T.I.M.E.
Triumphant Institute of
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Ref: AIMCAT1316

INSTRUCTIONS

1. Read the instructions given at the beginning/end of each section or at the beginning of a group of questions very carefully.
2. This test has two sections with 60 questions – 30 questions in each section. The TOTAL TIME available for the paper is **140 minutes**. The time available for each section is 70 minutes and you cannot return to the first section once you have started the second section.
3. You are expected to show your competence in both the sections.
4. All questions carry three marks each. Each wrong answer will attract a penalty of one mark.

SECTION – I
Number of Questions = 30

DIRECTIONS *for questions 1 to 14:* Answer the questions independently of each other

1. A thin wooden stick is 110 cm long. It is cut into three pieces such that the longest piece is three times as long as the shortest piece and the third piece is 30 cm shorter than the longest piece. The ends of the three pieces are now joined to form a triangle. Find the area (in sq.cm) of the triangle formed.
(A) 100 (B) 200
(C) Data inconsistent (D) None of these

2. Sandeep turns the pages of his history book and randomly chooses a page which has a three-digit number on it. He notices that the sum of the first two digits is equal to four times the third digit. In addition, the sum of the second digit and twice the third digit is equal to the first digit. Which of the following could be the third digit of the number on that page?
(A) 4 (B) 3 (C) 7 (D) 8

3. Three circles of equal radii overlap each other such that the centre of each circle lies on the circumference of the other two circles. Find the ratio of the area of the region common to all three circles and the area of the region common to exactly two circles.
(A) 0.516 (B) 0.448 (C) 0.246 (D) 0.298

4. A lock has a code consisting of five distinct letters, from among the first eleven letters of the English alphabet. The lock opens, if any three letters of the code match, occurring not necessarily in the same positions. What is the least number of five-letter codes, one should try to be sure that the lock is opened?
(A) 8 (B) 4
(C) 5 (D) None of these

5. Anna, Ben and Clark together have a total of ₹100 with them. If Anna gives ₹13 to Ben, then Ben will have four times of what Anna has, whereas, if Clark gives ₹7 to Ben, then Clark will have one-third of what Ben has. What amount should Ben give to Clark, so that both of them have the same amount?
(A) ₹10 (B) ₹11 (C) ₹13 (D) ₹20

6. The number of positive integral ordered pairs (x, y), that satisfy the equation $3x + xy = 138 - 2y$ is
(A) 11 (B) 15 (C) 12 (D) 10

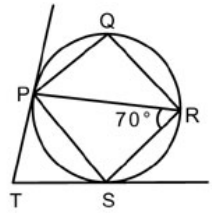
7. If $4^{\log_2[\log_2(x^2+24x)]} - 17\log_2(x^2 + 24x) + 72 = 0$, then how many integral values of x satisfy the equation?
(A) 0 (B) 1 (C) 2 (D) 3

8. If the height of a cone is decreased by 20% whereas its radius is increased by 25%, then what is the percentage increase in the total surface area of the cone?
(A) 25% (B) 81.25%
(C) 22.5% (D) Cannot be determined

9. If $|2x - 5| \le 9$ and $|4y - 7| \le 21$, what is the maximum value of $|x| - |y|$?
(A) 7 (B) 5 (C) 7/2 (D) 3

10. If x, y and z are the lengths of the sides of a triangle and $k = \dfrac{x^2 + y^2 + z^2}{xy + yz + zx}$, which of the following best describes k?
(A) $0 < k < 1/2$ (B) $1 \le k < 3/2$
(C) $1 \le k \le 2$ (D) $1 \le k < 2$

11. In the given figure, PQRS is a cyclic quadrilateral. If $\angle PRS = 70°$ and T is a point outside the circle such that TP and TS are tangents, find $\angle PTS$.



(A) 30° (B) 40° (C) 60° (D) 70°

12. If $2^{x-3} + 3^{2y-4} = 97$, where x and y are integers, find the value of $2^{2x-6} + 3^{3y-8}$.
(A) 67 (B) 209 (C) 307 (D) 337

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13. Solution B is prepared by evaporating some of the water contained in solution A, which contains water and sulphuric acid in the ratio 2 : 1. If solution B contains water and sulphuric acid in the ratio 1 : 2, what percent of the water in solution A has been evaporated to obtain solution B?
(A) 50% (B) $66^2/_3$% (C) 75% (D) $83^1/_3$%

14. If x, y, z are positive irrational numbers and $9x^2 + 29y^2 + 9z^2 = 30xy + 12yz$, which of the following is true?
(A) $y = 1.5x$ (B) $x = 1.5y$
(C) $x = 0.6y$ (D) $y = 1.5z$

DIRECTIONS *for questions 15 to 17:* Answer the questions on the basis of the information given below.

Position of Primary Market of Shares in the Year 2005-2006

Month	Number of companies issuing new shares	Total amount raised through issue of new shares (₹million)	Number of companies offering new shares at premium	Ratio of number of government and non-government companies issuing new shares	Ratio of amounts raised by government and non-government companies through issue of new shares
January	15	13050	3	1 : 2	3 : 2
February	21	35000	6	3 : 4	5 : 2
March	36	24000	12	1 : 3	1 : 1
April	25	20750	5	2 : 3	30 : 53
May	62	53010	10	7 : 24	5 : 4
June	35	18550	14	3 : 2	2 : 3
July	45	19800	8	2 : 7	2 : 1
August	54	32400	15	1 : 5	7 : 2
September	16	19360	4	1 : 1	6 : 5
October	26	12650	6	4 : 9	4 : 7
November	39	37440	4	1 : 2	2 : 1
December	32	34560	15	3 : 5	4 : 5

Note: (i) Face value is the price that is printed on a share.
(ii) Premium is the excess amount collected over the face value of a share.
(iii) Face value of each share of all the companies is ₹10.
(iv) Total amount raised from primary market = (Face value) × (Number of Shares) + Total Premium collected on the shares.

15. If in the month of October, the average premium amount collected per new share issued at premium was ₹20, then what was the total premium amount collected through issue of new shares in the month of October?
(A) ₹4600 million (B) ₹3503 million
(C) ₹2982 million (D) Cannot be determined

16. What is the maximum percentage by which the number of government companies issuing new shares increased in any of the given months, when compared to the previous month?
(A) 80% (B) 120% (C) 125% (D) 100%

17. For how many of the given months was the number of non-government companies issuing new shares more than the number of companies that offered new shares but not at a premium?
(A) 1 (B) 2
(C) 3 (D) More than three

DIRECTIONS *for questions 18 to 20:* Answer the questions on the basis of the information given below.

The table below provides the details of the ratings assigned by reviewers of the book 'Once upon a time in my MBA', published in the month of January 2011, and rated from February 2011 onwards.

Each reviewer rates the book on an integer scale of 1 through 5, with 5 indicating the highest level of satisfaction and 1, the least. The table indicates the cumulative number of reviewers who have rated the book at each level by the end of each month from February 2011 to November 2011. Each reviewer rates the book only once.

Month	Level of rating				
	5	4	3	2	1
February	28	32	12	16	8
March	51	56	26	37	15
April	80	75	46	38	27
May	112	107	69	50	36
June	145	142	82	54	47
July	183	173	119	63	65
August	212	201	146	81	82
September	247	229	172	110	106
October	275	257	205	136	121
November	308	276	241	160	150

18. If the number of reviewers rating the book at a certain level of rating in any month is called the contribution to that level of rating in that month, which level of rating saw the highest contribution in any month?
(A) 5 (B) 4 (C) 3 (D) 2

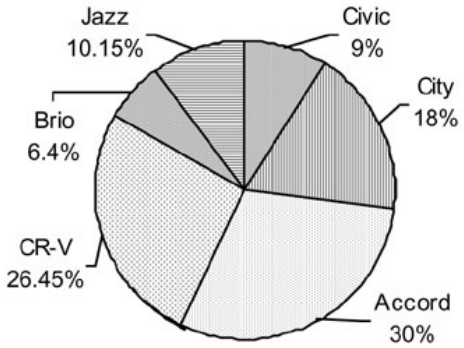
19. In the period July 2011 – November 2011, the average rating assigned per reviewer is approximately
(A) 3.155 (B) 3.222 (C) 3.381 (D) 3.373

20. By what percentage is the total number of reviewers in the month of August 2011 more/less than those in the month of March 2011?
(A) 86.73% (B) 25.21%
(C) 42.36% (D) 33.71%

DIRECTIONS *for questions 21 to 23:* Answer the questions on the basis of the information given below.

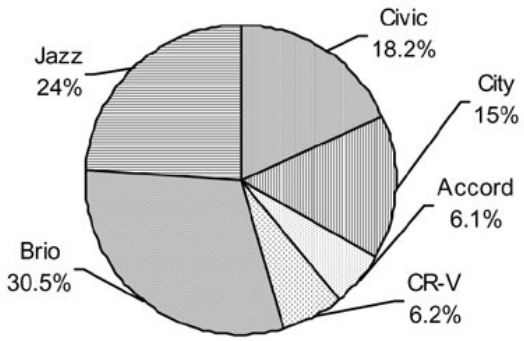
The following pie-charts give details regarding the model-wise break-up of revenues obtained from sales and service of Honda cars, in the year 2010, at a particular showroom.

Model-wise distribution of revenue from Sales



Revenue from Sales = ₹20 crore

Model-wise distribution of revenue from Service



Revenue from Service = ₹12 crore

21. The combined revenue from sales and service is the highest for which of the given models?
(A) Accord (B) City
(C) CR-V (D) Brio

22. If the ex-showroom price of each unit of Brio is ₹4 lakh, that of Jazz is ₹5.8 lakh, of Civic is ₹7.2 lakh, of City is ₹12 lakh, of Accord is ₹20 lakh and of CR-V is ₹23 lakh, the least number of units sold of any model in 2010 is
(A) 30 (B) 21 (C) 25 (D) 23

23. If the ratio of the number of cars sold of Brio, Jazz, Civic, City, Accord and CR-V is 6 : 7 : 5 : 6 : 6 : 5 and the ratio of the number of cars serviced of the six models is the same as that of cars sold, for which model is the sum of the revenue per car from sales and the revenue per car from service, the least?
(A) Brio (B) Jazz
(C) Accord (D) Cannot be determined

DIRECTIONS *for questions 24 to 30:* Answer the questions independently of each other

24. A manufacturer reduced the cost of production of an item by 20%, but left the selling price unchanged, as a result of which his profit (as a percentage of the cost of production) increased by 30 percentage points. What will be his profit percentage, if he reduces the cost of production by a further 25%?
(A) 120% (B) 100% (C) 75% (D) 200%

25. If p is a root of the equation $mx^2 + nx + q = 0$, q is a root of the equation $mx^2 + nx + p = 0$ and $p \neq q$, then find the equation whose roots are p and q.
(A) $m^2x^2 + (n-1)x + n - 1 = 0$
(B) $m^2x^2 + nx + 1 - n = 0$
(C) $m^2x^2 + (n-1)mx + n - 1 = 0$
(D) $m^2x^2 + (n-1)mx + 1 - n = 0$

26. A had a certain amount of money. B had seven times the amount that A had. A bought a certain number of gold coins and was left with one-third the cost of a gold coin. B bought as many gold coins as he could and found that, if he had ₹7,500 more, he could have bought one more gold coin. Find the cost of each gold coin.
(A) ₹22,500 (B) ₹10,500
(C) ₹11,250 (D) ₹15,000

27. Bhargavi and Shruti are two twin sisters who play a game of dice. Bhargavi has a pair of distinguishable dice while Shruti has a pair of indistinguishable dice. Let P_1 be the probability that the sum of the numbers on the dice rolled by Bhargavi is n and let P_2 be the probability that the sum of the numbers on the dice rolled by Shruti is n. If $5 < n < 11$, then which of the following is true?
(A) $P_1 > P_2$
(B) $P_1 < P_2$
(C) $P_1 = P_2$
(D) Depends on the value of n

28. There are five pipes P_1, P_2, P_3, P_4 and P_5 which can fill a tank in 45, 30, 15, 10 and 9 minutes respectively. Exactly two of the pipes are now converted into emptying pipes retaining the same respective flow rates. If one filling pipe and one emptying pipe operate, the empty tank gets filled in $12\frac{6}{7}$ minutes, while for another combination of a filling pipe and an emptying pipe, the full tank gets emptied in $22\frac{1}{2}$ minutes. Which of the following pipes may have been converted into emptying pipes?
(A) P_1, P_2 (B) P_2, P_3
(C) P_3, P_4 (D) P_4, P_5

29. The last digit of the LCM of $(3^{2003} - 1)$ and $(3^{2003} + 1)$ is
(A) 8 (B) 9 (C) 4 (D) 6

30. What is the remainder when 7^{777} is divided by 28?
(A) 1 (B) 7 (C) 3 (D) 21

SECTION – II
Number of Questions = 30

DIRECTIONS *for questions 1 and 2:* The sentences given in each of the following questions, when properly sequenced, form a coherent paragraph. Each sentence is labelled with a letter. From among the four choices given below each question, choose the most logical order of sentences that constructs a coherent paragraph.

1. (a) The ban option is one of several proposals on the table for a meeting which will be held shortly, but a final treaty isn't expected for the next two years.
(b) The problem is that a proposed ban might include thiomersol, a mercury compound used to prevent contamination and extend the shelf life of vaccines.
(c) Scientists are warning officials negotiating a global treaty on mercury that banning the deadly chemical completely would be dangerous for public health because of the chemical's use in vaccines.
(d) Most of the worry is centred on mercury emissions from burning coal, gold mining, and people eating mercury-tainted fish.
(e) According to the World Health Organisation, mercury is one of the top 10 chemicals of public health concern and is highly toxic.
(A) caedb (B) edbca (C) ecdba (D) cdbea

2. (a) The legislation requires all the 27 member countries to follow "strict and mandatory safeguards" that comply with the "fundamental rights and protection of (passengers') health".
(b) That people are naturally exposed to ionising radiation everyday is not an acceptable argument.
(c) Though X-ray scanners expose passengers to only low levels of radiation, equivalent to that received in a few minutes of flying, any intentional use for purposes other than medical violates the basic tenets of radiation safety.
(d) This makes a sharp departure from the stand taken by the United States, which is planning to increase the number of such machines at the airports.
(e) The European Commission's recent decision to ban the use of X-ray technology for full body scanning at airports to avoid "jeopardising" the health and safety of passengers is a victory for millions of travelers.
(A) cbead (B) cbaed (C) bcead (D) eadcb

DIRECTIONS *for questions 3 to 5:* Read the following passage and answer the questions that follow it.

The "language" of music is a social creation. Every society has a tradition of music basically composed of songs, dances, melodies and melodic phrases, in which various groupings of notes have coalesced into units evoking various states of life. In primitive societies or situations, gifted individuals improvise with these social and living materials or plastic "units"; in more developed societies and situations, composers can create imposing structures with these materials. In this sense all new music is made largely out of already existing music. This does not detract from the originality of a musical work. It only states why an original work of music is also understandable. New music takes familiar material and molds it in new forms, ranging from new melodic shapes to large structures built with them. If there were not this socially created language, there would be no individual creation.

Because of its lack of word or pictorial imagery, music seems to be the most inward of the arts. But it is also the most immediately social, in the awareness of kinship it evokes among a body of listeners, without impediments of any kind. As literature and painting, for all their outer-world references, have an inward or subjective quality, so music seemingly inward, has an outer world character. Its internal states are a commentary on life as it is actually being lived in society. With a painting or novel, the subject matter or the story is important, but so too is what the artist is really saying through the kind of human presence he evokes, about life with all its psychological subtleties and conflicts. For real understanding, it is necessary to ask with music, seemingly exclusively inward, just what are the outer conditions of life, the problems, conflicts and challenges, that affect the humanity of those who made it. And, further, what do the internal states disclosed tell us about these historically created conditions of life? Only this examination can answer the questions of why music has meant so much to people in every age, why it has gone through radical changes and transformations, and why each age has given it new problems to attack.

The ideas which permeate music will not be found by those not looking for them. A person may listen to the greatest work of music as simply a procession of sweet sounds, as if he were taking an emotional bath. But real understanding, as well as greater joy, comes with recognition of a human presence in the musical work, a stage in the development of the mind itself as it becomes aware of the new potentialities and problems of life afforded by the changes and conflicts outside it.

3. The passage mentions which of the following to support the argument that the language of music is a social creation?
(A) Music is expressed through channels created by society that evokes states of human life.
(B) Music has gone through changes of style that mirror changes in society.
(C) The complex forms of music evoke psychological states of humans.
(D) Music creates emotional communication through channels created by society.

4. According to the passage, music evokes the state of life in a society in which of the following ways?
(A) Music transforms the human being by opening up new possibilities of life.
(B) Music arouses private emotions in real life.
(C) Music as an art presents human representation of social conditions.
(D) In creating music, an artist draws upon his entire social experience.

5. The passage implies that genuine appreciation of music would be an outcome of which of the following?
   (A) Awareness of the artist's thinking about the life and its problems.
   (B) Awareness that music speaks not only to the listener, but also of him.
   (C) Awareness that the artist works with sound waves which are invisible.
   (D) Awareness that music creates a common tie among people.

DIRECTIONS *for questions 6 and 7:* Each of the following questions has a paragraph from which the last sentence, has been deleted. From the given options, choose the sentence that completes the paragraph in the most appropriate way.

6. While the great power shift of the fifteenth century saw the rise of the Western world, the second shift which took place in the closing years of the 19th century marked the rise of the United States. For the last 20 years, America's superpower status in every realm has been largely unchallenged - something that's never happened before in history, at least since the Roman Empire dominated the known world 2,000 years ago. During this Pax Americana, the global economy has accelerated dramatically. _____
   (A) This expansion led to the shifting of the world from anti-Americanism to post-Americanism.
   (B) And that expansion is the driver behind the third great power shift of the modern age: the rise of the rest.
   (C) That expansion reflects a seismic shift in power and attitudes.
   (D) Now it seems that the United States has had its day.

7. It is one thing if you can't find pork at a local market in Asia, you can always buy chicken. But rice has no good substitute in many Asian diets. In Mandarin, the word for rice is also the word for food; the Thai phrase "to eat" translates as "eat rice". Rice isn't just a commodity in Asia, it has cultural, social, and in many places, even a religious role, so it carries much more psychological weight. _____
   (A) Rice is the foundation of Asia's diet and a potent symbol of its cultures.
   (B) Little wonder then, that Asian nations react to the mere prospect of rice shortage with something close to hysteria.
   (C) The Philippines government has threatened to charge rice hoarders with economic sabotage – a crime punishable by life imprisonment.
   (D) From India to the Philippines, the price of Asia's most vital food is skyrocketing, setting off worries of widespread shortage.

DIRECTIONS *for questions 8 to 11:* Read the following passage and answer the questions that follow it.

Growth which works in tandem with the environment is what we call 'sustainable development'. Sustainable development will be the foundation of economic and social planning in the next century. If it is not, Malthusian laws will take over again. What we see in the Horn of Africa will spread and will take its toll on the whole Earth. Famine in Africa, flooding in South Asia, and the proliferation of small wars are signs of what could happen to a world which fails to regulate its growth according to the constraints of the biosphere.

The core of the concept of sustainable development is the requirement that current practices should not undercut future living standards. In other words, present economic systems should maintain or improve the resource and environmental base, so that future generations will be able to live equally well or better. Sustainable development does not require the preservation of the current stock of natural resources or any particular mix of human, physical and natural assets. Nor does it place artificial limits on economic growth, provided that growth is both economically and environmentally sustainable.

Secondly, we remain at the starting gate of policy implementation. Economic priorities and ecological goals still echo a dialogue of the deaf – both sides presenting generalist critiques and simplistic alternatives. Too much rhetoric; too much lip service; too little action.

Of course, there are no quick fixes. Sustainable development is not a ready made policy menu. It is a demanding series of concrete, costed and draconian reforms which confront failed economic policies and instigate new structural adjustment programmes. These reforms work to alleviate poverty, meet basic human needs and put to rest economic conditions that promote environmental destruction. Throughout the global South, a rigidly unfair, protectionist international economic order, commodity price volatility, crippling debt and poverty all tighten the stranglehold of natural resource destruction, chronic pollution and skyrocketing population.

Governments must set guidelines for themselves and for private enterprises that give real, short term material incentives for sustainable development.

Free marketers will be appalled by this suggestion, at a time when liberalization of the economy is so fashionable. I would simply refer these people to the works of Adam Smith. The father of capitalism never suggested that private enterprise should work to the detriment of society as a whole. Quite the opposite. He spoke of the market system as one in which the profit of every individual brushes off on the wider community (in terms of increased employment, for instance) – much the same way as the bee gathers honey for its own uses, but in so doing pollinates the flowers, enabling the system to continue in future years. Adam Smith would have been horrified at a system which knowingly undermined its future.

8. Which of the following may not be true, as understood from the passage?
   (A) A reorientation of priorities based on conservation has been recognized.
   (B) Adam Smith had a benevolent vision of capitalism.
   (C) Nature checks unregulated growth.
   (D) There has been reckless over exploitation of the planet's natural resources.

9. The passage mentions each of the following as an imperative for sustainable development EXCEPT :
   (A) Assuring the well being of future generations.
   (B) Checking industrialization as a criterion of success.
   (C) Government intervention in the form of appropriate direction.
   (D) Economic reforms that forestall environmental destruction.

10. In the context of the passage, the word "flowers" most closely symbolizes which of the following?
   (A) Economic development
   (B) Larger environment
   (C) The free market economy
   (D) Sustainable development

11. It can be inferred from the passage that "free marketers" believe which of the following?
   (A) Environmental concerns can have positive economic spin offs
   (B) The government should not interfere in the economic development of a country
   (C) Limitless pursuit of material possessions is the hallmark of an economy
   (D) Environmental problems are the result of extreme poverty

DIRECTIONS *for questions 12 and 13:* In each of the following questions, the word in capitals is used in four different ways, A to D. Choose the option in which the usage of the word is INCORRECT or INAPPROPRIATE.

12. BLOW
   (A) A sudden gust of wind made the candles blow off.
   (B) John's untimely death came as a sudden blow to his family.
   (C) According to the weather forecast the storm would blow over within the next forty eight hours.
   (D) I went for a long walk early in the morning to blow the cob webs away and to refresh myself.

13. FIT
   (A) She banged the door hard in a fit of anger.
   (B) I'm sure you will find something which fits your requirements.
   (C) He exercises for an hour everyday to keep himself fit.
   (D) I'm very busy, I had to fit ten appointments in one morning.

DIRECTIONS *for questions 14 and 15:* Answer the questions on the basis of the information given below.

Three girls – Aishwarya, Ashmita and Ananya – and five boys – Raghuram, Ritvik, Rishi, Ramesh and Rana are sitting around a circular table such that no two girls are opposite or adjacent to each other. The following additional information is also known about the way they are seated:
(i) Raghuram is four places away to the right of Rana.
(ii) Aishwarya is to the immediate left of Ritvik.
(iii) Ramesh and Ashmita are opposite each other.
(iv) Rana is not adjacent to Ramesh.
(v) Rishi is adjacent to two girls.

14. Who is sitting opposite Ananya?
   (A) Ritvik (B) Rishi
   (C) Rana (D) Raghuram

15. Who is sitting three places away to the right of Rana?
   (A) Rishi (B) Ramesh
   (C) Ashmita (D) Ananya

DIRECTIONS *for question 16:* This question is followed by two statements, I and II. Indicate your responses based on the following directives:

Mark (A) if the question can be answered using one of the statements alone, but cannot be answered using the other statement alone.
Mark (B) if the question can be answered using either statement alone.
Mark (C) if the question can be answered using I and II together but not using I or II alone.
Mark (D) if the question cannot be answered even using I and II together.

16. Four students – Ajay, Bhuvan, Chanchal and Deepak – were among the top four rankers in a class in each of the three subjects P, Q and R. No two of them got the same rank in any subject and none of them got the same rank in any two subjects. Further, Ajay got the second rank in Q, and Chanchal got the fourth rank in P. What are their respective ranks in each of the three subjects?
   I. The sum of the ranks, in all the three subjects put together, of no two persons is the same and the sum of the ranks of Deepak is the highest. The rank of Deepak in P is the same as the rank of Bhuvan in Q.
   II. Bhuvan got a better rank than Deepak in each of the three subjects.

DIRECTIONS *for questions 17 to 19:* Answer the questions on the basis of the information given below.

A team is to be selected from among ten persons – A, B, C, D, E, F, G, H, I and J – subject to the following conditions.
(i) Exactly two among E, J, I and C must be selected.
(ii) If F is selected, then J cannot be selected.
(iii) Exactly one among A and C must be selected.
(iv) Unless A is selected, E cannot be selected,
(v) If and only if G is selected, D must not be selected.
(vi) If D is not selected, then H must be selected.

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

17. What is the largest possible size of the team?
   (A) 5 (B) 6 (C) 7 (D) 8

18. In how many ways can a team of size 6 be selected, if it includes E?
   (A) 5 (B) 6 (C) 7 (D) 8

19. What could be the size of a team that includes both F and H?
   (A) 8 (B) 3 (C) 4 (D) 5

DIRECTIONS *for questions 20 to 22:* Read the following passage and answer the questions that follow it.

It has long been a truism that changes in material culture cause shifts in the patterns of the entire culture. The ancient road made possible armies and empires and destroyed the isolated city states of Greece. But the road depended in the first place on writing. Behind the imperial command of great land areas stood the written word in easily transportable form. In the nineteenth century, the newspapers, especially after the telegraph, paid for new roads and faster transport by land and sea. The press altered the forms of government, and the telegraph brought secret diplomacy to an end. When events in Egypt or Russia, London, Paris, or New York were known everywhere at once, the time for secret negotiation was reduced to hours and minutes. And the great national populations of the world, altered and emotionalized by the press, could confront one another immediately for a showdown.

Printing had from the first fostered nationalism because the vernaculars with their large reading publics were more profitable to commercial publishers than Latin. The press has pushed this nationalism to its ultimate point. There it remains. But photography and movies, like music and painting, are international in their power of appeal. The power of pictures to leap over national frontiers and prejudices is well-known, for good and ill.

The basic fact to keep in mind about the movie camera and projector is their resemblance to the process of human cognition. That is the real source of their magical, transforming power. The camera rolls up the external world on a spool. It does this by rapid still shots. The projector unwinds this spool as a kind of magic carpet which conveys the enchanted spectator anywhere in the world in an instant. The camera records and analyzes the daylight world with more than human intensity because of the forty-five degree angle of the camera eye. The projector reveals this daylight world on a dark screen where it becomes a dream world.

The wonderful resemblance in all this to human cognition extends at least this far: in cognition we have to interiorize the exterior world. We have to recreate in the medium of our senses and inner faculties the drama of existence. This is the work of the 'logos poielikos', the agent intellect. In speech we utter that drama which we have analogously recreated within us. In speech we make or 'poet' the world even as we may say that the movie parrots the world. Languages themselves are thus the greatest of all works of art. They are the collective hymns to existence. For in cognition itself is the whole of the poetic process. But the artist differs from most men in his power to arrest and then reverse the stages of human apprehension. He learns how to embody the stages of cognition (Aristotle's "plot") in an exterior work which can be held up for contemplation.

Even in this respect the movie resembles the cognitive process since the daylight world which the camera rolls up on the spool is reversed and projected to become the magical dream world of the audience. But all media of communication share something of this cognitive character which only a Thomist vision of existence and cognition dares do justice to.

20. Which of the following is mentioned in the passage as a unique characteristic of artists?
(A) They are able to causally relate events to one another in a literary pattern.
(B) They are able to harness languages to construct eternal works of art.
(C) They are able to combine the medium of speech and vision to create drama.
(D) They are able to draw inspiration from their intellect to solve existential dilemmas.

21. The passage suggests which of the following as likely to be true of a Thomist vision?
(A) The human potential to use reality as a base for fantasy.
(B) The ability to concoct dreams far removed from reality.
(C) The belief that knowledge is received from sensible matter only.
(D) Create art to include all that is lacking in real life.

22. The passage suggests that the movie camera resembles the process of human cognition in which of the following ways?
(A) Both absorb sensory impression of events for intellectual assimilation
(B) Both absorb sensory impression of events for intellectual interpretation
(C) Both absorb sensory impression of events for intellectual presentation
(D) Both absorb sensory impressions of events for intellectual representation

DIRECTIONS *for questions 23 and 24:* In each question, there are five sentences or parts of sentences that form a paragraph. Identify the sentence(s) or part(s) of sentence(s) that is/are correct in terms of grammar and usage. Then, choose the **most appropriate** option.

23. (a) If it were a novel, people would criticize the plot for being too far-fetched
(b) thriving colonies disappear overnight without leaving a trace,
(c) bodies of the victims are never found.
(d) Only in this case, its not fiction: It's what's happening
(e) to a third of commercial beehives, over million colonies every year.
(A) b and c (B) a and d
(C) d and e (D) Only a and b

24. (a) Travel, like life, is best understood backward but must be experienced forward.
(b) After decades of wandering, now only does a pattern emerge.
(c) I'm drawn to places that beguile and inspire, sedate and stir, places where,
(d) for a few blissful moments I loosen my death grip on life, and can breath again.
(e) It turns out these destination have a name: thin places.
(A) a and e (B) a and c
(C) b and c (D) c and d

DIRECTIONS *for questions 25 and 26*: Answer the questions on the basis of the information given below.

Christopher was scheduled to meet four friends – Kareena, Jiya, Bipasha and Mary – on the same day, at a clubhouse. He made sure that each of his friends were to meet him at a different location inside the clubhouse and at a different time.

(a) The friend whom he met at the lawns, and Jiya were the last and the first friends he met respectively.
(b) Mary was not the friend he met at the pattiserie and she was not the last friend he met.
(c) He met Bipasha after he met Kareena.
(d) He met exactly one friend in between meeting Bipasha and meeting the friend at the pattiserie, not necessarily in the same order.
(e) He met the friend at the bar before meeting the friend at the library.

25. Whom did Christopher meet at the library?
(A) Mary (B) Jiya
(C) Kareena (D) Bipasha

26. At which of the following locations did Christopher meet a friend immediately before meeting the friend at the lawns?
(A) Pattiserie
(B) Bar
(C) Library
(D) Either Pattiserie or Library

DIRECTIONS *for question 27:* Select the correct alternative from the given choices.

27. Today, Aman, who is 57 year old, told his friend Amar, "I have seen 15 leap years". After hearing this, Amar redefined a leap year as follows: Every year which is a multiple of either 2 or 3 or both is considered as a leap year. As per Amar's definition of a leap year, if both, the year of Aman's birth and the present year become leap years, then how many leap years must Aman have seen according to this new definition?
(A) 37 (B) 38 (C) 39 (D) 40

DIRECTIONS *for question 28:* The following question presents four statements of which three, when placed in appropriate order would form a contextually complete paragraph. Pick the statement that is not part of that context.

28. (A) Japanese insularity is becoming a luxury that the country can no longer afford.
(B) Throughout its history the country has oscillated between pathological suspicion of foreigners and eager imitation of alien ways.
(C) Japan has always had an ambiguous relationship with the outside world.
(D) Recently some of the buried legacy of isolationism – manifested in a stubborn resistance to foreign investment and a reluctance to capitalize on the opportunities of globalization – has been coming back to the surface.

DIRECTIONS *for questions 29 and 30:* There are two blanks in each of the following sentences. From the pairs of words given below each sentence choose the pair that fills the blanks most appropriately.

29. Despite being more articulate and better listeners when compared to men, women are often wrongly perceived as too _____ or overly _____in their communication styles.
(A) incoherent ..... persuasive
(B) lucid ..... rhetorical
(C) aggressive ..... accommodating
(D) bomastic ..... florid

30. Although escapism begins as _____, a desire to forget the tedium and problems of the everyday, it can sometimes take you to a place more _____ than the one you are trying to escape.
(A) speculation ..... morbid
(B) angst ..... intimidating
(C) despair ..... lugubrious
(D) fantasy ..... menacing

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(Key and Solutions for AIMCAT1316)

Key

SECTION – I

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

SECTION – II

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

Solutions

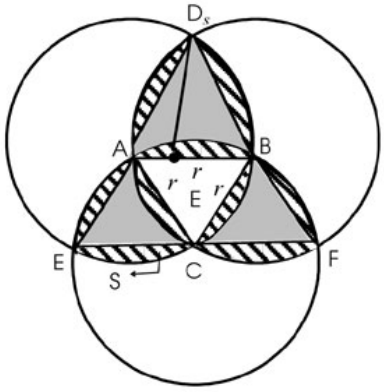
SECTION – I

Solutions for questions 1 to 14:

1. Let the lengths of the longest, the shortest and the third pieces be ℓ, s and m respectively.
$110 = \ell + m + s$
$\ell = 3s$.
$m = \ell - 30$.
$\Rightarrow 110 = s + 3s + 3s - 30 \Rightarrow s = 20$
$\therefore \left| \begin{array}{l} \ell = 60 \\ m = 30 \\ s = 20 \end{array} \right\}$ Triangle can't formed as $(m + s) < (\ell)$
Hence, given data is inconsistent. Choice (C)

2. Let the three-digit number be abc. Given that
a + b = 4c ---------- (1)
and 2c + b = a ---------- (2)
From (1) and (2), we get a = 3c
$\therefore$ since we know that maximum value of a = 9, c can take only three possible values of 1, 2 or 3. Choice (B)

3.



There are four identical equilateral triangles – ΔEAC, ΔABC, ΔCBF, and ΔADB – each of area say 'E' and nine identical segments of areas S each (cross-hatched) in the relevant portion of the figure.

The area common to exactly three circles = E + 3S.
Area common to at least two
= entire area (cross hatched + shaded) = 4E + 6S
$\Rightarrow$ Area common to exactly two
= (4E + 6S) – (E + 3S) = 3E + 3S

Required ratio = $\dfrac{E+3S}{3E+3S}$

Here, it can be observed that E $\cong$ 4.8 times S because, for say r = 1, E = $\dfrac{\sqrt{3}}{4} \cong 0.433$ and S = $\dfrac{\pi}{6} - \dfrac{\sqrt{3}}{4}$
= 0.523 – 0.433 $\cong$ 0.09
Hence substituting E $\cong$ 4.8S

$$\frac{E+3S}{3E+3S} \cong \frac{7.8S}{17.4S} \cong 0.448$$

Even if we roughly assume E $\cong$ 4.5, we get $\dfrac{E+3S}{3E+3S} \cong 0.45$

OR
if E $\cong$ 5S, then we get 0.44
Hence without any cumbersome calculations of actual areas, the question can be answered, especially by observing the answer choices which are not very close.
Choice (B)

4. It is given that the lock code comprises five letters and can be opened if any three of the five letters of the code match. Since there are a total of 11 letters, divide them into two groups of 5 letters, say A, B, C, D, E and 6 letters, F, G, H, I, J, K. Since the objective is to definitely open the lock using the least number of attempts, we need to consider the worst case scenario.

Say, we try the combination of ABCDE and the lock does not open $\Rightarrow$ This combination has either 0,1 or 2 out of the 5 letters from the lock code with the unused letters comprising the remaining letters of the code.

If there are 0 letters of the lock code in ABCDE, this means that all the 5 letters of the code are in the remaining 6 letters FGHIJK and hence, whatever combination of 5 letters from among the 6 is chosen, the lock would certainly be opened.

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If there is only 1 letter of the lock code in ABCDE, this means that 4 letters of the code are in the 6 letters FGHIJK. Now, whatever combination of 5 letters from among the 6 is chosen, will definitely contain at least 3 of the 4 letters of the code and hence, the lock would certainly be opened.

If there are only 2 letters of the lock code in ABCDE, which is the worst case scenario, this means that 3 letters of the code are in the 6 letters FGHIJK. Since only 5 out of the 6 letters have to be selected, in the worst case, only 2 out the 3 letters of the code can be selected. This can occur in 3 instances. For example, say F,G,H are 3 letters which are part of the code. In a selection of 5 letters, it is possible that one of F,G,H is not selected (FGIJK,FHIJK,GHIJK) The next selection of 5 letters out of FGHIJK, i.e. the fourth combination attempted out of these 6 letters, will certainly include all the 3 letters of the code.

Therefore, in the worst case scenario, one would attempt the combination of ABCDE and then four combinations of FGHIJK to be able to definitely open the lock.

Choice (C)

5. Let the amounts with Anna, Ben and Clark be ₹a, ₹b and ₹c respectively.
$a + b + c = 100$
$4(a - 13) = b + 13$
$3(c - 7) = b + 7$
Solving these equations, we get a = ₹28, b = ₹47, and c = ₹25
Let the sum that Ben needs to give to Clark be ₹x such that they have the same amount.
$47 - x = 25 + x$ or, $x = 11$. Choice (B)

6. $3x + xy = 138 - 2y$
$\Rightarrow 2y + 3x + xy + 6 = 138 + 6$
$\Rightarrow (y + 3)(x + 2) = 144$, where x and y are integers greater than 0.
We have the following possibilities for x and y.

x	1	2	4	6	7	10	14	16	22	34
y	45	33	21	15	13	9	6	5	3	1

10 possibilities in all, as 144 can be written as product of 2 numbers in the following ways

$(y + 3) \times (x + 2)$	$(y + 3) \times (x + 2)$
1×144	16×9
2×72	18×8
3×48	24×6
4×36	36×4
6×24	48×3
8×18	72×2
9×16	144×1
12×12	

Since $x > 0$ and $y > 0$, $y + 3 > 3$ and $x + 2 > 2$
Thus we have 10 positive integral ordered pairs (x, y) which satisfy the given equation. Choice (D)

7. $4^{(\log_2(\log_2(x^2+24x))} - 17\log_2(x^2 + 24x) + 72 = 0$
$\Rightarrow (2^2)^{\log_2(\log_2(x^2+24x))} - 17\log_2(x^2 + 24x) + 72 = 0$
$[\log_2(x^2 + 24x)]^2 - 17\log_2(x^2 + 24x) + 72 = 0$
Taking $\log_2(x^2 + 24x) = a$, we get $a^2 - 17a + 72 = 0$
$\Rightarrow a = 8$ or 9.
If $a = 8$, $x^2 + 24x = 2^8$
$x^2 + 24x - 256 = 0$
$x = -32$ or 8
Both – 32 and 8 satisfy the original equation.
If $a = 9$, $x^2 + 24x - 512 = 0$. The discriminant of the above equation is not a perfect square.
$\therefore$ x will not be an integer.
$\therefore$ The given equation has only two integral solutions for x.
Choice (C)

8. The total surface area of a cone = $\pi r^2 + \pi rl$.
Where $l = \sqrt{r^2 + h^2}$
Given that h decreases by 20% where as r increases by 25%. Now without knowing the ratio of r and h, we cannot find the percentage change in l and thus we cannot determine the percentage change in the total surface area of the cone. Choice (D)

9. For $|x| - |y|$ to be maximum, $|x|$ must be maximum and $|y|$ minimum.
For $|x|$ to be maximum subject to $|2x - 5| \le 9$.
Take the maximum possible positive value.
2x must be as positive as possible.
$\Rightarrow 2x = 9 + 5 = 14 \Rightarrow x = 7$ and $|y|$ can be zero, which still satisfies $|4y - 7| \le 21$.
i.e., $|-7| \le 21$
$\therefore$ The maximum value of $|x| - |y| = 7 - 0 = 7$
Choice (A)

10. We know that if x, y, z are the sides of a triangle (or, for any three real numbers, x, y, z), then
$(x - y)^2 + (y - z)^2 + (z - x)^2 \ge 0$ or,
$2(x^2 + y^2 + z^2) - 2xy - 2yz - 2xz \ge 0$ or,
$x^2 + y^2 + z^2 \ge xy + yz + xz$ or,
$$\frac{x^2 + y^2 + z^2}{xy + yz + xz} \ge 1$$
In a triangle sum of 2 sides is greater than the third side

$x + y > z$ $\quad$ $y + z > x$ $\quad$ $x + z > y$
$\therefore xz + yz > z^2$ --- (1) $\therefore xy + xz > x^2$ – (2) $xy + yz > y^2$ --- (3)

Adding (1), (2) and (3), we get
$x^2 + y^2 + z^2 < 2(xy + yz + xz)$ or $\dfrac{x^2 + y^2 + z^2}{xy + yz + xz} < 2$
$(xy + yz + zx) \le x^2 + y^2 + z^2 < 2(xy + yz + zx)$
$$\Rightarrow 1 \le \frac{x^2 + y^2 + z^2}{xy + yz + zx} < 2$$

Alternative solution:
Since we are considering a triangle, the three limiting conditions are, $x = y = z$; $x \to 0$ and $y = z$; $x^2 + y^2 = z^2$, that is the triangle is equilateral, degenerate isosceles and right-angled isosceles. From these three limiting cases, the range of k can be obtained. Choice (D)

11. In the given figure, $\angle TSP = \angle PRS$ (alternate segment theorem)
$\therefore \angle TSP = 70°$.
In triangle PTS, TP = TS (because, tangents drawn from a point to the same circle are equal).
$\Rightarrow \angle TPS = \angle TSP = 70°$.
$\angle PTS = 180° - (70° + 70°) = 40°$. Choice (B)

12. Let $x - 3 = a$ and $2y - 4 = b$
Now, since $2^a + 3^b = 97$, both 2^a and 3^b must be positive integers and greater than 1.
$\therefore 2^a \le 96$, $3^b \le 96$.
By trial and error we get the only possibility as a = 4 and b = 4
$\Rightarrow x = 7$ and $y = 4 \Rightarrow 2x - 6 = 8$ and $3y - 8 = 4$
$\Rightarrow 2^{2x-6} + 3^{3y-8} = 2^8 + 3^4 = 256 + 81 = 337$. Choice (D)

13. Consider 300 ml of solution A. It contains 100 ml of sulphuric acid and 200 ml of water. Solution B contains 100 ml sulphuric acid and 50 ml water. Therefore, by evaporating 150 ml out of 200 ml of water in solution A, we get solution B.
$\therefore$ Fraction of water evaporated is 150/200 = 75%.
Choice (C)

14. $9x^2 - 30xy + 25y^2 + 4y^2 - 12yz + 9z^2 = 0$
$\Rightarrow (3x - 5y)^2 + (2y - 3z)^2 = 0 \Rightarrow 3x = 5y$ and $2y = 3z$
$\therefore y = 0.6x$ and $y = 1.5z$
Therefore only choice (D) is necessarily true.
Choice (D)

Solutions for questions 15 to 17:

15. Let N be the total number of shares issued by all companies and let N_p be the number of shares issued at a premium by the six companies together. Since the average premium collected per new share issued at premium is ₹20, total premium collected = $20N_p$.
$\therefore$ Total amount raised = $10N + 20N_p = 12650$ million.
Unless there is more information about N and N_p, the total premium cannot be computed. Choice (D)

16. The number of government companies which issued new shares from January to December is as follows:

$15 \times \frac{1}{3}; 21 \times \frac{3}{7}; 36 \times \frac{1}{4}; 25 \times \frac{2}{5}; 62 \times \frac{7}{31}; 35 \times \frac{3}{5};$

$45 \times \frac{2}{9}; 54 \times \frac{1}{6}; 16 \times \frac{1}{2}; 26 \times \frac{4}{13}; 39 \times \frac{1}{3}; 32 \times \frac{3}{8}$ respectively.

By observation, the maximum percentage increase is 80% from January to February. Choice (A)

17. The values calculated in the earlier solution for the number of government companies could be subtracted from the total number of companies. Also, the number of companies not issuing new shares at premium is equal to the total number of companies minus the values given in the fourth column. The required condition is met in only March, August and December, that is, in three months.
Choice (C)

Alternately, the solution to this question directly follows from the solution to the earlier question (since total number of companies is constant for any given month).

Solutions for questions 18 to 20:

18. The contribution to each level of rating in each month is given below.

	5	4	3	2	1
February	28	32	12	16	8
April	23	24	14	21	7
April	29	19	20	1	12
May	32	32	23	12	9
June	33	35	13	4	11
July	38	31	37	9	18
August	29	28	27	18	17
September	35	28	26	29	24
October	28	28	33	26	15
November	33	19	36	24	29

The highest contribution is 38 (under '5' rating).
Choice (A)

19. The average rating received per reviewer in the period

July-Nov '11 = $\frac{\text{Total rating}}{\text{Total number of reviewers}}$

Total value of 5 rating = 5 × No.of people who rated 5
= 5 × (308 – 145)
Similarly, total value of
4 rating = 4 × (276 – 142)
3 rating = 3 × (241 – 82)
2 rating = 2 × (160 – 54)
1 rating = 1 × (150 – 47)
$\therefore$Total rating = 5 (308 – 145) + 4 (276 – 142) + 3 (241 – 82) + 2 (160 – 54) + 1 (150 – 47)
= 5 × 163 + 4 × 134 + 3 × 159 + 2 × 106 + 1 × 103 = 2143
Total no.of reviewers = 163 + 134 + 159 + 106 + 103 = 665

$\therefore$ Average rating = $\frac{2143}{665} = 3\frac{148}{665} \cong 3.222$ Choice (B)

20. Total number of reviewers in the month of August 2011
= (212 – 183) + (201 – 173) + (146 – 119) + (81 – 63) + (82 – 65)
= 29 + 28 + 27 + 18 + 17 = 119
Total number of reviewers in March 2011
= (51 – 28) + (56 –32) + (26 – 12) + (37 – 16) + (15 – 8)
= 23 + 24 + 14 + 21 + 7 = 89

$\therefore$Required percentage = $\frac{119-89}{89} \times 100 = 33.71\%$ more
Choice (D)

Solutions for questions 21 to 23:

21.

Model	Revenue from sales	Revenue from service
Brio	6.4% of 20 = 1.28	30.5% of 12 = 3.66
Jazz	10.15% of 20 = 2.03	24% of 12 = 2.88
Civic	9% of 20 = 1.8	18.2% of 12 = 2.184
City	18% of 20 = 3.6	15% of 12 = 1.8
Accord	30% of 20 = 6r	6.1% of 12 = 0.732
CR-V	26.45% of 20 = 5.29	6.2% of 12 = 0.744

Combined revenue, ₹6.732 cr, is highest for Accord
Choice (A)

22. Volume of cars sold of Brio = $\frac{6.4}{100} \times \frac{20}{4}$

of Jazz = $\frac{10.15}{100} \times \frac{20}{5.8}$

of Civic = $\frac{9}{100} \times \frac{20}{7.2}$

of City = $\frac{18}{100} \times \frac{20}{12}$

of Accord = $\frac{30}{100} \times \frac{20}{20}$

of CR-V = $\frac{26.45}{100} \times \frac{20}{23}$

It can be seen that the least number of cars sold is of CR-V, which is equal to 23. Choice (D)

23. Say the no.of cars sold of the six brands is $6k_1$, $7k_1$, $5k_1$, $6k_1$, $6k_1$, $5k_1$ respectively.
Say the no.of cars serviced of the six brands is $6k_2$, $7k_2$, $5k_2$, $6k_2$, $6k_2$, $5k_2$ respectively.
Sum of revenue per car from sales and from service.

$= \frac{6.4\% \text{ of } 20}{6k_1} + \frac{30.5\% \text{ of } 12}{6k_2}$

Revenue obtained per car of Jazz

$= \frac{10.15\% \text{ of } 20}{7k_1} + \frac{24\% \text{ of } 12}{7k_2}$

Similarly, the expressions for other cars can be written. Unless some relation between k_1 & k_2 is known, the expressions cannot be compared.
$\therefore$It cannot be determined. Choice (D)

Solutions for questions 24 to 30:

24. Let 100 be the initial cost price and P be the initial profit percentage. Hence, selling price = 100 + P
The decreased cost price will be 80.

Final profit percentage = $\frac{(P+20)}{80} \times 100 = P + 30$

$\Rightarrow$ P = 20. If cost is decreased by a further 25%, CP = 60

$\Rightarrow$ final profit percentage = $\frac{(120-60)}{60} = 100\%$

Choice (B)

25. p is a root of the equation $mx^2 + nx + q = 0$ and q is a root of the equation $mx^2 + nx + p = 0$.
Now, substituting p and q for x in the two equations, we get
$p^2m + np + q = 0$ ------ (1)
$q^2m + nq + p = 0$ ----- (2)
Subtracting equation (2) from equation (1), we get
$m\{p^2 - q^2\} + n(p - q) + q - p = 0$
$(p - q)\{m(p + q) + n - 1\} = 0$

$\because p \neq q$, therefore $m(p + q) + n - 1 = 0$ or, $p + q = \frac{1-n}{m}$

Dividing equation (1) with p and equation (2) with q, we get

$pm + n + \frac{q}{p} = 0$

$qm + n + \frac{p}{q} = 0$

Equating n in both the equations, we get

$-pm - \frac{q}{p} = -qm - \frac{p}{q}$

$pm - qm = \frac{p}{q} \frac{-q}{p}$

$m(p - q) = \frac{(p-q)(p+q)}{pq}$ or, $pq = \frac{p+q}{m} = \frac{1-n}{m^2}$

The equation with roots p and q is given by $x^2 - (p + q)x + pq = 0$

$\Rightarrow x^2 - \frac{(1-n)}{m}x + \frac{(1-n)}{m^2} = 0$

$\Rightarrow m^2x^2 + m(n - 1)x + 1 - n = 0$ Choice (D)

26. Let the cost of each gold coin be x and let the number of gold coins that A could buy with his money be n.
Sum with A = nx + x/3
Had the amount left with A been twice more than what it was, then he could have bought one more gold coin i.e., had his amount left been $\frac{2(x)}{3} + \frac{x}{3} = x$, he could have bought another coin.
Sum with B = 7 times the sum with A = 7(nx + x/3)
= 7nx + 2x + x/3
Now x/3 + 7500 = x [∵with an extra ₹7500, B would have been able to purchase another gold coin] or, $\frac{2x}{3} = 7500$ or, x = ₹11,250
Therefore the cost of each gold coin was ₹11,250.
Choice (C)

27. The probability of obtaining a particular sum remains the same whether the dice are distinguishable or not. For instance, let ***n*** = 8. When the dice are distinguishable, the following outcomes will each be counted as distinct and are all equally likely.
2 + 6, 6 + 2, 3 + 5, 5 + 3, 4 + 4.
In this case, the probability of obtaining 8 as the sum is 5/36.
When the dice are indistinguishable, there will be only three distinguishable outcomes but they are not all equally likely.
2 + 6, 3 + 5, 4 + 4.
2 + 6 is twice as likely to occur as 4 + 4. Similarly, 3 + 5 is twice as likely to occur as 4 + 4.
Therefore, p(2,6) = p(3,5) = 2p(4,4) Hence, the probability remains as 5 /36.
Therefore, $P_1 = P_2$. Choice (C)

28. Considering 90 as the capacity of the tank {LCM of (45, 30, 15, 10, 9) we can find the rate of flow for the 5 pipes as $\frac{90}{45}, \frac{90}{30}, \frac{90}{15}, \frac{90}{10}$ and $\frac{90}{9}$ respectively.
The time and the rates of the 5 pipes are tabulated below.

	P_1	P_2	P_3	P_4	P_5
Rates	2	3	6	9	10
Time in minutes	45	30	15	10	9
Rate (if pipe is converted to emptying)	–2	–3	–6	–9	–10

If the tank gets filled in $12\frac{6}{7}$ min, effective rate of filing

$= \frac{90}{\left(\frac{90}{7}\right)} = 7$ units/min

If the tank gets emptied in $22\frac{1}{2}$ min, effective rate of emptying $= \frac{90}{\left(\frac{45}{2}\right)} = 4$ units/min

7 units/min can be obtained by making P_4 a filling pipe and P_1 emptying pipe or P_5 filling and P_2 emptying. If P_4 is filling pipe and P_1 emptying pipe, 4 units/min can be obtained by making P_5 emptying pipe and P_3 filling pipe. In the latter case, P_3 emptying and P_1 filling pipe.

Case(i): $7 = 10 - 3 = P_5 - P_2$
$-4 = 2 - 6 = P_1 - P_3$

Case(ii): $7 = 9 - 2 = P_4 - P_1$
$-4 = 6 - 10 = P_3 - P_5$

∴ P_1, P_5 or P_3, P_2 may have been converted to emptying pipes. Only P_2, P_3 is listed among the options.
Choice (B)

29. $3^{2003} - 1$, $3^{2003} + 1$ are consecutive even numbers
So, their GCD is 2

$LCM = \frac{\text{Product}}{\text{GCD}} = \frac{3^{4006} - 1}{2}$,

The last digit of this is $\frac{3^2 - 1}{2} = 4$ Choice (C)

30. $\text{Rem}\left[\frac{7}{28}\right] = 7$; $\text{Rem}\left[\frac{7^2}{28}\right] = 21$ (or –7);

$\text{Rem}\left[\frac{7^3}{28}\right] = \text{Rem}\left[\frac{343}{28}\right] = 7$;

Now, $\text{Rem}\left[\frac{7^4}{28}\right] = \text{Rem}\left[7 \times \text{Rem}\left[\frac{7^3}{28}\right]\right] = \text{Rem}\left[\frac{7^2}{28}\right]$

= 21(or –7)
Hence the pattern of remainders alternates between 7 and 21 (or –7).
For 7^{2K+1} (i.e., odd powers of 7) the remainder is 7.

$\Rightarrow \text{Rem}\left[\frac{7^{777}}{28}\right] = 7.$

Alternative solution 1:

Let R and k be the remainder and quotient when 7^{777} is divided by 28. $\Rightarrow 7^{777} = 28k + R$
Since 7^{777} and 28k are multiples of 7, R must also be a multiple of 7. So, let R = 7r

$\Rightarrow 7^{776} = 4k + r \Rightarrow r = \text{rem}\left[\frac{7^{776}}{4}\right] = \text{rem}\left[\frac{(1)^{776}}{4}\right] = 1$

∴ The remainder when 7^{777} is divided by 28 is 7×1 i.e., 7.

Alternative solution 2:

Since the divisor, i.e., $28 = 7 \times 4$ (co-prime factors) and 7^{777}, when divided by 7 and 4, leaves remainders of 0 and 3 respectively. Now, the smallest number of this kind is 7. Thus, we get that 7^{777} is of the form $(7 \times 4)k + 7$, i.e., 28k + 7. Hence the required remainder is 7. Choice (B)

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

SECTION – II

Solutions for questions 1 and 2:

1. Statement (e) introduces the para by stating that mercury is one of the top 10 chemicals which are highly toxic. (d) follows (e) by saying that the worry is centered on mercury emissions and consuming mercury tainted fish. 'The worry' in (d) refers to the 'health concern' spoken about in (e). Hence (d) follows (e). (b) follows (d) by saying why a proposed ban on the chemical would be a cause for concern (because of its used in vaccines). Statement (c) is a continuation of (b) as it speaks of the ban. Statement 'a' is conclusive in nature. Hence, edbca is the logical sequence. Choice (B)

2. Statement (e) is the introductory statement of the para as it introduces the subject of body scan. (a) is a continuation of (e) because 'the legislation' in (a) refers to the European commission's decision to ban the use of X-ray technology in airports. (d) contrasts with that is stated in (e) and (a) by mentioning how the situation is different in the U.S. which plans to increase the number X-ray machines. (c) follows (d) by saying how the use of X-ray scanners can pose a threat to public health. (b) concludes the para. Hence eadcb. Choice (D)

Solutions for questions 3 to 5:

Number of words and Explanatory notes for RC:

Number of words : 446

3. The passage states that "... society has a music ... composed of .... notes..... units evoking various states of life." (second sentence of para 1). This view is echoed in choice (A). Choice (B) addresses "changes". Choice (C) does not mention 'society' choice (D) introduces "emotions". Choice (A)

4. The passage states that the "internal states (of music) are a commentary on life as it is actually being lived in society." (para 2) The passage goes on to mention ".... The problems..... that affect .... Humanity of those who make it (music)" implying society. Choice (C) resounds with this view. Choice (A) mentions "transorms," which is not stated in the passage. Choice (B) does not mention states of life in a society. Choice (D) focuses on the artists experience, not society's experience. Choice (C)

5. Refer to the 3rd and 4th sentence from the end of the penultimate para which clearly states that "real understanding" comes form "recognition of a human presence in the musical work ...", which is stated in choice (A). The other choices are not relevant for the given question. Choice (A)

Solutions for questions 6 and 7:

6. The passage talks about the shift in power from the western world to the United States and the super power status of America which remained unchallenged for 20 years. The text further goes on to say that the global economy has accelerated dramatically. The concluding statement should say what is the change that took place as a result of that expansion. Options A and B spell out the rest. But between A and B the latter is more appropriate as it talks about the third great power shift and is thus linked to the 1st and 2nd power shift mentioned in the paragraph. Options C and D are rather vague and can therefore be eliminated. Choice (B)

7. Option C can be ruled out because it specifically talks about the Philippines whereas the passage talks about Asian countries. Option D does not conclude. Between option A and B the latter is more apt and in keeping with the tone of the passage and it corroborates what is stated in the passage by speaking about the significance of rice in the lives of Asians. Option A is a mere repetition of what is stated in passage. Choice (B)

Solutions for questions 8 to 11:

Number of words and Explanatory notes for RC:

Number of words : 455

8. Choice (A) is uncertain "Too much rhetoric ..... action" (para 3). Choice (B) can be inferred "Adam Smith would have been horrified ....." (last sentence of the passage). Choice (C) an be inferred "..... a world which fails to regulate its growth ...." (para 1, last sentence). Choice (D) can be inferred "... tighten the stranglehold of natural resource destruction....." (para 4, last sentence). Choice (A)

9. Choice (A) can be inferred "... future generations live equally well ...." (para 2). Choice (C) can be inferred "... Governments .... set guidelines ...." (penultimate para). Choice (D) can be inferred "... Put to rest economic conditions that promote environmental ... destruction" (para 4). But choice (B) is not true "Nor does it place artificial limits on economic growth..." (para 2, last sentence). Choice (B)

10. Refer to the last 2 sentences of the passage. "Flowers" clearly refers to the community that benefits from the profit of an individual hence choice (B). Choice (D) is the larger theme of the passage. Choice (B)

11. Refer to the first sentence of the last para – 'this suggestion' refers to the penultimate para – 'governments must set ..... development'. Choice (B)

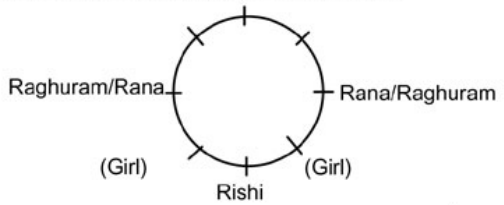
Solutions for questions 12 and 13:

12. Option A is erroneous. '... made the candles blow off' is an incorrect expression. ..... 'wind blew the candles out is right. If a flame blows out it stops burning. While somebody can be 'made to blow out' the candles, the expression as used in the sentence is incorrect. Further 'blow off' would mean the candles were carried away by the wind. Choice (A)

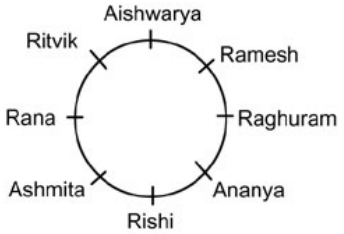
13. Option D is incorrect. It should be fit ..... into one morning. Choice (D)

Solutions for questions 14 and 15:

From (v), as Rishi is adjacent to two girls and from (i), on the other side of each of these two women, either Raghuram or Rana is sitting. The arrangement is as follows:



Also, as no two girls are opposite each other, the 3rd girl must be opposite Rishi.
From (ii) and the above results, the 3rd girl must be Aishwarya
∴ Aishwarya is opposite Rishi.
Now, there is only position for Ramesh, the one to the immediate left of Aishwarya.
From (iii) and the above results, Ashmita is to the immediate left of Rishi and Ananya is to the immediate right of Rishi.
From (iv), the final arrangement is as follows.



14. Ritvik is opposite Ananya. Choice (A)

15. Ananya is three places to the right of Rana. Choice (D)

Solution for question 16:

16. Let us first tabulate the given information.

	Ajay	Bhuvan	Chanchal	Deepak
P			4	
Q	2			
R				

Let us denote each person by the first letter of his/her name.
From statement I alone, the only possible sums of the ranks of the four persons are 9 (2 + 3 + 4), 8 (1 + 3 + 4), 7 (1 + 2 + 4) and 6 (1 + 2 + 3).
As the sum of the ranks of D is the highest i.e. it is 9, D got the second, the third and the fourth ranks in the three subjects in any order.
Let the rank of Deepak in P (or the rank of B in Q) be *a*.
$\Rightarrow$ *a* cannot be 4 or 2 and it also cannot be 1. ($\therefore$ The rank of D in any subject cannot be 1)
$\Rightarrow a = 3$
$\Rightarrow$ The rank of A in P is 1 and that of B in P is 2.
$\Rightarrow$ The ranks of D in Q and R are 4 and 2 respectively and the ranks of C in Q is 1.
$\therefore$ The rank of B in R cannot be 4.
($\because$ The sum of the ranks in the three subjects put together is different for each of them.)
Thus the rank of B in R is 1.
$\Rightarrow$ The ranks of C and A in R are 3 and 4 respectively.
$\therefore$ I alone is sufficient.
From II alone, as B always got a better rank than D, B never got 4th rank and Deepak never got 1st rank.
And whenever B got 3rd rank in a subject, D got 4th rank in that subject.
Similarly, if B got 2nd rank in any subject, D got 3rd rank in that subject and so on.
In Q, B cannot get either 1st or 2nd rank.
$\Rightarrow$ In Q, B got the third rank and thus D got the 4th rank.
$\Rightarrow$ C got the 1st rank in Q and A got the 4th rank in R.
As D cannot get 1st rank, B gets 1st rank in R.
$\Rightarrow$ D got the second rank in R.
$\Rightarrow$ C got the 3rd rank in R, B got the 2nd rank in P and D got the 3rd rank in P.
$\Rightarrow$ A got the first rank in P.
$\therefore$ II alone is also sufficient. Choice (B)

Solutions for questions 17 to 19:

Given,
(i) E, J, I, C $\rightarrow$ EJ / EI / EC / JI / JC / IC
(ii) F, J $\rightarrow$ F / J / 0
(iii) A, C $\rightarrow$ A / C
(iv) E $\rightarrow$ A
(V) G, D $\rightarrow$ G / D
(vi) D, H $\rightarrow$ H / D/ HD

From (ii), among F and J, only J can be selected or only F can be selected or none of them can be selected.

17. To maximize the size of the team
(i) C must not be selected, because if C is selected only one from E, I and J is selected and A cannot be selected.
(ii) J must not be selected, because if J is selected only one from E, I and C is selected and F cannot be selected.
Hence, C, J and exactly one among D and G are not selected.
$\therefore$ The team size can be atmost 7 and the team can be ABDEFHI (or) ABEFGHI Choice (C)

18. If E is selected, then A must also be selected.
$\therefore$ C cannot be selected.
$\therefore$ In the following ways, the team of 6 can be selected.
(1) A, E, J, G/D, H, B ------- 2 ways
(2) A, E, I, F, G/D, H ----- 2 ways
(3) A, E, I, G/D, H, B -------- 2 ways
(4) A, E, I, F, D, B
$\therefore$ There are a total of 7 ways. Choice (C)

19. Both F and H are selected.
$\therefore$ Exactly two among E, I and C must be selected and exactly one among G and D must be selected.
$\therefore$ The team which includes both F and H, cannot be of the size less than 5.
The maximum possible size of the team is 7.
The size of the team could be 5, 6 or 7. The team of size 5 could be as follows:
F, H, I, C, G Choice (D)

Solutions for questions 20 to 22:

Number of words and Explanatory notes for RC:

Number of words : 540

20. The passage clearly states that an artist "embody (ies) the stages of cognition .... (plot)" in a work (last sentence of penultimate para). Thus, choice (A) is correct. Choice (D) is not stated in the passage. Choices (B) and (C) do not address the uniqueness of the artist. Choice (A)

21. The last sentence refers to 'a Thomist vision'. It can be inferred from the para that the Thomist vision refers to the cognitive process which can transform reality into fantasy. Choice (A)

22. The fourth para clearly states "we have to <u>recreate</u> in the medium of our senses" through the "intellect", and goes on to say that "Even in this respect the movie resembles the cognitive process....." (last para, 1st line). Hence, only choice (D) "representation" is the answer. Choice (D)

Solutions for questions 23 and 24:

23. Part (a) and (b) are correct.
Part (c) is incorrect because of the definite article before 'victims' – the sentence is generalized in nature and not specific.
Part (d) is incorrect as the apostrophe is missing in 'its' – it's not fiction.
Part (e) is incorrect as the indefinite article (a) is missing before 'million'. We are referring to one or a million. Choice (D)

24. Part (a) is correct.
Part (b) is incorrect - 'only' must precede 'now' which it qualifies.
Part (c) is correct.
Part (d) is incorrect as there should be a comma after 'moments' since 'for a few blissful moments' is a parenthetical expression.
Part (e) is incorrect since 'destinations' must be in plural as shown by 'these' and 'have'. Choice (B)

Solutions for questions 25 and 26:

(a) Jiya $\neq$ Lawns
Jiya = 1st person met by Christopher
Person met at the lawns is the 4th person met by Christopher.

(b) Mary $\neq$ Pattiserie
Mary is not the last person that Christopher met.

(c) Christopher met Bipasha after Kareena.

(d) As neither Kareena nor Mary can be the last person Christopher met, Bipasha must be the last person met by Christopher. Kareena must be the 2nd person he must have met and they must have met at the pattiserie.

(e) Christopher meets the person at the bar before meeting the person at the library.

From the above information, the following can be deduced.

Order of meeting Christopher	Name	Location
1	Jiya	Bar
2	Kareena	Pattiserie
3	Mary	Library
4	Bipasha	Lawns

25. At the library, Christopher met Mary. Choice (A)

26. At the library. Choice (C)

Solution for question 27:

27. Since Amar, who is 57 years of age, has seen 15 leap years, either his year of birth or the present year must be a leap year. Let us consider both the cases.

Case (i):
The birth year is a leap year.
The birth year can be written as 4K and the present year can be written as 4K + 57.
As per the new definition of a leap year, any year which is a multiple of 2 or 3 is a leap year. It is given that as per this definition both the year of birth and the present years are leap years.
Since 4K + 57 is an odd number, and is a leap year, it should be a multiple of 3. If 4K + 57 is a multiple of 3, 4K should also be a multiple of 3 $\Rightarrow$ 4K is also a multiple of 6.
In the period from 4K to 4K + 57, no. of years which are multiples of 2 is 29.
In the same period, no. of years which are multiples of 3 is 20, and no. of years which are multiples of 6 is 10 (from 4K to 4K + 54).
$\therefore$ Total no. of years which are multiple of 2 or 3
= 29 + 20 – 10 = 39.

Case (ii):
The present year is a leap year.
The year of birth can be written as 4K – 1 and the present year can be written as 4K + 56.
Since 4K – 1 is an odd number and a leap year as per the new definition, it must be a multiple of 3. And if 4K – 1 is a multiple of 3, (4K – 1) + 57 = 4K + 56 is also a multiple of 3.
4K + 56 is also a multiple of 4 $\Rightarrow$ It is also a multiple of 6.
$\therefore$ In the period 4K – 1 to 4K + 56, no. of years which are multiples of 2 is 29 (from 4K to 4K + 56).
No. of years which are a multiple of 3 is 20 (from 4K – 1 to 4K + 56).
$\therefore$ No. of years which are a multiple of 2 or 3 is 29 + 20 – 10 = 39.
$\therefore$ In either case, Amar would witness 39 leap years as per the new definition. Choice (C)

Solution for question 28:

28. Statement C speaks about Japan's ambiguous relationship with the outside world. Statement B further elaborates on this ambiguous relationship which has been witnessed throughout history. Statement D concludes the para by citing an example of Japan's insularity which is still continuing. Hence CBD form a sequence. Statement A mentions what is happening as a result of this insularity. It can follow D but cannot form a series with the rest of the sentences. Hence A is the answer. Choice (A)

Solutions for questions 29 and 30:

29. The conjunction 'or' which separates the two blanks indicates that the words which fit into the two blanks are contrasting words. Hence bombastic (pompous) and florid (overblown; pompous) which are synonymous can be ruled out. The words lucid (clear) and rhetorical (grandiose) also do not bring out the contrast intended in the sentence. The words incoherent (unclear) and persuasive (convincing) in option A can also be ruled out. The words aggressive (assertive) and accomodating (polite; adaptive) are logically appropriate. Choice (C)

30. The word in the first blank is described as 'a desire to forget the tedium and problems of .....', hence 'fantasy'. The words fantasy and menacing (threatening) are most appropriate in the given context. Choice (D)

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