the time for obtaining 97% purity.  
Method D must be used six times for the purity to be greater than 97%. If it is used only five times, the purity will be 96.875%. Time taken = 18 hours.  
However, since Method B is also close in terms of efficiency, we can also check for that.  
Method B can be used four times and the purity will be 97.44%. Time taken = 16 hours.  
Hence, the minimum time taken = 16 hours. Choice (A)

#### Solutions for questions 25 to 28:

Since ABBBB represents a bottle manufactured using PP by Beta, the material and company must be in the last four letters of the code.

From (ii), the first, second, third or fifth letters can be the size of the bottle.

From (iii), the material can only be in the first three letters. Combining this with (i), we get that the material can only be the 2<sup>nd</sup> or 3<sup>rd</sup> letters.

The cap must be one of the last two letters. From (iv), the last letter must be the colour. Hence, the fourth letter must be the cap. Since neither the company nor the material can be the first letter, the first letter must be the capacity.

The following table provides the information represented by the five letters of the code:

Letter	First	Second	Third	Fourth	Fifth
Information	Capacity	Company/Material	Material/Company	Cap	Colour

25. A 1 litre, Orange coloured bottle with a Measuring cap manufactured using PET by Beta will have the code DBBCE. Choice (D)

26. The code of the given bottle will be AFFDB. Choice (C)

27. From the given information, the second letter stands for the material and the third letter stands for the company. A 1.5 litre, Red coloured bottle with a Flip cap manufactured using PVC by Delta will have the code FADBD. Choice (D)

28. A 1 litre Blue coloured bottle with a Spray cap will have D as the first letter, F and A as the fourth and fifth letters respectively. Since it must not be manufactured by Alpha, neither the second letter nor the third letter can be A. From the given options, only option D satisfies. Choice (D)

#### Solutions for questions 29 to 32:

Given that the number of persons who are to the left of the husband is the same as the number of persons to the right of the wife. From this we can infer that the person in the middle has to be unmarried. This is because if the person in the middle is married, no other person in any other position can have the same number of persons to his left or right.

Let 1 to 7 represent the positions in which the seven persons are standing in the line from left to right.

From (i), the person at 4 must be unmarried male. The person at 1 and the person at 7 must be married to each other; the person at 2 and the person at 6 must be married to each other; the person at 3 and the person at 5 must be married to each other.

From (ii), B is a male and must be at 5. Hence, B is a husband and his wife must be at 3.

From (iii), A is a male and is standing to the immediate left of D. Since B is at 5, A cannot be at 4. If D is in the middle, A must be at 3. But this is not possible as A, a male, cannot be married to B. Hence, neither A nor D is the unmarried male.

From (iv), E is a husband. Since there are three husbands (A, B and E), D must be a wife.

From (v), F is also a wife.

From (vi), D is not married to A, since it is not possible for a wife and husband to stand next to each other. D is also not married to E. Hence, D must be married to B and must be standing at 3. From (vii), if C is in the middle (i.e., if he is the unmarried male), F must be married to B, which is not possible. Hence, C is not the unmarried male. Hence, G is the unmarried male and D, C and F are the wives.

Therefore, G must be at 4. Since D is at 3, A must be at 2.

From (viii), F is married to the person to the immediate right of C. Hence, C can only be at 1 or 6. From (ix), C can only be at 6. If C is at 6, F must be married to the person at 7. Hence, E must be at 7 and F must be at 1.

The following table provides the positions of the seven persons and their respective spouses:

Position	1	2	3	4	5	6	7
Person	F	A	D	G	B	C	E
Spouse	E	C	B	-	D	A	F

29. G is the unmarried male. Choice (B)

30. Five persons are standing between F and her spouse, E. Ans: (5)

31. The spouse of C is A. D is standing to the immediate right of A. Choice (B)

32. The spouse of B is D. The person to the immediate left of D is A. A is standing to the immediate right of F, who is the spouse of E. Choice (A)

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

#### SECTION – III

#### Solutions for questions 1 to 34:

1. Let us first arrange the seven numbers in the ascending order.

$$5, 8, 8, 9, 9, 10, 12$$

Now, the median will be the least possible when the remaining four numbers are all less than or equal to 5, in which case, the sixth number, i.e., 8, will be the median.

Choice (B)

2. It is given that,  $a \propto b^2$   
 $\Rightarrow a = k_1 b^2$  (where  $k_1$  is a constant)

Again  $b \propto c^{\frac{1}{4}}$ , i.e.,  $b = k_2 c^{\frac{1}{4}}$

$$\therefore a = k_1 \left( k_2 c^{\frac{1}{4}} \right)^2 \quad b = k_2 c^{\frac{1}{4}} \text{ (where } k_2 \text{ is a constant)}$$

$$= k_1 k_2 c^{\frac{1}{2}} = k_3 c^{\frac{1}{2}} \text{ (where } k_3 \text{ is a constant)}$$

Similarly, since  $c \propto d^3$ , we get

$$a = k_4 \left( d^3 \right)^{\frac{1}{2}} = k_4 d^{\frac{3}{2}}, \text{ (where } k_4 \text{ is a constant).}$$

Therefore,  $a$  varies as  $d^{\frac{3}{2}}$ . Choice (D)

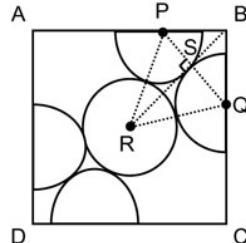
3. Let us first arrange the consonants, N, T and N.

Now, NTN can be arranged in  $\frac{3!}{2!} = 3$  ways.

Let one of these arrangements be \_ N \_ T \_ N\_. We can arrange the three vowels in the blank spaces in  ${}^4 C_3 \times 3!$  Ways, i.e., 24 ways.

Therefore, the total number of ways in which the letters of the word NATION can be arranged such that no two vowels are together =  $3 \times 24 = 72$  ways. Ans: (72)

- 4.



Let us denote the centres of two adjacent semicircles as P and Q and that of the circle by R.

Now  $PQ = QR = PR = 2$

Therefore, PQR is an equilateral triangle.

$$RS = QR \sin 60^\circ = 2 \times \frac{\sqrt{3}}{2} = \sqrt{3} \text{ (where } S \text{ is the foot of the perpendicular from } R\text{)}$$

By symmetry,  $BP = BQ$

Again,  $\angle BPQ = \angle BQP = 45^\circ$ . [ $\because \angle PBQ = 90^\circ$ ]

$\angle PBS = 45^\circ$  [ $\because \angle PSB = 90^\circ$  and  $\angle BPS = 45^\circ$ ]

$\therefore PS = SB = 1$  [Radius of the semicircle with centre at P]

$$\therefore RB = RS + SB = \sqrt{3} + 1$$

Similarly,  $DR = RB = \sqrt{3} + 1$

$\therefore BD = 2(\sqrt{3} + 1)$  which is the diagonal of the square.

$$\therefore BD = AB\sqrt{2} = 2(\sqrt{3} + 1)$$

$$\Rightarrow AB = \sqrt{2}(\sqrt{3} + 1)$$

$$\therefore \text{Area of the square} = \sqrt{2}^2 (\sqrt{3} + 1)^2 = 2(4 + 2\sqrt{3})$$

Therefore, the area of the square ABCD =  $8 + 4\sqrt{3}$

$$= 4(2 + \sqrt{3}) \text{ sq. cm.} \quad \text{Choice (D)}$$

5.  $6^n - 1 = (6^n - 1)^n$

Now,  $6^n - 1$  will always be divisible by  $6 - 1$ .

$\therefore 6^n - 1$  will be a prime number only when  $n = 1$ .

Choice (B)

$$6. \frac{1}{\sqrt{17+\sqrt{17^2-1}}} = \frac{1}{\sqrt{17+\sqrt{(16)(18)}}} = \frac{1}{\sqrt{(\sqrt{9})^2+(\sqrt{8})^2+2\sqrt{9\times 8}}}$$

$$= \frac{1}{\sqrt{(\sqrt{9}+\sqrt{8})^2}} = \frac{1}{\sqrt{9}+\sqrt{8}}$$

$$= \frac{1(\sqrt{9}-\sqrt{8})}{(\sqrt{9}+\sqrt{8})(\sqrt{9}-\sqrt{8})}$$

$$= \sqrt{9}-\sqrt{8}$$

$$\text{Similarly, } \frac{1}{\sqrt{15+\sqrt{15^2-1}}} = \sqrt{8}-\sqrt{7}$$

$$\frac{1}{\sqrt{13+\sqrt{13^2-1}}} = \sqrt{7}-\sqrt{6} \dots\dots\dots$$

and so on .....

$$\text{upto } \frac{1}{\sqrt{3+\sqrt{3^2-1}}} = \sqrt{2}-\sqrt{1}$$

$$\therefore \frac{1}{\sqrt{17+\sqrt{17^2-1}}} + \frac{1}{\sqrt{15+\sqrt{15^2-1}}} + \frac{1}{\sqrt{13+\sqrt{13^2-1}}} + \dots + \frac{1}{\sqrt{3+\sqrt{3^2-1}}}$$

$$= (\sqrt{9}-\sqrt{8}) + (\sqrt{8}-\sqrt{7}) + (\sqrt{7}-\sqrt{6}) + \dots + (\sqrt{2}-\sqrt{1})$$

$$= \sqrt{9}-\sqrt{1}$$

$$= 3 - 1$$

$$= 2. \quad \text{Choice (B)}$$

7. The volume of a sphere =  $\frac{4}{3}\pi r^3$ .

It is given that the radius of the sphere increases by 200%,

so the increased radius is  $r + \frac{200}{100}r = 3r$ .

The increased volume of the sphere

$$= \frac{4}{3}\pi(3r)^3 = 27\left(\frac{4}{3}\pi r^3\right)$$

Therefore, the volume of the sphere increases by 2600%.

Choice (C)

8. It is given that  $A = \{1, 2, 3, 4, \dots, 200\}$ .

We observe that integers from 51 to 200 can be included provided we do not include integers from 13 to 50. Now for the elements from 1 to 12, we can include 5, 6, 7, 9, 10 and 11 in addition to one element from each of the following pairs: (1, 4), (2, 8) and (3, 12).

Therefore the maximum number of elements in B

=  $150 + 6 + 3 = 159$ . Ans: (159)

9. It is given that

$$a \theta b = a^2 - 2b$$

$$\therefore [4 \theta 2] - [3 \theta 1] = [4^2 - 2 \times 2] - [3^2 - 2 \times 1]$$

$$= 12 - 7$$

$$= 5. \quad \text{Choice (A)}$$

10. It is given that,  $(a, 0)$  is equidistant from  $(2, 3)$  and  $(5, 6)$

$$\therefore \sqrt{(a-2)^2 + (0-3)^2} = \sqrt{(a-5)^2 + (0-6)^2}$$

Squaring both sides, we get  
 $a^2 - 4a + 13 = a^2 - 10a + 61$   
 $\Rightarrow 6a = 48$

$$\therefore a = 8.$$

$\Rightarrow$  distance between  $(0, a + 3)$  and  $(a + 1, 3a - 1)$   
 $= \sqrt{(a+1)^2 + (2a-4)^2} = \sqrt{9^2 + 12^2} = 15$  Choice (D)

11. It is given that,  $(a - b)^2 = c^2 - ab$

$$\Rightarrow a^2 + b^2 - 2ab = c^2 - ab$$

$$\Rightarrow a^2 + b^2 - c^2 = ab$$

$$\Rightarrow \frac{a^2 + b^2 - c^2}{ab} = 1$$

By the cosine rule,

$$\cos C = \frac{a^2 + b^2 - c^2}{2ab} = \frac{1}{2} \left( \frac{a^2 + b^2 - c^2}{ab} \right) = \frac{1}{2} = \cos 60^\circ$$

$\therefore C = 60^\circ$  Ans : (60)

12. Her average score in the first two exams =  $\frac{46+68}{2} = 57$

Her average score in all three exams decreased by 2 marks =  $57 - 2 = 55$

$$\Rightarrow \frac{46+68+n}{3} = 55 \Rightarrow n = 51$$
 Choice (B)

13. Amount of orange juice remaining in the bottle after one minute =  $\frac{1}{2}(330)$

Amount of orange juice remaining in the bottle after two minutes =  $\frac{1}{2}(330) - \frac{1}{3}\left[\frac{1}{2} \times 300\right] = \frac{2}{3} \times \frac{1}{2} \times 330$

Proceeding similarly, the quantity of orange juice remaining in the bottle after 10 minutes.

$$= \frac{10}{11} \times \frac{9}{10} \times \frac{8}{9} \times \frac{7}{8} \times \frac{6}{7} \times \frac{5}{6} \times \frac{4}{5} \times \frac{3}{4} \times \frac{2}{3} \times \frac{1}{2} (330)$$

$$= \frac{1}{11}(330) = 30 \text{ ml}$$
 Choice (B)

14. Since the sum of any two sides of a triangle is greater than the third side, the maximum value of each side of the triangle <  $\frac{\text{Perimeter}}{2}$  i.e.,  $<\frac{6}{2}$ . Therefore the maximum

value of each side = 2. As all the sides are of integral measures, the remaining two sides must also measure 2 cm each. Therefore, the triangle must be an equilateral triangle, whose area =  $\frac{\sqrt{3}}{4}(2)^2 = \sqrt{3}$  sq.cm.

Choice (A)

15. It is given that,  $x^{\log_{10} x^2} = 1000x$ .

Let  $\log_{10} x = t$

$$\therefore x^{2\log_{10} x} = 1000x$$

$$\Rightarrow x^{2t} = 1000x$$

Taking logarithm to the base 10 on both sides, we get  $\log_{10} x^{2t} = \log_{10} 1000x$ .

$$\Rightarrow 2t\log_{10} x = \log_{10} 1000 + \log_{10} x$$

$$\Rightarrow 2t(t) = 3 + t$$

$$\Rightarrow 2t^2 - t - 3 = 0$$

$$\Rightarrow 2t^2 + 2t - 3t - 3 = 0$$

$$\Rightarrow 2t(t + 1) - 3(t + 1) = 0$$

$$\Rightarrow (2t - 3)(t + 1) = 0$$

$$\therefore t = \frac{3}{2} \text{ or } t = -1$$

$$\log_{10} x = \frac{3}{2} \Rightarrow x = 10^{\frac{3}{2}} \text{ or } \log_{10} x = -1 \Rightarrow x = 10^{-1}$$

Therefore, the product of the possible values of x

$$= 10^{\frac{3}{2}} \times 10^{-1}$$

$$= \sqrt{10}, \text{ i.e., } 10^{\frac{1}{2}}$$

$$\therefore m = \frac{1}{2}$$

Choice (D)

16. Given  $a = \frac{3ar}{(1-r)}$

$$\Rightarrow (1-r) = 3r \quad (\because a \neq 0)$$

$$\Rightarrow 4r = 1$$

$$\therefore r = \frac{1}{4}$$

Choice (B)

17. The remainder when  $f(x)$  is divided by  $(x + a)$  is given by  $f(-a)$

Therefore, the remainder when  $f(x) = x^{11} + x^5 + 2$  is divided by  $(x + 1)$  is  $f(-1) = (-1)^{11} + (-1)^5 + 2 = 0$ .

**Alternative Solution:**

Substituting  $x = 1$  in  $f(x)$  and  $(x + 1)$

We get  $f(1) = 4$  and  $x + 1 = 2$ .

Dividing  $f(1)$  by  $(1 + 1)$ , i.e., 2, we get a remainder of 0.

Choice (A)

18. It is given that  $a + 2b + 3c + 4d = 120$

For a given sum, the product will be maximum when the variables are all equal. So we re-write the given equation as

$$\left(\frac{a}{4} + \frac{a}{4} + \frac{a}{4} + \frac{a}{4}\right) + \left(\frac{2b}{3} + \frac{2b}{3} + \frac{2b}{3}\right) + \left(\frac{3c}{2} + \frac{3c}{2}\right) + 4d = 120$$

Now, the product of the above ten terms, i.e.,

$$\left(\frac{a}{4}\right)\left(\frac{a}{4}\right)\left(\frac{a}{4}\right)\left(\frac{a}{4}\right)\left(\frac{2b}{3}\right)\left(\frac{2b}{3}\right)\left(\frac{2b}{3}\right)\left(\frac{3c}{2}\right)\left(\frac{3c}{2}\right)(4d)$$

the maximum when all the ten terms are equal. Hence, the value of each term =  $\frac{120}{10} = 12$  ( $\because$  their sum is 120)

$\therefore$  The maximum product of the above ten terms

$$= \frac{a^4}{4^4} \times b^3 \left(\frac{2^3}{3^2}\right) \times c^2 \left(\frac{3^2}{2^2}\right) \times 4 = 12^{10}$$

$$\Rightarrow \text{maximum value of } \frac{a^4 \times b^3 \times c^2 \times d}{2^5 \times 3} = 2^{20} \times 3^{10}$$

$$\Rightarrow \text{maximum value of } (a^4 \times b^3 \times c^2 \times d) = 2^{25} \times 3^{11}$$

Choice (C)

19. It is given that  $f(x) = \frac{12}{|x-3|+4}$

$f(x)$  will be maximum, when  $(|x - 3| + 4)$ , i.e.,  $|x - 3|$  is minimum.

The minimum value of  $|x - 3|$  is 0, and it occurs when  $x = 3$ .

$$\therefore \text{maximum value of } f(x) = \frac{12}{|3-3|+4} = 3.$$

Choice (C)

20. As 87 men take 94 days to complete the work, the total work (in mandays) =  $87 \times 94 = 8178$ .

The work is done in the following manner:

Day	No. of persons joining	Work done (in man days)
1	1	$1 = 2^1 - 1$
2	2	$(1 + 2) = 2^2 - 1$
3	4	$(1 + 2 + 4) = 2^3 - 1$
4	8	$(1 + 2 + 4 + 8) = 2^4 - 1$
.	.	.
.	.	.
.	.	.
n	$2^{n-1}$	$(1 + 2 + 4 + \dots + 2^{n-1}) = 2^n - 1$

Therefore the work done in n days  
 $= (2^1 - 1) + (2^2 - 1) + (2^3 - 1) + (2^4 - 1) + \dots + (2^n - 1)$   
 $= 2^1 + 2^2 + 2^3 + \dots + 2^n - n$   
 $= 2(1 + 2 + \dots + 2^{n-1}) - n$   
 $= 2(2^n - 1) - n$   
 $= 2^{n+1} - 2 - n = 2^{n+1} - (n + 2)$

Now,  $2^{n+1} - (n + 2) = 87 \times 94$

For n = 12,  $2^{12+1} - (2 + 12) = 8178$

Thus, the work gets over in exactly 12 days.

Ans: (12)

21. A quadratic equation of the form  $ax^2 + bx + c = 0$  has the sum of its roots as  $-\frac{b}{a}$  and the product of its roots as  $\frac{c}{a}$ .

For the equation  $17x^2 - 12x + 36 = 0$ ,

$$S = \frac{12}{17} \text{ and } P = \frac{36}{17}.$$

$$\text{Therefore, } \frac{P}{S} = \frac{\left(\frac{36}{17}\right)}{\left(\frac{12}{17}\right)} = 3. \quad \text{Choice (B)}$$

22.  $(101)_{10}$  in base 8 is  $(145)_8$  and  $(372)_{10}$  in base 8 is  $(564)_8$ .  
 $\therefore (145)_8 < (abc)_8 < (564)_8$

Again  $7 > b > c > 2$

Let us tabulate the values of a, b and c

a	b	c	Number of possibilities
$(2/3/4/5)$	4	3	4
$(1/2/3/4/5)$	5	3	5
$(1/2/3/4/5)$	6	3	5
$(1/2/3/4/5)$	5	4	5
$(1/2/3/4)$	6	4	4
$(1/2/3/4)$	6	5	4

Therefore abc can assume a total of 27 possible values.  
 Choice (D)

$$23. \frac{3^{n+4} - 13 \times 3^n}{3^{n+2} + 8 \times 3^n} = \frac{3^n (3^4 - 13)}{3^n (3^2 + 8)} = \frac{68}{17} = 4. \quad \text{Choice (B)}$$

24. It is given that  $f(x)$  is a quadratic function  
 $\therefore f(x) = ax^2 + bx + c$

$$\text{As } f(0) = 2, \quad a(0)^2 + b(0) + c = 2 \\ \Rightarrow c = 2$$

$$\text{Also, } f(x) \text{ will attain the maximum value at } x = \frac{-b}{2a}.$$

Since  $f(x)$  attains a maximum value at  $x = -1$ ,

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

$$\therefore f(x) = ax^2 + 2ax + 2$$

$$\text{Further, } f(-1) = 5$$

$$\therefore a(-1)^2 + 2a(-1) + 2 = 5$$

$$\Rightarrow a = -3$$

$$\therefore f(x) = -3x^2 - 6x + 2$$

$$\therefore f(2) = -3(2)^2 - 6(2) + 2 = -22.$$

#### Alternative Solution:

Since  $f(x)$  has a maximum (at  $x = 1$ ) the graph of  $f(x)$  is a downward facing inverted parabola, which has  $x = -1$  as its line of symmetry. Hence, by symmetry,  $f(-2) = f(0)$  (as both  $-2$  and  $0$  are equidistant from  $x = -1$ , i.e., the line of symmetry).

Hence,  $ax^2 + bx + c = 2$ , for both  $x = 0$  and  $x = -2$ .

Also,  $ax^2 + bx + c = 5$  for  $x = -1$ .

Solving the above three equations,

we get  $f(x) = -3x^2 - 6x + 2$ .

$$\therefore f(2) = -22.$$

Ans: (-22)

25. Let the distance covered by Kamran going up the hill and that while coming down, each be denoted by d.

Therefore, the average speed

$$= \frac{\text{Total distance covered}}{\text{Total time taken}}$$

$$= \frac{d+d}{\left(\frac{d}{7.5} + \frac{d}{5}\right)} = \frac{2d \times 7.5 \times 5}{d(12.5)} = 6 \text{ km/hr.} \quad \text{Choice (B)}$$

26. It is given that,  $a + b + ab = 124$

Adding 1 to both sides, we get

$$ab + a + b + 1 = 125$$

$$(a+1)(b+1) = 125$$

Now, 125 can be expressed as the product of two numbers in two ways.

$125 \times 1$  and  $25 \times 5$ , i.e., corresponding to the two cases  $a = 124$ ,  $b = 0$  and  $a = 24$ ,  $b = 4$  (since  $a > b$ )

But  $b = 0$  is not admissible, as  $b > 0$ .

Therefore, the value of b is 4.

Ans: (4)

27. It is given that,

$$\log_3 45 - \log_7 128 = a$$

$$\therefore a = \log_3(9 \times 5) - \log_3 5^3 = \log_3 9 + \log_3 5 - \frac{3}{3} \log_3 5$$

$$= 2 \log_3 3 + \log_3 5 - \log_3 5$$

$$= 2.$$

Choice (A)

28. It is given that each of 728, 842 and 937, when divided by a certain number 'a' gives a remainder of x.

Hence, 'a' must be a common factor of  $(937 - 842)$  and  $(842 - 728)$ , i.e., 114 and 95, i.e., 19.

Hence  $a = 19$  and  $x = 6$  (since  $728 = 19k + 6$ ).

Similarly we get 'b' as 23, i.e., the only common factor of  $(648 - 487)$  and  $(487 - 257)$ , i.e., 230 and 161.

Hence,  $y = 4$  (since  $257 = 23k + 4$ ).

Hence  $a + b + x + y = 19 + 23 + 6 + 4 = 52$ .

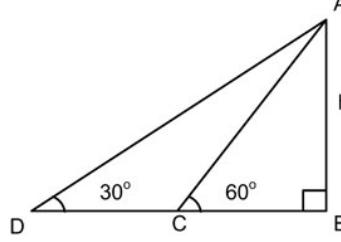
Ans: (52)

29. Let the height of the tower, AB, be denoted by h.

Let Nishit walk from D to C.

$$\tan 30^\circ = \frac{h}{BC} \Rightarrow BC = \frac{h}{\tan 30^\circ} = h\sqrt{3}$$

$$\text{and } \tan 60^\circ = \frac{h}{BC} \Rightarrow BC = \frac{h}{\tan 60^\circ} = \frac{h}{\sqrt{3}}$$



It is given that,

$$BD - BC = 30\sqrt{3}$$

$$h\sqrt{3} - \frac{h}{\sqrt{3}} = 30\sqrt{3}$$

$$\frac{2h}{\sqrt{3}} = 30\sqrt{3}$$

$$\therefore h = 45 \text{ m.}$$

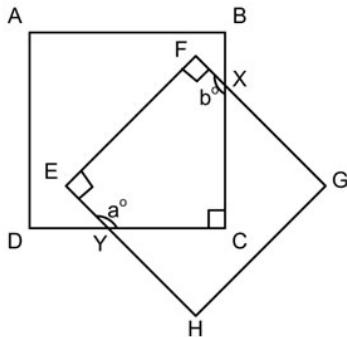
Therefore, the height of the tower is 45 m.

Choice (A)

30. The difference between the total compound interest and the total simple interest for two years =  $\frac{Pr^2}{100^2}$

$$\therefore \frac{Pr^2}{100^2} = 9600 \times \left(\frac{15}{100}\right)^2 = ₹216. \quad \text{Choice (C)}$$

31.



Let us denote the point of intersection of the two squares by X and Y.

Now EFXCY is a pentagon the sum of whose interior angles is  $(5 - 2)180^\circ = 540^\circ$

$$\therefore \angle E + \angle F + \angle C + a + b = 540^\circ$$

$$90^\circ + 90^\circ + 90^\circ + a^\circ + b^\circ = 540^\circ [\because \angle E = \angle F = \angle C = 90^\circ]$$

$$\Rightarrow (a + b) = 540^\circ - 270^\circ = 270^\circ.$$

**Alternative Solution:**

With some imagination, we can consider the situation where the second square (EFGH) is rotated, say, counter-

clockwise, such that GH becomes parallel to BC (and so will the other corresponding sides). Then  $b = \text{angle between } FG \text{ and } BC = 90^\circ$  and  $a = \text{angle between } EH \text{ and } DC = 180^\circ$ . Hence,  $a + b = 90^\circ + 180^\circ = 270^\circ$ .

Ans: (270)

32. The given information is tabulated below:

Lotion	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>
Alcohol Percentage	20%	c%	2c%
Quantity taken (by volume)	1	3	2

Therefore, the concentration of the resultant mixture

$$= \frac{1}{6}(20) + \frac{3}{6}(c) + \frac{2}{6}(2c) = 22$$

$$\Rightarrow 20 + 7c = 132$$

$$\therefore c = 16\%.$$

Choice (B)

33.  $4x - 3y = 8 \quad \dots (1)$   $12x - 9y = 25 \quad \dots (2)$

Multiplying equation (1) by 3, we get  $12x - 9y = 24$

Therefore, we get  $24 = 25$ , which is not possible. Thus, the two equations are inconsistent and there is no solution possible for  $(x, y)$ .

Choice (C)

34. Let the speed of the two runners be denoted by  $a$  and  $b$  (where  $a > b$ ).

When running in the same direction,  $(a - b)30 = d$

When running in opposite direction,  $(a + b)10 = d$

$$\therefore (a - b)30 = (a + b)10$$

$$3(a - b) = a + b$$

$$2a = 4b$$

$$\frac{a}{b} = \frac{2}{1}.$$

Choice (A)

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