



(Test Ref.: AIMCAT1214)

INSTRUCTIONS

1. Read the instructions given at the beginning/end of a section or group of questions very carefully.
 2. The total time for the test is **135 minutes**. You may apportion this time among various sections as you wish.
 3. **Pattern of the test and marking scheme**
- | Section | Questions | Number of questions | Marks per question | Negative marks |
|-----------------------------|-----------|---------------------|--------------------|----------------|
| Logic & Data Interpretation | 1 – 20 | 20 | 3 | 1 |
| Verbal Ability | 21 – 40 | 20 | 3 | 1 |
| Quantitative Ability | 41 – 60 | 20 | 3 | 1 |
| Total | – | 60 | – | – |
4. You are expected to show your competence in all the three sections.
 5. Each wrong answer will attract a penalty of one mark.
 6. There are no negative marks for unattempted questions.
 7. You can navigate to any question of your choice.
 8. During the test, you can mark questions for review and return to them at a convenient time.
 9. An answer once marked can be changed any number of times before submitting the test. However the last marked answer will be considered as the final answer.
 10. Do not carry calculators, slide rules or any other calculating devices. Do not carry any other papers with you except your HALL TICKET. Rough papers for calculations will be provided.

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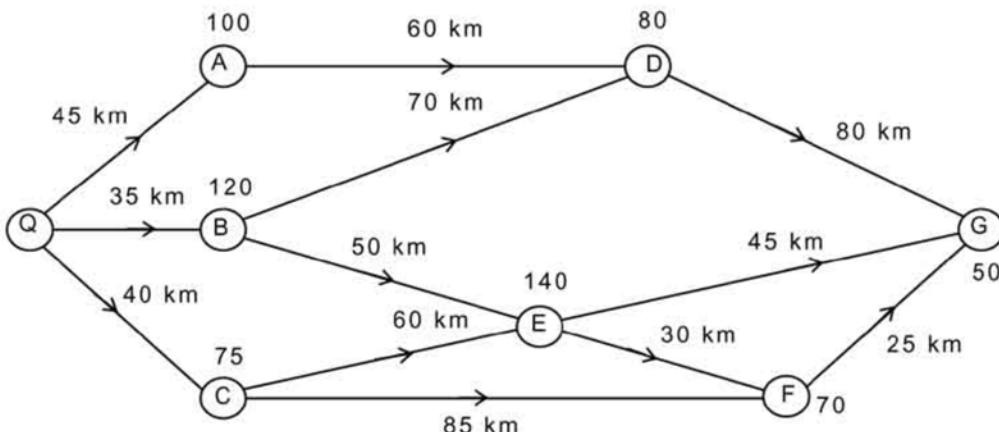
INSTRUCTIONS

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 and 2: Answer the questions on the basis of the information given below.

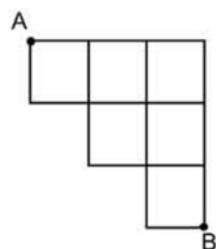
The network below gives the flow of goods from company Q to its godowns A, B, C, D, E, F and G. The arrows represent the direction in which goods are moved and the values alongside the arrows represent the distance between these points. The capacity (in tonnes) of each godown is also given alongside the godown. Goods are moved such that only if the capacity of a godown is completely used up, the goods are moved to the next godown in the supply line. Goods are moved on trucks which have a maximum capacity of 40 tonnes and the running cost of a truck is Rs.8/km. There are no other costs involved in the movement of goods.



1. Assuming that all the godowns are initially empty, what is the minimum cost of transporting goods from the company to completely fill godown E?
 (1) Rs.3620 (2) Rs.3840
 (3) Rs.3960 (4) None of these
2. If all the godowns are empty initially, then what is the maximum quantity (in tonnes) of goods that can be transported to godown D such that the total cost of transporting goods does not exceed Rs.1750?
 (1) 10 (2) 20 (3) 40 (4) 80

DIRECTIONS for question 3: Select the correct alternative from the given choices.

3. In how many ways can one go from A to B in the following figure if movement is allowed only along the edges, travelling the shortest distance possible in each case?



- (1) 14 (2) 15 (3) 10 (4) 16

DIRECTIONS for questions 4 to 6: Answer the questions on the basis of the information given below.

An institute selects 150 students for a post-graduate program. The selected candidates can be classified as having either a good or an average academic record, as

freshers or as having work-experience, as B.Com graduates or Engineering graduates. It is further known that the number of students with work experience is half the number of freshers. The number of students who are engineers is twice those who are B.Com graduates. The number of freshers having a good academic record is same as the number of B.Com students having a good academic record. The number of B.Com graduates with work-experience and an average academic record is one more than the number of engineering graduates who are freshers and have a good academic record. The number of students with an average academic record is 54 more than those with good academic record.

DIRECTIONS for questions 7 to 10: Answer the questions on the basis of the information given below.

A and B are two traders who trade in gold futures at the commodity exchange. They trade from Monday (Day 1) to Friday (Day 5). On Day 1, A started with 100 grams of gold and Rs.50000, while B started with 50 grams of gold and Rs.100000. Gold is sold or bought only in multiples of 10 grams and at the beginning of Day 1, the price of 10 grams of gold was Rs.8600, while at the end of Day 5, the price was Rs.8400. At the end of each day, the price of 10 grams of gold went up by Rs.200, or else it came down by Rs.200. Both A and B took buying and selling decisions, at the end of each trading day. On each day the beginning price of gold was the same as the ending price on the previous day. Below are some additional facts about how A and B traded over the five trading days.

Each day if the price went up, A sold 10 grams of gold at the closing price. On the other hand, each day if the price went down, he bought 10 grams at the closing price.

If on any day, the closing price per 10 grams of gold was above Rs.8800, then B sold 10 grams of gold, and if the closing price was below Rs.8400, he bought 10 grams, all at the closing price.

DIRECTIONS for question 11: The question below 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.

Mark (1) if the question cannot be answered using both the given statements.

Mark (2) if the question can be answered using both the statements together but not either statement alone.

Mark (3) if the question can be answered using either statement alone.

Mark (4) if the question can be answered using any one of the statements but not the other.

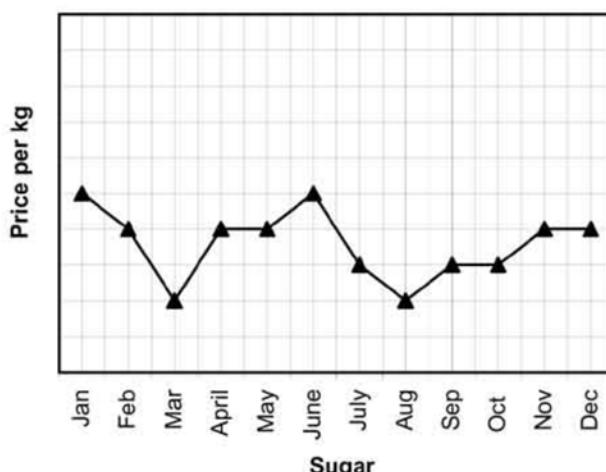
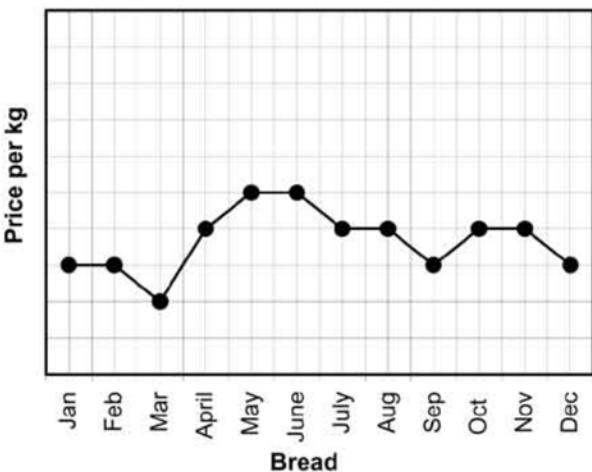
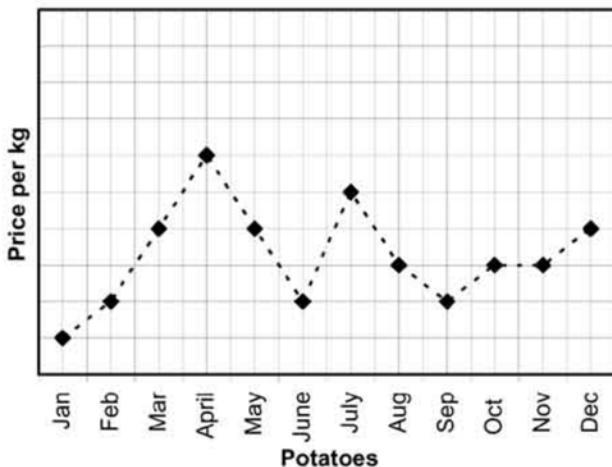
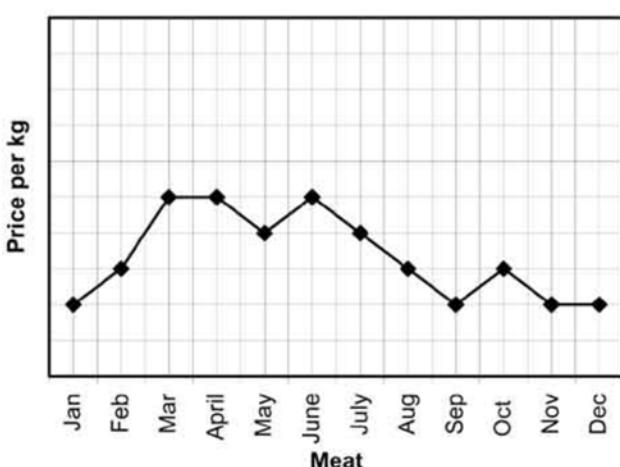
11. 60 mathematicians attended a quiz competition. 10 of them were award-winners. How many of the people who attended were award-winners?

(I) 50% of the award winners were not mathematicians.

(II) All the award winners are not necessarily mathematicians.

DIRECTIONS for questions 12 to 14: These questions are based on the following line graphs.

Price movement of four products in 2007



12. The prices of which of the following pairs of products moved in tandem (i.e., showed the same trend in change) for the maximum number of months from February to December, when compared to the corresponding previous month?
 - (1) Bread and Sugar
 - (2) Meat and Sugar
 - (3) Meat and Potatoes
 - (4) Bread and Potatoes

13. In how many months from February to December did the prices of all four items increase, when compared to the corresponding previous month?
 - (1) 3
 - (2) 0
 - (3) 2
 - (4) 1

14. In how many months from February to December did the prices of at least three items move in tandem (i.e., showed the same trend in change), when compared to the corresponding previous month?
 - (1) 4
 - (2) 2
 - (3) 5
 - (4) 6

DIRECTIONS for question 15: Select the correct alternative from the given choices.

15. There are 7 students – 4 boys and 3 girls – standing in a queue not necessarily in any particular order. A physical trainer followed a simple procedure to

arrange these students in a particular order. Starting from the 1st student, every alternate student was made to go to the rear end of the queue and every 2nd student was separated to form a new queue, with students being added to the rear end of the new queue. The last person thus remaining in the initial queue was added to the rear end of the new queue. In this manner, the physical trainer adjusted the students to form a new queue and finally found the students to be in the order BGBGBGB. Which student(s) position has remained unchanged in the new queue?

- (1) 3rd position from front end
- (2) 5th position from front end.
- (3) 5th and 7th positions from front end.
- (4) 2nd position from rear end.

DIRECTIONS for question 16: The question below 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.

Mark (1) if the question cannot be answered using both the given statements.

Mark (2) if the question can be answered using both the statements together but not either statement alone.

Mark (3) if the question can be answered using either

Mark (4) if the question can be answered using any one of the statements but not the other.

16. In a class, there are five students – Anil, Bharat, Chetan, Dilip and Emran, all of whom attend an exam. When their marks in the exam are arranged

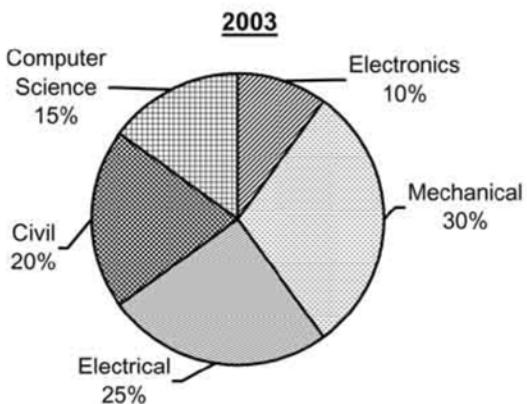
in descending order, it is observed that Dilip has more marks than Emran, and Bharat has more marks than Chetan. If Chetan has scored fewer than the median marks, then who has scored the highest marks?

- (I) Anil did not get the least marks.
(II) Bharat was not among the first two rankers.

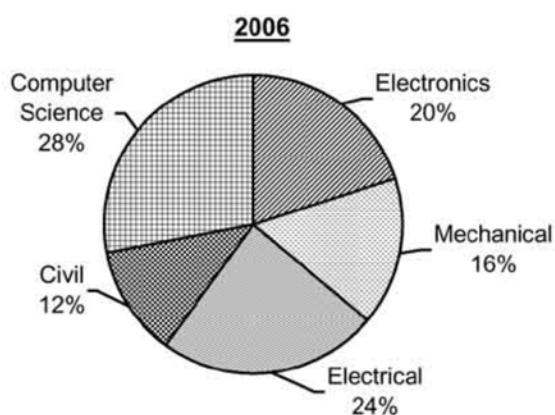
DIRECTIONS for questions 17 to 20: Answer the questions on the basis of the information given below.

The following two pie charts give the details of the number of professors in the age group of 35 to 50 years, in different departments, at an engineering college, during the year 2003 and the year 2006. No faculty joined or left the college or shifted to another department during the period from 2003 to 2006.

Department Wise Distribution of Professors in the Age Group of 35 to 50 years



Total number of professors = 80



Total number of professors = 75

17. If the number of professors in the college who crossed the age of 50 years between 2003 and 2006 is represented by x , the minimum possible value of x is
(1) 5 (2) 16 (3) 18 (4) 21

18. What is the minimum possible number of professors who crossed the age of 35 years between 2003 and 2006?
(1) 14 (2) 16 (3) 18 (4) 20

19. If all lecturers who attain an age of 32 years get promoted as assistant professors and all assistant professors on attaining an age of 35 years get promoted as professors, then the number of assistant professors in the college in 2003 was the maximum in which department?
(1) Computer Science (2) Mechanical
(3) Electronics (4) Cannot be determined

20. If the number of professors in the 47 to 50 years age group in the college in 2003 was the minimum possible, then which of the following statements is definitely true, given that the college had no professor over the age of 50 years in the year 2003?

 - In 2006, the average age of professors over the age of 50 years is the highest for the Mechanical department.
 - In 2006, the average age of the professors in the Civil department is more than 50 years.
 - In 2006, the number of professors in the college over the age of 50 years is more than ten.
 - None of the above

SECTION – II

DIRECTIONS for questions 21 to 23: In each question, there are five sentences. Each sentence has pairs of words/phrases that are italicized and highlighted. From the italicized and highlighted words/phrases, select the **most appropriate** words/phrases to form correct sentences. Then, from the options given, choose the best one.

21. When they reached the restaurant, after a long trek the aroma of the delicacies **wetted** [a] / **whetted** [b] their appetites.

The audience seemed to have enjoyed the **solecism** [a]/ **solipsism** [b] of the farce thoroughly. Her **simple** [a]/ **simplistic** [b] answers were frowned upon by the interview panel.

We had planned to collect Rs.1 crore for the treatment of the cancer patients, but suffered a shortage [a] / shortfall [a] of Rs.40,000.

22. He **adduced** [a] / **deduced** [b] a series of certificates to convince the selectors that he was a black belt holder in Karate.

It was the **presumptive** [a] / **presumptuous** [b] behavior of the CEO that led to his ouster.

The protesters **rapped** [a] / **wrapped** [b] the benches non-stop even after mid-night.

The defence counsel **rebutted** [a] / **denied** [b] the allegation with the support of evidence.

- | | |
|----------|----------|
| (1) baba | (2) abaa |
| (3) baab | (4) aabb |

He shuddered and woke up from deep slumber disturbed by the **wraith** [a] / **wreath** [b] he thought he saw.

The thunder and lightening continued **spasmodically** [a] / **sporadically** [b] through out the night.

The passengers were panic - **stricken** [a] / - **struck** [b] when they heard a loud explosion at the rear of the aircraft.

- | | |
|-------------|-------------|
| (1) b a a b | (2) a b b a |
| (3) b b a a | (4) b a b a |

23. She stood on the sands with **baited** [a] / **bated** [b] breath while her son enjoyed playing in the waves.

DIRECTIONS for questions 24 to 26: Read the following passage and answer the questions that follow it.

Faced with a streak of events and the necessity to make a choice, people may make one of three possible inductions: (1) that the streak is irrelevant, (2) that the streak will continue, or (3) that the streak will stop. If people generally accepted the first of these inductions, then when faced with a forced choice, they should predict the next event with a probability equal to its base rate. However, what is often observed is a bias toward one of the other two inductions, even when the events are independent. The induction that the streak should continue was observed by Gilovich, Vallone, and Tversky in their study of the basketball phenomenon known as the *hot hand*. They found that basketball fans believed that a streak should be more likely to continue if a basketball player experiences a streak of hits than if that player had experienced a streak of misses. Yet Gilovich et al. also showed that streaks of hits are no more likely than chance. The third induction is often known as the gambler's fallacy, a tendency to believe that a streak of events is likely to end. Laplace first wrote about this phenomenon, and its existence has been well documented.

Tversky and Kahneman's explanation for belief in the gambler's fallacy was that it is due to the representativeness heuristic, leading to a belief in a law of small numbers. In order for a sequence of events to be considered representative, people think that every segment of a random sequence should reflect the true proportion. Thus, a streak of one type of event must quickly end and be evened out by other events. Gilovich et al. argued that belief in the hot hand is also due to belief in the law of small numbers. A belief that things should even out will be challenged by a long streak; therefore, basketball players may reconcile the apparently unusual streak and their belief in the law of small numbers by assuming that the events are dependent.

Falk and Konold have pointed out that, in general, representativeness offers a convincing account of what participants do when judging random sequences but that its predictive power is weak. Similarly, Gigerenzer has pointed out that explaining the opposite phenomena with the same principle raises problems, yet this is what has been done with the gambler's fallacy (i.e., the streak should stop) and the hot hand (i.e., the streak should continue). A step toward understanding how people use streak information would be to understand what distinguishes situations in which people tend to think a streak will continue from those in which they tend to think it will stop. The law of small numbers cannot explain this.

24. Which of the following is an instance of 'gambler's fallacy' at play?

- (1) A gambler winning by betting on a certain number, and in subsequent chances betting on the same number hoping to win.
- (2) A motorist being apprehensive about driving after being involved in an accident.
- (3) A person who after being rejected in love is unable to muster courage to fall in love again.
- (4) A person pursuing his attempts to get through the 'Kaun Banega Crorepati' phone lines despite trying in vain for an hour.

25. As understood from the passage, what could be a reason for the basketball fan's belief that a player is more likely to experience a streak of hits than misses?

- (1) Lack of analytical bent of mind of the basketball fans
- (2) Media inputs to uphold the basketball fan's belief.
- (3) Entrenched belief made stronger by selective observations.
- (4) Focus on enjoying rather than analyzing the game.

26. As understood from the passage, what can be inferred from the last sentence of the passage?

- (1) A streak is incomprehensible.
- (2) Sample size alone does not help in explaining people's behaviour regarding streaks.
- (3) People's belief regarding streaks is contingent on adequate sample size.
- (4) People's analysis of gravitating between gambler's fallacy and hot hand is contingent on their preconceived notions.

DIRECTIONS for questions 27 to 29: 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.

27. a. The inland west knows that they must adjust to dry times rather than look for more water.
- b. Colorado thinks it has at least one answer. Researchers at Colorado State University and the
- c. University of Colorado are teaming to create a project called Drought lab. This will analyse rainfall patterns,

DIRECTIONS for questions 30 to 32: Read the following passage and answer the questions that follow it.

In the unusual properties of "mirror neurons", a special category of nerve cell, scientists may have stumbled upon the brain mechanisms that give us the power to feel what others feel, to read others' intentions as though they were our own, and even to get deeply involved in the activity of others during a game of football or a dance performance. Yet more surprising, the properties of these mirror neurons suggest that human language began in gesture and mime, not in speech. And, finally, research links defects in these nerve cells to autism and suggests novel methods for treatment.

The mirror-neuron story begins back in 1995, with a simple but surprising observation in the laboratory of Giacomo Rizzolatti at the University of Parma in Italy. Mr Rizzolatti was measuring the electrical activity of brain cells in the premotor cortex of macaque monkeys. As its name suggests, this is a high-level area of the brain which plans and initiates body movements; commands passed on from here result in electrical impulses going down your nerves to get your muscles moving.

The Italian team found that particular nerve cells became active when a monkey reached out to pick up a peanut. That is what you might expect in a part of the brain involved in planning movement. Then the big surprise. When the monkey noticed one of the researchers reach out and pick up a peanut, exactly the same cells became active again. The brain cells fired whether the monkey itself did something or it saw another person or monkey do something with the same goal. Many more of these nerve cells that "mirrored" another animal's goal-directed movements were found. Before long, a much wider range of related mirror-neuron systems were found in human brains too.

Why were these mirror neurons such a surprise? On a conventional view of how the brain works, sensations would arrive from the eyes, be analyzed in the cortex and commands sent on to the muscle if action were required. The new experiments show that when we see someone carry out certain actions, the same parts of our brain are activated "as if" we were doing it ourselves. In essence: We don't need to think and analyse, we know immediately what other people mean and feel by replicating what they do within the same areas of our own brains. As Mr Rizzolatti puts it, "the fundamental mechanism that allows us a direct grasp of the mind of others is not conceptual reasoning but direct simulation of the observed events through the mirror mechanism."

That "direct grasp of the mind of others" is an ability that sets humans apart from almost all other animals, except the monkeys and apes, which have only the first rudiments of this skill. Understanding what others intend makes possible those unique human skills of deliberate lying, cheating and manipulating, as well as imitation of others. Imitation is another skill that is almost uniquely human and permits learning to be passed on and culture to develop.

Language, too, may owe its origins to the mirror neuron system. Obviously enough, any language has a first requirement that the person being communicated with understands the message of the communicator. Mirror neurons provide this first step directly. When a monkey performs an action with its hand, the mirror cells of another monkey watching will register that same action as if it were its own. Mirror neurons could have provided the starting-point for the evolution of a language based on gestures which only later became associated with sounds.

If our spoken language did come from gestures, then there should still be an overlap between the language areas of the brain and the motor areas. Not only does that turn out to be true but brain scanners also show that one of the most important speech areas is active when we speak, when we gesture and when we see others gesture – just what would be predicted from a mirror-neuron origin of language.

What happens if mirror neurons go wrong? We might expect that people would lose their ability to have a direct, intuitive feel for the mind of other people. That condition sounds very much like autism, which is characterized by defects in social interaction. Recently, Vilayanur Ramachandran and his team at the University of California in San Diego measured the activity of the mirror-neuron areas in people by looking at a particular kind of brain wave, called the mu

rhythm, which is suppressed when mirror nerves become active. Sure enough, the team found that the mu wave was suppressed when people either moved their hands or watched others do so. But the mu rhythm of autistic people changed only when they moved their own hands and not when they saw other people do the same thing. Autistic people indeed appear to have lost that direct link between watching and feeling that the mirror system may provide. Research is just beginning, but these findings may lead to new therapies.

- 30.** All of the following information is true regarding the 'mu rhythm', EXCEPT:
- it gets suppressed when mirror nerves become active.
 - it is not suppressed when autistic people gesture.
 - it is suppressed when people watch others gesture.
 - it is not suppressed when autistic people watch others move their hands.
- 31.** All of the following link language to the mirror-neuron system EXCEPT:
- There is no evidence of a link between the language areas and motor areas of the brain.
 - Gestures are used as sign language by the hearing-impaired.
 - Brain scanners reveal that a speech area is active when we gesture.
 - A mirror neuron system can provide an origin for a language based on gestures that later turned to sound.
- 32.** The "direct grasp of the mind of others" could result in all of the following, EXCEPT:
- Understanding the intentions of the observed.
 - Learning through imitation.
 - The development of language.
 - None of the above.

DIRECTIONS for questions 33 to 35: 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.

- 33.** (a) Renaissance explorers relied on charts of their time and since these were gravely inaccurate, even the most capable leaders were faced by longer voyage without landfalls than they bargained for.
 (b) Storms, ship wrecks, hostile inhabitants were hazards common to all seafaring, even in European waters, and the explorer prepared himself as best he could to meet these mishaps.
 (c) Their most common reaction was baffled alarm at finding sea where they counted on finding

DIRECTIONS for questions 36 to 38: Read the following passage and answer the questions that follow it.

Leading B-schools are looking to overhaul the MBA syllabus. Nitin Nohria, the newly-appointed dean of Harvard Business School (HBS), is said to believe that the way management is taught in B-schools contributed to the recent financial crisis.

Srikant Datar, another HBS professor, and two of his colleagues have authored a book, 'Rethinking the MBA: Business education at a crossroads', that echoes this theme. It also laments the fact that MBA students are taking less and less interest in their classes and spending more time on networking and attending recruiting events.

'The management myth: Why the experts keep getting it wrong,' provides pointers to why students in MBA programmes may be switching off. The author, Matthew Stewart, thinks that management theories don't add up to much, so the MBA course itself means little.

Stewart's background is interesting. After completing a doctorate in philosophy, he took up a job with a management consulting firm. With no knowledge of or background in management, he found himself advising CEOs of top companies at a billing rate of half-a-million dollars a year.

In his book, Stewart dissects some of the more famous management theories and finds them hollow. His assault on management's claims to being a science rests on a scrutiny of key theories in two areas, organisational behaviour and strategy, and works that focus on the creation of 'excellence' in companies.

As an example of how pretentious management theory can get, Stewart cites the Hawthorne effect uncovered by one of the famous names in organisational behaviour, Elton Mayo. A researcher was studying the effect of workplace illumination on worker productivity at a plant, Hawthorne Works. When the illumination was increased, productivity went up; when it was turned down, again it went up. The same thing happened with various other interventions.

Mayo concluded that the results were not due to an external intervention but to the fact that the employees found they were getting attention. This is the foundation of much that has followed in the field since: about empowerment, teamwork, etc. But Mayo's finding hardly qualifies as a dazzling insight. He was merely pointing out that, as Stewart puts it, "If you are nice to other people, they will usually be nice to you." This is a simple ethical construct. The danger in wrapping it up in management jargon is that students will see through the puffery and switch off.

Some of Stewart's sharpest criticisms are reserved for the genre of management books typified by 'In search of excellence' authored by two ex-McKinsey consultants, Tom Peters and Robert Waterman. The book purported to list the attributes of high-performing companies after evaluating 43 such companies. Two years later, half of the excellent 43 were in trouble. Five years later, almost all showed signs of decline.

A great deal of what is taught in the harder areas at B-schools, such as accounting, finance and quantitative sciences, is based on sound theory and finds wide applications in business. But Stewart is right in saying that most of the hard stuff at B-schools can be picked up fairly quickly. It is the soft part that constitutes education and makes for a rounded manager. It is not easily imparted through courses, such as ethics or leadership, that are the staple of B-schools. Soft skills, Stewart points out, are what the old liberal arts education or humanities was all about.

36. Mathew Stewart would most probably favor

- (1) dumping the MBA program altogether.
- (2) an MBA that combines the requisite quantitative skills with a liberal arts education.
- (3) an MBA program based on humanities.
- (4) a compressed MBA program based on quantitative skills and liberal arts.

37. Stewarts' comments on Mayo's finding from the research on work place illumination _____

- (1) express his conviction that working conditions have a definite bearing on worker-productivity.
- (2) depict his thought that all management research is sham.
- (3) reflect his belief that management theories are no more than common place truths.
- (4) are in line with his view 'as you sow, so you reap'.

38. Which of the following statements is NOT true, according to the passage?

- (1) Stewart believes that students are not very interested in MBA programmes.
- (2) Stewart does not believe that management is a science.
- (3) Stewart has a doctorate in Business Management.
- (4) Soft skills make a well-rounded manager.

DIRECTIONS for questions 39 and 40: The following question 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.

39. Laboratory tests on the rocky filaments found no evidence to suggest they were remnants of Earth-based organisms that contaminated the meteorites after they landed, Mr. Hoover said. He discovered the features after inspecting the freshly cleaned

surfaces of three meteorites that are believed to be among the oldest in the solar system. He being an expert on life in extreme environments, has reported similar structures in meteorites several times before.

- (1) Mr. Hoover is not the only researcher to claim a discovery to alien life inside meteorites.
- (2) The implications are that life is everywhere, and that life on earth may have come from other planets.
- (3) So far, none has been confirmed as the ancient remains of alien life.
- (4) To many scientists, Mr. Hoover's work recalls the adage that extraordinary claims required extraordinary evidence.

40. The initial excitement generated by universal adult franchise gave way to cynicism. The pentennial exercise of elected representatives seeking the people's consent for re-election became a ritual. The initial hopes and dreams of the majority, the poor, were soon shattered with minimal changes in their lot. The original enthusiasm when faced with an option of voting for different parties gradually faded with the realization that the choices provided no real alternative. _____

- (1) Nevertheless, political parties soon realized the importance of identifying dominant socio-demographic pressures within constituencies.
- (2) Representation of people in the legislatures and the government did little for their empowerment or upliftment.
- (3) Telangana is a classic example of economic growth without political space and empowerment for its people.
- (4) Gradually, the sheen wore off.

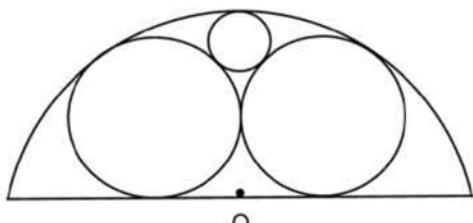
SECTION – III
Number of Questions = 20

DIRECTIONS for questions 41 to 45: Answer the questions independently of each other.

41. A right circular cone is cut (parallel to its base) into five slices, all of the same height. What is the ratio of the volume of the middle slice to that of the biggest slice?

- (1) 27 : 125 (2) 19 : 61
(3) 37 : 91 (4) 4 : 25

42.



Two identical circles and a smaller circle are inscribed, (as shown in the figure) in a semi-circle of radius R. Find the radius of the smaller circle.

- (1) $\left(\frac{5\sqrt{2}}{3} - 2\right)R$ (2) $(3 - 2\sqrt{2})R$
(3) $(2\sqrt{3} - 3)R$ (4) $\left(\frac{5\sqrt{2}}{2} + 2\right)R$

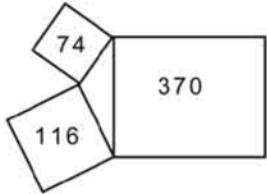
43. $f(x) = x^2 + ax + b$. If for two real values, α and β , lying between 2 and 3, $f(x) = 0$, then which of the following gives a possible value of $f(2)f(3)$?

- (1) 1/16 (2) 1/8 (3) 1/4 (4) 1

44. How many four-digit perfect squares exist which are of the form AB64 ($A \neq B$)

- (1) 0 (2) 1 (3) 2 (4) 3

45. Three square plots of areas 74, 116, 370 sq.km are observed to be as given below.



Find the area of the region enclosed by the three plots. (in sq.km)

- (1) 180 (2) 11 (3) 15
(4) Cannot be determined

DIRECTIONS for question 46: This question is followed by two statements, A and B, giving certain data. You have to mark the correct answer depending on the sufficiency of the data given in the statements to answer the question.

Mark (1) if the question can be answered by using one of the statements alone but cannot be answered by using the other statement alone.

Mark (2) if the question can be answered by using either statement alone.

Mark (3) if the question can be answered by using both the statements together but cannot be answered by using either statement alone.

Mark (4) if the question cannot be answered even by using both the statements together.

46. If m and n are positive integers, is $m > n$?

- A. $4m + 5n = 87$
B. $m^3 > 52n^2$

DIRECTIONS for questions 47 to 49: Answer the questions on the basis of the information given below.

In a game called 'Crystal maze' a set of 25 islands are connected through bridges. Danny, a participant, walked onto every island crossing each bridge exactly once. In the process, he visited an island named Pentagon five times.

47. How many bridges are there to Pentagon, if Danny neither started nor ended at Pentagon?

- (1) 6 (2) 11 (3) 9 (4) 10

48. How many bridges are there to Pentagon, if Danny started at Pentagon but did not end there?

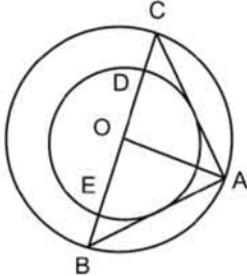
- (1) 12 (2) 1 (3) 9 (4) 10

49. How many bridges are there to Pentagon, if Danny started and ended at Pentagon?

- (1) 10 (2) 8 (3) 9 (4) 11

DIRECTIONS for questions 50 to 53: Answer the questions independently of each other.

50.



In the figure above, there are two concentric circles, centred at O, with diameters as ED and BC. OA is the bisector of $\angle BAC$ while AB is a tangent to the inner circle. If $OD = 8$ cm, what is the area of the triangle OAB?

- (1) $32\sqrt{2}$ sq.cm (2) 64 sq.cm
(3) $64\sqrt{2}$ sq.cm (4) 128 sq.cm

51. There are four pipes, P_1 , P_2 , P_3 and P_4 , which can fill a tank in 10 minutes, 20 minutes, 40 minutes and 45 minutes respectively. Two of these four pipes are now converted into emptying pipes. If exactly one of the emptying pipes is operated along with exactly

one of the filling pipes, then the time in which they can fill the tank is $3\frac{1}{9}$ times that taken by the remaining two pipes when operating together. Of these two pairs of pipes, find the pair of pipes that takes lesser time to fill the tank.

- (1) P₁, P₂ (2) P₂, P₃ (3) P₃, P₁ (4) P₁, P₄

52. In a network, there are 20 cities with every city being connected with every other city by distinct routes. How many paths exist from city 3 to city 17 each of which passes through exactly 7 cities including cities 5, 8 and 12 but excluding cities 7 and 9?

- (1) 495 (2) 715
(3) 1716 (4) $715 \times 7!$

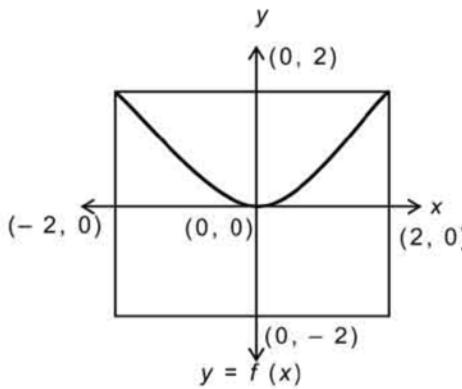
DIRECTIONS for questions 54 and 55: Answer the questions on the basis of the information given below.

In each of the questions two graphs $y = f(x)$ and $y = F(x)$ are shown. In each question, one or more of the following relations could hold between $f(x)$ and $F(x)$:

- (i) $f(x) = F(-x)$
- (ii) $f(x) = -F(x)$
- (iii) $f(x) = -F(-x)$
- (iv) $f(x) = |F(x)|$
- (v) $f(x) = -|F(x)|$

Identify, in each case, the number of relations that the pair of graphs satisfy.

54.

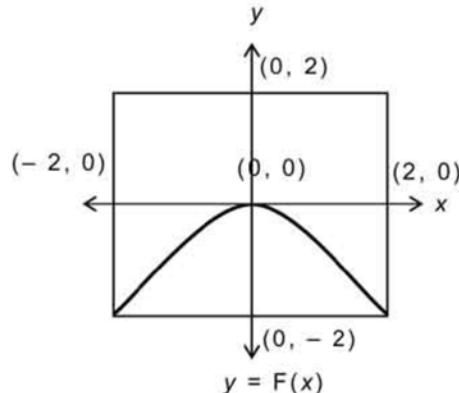


- (1) 1

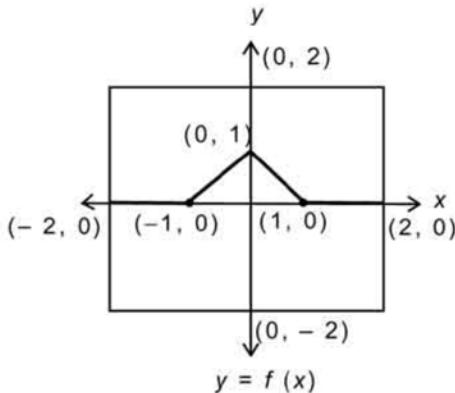
- (2) 2

- (3) 3

- (4) 4



55.

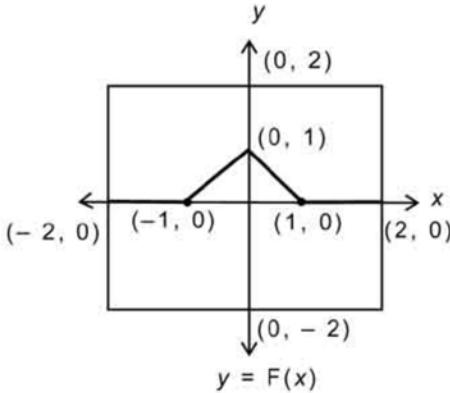


- (1) 1

- (2) 2

- (3) 3

- (4) 4



53. If $f(x) = bx^2 - a|x| - c$ and $f(0) = +2$, $f(1) = 2$, $f(-2) = 32$, find the sum of the cubes of the roots of the equation $f(x) = 0$.

(1) $\frac{-111}{343}$

(2) 0

(3) $\frac{111}{343}$

(4) $\frac{-57}{343}$

DIRECTIONS for questions 56 to 60: Answer the questions independently of each other.

56. A series S is as given below.

$$S = \log a + \log \frac{a^3}{b} + \log \frac{a^5}{b^2} + \log \frac{a^7}{b^3} + \dots$$

The value of the sum upto n terms of S is

$$(1) \log \left(\frac{a^{2n}}{b^{n-1}} \right)^{\frac{n}{2}}$$

$$(2) \log \left(\frac{a^{n+1}}{b^{n-1}} \right)^{\frac{n}{n+1}}$$

$$(3) \log \left(\frac{a}{b} \right)^{\frac{n(n+1)}{2}}$$

$$(4) \log \left(\frac{a}{b} \right)^{\frac{n(n-1)}{2}}$$

57. If $\log_5(3^x - 17)$, $\log_5(3^x - 65)$ and $\log_5 4$ are in arithmetic progression, x can be

- (1) the square of an integer.
- (2) a rational number but not an integer.
- (3) an irrational number.
- (4) Either (1) or (3)

58. I. $5! + 6! + 7! + 8! + \dots + 230!$ is a perfect square.

II. $2(1! + 2! + 3! + 4! + \dots + 125!)$ is a perfect cube

(1) I is true but II is false

(2) II is true but I is false

(3) Both I and II are true

(4) Both I and II are false

59. If the minimum value of $4x^2 + px - 3$ is realized for $x = a$, where $a > 0$, which of the following statements is necessarily true?

- (1) $8a + p < 0$
- (2) $6a + p > 0$
- (3) $11a + 2p > 0$
- (4) $15a + 2p < 0$

60. From a four digit-number, Raju subtracted 10 times the sum of its digits. From this result, he erased one of the digits. The remaining three digits were 0, 2 and 4. Find the digit erased.

- (1) 1
- (2) 2
- (3) 3
- (4) Cannot be determined