

Ref: AIMCAT1110-Form-3

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 three sections with 60 questions – 20, 20, and 20 respectively in the first, second and third sections. The TOTAL TIME available for the paper is **135 minutes**. The student may apportion this time among various sections as he/she wishes. However, the student is expected to show his/her competence in all the three sections.
3. All questions carry three marks each. Each wrong answer will attract a penalty of one mark.

SECTION – I
Number of Questions = 20

DIRECTIONS for questions 1 to 10: Answer the questions independently of each other.

1. Four-fifths of a number exceeds the square of the number by as much as the cube of the number exceeds four-fifteenths of the square of the number. How many such numbers lie in the interval $[-1, 1]$?
(1) 0 (2) 1 (3) 2 (4) 3
2. What is the remainder when 7^{700} is divided by 100?
(1) 1 (2) 61 (3) 41 (4) 21
3. Three lines represented by $x - y + 1 = 0$; $3x - 4y + 5 = 0$; and $3x + 2y - 7 = 0$ are drawn on the cartesian plane. The three lines
(1) form a triangle. (2) are parallel.
(3) are concurrent. (4) None of these
4. If the selling price of 10 oranges is equal to the cost price of 14 oranges, which, in turn, is equal to one-third of the total discount offered upon 70 oranges, then find the profit/loss percentage when the mark-up percentage is halved and the discount percentage is decreased by 5 percentage points.
(1) 12.5% profit (2) 20% profit
(3) 7.5% loss (4) 10% loss
5. Two motorcyclists, Ajay and Vijay, start simultaneously from a point S on an oval track and drive around the track in the same direction, with speeds of 29 km/hr and 19 km/hr respectively. Every time Ajay overtakes Vijay (anywhere on the track), both of them decrease their respective speeds by 1 km/hr. If the length of the track is 1 km, how many times do they meet at the starting point before Vijay comes to rest?
(1) 2 (2) 3 (3) 5 (4) 6
6. A natural number n is such that $120 \leq n \leq 240$. If HCF of n and 240 is 1, how many values of n are possible?
(1) 24 (2) 32 (3) 36 (4) 40
7. If the sum to infinity of the series $2 + (2 - d)\frac{2}{3} + (2 + d)\frac{4}{9} + (2 + 3d)\frac{8}{27} + \dots \infty$ is $\frac{5}{2}$, what is the value of d ?
(1) $\frac{7}{12}$ (2) $-\frac{7}{12}$ (3) $-\frac{5}{12}$ (4) $\frac{5}{12}$

8. Let t_n be the n^{th} term of a series for which $t_{n+1} = t_n + t_{n-1}$, for all n greater than 1. If $t_1 = 1$ and $t_2 = 1$, the sum of the squares of the first thirty terms of the series equals
(1) $t_{32} \times t_{31}$. (2) $(t_{30})^2 + t_{30}$.
(3) $(t_{29} + 1) \times (t_{30} + 1)$. (4) $t_{31} \times t_{30}$.
9. There are n boxes, each of which contains several coins of denominations Re.1, Rs.2, Rs.3, Rs.4 and Rs.5. If exactly 10 coins are randomly drawn from each of the boxes, then find the minimum possible value of n such that at least eight coins of the same denomination are obtained on the whole.
(1) 2 (2) 3 (3) 5 (4) 4
10. If the roots of the equation $(x + 1)(x + 9) + 8 = 0$ are a and b , then the roots of the equation $(x + a)(x + b) - 8 = 0$ are
(1) 1 and 9 (2) -4 and -6
(3) 4 and 6 (4) Cannot be determined

DIRECTIONS for questions 11 and 12: Answer the questions on the basis of the information given below.

A robot is designed to move in a peculiar way and it can be set in motion by a microprocessor program. The program can be initiated by assigning a positive rational value to its variable n . The program directs the robot to move in the following way. As soon as the program is started, the robot starts from the point O, moves $2n$ metres northward and changes its direction by n° to the right. It then moves $2n$ metres forward and again changes its direction by n° to the right and continues in this manner till it reaches the starting point O, or till it covers a total distance of 1000 m, whichever happens first, and then it stops.

11. I assigned a value for n and started the program. If the robot finally came back to O and stopped, what is the total distance that it has covered?
(1) 180 m
(2) 360 m
(3) 720 m
(4) Cannot be determined

12. For how many values of n in the intervals $[1, 60]$ does the robot cover less than 1000 m, before it stops?
 (1) 19 (2) 60 (3) 355 (4) Infinite

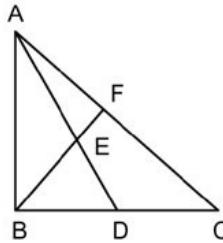
DIRECTIONS for questions 13 to 20: Answer the questions independently of each other.

13. Two vessels, A and B, contain equal quantities of a solution of milk and water. The concentration of milk is the same in both A and B. If eight litres of the solution from A is replaced with pure milk, then the concentration of milk in A becomes twice of what it was initially. If 16 litres of the solution from B is replaced with pure milk, then find the ratio of the final concentration of milk in B to the initial concentration of milk in B.
 (1) 2.5 (2) 3 (3) 4 (4) Cannot be determined

14. The first n natural numbers, 1 to n , have to be arranged in a row from left to right. In how many ways can it be done, if $n = 7$ and there are an odd number of numbers between any two even numbers and an even number of numbers between 1 and 2?
 (1) 576 (2) 288 (3) 144 (4) None of these

15. A sequence of 4 digits, when considered as a number in base 10 is four times the number it represents in base 6. What is the sum of the digits of the sequence?
 (1) 7 (2) 6 (3) 9 (4) 8

16. In the figure below, $BD = 8$ cm and $DC = 6$ cm. $AE : ED = 3 : 4$. If $AF = 12$ cm, find AC (in cm).



- (1) 28 (2) 38 (3) 44 (4) 40

17. A regular polygon has an even number of sides. If the product of the length of its side and the distance between two opposite sides is $\frac{1}{4}$ th of its area, find the number of sides it has.
 (1) 6 (2) 8 (3) 20 (4) 16

18. If two of the sides of a right triangle are 10 cm and 10.5 cm and its inradius is 3 cm, what is its circumradius?
 (1) 14.5 cm (2) 5 cm
 (3) 5.25 cm (4) 7.25 cm

19. S_n denotes a family of sets with each set consisting of 5 consecutive natural numbers, starting from n , where $1 \leq n \leq 80$. How many of these 80 sets contain a multiple of 6?
 (1) 60 (2) 66 (3) 72 (4) 54

20. If $[\log_{10}1] + [\log_{10}2] + [\log_{10}3] + [\log_{10}4] + \dots + [\log_{10}n] = n$, where $[x]$ denotes the greatest integer less than or equal to x , then
 (1) $96 \leq n < 104$ (2) $104 \leq n < 107$
 (3) $107 \leq n < 111$ (4) $111 \leq n < 116$

SECTION – II

Number of Questions = 20

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

The following tables give information about the sales, net profit and market capitalization of the 50 top companies in the country. A company, X, will always have a higher net profit and higher market capitalization than any other company, Y, if the sales of company Y are less than that of company X.

Table I

Sales (Rs. cr) less than	No. of Companies
1000	48
900	43
800	37
700	31
600	28
500	21
400	17
300	11
200	3
100	1

Table II

Net profit (Rs. cr) less than	No. of Companies
200	45
180	39
160	36
140	30
120	24
100	22
80	18
60	14
40	12
20	7

Table III

Market Capitalization (Rs. cr.) less than	No. of Companies
2500	43
2250	41
2000	38
1750	35
1500	32
1250	29
1000	24
750	20
500	17
250	11

In each table, the value in any row of the second column denotes the number of companies for which the value of the parameter mentioned at the top of the first column is less than the corresponding value given in the first column.

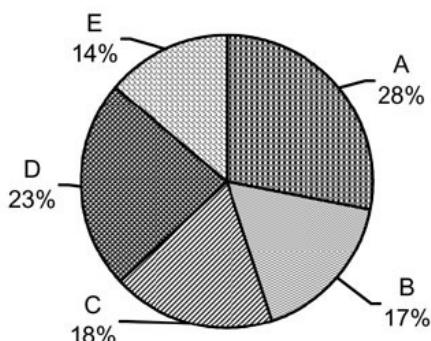
For example, the third row of Table I shows, that there are 37 companies having sales less than Rs.800 crore.

23. The number of companies, from among those given, having a market capitalization of less than Rs.2000 crore but with a net profit of at least Rs.100 crore is
(1) 13 (2) 15 (3) 16 (4) 18

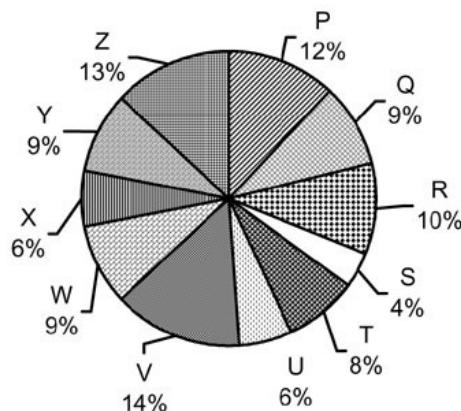
DIRECTIONS for questions 24 to 26: Answer the questions on the basis of the information given below.

Pie chart – 1 gives the percentage shares of all the five cement companies – A, B, C, D and E – in the total quantity of cement sold in country XYZ. Pie chart – 2 gives the percentage shares of all the eleven states – P through Z – in the total quantity of cement sold in the country.

Pie chart - 1



Pie chart - 2



The *market share* of any company in a state is the total quantity of cement sold by the company in that state as a percentage of the total quantity of cement sold in that state.

24. In any state, if no company had more than 50% *market share*, then in at least how many states did company A sell cement?
(1) 4 (2) 5 (3) 6 (4) 3

25. If in all the states in which company E was present, it had a *market share* of at least 25%, in at most how many states did company E sell cement?
(1) 9 (2) 8 (3) 7 (4) 6

26. The number of companies which had sales in more than two states, is at least
(1) 1 (2) 2 (3) 3 (4) 4

DIRECTIONS for question 27: Each question is followed by two statements, I and II. Answer each question using the following instructions:

- | | |
|----------|---|
| Choose 1 | if the question can be answered by using one of the statements alone, but cannot be answered using the other statement alone. |
| Choose 2 | if the question can be answered by using either statement alone. |
| Choose 3 | if the question can be answered by using both statements together, but cannot be answered using either statement alone. |
| Choose 4 | if the question cannot be answered even by using both statements together. |

27. What would be the ratio of Changu's age to that of Mangu's age, five years from now?

 - The ratio of Changu's and Mangu's ages now is 2 : 1 and would be 4 : 3 ten years from now.
 - The sum of the ages of Changu and Mangu is 25 years and the ratio of Changu's age to that of Manqu's age 6 years back was 9 : 4.

DIRECTIONS for question 28: Each question is followed by two statements, I and II, giving certain data. You have to decide whether the information provided in the statements is sufficient for answering the question.

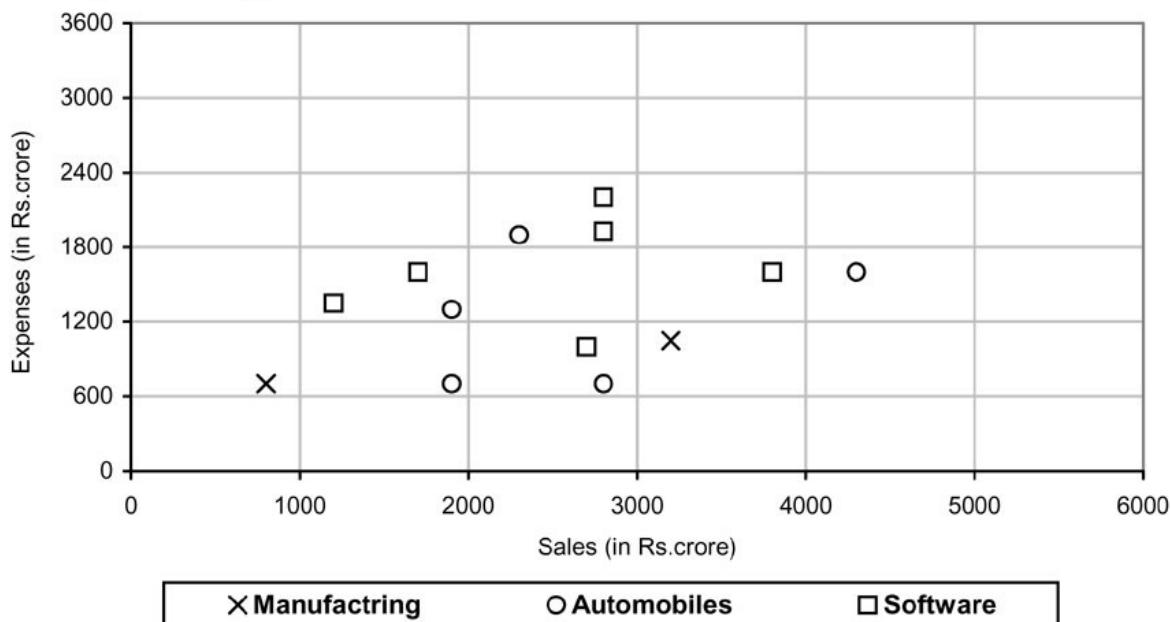
- | | |
|----------|--|
| Choose 1 | if the question can be answered by using one of the statements alone, but cannot be answered by using the other statement alone. |
| Choose 2 | if the question can be answered by using either statement alone. |
| Choose 3 | if the question can be answered by using both statements together, but cannot be answered by using either statement alone. |
| Choose 4 | if the question cannot be answered even by using both the statements together. |

28. Triangle ABC is right angled at B. What is the value of $AB + BC$?

 - I. Diameter of the circle inscribed in the triangle ABC is 10 cm.
 - II. Diameter of the circle circumscribing the triangle ABC is 27 cm.

DIRECTIONS for questions 29 and 30: Answer the questions on the basis of the information given below.

Each point in the graph below shows the sales and expenses of a company. Each company belongs to one of the three sectors among manufacturing, automobiles and software.

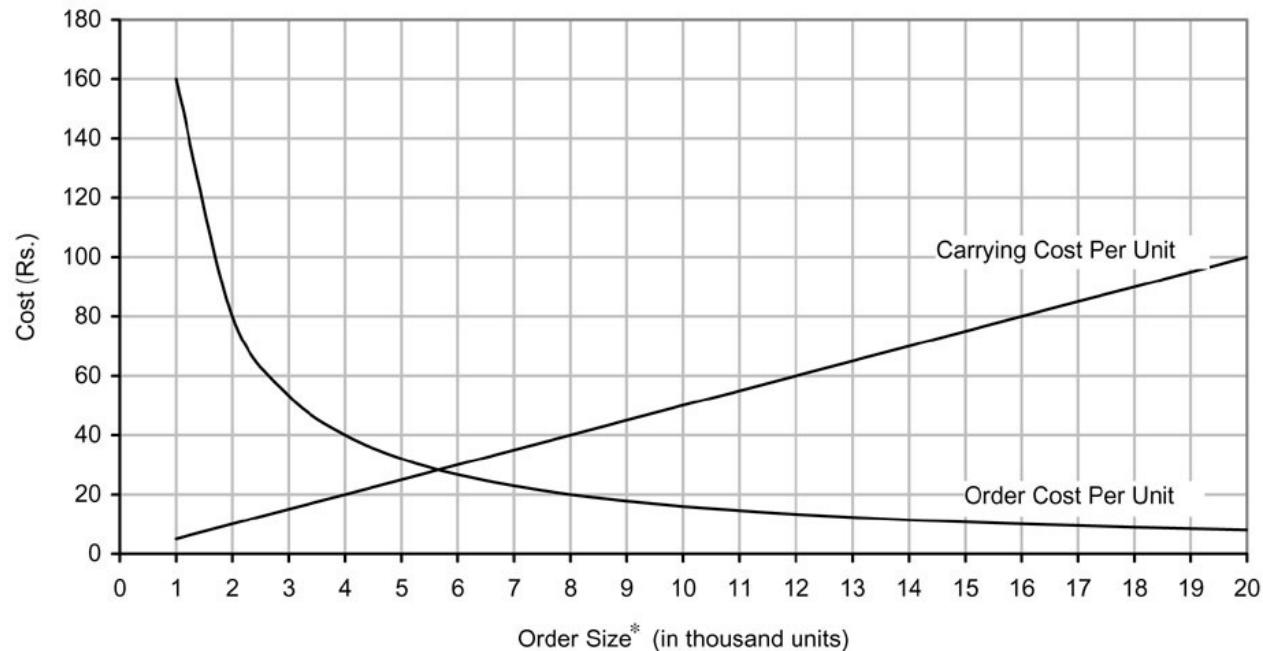


29. For how many of the companies, is the profit more than 40% of the sales (Profit = Sales – Expenses)?
 (1) 4 (2) 5 (3) 6 (4) 7

30. For how many software companies are the sales more than Rs.2500 crore but the expenses less than Rs.2100 crore?
 (1) 2 (2) 3 (3) 4 (4) 6

DIRECTIONS for questions 31 to 33: Answer the questions on the basis of the information given below.

In the graph given below the inventory related costs – carrying cost and order cost – are shown with respect to the order size (i.e., the number of units ordered).



Note: Total Cost per unit = Carrying Cost per unit + Order Cost per unit
 * Order size \geq 1000 units

31. The order size for which the carrying cost per unit is half the order cost per unit is
 (1) 8000 units (2) 2000 units
 (3) 4000 units (4) Such a situation is not possible

32. If the total cost per unit for an order size of N is C and that for an order size of 2N is 2C, then which of the following is a possible value of N?
 (1) 2500 units
 (2) 4000 units
 (3) 5000 units
 (4) Such a situation is not possible

33. What is the approximate least possible total cost per unit?
 (1) Rs.28 (2) Rs.44 (3) Rs.56 (4) Rs.72

DIRECTIONS for questions 34 to 36: Answer the questions on the basis of the information given below.

After facing yet another World Cup debacle, the Board of Cricket Control in India (BCCI) is in search of a new coach for the team. It shortlisted five persons – Anshuman, Buchanan, John, Whatmore and Chappel. Each of them is from a different country among Australia, India, Japan, Pakistan and Canada, not necessarily in that order. At present, each of them is coaching the team of a different country among Australia, Bangladesh, China, Wales and Bermuda, not necessarily in that order. The following details were also observed about their particulars:

- (i) For any person, each of his three particulars – his name, the name of the country from which he is and the name of the country that he is coaching at present, starts with a different letter.
- (ii) Whatmore is coaching Australia and John is from neither Australia nor Pakistan.
- (iii) Buchanan is not coaching China and the person who is coaching Bermuda is from Canada.
- (iv) Anshuman is neither from Canada nor from Pakistan and also the person from Pakistan is coaching Bangladesh.

34. Whatmore is from which country?
 (1) India (2) Japan
 (3) Canada (4) Cannot be determined

35. Who is the person from Australia?
 (1) Buchanan (2) John
 (3) Whatmore (4) Cannot be determined

36. The person from Japan is definitely not coaching
 (1) China.
 (2) Wales.
 (3) Australia.
 (4) More than one of the above

DIRECTIONS for question 37 and 38: Each question is followed by two statements, I and II. Answer each question using the following instructions:

Choose 1 if the question can be answered by using one of the statements alone, but cannot be answered using the other statement alone.

- Choose 2 if the question can be answered by using either statement alone.
- Choose 3 if the question can be answered by using both statements together, but cannot be answered using either statement alone.
- Choose 4 if the question cannot be answered even by using both statements together.

37. If a, b, c and d are integers, then is $ac + ad - bc - bd$ even?
 I. $a + c$ is even.
 II. $c - d$ is even.

38. What percentage of the questions were attempted by Ramya in the exam?
 I. 30% of the questions are attempted by both Ramya and Swathi.
 II. The number of questions attempted by Ramya but not by Swathi is $(5/8)$ th of the total number of questions attempted by Ramya.

DIRECTIONS for questions 39 and 40: Answer the questions on the basis of the information given below.

As part of their effort to attract Indian Companies to invest in Sri Lanka, the Sri Lankan foreign affairs minister, on his two-day visit to India, decided to meet a total of six different industrialists, three on each of the two days. Of the six industrialists, there must be at least three from the IT sector, at least one from the manufacturing sector and at least one from the telecommunications sector. He has to select the six industrialists from among the available 11 industrialists, from three different sectors, given below:

IT	– Murthy, Azim, Rama and Raju
Manufacturing	– Anand, Ratan, Jagdish and Rahul
Telecommunications	– Anil, Sunil and Sarin

Further,

- (i) On any day, the minister can meet not more than two people from the same sector.
- (ii) Murthi, Azim, Raju, Ratan and Anil are unavailable to meet the minister on the first day.

39. Who among the following did the minister definitely meet on one of the two days?
 (1) Rahul (2) Rama (3) Raju (4) Azim

40. Which of the following is a possible list of the people that the minister met on the second day?
 (1) Murthy, Ratan and Rama
 (2) Anand, Sarin and Raju
 (3) Azim, Rahul and Murthy
 (4) Raju, Ratan and Anil

DIRECTIONS for question 41: The following question has a set of five 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').

SECTION – III

Number of Questions = 20

- 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 statements.

- 41.** (A) The proposed central legislation to regulate international schools could turn out to be fatal for several city schools which call themselves international without holding required recognition.
 (B) With the proposed regulation suggesting that each of the international schools should have recognition from international boards, several schools in the city are trying hard to get IGCSE or IB recognition years after they were set up.
 (C) Currently only nine international schools out of 45 located in the city and surrounding areas are registered with international boards.
 (D) However, there is a rising demand for international schools in the city, and several managements are hard selling the international tag even when they do not have recognition to run international curriculum.
 (E) As the CBSE syllabus is now offered in countries in the Middle East and hence the CBSE could be considered an international board, schools can be called international even if the CBSE syllabus is offered by them.
- (1) IJFIJ (2) JIFJI (3) JIFJF (4) IIFFI

DIRECTIONS for questions 42 to 43: In each question, there are five sentences/paragraphs. The sentence/paragraph labelled A is in its correct place. The four that follow are labelled B, C, D and E, and need to be arranged in the logical order to form a coherent paragraph/passage. From the given options, choose the most appropriate option.

- 42.** (A) Just seven species make up the known diversity of the world's sea turtles today, but these evolutionary marvels are encountering a growing number of threats.
 (B) With each passing year, nesting habitat is degraded or lost, feeding grounds are polluted, more turtles die in mechanised fisheries, and the threat of mindless port development looms large.
 (C) If a healthy population of turtles must survive into the future, there is a need for a new conservation paradigm.
 (D) Two environmental crises in the past few weeks highlight the dangers. The large oil spill in the Gulf of Mexico has turned the major feeding grounds of the rare Kemp's Ridley turtle into a veritable death zone. In South Asia, which hosts five species, thousands of Olive Ridleys making their annual journey to Orissa's Rushikulya rockery for nesting had to suffer the effects of a massive oil leak from a ship in the Ganjam port.
 (E) The marine reptiles, all of them endangered have persisted for millions of years, moving from the sea to land for nesting, and traversing the great tropical and subtropical oceans as part of their life cycles. Yet, as the 30th Annual Symposium on sea turtle biology and

conservation held recently in Goa has highlighted, the modern human dominated era poses grave challenges for their survival.

- (1) BCED (2) EBDC (3) BCDE (4) EDBC

- 43.** (A) The human safaris promoted by some tour operators in the Andaman Islands offering their customers glimpse of the Jarawa tribal community are not only an outrageous insult to human dignity, they are also a symptom of the larger problem facing the 300 – odd members of this indigenous community
 (B) Many NGOs feel the damage can be limited if the government follows the Supreme Court of India's 2002 order to close down the Trunkroad. While this could mean a serious inconvenience to a few thousand settlers the very survival of the indigenous people may lie in balance
 (C) Despite the coming and going of the Europeans and then the settlers from mainland India, the creation of a Reserve in the 1950s and the construction of the Andamans Trunk Road cutting through their homeland in the 1970s, the Jarawas maintained a hostile distance from outsiders until 1997.
 (D) For hundreds of thousands of years, the tribe lived life on its own terms, hunting and gathering food within the boundaries of its pristine home.
 (E) Since then, their interactions with settlers and tourists have had a mixed bag of consequences which include two measles epidemics, and encounters with curious tourists doling out food and snapping photographs.
 (1) CDDE (2) DEBC (3) DCEB (4) DCBE

DIRECTIONS for questions 44 to 46: In each question, there are five sentences. Each sentence has pairs of words/phrases that are italicised and highlighted. From the italicised and highlighted word(s)/phrase(s), select the **most appropriate** word(s)/phrase(s) to form correct sentences. Then, from the options given, choose the best one.

- 44.** (i) Intelligence agencies feel that the latest move made by the hostile neighbouring country as a diplomatic **gambit** (A) / **gamut** (B).
 (ii) A sedentary lifestyle can have an **adverse** (A) / **averse** (B) effect on a person's health.
 (iii) After spending several days in the library **poring** (A) / **pouring** (B) through volumes of books we got the information that we wanted.
 (iv) In most Indian households it is generally the husband who keeps a tight **rein** (A) / **reign** (B) on the family's finances.
 (v) The lopsided policies of the government attracted a lot of **flack** (A) / **flak** (B) from the people.
 (1) AAAAA (2) AAAAB (3) BAABA (4) AAABA
- 45.** (i) The municipal **councillor** (A) / **counsellor** (B) promised to improve civic amenities in the suburbs.
 (ii) Jean's **adopted** (A) / **adoptive** (B) patents dote on her and cater to her every whim.
 (iii) The **venal** (A) / **venial** (B) official was caught red – handed accepting bribe.

- (iv) We have now shifted our residence **further** (A) / **further** (B) away from the main city.
 (v) She claims to be of aristocratic **dissent** (A) / **descent** (B).
 (1) AAABB (2) BBABB (3) ABBAB (4) ABAAB
- 46.** (i) While evacuating people from the flood ravaged areas **precedence** (A) / **precedent** (B) was given to women and children.
 (ii) The best way to reach the summit is by trekking up the hill, **alternately** (A) / **alternatively** (B) you can go on horse back.
 (iii) His impeccable manners perfectly **complimented** (A) / **complemented** (B) his polished looks and fashionable attire.
 (iv) There has been a **noticeable** (A) / **notable** (B) improvement in Tarun's academic performance lately.
 (v) You must be **discreet** (A) / **discrete** (B) about your plans.
 (1) AABAB (2) ABBBB (3) BABAA (4) ABBA

DIRECTIONS for questions 47 and 48: 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.

- 47.** (A) Israel's imprudent commando raid of an aid flotilla headed towards the besieged Gaza strip
 (B) has generated an international wave of righteous anger
 (C) which promises to shake off West Asia's oppressive political order.
 (D) Pre-dawn images of gun-toting commandos slithering from helicopters onto the deck of the Turkish humanitarian aid ship,
 (E) Mavi Marmara, and the bloodbath that followed, has left the world aghast.
 (1) A, B and D (2) B and D
 (3) A and E (4) B, C and D
- 48.** (A) It all began on the summit of a high peak in the Austrian Alps.
 (B) As the sun shined onto my face on that warm summer day
 (C) my thoughts wandered away to the snow covered mountain range in the far distance

DIRECTIONS for questions 51 to 53: Read the following passage and answer the questions that follow it.

Humans have a basic need to perceive themselves as part of a grand scheme, of a natural order that has a deeper significance and greater endurance than the petty affairs of daily life. The incongruous mismatch between the futility of the human condition and the brooding majesty of the cosmos compels people to seek a transcendent meaning to underpin their fragile existence.

For thousands of years this broader context was provided by tribal mythology and storytelling. The transporting qualities of those narratives gave human beings a crucial spiritual anchor. All cultures lay claim to haunting myths of otherworldliness: from the dreaming of the Australian Aborigines or the Chronicles of Narnia, from the Nirvana of Buddhism to the Christian Kingdom of Heaven. Over time, the humble campfire stories morphed into the splendour and ritual of organized religion and the great works of drama and literature.

Even in our secular age, where many societies have evolved to a post-religious phase, people still have unfulfilled spiritual yearnings. A project with the scope and profundity of SETI (search for extra-terrestrial intelligence) cannot be divorced from this wider cultural context, for it too offers us the compelling promise that this could happen any day soon. As writer David Brin has pointed out, 'contact with advanced alien civilizations may carry much the same transcendental or hopeful significance as any more traditional notion of "salvation from above". I have argued that if we did make contact with an advanced extraterrestrial community, the entities with which we would be dealing would approach

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- (D) and I felt that the time had come to go for a long pilgrimage.
 (E) I decided to walk out into the world and share the pleasure of walking with others.
 (1) A and E (2) A, B and D
 (3) C and D (4) B, C and D

DIRECTIONS for question 49: 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 appropriate way.

- 49.** Birth rates have fallen dramatically – and voluntarily. Coercive birth control, including paying people not to have babies, was discredited and abandoned decades ago. Nearly two-thirds of the couples in poor countries now use birth control, and not because some patriarchal westerner told them to. In the 1970s, the government of Bangladesh offered people in the Matlals region low-cost contraceptive supplies and advice. Birth rates promptly fell well below those of neighbouring regions. So Bangladesh extended the service nationally and its birth rate plummeted from six children per woman to three.
 (1) The 'population bomb' has already gone off.
 (2) Given the choice, people want fewer children.
 (3) Governments want fewer children since their own life expectancy falls with rising numbers.
 (4) Even when birth rates fall, there is a lag which means population keeps growing far decades until birth and death rates even out.

DIRECTIONS for question 50: In each of the following questions, the word at the top is used in four different ways, numbered 1 to 4. Choose the option in which the usage of the word is INCORRECT or INAPPROPRIATE.

- 50. MARK**
 (1) The signing of the peace pact will mark a new phase in international relations.
 (2) Ensure that you are punctual to class otherwise I shall mark you absent.
 (3) The traumatic experience has left a mark on the child's mind.
 (4) Low sales has forced the company to mark off the price of a wide range of goods.

godlike status in our eyes. Certainly they would be more godlike than humanlike; indeed, their powers would be greater than those attributed to most gods in human history.'

So is SETI itself in danger of becoming a latter day religion? Science fiction writer Michael Crichton thought so. He said: "Faith is defined as the firm belief in something for which there is no proof," he explained. "The belief that there are other life forms in the universe is a matter of faith. There is not a single shred of evidence for any other life forms, and in forty years of searching, none has been discovered." Writer Margaret Wertheim has studied how the concept of space and its inhabitants has evolved over several centuries. She traces the modern notion of aliens to Renaissance writers such as the Roman Catholic Cardinal Nichols of Cusa, who considered the status of man in the universe in relation to celestial beings such as angels.

With the arrival of the scientific age, speculations about alien beings passed from theologians to science fiction writers, but the spiritual dimension remained just below the surface. Occasionally it is made explicit, as in Olaf Stapledon's Star Maker, David Lindsay's A Voyage to Arcturus, or Steven Spielberg's Close Encounters of the Third Kind, which is strongly reminiscent of John Bunyan's A Pilgrim's Progress. These are iconic images that resonate deeply with the human psyche, and shadow the scientific quest to discover intelligent life beyond Earth...

51. It can be inferred from the passage that, 'Close Encounters of the Third Kind'
- (1) is a modern, scientific version of John Bunyan's Pilgrim's Progress.
 - (2) explores the spiritual unknown in the scientific quest to discover the extraterrestrial.
 - (3) is the work of a theologian-turned science fictionist.
 - (4) speculates on intelligent life in outer space and reflects vivid spiritual overtones.
52. Which of the following statements reflects or captures the author's view on the search for extraterrestrial intelligence?
- (1) It is a vain attempt by man to underpin his fragile existence.
53. Great literary works, according to the passage
- (1) had their origins in the spiritual age.
 - (2) evolved from tribal tales.
 - (3) were a product of the Renaissance.
 - (4) dwelt on the spiritual.

DIRECTIONS for questions 54 to 57: Read the following passage and answer the questions that follow it.

On June 12, 1990 the First Congress of the People's Deputies of the Russian Federation announced "The Declaration of State Sovereignty of the Russian Federative Socialist Republic". Quite a mouthful: in essence the intention was to bring about constitutional reform thus ushering in the "new" state of Russia as a nation and ultimately a democracy. Two years later, during which time the Soviet Union imploded, the date was adopted as a national holiday – Russia day. This year we celebrate the 20th anniversary of Russia day. It makes one think!

One of the truly astonishing things in modern history, perhaps especially for someone of my generation (born in 1945), is how amazingly short-lived the Soviet Union was: 1922-1991 are millions of people on the planet who were born before the Soviet Union and died long after. The USSR had a relatively short lifetime. Having been on a number of occasions in the Soviet Union in the mid/late '60s, it would have seemed absolutely inconceivable at the time that in fact the regime was living on not much more than borrowed time. Ultimately, not only was the collapse quite incredible, but so was the speed with which it happened: here today, gone tomorrow.

The last two decades have been a roller-coaster ride for Russia. The Yeltsin years (1991-1999) were certainly quite frantic, ending with the 1998 collapse of the Russian stock-market, rouble and economy, relegating the country to virtual junk status. It was estimated then that the Russian GDP was smaller than Belgium's! RIP Russia was the generally prevalent attitude of the outside world. When the G7 submitted to Putin's insistent demand to have Russia admitted into the club in 2002 – hence becoming the G8 – this was seen basically as a sop on the part of the initial G7 to "poor old Russia". During the Putin years (2000-2008), Russia's economic and geopolitical star re-emerged; written off in 1998, within a short time it appeared that Russia as a global power was back. President Medvedev (2008-) has had to contend with the catastrophic impact of the global economic crisis, as a result of which the Russian GDP in the space of one year contracted by 10.9%, but his agenda does not deviate from Putin's.

So in the course of these very tumultuous two decades, some very pertinent questions remain, including whether Russia is a democracy, whether it is a market economy, whether it is west or East? What will the future hold?

A new categorization arose with the invention of the term "BRIC" by Goldman Sachs economist Jim O'Neill in 2001. In this "paradigm", Russia is put in the company of the key "emerging" nations, two of which (China and India) are Asian and one (Brazil) Latin American. This would seem to put Russia beyond Europe. Moscow occasionally seems to relish this association and there have been some not terribly convincing attempts at institutionalizing the BRICs as a body engaged in global governance. Russia is also a member of the Shanghai Cooperation Organization, also founded in 2001, which brings together the leaders of Russia, China, Uzbekistan, Tajikistan and Kyrgyzstan, intended to provide geopolitical weight – or counter-weight – in a still Western dominated planet.

As many have pointed out, however, Russia's appurtenance to these entities raises multiple anomalies. It does not really belong in the "BRICs"; it is not an "emerging market", it is more of an old power undergoing pains of transition and decline. Whereas India, China and Brazil are all three prominent members of the WTO and active commercial players in multiple sectors across the planet, Russia is basically an oil and gas economy.

But perhaps the element that most distinguishes Russia and puts it in stark contrast with emerging economies is demographics. Russia has a very low birth rate and a much shorter life expectancy than both industrialized and emerging economies. Prospects are dim. With a population of 145 million in 2010, on the basis of current demographic trends – and demographic trends are difficult to reverse – the population by 2050 will have dwindled to an expected 108 million.

Demographics, as the philosopher Auguste Comte stated, is destiny: you cannot escape it. Russia is by far the world's biggest country with extremely long boundaries. How can a dwindling and aging population continue to inhabit such a vast territory, let alone govern and protect it, is a critical question.

Bearing all this in mind, it would, it seems, be in Russia's national interest to cement much closer ties with Europe; and this would also be in Europe's interest. Some indeed advocate that Russia should be made a member-state of the European Union. To that end, Europe – and notably the European Union – should be having a much more pro-active policy of engaging with Russia.

Paradoxically, however, there is one other dimension in which Russia does stand out from most of the rest of Europe. Western Europe, but also increasingly Central and Eastern Europe have become secular, indeed one can say irreligious societies. Churches are empty and consequently they play far less of a role in European daily life than they did only half-a-century ago. In Russia, remarkably, after seven decades of enforced atheism, the Orthodox Church has enjoyed a truly remarkable renaissance. It is close to the center of power as it also impacts on the lives of ordinary Russians.

DIRECTIONS for questions 58 to 60: Read the following passage and answer the questions that follow it.

Just when the world was heaving a collective sigh of relief that the 2008 crisis was finally ending, another major crisis has emerged. Late last year, analysts were debating whether we would see a sharp V-shaped recovery from the Great Recession or a more gradual U-shaped recovery. Some prescient analysts spoke of a W-shaped or double-dip path to recovery. They were right but for the wrong reason. The recovery path is indeed facing a double-dip. However, this is not being triggered by the discovery of hitherto hidden toxic assets in the US as had been feared. Instead, it is being driven by the threat of sovereign debt default in Greece.

The global financial system seems remarkably fragile. Greece accounts for less than 2 per cent of the combined GDP of the European Union. Yet, it has set that entire region in turmoil and this in turn has spooked investors across the globe. During the past month stock markets have declined not only in Europe but also in the US and throughout Asia. The decline is now beginning to spill over into commodities like copper and oil.

Greece is in a tight spot. A public debt stock amounting to 115 per cent of GDP is likely to rise to 150 per cent by 2014. This is partly because its large fiscal deficit is adding nearly 14 per cent of GDP to the debt stock annually, and partly because Greek GDP is declining by 4 per cent to 5 per cent per year. Getting back to a sustainable fiscal path will require cutting the deficit by 10 per cent of GDP by 2014, after allowing for an interest burden amounting to 7.5 per cent of GDP.

Such harsh fiscal compression is not politically feasible. Even the much milder austerity programme announced earlier this month had Greeks rioting in the streets to defend their entitlements and jobs. Nor does Greece have the option to moderate the fiscal compression, combining it with aggregate expenditure switching from imports to exports through devaluation. It is locked into the euro and no longer has its own currency.

Investors are aware of all this. They are also aware of similar debt crises potentially looming in Spain, Portugal, Ireland, Italy and even the UK. Hence, the risk of contagion in case Greece defaults on its debt. It was to stem the fears that European leaders announced a \$1 trillion bailout package on May 10, worked out in collaboration with the IMF. This is partly money on the table but mostly guarantees of assistance. Moreover, the 'independent' European Central Bank (ECB) was persuaded to announce that it would buy Greek government bonds three days after its head, Jean-Claude Trichet, announced that the ECB would do no such thing. Initial market reaction was positive. But sentiments turned bearish when investors realized that even this large package would only postpone the date of final reckoning for sovereign Greek debt.

What is the outlook going forward? Three possible scenarios can be envisaged. Greece could withdraw from the EU, revive its own currency and devalue the drachma to stimulate growth and ease the fiscal burden. However, this is quite unlikely since no European country is prepared to see the EU's unravelling at present. Alternatively, Greece can remain in the EU and impose harsh fiscal compression to meet its debt obligations. However, the markets are already discounting this option as being politically infeasible. The third and most likely outcome is that Greece will remain in the EU, and combine politically feasible austerity measures with some debt restructuring, that is, a managed and partial haircut for investors exposed to Greek and derivative debt. The markets are probably factoring in this outcome right now, hence the decline.

How will all this affect India? Finance minister Pranab Mukherjee and RBI governor D. Subbarao have both indicated that the impact on India will be limited. They are probably right. Though bigger than the Dubai debt hiccup a few months ago, the Greek debt crisis is nowhere near the scale of the great recession that hit the world two years ago. Even then the impact on India was quite muted. Hence, it is reasonable to expect that the fallout of the present crisis will be relatively benign.

Nobody knows how soon the Greek markets will settle. If market volatility is sustained, economic recovery in Europe and other advanced countries will be disrupted. Oil prices will remain soft. There will be an initial capital flight from Europe to the US and other 'safe' advanced country markets. Then fear will give way to a search for better returns, and we should see a significant increase in capital flows to relatively safe emerging markets like India. However, there will be an adverse negative impact on the incipient recovery of India's exports. On balance, a modest negative net impact.

If the markets settle soon, Europe and advanced countries elsewhere will resume their recovery. This will drive up oil prices, but it will also help sustain the recovery of Indian exports. Finally, the setting of markets in Europe notwithstanding, we will probably still see enhanced capital flows to India. On balance, a modest net positive impact.

58. The optimism that Greece's debt crisis may not seriously impact India is based on the fact that
- India's trade with Greece is on a very moderate scale.
 - India had been able to survive the Dubai debt crisis.
 - India had remained immune to the consequences of the great recession that hit the world.
 - India had weathered both the Dubai debt crisis and the great global recession.
59. From the passage, it could be inferred that the author views Greek's debt crisis as causing
- the world economy to decline from a robust condition.
- (2) the world economy's recovery from a gradual decline.
(3) the world economy's recovery from a sharp decline.
(4) the world economy's decline after an initial recovery from an earlier decline.
60. According to the passage, the nature of the impact of Greece's debt crisis on India depends upon
- the seriousness of the impact of the crisis on EU countries.
 - the stability of the Indian markets.
 - time taken for Greek markets to stabilise.
 - the magnitude of Indian exports.

(Key and Solutions for AIMCAT1110-Form-3)

Key

1. 3	7. 2	13. 2	19. 2	25. 3	31. 3	37. 1	43. 3	49. 2	55. 1
2. 1	8. 4	14. 1	20. 3	26. 1	32. 4	38. 3	44. 2	50. 4	56. 4
3. 3	9. 4	15. 4	21. 1	27. 2	33. 3	39. 2	45. 4	51. 4	57. 1
4. 1	10. 1	16. 4	22. 1	28. 3	34. 4	40. 3	46. 4	52. 3	58. 4
5. 2	11. 3	17. 4	23. 3	29. 3	35. 1	41. 4	47. 2	53. 2	59. 4
6. 2	12. 3	18. 4	24. 2	30. 2	36. 2	42. 2	48. 1	54. 4	60. 3

Solutions

SECTION – I

Solutions for questions 1 to 10:

1. Let the number be x .

$$\text{Given } \frac{4}{5}x - x^2 = x^3 - \frac{4}{15}x^2.$$

$$\text{Hence, } x^3 + \frac{11}{15}x^2 - \frac{4}{5}x = 0$$

$$\Rightarrow \left(x^2 + \frac{11}{15}x - \frac{4}{5} = 0 \right) \text{ OR } (x = 0)$$

$$\Rightarrow 15x^2 + 11x - 12 = 0 \text{ OR } x = 0$$

$$15x^2 + 20x - 9x - 12 = 0 \text{ OR } x = 0$$

$$\Rightarrow 5x(3x + 4) - 3(3x + 4) = 0 \text{ OR } x = 0$$

$$\Rightarrow (5x - 3)(3x + 4) = 0 \text{ OR } x = 0$$

$$\Rightarrow x = \frac{-3}{5} \text{ OR } \frac{-4}{3} \text{ OR } 0$$

Only $\frac{-3}{5}$ and 0 lie in the interval $[-1, 1]$.

Hence only two values lie in the given interval.
Choice (3)

2. Consider 7^4 , whose value is 2401

$$\therefore 7^{700} = (7^4)^{175} = (2401)^{175}$$

Any power of 2401 will end with 1 as the units digit and 0 as the tens digit.

∴ When it is divided by 100, the remainder is 1.

Choice (1)

3. On solving the first two of the given equations we get $(x, y) = (1, 2)$. This point satisfies the third equation. Hence, the three lines pass through a common point. Choice (3)

4. Given $10S = 14C \Rightarrow S = 1.4C$

$$\text{Also } 14C = \frac{70}{3}(M - S)$$

$$\Rightarrow 42C = 70M - 98C \Rightarrow 140C = 70M \Rightarrow M = 2C$$

$$\Rightarrow \text{Profit \%} = \frac{0.4C}{1C} = 40\%$$

$$\text{discount \%} = \frac{2C - 1.4C}{2C} = 30\%$$

$$\text{Mark up \%} = \frac{2C - C}{C} = 100\%$$

Now, mark up \% is halved i.e., 50% and discount% is 25%. If cost price is Rs.100 then marked up price is 150 and selling price is $150 \times 75\% = 112.5$ = Profit percentage is 12.5%.
Choice (1)

5. The relative speed of Ajay with respect to Vijay = $29 - 19 = 10$ km/hr and this is constant through out the time as (both decrease their speed equally and simultaneously, every time they meet).

Since track length = 1 km, they will meet when Ajay covers 2.9 km and Vijay 1.9 km (i.e., $2.9 - 1.9 = 1$ km), and the meeting point will be exactly 0.1 km before the starting point. The second meeting point will be 0.2 km before the first meeting point, as this time they will meet after covering 2.8 km and 1.8 km respectively (owing to decrease in speeds). In total, they will meet 19 times before Vijay comes to rest.

This way, every time $0.1 + 0.2 + 0.3 + 0.4 \dots 1.9$ is a whole number, they meet at the starting point. This is equivalent to the case when $\frac{n(n+1)}{2}$ is a multiple of 10, for $n \leq 19$.

Hence, $n(n+1)$ is a multiple of 20, the possible values of n are 4, 15 and 19.

Hence, they meet at the starting point on 3 occasions on the whole.
Choice (2)

6. Given that $120 \leq n \leq 240$.

$$120 = 2^3(3)(5) \text{ and } 240 = 2^4(3)(5)$$

So, the prime factors involved in 120 and 240 are the same. We want the number of co-primes of 240 lying between 120 and 240 = $\phi(240) - \phi(120)$.

$$= 240 \left(1 - \frac{1}{2}\right) \left(1 - \frac{1}{3}\right) \left(1 - \frac{1}{5}\right) - 120 \left(1 - \frac{1}{2}\right) \left(1 - \frac{1}{3}\right) \left(1 - \frac{1}{5}\right)$$

$$= (240 - 120) \left(\frac{1}{2}\right) \left(\frac{2}{3}\right) \left(\frac{4}{5}\right) = 32 \quad \text{Choice (2)}$$

7. Let $S = (2-d) \left(\frac{2}{3}\right) + (2+d) \left(\frac{4}{9}\right) + (2+3d) \left(\frac{8}{27}\right)$

$$\therefore S \left(\frac{2}{3}\right) = (2-d) \left(\frac{4}{9}\right) + (2+d) \left(\frac{8}{27}\right) + \dots$$

Subtracting,

$$\frac{S}{3} = (2-d) \left(\frac{2}{3}\right) + 2d \left(\frac{4}{9}\right) + 2d \left(\frac{8}{27}\right) + \dots$$

$$= (2-d) \left(\frac{2}{3}\right) + 2d \left[\frac{4}{9} + \frac{8}{27} + \dots\right]$$

$$= (2-d) \left(\frac{2}{3}\right) + (2d) \left[\frac{4}{9} \left(\frac{3}{1}\right)\right] = \frac{4}{3} + 2d$$

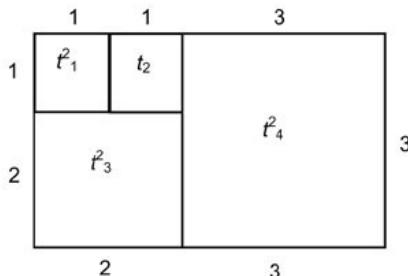
$$\Rightarrow S = 4 + 6d. \text{ Given } S = \frac{5}{2} - 2 = \frac{1}{2} \therefore d = \frac{-7}{12}$$

Choice (2)

8. Given is the original fibonacci series ($t_1 = t_2 = 1$ and $t_{n+1} = t_{n-1} + t_n$).
 $1, 1, 2, 3, 5, \dots, t_{30}$.
Now, we are required to find the sum

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

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



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

Alternative solution:

Alternately, considering say the sum of the squares of the first two terms, three terms, four terms, etc., it may be observed that the sum of the squares of the first n terms is $t_n \times t_{(n+1)}$.
Choice (4)

9. The total number of coins drawn 'T' will be $10n$. Since only 5 distinct denominations are possible, when $T = 6$ we will have at least two coins of the same denomination. Similarly, to get at least p coins of the same denomination we need to have at least $5(p-1) + 1$ coins
 \Rightarrow for $p = 8$, we need at least $T = 5 \times (8-1) + 1 = 36$ coins
 $\Rightarrow 10n \geq 36 \Rightarrow n \geq 4$
Choice (4)

10. $(x+1)(x+9)+8=0$
 $x^2+10x+17=0$
The roots of the equation are a and b
 $\therefore a+b=-10$
 $ab=17$
 $(x+a)(x+b)-8=0$
 $x^2+(a+b)x+ab-8=0$
 $x^2-10x+9=0$
Therefore, roots of $(x+a)(x+b)-8=0$ are 1 and 9.
Choice (1)

Solutions for questions 11 and 12:

If n is a factor of 360, then according to the pattern of movement followed by the robot, it will cover a regular polygon of an external angle of n° and number of sides = $\frac{360}{n}$. The length of

each side will be $2n$ metres. Hence the robot will come back to O in this case. However, if n is not a factor of 360° , then the robot will not come back to O, but will continue moving till it covers 1000 metres and then stop.

Note: The robot may come back to O for other values of n , which are not factors of 360° but are factors of $720^\circ, 1080^\circ, \dots$ etc. However, in such cases the distance required to be covered before reaching O will be greater than 1000 m.

11. Since the robot came back to O, n must be a factor of 360° and also the total distance covered = (number of sides of the regular polygon) \times (length of each side) = $\frac{360}{n} \times 2n = 720$ m
Choice (3)
Note that the distance is independent of N.

12. If the robot covered less than 1000 m, then it must have come back to O. The factors of 360 in the range [1, 60] are $\frac{360}{1} \Rightarrow 360$ sides to $\frac{360}{60} = 6$ sides. All other rational values of n , for 359 sides, 358 sides and so on till 6 sides are possible.
Hence a total of $(360 - 6) + 1 = 355$ values are possible.
Choice (3)

Solutions for questions 13 to 20:

13. Since the concentration in A doubled, the net addition of milk to A due to the replacement of 8 litres is the same as the initial quantity of milk in A. This means that (8 litres of pure milk) – (the milk lost in the 8 litres of solution replaced) = quantity of milk initially present.
Now the replacement of 16 litres in B can be thought of as the replacement of two 8-litre volumes of the solution. This will lead to a net addition of two times the initial volume of milk. This will triple the concentration of milk in B.
Choice (2)

14. If there are an odd number of numbers between any two numbers, the two numbers occupy positions of the same parity (i.e. both are in even places or both are in odd places)

The even numbers 2, 4, 6 are all in odd places or all in even places, while 1 and 2 are in positions of opposite parity.

We have the following possibilities.

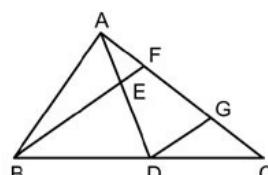
Positions	1, 3, 5, 7	2, 4, 6
Numbers	{1, 3, 5, 7}	{2, 4, 6}
	{2, 4, 6, x}	{1, y, z}

Where x, y, z are 3, 5 and 7, in any order (i.e., permutation).

\therefore The number of arrangements is ${}^4P_4 \cdot {}^3P_3 + {}^4P_3 \cdot {}^3P_3 = 4!3! + 4!(3!)^2 = 576$
Choice (1)

15. Let the 4-digit sequence be $abcd$.
In base 6, this represents $216a + 36b + 6c + d$ and each of a, b, c, d is less than 6.
In base 10, it represents $1000a + 100b + 10c + d$.
Given $4(216a + 36b + 6c + d) = 1000a + 100b + 10c + d$
 $\Rightarrow 136a = 44b + 14c + 3d$ ----- (A)
By trial $a = 1, b = 2, c = 3, d = 2$
If $a = 2$, the LHS = 272
[If we consider $b = 5$, we need 272 – 220 or 52 from $14c + 3d$ ($c, d = (2, 8)$ but 8 is not a proper digit in base 6).
If $a = 3$, the LHS = 408, while $44b + 14c + 3d$ can at the most be $(44 + 14 + 3)5$ or 305.
 \therefore There are no other possible values that satisfy (A)]
 $\therefore abcd = 1232$ and $a + b + c + d = 8$
Choice (4)

16. Let G be a point on AC such that DG is parallel to BF.



$$\begin{aligned}\frac{AF}{FG} &= \frac{AE}{ED} = \frac{3}{4}, \quad \frac{FG}{GC} = \frac{BD}{DC} = \frac{4}{3} \\ \therefore AF : FG : GC &= 3 : 4 : 3. \\ \therefore AC &= \frac{10}{3}(AF) = \frac{10}{3}(12) \text{ cm} = 40 \text{ cm} \quad \text{Choice (4)}\end{aligned}$$

17. Let the number of sides be $2n$. Let the length of the side be S and the length of the perpendicular from the centre to each side be P . Since the number of sides is even, the opposite sides will be parallel and the distance between any two opposite sides is equal to $2P$.

$$\text{Also, area of the polygon (A)} = 2n \left(\frac{SP}{2} \right) \quad \text{--- (1)}$$

$$\begin{aligned}\text{Given that } S(2P) &= A/4 \text{ or } SP = A/8 \\ \therefore (1) \Rightarrow A &= n(A/8) \\ \Rightarrow n = 8 \text{ or } 2n &= 16 \quad \text{Choice (4)}\end{aligned}$$

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

If hypotenuse = 10.5 cm, then the sides containing the right angle are 10 cm and $\sqrt{(10.5)^2 - 10^2} = \sqrt{10.25} \sim 3.2$
But the inradius of the triangle is given as 3 cm.
 \Rightarrow The smallest of the sides is more than 6 cm long. Therefore, the 10.5 cm side is not the hypotenuse. Hence the lengths of the sides containing the right angle are 10 cm and 10.5 cm. So, hypotenuse = $\sqrt{10^2 + 10.5^2} = 14.5$ cm
 \therefore The circumradius of the right triangle = $\frac{14.5}{2} = 7.25$ cm
Choice (4)

19. $S_n = \{n, n+1, n+2, n+3, n+4\}$
If $n = 6k$ or $6k+2$ or $6k+3$ or $6k+4$ or $6k+5$ where k is a natural number, one element of S_n will definitely be divisible by 6. If $n = 6k+1$ where k is a natural number none of the elements in S_n is divisible by 6.
 $\therefore 1 \leq 6k+1 \leq 80$.
 $\therefore k$ can assume values from 0 to 13, i.e., 14 possible values, i.e., 14 of the sets do not have a multiple of 6 and $80 - 14 = 66$ sets contain a multiple of 6. Choice (2)

20. $[\log_{10}x] = 0$, for any value of $x \in \{1, 2, \dots, 9\}$, —— (1)
Similarly $[\log_{10}x] = 1$, for $x \in \{10, 11, 12, \dots, 99\}$ —— (2) and $[\log_{10}x] = 2$, for $x \in \{100, 101, 102, \dots, 999\}$ —— (3)
Now consider, $1 \leq n \leq 9$, then
 $[\log_{10}1] + [\log_{10}2] + [\log_{10}3] + \dots + [\log_{10}n] = 0$ (i.e., $\neq n$)
Hence the expression given in the question cannot be satisfied.
Now consider, $10 \leq n \leq 99$, then $[\log_{10}1] + [\log_{10}2] + \dots + [\log_{10}n] = (0 + 0 + \dots + 9 \text{ times}) + (1 + 1 + \dots + (n-9) \text{ times}) = n - 9$
Using the same approach, for
 $100 \leq n \leq 999$, $[\log_{10}1] + [\log_{10}2] + \dots + [\log_{10}n] = 90 + 2(n-99)$
It can be seen that, only for the third case i.e., $100 \leq n \leq 999$, can the expression given in the question be satisfied.
Hence $90 + 2(n-99) = n$
 $\Rightarrow n = 198 - 90 = 108$ Choice (3)

Difficulty level wise summary - Section I	
Level of Difficulty	Questions
Very Easy	—
Easy	3, 10
Medium	1, 2, 4, 6, 9, 13, 17, 19
Difficult	5, 7, 8, 11, 12, 14, 15, 16, 18, 20
Very Difficult	—

SECTION – II

Solutions for questions 21 to 23:

21. Number of companies with sales less than 500 cr is given as 21.

\therefore The remaining 29 companies should have sales of at least 500 crores. (Companies with rank 1 to 29 if they are arranged in the descending order of sales)

Companies with net profit less than 160 crores is 36 (companies with rank 15 to 50 if they are arranged in the descending order of net profit). Since a company with higher sales will always have higher profit, only 15 companies, i.e., companies with rank 15 to 29 in the ranking would satisfy both the conditions. Choice (1)

22. 37 companies have sales less than 800 crores (companies with rank 14 to 50 when arranged in descending order of sales). 39 companies (rank 12 to 50) have a net profit less than 180 cr while 18 companies (as there are 32 companies with market capitalization less than 1500 cr) i.e. companies with rank 1 to 18 have a market capitalization of at least 1500 crore. Companies which will satisfy all these conditions are just five (companies with ranks 14 to 18).
Choice (1)

23. Companies with market capitalization less than 2000 cr is 38 (companies with rank 13 to 50 when arranged in descending order) companies with net profit more than 100 cr is 28 (50 – companies with net profit less than 100 cr = 50 – 22)
There 28 companies are those with ranks 1 to 28 when arranged in descending order of net profit. The common ones in these are companies with ranks 13 to 28 = 16 companies.
Choice (3)

Solutions for questions 24 to 26:

24. To find the least number of states in which company A sold cement, we have to assume that company A had its sales in states in which the total sales were the maximum. Even if we assume company A had 50% market share in the states with maximum sales, there must be at least 5 states where company A sold cement.
Choice (2)

25. To find the maximum number of states where company E was present, we have to assume it had sales in the states where the total sales are minimum and it had a share of only 25% in the states.
 \therefore Company E had its sales in at most 7 states (S, U, X, T, Q, W and Y). It cannot include R also as 25% of sales in R is 2.5% of total and already at least 25% of 51% = 12.75% is accounted by the seven states.
Choice (3)

26. For the minimum number of companies with sales in more than two states, the sales of the companies can be as follows:
B(17%) – W(9%) + T(8%)
C(18%) – Y(9%) + Q(9%)
D(23%) – Z(13%) + R(10%)
E(14%) – V(14%)
Only company A has sales in more than two states.
Choice (1)

Solution for question 27:

27. Let Changu's age be C and Mangu's be M.
From statement I:

$$C = 2M \text{ and } (C + 10) = \frac{4}{3}(M + 10).$$

Both the equations, when solved, will give values of C and M. Hence, statement I alone is sufficient.

From statement II:

$$C + M = 25 \text{ and } (C - 6) = \frac{9}{4}(M - 6)$$

Solving the above two equations we get $C = 15$ and $M = 10$. Statement II alone is also sufficient. Choice (2)

Solution for question 28:

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

Let c and a be AB and BC , then

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

And $a^2 + c^2 = b^2$

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

Choice (3)

Solutions for questions 29 and 30:

29. Companies for which the expenses are less than 60% of the sales, will have a profit more than 40% of the sales. There are six such companies.

Choice (3)

30. Only for three software companies the sales, are over Rs.2500 crore and expenses are less than Rs.2100 crore.

Choice (2)

Solutions for questions 31 to 33:

31. At order size = 8000 or 12000 units, the carrying cost per unit is more than ordering cost per unit and at order size = 2000 units, the ordering cost per unit is much more than twice of carrying cost per unit. Hence, by elimination order size = 4000 units.

Alternately, if we look at the graph given for order cost per unit, at different order size values, the order cost per unit is

$$\frac{160}{x}.$$

Solutions for questions 34 to 36:

Let the countries to which the persons belong i.e. Australia, Canada, Pakistan, India and Japan be represented by A, C, P, I and J respectively. Let the countries that they are coaching i.e. Australia, Wales, Bangladesh, Bermuda and China be represented by Au, Wa, Ba, Be and Ch respectively.

Name	Anshuman		Buchanan		John		Whatmore		Chappel	
	x	✓	x	✓	x	✓	x	✓	x	✓
A					J					
C	I or J		-	A	A	C	A	J or I	C	P
P					P					
Country he is coaching	Au		Ba		Au				Ch	
	Wa		Be		Wa	Be	Wa	Au	Au	
	Ba	Ch	Au						Wa	
	Be		Ch		Ch				Be	Ba

34. Whatmore can be from India or Japan.

Choice (4)

35. Buchanan is from Australia.

Choice (1)

36. Wales had Buchanan, who is from Australia, as their coach.

Choice (2)

According to the carrying cost per unit graph, at different order size values, the carrying cost per unit is $5x$.

$$\text{Now given that } \frac{160}{x} = 2(5x) \Rightarrow x$$

$$\Rightarrow 4 \text{ i.e., 4000 units.}$$

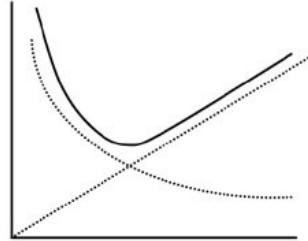
Choice (3)

32. The carrying cost per unit graph is linear, hence if N is doubled, then carrying cost per unit is doubled. as it is given that total cost per unit is also doubled,

\therefore ordering cost per unit must also be doubled. But in the given graph, ordering cost per unit is decreasing as order size is increasing. So, the situation given in the question is not possible.

Choice (4)

33. As per the definition given for total cost per unit, the graph of the total cost will be as follows.



The minimum happens at the intersection of the graphs.

Now, going by choices, the approximate value is at order size = 5600 (approximately). The value of total cost per unit here is $2 \times 28 = 56$

Choice (3)

34. Whatmore can be from India or Japan.

Choice (4)

35. Buchanan is from Australia.

Choice (1)

36. Wales had Buchanan, who is from Australia, as their coach.

Choice (2)

But by combining both the statements, If x is the percentage of questions attempted by Ramya $\frac{3}{8} \times x = 30$

$$\Rightarrow x = 80$$

\therefore 80% of the questions are attempted by Ramya.

Choice (3)

Solutions for questions 37 and 38:

37. The given expression is $E = ac + ad - bc - bd = (a - b)(c + d)$ From II, we can conclude that, E is even (since $(c - d)$ is even means $(c + d)$ is even), but from I alone, E could be even or odd.

Choice (1)

38. From statement I, we cannot determine the total percentage of questions attempted by Ramya as we do not know the % of questions attempted by Ramya but not by Swathi.

From statement II, the number of questions attempted by both Ramya and Swathi together is not known.

Solutions for questions 39 and 40:

39. Among the people from the IT sector, Murthy, Azim and Raju can be met only on the second day. As three people from the IT sector have to be met in the two days, and as at most two from that sector can be met on the second day, the minister should definitely meet Rama on the first day.

Choice (2)

40. Choice (1) : The minister definitely met Rama on the first day. As the minister met only one person from the IT sector on the first day, he should meet at least two people from the IT sector on the second day. Hence choices (1), (2) and (4) are not possible. Choice (3) does not violate any condition.

Choice (3)

Difficulty level wise summary - Section II	
Level of Difficulty	Questions
Very Easy	29, 30
Easy	38, 39, 40
Medium	21, 22, 23, 24, 25, 26, 27, 28, 31, 32, 33, 34, 35, 36, 37
Difficult	-
Very Difficult	-

SECTION – III

Solution for question 41:

41. A. The proposed legislation is a fact, the consequence of it is the author's understanding. Hence I.
 B. What the proposed legislation says and what the schools are trying to do are both facts but the link between them is the author's understanding. Hence I.
 C. The figures in the statement show it to be a fact – F.
 D. The rising demand is a fact, that several management's are hand selling is also a fact – both being presented as observations. Hence fact – F.
 E. Here again the latter half is fact, the first half is the reason as inferred by the author – I. Hence IIFFI
 Choice (4)

Solutions for questions 42 and 43:

42. Statement A opens the paragraph by speaking about the sea turtles of which only seven species one now existing. Statement E is a continuation of A as it further elaborates on the sea turtles. The 'marine reptiles' in E refers to the sea turtles in A. B follows E by mentioning the causes for the depletion of the species. D elaborates on B by citing examples. C is conclusive in nature. Hence EBDC.
 Choice (2)
43. A, which begins the para, talks about the problems faced by the members of the Jarawa tribals, D carries forward the idea expressed in A. The tribe refers to the 'Jarawas Community' referred to in A. C is a continuation of D. It is stated in C that the Jarawas maintained a hostile distance from humans till 1997. E is a continuation of C. 'Since then' in E refers to the period around 1997 when they came in to contact with out sides. B concludes the para by stating what measures are suggested to protect the Jarawas. Hence DCEB.
 Choice (3)

Solutions for questions 44 to 46:

44. Only the word gambit – a thing that somebody does or something that somebody says at the beginning of a situation or conversation that is intended to give them some advantage – makes sense in the given context. Gamut (a wide range) does not make sense here, Hence A is apt. It is said that something has an adverse effect on something. An adverse effect is an unfavourable effect. If you are averse to something it means that you are not favourably inclined to it and you detest it. Only A makes sense here.
 To pore over something is to look at or read something very carefully. Hence A is apt. Pouring which refers to the act of pouring (a liquid etc) is inapt here.
 To keep a rein on something or someone is to control them firmly. Hence A.
 The word flak which means criticism is more apt in the given context when compared to the word flack. Hence A. Therefore the sequence is AAAAB. Choice (2)
45. A councillor is a member of a municipal council etc whereas a counsellor is an advisor. Only the former is apt here. Hence A. Someone's adoptive parents are those who have adopted them. To adopt a child is to adopt someone else's child and take it into your own family Therefore B. Venal means corrupt. Venial is minor offence. Only A makes sense here.

The word farther which means a greater distance than something else, is apt here. Hence A.

The word descent which refers to family origin is apt in the context. Dissent meaning disagreement does not make sense here. Hence B. Therefore the correct sequence is ABAAB. Choice (4)

46. The word precedence which means the condition of being dealt with before other things or of being considered more important than other things is apt in the given context. Hence A.

Alternately means alternating between two things. Alternatively which is used to suggest another possibility is apt in the context. Hence B. Compliment is a remark that expresses approval admiration or respect. Complement which means to make something else seem better or more attractive when combining with it. Only B is apt here. Notable means important and demanding attention. Noticeable means easy to see or recognize. Only A is apt. The word discreet means to keep something several Discrete means having a clear, independent shape or form. Only the former makes sense here. Hence the correct sequence is ABAA. Choice (4)

Solutions for questions 47 and 48:

47. A is erroneous because 'raid of' should be 'raid on' C is incorrect because the phrasal verb shake off is inapt here. The correct phrasal verb to be used is shake up which means to cause large changes in something, usually in order to make improvements. E is incorrect because the verb has does not agree with the plural subject images, the correction is 'pre dawn images have left the world aghast'. B and D are free of errors. Choice (2)
48. B is incorrect because the past tense of the verb shine is shone in this context. Shined can also be a past tense of shone but when the reference is to sun shine the past tense is always shone. Therefore the correction here, is 'As the sun shone onto my face....' C is erroneous because the verb wander need not be followed by away. To wander away means to depart diverge or drift away from someone. Hence the phrasal verb 'wander away' does not make sense here. The correction is '... my thoughts wandered to'. D is incorrect because the expression '..... go for a pilgrimage' is incorrect. The correction is '..... go on a pilgrimage'. Only A and E are grammatically correct. Choice (1)

Solution for question 49:

49. The para talks of falling birth rate – not due to coercion but through choice. It gives the example of Bangladesh to show that if people have the knowledge and access to birth control measures, births will fall dramatically. Choice 4 cannot conclude the para because its tone is not in keeping with the positive tone of the para. Choice 3 talks of what governments want and why and so is not relevant. Choice 1 and 2 are possible choices. Choice 1 is not very clear where as 2 concludes the idea in the para. Choice (2)

Solution for question 50:

50. The error lies in choice 4., Here, the expression '... mark off' is incorrect. The correction is 'Low sales has ... mark down the price of a range of goods'. To mark down the price is to reduce the price. Choice (4)

Solutions for questions 51 to 53:

Number of words and Explanatory notes for RC:

Number of words : 498

51. Choice (4) is the best pick. Refer to the last para. The phrase 'modern scientific' renders choice (1) incorrect. The

book does not explore the 'spiritual unknown in the scientific quest'. It is science fiction with explicit spiritual dimensions'. Choice (3) can be easily ruled out.

Choice (4)

52. The author does not say that the search is a vain attempt. So, choice (1) is ruled out. Choices (2) and (4) are not the author's view. Refer to para (4). They are science fiction writer Michael Crichton's view. Para (3) points to option (3) as the answer.

Choice (3)

53. Para (2) clearly points to option (2). Ideas suggested in other options are distorted and can't be supported.

Choice (2)

Solutions for questions 54 to 57:

Number of words and Explanatory notes for RC:

Number of words : 885

54. Option (1) is not true, as Russia has been on a 'roller-coaster' ride with multiple 'ups' and 'downs'.
Option (2) is not true, as even Russia 'had to contend with the catastrophic impact of the global economic crisis'.
Option (3) misses the point that the passage is dealing with Russia's identity crisis.
Option (4) is correct. Refer to para 4, '...whether Russia is a democracy....', and the rest of the passage that discusses Russia's place in various categories.

Choice (4)

55. Choice (1) – cultural heritage is not discussed anywhere in the passage and is the answer. Choice (2) is mentioned in the context of Russia's inclusion in BRIC 'basically an oil and gas economy. Choice (3) is stated as the element that most distinguishes Russia. (Para 7) choice (4) is suggested in the last para.

Choice (1)

56. (A) is stated as 'Europe ...proactive policy... engaging with Russia' (B) is also mentioned – 'Putin years... Russia as a global power was back'. (C) is also mentioned – ' whether it is a market economy'. (D) is stated – 'collapse of the ...rouble'. Hence, choice (4) is the answer.

Choice (4)

57. 'To patronize' is to treat someone in a way that suggests they are inferior. Russia had been a force to reckon with, hence it was included in the 'club', as an act of patronage. 'To condescend' is to do something that one believes is below one's dignity. This negative tone is not suggested. The act of including Russia rules out 'trivialize'. The tone is not factual, as poor old is a matter of opinion.

Choice (1)

Solutions for questions 58 to 60:

Number of words and Explanatory notes for RC:

Number of words : 860

58. Refer to the seventh para, which provides the reason for the optimism in India. Option (1) is an easy elimination. Option (2) includes only the Dubai crisis and misses the reference to the world recession. The phrase "immune to the consequences" in option (3) is a distortion. Muted impact does not imply remaining immune. Since the author mentions both Dubai and the world recession in the same para, while discussing the idea, option (4) is the best pick.

Choice (4)

59. Choice (4) is the answer. The introductory para where the author discusses the 'W-shaped' or 'double-dip' path provides the key.

Choice (4)

60. The last two paragraphs relate to the impact on India. The net impact will be negative or positive depending upon whether the Greek markets remain volatile or settle soon. So, choice 3 is the answer.

Choice (3)

Difficulty level wise summary - Section III	
Level of Difficulty	Questions
Very Easy	–
Easy	–
Medium	42, 45, 47, 53, 56, 60
Difficult	41, 43, 44, 46, 48, 49, 50, 51, 52, 54, 55, 57, 58, 59
Very Difficult	–