

## (Key and Solutions for AIMCAT1812)

**Key****SECTION – I**

1. C	8. B	15. A	22. D	29. 5
2. D	9. C	16. B	23. A	30. 3
3. B	10. B	17. C	24. C	31. 5
4. B	11. A	18. D	25. 42513	32. 2
5. D	12. B	19. C	26. 53241	33. 3
6. A	13. C	20. A	27. 43152	34. 1
7. D	14. D	21. 5	28. 32154	

**SECTION – II**

1. 4	8. A	15. B	22. 15	29. C
2. A	9. 85	16. D	23. B	30. B
3. 6	10. A	17. 840	24. A	31. A
4. B	11. B	18. C	25. A	32. C
5. C	12. D	19. 900	26. B	
6. D	13. B	20. D	27. C	
7. B	14. A	21. D	28. D	

**SECTION – III**

1. 900	8. B	15. 7	22. C	29. D
2. D	9. A	16. D	23. A	30. C
3. C	10. D	17. B	24. 6	31. D
4. A	11. D	18. B	25. 21	32. 25
5. C	12. B	19. A	26. D	33. 96
6. 49	13. A	20. 17.32	27. C	34. 12
7. B	14. D	21. -119	28. B	

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

Number of words: 659

1. The author mentions at the beginning of the second paragraph that "most business analysts remained tied to the past, wedded to a GM-era kind of thinking. At no time was this more evident than when Starbucks itself started to falter."

Option A: In the second paragraph, the author mentions that the business analysts stuck with old school economic reasoning to explain Starbucks' reversal of fortunes. This is why the author mentions that they "remained tied to the past". The author does not mention that they failed to notice that the American economy moved in tandem with latte sales to support his claim. Hence, this is not the correct answer.

Option B: According to the author, "the experts had it largely wrong, in terms of both the timing and the causes of Starbucks' decline. That's because they repeatedly fell back on culturally uninformed, old school economic reasoning to explain Starbucks' slip." Hence, the author mentions that

they used traditional economic reasoning to explain Starbucks' slip and not the slowdown of American economy. Option C: The experts attributed Starbucks' slip to "rising price of gasoline, competition from McDonald's and Dunkin' Donuts, the mortgage crisis, and a new frugality bred by rising joblessness", which was a mistake according to the author. Because they stuck with traditional economic reasoning, the author says that they remained in the past. Hence, this is the correct answer.

Option D: In the second paragraph, where the author claimed that "most business analysts remained tied to the past", the author does not talk about production, jobs and purchasing. He chiefly talks about the reversal of Starbucks' fortunes. Hence, this is not the correct answer. Therefore, the correct answer is option C.

Choice (C)

2. The author talks about the buying behaviour of the people in the latter part of the second paragraph of the passage. He mentions that buying in post-GM era "turned on more than price or functionality".

Option A: In the post-GM era, "buying became more than ever before not just a way for people to fulfil basic needs". However, this does not imply that people did not buy to fulfil basic needs. They bought not only to fulfil their basic needs

but also as "an expression of longing... class and social standing". Hence, this statement is incorrect.

Option B: We can infer from the passage that price and functionality did not play as important a part in buying in the post-GM era. However, we cannot infer that they did not play any part at all in buying. Hence, this is not the correct answer.

Option C: In the first paragraph, the author mentions that, in the GM era, the economy revolved around "making things, creating good jobs, and selling big-ticket items". In the post-GM era, these things did not play an important part in the economy (as it "turned entirely on buying alone"). However, we cannot infer from the passage that people cut back on purchasing big ticket items in GM era (It is possible that they are purchasing other items more without cutting back on purchasing big ticket items). Hence, this is not the correct answer.

Option D: The last sentence of the second paragraph states that "The value of a particular good, therefore, depended on how well it met this broad range of needs, not on the physical qualities of the good itself". Hence, this is a difference in the buying behaviour in the post-GM era.

Therefore, the correct answer is option D.

Choice (D)

3. The author states that "During GM's reign as the nation's financial bellwether, business in the United States revolved around production, employment, and consumption". Further, "During the days that the nation moved in tandem with Starbucks and latte sales, the American economy turned almost entirely on buying alone".

Option A: The author mentions that American economy moved in tandem with both these companies at different points in time. However, moving in tandem does not imply that these two companies determined the direction in which American economy moved.

Option B: During the GM era, "business in the United States revolved around production, employment, and consumption". GM was a major player in these aspects. In the Starbucks era, "buying drove the nation's economic engine". In the second paragraph, the author explains how Starbucks is symbolic of buying in United States. Hence, both the companies symbolized what the American economy depended on.

Option C: While both the companies acted as important indicators of the economy, we cannot infer that they were significant contributors to the growth of American economy. Hence, this is not the correct answer.

Option D: According to the author, when the nation moved in tandem with Starbucks, buying "shaped the daily lives identities, and emotions of the country's citizenry". However, he does not say the same about GM era. Further, he mentions in the second paragraph that the factors which people consider important in buying in the GM era were no longer as important in the post-GM era. Hence, this is not the correct answer.

Therefore, the correct answer is option B.

Choice (B)

4. The company talks about the relation between Starbucks and the American economy in the second paragraph of the passage.

Option A: The author mentions that the experts were mistaken in thinking that "the rising price of gasoline, competition from McDonald's and Dunkin' Donuts, the mortgage crisis, and a new frugality bred by rising joblessness" was the reason for Starbucks' reversal of fortune. Hence, competition from other companies was not the reason, according to the author.

Option B: The author states that the experts "expected buying decisions to revolve around utility, cost, and the physical qualities of a product but, as Starbucks' spectacular success had demonstrated, buying in post-GM, postindustrial America turned on more than price or functionality." The experts believed that utility, cost and physical qualities of a product impact buying decisions. But they were proved wrong because of Starbucks' success.

The price (or affordability) of Starbucks' products was not the only reason for its success. There were other reasons (like an expression of longing, a source of entertainment...) for its success. Hence, this is the correct answer.

Option C: The author mentions that Starbucks enjoyed "a fifteen-year uninterrupted run of nonstop growth". But we do not know how the author defines growth in this case. However, we can infer that the author is talking about the number of stores in U.S. from the next part of the sentence. Therefore, we cannot infer anything about the stock price of Starbucks from this.

Option D: The author mentions that Starbucks became successful because of the change in the buying behaviour of the people. However, we cannot infer that Starbucks was responsible for this change in the people. Hence, this is not the correct answer.

Therefore, the correct answer is option B.

Choice (B)

5. In the last paragraph of the passage, the author talks about the post-Reagan era. He mentions that in this era, "Milton Friedman-inspired free-market political economy of neoliberal, deregulated capitalism, brand-induced consumption oozed into every aspect of daily life". But several aspects of this were not new, i.e., they were present even before this.

Option A: The author mentions that "Nor was the commodification of consumers' deepest anxieties, desires, and aspirations all that new." Hence, this commodification, i.e., using consumers' anxieties and aspirations for selling products was present even during the Reagan era.

Option B: The author states that "hefty doses of buying, advertising, and marketing certainly weren't new to America." Hence, this was also present during the Reagan era.

Option C: According to the author, branding of everything "from fun runs to urinal covers to rock concerts" was also not new. Hence, this was also present in the Reagan era.

Option D: Under the post-Reagan era, Milton Friedman-inspired free-market political economy of neoliberal, deregulated capitalism, brand-induced consumption oozed into every aspect of daily life. Yet hefty doses of buying, advertising, and marketing certainly weren't new to America. Neither was the branding of everything from fun runs to urinal covers to rock concerts. Nor was the commodification of consumers' deepest anxieties, desires, and aspirations all that new. It wasn't even that Americans suffered, in business writer Lucas Conley's telling phrase, from "obsessive branding disorder." So, what the last para says is: It's not as if the earlier era didn't have buying, advertising, and marketing, and it's not as if the post-Reagan era had obsessive branding disorder. Now this can't be taken to mean that the pre-Reagan or Reagan era had or didn't have obsessive branding disorder. So, it can't be inferred that they had obsessive branding disorder.

Choice (D)

6. The author talks about a fundamental transformation in the last paragraph of the passage: "the nearly wholesale replacement of civic society by a rapacious consumer society." The author follows this by saying what was not new – hefty doses of buying, advertising, and marketing, "the branding of everything"... What's new is mentioned in the last sentence of the paragraph and this can be inferred to be a feature of a "rapacious consumer society".

Option A: According to the author, "what makes our world both more alienating and more susceptible to the seductions of buying, is the withering of nonmarket relationships and the public institutions that in the past had pushed back against the market and brands to challenge them for people's allegiances and identities". Hence, the public institutions which in the past challenged markets and brands for people's allegiances are no longer strong. The public institutions do not stand between the markets and the people. Hence, this is the correct answer.

Option B: The author mentions at the beginning about the "nearly wholesale replacement of civic society by a

rapacious consumer society". Since the author said that the civic society is nearly replaced, we cannot say that the markets and brands have taken over all the functions of public institutions.

Option C: We cannot infer from the passage that the public institutions and civic society need branding for functioning effectively as the passage does not talk about effective functioning of civic society.

Option D: The author does not talk about effective functioning of civic society and markets. Hence, this cannot be inferred from the passage.

Therefore, the correct answer is option A.

Choice (A)

#### Solutions for questions 7 to 12:

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

Number of words: 730

7. Refer to the fourth para. The doctrine as to the ethics of economic conduct, which had been formulated by medieval Popes, was rehearsed by the English divines of the sixteenth century, not merely as the conventional tribute paid by a formal piety to the wisdom of the past, but because the swift changes of the period in commerce and agriculture had, not softened, but **accentuated, the problems of conduct** for which it had been designed. Hence choice D is the answer.

Option A: Choice A provides incomplete facts and can be ruled out.

Option B: The first part of Choice B sounds positive by itself. It is not sufficient to answer the question. The second part of choice B repeats a line from the passage: not merely as the conventional tribute paid by a formal piety to the wisdom of the past. Choice B is not the answer.

Option C: As the changing scenario had aggravated the problem, it naturally follows that it could not solve or do away with the problems of conduct. Choice C is incorrect.

Choice (D)

8. Refer to the third para. "The special economic malaise of an age is naturally the obverse of its special qualities." 'obverse' means the opposite or counterpart of a fact or truth. The author makes the statement in para 3 (which has been given in the question) and thereafter explains it when he shows how society in medieval England, especially of the common man, was one of people independent in their vocations – whether small farmers, traders or craftsmen – with only a few wage earners. However this very feature meant that there was a great dependence on borrowed funds, since the common folk needed such help to continue with their vocation. Refer to the examples in para 3: The farmer must borrow money .... The craftsman must buy raw materials on credit .... The young tradesman must scrape together a little capital .... Even the cottager must .... Hence choice B is the answer.

Option A: Choice A is the verbatim translation of the sentence given in quotes in the question. But it does not specifically answer the question about what aspect of society the author is referring to.

Option C: Choice C is too general to describe the discussion which takes place in para 3.

Option D: Virtuosity in choice D means "skill" or "genius". Choice D does not explain the economics of the situation explained in para 3.

Choices A, C and D may draw our attention initially because of the words "reverse", "opposing" and "offset" in them respectively. They are not specific to the question.

Choice (B)

9. The passage begins with the opening sentence "If a philosophy (ideology) of society is to be **effective**, it must be as mobile and realistic as the **forces which it would control**. The weakness of an attitude which met the onset of insurgent economic interests with a generalized appeal to traditional morality and an idealization of the past was

only too obvious. Hence choice C is the answer. The absence of rigidity and impracticality in an ideology would render it **ineffective** in its role of **regulation**.

Option A: Choice A speaks of present trends which has not been given in the passage. Hence choice A is not the answer.

Option B: The word 'solutions' in choice B makes it irrelevant.

Option D: The word 'challenges' in choice D makes it irrelevant.

If choice B could be an answer, then choice D would also be appropriate. Therefore in this question, neither of them are the answers as they do not focus on "forces which the philosophy or ideology would control".

Choice (C)

10. A distributive state is one where people own resources – natural and manmade. {According to distributists, property ownership is a fundamental right, and the means of production should be spread as widely as possible, rather than being centralized under the control of the state (state socialism), a few individuals (plutocracy), or corporations (corporatism). Distributism, therefore, advocates a society marked by widespread property ownership.}

Option A: In choice A, the ownership of the capitalists is mentioned. Hence it is incorrect as an answer to the question.

Option B: Tudor England was still a Distributive State. It was a community in which the **ownership of land**, and of the simple tools used in most industries, was not the badge of a class, but the **attribute of a society**, and in which the typical worker was a peasant farmer, a tradesman, or a small master. Hence choice B is correct.

Option C: The typical worker was a peasant farmer, a tradesman, or a small master. While this may be true of Tudor England, it is not the reason that 'Tudor England' was called a Distributive State. Hence choice C is not the answer.

Option D: Choice D repeats a fact from para 2. "In this world of small property-owners, of whose independence and prosperity English publicists boasted, in contrast with the "housed beggars" of France and Germany, .....". But that does not prove that the state was a distributive one.

Choice (B)

11. The term 'usury' is mentioned at the end of para 1: The center of the controversy was the problem which contemporaries described by the word 'usury'. 'Usury' refers to the action or practice of lending money at unreasonably high rates of interest.

Option A: The answer to the question lies in the last para: For the average practical man, almost any form of bargain which he thought oppressive would be classed as usurious. The interpretation placed on the word by those who expounded ecclesiastical theories of usury was equally elastic. ... The common man could not point out the reason why usury was wrong as it was considered to be a very broad term and had various shades of meaning. Hence choice A is the answer.

Option B: Choice B distorts what has been mentioned in the last para: If the common man was asked why usury was wrong, he would probably have answered with a quotation from scripture.

Option C: While reference has been made to St. Thomas in the penultimate para, there is no mention of St. Raymond's manual. Hence choice C is not the answer.

Option D: Choice D is true from the last sentence of the passage but it does not answer the question.'

Choice (A)

12. Option B: The penultimate para talks about the medieval scheme of the ethics of economic conduct. The penultimate para begins with: It is not surprising that there should have been a popular outcry **against extortion**." There is an important line in the penultimate para which gives us a clue as to what can complete the para: Nor was it only against the particular case of the **covetous moneylender** that the

preacher and the moralist directed their arrows. This would imply that it was not just the moneylender's business, but the way in which it was conducted. This connects with 'extortion' in statement B. Hence choice B best connects with the previous part of the last sentence and also mirrors the introduction. Choice B concludes and completes the last sentence of the penultimate para.

Option A: Choice A leaves the thoughtflow incomplete. It will need further elaboration and substantiation.

Option C: Choice C sounds moralistic but cannot complete the para. It does not gel well with the contents of the penultimate para.

Option D: Choice D cannot be a practical reason for the prohibition of 'usury'.  
Choice (B)

#### Solutions for questions 13 to 15:

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

Number of words: 353

13. Professor Geballe talks about "industrial lawn" and "freedom lawn" in the second paragraph of the passage. "He welcomes wildflowers and tolerates some weeds in his own lawn rather than achieve sweeping green perfection by overreliance on herbicides, fertilizers and water".

Option A: We can infer from the passage that Professor Geballe advocates "freedom lawn" instead of an "industrial lawn". He talks about how the lawn can have weeds, and also "brown patches" (in the seventh paragraph of the passage). Hence, we can say that a freedom lawn need not be uniformly green.

Option B: We can infer from the passage that there should not be an overreliance on herbicides, fertilizers and water. But we cannot infer from the passage that "freedom lawn" requires no maintenance. Hence, this is not the correct answer.

Option C: Professor Geballe does not want "sweeping green perfection". He welcomes weeds and also thinks brown patches "look beautiful" on lawns. Hence, brown patches and weeds can be present in "freedom lawn".

Option D: Professor Geballe does not say that plants should not be supplied nitrogen. He advises using less amount of fertilizers. Hence, this will not be a feature of "freedom lawn".

Therefore, the correct answer is option C.  
Choice (C)

14. In the third paragraph of the passage, Professor Geballe mentions that "he is particularly alarmed about the perfect expanses of green lawn that border Long Island Sound". He explains why he is alarmed in the next paragraph of the passage.

Option A: Professor Geballe mentions that "another source of the problem is nitrogen coming from fertilization of lawns". This adds to the problems of the Sound. He is not concerned about using this nitrogen for fertilizing the surrounding lawn. He is concerned that because of the surrounding lawn nitrogen is released into the Sound. Hence, this is not the correct answer.

Option B: Professor Geballe does not talk about the contrast between the lawns and the Sound. Hence, this is not the correct answer.

Option C: Professor Geballe does not refer to the water used for maintaining the lawns.

Option D: According to Professor Geballe, "another source of the problem is nitrogen coming from fertilization of lawns, which also flows into the Sound". Hence, this is the correct answer.  
Choice (D)

15. In the penultimate paragraph of the passage, Professor Geballe mentions that "Applying inorganic fertilizer supplies instant nitrogen and he explained, "whatever the plant doesn't get, if it's watered or rained upon, gets below the roots and on its way somewhere else."

Option A: Professor Geballe mentions that the nitrogen from inorganic fertilizers "gets below the roots and on its

way somewhere else". The "somewhere else" can be nearby waterbodies as the passage provides an example of the Sound (which is polluted by the nitrogen from the fertilizers). Hence, this is the correct answer.

Option B: While it is true that inorganic fertilizers supply instant nitrogen, we cannot infer from the passage that plants absorb more nitrogen. Further, this is not a reason why Professor Geballe does not want people to use inorganic fertilizers.

Option C: The passage does not mention that inorganic fertilizers must be used with large quantities of water.

Option D: Professor Geballe mentions that brown patches look beautiful. But he does not say that uniformly green lawn does not look beautiful. Further, aesthetics has nothing to do with why he does not want people to use too much inorganic fertilizers.

Hence, the correct answer is option A.  
Choice (A)

#### Solutions for questions 16 to 18:

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

Number of words: 344

16. The author mentions some limitations in using outcome-dependent definitions of medical error in the first paragraph and the third paragraph of the passage.

Option A: In the first paragraph, the author states that "A lack of standardized nomenclature and the use of multiple and overlapping definitions of medical error have hindered data synthesis, analysis, comparison, collaborative work and evaluation of the impact of changes in health care delivery". However, the author only says that it has hindered. We cannot say that it is not possible to analyse the impact. Further, in the last paragraph, the author states that "Outcome-dependent definitions of medical error have provided valuable insight into the costs, morbidity and magnitude of harm resulting from such events". Hence, this option is incorrect.

Option B: In the last paragraph, the author states that "quality improvement initiatives require understanding of the processes that lead to such errors". We can infer from the last paragraph that outcome-dependent definitions do not capture process or system failures that cause errors". Hence, using outcome-dependent definition of medical error will not help in identifying the means through which medical errors arise. Therefore, this is the correct answer.

Option C: Outcome-dependent medical error limits "focus to patients experiencing adverse symptoms or injury as a consequence of medical care". Hence, by definition, this will capture all the cases in which the patient suffered an injury due to a medical error. Therefore, this is not the correct answer.

Option D: By definition, outcome-dependent definition of medical error includes only those cases where patients experience "adverse symptoms or injury as a consequence of medical care". Hence, this is not the correct answer.

Therefore, the correct answer is option B.  
Choice (B)

17. In an outcome-dependent definition of medical error, only if 'there is an outcome, i.e., the patient suffers adverse symptoms or injury, it will be called medical error. However, "process-dependent definitions of medical error should capture the full spectrum of medical errors, namely, errors that result in adverse patient outcomes as well as those that expose patients to risk but do not result in injury or harm".

Option A: In this case, the patient suffered an injury as he lost a limb. Hence, this will be classified as a medical error under both the definitions.

Option B: In this case, the patient suffered an allergy, which is an outcome of a medical error. Hence, this will also be classified as a medical error under both the definitions.

Option C: In this case, the patient did not suffer any injury because of the doctor's negligence. Hence, this will not be

classified as a medical error under outcome-dependent definition. However, process-dependent definition classifies near misses, close calls as medical errors. Hence, this will be classified as a medical error under process-dependent definition. Therefore, this is the correct answer.

Option D: In this case, we cannot say that there was a medical error (as it was by design that the doctor prescribed a higher dose). We do not know whether the patient suffered because of this increase in dosage. Hence, we cannot say whether this will be classified as a medical error under any of the two definitions.

Therefore, the correct answer is option C.

Choice (C)

18. In the second paragraph, the author talks about "a guiding principle of medical practice credited to Hippocrates, *prium no nocere*, which translates to "First, do no harm."".

Option A: The first part of this option is correct as the principle does emphasize on not causing any harm to the patient. The author does not say that the outcome-dependent definition was formed on this basis. He only provides a possibility which may or may not be the case. Hence, we cannot infer from the passage the second part of this option.

Option B: Hippocrates' principle does not talk about medical error. The author hypothesises that this definition may have been influenced by the principle. Hence, this is not the correct answer.

Option C: Hippocrates' principle does not provide any definition of medical error. Hence, this is not the correct answer.

Option D: The Hippocrates' principle highlights not causing the patient any harm. Outcome-dependent definition of medical error is based on the same tenet. Hence, both of these highlight the same aspect. Further, the author says this tendency to limit "their focus to patients experiencing adverse symptoms or injury as a consequence of medical care" may have stemmed from Hippocrates' principle. Hence, this is the correct answer.

Choice (D)

#### Solutions for Questions 19 to 24:

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

Number of words: 722

19. The author's view is that: I don't care if the Maya civilization collapsed. We shouldn't shed a single retrospective tear. I don't care whether it fell from war/ drought/ disease? Because the Maya civilization in Mexico didn't amount to much. ... There were no ripples from the Maya. No enlightenment.

Option A: ... than a realistic description of murderous chieftains who cared only about power, enslavement, and killing. .... sadness detected by Stephens was due to nasty customs of torture and sacrifice. .... the dried blood of sacrificial victims. What I look for in a civilization is Mind at Work. That's what we find in ancient Greece .... Hence choice A applies and is not the answer.

Option B: The civilization of the Maya never got past contesting blood-soaked patches of ground. In Greece, an enlightened tradition of political thought, had already received its quintessential expression under Pericles. Hence choice B is applicable and is not the answer.

Option C: Choice C praises Maya art. The comment in choice C is similar to that of the American John Stephens who talked about evidence of their taste in art. Choice C does not serve to support the author's view that the Maya civilization in Mexico didn't amount to much. Choice C is the answer.

Option D: Now gallery owners in New York will showcase the glories of Maya art. But glamorous talk of "kings", "lords", sounds better than a realistic description of murderous chieftains who cared only about power, enslavement, and killing. Their hands dripped blood and as situations became worse, the Maya solution "was higher pyramids and foreign wars, more power to the kings, harder

work for the masses." Hence choice D is applicable and is not the answer.

Choice (C)

20. Option A: Now gallery owners in New York will showcase the glories of Maya art. .... Yes: the Maya wore spectacular feather head-dresses.... We can say that the narration of American John Stephens is also a wholly aesthetic response (evidence of their taste in art)... What we expect of any civilization is something that lifts us up, .....however interesting its art may be... Towards the end of the passage, the author refers to art and masonry. Hence we can say that the author agrees that Maya art is interesting. Hence choice A is the answer.

Option B: Choice B is not the author's view. .... "archaeologists believed the ancient Maya to be gentle and peaceful people." "We now know that Maya warfare was chronic and unresolvable..." and that the sadness Stephens detected long ago was due to some very nasty customs of torture and sacrifice. .... I don't care whether the Maya civilization collapsed from war/ drought/ disease? Choice B is incorrect.

Option C: My own impression is that however successful they were in "charting the mystery of time", Maya calendrical calculations mainly reflected a mistaken devotion to astrology and numerology – and a more sterile dead-end it would be hard to find. Choice C is not the answer.

Option D: We expect a moral and philosophical perspective on human existence. ... Egypt had this. India had this. China had this. The Maya did not. Choice D is negated.

Choice (A)

21. (1) – Democritus had cried: "I would rather find a single causal law than be king of Persia!" .... That does not mean that he actually did so. Also pursue 'law' in (1) is incorrect. 'causal law' hints at a scientific discipline: In connection with Greek science, Democritus ..... (1) is not the answer.

(2) – Heraclitus maintained that everything changes, and Parmenides retorted that nothing changes. Hence (2) is not correct.

(3) – Bertrand Russell did not convince the Greek mathematicians that geometry must be established independently of arithmetic. Pythagoras did. .... What Pythagoras said about right-angled triangles led to the discovery of incommensurables. In Bertrand Russell's words, his argument (i.e. Pythagoras' argument) convinced the Greek mathematicians that geometry must be established independently of arithmetic. Also we do not know the nationality of Bertrand Russell from the article. Hence (3) is wrong.

(4) – Xenophanes was a freethinker. A serious religion with a seriously uplifting ethic is also welcome: failing that, as among the Greeks, let's have a serious freethinker like Xenophanes, who wondered why the faithful always imagine that their gods look like themselves .... horses would paint the forms of gods like horses, and oxen like oxen. While the second part of (4) is correct, the first part is not. (4) is not the answer.

(5) – Eratosthenes used simple instruments and elementary geometry to measure the earth's diameter as 7,850 miles – about fifty miles short of the truth. Hence (5) is true and is the answer.

(6) – In Greece, an enlightened tradition of political thought, had already received its quintessential expression under Pericles: "Our administration favors the many instead of the few in Athens: that is why it is called democracy". (6) is out of scope.

Ans: (5)

22. Option A: Choice A is mentioned in the article: But glamorous talk of "kings", "lords" sounds better than a realistic description of murderous chieftains who cared only about power, enslavement, and killing. .... Like the Aztecs, the Maya had interesting art and pyramids but their culture was steeped in barbarism: torture and human sacrifice. .... to look beyond the endless cyclical violence of the barbaric past, however interesting its art may be. This is not the only

thing that provokes the author to make a virulent attack on the Maya civilization. Choice A is not the answer.

Option B: Choice B has not been mentioned in the article. Option C: Maya warfare was chronic and unresolvable... Maya calendrical calculations mainly reflected a mistaken devotion to astrology and numerology – and a more sterile dead-end it would be hard to find. Choice C is true but it is not enough to face the author's criticism. Choice C is not the main reason.

Option D: The Maya civilization in Mexico didn't amount to much. ... The Maya had no 'moral and philosophical perspective on human existence' and no evidence of 'Mind at Work', (because of which, we can say that *their culture had no positive influence on the outside world*). ... The ripples of Greek civilization spread globally, and deserved to. There were no ripples from the Maya. No enlightenment. Choice D is the answer.

Choice (D)

23. Consider the following statements from the 2 paragraphs in the middle of the article:

- We expect a moral and philosophical perspective on human existence. The "examined life" as Socrates put it, with the fruit of this examination religiously incorporated. Egypt, India and China had this. Not the Mayans. ...

- One needs a developed form of writing to record evidence that life has been examined, thought about, and critically assayed. - It is true the Maya had a rudimentary script ... and a philosophical interest in time. ..... My own impression is that however successful they were in "charting the mystery of time", Maya calendrical calculations mainly reflected a mistaken devotion to astrology and numerology – and a more sterile dead-end it would be hard to find..

Statement (a): When we consider the lines reproduced above, especially the underlined portions, we understand that the author believes that the Maya did not have a moral perspective and a philosophical outlook towards life. Statement (a) is correct.

Statement (b): It is given that the Maya had a rudimentary script but the second half of statement (b) is inappropriate .... While the author does wonder whether war was one of the reasons for the decline of the Maya civilization, there is no discussion of wars fought, or the frequency of wars.

So only statement (a) is correct.

Choice (A)

24. Option A: Ronald Wright comments that "using their advanced arithmetic in a calendar (Long Count), the Maya charted the mystery of time, recording astronomical events and running mythological calculations far into the past and future." The second part of choice A cannot be inferred from the article. I don't care whether the decline happened because of war?/ drought?/ disease? Choice A is not the answer.

Option B: We expect a moral and philosophical perspective on human existence. The "examined life" as Socrates put it, with the fruit of this examination religiously incorporated. Egypt, India and China had this. Not the Maya. .... What I look for in a civilization is Mind at Work. That's what we find in ancient Greece. .... The author does not compare ancient Greece to any civilization other than the Maya, so choice B cannot be inferred.

Option C: "We went up to their desolate temples; and saw the evidence of their taste in arts. ... We called back into life the strange people who gazed in sadness from the wall; pictured them, in fanciful costumes. ..." "Gazing upon the ruins Stephens conjures up in his imagination a world of "orators, warriors, statesmen." Hence choice C is true and is the answer.

Option D: We expect a civilization to be ennobling, to lift us up, to look beyond the endless cyclical violence of the barbaric past, however interesting its art may be. No matter how interesting a civilization's art is, it does not excuse barbarism; and the author explicitly states that the Maya, and the Aztecs, offered barbarism plus pyramids. Hence choice D is wrong.

Choice (C)

#### Solutions for questions 25 to 28:

25. It would help to pay attention to the tense of the sentences given in this question. On a careful reading of the sentences, it can be observed that sentence 4 is a general sentence that begins the paragraph. It introduces the background: African bonds were a rare sight in the past. Sentences 4 and 2 form a mandatory pair. "rare sight" in sentence 4 is linked with "only South Africa had ever sold ...." in sentence 2. Sentence 5 continues after sentence 2. "Since then" in sentence 5 refers to the time point i.e. "since ten years ago" mentioned earlier in sentence 4. "16 more have" in sentence 5 links with "only South Africa had ever sold ...." in sentence 2. 16 more countries (in addition to South Africa) have sold a dollar-denominated bond to foreign investors. So, 425. Sentence 1 talks about the situation last year. It expands on the points highlighted in sentences 2 and 5. Sentence 1 mentions the value of the dollar debt sold to foreign investors last year. "issued \$6.75 billion of dollar debt last year, just short of the record \$7 billion sold in 2014" in sentence 1 links with "South Africa and 16 more countries had ever sold a dollar-denominated bond to foreign investors" in sentences 2 and 5. Sentence 3 has a negative tone and is best placed at the end of the paragraph. "taking the shine off due to depreciating currencies, low commodity prices and a rise in interest rates in America" in sentence 3 contrasts "African countries issued \$6.75 billion of dollar debt last year" mentioned in sentence 1. So, 42513.

Ans: (42513)

26. On a careful reading of the sentences, it can be observed that sentence 5 is a general sentence that begins the paragraph. It introduces Phaedrus to us and tells us that he is mostly bizarre except when studying Kant. Sentences 5 and 3 form a mandatory pair. "eighteenth-century German philosopher" in sentence 3 refers to "Immanuel Kant" mentioned in sentence 5. The pronoun "he" in sentence 3 refers to "Phaedrus" in sentence 5. "he is less strange" in sentence 5 is further strengthened by "he feels a respect that rises out of appreciation for Kant" in sentence 3. Sentence 2 tells us why Phaedrus appreciates Kant (Kant is methodical, persistent, regular and meticulous). "he scales that great snowy mountain of thought" in sentence 2 links with "Kant's formidable logical fortification of his position" in sentence 3. So, 532. "scales that great snowy mountain of thought" in sentence 2 is further explained in sentence 4: Modern climbers consider it one of the highest peaks of all. "It" in sentence 4 points to the "mind" given in sentence 2. Sentences 4 and 2 are further connected to each other. "This will give us a clearer picture" in sentence 1 links with "I want now to magnify this picture" in sentence 4. "prepare the way for an understanding of Phaedrus' thoughts" in sentence 1 links with "how Phaedrus thought about him" in sentence 4. Hence, 53241.

Ans: (53241)

27. On a careful reading of the sentences, it can be observed that sentence 4 is a general sentence that begins the paragraph. It introduces the background: Pessimists find reasons to fret. Sentence 3 follows sentence 4 with an example. (... for example ....). "will only add to the amount of carbon in the atmosphere, increasing global warming" in sentence 3 is "another reason to fret" in sentence 4. Sentence 1 follows sentence 3 as another example (As for agriculture ....). Sentence 1 is positive in tone and is followed by sentence 5 which has a contrast conjunction 'but' and which has a negative tone. "Steady increases in grain production have kept the prices down" in sentence 1 is followed by "higher production" is mostly a result of rising yields" and "... which cannot continue" in sentence 5. Sentences 5 and 2 form a mandatory pair. "rising yields supported by ever more intensive application of fertilizer" in sentence 5 links with "humans could fertilize crops by relying on phosphorus" in sentence 2. "diminishing supply of phosphate-containing rocks" in sentence 2 justifies "cannot continue" in sentence 5. Hence 43152.

Ans: (43152)

28. On a careful reading of the sentences, it can be observed that sentence 3 is a general sentence that begins the paragraph. It has the proper nouns *The Seventh Seal* and *Winter Light* and the complete name of the film director: Ingmar Bergman. Sentence 3 begins the discussion by mentioning a possibility ( .... could films .... conceived in another climate?). Sentence 2 follows sentence 3 as sentence 2 is the beginning of the explanation of the possibility given in sentence 3. The possibility "been conceived in another climate" in sentence 3 links with the present scenario: "The present natural light-dark cycle is tied to human biological rhythms" in sentence 2. Sentences 2 and 1 form a mandatory pair. "ways that are, as yet, unexplored" in sentence 2 contrasts "Even so, one can easily imagine the use of orbiting sun-mirrors to alter the hours of light" in sentence 1. "natural light-dark cycle" in sentence 2 links with "orbiting sun-mirrors to alter the hours of light" in sentence 1. "human biological rhythms" in sentence 2 is similar to "agricultural, industrial or even psychological" in sentence 1. Sentence 2 is followed by sentence 1. So, 321. Sentence 5 follows sentence 1 as an example. "one can easily imagine the use of orbiting sun-mirrors to alter the hours of light" in sentence 1 links with "the introduction of longer days into Scandinavia" in sentence 5. Sentence 4 follows sentence 5. "what happens to Bergman's brooding art when Stockholm's brooding darkness is lifted?" (sentence 4) is a question posed to understand what would happen when "longer days are introduced into Scandinavia" (sentence 5). Sentence 4 concludes the para. Sentence 4 also mirrors the introduction sentence 3. "what happens to Bergman's brooding art when Stockholm's brooding darkness is lifted?" is another question posed in the conclusion sentence and it mirrors the possibility "Could have the two Swedish drama-fantasy films been conceived in another climate?" asked in sentence 3. So, 32154.  
Ans: (32154)
31. 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 topic of discussion: organizational geography of superindustrial society can be expected to become increasingly kinetic. Sentences 2 and 1 form a mandatory pair. "filled with turbulence and change" in sentence 2 links with "The more rapidly the environment changes" in sentence 1. Sentence 1 is followed by sentence 4. "the shorter the life span of organization forms" in sentence 1 is linked with "long-enduring to temporary forms, from permanence to transience (in administrative structure)" in sentence 4. Sentence 3 concludes the para. Adhocracy is a system of flexible and informal organization (synonymous with 'temporary forms/ transience) and management in place of rigid bureaucracy (synonymous with 'long-enduring/ 'permanence'). So, 2143. Sentence 5 talks about 'turnover' in another context. It can come prior to the paragraph. It is the odd man out.  
Ans: (5)
32. On a careful reading of the sentences, it can be observed that sentence 4 is a general sentence that begins the paragraph. It introduces the background: Lin-Zhang is not quite like Keynes-Hayek. "The debate/ clash between John Maynard Keynes and Friedrich Hayek" mentioned in sentence 3 serves to further expand on the reference to "Keynes-Hayek", introduced in sentence 4. So sentence 3 follows sentence 4. Sentences 3 and 1 form a mandatory pair. "clash ..... intervention that exploded in the 1930s and still reverberates today" in sentence 3 links with "it has echoed around Chinese lecture halls" in sentence 1. Sentence 5 then brings Justin Lin and Zhang Weiying in context. ("Lin-Zhang" was introduced earlier in sentence 4). Sentence 5 tells us that Justin Lin leans to Keynesian faith and Zhang Weiying is a self-professed Hayekian. So, 4315. Sentence 2 concludes the para. It mirrors the introduction: It is not quite Keynes-Hayek, but Lin-Zhang is a marvel in its own right. Sentence 2 can come later in the thoughtflow. It needs a precedent and does not form a part of the paragraph containing the remaining sentences.  
Ans: (2)

#### Solutions for questions 29 to 32:

29. 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 topic of discussion: The future of television was meant to have arrived now. Sentence 2 follows sentence 3. "meant to have arrived by around now" in sentence 3 is linked with the problems "high cost of cable TV in America, combined with dire customer service and the rise of appealing on-demand streaming services" given in sentence 2. Sentences 2 and 1 form a mandatory pair. "drive millions to "cut the cord" with their cable providers" in sentence 2 links with "customers would receive their TV over the internet" in sentence 1. "pay less for it" in sentence 1 contrasts "high cost of cable TV" in sentence 2. Sentence 1 is followed by sentence 4. Sentence 4 actually offers a step that cable guys could take to 'stanch the flow (the 'flow' being the migration from cable to internet). So, 3214. Sentence 5 is the odd sentence out. It can come much later in the thoughtflow. Sentence 5 needs a precedent and more substantiation.  
Ans: (5)

30. On a careful reading of the sentences, it can be observed that sentence 4 is a general sentence that begins the paragraph. It introduces the topic of discussion: championed the creation of a court .... Sentence 4 is followed by sentence 1. "championed the creation of a court" in sentence 4 is linked with "came a boon for international justice" in sentence 1. "apartheid and the Rwandan genocide" in sentence 1 points to "criminals" in sentence 4. "Mandela's government played a central role" in sentence 1 links with "under Nelson Mandela's government" in sentence 4. Sentence 5 follows sentence 1. Sentence 5 has Mandela's comment. "horrors emanating from the inhumanity of humans" in sentence 5 points to "apartheid and the Rwandan genocide" in sentence 1. Sentence 2 follows sentence 5 and concludes the paragraph. So, 4152. Sentence 3 (leave the ICC) runs tangent to the text. It is a new viewpoint and can be a part of another paragraph.  
Ans: (3)

#### Solutions for questions 33 and 34:

33. The paragraph starts with how innate/ acquired distinction is commonly misunderstood as being caused by genes/ environment. Efforts to explain the distinction using arguments related to genetics have been unsuccessful and it has not been supported by the developments in other fields like molecular developmental biology. The author then outlines three philosophical theories and explains that the fourth one belongs to sceptical tradition and questions the distinction itself. He also stresses that the distinction between innate and acquired traits might be best understood within the area of psychology only. Choice 3 has all the main points in the paragraph and serves as an apt summary.  
Choice 1 is incomplete and attempts to cover only the first two sentences of the para. The second sentence of choice 1 is unnecessary as it covers trivial details. Choice 1 is also incorrect since the author does not say that the innate/acquired distinction is a psychological one. It is stated that it is best understood within the field of psychological research.  
The first sentence in choice 2 is incorrect as the author does not say that the debate of the distinction between innate and acquired traits in an organism can be resolved. The second sentence is a bit extreme in tone. The third and fourth sentences of choice 2 are correct but choice 2 is unnecessarily wordy.  
Choice 4 attempts to restates a particular idea in the passage but it has 'out of scope' or extraneous points. It is again incomplete as a summary.  
Ans: (3)

34. The main points of the paragraph are:  
 (i) American historians believed that there is something called a national personality that linked all Americans because of their inheritance, environment and experience.

- (ii) In the 1960s, political and cultural events including challenges from New Left historians seemed to disallow the oneness.  
 (iii) Preferring detailed local studies of specific groups over indiscriminate claims of oneness, social historians repudiated the very idea of national character.

Choice 2 is incorrect as it says that political and cultural events from New Left historians disallowed the singular idea about America.

Choice 3 is unclear as it presents a mix up of all ideas in the paragraph. Moreover, it mentions the conflicts and diversity by various groups, which is incorrect. In first sentence of choice 3, 'half-century' is incorrectly mentioned instead of 'century'.

Choice 4 is seemingly correct, but the last part of the summary is digressing by saying that the idea of nationality/personality has turned away from the sweeping claims.

Choice 1 is the most appropriate summary capturing all the essential points.

Ans: (1)

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

## SECTION – II

### Solutions for questions 1 to 4:

Given that Salman and Pavan were in the same class in 2012. Since Salman did not fail in any year, both Salman and Pavan must have been in Class VII in 2012. Neither of them would have failed any exam before 2012. Since Pavan failed twice, he must have failed both the times from 2012 onwards.

Manoj and Tarun failed exactly once and they were in the same class in 2012. They must have been in Class VII in 2012 as they could have failed only once. In 2009 or 2010 or 2011, they would have failed once. Further, they would not have failed in any subsequent year and they would have been in Class VIII, IX and X in 2013, 2014 and 2015 respectively.

Since Lalit failed twice and was in a different class, he must have been in Class VI in 2012. He must have failed twice from 2009 to 2011. From 2012 onwards, he would have cleared all the annual exams. Hence, he will be in Class VII, VIII, IX and X in 2013, 2014, 2015 and 2016.

The following table provides the possible classes in which the five students can be in at the beginning of each year:

	2009	2010	2011	2012	2013	2014	2015	2016
Lalit	V	V/VI	V/VII	VI	VII	VIII	IX	X
Manoj	V	V/VI	VI/VII	VII	VIII	IX	X	
Pavan	V	VI	VII	VIII	VIII/IX	VIII/IX/X	IX/X	X
Salman	V	VI	VII	VIII	IX	X		
Tarun	V	V/VI	VI/VII	VII	VIII	IX	X	

- In 2011, four students can be in 2011. Ans: (4)
- Lalit will definitely be in Class VIII in 2014. Choice (A)
- Pavan and Tarun can be in the same class for a maximum of 6 years (2009, 2010, 2011, 2013, 2014 and 2015). Ans: (6)
- In 2011, Manoj will be in Class VI. Choice (B)

### Solutions for questions 5 to 8:

A spent a total of  $24 + 26 + 51 = 101$  on Rockin' Tug, Rock-O-Plane, Cliffhanger and Devil's Wheel.

Hence, he would have spent a total of 106 on Balloon Race and Hayride.

If he participated in Balloon Race x times and in Hayride y times, he would have spent a total of  $15x + 19y$ .

$$\therefore 15x + 19y = 106$$

If  $y = 1$ , x cannot be an integer.

If  $y = 2$ , x cannot be an integer.

If  $y = 3$ , x cannot be an integer.

If  $y = 4$ , x = 2.

If  $y = 5$ , x cannot be an integer.

If  $y \geq 6$ , x will be negative.

Hence, the only possibility for  $(x, y) = (2, 4)$ .

B spent a total of 174 for all the rides except Devil's Wheel. Hence, he must have spent 155 on Devil's Wheel. Number of times B participated in Devil's Wheel =  $155/31 = 5$

C spent a total of 225 on all the rides except Rock-O-Plane and Hayride. Hence, he must have spent 166 on Rock-O-Plane and Hayride. If C took Rock-O-Plane x times and Hayride y times,  $26x + 19y = 166$ . The only possible values for x and y are 2 and 6 respectively.

D spent a total of 252 on all the rides except Hayride. Hence, he must have spent 133 on hayride. Number of times D took the Hayride =  $133/19 = 7$

E spent a total of 301 on all the rides except Cliffhanger. Hence, he must have spent 85 on Cliffhanger. Number of times E took Cliffhanger =  $85/17 = 5$

F spent a total of 241 on all the rides except Rockin' Tug and Balloon Race. Hence, he must have spent 81 on these two rides. If F took Rockin' Tug x times and Balloon Race y times,  $12x + 15y = 81$ . The only possible values of x and y are 3 and 3 respectively.

The following table provides the number of times each person took each ride:

Game	Ticket Price (in Rs.)	Number of times participated					
		A	B	C	D	E	F
Rockin' Tug	12	2	1	3	7	1	3
Rock-O-Plane	26	1	1	2	1	3	2
Balloon Race	15	2	3	6	4	2	3
Cliffhanger	17	3	2	4	3	5	3
Devil's Wheel	31	0	5	1	1	4	2
Hayride	19	4	3	6	7	3	4
<b>Total Amount Spent (in Rs.)</b>	<b>207</b>	<b>329</b>	<b>391</b>	<b>385</b>	<b>386</b>	<b>322</b>	

5. Among the six persons, D took the Hayride the maximum number of times.

Choice (C)

6. The six of them took the Balloon Race 20 times.

Choice (D)

7. A must have spent at least  $207 \times 0.3 = 62.1$  on one ride.

He spent more than this on Hayride.

B must have spent at least 98.7 on one ride. He spent more than this on Devil's Wheel.

C must have spent at least 117.3 on one ride. He did not spend more than this on any ride.

D must have spent at least 115.5 on one ride. He spent more than this on Hayride.

E must have spent at least 115.8 on one ride. He spent more than this on Devil's Wheel.

F must have spent at least 96.6 on one ride. He did not spend more than this on any ride.

Hence, four persons (A, B, D and E) spent at least 30% on one ride.

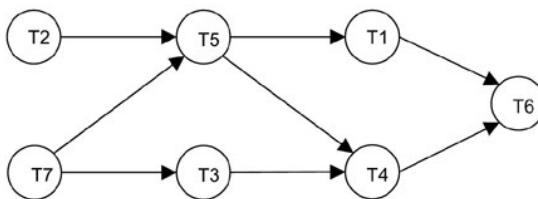
Choice (B)

8. F took any ride 17 times.

Choice (A)

### Solutions for questions 9 to 12:

Let  $T_1, T_2, T_3\dots$  be the tasks mentioned. From the prerequisite tasks given, we get the following network diagram:



Since we know the number of days required for completing each task, we can estimate the number of days required for completing the six tasks (ignoring the persons required for doing the task)

The following table provides the days on which each task can be done (from Day 1 onwards) and the persons who can take up that task:

Task	T2	T7	T5	T3	T1	T4	T6
Days	1-24	1-25	26-44	26-48	45-58	49-64	65-84
Persons	C/E	B/C/E	C/E	C/D	A/B	B/D	A/B

We can try to assign the persons to each task keeping the number of days to 84.

T6 must be assigned to A/B. T1 must also be assigned to A/B. For there to be no delay in completing the project, A and B must be assigned to T6 and T1 in any order. Therefore, T4 must be assigned to D (otherwise there will be a seven-day delay). Since T4 is assigned to D, T3 must be assigned to C (if T3 is also assigned to D, there will be a seven-day delay). Since T3 is assigned to C, T5 must be assigned to E (since T3 and T5 happen during the same period roughly).

T2 can be assigned to C/E. In either case, Task 7 can be assigned to B. If T2 is assigned to C, C can start working on T3 only by Day 32 (since C will finish working on T2 by Day 24 and takes 7 days' rest). T3 can be finished by Day 54. T4 can be started on Day 55 and finished by Day 70. T6 will be finished by Day 90. There will be a **six-day delay** in this case.

If T2 is assigned to E, T5 can be started on Day 32 and finished by Day 50. T4 can be started on Day 51 and be finished by Day 66. T1 can be started on Day 51 and finished by Day 64. T6 can be started on Day 67 and finished by Day 86. There will be a **two-day delay** in this case. Hence, we can see that it is not possible to finish the tasks without any delay.

Since it is not possible to finish the project without any delay, now we can consider the case that T4 is assigned to B. T1 must be assigned to A. T6 can be assigned to A so that there is less delay. T6 can start on Day 66 (since A works on T1 till Day 58 and takes rest till Day 65).

If T2 and T5 are both assigned to the same person, there will be an additional two-day delay in starting T4 and will increase the number of days required for completing the project by two more days.

If T2 and T5 are assigned to C and E in any order, T3 can be assigned to D and T7 will be assigned to B. In this case, there will be no additional delay and the minimum number of days required for finishing the project will be 85 days (as there will be a 1-day delay for starting T6).

9. The minimum number of days required for completing the project is 85 days.  
Ans: (85)

10. There are two possibilities for completing the project in the minimum number of days. In the two cases, T1 through T7 are assigned to A, C/E, D, B, E/C, A, B. In either case, A and B will be assigned two tasks each. From the given options, the maximum number of tasks are assigned to A.  
Choice (A)

11. Since Task 1 and Task 6 can be assigned to only A and B, one among the two must be selected.  
Since Task 2 and Task 5 can be assigned to only C and E, one among these two must also be selected.  
B must be selected because Task 4 can be assigned to only B (since D will not be selected).

C must be selected because Task 3 can be assigned to only C (since D will not be selected).

Hence, C will be assigned Task 2, Task 5 and Task 3. B will be assigned Task 1, Task 4 and Task 6.

B can also be assigned Task 7 since Task 2, Task 5 and Task 3 are assigned to C.

Task 7 will start by Day 1 and end by Day 25.

Task 2 will start by Day 1 and end by Day 24.

Between Task 3 and Task 5, any task can be taken up first. But until Task 5 is completed, Task 1 cannot be started. If Task 5 is completed first, B can start on Task 1. If Task 3 is completed first, B should wait until Task 5 is completed before he can start working on either Task 1 or Task 4. Hence, Task 5 must be completed first.

Task 5 will start by Day 32 and end by Day 50.

Task 3 will start by Day 58 and end by Day 80.

Task 1 can be started by B on Day 51 and ends by Day 64. Hence, Task 1 can be finished by the earliest on Day 64.

Choice (B)

12. As we have seen in the earlier solution, Task 1 can be finished by the earliest by Day 64.  
Task 4 starts on Day 81 (since B will have more than seven days rest after finishing Task 1) and end on Day 96.  
Task 6 starts on Day 104 and ends on Day 123.  
Therefore, the minimum number of days required for finishing the project will be 123 days.

Choice (D)

#### Solutions for questions 13 to 16:

The following table provides the total number of reviews, positive reviews and negative reviews during the given months:

	Jan	Feb	Mar	Apr	May	Jun	Jul
Total Reviews	120	160	110	130	140	150	180
Positive	70	80	60	50	70	60	80
Negative	50	80	50	80	70	90	100

13. The number of positive reviews as a percentage of the total number of reviews for the seven months are 58.33%, 50%, 54.55%, 38.46%, 50%, 40%, 44.44% (in the same order of the months). We can see that the percentage decreased in three months (February, April and June). Choice (B)

14. The number of positive reviews exceed the number of negative reviews by 20% on only one month - January.  
Choice (A)

15. The number of negative reviews of the restaurant in the seven months are 50, 80, 50, 80, 70, 90 and 100. The highest percentage increase in the number of negative reviews =  $30/50 = 60\%$   
Choice (B)

16. The number of positive reviews and the number of negative reviews received by the restaurant till the end of each month is given below:  
January – Positive: 70; Negative: 50  
February – Positive: 150; Negative: 130  
March – Positive: 210; Negative: 180  
April – Positive: 260; Negative: 260  
May – Positive: 330; Negative: 330  
June – Positive: 390; Negative: 420  
July – Positive: 470; Negative: 520  
Hence, the number of negative reviews is greater than the number of positive reviews for two months – June and July.  
Choice (D)

#### Solutions for questions 17 to 20:

Let  $x$  be the total amount spent by all the seven persons combined. We can find the total amount with them at the beginning of the trip in terms of  $x$ .

Since A spent  $0.1x$  and had 150 left, he would have had  $0.1x + 150$  at the beginning of the trip.

Similarly, we can find the amounts with each person at the beginning of the trip and this is presented in the following table:

Person	Amount
A	$0.1x + 150$
B	$0.19x + 669$
C	$0.2x + 180$
D	$0.1x + 30$
E	$0.05x + 435$
F	$0.25x + 495$
G	$0.11x + 501$

By observation, we can see that either D or E must have the least amount. Hence, D can have the least amount or the second least amount.

Also, A must have a lesser amount than B, C, F and G. Hence, A can have the second least amount or the third least amount. Hence, the following possibilities arise for the persons with the least and the second least amount: (D, E) OR (E, D) OR (D, A). If E and D have the least and second least amount respectively, then the ratio of money with E and D must be 1:2.

$$\text{Hence, } \frac{0.05x + 435}{0.1x + 30} = \frac{1}{2}$$

But this is not possible.

If D and E have the least and second least amount,

$$\frac{0.1x + 30}{0.05x + 435} = \frac{1}{2} \Rightarrow x = 2500$$

In this case, D and E have 280 and 560 respectively. The amount with A will be 400. But this implies A has lower amount than E. This violates the assumption that we started with (that E has the second lowest amount of money). Hence, this case is not possible.

If D and A have the least and second lowest amount of money,

$$\frac{0.1x + 30}{0.1x + 150} = \frac{1}{2} \Rightarrow x = 900$$

In this case, A through G will have 240, 840, 360, 120, 480, 720 and 600 respectively.

The following table provides the amount with each person at the beginning of the trip and the amount spent by each person during the trip:

Person	Amount at Start	Amount Spent	Amount at End
A	240	90	150
B	840	171	669
C	360	180	180
D	120	90	30
E	480	45	435
F	720	225	495
G	600	99	501

17. The highest amount that any person had at the beginning of the trip was Rs. 840.  
Ans: (840)

#### Solutions for questions 25 to 28:

Given that Raghu purchased Fried Rice, Spoon and Ketchup in that order.

From (iv), Udainagar was the fifth station. From (iii), he purchased ketchup in the station immediately after Ambanagar. From (vi), the station immediately before Udainagar was not Ambanagar.

Combining these statements, we can infer that Raghu did not purchase the Ketchup at Udainagar. Hence, he could have purchased the Ketchup at the third station or the fourth station.

If Raghu purchased the Ketchup at the third station, he must have purchased the Fried Rice at the first station and the Spoon at the second station. From (iii), Ambanagar must be the second station. From (vi), Rajnagar must be immediately after Bhagnagar. The only possibility for this is that Rajnagar is third and Bhagnagar is fourth. Tamnagar must be the first or the last station. However, this is not possible as this will violate condition (iv).

Hence, Raghu must have purchased the Ketchup at the fourth station. From (iii), Ambanagar must be the third station. From (vi), Bhagnagar and Rajnagar can only be first and second respectively. From (iv), Tamnagar cannot be the last station. Hence, Tamnagar must be the fourth station and Padhnagar must be the last station. From (ii), Raghu did not purchase the Spoon at Rajnagar. Hence, he must have purchased the Spoon at Ambanagar. He could have purchased the fried rice at either Bhagnagar or Rajnagar.

The following table provides the order in which the train stopped and the items that Raghu purchased:

18. By observation, we can see that E spent the minimum amount as a percentage of the amount with him at the beginning, which is  $45/480 = 9.375\%$   
Choice (C)

19. Total amount spent by the seven persons combined = 900  
Ans: (900)

20. Four persons spent at least 30% of what they had at the beginning of the trip – A, C, D and F.  
Choice (D)

#### Solutions for questions 21 to 24:

From (ii), AMail should have a limit of 20 MB or 25 MB. From (iv), DMail should have a limit of 15 MB or 20 MB or 25 MB. From (vi), he used BMail to send two mails. He used another e-mail ID to send a mail to Parthiv and Rohit. Hence, Rahul would have sent exactly one mail using the other e-mails.

From (v), Ashwin received a mail from e-mail ID with limit as 15 MB. Hence, DMail will not have 15 MB as limit. From (iv), Rahul sent a mail of size 23 MB. This cannot be using DMail (since he sent a mail of 11 MB using DMail). Therefore, AMail will have a limit of 25 MB and DMail will have a limit of 20 MB.

Rahul could not have used AMail to send a mail to Rohit, Parthiv, Virat, Shikhar, Ashish or Ashwin. Hence, Rahul sent a mail to Ravi using AMail.

From (vi), FMail will have a limit of 15 MB. Also, from (iii), he sent mails to Rohit and Parthiv using CMail. From (v), Rahul used FMail to send a mail to Ashwin and used BMail to send a mail to Ashish and Shikhar.

The following table presents this information:

e-mail	Limit	Person	Size of e-mail
AMail	25	Ravi	23
BMail	5	Ashish, Shikhar	-
CMail	10	Rohit, Parthiv	-
DMail	20	Virat	11
FMail	15	Ashwin	12

21. Rahul sent an e-mail to Shikhar using BMail.  
Choice (D)
22. The maximum size of an e-mail that can be sent using FMail is 15 MB.  
Ans: (15)
23. Rahul sent mails to two persons using CMail.  
Choice (B)
24. He could have sent an e-mail of size less than 5MB to Shikhar.  
Choice (A)

Order	1	2	3	4	5	6
Station	Bhagnagar	Rajnagar	Ambanagar	Tamnagar	Udainagar	Padhnagar
Item	(Fried Rice)	(Fried Rice)	Spoon	Ketchup	-	-

25. The last station, i.e., Padhnagar, is Raghu's hometown.  
Choice (A)
26. Raghu purchased the spoon at Ambanagar.  
Choice (B)
27. Raghu purchased Ketchup in Tamnagar.  
Choice (C)
28. Raghu could have purchased the Fried Rice in Bhagnagar or Rajnagar. Hence, the answer cannot be determined.  
Choice (D)

**Solutions for questions 29 to 32:**

From (i), Gold left a Brown precipitate. From (ii), Borocilic Acid left a Blue precipitate and Carboxylic Acid left a Green precipitate. From (iv), Copper left a Red precipitate. From (iii), Aluminium was not mixed with Carboxylic Acid. From (v), since Aluminium did not leave a Blue precipitate, it was not mixed with Borocilic Acid. Hence, Aluminium must have left a Grey precipitate.

The metals that are mixed Borocilic Acid and Carboxylic Acid cannot be Gold, Copper or Aluminium (since these three metals cannot leave blue or green precipitate). Hence, Iron and Silver must have been mixed with these two acids, in any order. From (iv), since Iron did not leave a Blue precipitate, Iron must have been mixed with Carboxylic Acid. Silver must have been mixed with Boric Acid. From (v), Hydrochloric Acid did not leave a Grey precipitate. Hence, it must not have been mixed with Aluminium. The following information is known about the acid, metals and precipitate colours:

Metal	Acid	Precipitate
Gold	Hydrochloric/Nipric Acid	Brown
Silver	Borocilic Acid	Blue
Iron	Carboxylic Acid	Green
Copper	Hydrochloric/Nipric/Sulmuring Acid	Red
Aluminium	Nipric/Sulmuring Acid	Grey

29. The reaction involving Aluminium left a Grey precipitate.  
Choice (C)
30. Silver was mixed with Borocilic Acid.  
Choice (B)
31. The reaction involving Sulmuring Acid could have left Red or Grey precipitate.  
Choice (A)
32. In the given case, Copper would have been mixed with Sulmuring Acid.  
Choice (C)

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

**SECTION – III**
**Solutions for questions 1 to 32:**

1.  $p^2 + q^2 - 6p + 18q + 90 = 0$   
 $\Rightarrow (p-3)^2 + (q+9)^2 = 0$   
 $\Rightarrow p = 3 \text{ and } q = -9$   
Now,  $p^2 + 9q^2 - 6pq$   
 $= (p-3q)^2 = (3 - (-27))^2 = 900.$  Ans: (900)

2.  $5^{\log_2 x} = \frac{7}{\frac{1}{2}} = 7$   
 $\log_2 x = \log_5 7$   
 $x = 2^{\log_5 7}$   
 $5^{\log_7 y} = \frac{1}{\frac{1}{2}} = 2$   
 $\log_7 y = \log_5 2$   
 $y = 7^{\log_5 2}$   
 $x - y = 2^{\log_5 7 - \log_5 2}$   
 $= \left(7^{\log_7 2}\right)^{\log_5 7} - 7^{\log_5 2} = 7^{\log_7 2 \cdot \log_5 7} - 7^{\log_5 2}$   
 $= 7^{\log_5 2} - 7^{\log_5 2} = 0$  Choice (D)

3. By observation we see that  
 $16 - 6 = 10, 17 - 7 = 10,$  and  $18 - 8 = 10,$   
So, (divisor – remainder) is same in all the cases. N will be  
= {LCM (16, 17, 18) – 10}  
We see that LCM of 16, 17 and 18 is also divisible by 12,  
and when 10 is subtracted from it, we get 2 as a remainder  
when divided by 12.  
Hence, when  $N^2$  is divided by 12, the remainder =  $2^2 = 4$   
∴ When  $(N^2 + 5N + 6)$  is divided by 12, the remainder will  
be  $4 + 5(2) + 6 = 20,$  i.e., remainder =  $20 - 12 = 8$  Choice (C)

4. Let  $\ell$  be the length covered by  $D_1$  in 3 steps  
 $\Rightarrow$  step length of  $D_1 = \frac{\ell}{3}.$   
By the same logic, step lengths of  $D_2$  and  $D_3$  are  
respectively  $\frac{\ell}{4}$  and  $\frac{\ell}{5}.$  Distances covered by  $D_1, D_2$  and  
 $D_3$  in 5 steps, 4 steps and 6 steps are  
 $5\left(\frac{\ell}{3}\right), 4\left(\frac{\ell}{4}\right)$  and  $6\left(\frac{\ell}{5}\right)$  respectively.  
As these distances are covered in the same time interval, the  
ratio of speed of  $D_1 : D_2 : D_3 = \left(\frac{5}{3}\right) : (1) : \left(\frac{6}{5}\right) = 25 : 15 : 18$   
∴ Required ratio  $(D_1 : D_2 : D_3) = 25 : 15 : 18$  Choice (A)

5. If only one switch is switched on, then it can be done in  
eight ways – i.e., in  $(8 + 1 - 1)$  ways.  
If two switches are switched on, it can be done in seven  
ways, i.e., in  $(8 + 1 - 2)$  ways, and so on.  
∴ If eight switches are switched on, it can be done in  
 $(8 + 1 - 8)$  ways, i.e., in one way.  
∴ Total number of ways  
 $= 8 + 7 + 6 + 5 + 4 + 3 + 2 + 1 = 36.$  Choice (C)

6.  $f(x) = \frac{25^x}{25^x + 5}$   
 $\therefore f(1-x) = \frac{25^{1-x}}{25^{1-x} + 5} = \frac{5}{5 + 25^x}$   
Thus  $f(x) + f(1-x) = \frac{25^x}{25^x + 5} + \frac{5}{25^x + 5} = 1$

$$\therefore f\left(\frac{1}{99}\right) + f\left(\frac{98}{99}\right) = 1$$

$$f\left(\frac{2}{99}\right) + f\left(\frac{97}{99}\right) = 1$$

$$f\left(\frac{49}{99}\right) + f\left(\frac{50}{99}\right) = 1$$

Therefore adding,

$$\text{we get } f\left(\frac{1}{99}\right) + f\left(\frac{2}{99}\right) + \dots + f\left(\frac{98}{99}\right)$$

$$= 49(1) = 49$$

Ans: (49)

7. Let the missed number be  $x$ .

$$\Sigma n - x = 660$$

$$x = \Sigma n - 660$$

$$\text{If } n = 35, \Sigma n = 630$$

$$\text{If } n = 36, \Sigma n = 666$$

We can see that  $\Sigma n$  should be greater than 660.

$$\therefore \Sigma n = 666$$

$$\therefore x = 666 - 660 = 6.$$

Choice (B)

8. Let Ajay do ' $x$ ' work in one day.

Bhanu does '2x' work in one day.

Chandu does '4x work' in one day and

Dinesh does '8x' work in one day.

From  $x, 2x, 4x, 8x$  we need to form two pairs such that sum

$$\text{of one pair} = \frac{1}{\binom{2}{3}} \text{ of the other paid}$$

$$\text{By observation, we get } x+8x = \frac{3}{2}(2x+4x)$$

$$\text{A and D, when paired up together, do } \frac{3}{2} \text{ work of B & C}$$

$$\text{together. So A + D take } \frac{2}{3} \text{ times the time taken by B+C to complete the work.}$$

Choice (B)

9. Let the marked prices of A and B be  $2x$  and  $3x$ .

Also, if cost price of A = ₹50, then cost price of B = ₹75. (Since the ratio is 2 : 3)

Now a  $33\frac{1}{3}\%$  discount on M.P of B = S.P of B =  $2x$

Given S.P. of A = 80% of S.P. of B = 80% of  $2x = 1.6x$ .

Given profit of A = 60%

$$\Rightarrow 1.6x - 50 = 0.6 \times 50$$

$$\Rightarrow x = 50$$

$$\Rightarrow \text{M.P. of B} = 3x = ₹150.$$

Choice (A)

10. Given is the original fibonacci series

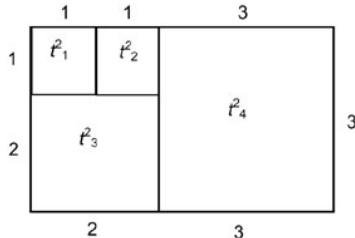
$$(t_1 = t_2 = 1 \text{ and } t_{n+1} = t_{n-1} + t_n).$$

$$1, 1, 2, 3, 5, \dots, t_{30}.$$

Now, we are required to find the sum

$$1^2 + 1^2 + 2^2 + 3^2 + 5^2 + \dots + t_{30}^2$$

Consider an intuitive approach, where we start with two unit squares (representing  $t_1^2$  and  $t_2^2$  respectively) i.e., two squares of side one unit each, adjacent each other, so as to form a  $1 \times 2$  rectangle, as shown below.

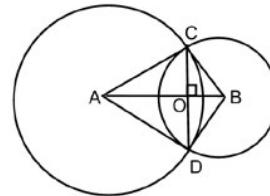


Another  $2 \times 2$  square ( $t_3^2$ ) is drawn adjoining the above two squares, which results in a rectangle of area  $2 \times 3$  sq.units, on the whole. Now to this rectangle, add a  $3 \times 3$  square ( $t_4^2$ ) and we get a rectangle of  $3 \times 5$  sq.units. This way, when we add all squares up to  $t_{30}^2$ , we will get an overall rectangle of dimensions  $t_{30} \times t_{31}$ . The area of this large rectangle is  $t_{30} \times t_{31}$  sq.units and is nothing but the sum of  $1^2 + 1^2 + 2^2 + 3^2 + 5^2 + \dots + t_{30}^2$ .

#### Alternative solution:

Alternately, considering say the sum of the squares of the first two terms, three terms, four terms, etc., it may be observed that the sum of the squares of the first  $n$  terms is  $t_n \times t_{(n+1)}$ .  
Choice (D)

11. Let CO be the common chord of two circles, with centres A and B respectively.



$AC = 156$  cm and  $BC = 65$  cm (radii of the circles) and  $AB = 169$  cm

These numbers form Pythagorean triplets  $13 \times (12, 5, 13)$

$\Rightarrow \triangle ACB$  is right angled at C.

$\therefore$  Area of  $\triangle ACB$

$$= \frac{1}{2}(AC)(CB) = \frac{1}{2}(AB)(CO)$$

$$\Rightarrow CO = \frac{(AC)(CB)}{AB}$$

$$= \frac{(156)(65)}{169} = 12(5)$$

$$= 60 \text{ cm and } CD = 2(CO) = 120 \text{ cm}$$

Choice (D)

12. Given  $a + b + c + d = 13$

$$a^3 + b^3 + c^3 + d^3, \text{ will be minimum if } a = b = c = d = \frac{13}{4}.$$

But, since  $a, b, c$  &  $d$  are positive integers, this is not possible.

Hence  $a, b, c$  and  $d$  must be as close as possible, i.e.,  $(a, b, c, d) = (3, 3, 3, 4)$

$\therefore$  Minimum value of  $a^3 + b^3 + c^3 + d^3 = 145$  Choice (B)

13. From statement I alone  $2 + \frac{a}{b} + \frac{b}{a} = 4$ . Hence, we can say that  $a = b$ , as this is the only possibility that satisfies.

From statement II, since  $(a - 50) = \pm(b - 50)$ , we cannot definitely say whether  $a = b$  or not.

Choice (A)

14. Let the price per kg of the three varieties be  $p_1, p_2$  and  $p_3$ . Let the quantities of the three varieties purchased be  $q_1, q_2$  and  $q_3$ .

$$\therefore \frac{q_1 p_1 + q_2 p_2}{q_1 + q_2} = 50 \Rightarrow q_1 p_1 + q_2 p_2 = 50(q_1 + q_2) \quad (1)$$

Similarly  $q_2 p_2 + q_3 p_3 = 60(q_2 + q_3) \quad (2)$  and

$$q_3 p_3 + q_1 p_1 = 68(q_3 + q_1) \quad (3)$$

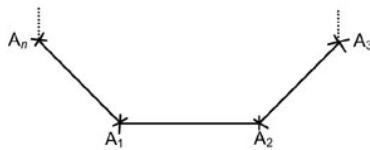
Adding (1), (2) and (3), we get

$$\Rightarrow 2(q_1 p_1 + q_2 p_2 + q_3 p_3) = 118q_1 + 110q_2 + 128q_3$$

$$\Rightarrow q_1 p_1 + q_2 p_2 + q_3 p_3 = 59q_1 + 55q_2 + 64q_3$$

Hence,  $\frac{(q_1 p_1 + q_2 p_2 + q_3 p_3)}{(q_1 + q_2 + q_3)}$  lies between 64 and 55 (both exclusive).  
Choice (D)

15. Let  $A_n, A_1, A_2, A_3$  be any four consecutive vertices of the polygon, having  $n$  vertices. If the side  $A_1, A_2$  is to be the only side common to the triangle and the polygon, then,



$A_1$  and  $A_2$  shall be joined to any of the vertices other than  $A_n$  and  $A_3$  i.e.,  $A_1$  and  $A_2$  can be joined to any one of the remaining  $(n - 4)$  vertices. Hence,  $(n - 4)$  such triangles are formed and all of them are distinct.

Hence, the total number of triangles with only one side being common =  $n(n - 4) \rightarrow (1)$

Consider the vertex  $A_2$ .  $A_1 A_2 A_3$  is a triangle which has two of its sides (i.e.  $A_1 A_2$  and  $A_2 A_3$ ) in common with those of the polygon. Similarly, at each vertex, there is one such triangle. All these triangles are distinct.

Hence, the number of triangles, having two sides in common is  $n \rightarrow (2)$

As per the given data,  $n(n - 4) + n = 28$

$$\Rightarrow n^2 - 3n - 28 = 0$$

$n = 7$  or  $-4$ . Ignoring the negative value,  $n = 7$ .

$\therefore$  The polygon is a heptagon.

Ans: (7)

16.  $x$  is real;  $f(x) = x^3 + 1$ ;  $g(x) = x^2 + x$   
All the options are statements about the inequality between  $f(x)$  and  $g(x)$   
Consider  $f(x) - g(x)$   
 $f(x) - g(x) = x^3 + 1 - x^2 - x = x^2(x - 1) - (x - 1)$   
 $= (x^2 - 1)(x - 1) = (x - 1)^2(x + 1)$   
if  $(x - 1)^2(x + 1) > 0$  then  $f(x) > g(x)$ ; and  
when  $f(x) - g(x) < 0$  then  $f(x) < g(x)$   
 $f(x) - g(x) = (x - 1)^2(x + 1)$  and this will be zero when  $x = 1$  or  $-1$ . And in that case,  $f(x) = g(x)$ . As the statements of first two options are for all values of  $x$ , neither of them is true.  
 $(x - 1)^2(x + 1)$  is always positive for  $x > 1$ ; and when  $x < 1$ ,  $(x - 1)^2(x + 1)$  is positive for  $0 \leq x \leq 1$  and  $(x - 1)^2(x + 1)$  is negative for  $x < 0$ . Hence, no generalisation can be made for  $x < 1$ . Hence option (C) is not valid. Option (D) has two sections:

Section 1 is :  $f(x) > g(x)$  when  $x > 1$ ; this is already proved valid.

Section 2 is :  $f(x) < g(x)$  when  $x < -1$ . When  $x < -1$ ,  $(x - 1)^2(x + 1)$  is negative;

$$\Rightarrow f(x) - g(x) < 0$$

$\Rightarrow f(x) < g(x)$ . i.e., section 2 is also valid. Hence, option (D) is true.

#### Alternative Solution:

We can also answer the question by substituting values for  $x$  and eliminating the choices.

When  $x = 0$ ,  $f(x) = 1$  and  $g(x) = 0$  then  $f(x) > g(x)$ . By this we can eliminate choice (B) and choice (C) when  $x = 1$ ,  $f(x) = 2$  and  $g(x) = 2$  then  $f(x) = g(x)$ . By this we can eliminate choice (A).

$\therefore$  Choice (D) is the answer.

Choice (D)

17. In the two vessels, at any stage, there is a total of 5 litres of alcohol and 5 litre of water.

At the end of the two transfers, let the quantities of alcohol and water be as tabulated below.

	Vessel 1	Vessel 2
Alcohol	$x$	$5 - x$
Water	$5 - x$	$x$

$$\text{Percentage of alcohol in vessel 2} = \left( \frac{5 - x}{5} \right) 100\%$$

$$\text{Percentage of water in vessel 1} = \left( \frac{5 - x}{5} \right) 100\%$$

These two percentages are equal. Choice (B)

18. We can consider the two tanks together to now become a single tank of twice the volume. Hence the each inlet alone would take twice the respective times given. i.e.,  $10 \times 2 = 20$  minutes and  $20 \times 2 = 40$  minutes.

$$\therefore \text{Together they will take } \frac{20 \times 20}{20 + 40} = 13 \frac{1}{3} \text{ minutes.}$$

Choice (B)

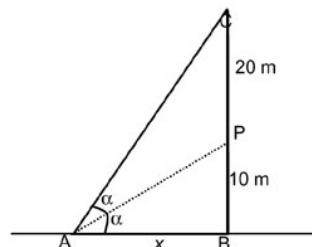
19. Since  $\frac{a}{b} = \frac{b}{c}$  we get  $\log_b a + \log_b c = \log_b b^2$ .

$$\frac{\log_b a + \log_b c}{2} \geq (\log_b a \times \log_b c)^{1/2} \quad (\because \text{AM} \geq \text{GM})$$

$$\Rightarrow \frac{\log_b b^2}{2} \geq (\log_b a \times \log_b c)^{1/2} \Rightarrow (\log_b a \times \log_b c) \leq 1.$$

Choice (A)

20. Let the observer be at point A on the ground and let BC be the building. Let the distance AB =  $x$  m.



$$\tan \alpha = \frac{10}{x}$$

$$\tan 2\alpha = \frac{30}{x}$$

$$\text{But since } \tan 2\alpha = \frac{2 \tan \alpha}{1 - \tan^2 \alpha}$$

$$\frac{2 \tan \alpha}{1 - \tan^2 \alpha} = \frac{30}{x}$$

$$\frac{2 \left( \frac{10}{x} \right)}{1 - \left( \frac{10}{x} \right)^2} = \frac{30}{x}$$

$$20x^2 = 30x^2 - 3000$$

$$x = \sqrt{300} = 10\sqrt{3} \approx 17.32$$

#### Alternative solution:

Using angle bisector theorem, AP bisects  $\angle CAB$

$$\Rightarrow \frac{AC}{AB} = \frac{CP}{PB} = \frac{2}{1}$$

$$\text{Also } AC^2 = AB^2 + BC^2 = x^2 + (20 + 10)^2 = x^2 + 900$$

$$\Rightarrow \frac{\sqrt{x^2 + 900}}{x} = \frac{2}{1} \Rightarrow \frac{x^2 + 900}{x^2} = \frac{4}{1}$$

$$\Rightarrow x^2 = 300, \text{ i.e., } x = 10\sqrt{3} \approx 17.32 \text{ m}$$

Ans: (17.32)

21. Let  $a + c = x$

$$\Rightarrow b + x = 25 \quad \dots (1)$$

$$\text{and } (1 + b)x = 144 \quad \dots (2)$$

$$\Rightarrow (1 + b)(25 - b) = 144$$

$$b^2 - 24b + 119 = 0$$

$$\Rightarrow b^2 - 24b = -119$$

Ans: (-119)

22. Let the number of correct answers, wrong answers and unattempted questions be c, w and u respectively. To enable easier solving, consider the maximum possible total first as  $6 \times 150 = 900$  marks. From this, every unattempted question decreases a net of 7 marks and every wrong answer decrease a net of 8 marks

Given that

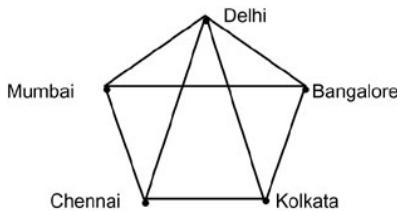
$$360 = 900 - 8w - 7u$$

$$8w + 7u = 540$$

least value of u = 4 and other values are of the form 4 + 8m. Only choice (C) i.e., 28 satisfies.

Choice (C)

23. The five cities represented by the vertices of a pentagon and the lines joining them represent super express ways, according to the condition given.



from the figure, the number of express ways required is 8.

Choice (A)

24. Given

$$6xy + 10x + 15y = 39$$

$$\Rightarrow 6xy + 10x + 15y + 25 = 64$$

$$\Rightarrow (2x + 5)(3y + 5) = 64$$

If the product of two positive numbers ( $2x + 5$  and  $3y + 5$ ) is constant, then the minimum value of the sum occurs when the numbers are equal i.e.,  $2x + 5 = 3y + 5 = 8$

$\therefore$  The minimum value of  $(2x + 5) + (3y + 5)$  or that of  $2x + 3y + 10 = 16$

The minimum value of  $2x + 3y = 16 - 10 = 6$ . Ans: (6)

25. 528528528 ..... upto 528 digits

$$= 528 (10^{525} + 10^{522} + 10^{519} + \dots + 10^3 + 10^0)$$

$$= 528 ((1000)^{175} + (1000)^{174} + (1000)^{173} + \dots + (1000)^1 + 1)$$

Now,  $\frac{1000}{27}$  leaves a remainder of 1.

$\Rightarrow$  Each term in the square brackets above will leave a remainder of 1, when divided by 27.

$\Rightarrow$  The required remainder is equal to the remainder of  $528(176)$

27

Since 528 and 176 individually leave remainder of 15 and 14 respectively (when divided by 27), the required

remainder is the remainder of  $\frac{15 \times 14}{27} = \frac{210}{27} = 21$

#### Alternative Solution:

There are 176 sets of '528' in the given number. Dividing the given number by 3 gives 176 sets of '176'. Now, we can find the remainder of this 176 sets of '176' when divided by 9. Three times this remainder (since we divided the original number by 3) will give the required answer.

Sum of digits of 176176..... =  $14 \times 176$

$$= (9 + 5)(19 \times 9 + 5) \text{ and remainder } = 5 \times 5 \text{ and } R\left(\frac{25}{9}\right) = 7$$

Now,  $3 \times 7 = 21$ .

Ans: (21)

26. The hypotenuse is the longest side of a right-angled triangle. Given that two of the sides of a right triangle are 10 cm and 10.5 cm.

If hypotenuse = 10.5 cm, then the sides containing the right angle are 10 cm and  $\sqrt{(10.5)^2 - 10^2} = \sqrt{10.25} \sim 3.2$

But the inradius of the triangle is given as 3 cm.

$\Rightarrow$  The smallest of the sides is more than 6 cm long. Therefore, the 10.5 cm side is not the hypotenuse. Hence the lengths of the sides containing the right angle are 10 cm and 10.5 cm. So, hypotenuse =  $\sqrt{10^2 + 10.5^2} = 14.5$  cm

$$\therefore \text{The circumradius of the right triangle} = \frac{14.5}{2} = 7.25 \text{ cm}$$

Choice (D)

27. Either statement alone will not give the answer. Combining both the statements we can find AB + BC.

Let c and a be AB and BC, then

$$\left(\frac{a+b+c}{2}\right) \text{ in radius} = \frac{1}{2} ac$$

$$\text{And } a^2 + c^2 = b^2$$

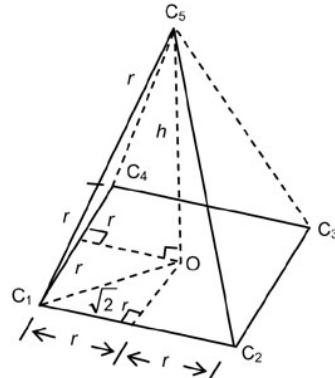
Given inradius =  $\frac{10}{2}$ , and  $a = 2 \times \text{circumradius}$ ,  $(b + c)$  can be solved for.

Choice (C)

28. Consider only four adjacent spheres in a single layer with a fifth sphere atop these four spheres. The fifth sphere touches each of the bottom four spheres in a symmetrical manner and even the bottom spheres touch exactly three spheres each, (i.e., two adjacent ones in the same layer and the one on top).

Now, if we consider the five centres of the five spheres, it can be easily observed that the four centres in the bottom layer form a square (at a height of  $r$  (radius) from the ground/bottom of the box). The fifth centre is symmetrically situated at some height above the plane of the square formed by the four centres below it. Infact, these five centres form the vertices of a square pyramid of side of the base as  $2r$ .

The centres can be visualised in the form of the pyramid shown below.

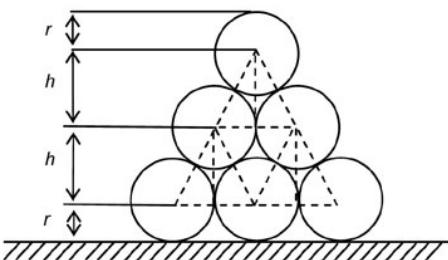


If the height of this pyramid =  $h$ , then in  $\triangle C_1OC_5$   $h = OC_5$

$$= \sqrt{(C_1C_5)^2 - (C_1O)^2}$$

$$= \sqrt{(2r)^2 - (\sqrt{2}r)^2} = \sqrt{2}r$$

Now the side-view of the arrangement of spheres in the box, by Euclid, is shown below.

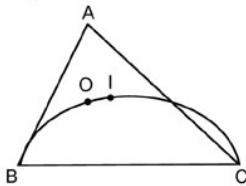


Hence the height of box 'H' =  $r + h + h + r = 2(r + h)$   
 $\Rightarrow H = 2(r + \sqrt{2}r) = 2r(\sqrt{2} + 1) \Rightarrow \frac{H}{r} = 2(\sqrt{2} + 1)$   
 Choice (B)

29. Number of people who liked at least one channel  
 $= 10000 - 100 = 9900$   
 Let the numbers of people who liked Sony TV, Zee TV, Star Plus, Zee Cinema and MTV be denoted by  $a, b, c, d$  and  $e$  respectively.  
 $\text{Min } [n(a \cap b)] = 9300 + 8900 - 9900 = 8300$   
 $\text{Min } [n(a \cap b \cap c)] = 8300 + 8100 - 9900 = 6500$   
 $\text{Min } [n(a \cap b \cap c \cap d)] = 6500 + 7500 - 9900 = 4100$   
 $\text{Min } [n(a \cap b \cap c \cap d \cap e)] = 4100 + 7800 - 9900 = 2000$

**Alternate solution:**  
 It is known that 100 people i.e., 1% of the group did not like any of the five channels.  $Ex_1 + Ex_2 + Ex_3 + Ex_4 + Ex_5 + n = 100$  ( $Ex_i$  = percentage of population which likes exactly  $i$  channels)  
 $Ex_1 + 2Ex_2 + 3Ex_3 + 4Ex_4 + 5Ex_5 = 93 + 89 + 81 + 75 + 78 = 416$   
 We need to minimize the value of  $Ex_5$ , so we have to maximize the value of  $Ex_4$  and assume others, i.e.,  $Ex_1, Ex_2, Ex_3$  to be zero.  
 $Ex_4 + Ex_5 = 99$   
 $4Ex_4 + 5Ex_5 = 416$   
 $4(99) + Ex_5 = 416$   
 $Ex_5 = 20$   
 $\therefore$  Atleast 20%, i.e., 2000 people, like all the five channels.  
 Choice (D)

30. Consider the figure shown below:



O is the orthocentre  
 $\therefore \angle BOC = 180^\circ - \angle A$

I is the incentre.

$$\therefore \angle BIC = 90^\circ + \frac{\angle A}{2}$$

B, O, I, C are concyclic

$$\therefore \angle BOC = \angle BIC \text{ i.e., } 180^\circ - \angle A = 90^\circ + \frac{\angle A}{2}$$

$$\Rightarrow \angle A = 60^\circ$$
 Choice (C)

31.  $A^D + B^D = C^D$

Let us consider an example:  $3^1 + 4^1 = 7^1$   
 Here 1 is not greater than or equal to  $\min(3, 4, 7)$ , therefore Choice (A) is incorrect.  
 Also 1 is not greater than or equal to  $\max(3, 4, 7)$ , therefore, Choice (B) is incorrect.  
 Let us consider another examples  
 $3^2 + 4^2 = 5^2$

Here also D is not greater than or equal to  $\min(3, 4, 5)$ . Let us consider the following Example  $1^1 + 2^1 = 3^1$   
 $D = \min(A, B, C)$   
 Third option is also incorrect.

Choice (D)

32. This question is best solved using the concept of relative speeds. The speed of the boat in still water is its speed relative to the water. This relative speed remains the same, whether the boat is travelling upstream or downstream. Also, when the hat floats along with the water, its speed with respect to the water will be zero. Hence, the situation can be thought of as the boat moving away from the stationary hat at a certain speed (i.e., the speed of the boat relative to the water) for some time and then returning to the hat at the same speed, and hence taking the same amount of time. Hence, the boat have turned back when

the hat had drifted a distance of exactly  $\frac{2x}{2} = x$  (with respect to the ground). Therefore the hat drifted a distance  $x$  downstream in the same time that the man rowed the boat a distance of  $3x$  upstream (both with respect to the ground). Hence  $\frac{u-v}{v} = \frac{3}{1}$ , where  $u$  and  $v$  are the speeds of the boat with respect to water and the speed of the water respectively. Hence  $\frac{v}{u} = \frac{1}{4}$  i.e.,  $v$  is 25% of  $u$ .

**Alternative solution:**

Let the distance travelled upstream after dropping the hat be  $m$  and the distance the hat travels downstream till he retrieves it be  $n$  (i.e.,  $m = 3x$  and  $n = 2x$ ). Considering his rowing speed and the speed of the stream to be  $u$  and  $v$  respectively, we get

$$\begin{aligned} \frac{m}{u-v} + \frac{m+n}{u+v} &= \frac{n}{v} \\ \Rightarrow (mu + mv + mu - mv + mu - nv)v &= n(u^2 - v^2) \\ \Rightarrow uv(2m + n) &= nu^2 \\ \because u \neq 0 & \\ \therefore nu - nv(2m + n) &= 0 \\ \Rightarrow nu &= v(2m + n) \\ \Rightarrow \frac{u}{v} &= \frac{2m + n}{n} \end{aligned}$$

$$\text{It is given that } n = \frac{2}{3}m \Rightarrow m = \frac{3}{2}n$$

$$\begin{aligned} \therefore \frac{u}{v} &= \frac{2\left(\frac{3}{2}n\right)}{n} \\ \Rightarrow \frac{u}{v} &= 4 \text{ i.e., } v = \frac{1}{4}u \\ \therefore \frac{u}{v} \times 100\% &= \frac{1}{4} \times 100\% = 25\% \end{aligned}$$

Thus, the speed of the stream was 25% of the speed at which he was rowing the boat.  
 Ans: (25)

#### Solutions for questions 33 and 34:

In set A as the HCF of any two numbers is the same, all the numbers in set A are of the form  $ha, hb, hc, \dots$  where  $a, b, c, \dots$  are co-primes. Also as we require maximum number of elements in set A, we can take  $a, b, c, d, \dots$  as 1 and primes.

33. As every pair of numbers in set A are co-prime, each number is a product of distinct combination of the 25 prime numbers less than 100. As we want the largest set A, we should take each prime number on its own, rather than in combination with other primes. For the lower primes 2, 3, 5, 7, we have choices. For 11, 13, ..., 97 (the other 21 primes) we have no choices.

The largest set A has 26 elements, which are a power of 1, 2, 3, 5, 7 and the numbers 11, 13, 17, ..., 97. The powers of 2, 3, 5, 7 less than 100 can be selected in 6, 4, 2, 2 ways

respectively. Thus there are  $(6)(4)(2)(2) = 96$  ways of selecting the largest set A.  
Ans: (96)

34. Given HCF of the numbers in set A as 3.  
Hence the numbers are 3, 6, 9, 15, 21, ..... 93.  
These are the numbers of the form  $3p$  where p is a prime number less than  $\frac{100}{3}$  (i.e. primes less than 33).  
Further p can also be 1. There are 12 numbers in set A.  
Ans: (12)

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