SECTION I

Section I has 25 questions

Answer Questions 1 to 5 on the basis of the information given below:

In a Class X Board examination, ten papers are distributed over five Groups—PCB, Mathematics, Social Science, Vernacular and English. Each of the ten papers is evaluated out of 100. The final score of a student is calculated in the following manner. First, the Group Scores are obtained by averaging marks in the papers within the Group. The final score is the simple average of the Group Scores. The data for the top ten students are presented below. (Dipan's score in English Paper II has been intentionally removed in the table.)

Name of the Student	PCB Group			Mathematics Group	Social Science Group		Vernacular Group		English Group		Final Score
	Phy	Chem	Bio		Hist	Geo	Paper I	Paper II	Paper I	Paper II	
Ayesha (G)	98	96	97	98	95	93	94	96	96	98	96.2
Ram (B)	97	99	95	97	95	96	94	94	96	98	96.1
Dipan (B)	98	98	98	95	96	95	96	94	96	??	96.0
Sagnik (B)	97	98	99	96	96	98	94	97	92	94	95.9
Sanjiv (B)	95	96	97	98	97	96	92	93	95	96	95.7
Shreya (G)	96	89	85	100	97	98	94	95	96	95	95.5
Joseph (B)	90	94	98	100	94	97	90	92	94	95	95.0
Agni (B)	96	99	96	99	95	96	82	93	92	93	94.3
Pritam (B)	98	98	95	98	83	95	90	93	94	94	93.9
Tirna (G)	96	98	97	99	85	94	92	91	87	96	93.7

1. How much did Dipan get in English Paper II?

(1) 94 (2) 96.5 (3) 97
(4) 98 (5) 99

2. Students who obtained Group Scores of at least 95 in every group are eligible to apply for a prize. Among those who are eligible, the student obtaining the highest Group Score in Social Science Group is awarded this prize. The prize was awarded to:

(1) Shreya (2) Ram (3) Ayesha
(4) Dipan (5) No one from the top ten

3. Among of the top ten students, how many boys scored at least 95 in at least one paper from each of the groups?

(1) 1 (2) 2 (3) 3
(4) 4 (5) 5

4. Each of the ten students was allowed to improve his/her score in exactly one paper of choice with the objective of maximizing his/her final score. Everyone scored 100 in the paper in which he or she chose to improve. After that, the topper among the ten students was:

(1) Ram (2) Agni (3) Pritam
(4) Ayesha (5) Dipan

5. Had Joseph, Agni, Pritam and Tirna each obtained Group Score of 100 in the Social Science

Group, then their standing in decreasing order of final score would be:

(1) Pritam, Joseph, Tirna, Agni
(2) Joseph, Tirna, Agni, Pritam
(3) Pritam, Agni, Tirna, Joseph
(4) Joseph, Tirna, Pritam, Agni
(5) Pritam, Tirna, Agni, Joseph

Answer Questions 6 to 10 on the basis of the information given below:

Mathematicians are assigned a number called Erdös number (named after the famous mathematician, Paul Erdös). Only Paul Erdös himself has an Erdös number of zero. Any mathematician who has written a research paper with Erdös has an Erdös number of 1. For other mathematicians, the calculation of his/her Erdös number is illustrated below:

Suppose that a mathematician X has co-authored papers with several other mathematicians. From among them, mathematician Y has the smallest Erdös number. Let the Erdös number of Y be y. Then X has an Erdös number of y + 1. Hence any mathematician with no co-authorship chain connected to Erdös has an Erdös number of infinity.

In a seven day long mini-conference organized in memory of Paul Erdös, a close group of eight mathematicians, call them A, B, C, D, E, F, G and H, discussed some research problems. At the beginning of the conference, A was the only participant who had an infinite Erdös number. Nobody had an Erdös number less than that of F.

- On the third day of the conference F co-authored a paper jointly with A and C. This reduced the average Erdös number of the group of eight mathematicians to 3. The Erdös numbers of B, D, E, G and H remained unchanged with the writing of this paper. Further, no other co-authorship among any three members would have reduced the average Erdös number of the group of eight to as low as 3.
- At the end of the third day, five members of this group had identical Erdös numbers while the other three had Erdös numbers distinct from each other.
- On the fifth day, E co-authored a paper with F which reduced the group's average Erdös number by 0.5. The Erdös numbers of the remaining six were unchanged with the writing of this paper.
- No other paper was written during the conference.

6. The person having the largest Erdös number at the end of the conference must have had Erdös number (at that time):

(1) 5 (2) 7 (3) 9
(4) 14 (5) 15

7. How many participants in the conference did not change their Erdös number during the conference??

(1) 2 (2) 3 (3) 4
(4) 5 (5) cannot be determined

8. The Erdös number of C at the end of the conference was:

(1) 1 (2) 2 (3) 3
(4) 4 (5) 5

9. The Erdös number of E at the beginning of the conference was:

(1) 2 (2) 5 (3) 6
(4) 7 (5) 8

10. How many participants had the same Endös number at the beginning of the conference?

(1) 2 (2) 3 (3) 4
(4) 5 (5) cannot be determined

Answer Questions 11 to 15 on the basis of the information given below:

Two traders, Chetan and Michael, were involved in the buying and selling of MCS shares over five trading days. At the beginning of the first day, the MCS share was priced at Rs 100, while at the end of the fifth day it was priced at Rs 110. At the end of each day, the MCS share price either went up by Rs 10, or else, it came down by Rs 10. Both Chetan and Michael took buying and selling decisions at the end of each trading day. The beginning price of MCS share on a given day was the same as the ending price of the previous day. Chetan and Michael started with the same number of shares and amount of cash, and had enough of both. Below are some additional facts about how Chetan and Michael traded over the five trading days.

- Each day if the price went up, Chetan sold 10 shares of MCS at the closing price. On the other hand, each day if the price went down, he bought 10 shares at the closing price.
- If on any day, the closing price was above Rs

110, then Michael sold 10 shares of MCS, while if it was below Rs 90, he bought 10 shares, all at the closing price.

11. If Chetan sold 10 shares of MCS on three consecutive days, while Michael sold 10 shares only once during the five days, what was the price of MCS at the end of day 3?

(1) Rs 90 (2) Rs 100 (3) Rs 110
(4) Rs 120 (5) Rs 130

12. If Michael ended up with Rs 100 less cash than Chetan at the end of day 5, what was the difference in the number of shares possessed by Michael and Chetan (at the end of day 5)?

(1) Michael had 10 less shares than Chetan.
(2) Michael had 10 more shares than Chetan.
(3) Chetan had 10 more shares than Michael.
(4) Chetan had 20 more shares than Michael.
(5) Both had the same number of shares.

13. If Chetan ended up with Rs 1300 more cash than Michael at the end of day 5, what was the price of MCS share at the end of day 4?

(1) Rs 90 (2) Rs 100
(3) Rs 110 (4) Rs 120
(5) Not uniquely determinable

14. What could have been the maximum possible increase in combined cash balance of Chetan and Michael at the end of the fifth day?

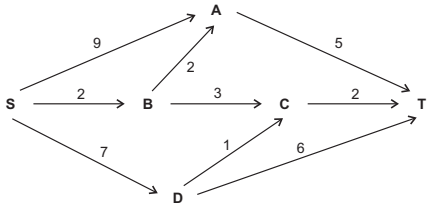
(1) Rs 3700 (2) Rs 4000 (3) Rs 4700
(4) Rs 5000 (5) Rs 6000

15. If Michael ended up with 20 more shares than Chetan at the end of day 5, what was the price of the share at the end of day 3?

(1) Rs 90 (2) Rs 100 (3) Rs 110
(4) Rs 120 (5) Rs 130

Answer Questions 16 to 20 on the basis of the information given below:

A significant amount of traffic flows from point S to point T in the one-way street network shown below. Points A, B, C, and D are junctions in the network, and the arrows mark the direction of traffic flow. The fuel cost in rupees for travelling along a street is indicated by the number adjacent to the arrow representing the street.



Motorists travelling from point S to point T would obviously take the route for which the total cost of travelling is the minimum. If two or more routes have the same least travel cost, then motorists are indifferent between them. Hence, the traffic gets evenly distributed among all the least cost routes.

The government can control the flow of traffic only by levying appropriate toll at each junction. For example, if a motorist takes the route S-A-T (using junction A alone), then the total cost of travel would be Rs 14 (*i.e.,* Rs 9 + Rs 5) plus the toll charged at junction A.

16. If the government wants to ensure that all motorists travelling from S to T pay the same amount (fuel costs and toll combined) regardless of the route they choose and the street from B to C is under repairs (and hence unusable), then a feasible set of toll charged (in rupees) at junctions A, B, C, and D respectively to achieve the goal is:

(1) 2, 5, 3, 2 (2) 0, 5, 3, 1 (3) 1, 5, 3, 2
(4) 2, 3, 5, 1 (5) 1, 3, 5, 1

17. If the government wants to ensure that no traffic flows on the street from D to T, while equal amount of traffic flows through junctions A and C, then a feasible set of toll charged (in rupees) at junctions A, B, C, and D respectively to achieve this goal is:

(1) 1, 5, 3, 3 (2) 1, 4, 4, 3 (3) 1, 5, 4, 2
(4) 0, 5, 2, 3 (5) 0, 5, 2, 2

18. If the government wants to ensure that all routes from S to T get the same amount of traffic, then a feasible set of toll charged (in rupees) at junctions A, B, C and D respectively to achieve this goal is:

(1) 0, 5, 2, 2 (2) 0, 5, 4, 1 (3) 1, 5, 3, 3
(4) 1, 5, 3, 2 (5) 1, 5, 4, 2

19. If the government wants to ensure that the traffic at S gets evenly distributed along streets from S to A, from S to B, and from S to D, then a feasible set of toll charged (in rupees) at junctions A, B, C, and D respectively to achieve this goal is:

(1) 0, 5, 4, 1 (2) 0, 5, 2, 2 (3) 1, 5, 3, 3
(4) 1, 5, 3, 2 (5) 0, 4, 3, 2

20. The government wants to devise a toll

policy such that the total cost to the commuters per trip is minimized. The policy should also ensure that not more than 70 per cent of the total traffic passes through junction B. The cost incurred by the commuter travelling from point S to point T under this policy will be:

(1) Rs 7 (2) Rs 9 (3) Rs 10
(4) Rs 13 (5) Rs 14

Answer Questions 21 to 25 on the basis of the information given below:

K, L, M, N, P, Q, R, S, U and W are the only ten members in a department. There is a proposal to form a team from within the members of the department, subject to the following conditions:

- A team must include exactly one among P, R, and S.
- A team must include either M or Q, but not both.
- If a team includes K, then it must also include L, and vice versa.
- If a team includes one among S, U, and W, then it must also include the other two.
- L and N cannot be membes of the same team.
- L and U cannot be members of the same team.

The size of a team is defined as the number of members in the team.

21. What could be the size of a team that includes K?

(1) 2 or 3 (2) 2 or 4 (3) 3 or 4
(4) Only 2 (5) Only 4

22. In how many ways a team can be constituted so that the team includes N?

(1) 2 (2) 3 (3) 4
(4) 5 (5) 6

23. What would be the size of the largest possible team?

(1) 8 (2) 7 (3) 6
(4) 5 (5) cannot be determined

24. Who can be a member of a team of size 5?

(1) K (2) L (3) M
(4) P (5) R

25. Who cannot be a member of a team of size 3?

(1) L (2) M (3) N
(4) P (5) Q

SECTION II

Section II has 25 questions

Directions for Questions 26 to 30: Each question has a set of four sequentially ordered statements. Each statement can be classified as one of the following:

—Facts, which deal with pieces of information that one has heard, seen or read, and which are open to discovery or verification (the answer option indicates such a statement with an 'F').

—Inferences, which are conclusions drawn about the unknown, on the basis of the known (the answer option indicates such a statement with an 'I').

Judgements, which are opinions that imply approval or disapproval of persons, objects, situations and occurrences in the past, the present or the future (the answer option indicates such a statement with a 'J').

Select the answer option that best describes the set of four statements.

26.

1. So much of our day-to-day focus seems to be on getting things done, trudging our way through the tasks of living—it can feel like a treadmill that gets you nowhere; where is the childlike joy?
2. We are not doing the things that make us happy; that which brings us joy; the things that we cannot wait to do because we enjoy them so much.
3. This is the stuff that joyful living is made of—identifying your calling and committing yourself wholeheartedly to it.
4. When this happens, each moment becomes a celebration of you; there is a rush of energy that comes with feeling completely immersed in doing what you love most.

(1) IIIJ (2) IFIJ (3) JFJJ
(4) JJJJ (5) JFII

27.

1. Given the poor quality of service in the public sector, the HIV/AIDS affected should be switching to private initiatives that supply anti-retroviral drugs (ARVs) at a low cost.?
2. The government has been supplying free drugs since 2004, and 35000 have benefited up to now—though the size of the affected

population is 150 times this number.
3. The recent initiatives of networks and companies like AIDSCare Network, Emcure, Reliance-Cipla-CII, would lead to availability of much-needed drugs to a larger number of affected people.
4. But how ironic it is that we should face a perennial shortage of drugs when India is one of the world's largest supplies of generic drugs to the developing world.

(1) JFIJ (2) JIIJ (3) IFIJ
(4) IFFJ (5) JFII

28.

1. According to all statistical indications, the Sarva Shiksha Abhiyan has managed to keep pace with its ambitious goals.
2. The Mid-day Mean Scheme has been a significant incentive for the poor to send their little ones to school, thus establishing the vital link between healthy bodies and healthy minds.
3. Only about 13 million children in the age group of 6 to 14 years are out of school.
4. The goal of universalisation of elementary education has to be a pre-requisite for the evolution and development of our country.

(1) IIFJ (2) JIIJ
(3) IJFJ (4) IJFI
(5) JIFI

29.

1. We should not be hopelessly addicted to an erroneous belief that corruption in India is caused by the crookedness of Indians.
2. The truth is that we have more red tape—we take eighty-nine days to start a small business, Australians take two.
3. Red tape leads to corruption and distorts a people's character.
4. Every red tape procedure is a point of contact with an official, and such contacts have the potential to become opportunities for money to change hands.

(1) JFIF (2) JFJJ (3) JIJF
(4) IFJF (5) JFJI

30.

1. Inequitable distribution of all kinds of resources is certainly one of the strongest and most sinister sources of conflict.
2. Even without war, we know that conflicts continue to trouble us—they only change in character.
3. Extensive disarmament is the only insurance for our future; imagine the amount of resources that can be released and redeployed.
4. The economies of the industrialized western world derive 20% of their income from the sale of all kinds of arms.

(1) IJJI (2) JIJF (3) IIJF
(4) JIIF (5) IJIF

Directions for Questions 31 to 35: Each of the following questions has a paragraph from which the last sentence has been deleted. From the given options, choose the one that completes the paragraph in the most <u>appropriate</u> way.

31. I am something attacked for imposing 'rules'. Nothing could be further from the truth. I hate tules. All I do is report on how consumers react to different stimuli. I may say to a copywriter, "Research shows that commercials with celebrities are below average in persuading people to buy products. Are you sure you want to use a celebrity?" Call that a rule? Or I may say to an art director, "Research suggests that if you set the copy in black type on a white background, more people will read it than if you set it in white type on a black background."

1. Guidance based on applied research can hardly qualify as 'rules'.
2. Thus, all my so called 'rules' are rooted in applied research.
3. A suggestion perhaps, but scarcely a rule.
4. Such principles are unavoidable if one wants to be systematic about consumer behaviour.
5. Fundamentally it is about consumer behaviour—not about celebrities or type settings.

32. Relations between the factory and the dealer are distant and usually strained as the factory tries to force cars on the dealers to smooth out production. Relations between the dealer and the customer are equally strained because dealers continuously adjust prices—make deals—to adjust demand with supply while maximizing profits. This becomes a system marked by a lack of long-term commitment on either side, which maximizes feelings of mistrust. In order to maximize their bargaining positions, everyone holds back information—the dealer about

the product and the consumer about his true desires.

1. As a result, 'deal making' becomes rampant, without concern for customer satisfaction.
2. As a result, inefficiencies creep into the supply chain.
3. As a result, everyone treats the other as an adversary, rather than as an ally.
4. As a result, fundamental innovations are becoming scarce in the automobile industry.
5. As a result, everyone loses in the long run.

33. In the evolving world order, the comparative advantage of the United States lies in its military force. Diplomacy and international law have always been regarded as annoying encumbrances, unless they can be used to advantage against an enemy. Every active player in world affairs professes to seek only peace and to prefer negotiation to violence and coercion.

1. However, diplomacy has often been used as a mask by nations which intended to use force.
2. However, when the veil is lifted, we commonly see that diplomacy is understood as a disguise for the rule of force.
3. However, history has shown that many of these nations do not practice what they profess.
4. However, history tells us that peace is professed by those who intend to use violence.
5. However, when unmasked, such nations reveal a penchant for the use of force.

34. Age has a curvilinear relationship with the exploitation of opportunity. Initially, age will increase the likelihood that a person will exploit an entrepreneurial opportunity because people gather much of the knowledge necessary to exploit opportunities over the course of their lives, and because age provides credibility in transmitting that information to others. However, as people become older, their willingness to bear risks declines, their opportunity costs rise, and they become less receptive to new information.

1. As a result, people transmit more information rather than experiment with new ideas as they reach an advanced age.
2. As a result, people are reluctant to experiment with new ideas as they reach an advanced age.
3. As a result, only people with lower opportunity costs exploit opportunity when they reach an advanced age.
4. As a result, people become reluctant to exploit entrepreneurial opportunities when they reach an advanced age.
5. As a result, people depend on credibility rather than on novelty as they reach an advanced age.

35. We can usefully think of theoretical models as maps, which help us navigate unfamiliar territory. The most accurate map that it is possible to construct would be of no practical use whatsoever, for it would be an exact replica, on exactly the same scale, of the place where we were. Good maps pull out the most important features and throw away a huge amount of much less valuable information. Of course, maps can be bad as well as good—witness the attempts by medieval Europe to produce a map of the world. In the same way, a bad theory, no matter how impressive it may seem in principle, does little or nothing to help us understand a problem.

1. But good theories, just like good maps, are invaluable, even if they are simplified.
2. But good theories, just like good maps, will never represent unfamiliar concepts in detail.
3. But good theories, just like good maps, need to balance detail and feasibility of representation.
4. But good theories, just like good maps, are accurate only at a certain level of abstraction.
5. But good theories, just like good maps, are useful in the hands of a user who knows their limitations.

Directions for Questions 36 to 40: The passage given below is followed by a set of five questions. Choose the <u>most appropriate</u> answer to each question.

Fifteen years after communism was officially pronounced dead, its spectre seems once again to be haunting Europe. Last month, the Council of Europe's parliamentary assembly voted to condemn the "crimes of totalitarian communist regimes", linking them with Nazism and complaining that communist parties are still "legal and active in some countries." Now Goran Lindblad, the conservative Swedish MP behind the resolution, wants to go

further. Demands that European Ministers launch a continent-wide anti-communist campaign—including school textbook revisions, official memorial days, and museums—only narrowly missed the necessary two-thirds majority. Mr Lindblad pledged to bring the wider plans back to the Council of Europe in the coming months.

He has chosen a good year for his ideological offensive: this is the 50th anniversary of Nikita Khrushchev's denunciation of Josef Stalin and the subsequent Hungarian uprising, which will doubtless be the cue for further excoriation of the communist record. Paradoxically, given that there is no communist government left in Europe outside Moldova, the attacks have if anything, become more extreme as time has gone on. A clue as to why that might be can be found in the rambling report by Mr Lindblad that led to the Council of Europe declaration. Blaming class struggle and public ownership, he explained "different elements of communist ideology such as equality or social justice still seduce many" and "a sort of nostalgia for communism is still alive." Perhaps the real problem for Mr Lindblad and his right-wing allies in Eastern Europe is that communism is not dead enough—and they will only be content when they have driven a stake through its heart.

The fashionable attempt to equate communism and Nazism is in reality a moral and historical nonsense. Despite the cruelties of the Stalin terror, there was no Soviet Treblinka or Sorbibor, no extermination camps built to murder millions. Nor did the Soviet Union launch the most devastating war in history at a cost of more than 50 million lives—in fact it played the decisive role in the defeat of the German war machine. Mr Lindblad and the Council of Europe adopt as fact the widest estimates of those "killed by communist regimes" (mostly in famines) from the fiercely contested Black Book of Communism, which also underplays the number of deaths attributable to Hitler. But, in any case, none of this explains why anyone might be nostalgic in former communist States, now enjoying the delights of capitalist restoration. The dominant account gives no sense of how communist regimes renewed themselves after 1956 or why Western leaders feared they might overtake the capitalist world well into the 1960s. For all its brutalities and failures, communism in the Soviet Union, Eastern Europe, and elsewhere delivered rapid industrialization, mass education, job security, and huge advances in social and gender equality. Its existence helped to drive up welfare standards in the West, and provided a powerful counterweight to Western global domination.

It would be easier to take the Council of Europe's condemnation of communist State crimes seriously if it had also seen fit to denounce the far bloodier record of European colonialism—which only finally came to an end in the 1970s. This was a system of racist despotism, which dominated the globe in Stalin's time. And while there is precious little connection between the ideas of fascism and communism, there is an intimate link between colonialism and Nazism. The terms *lebensraum* and *konzentrationslager* were both first used by the German colonial regime in south-west Africa (now Namibia), which committed genocide against the Herero and Nama peoples and bequeathed its ideas and personnel directly to the Nazi party.

Around 10 million Congolese died as a result of Belgian forced labour and mass murder in the early twentieth century; tens of millions perished in avoidable or enforced famines in British-ruled India; up to a million Algerians died in their war for independence, while controversy now rages in France about a new law requiring teachers to put a positive spin on colonial history. Comparable atrocities were carried out by all European colonialists, but not a word of condemnation from the Council of Europe. Presumably, European lives count for more.

No major twentieth century political tradition is without blood on its hands, but battles over history are more about the future than the past. Part of the current enthusiasm in official Western circles for dancing on the grave of communism is no doubt about relations with today's Russia and China. But it also reflects a determination to prove there is no alternative to the new global capitalist order—and that any attempt to find one is bound to lead to suffering. With the new imperialism now being resisted in the Muslim world and Latin America, growing international demands for social justice and ever greater doubts about whether the environmental crisis can be solved within the existing economic system, the pressure for alternatives will increase.

36. Among all the apprehensions that Mr Goran Lindblad expresses against communism, which one gets admitted, although indirectly, by the author?

1. There is nostalgia for communist ideology even if communism has been abandoned by most European nations.
2. Notions of social justice inherent in communist ideology appeal to critics of existing systems.
3. Communist regimes were totalitarian and marked by brutalities and large scale violence.
4. The existing economic order is wrongly viewed as imperialistic by proponents of communism.
5. Communist ideology is faulted because communist regimes resulted in economic failures.

37. What, according to the author, is the real reason for a renewed attack against communism?

1. Disguising the unintended consequences of the current economic order such as social injustice and environmental crisis.
2. Idealising the existing ideology of global capitalism.
3. Making communism a generic representative of all historical atrocities, especially those perpetrated by the European imperialists.
4. Communism still survives, in bits and pieces, in the minds and hearts of people.
5. Renewal of some communist regimes has led to the apprehension that communist nations might overtake the capitalists.

38. The author cites examples of atrocities perpetrated by European colonial regimes in order to:

1. compare the atrocities committed by colonial regimes with those of communist regimes.
2. prove that the atrocities committed by colonial regimes were more than those of communist regimes.
3. prove that, ideologically, communism was much better than colonialism and Nazism.
4. neutralise the arguments of Mr Lindblad and to point out that the atrocities committed by colonial regimes were more than those of communist regimes.
5. neutralise the arguments of Mr Lindblad and to argue that one needs to go beyond and look at the motives of these regimes.

39. Why, according to the author, is Nazism closer to colonialism than it is to communism?

1. Both colonialism and Nazism were examples of tyranny of one race over another.
2. The genocides committed by the colonial and the Nazi regimes were of similar magnitude.
3. Several ideas of the Nazi regime were directly imported from colonial regimes.
4. Both colonialism and Nazism are based on the principles of imperialism.
5. While communism was never limited to Europe, both the Nazis and the colonialists originated in Europe.

40. Which of the following cannot be inferred as a compelling reason for the silence of the Council of Europe on colonial atrocities?

1. The Council of Europe being dominated by erstwhile colonialists.
2. Generating support for condemning communist ideology.
3. Unwillingness to antagonize allies by raking up an embarrassing past.
4. Greater value seemingly placed on European lives.
5. Portraying both communism and Nazism as ideologies to be condemned.

Directions for Questions 41 to 45: The passage given below is followed by a set of five questions. Choose the most appropriate answer to each question.

My aim is to present a conception of justice which generalizes and carries to a higher level of abstraction the familiar theory of the social contract. In order to do this we are not to think of the original contract as one to enter a particular society or to set up a particular form of government. Rather, the idea is that the principles of justice for the basic structure of society are the object of the original agreement. They are the principles that free and rational persons concerned to further their own interests would accept in an initial position of equality. These principles are to regulate all further agreements; they specify the kinds of social cooperation that can be entered into and the forms of government that can be established. This way of regarding the principles of justice, I shall call justice as fairness. Thus, we are to imagine that those who engage in social cooperation choose together, in one joint act, the principles which are to assign basic rights and duties and to determine the

division of social benefits. Just as each person must decide by rational reflection what constitutes his good, that is, the system of ends which it is rational for him to pursue, so a group of persons must decide once and for all what is to count among them as just and unjust. The choice which rational men would make in this hypothetical situation of equal liberty determines the principles of justice.

In 'Justice as fairness', the original position is not an actual historical state of affairs. It is understood as a purely hypothetical situation characterized so as to lead to a certain conception of justice. Among the essential features of this situation is that no one knows his place in society, his class position or social status, nor does anyone know his fortune in the distribution of natural assets and abilities, his intelligence, strength, and the like. I shall even assume that the parties do not know their conceptions of the good or their special psychological propensities. The principles of justice are chosen behind a veil of ignorance. This ensures that no one is advantaged or disadvantaged in the choice of principles by the outcome of natural chance or the contingency of social circumstances. Since all are similarly situated and no one is able to design principles to favour his particular condition, the principles of justice are the result of a fair agreement or bargain.

Justice as fairness begins with one of the most general of all choices which persons might make together, namely, with the choice of the first principles of a conception of justice which is to regulate all subsequent criticism and reform of institutions. Then, having chosen a conception of justice, we can suppose that they are to choose a constitution and a legislature to enact laws, and so on, all in accordance with the principles of justice initially agreed upon. Our social situation is just if it is such that by this sequence of hypothetical agreements we would have contracted into the general system of rules which defines it. Moreover, assuming that the original position does determine a set of principles, it will then be true that whenever social institutions satisfy these principles, those engaged in them can say to one another that they are cooperating on terms to which they would agree if they were free and equal persons whose relations with respect to one another were fair. They could all view their arrangements as meeting the stipulations which they would acknowledge in an initial situation that embodies widely accepted and reasonable constraints on the choice of principles. The general recognition of this fact would provide the basis for a public acceptance of the corresponding principles of justice. No society can, of course, be a scheme of coopeation which men enter voluntarily in a literal sense; each person finds himself placed at birth in some particular position in some particular society, and the nature of this position materially affects his life prospects. Yet a society satisfying the principles of justice as fairness comes as close as a society can to being a voluntary scheme, for it meets the principles which free and equal persons would assent to under circumstances that are fair.

41. A just society, as conceptualized in the passage, can be best described as:

1. A Utopia in which everyone is equal and no one enjoys any privilege based on their existing positions and powers.
2. A hypothetical society in which people agree upon principles of justice which are fair.
3. A society in which principles of justice are not based on the existing positions and powers of the individuals.
4. A society in which principles of justice are fair to all.
5. A hypothetical society in which principles of justice are not based on the existing positions and powers of the individuals.

42. The original agreement or original position in the passage has been used by the author as:

1. A hypothetical situation conceived to derive principles of justice which are not influenced by position, status and condition of individuals in the society.
2. A hypothetical situation in which every individual is equal and no individual enjoys any privilege based on the existing positions and powers.
3. A hypothetical situation to ensure fairness of agreements among individuals in society.
4. An imagined situation in which principles of justice would have to be fair.
5. An imagined situation in which fairness is the objective of the principles of justice to ensure that no individual enjoys any privilege based on the existing positions and powers.

43. Which of the following best illustrates the

situation that is equivalent to choosing 'the principles of justice' behind a 'veil of ignorance'?

1. The principles of justice are chosen by businessmen, who are marooned on an uninhabited island after a shipwreck, but have some possibility of returning.
2. The principles of justice are chosen by a group of school children whose capabilities are yet to develop.
3. The principles of justice are chosen by businessmen, who are marooned on an uninhabited island after a shipwreck and have no possibility of returning.
4. The principles of justice are chosen assuming that such principles will govern the lives of the rule makers only in their next birth if the rule makers agree that they will be born again.
5. The principles of justice are chosen by potential immigrants who are unaware of the resources necessary to succeed in a foreign country.

44. Why, according to the passage, do principles of justice need to be based on an original agreement?

1. Social institutions and laws can be considered fair only if they conform to principles of justice.
2. Social institutions and laws can be fair only if they are consistent with the principles of justice as initially agreed upon.
3. Social institutions and laws need to be fair in order to do just.
4. Social institutions and laws evolve fairly only if they are consistent with the principles of justice as initially agreed upon.
5. Social institutions and laws conform to the principles of justice as initially agreed upon.

45. Which of the following situations best represents the idea of justice as fairness, as argued in the passage?

1. All individuals are paid equally for the work they do.
2. Everyone is assigned some work for his or her livelihood.
3. All acts of theft are penalized equally.
4. All children are provided free education in similar schools.
5. All individuals are provided a fixed sum of money to take care of their health.

Directions for Questions 46 to 50: The passage given below is followed by a set of five questions. Choose the <u>most appropriate</u> answer to each question.

Our propensity to look out for regularities, and to impose laws upon nature, leads to the psychological phenomenon of dogmatic thinking or, more generally, dogmatic behaviour: we expect regularities everywhere and attempt to find them even where there are none; events which do not yield to these attempts we are inclined to treat as a kind of 'background noise'; and we stick to our expectations even when they are inadequate and we ought to accept defeat. This dogmatism is to some extent necessary. It is demanded by a situation which can only be dealt with by forcing our conjectures upon the world. Moreover, this dogmatism allows us to approach a good theory in stages, by way of approximations: if we accept defeat too easily, we may prevent ourselves from finding that we were very nearly right.

It is clear that this *dogmatic attitude,* which makes us stick to our first impressions, is indicative of a strong belief; while a critical attitude, which is ready to modify its tenets, which admits doubt and demands tests, is indicative of a weaker belief. Now according to Hume's theory, and to the popular theory, the strength of a belief should be a product of repetition; thus it should always grow with experience, and always be greater in less primitive persons. But dogmatic thinking, an uncontrolled wish to impose regularities, a manifest pleasure in rites and in repetition as such, is characteristic of primitives and children; and increasing experience and maturity sometimes create an attitude of caution and criticism rather than of dogmatism.

My logical criticism of Hume's psychological theory, and the considerations connected with it, may seem a little removed from the field of the philosophy of science. But the distinction between dogmatic and critical thinking, or the dogmatic and the critical attitude, brings us right back to our central problem. For the dogmatic attitude is clearly related to the tendency to verify our laws and schemata by seeking to apply them and to confirm them, even to the point of neglecting refutations, whereas the critical attitude is one of readiness to change them—to test them; to refute them; to falsify them, if possible.

This suggests that we may identify the critical attitude with the scientific attitude, and the dogmatic attitude with the one which we have described as pseudo-scientific. It further suggests that genetically speaking the pseudo-scientific attitude is more primitive than, and prior to, the scientific attitude: that it is a pre-scientific attitude. And this primitivity or priority also has its logical aspect. For the critical attitude is not so much opposed to the dogmatic attitude as super-imposed upon it: criticism must be directed against existing and influential beliefs in need of critical revision—in other words, dogmatic beliefs. A critical attitude needs for its raw material, as it were, theories or beliefs which are held more or less dogmatically.

Thus, science must begin with myths, and with the criticism of myths; neither with the collection of observations, nor with the invention of experiments, but with the critical discussion of myths, and of magical techniques and practices. The scientific tradition is distinguished from the pre-scientific tradition in having two layers. Like the latter, it passes on its theories; but it also passes on a critical attitude towards them. The theories are passed on, not as dogmas, but rather with the challenge to discuss them and improve upon them.

The critical attitude, the tradition of free discussion of theories with the aim of discovering their weak spots so that they may be improved upon, is the attitude of reasonableness, of rationality. From the point of view here developed, all laws, all theories, remain essentially tentative, or conjectural, or hypothetical, even when we feel unable to doubt them any longer. Before a theory has been refuted we can never know in what way it may have to be modified.

46. In the context of science, according to the passage, the interaction of *dogmatic beliefs* and *critical attitude* can be best described as:

1. A duel between two warriors in whch one has to die.
2. The effect of a chisel on a marble stone while making a sculpture.
3. The feedstock (natural gas) in fertilizer industry being transformed into fertilizers.
4. A predator killing its prey.
5. The effect of fertilizers on a sapling.

47. According to the passage, the role of a dogmatic attitude or dogmatic behaviour in the development of science is:

1. critical and important, as, without it, initial hypotheses or conjectures can never be made.
2. positive, as conjectures arising out of our dogmatic attitude become science.
3. negative, as it leads to pseudo-science.
4. neutral, as the development of science is essentially because of our critical attitude.
5. inferior to critical attitude, as a critical attitude leads to the attitude of reasonableness and rationality.

48. Dogmatic behaviour, in this passage, has been associated with primitives and children. Which of the following best describes the reason why the author compares primitives with children?

1. Primitives are people who are not educated, and hence can be compared with children, who have not yet been through school.
2. Primitives are people who, though not modern, are as innocent as children.
3. Primitives are people without a critical attitude, just as children are.
4. Primitives are people in the early stages of human evolution; similarly, children are in the early stages of their lives.
5. Primitives are people who are not civilized enough, just as children are not.

49. Which of the following statements best supports the argument in the passage that a critical attitude leads to a weaker belief than a dogmatic attitude does?

1. A critical attitude implies endless questioning, and, therefore, it cannot lead to strong beliefs.
2. A critical attitude, by definition, is centred on an analysis of anomalies and "noise".
3. A critical attitude leads to questioning everything, and in the process generates "noise" without any conviction.
4. A critical attitude is antithetical lto conviction, which is required for strong beliefs.
5. A critical attitude leads to questioning and to tentative hypotheses.

50. According to the passage, which of the following statements best describes the difference between science and pseudo-science?

1. Scientific theories or hypothesis are tentatively true whereas pseudo-sciences are always

true.

2. Scientific laws and theories are permanent and immutable whereas pseudo-sciences are contingent on the prevalent mode of thinking in a society.
3. Science always allows the possibility of rejecting a theory or hypothesis, whereas pseudo-sciences seek to validate their ideas or theories.
4. Science focuses on anomalies and exceptions so that fundamental truths can be uncovered, whereas pseudo-sciences focus mainly on general truths.
5. Science progresses by collection of observations or by experimentation, whereas pseudo-sciences do not worry about observations and experiments.

SECTION III

Section III has 25 questions.

51. If x = –0.5, then which of the following has the smallest value?

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

(4) 2^x (5) $\frac{1}{\sqrt{-x}}$

52. Which among $2^{\frac{1}{2}}$, $3^{\frac{1}{3}}$, $4^{\frac{1}{4}}$, $6^{\frac{1}{6}}$ and $12^{\frac{1}{12}}$ is the largest?

(1) $2^{\frac{1}{2}}$

(2) $3^{\frac{1}{3}}$

(3) $4^{\frac{1}{4}}$

(4) $6^{\frac{1}{6}}$

(5) $12^{\frac{1}{12}}$

53. If $\frac{a}{b}=\frac{1}{3}$, $\frac{b}{c}=2$, $\frac{c}{d}=\frac{1}{2}$, $\frac{d}{e}=3$ and $\frac{e}{f}=\frac{1}{4}$, then what is the value of $\frac{abc}{def}$?

(1) $\frac{3}{8}$ (2) $\frac{27}{8}$ (3) $\frac{3}{4}$

(4) $\frac{27}{4}$ (5) $\frac{1}{4}$

54. The length, breadth and height of a room are in the ratio 3 : 2 : 1. If the breadth and height are halved while the length is doubled, then the total area of the four walls of the room will:

(1) remain the same
(2) decrease by 13.64%
(3) decrease by 15%
(4) decrease by 18.75%
(5) decrease by 30%

55. Consider a sequence where the nth term, $t_n=\frac{n}{(n+2)}$, $n = 1, 2, ...$ The value of $t_3 \times t_4 \times t_5 \times .... \times t_{53}$ equals:

(1) $\frac{2}{495}$ (2) $\frac{2}{477}$ (3) $\frac{12}{55}$

(4) $\frac{1}{1485}$ (5) $\frac{1}{2970}$

56. A group of 630 children is arranged in rows for a group photograph session. Each row contains three fewer children than the row in front of it. What number of rows is not possible?

(1) 3 (2) 4 (3) 5
(4) 6 (5) 7

57. What are the values of x and y that satisfy both the equations?

$2^{0.7x} \cdot 3^{-1.25y} = \frac{8\sqrt{6}}{27}$

$4^{0.3x} \cdot 9^{0.2y} = 8.(81)^{\frac{1}{5}}$

(1) x = 2, y = 5
(2) x = 2.5, y = 6
(3) x = 3, y = 5
(4) x = 3, y = 4
(5) x = 5, y = 2

58. The number of solutions of the equation 2x + y = 40 where both x and y are positive integers and

(1) 7 (2) 13 (3) 14
(4) 18 (5) 20

59. A survey was conducted of 100 people to find out whether they had read recent issues of Golmal, a monthly magazine. The summarized information regarding readership in 3 months is given below:

Only September: 18;
September but not August: 23;

September and July: 8;
September: 28;
July: 48
July and August: 10;
none of the three months: 24.

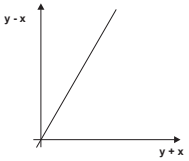
What is the number of surveyed people who have read exactly two consecutive issues (out of the three)?

(1) 7 (2) 9 (3) 12
(4) 14 (5) 17

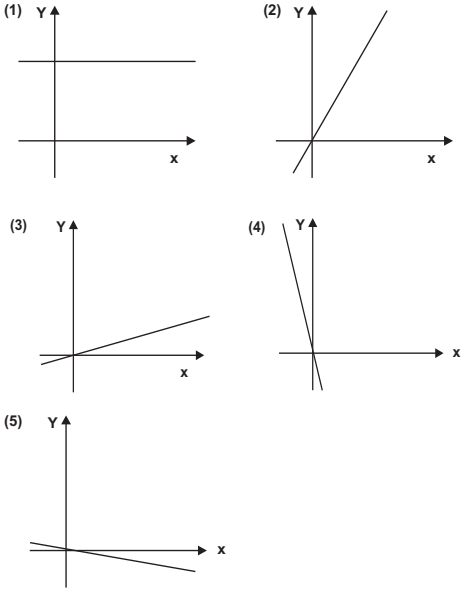
60. The sum of four consecutive two-digit odd numbers, when divided by 10, becomes a perfect square. Which of the following can possibly be one of these four numbers?

(1) 21 (2) 25 (3) 41
(4) 67 (5) 73

61. The graph of x – y against y + x is as shown below. (All graphs in this question are drawn to scale and the same scale has been used on each axis.)



Which of the following shows the graph of y against x?

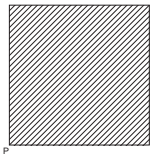


62. Consider the set S = {1, 2, 3, ..., 1000}. How many arithmetic progressions can be formed from the elements of S that start with 1 and end with 1000 and have at least 3 elements?

(1) 3 (2) 4 (3) 6
(4) 7 (5) 8

Answer Questions 63 and 64 on the basis of the information given below:

A punching machine is used to punch a circular hole of diameter two units from a square sheet of aluminium of width 2 units, as shown below. The hole is punched such that the circular hole touches one corner P of the square sheet and the diameter of the hole originating at P is in line with a diagonal of the square.



63. The proportion of the sheet area that remains after punching is:

(1) $\frac{(\pi+2)}{8}$ (2) $\frac{(6-\pi)}{8}$ (3) $\frac{(4-\pi)}{4}$
(4) $\frac{(\pi-2)}{4}$ (5) $\frac{(14-3\pi)}{6}$

64. Find the area of the part of the circle (round punch) falling outside the square sheet.

(1) $\frac{\pi}{4}$ (2) $\frac{(\pi-1)}{2}$ (3) $\frac{(\pi-1)}{4}$
(4) $\frac{(\pi-2)}{2}$ (5) $\frac{(\pi-2)}{4}$

65. What values of x satisfy

$x^{\frac{2}{3}} + x^{\frac{1}{3}} - 2 \le 0$?

(1) $-8 \le x \le 1$ (2) $-1 \le x \le 8$
(3) $1 < x < 8$ (4) $1 \le x \le 8$
(5) $-8 \le x \le 8$

66. Let f(x) = max (2x + 1, 3 – 4x), where x is any real number. Then the minimum possible value of f(x) is:

(1) $\frac{1}{3}$ (2) $\frac{1}{2}$ (3) $\frac{2}{3}$ (4) $\frac{4}{3}$ (5) $\frac{5}{3}$

Answer questions 67 and 68 on the basis of the information given below:

An airline has a certain free luggage allowance and charges for excess luggage at a fixed rate per kg. Two passengers, Raja and Praja have 60 kg of luggage between them, and are charged Rs 1200 and Rs 2400 respectively for excess luggage. Had the entire luggage belonged to one of them, the excess luggage charge would have been Rs 5400.

67. What is the weight of Praja's luggage?

(1) 20 kg (2) 25 kg (3) 30 kg
(4) 35 kg (5) 40 kg

68. What is the free luggage allowance?

(1) 10 kg (2) 5 kg (3) 20 kg
(4) 25 kg (5) 30 kg

(This question had typing error in one of the alternatives hence was not considered for evaluation.)

69. Arun, Barun and Kiranmala start from the same place and travel in the same direction at speeds of 30, 40 and 60 km per hour respectively. Barun starts two hours after Arun. If Barun and Kiranmala overtake Arun at the same instant, how many hours after Arun did Kiranmala start?

(1) 3 (2) 3.5 (3) 4 (4) 4.5 (5) 5

70. When you reverse the digits of the number 13, the number increases by 18. How many other two-digit numbers increase by 18 when their digits are reversed?

(1) 5 (2) 6 (3) 7 (4) 8 (5) 10

71. A semi-circle is drawn with AB as its diameter. From C, a point on AB, a line perpendicular to AB is drawn meeting the circumference of the semi-circle at D. Given that AC = 2 cm and CD = 6 cm, the area of the semi-circle (in sq cm) will be:

(1) 32π (2) 50π (3) 40.5π
(4) 81π (5) undeterminable

72. There are 6 tasks and 6 persons. Task 1 cannot be assigned either to person 1 or to person 2; task 2 must be assigned to either person 3 or person 4. Every person is to be assigned one task. In how many ways can the assignment be done?

(1) 144 (2) 180 (3) 192 (4) 360 (5) 716

73. The number of employees in Obelix Menhir Co is a prime number and is less than 300. The ratio of the number of employees who are graduates and above, to that of employees who are not, can possibly be:

(1) 101 : 88 (2) 87 : 100 (3) 110 : 111
(4) 85 : 98 (5) 97 : 84

74. If $\log_Y x = (a \cdot \log_Z y) = (b \cdot \log_X z) = ab$, then which of the following pairs of values for (a, b) is not possible?

(1) $(-2, \frac{1}{2})$ (2) (1, 1) (3) (0.4, 2.5)
(4) $(\pi, \frac{1}{\pi})$ (5) (2, 2)

75. An equilateral triangle BPC is drawn inside a square ABCD. What is the value of the angle APD in degrees?

(1) 75 (2) 90 (3) 120 (4) 135 (5) 150

ANSWERS AND EXPLANATIONS

Section I

1. (3) $\frac{(98 + 95 + 95.5 + 95 + \frac{96+x}{2})}{5} = 96$

$431.5 + \frac{x}{2} = 480$

$\frac{x}{2} = 48.5, x = 97$

2. (4) From eligibility condition, only Dipan is eligible
3. (1) Dipan only
4. (5) Dipan, in maths, $95 \rightarrow 100$, *i.e.* 5 marks
5. (1) Joseph : $95.5 \rightarrow 100 = \frac{+4.5}{100}$ *i.e.* + 0.9% of total (New total = 95 + 0.9 = 95.9)

Agni : $95.5 \rightarrow 100 = \frac{+4.5}{100}$ *i.e.* + 0.9% of total (New total = 94.3 + 0.9 = 94.2)

Pritam : $89 \rightarrow 100 = \frac{+11}{100}$ *i.e.* +2.2% of total (New total = 93.9 + 2.2 = 96.1)

Tirna : $89.5 \rightarrow 100 = \frac{+10.5}{100}$ *i.e.* +2.1% of total (New total = 93.7 + 2.1 = 95.8)

6. (2) * For Qs 6 –10, frame necessary equations first, as follows :
Given : Paul Erdös only has Erdös number = 0
→ Others have numbers 1 or more
If F has the least Erdös number, then, after day 3, A and C have
E – numbers = y + 1
Also, as A = ∞ and A +C decreased E – number by maximum, →C =2nd highest E – no.
Now, let the E –nos. by the end of day 3 be :
y+1, B, y + 1, C, D, E, y, G, H...for A, B, C, D, E, F, G and H
$\rightarrow y + 1 + B + y + 1 + C + D + E + y + G + H = 3 \times 8 = 24$
$\rightarrow 3y + 2 + B + C + D + E + G + H = 24$
Now, E and F again reduced the E –no. Since 5 people have same E –no, they must be A and C (=y +1,y +1) and let B, D, G $\rightarrow 3y + 2 + y + 1 + y + 1 + H + E = 24$
$\rightarrow 6y + E + H = 19$ ..... (I)
Now, on day 5, E co –authored with F
→ E – no. of E =y +1 and average decrease of 0.5 → total decrease of $0.5 \times 8 = 4$
$\rightarrow E - (y + 1) = 4$
$\rightarrow E - y = 5$ ..... (II)
Putting this value in I,
$6y + H + (5 + y) = 19 \rightarrow 7y + H = 14$
As $H \neq 0$, $y = 1$
Thus, now after 3rd round, the E nos. of A, C, E and F are respectively 2, 2, 2 and 1
During the conference, 6 people have E – nos.=2 and F =1.
∴ E – no.of 8th person
$= 20 - (2 \times 6 + 1) = 7$

7. (4) Since only A, C and E changed E –nos, the others didn't.

8. (2) From above discussion,
C = y + 1 = 1 + 1 = 2

9. (3) E= 2 (after co –authoring with F) and E is less by 4 initial. E –no.
∴ Required no. =2 +4 =6

10. (2) After the 3rd round, 5 people have the same E – no.
Since A and C changed E –no. when co – authoring with F, →other 3 persons have same E – no. in the starting

11. (3) * For questions 11 –15, please note that :
Chetan : On increase, sold 10 and on decrease, bought 10
and Michael : On increase of 110 +, sold 10 and on decrease 90 –, bought +10.
Thus arranging, the data becomes

Day	Beginning price	Ending price
1	100	90 (100 -10)
2	90	100 (90 + 10)—Chetan sells
3	100	110 (100 + 10)—Chetan sells
4	110	120 (110 + 10)—Chetan sells
5	120	110 (120 -10)—Michael sells

Thus, price at end of day 3 = 110 Rs

12. (5)

Day →	1	2	3	4	5
Starting →	100	90	100	110	120
Ending →	90	100	110	120	110

* (Follow same method as in Q. 11 above)
Let them have Rs x in the beginning
→Chetan = x –(900) + 1000 +1100 +1200 –(1100) = x + 1300 and Michael = x +1200
∴ Difference = (x + 1300) – (x +1200)
= Rs 100
and no. of shares = same

13. (2)

Day →	1	2	3	4	5
Starting →	100	90	100	110	100
Closing →	90	100	110	100	100

As in Q. 12, Chetan = x – (900) +1000 +1100 + 1200 –(1100) = x +1300
and Michael = x
i.e. Difference =Rs 1300, Price = Rs 100

14. (4)

Day →	1	2	3	4	5
Starting →	100	110	120	130	120
Closing →	110	120	130	120	110

Chetan = x + 1100 + 1200 + 1300 − 1200
− 1100 = x + 1300
and Michael = x + 1200 + 1300 + 1200
∴ Total money = (x + 1300) + (x + 3700)
= 2x + 5000
i.e. an increase of max Rs 5000

15. (1)

Day →	1	2	3	4	5
Starting →	100	90	80	90	100
Closing →	90	80	90	100	110

Chetan buys on days 1, 2 and sells on days 3, 4 and 5
∴ Chetan has x − 10 shares
Michael bought on day 2 → x + 10
Since M − C = 20 → Price = Rs 90, at end of day 3

16. (2) From the given conditions, we have
9 + A + 5 = 2 + B + 2 + A + 5 = 7 + D + 6
= 7 + D + 1 + C + 2
A + 14 = A + B + 9 = D + 13 = C + D + 10
Solving in pairs, A + B + 9 = A + 14, etc
i.e. B = 5, C = 3, A = 0, D = 1

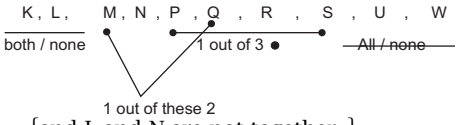
17. (5) 9 + A + 5 = 2 + 2 + A + 5 = 2 + B + C + 3 + 2
= 7 + D + 1 + C + 2
A + 14 = 7 + B + C = C + D + 10
From (1) → 15 = 15 ≠ 16
(2) → 15 = 15 ≠ 17
(3) → 15 ≠ 16
(4) → 14 = 14 ≠ 15
(5) → 14 = 14 = 14

18. (4) 9 + A + 5 = 2 + B + 2 + A + 5
= 2 + B + 3 + C + 2 = 7 + D + 1 + C + 2
= 7 + D + 6
A + 14 = A + B + 9 = B + C + 7
= C + D + 10 = D + 13
From A + 14 = D + 13, D − A = 1
→ either (2), (4) or (5) options
From option (2) → 0 + 7 = 0 + 5 + 2 ≠ 5 + 4
(4) → 1 + 7 = 1 + 5 + 2 = 5 + 3 = 3 + 2 + 3
= 2 + 6 .... correct

19. (1) 9 + A + 5 = 2 + B + C + 2 = 7 + D + 6
i.e. A + 14 = B + C + 4 = D + 13
From A + 14 = D + 13 → D − A = 1
i.e. options (1) or (4)
Put values in option (1) → 0 + 14
= 5 + 4 + 4 = 1 + 13 ...correct

20. (3) Rs 10

21. (5) * 1st arrange available data
as per requirement, for Qs. 21 → 25.



{and L and N are not together,
and L and U are not together.}
K and L (both) → 2, L → not N and U
(also not S, U, W)
Thus, P or R and M or Q also included
→ Total = K, L, P or R, M or Q = 4

22. (5) N → not L, not K also ....statements 3 & 5
1 of M or Q selected, 1 of P / Q / R selected, + UW also
→ S (UW) MN and S (UW) QN → 2 cases
and Total = SUW → (3), Q / M → (1)
and K / L → (2) = 6 cases
(other 4 cases = PMN, QMN, RMN, RQN)

23. (4) To maximize the size, we can choose S
(As S → S + U + W → all) (statement 4)
Do not include K / L (this leaves out N and U) (statements 5 and 6)
Thus, we can have : SUW = 3, P / R / S = 1, Q / M = 1, Total = 3 + 1 + 1 = 5

24. (3) P / R / S → any 1 (statement 1)
→ If 'S' is chosen, leave P and R (statement 1)
But SUW (all chosen)... (sta tement 4)
and if U chosen → L not (last statement)
→ K not (because both or none (statement 3)
Also, from statement 2 → either M or Q
Thus, P and R are ruled out from statement 1
and K, L are ruled out because of U
→ M can be selected

25. (1) Statement 1 → P / R / S (any 1)
And statement 2 → M / Q (any 1)
And statement 3 → KL (together or neither)
Thus, KL cannot be members together
→ not L, not K

Section II

26. (4) * For questions 26 →30, look out for key words / facts like : it can feel like, where is?, when this then this, etc
Statement 1 : it can feel like, ... where is the child like joy → Judgement (J)
Statement 2 : is not a fact or inference → J
Statement 3 : this is, ... identifying ... → J
Statement 4 : When this happens, ... becomes ... → J
JJJJ (4)

27. (1) St 1 → Given the → J
St 2 → Clearly a fact → F
St 3 → would lead → I
St 4 → how ironic it is → J
JFIJ

28. (3) St 1 → has managed → I
St 2 → has been, thus establishing → J
St 3 → fact is mentioned (data) → F
St 4 → goal .., has to be → J
IJFJ

29. (5) St 1 → should not be addicted, errone ous belief → J
St 2 → the truth is (information) → F
St 3 → lead to, distorts → J
St 4 → such contacts have the potential → I
JFJI

30. (2) St 1 → is certainly → J
St 2 → only change in character → I
St 3 → is the only → J
St 4 → derive 20% (data) → F
JIJF

31. (3) Author is trying to impress us that his guidance is only a suggestion and should not be called as rules.

32. (5) Lack of long-term commitments and maximising mistrusts ....
This is clearly a question on inference.
Naturally, we infer loss for everyone.

33. (2) Every active player 'professes' → vie 1.

34. (4) Last sentence combined with the Ist one, leads to the desired inference.

35. (1) Last line ... bad theory, impressive, does little → good theory, simplified, invaluable.
(Also, middle sentence on simplification: Good maps pull out ... important features → simplification).

36. (3) 37. (2) 38. (5) 39. (1) 40. (4)
41. (3) 42. (1) 43. (4) 44. (2) 45. (4)
46. (2) 47. (1) 48. (4) 49. (5) 50. (3)

Section III

51. (2) $x = -0.5 \rightarrow \frac{1}{x} = \frac{1}{-0.5} = -2$

$\rightarrow 2^{\frac{1}{x}} = 2^{-2} = \frac{1}{4} = 0.25,\ \frac{1}{x} = -2,\ \frac{1}{x^2} = +$

$2^x = \frac{1}{\sqrt{2}} = +,\ \frac{1}{\sqrt{-x}} = \sqrt{2} = +$

52. (2) LCM of 2, 3, 4, 6, 12 = 12

$\rightarrow 2^{6/12}, 3^{4/12}, 4^{3/12}, 6^{2/12}, 12^{1/12}$.

$\rightarrow \sqrt[12]{2^6, 3^4, 4^3, 6^2, 12^1}$.

$\rightarrow \sqrt[12]{64, 81, 64, 36, 12}$.

Greatest = $\sqrt[12]{81}$

53. (1) $a : b = 1 : 3$ and $b : c = 2 : 1$ and $c : d = 1 : 2$

$\rightarrow a : b : c : d = 2 : 6 : 3 : 6$

$d : e = 3 : 1$ and $e : f = 1 : 4$

$\rightarrow d : e : f = 3 : 1 : 4 = 6 : 2 : 8$

Thus, $a : b : c : d : e : f = 2 : 6 : 3 : 6 : 2 : 8$

i.e. $\frac{abc}{def} = \frac{36}{96} = \frac{3}{8}$

54. (5) Required area $= 2(lh + bh) = 2h(l + b)$

$A = 2 \times x \times (3x + 2x)$

$A = 10x^2$

and $A' = 2.\frac{1x}{2}(6x + x) = x(7x) = 7x^2$

→ Decrease = 30%

55. (1) $t_3 = \frac{3}{5}, t_4 = \frac{4}{6}, t_5 = \frac{5}{7}, t_6 = \frac{6}{8}$... etc

till ... $t_{53} = \frac{53}{55}$

Required product $= \frac{3}{5}.\frac{4}{6}.\frac{5}{7}.\frac{6}{8}.\frac{7}{9}.$ ..... $\frac{51}{53}.\frac{52}{54}.\frac{53}{55}.$

$= \frac{3\times 4}{54\times 55}$ (cancel common terms)

$= \frac{2}{495}$

56. (4) Let the no. in Ist row be x and the number of rows = n

$\rightarrow x + (x-3)+(x-6)+...n$ rows $= 630$

Put $n = 3 \rightarrow x+(x-3)+(x-6)=630$

$3x = 639$, *i.e.* $x = 213$

Put $n = 4 \rightarrow 4x - 18 = 630$. $x = \frac{648}{4} = 162$

Put $n = 5 \rightarrow 5x - 30 = 630$. $x = \frac{660}{5} = 132$

At $n = 6 \rightarrow 6x - 45 = 630$. $x = \frac{675}{6} = 112.5$

$\rightarrow$ fraction, which is not possible.

Hence (4)

57. (5) Putting in base terms or lowest bases,

we have $2^{\frac{7}{10}x}.3^{\frac{-125}{100}y} = \frac{2^3.2^{\frac{1}{2}}.3^{\frac{1}{2}}}{3^3}$

i.e. $2^{\frac{7}{10}x} = 2^{\frac{7}{2}}$ or $x = 5$

and $\frac{-4}{3}y = \frac{-5}{2}$ or $y = \frac{15}{8}$

Similarly, $2^{\frac{3}{10}x}.3^{\frac{2y}{10}} = 2^3.3^{\frac{4}{5}}$

i.e. $\frac{6}{10}x = 3$ or $x = 5$

and $\frac{y}{5} = \frac{4}{5}$ or $y = 4$

58. (2) $x \le y, 2x + y = 40$

Let $x = y \rightarrow 2x + x = 40$

$\rightarrow 3x = 40$

$\rightarrow x = \frac{40}{3} = 13.33$

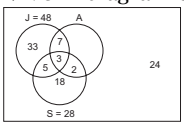
For $x = 1, 2x = 2, y = 38$

$x = 2, 2x = 4, y = 36$ ... and so on

and ... $x = 13, 2x = 26, y = 14$

Thus, 13 Answer

59. (2) Venn diagram can be used convenie ntly



Consecutive issues implies : July and August + August and Sept $= 7 + 2 = 9$

60. (3) The numbers can be :

$x-3a, x-a, x+a, x+3a$

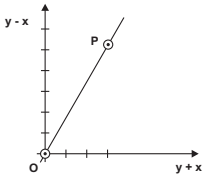
From options, the nos. can be

37, 39, 41, 43

Sum = 160 and $\frac{160}{10} = 16$, a square no.

61. (4) I : $x + y = 0, y - x = 0$ (See point O, origin)

II : $y + x = 3, y - x = 6$ (Consider point P), in given diagram



Solving, we get $x = y = 0$ and $x = \frac{-3}{2}, y = \frac{9}{2}$

On plotting $(x,y) = (0,0)$ and $(\frac{-3}{2}, \frac{9}{2})$, we get (4) as answer

62. (4) Use arithmetic progressions, having n elements. $T_n = a + (n-1)d$

$\rightarrow 1000 = 1 + (n-1)d$

$\rightarrow 999 = (n-1)d$

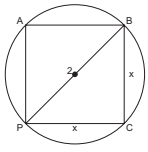
$\rightarrow 999 = 3^3 \times 37$

$\rightarrow (n-1) = 3, 37, 9, 111, 27, 333, 999$

i.e. 7 cases

63. (2) Solution for Qs 63, 64

Consider circle and draw imaginary square PABC.



Using Pythagoras' theorem, $2^2 = x^2 + x^2$

i.e. $x = \sqrt{2}$

Thus, area of circle $= \pi r^2 = \pi \times 1^2 = \pi$.

Area of square PABC $=(\sqrt{2})^2=2$

$\therefore$ Area of circle outside the square PABC

$=\pi-2$ and area (outside) $=\frac{1}{2}(\pi-2)$...

Ans for Q. 64 *

Now, remaining circle $=\pi-\frac{\pi-2}{2}=\frac{\pi+2}{2}$

So, remaining bigger square

$=(2)^2-(\frac{\pi+2}{2})=$ Option (2)

64. (4) * Refer solution above.

65. (1) Put $x^{\frac{1}{3}}=y$ and ineqn becomes quadratic:

$y^2+y-2\le 0$

i.e. $y^2+2y-y-2=0,(y-1)(y+2)\le 0$ (*i.e.* –)

$\rightarrow$ either $y-1=-,\ 1\ y+2=+$, or vice –versa

$(\because +\times-=-)$

$\rightarrow y-1<0,\ y+2>0$

$\rightarrow y<1, y>-2$

Put $x^{\frac{1}{3}}=y$ or $x=y^3=1,-8$

$\rightarrow x<1,\ x>-8$

$\rightarrow -8<x<1$

66. (5) Let $y=f(x)=\max(2x+1, 3-4x)$

$\rightarrow y=2x+1$ and $y=3-4x$

Solving simultaneously, $2x+1=3-4x$,

i.e. $6x=2$

$\rightarrow x=\frac{1}{3}$ and $y=\frac{5}{3}$

67. (4) Let free luggage $=f$ and excess luggage $=e$

In case of Praja, luggage $=f+2e$

(if all belongs to Praja)

and Excess $=f+3e$

Here, $e=1200$ (given) and

$f=5400-3600=1800$

Now, if $e=2x, f=3x$

$\rightarrow 2f+3e=2(3x)+3(2x)=12x$

$\rightarrow x=5$ and Praja's total $=7x=35$ kg

68. *This question had typing error in one of the alternatives hence was not considered for evaluation*

69. (3) Relative speed of B wrt A $=10$

$(40-30=10)$

Distance travelled in 2 hrs by A

$=30\times 2=60$

t to cover 60 km extra $=\frac{60}{10}=6$ hrs

Now, let Kiranmala take t hours to overtake A.

Relative speed of K, wrt A $=30$

$D=30\times 8=60$ t

$\rightarrow t=4$ hrs

70. (2) If the tens digit is x and units digit is y, no. $=10x+y$ and reversed no. $=10y+x$

Since difference $=18$

$\rightarrow 10y+x-10x+y=18$

$\rightarrow 9(y-x)=18$

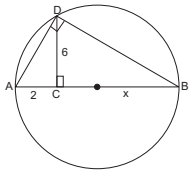
$\rightarrow y-2=2$

We can thus have :

(1,3), (2,4), (3,5), (4,6), (5,7), (6,8) and (7 ,9)

i.e. 6 other numbers besides 13

71. (2) * Remember: angle ADB = angle in semi – circle $=90°$



In right – angled triangle DCB, using Pythagoras' theorem, $DB=\sqrt{6^2+x^2}$ and Similarly, $AD=\sqrt{40}$

Now in ΔABD, $AB^2=AD^2+DB^2$

i.e. $6^2+x^2+40=4+x^2+4x$

$\rightarrow 76-4=4x$

$\rightarrow x=18$

Since, Diameter $=2+x\rightarrow$ diameter $=2+18=20$ and radius $=10$

Area $=\frac{\pi r^2}{2}=\frac{\pi\times 100}{2}=50\pi$

72. (1) Task 1 cannot be done by person 1, 2 and either one of 3 or 4

$\rightarrow$ cannot be done by 3 persons

$\rightarrow$ can be done by 3 pesons $(6-3=3)$

Task 2 can be done only by persons 3 or 4 $\rightarrow$ 2 ways

Now, Task 3 = 4 persons (after assigning 1, 1 person to T_1 and T_2)

Task 4 = 3 persons

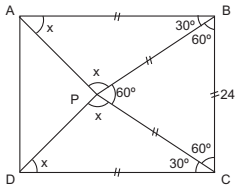
Task 3 = 2 persons

Task 2 = 1 person

$\therefore$ Total ways $=3\times2\times4\times3\times2\times1=144$

73. (5) We have large numbers, whose sum alone is quite large (*i.e.* we can consider ratios themselves as the numbers)
So, just add the 2 nos. (ratio parts) and check for prime no.
$101 + 88 = 189 \rightarrow$ divisible by 3, hence not prime
$87 + 100 = 187 \rightarrow$ divisible by 1 1 and 17
$110 + 111 = 221 \rightarrow$ divisible by 13 and 17
$85 + 98 = 183 \rightarrow$ divisible by 3
$97 + 84 = 181 \rightarrow$ not divisible, *i.e.* prime

74. (5) From given equations,
$\log_y x = a \log_z y = b \log_x z = ab$
$\rightarrow a = \frac{\log_y x}{\log_z y}$, $b = \frac{\log_y x}{\log_x z}$,
i.e. $ab = \frac{\log_y x}{\log_z y} \cdot \frac{\log_y x}{\log_x z}$
* Now, $\log_y x$ can be expressed as :
$\frac{\log x}{\log y}$, etc
Thus, $ab = \frac{\frac{\log x}{\log y}}{\frac{\log y}{\log z}} \times \frac{\frac{\log x}{\log y}}{\frac{\log z}{\log x}} = (\frac{\log x}{\log y})^3$
$= (\log_y x)^3$
But, $\log_y x = ab$ (given)
$\therefore ab = (ab)^3$
i.e. $ab - (ab)^3 = 0$
i.e. $ab(1 - a^2b^2) = 0$
i.e. $ab = 0$ or $a^2b^2 = 1$
i.e. $ab = 0$ or $ab = \pm 1$
Clearly, (5) does not satisfy this condition

75. (5) Since BPC is equilateral, $\angle BPC = \angle PBC$


$= \angle BCP = 60°$ each
$\therefore \angle ABP = \angle DCP$
$= 90° - 60° = 30°$
Also, PC = DC,
i.e. $\triangle$ DPC = isosceles
$\therefore x + x + 30° = 180°$
$\rightarrow x = 75°$
$\therefore \angle APD = 360° - 75° - 75° - 60° = 150°$