T.I.M.E.

Triumphant Institute of
Management Education Pvt. Ltd.

Ref: AIMCAT2014

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 a total of 100 questions in three sections: (i) Verbal Ability and Reading Comprehension –34 Questions (ii) Data Interpretation and Logical Reasoning –32 Questions and (iii) Quantitative Ability –34 Questions. The total time available for the test is **180 minutes**. However, you will be allotted exactly 60 minutes for answering the questions in each section and you cannot switch from one section to another while answering the questions in a section.

3. All questions carry three marks each. Each wrong answer to any multiple-choice type question will attract a penalty of one mark. Wrong answers to any non multiple-choice type question will not attract any penalty.

SECTION – I
Number of Questions = 34

DIRECTIONS *for questions 1 to 6:* The passage given below is accompanied by a set of six questions. Choose the best answer to each question.

In Hinduism's Vedic mythos, the deity Indra battles with a dragon that swallows Indra whole. A strikingly similar tale captured in the fossil record shows a newly recognized species of lizard in a dinosaur's belly. Named *Indrasaurus wangi*, after the mythical encounter, the reptile was found within the abdomen of a [four-winged] dinosaur known as Microraptor [whose] fossil [...] was itself unearthed from the 130-million-year-old Jehol biota, a treasure trove of Cretaceous-period fossils in what's now north-eastern China. It is the fourth Microraptor fossil to preserve stomach contents, but the first to show that Microraptors ate lizards. Previous fossils captured it eating small mammals, fish, or birds...

The Jehol biota [elucidates] what dinosaurs were eating which other dinosaurs. [T]he specimen is helping improve reconstructions of the ancient Jehol food web [by the] lead study author Jingmai O'Connor, a palaeontologist at China's Institute of Vertebrate Palaeontology and Palaeoanthropology (IVPP), and her colleagues...At least six types of plants form the base of the food chains in this tangled web. Lizards and dinosaurs alike fed on the lake ecosystem's abundant fish, and small mammals played the part of both predator and prey. Sinocalliopteryx, an eight-foot-long carnivore, seems to have been an apex predator, while Microraptor sat in the middle, picking off whatever it could.

...Once the team noticed the lizard [in the Microraptor fossil], they identified it because its bones are so well-preserved. And this exceptional preservation raises questions about how dinosaurs—including birds—evolved to digest their food. To power flight, modern birds have evolved an extremely efficient, specialized digestive system. Instead of chewing their food with teeth, they swallow it whole down an enlarged oesophagus, which in many birds forms a kind of pouch called the crop. The food then makes its way through a gauntlet of two stomachs. The first secretes digestive enzymes that chemically break down the food. The second, a thunder-dome of muscle called the gizzard, grinds up the food with the help of small stones. Some predatory birds such as owls take an additional step and spit back up pellets of undigested bone, feathers, and hair. This behaviour appears to go way back: the feathered dinosaur Anchiornis, an ancient cousin of modern birds, seems to have also spat up pellets of bone, based on analysis of six 160-million-year-old fossils.

Some palaeontologists had interpreted the Anchiornis evidence as a sign that forming gastric pellets was a necessary adaptation on the road to avian flight. By spitting up bone and feathers, the thinking goes, some flying birds wouldn't have to lug around unnecessary weight. But Microraptor's flight-ready feathers suggest that it could fly under its own power—and judging by the more intact state of *Indrasaurus* and other Microraptor meals, not all flying dinosaurs vomited up pellets. Of the four Microraptor specimens that have fossilized stomach contents, all four prey items appear to be whole, not jumbled-up bits of bone.

... O'Connor suspects that the Microraptor kept its meals in its stomach for longer than Anchiornis and modern birds, ultimately passing bone in their faeces like other dinosaurs such as Tyrannosaurus rex. This difference may be surprising, given how closely Microraptor and Anchiornis are thought to be related. Perhaps the Anchiornis pellets suggest that its lineage lies closer to the ancestors of modern birds than the dromaeosaurs, the dinosaur group to which Microraptors belong.

But as O'Connor points out, it's also possible that pellets simply evolved more than once. After all, hacking up indigestible bits of food is hardly unique to birds; living creatures from crocodiles to sperm whales do it, too. Like other traits, such as feathers, perhaps birds' presently unique digestive tract wasn't so evolutionarily unique, after all...

"You can't point to one change, one thing that evolved, and say that's what contributed to [birds'] success," O'Connor says. The ancestors of modern birds "survived the end-Cretaceous extinction probably because they were the only lineage that had all these adaptations that had evolved numerous times ... they were the ones that had them all together in one package."

1. The 'surprising' difference between the Microraptor and Anchiornis mentioned in the passage least strengthens which of the following arguments?
   (A) Microraptors and Anchiornis are not as closely related as they were previously thought to be.
   (B) The lineage of Anchiornis lies closer to the ancestors of modern birds than that of Microraptors does.
   (C) The lineages of Microraptors and Anchiornis could be different.
   (D) The Microraptors kept their meals in their stomachs for longer than Anchiornis and modern birds.

2. The 'more intact state of the Indrasaurus' inside the Microraptor fossil helped the palaeontologists infer that
   (A) the digestive tract of Microraptors is similar to that of the Tyrannosaurus Rex.
   (B) Microraptors had flight-ready feathers which ensured they didn't have to spit up bone and feathers to power their flight.
   (C) flying dinosaurs and modern birds do not share the same lineage.
   (D) spitting up pellets wasn't the only way undigested bone was gotten rid of by flying dinosaurs.

3. O'Connor's suggestion in the last para that 'it's also possible that pellets simply evolved more than once' implies which of the following statements?
   (A) The Anchiornis is more closely related to the modern birds than the Microraptors.
   (B) The digestive tract of birds is not evolutionarily unique.
   (C) The ancestors of modern birds were close in lineage to that of the dromaeosaurs.

   (D) The Microraptor kept its meals in its stomach for longer than modern birds do.

4. Which of the following, if proven to be true, weakens the inferences drawn by palaeontologists about the Jehol food web?
   (A) Lizards and small mammals sat in the middle of the food web.
   (B) There is no evidence of the Sinocalliopteryx being eaten by any other dinosaur species.
   (C) There is no evidence of the Microraptor being preyed upon by other dinosaurs.
   (D) Previous fossils of the Microraptor captured it eating plants.

5. The Anchiornis spitting up pellets of bone led some palaeontologists to infer that
   (A) spitting up pellets was one of the adaptations that eventually led to modern-day flying birds.
   (B) birds cannot fly if they carry the unnecessary weight of undigested bone and feathers.
   (C) the Anchiornis existed about 160-million years ago.
   (D) the Anchiornis was an ancient cousin of modern predatory birds.

6. Which of the following studies could be carried out to further enhance the depth of the given passage?
   (A) A study to explore whether birds and dinosaurs have a close lineage.
   (B) A study to explore whether modern predatory birds pass bone in their faeces.
   (C) A study to explore whether the similarities between Microraptors and Anchiornis outweigh the differences.
   (D) A study to explore whether the Anchiornis had avian abilities like flying.

DIRECTIONS *for questions 7 to 9:* The passage given below is accompanied by a set of three questions. Choose the best answer to each question.

Edgar Degas did not want to be known as a sculptor. The French artist spent his career producing impressionistic paintings and realistic drawings of dancers. But in his free time, he worked out the intricacies of the human figure and musculature of horses by creating sculptures out of beeswax, clay and plaster. During his lifetime, he only displayed one of these figures, "The Little Fourteen-Year-Old Dancer," in 1881. The rest he considered ephemeral pieces and let them degrade in his studio. On his death in 1917, over 150 of these sculptures were discovered, and are now considered masterpieces of the form.

The BBC reports that the Fitzwilliam Museum in Cambridge recently X-rayed the three fragile Degas sculptures they own, finding that the artist bulked out the armatures of his little dancers with bits of detritus he found around his studio. "The use of ordinary shop-bought armatures, wine bottle cork and old floorboards, confirm Degas to have been a highly unorthodox sculptor who used unconventional working practices, in terms of materials and technique, which resulted in the frequent loss of his wax sculpture," a spokesperson for the museum tells the BBC.

... [S]imilar examinations of the sculptures held by the National Gallery of Art in Washington, D.C., found that Degas used pieces of paint brushes and part of a saltshaker to create the sculptures. "You buy a wire armature, use these as an internal skeleton, pose the model, put clay over it and make a little figure," [says] Victoria Avery, keeper of applied arts at the Fitzwilliam... "But he snips off bits, bends them, and bulks it out probably to save money on modelling materials."

The Press Association reports that Degas' original sculptures are so fragile that they are rarely put on display. Most art lovers know his heirs commissioned Hébrard Foundry to cast 73 of his sculptures from bronze casts after his death in 1917, as it was something the painter resisted during his life (a 74th sculpture was cast later). "He'd be turning in his grave over the bronzes. He was an impressionist; he was about fleeting moments," Avery adds...

Triumphant Institute of Management Education Pvt. Ltd. (**T.I.M.E.**) HO: 95B, 2ⁿᵈ Floor, Siddamsetty Complex, Secunderabad – 500 003.

Tel : 040–40088400 Fax : 040–27847334 email : info@time4education.com website : www.time4education.com   **AIMCAT2014/2**

7. The author mentions the BBC report about X-raying the three fragile Degas sculptures to probably highlight that
   (A) Degas saved money on modelling materials.
   (B) the sculptures were bulked out from detritus found around the studio.
   (C) Degas abandoned orthodox methods completely in the process of making sculptures
   (D) wax sculptures were frequently lost because of Degas' unconventional practices.

8. Avery thought Degas would 'turn in his grave' because
   (A) he wanted to be known more as a painter than as a sculptor.
   (B) bronze casts would go against his belief in the ephemeral nature of things.
   (C) casting his sculptures in bronze is something he couldn't accomplish in his lifetime.
   (D) bronze casts would defeat the purpose of his letting the sculptures degrade in his studio.

9. It can be most reasonably inferred from the passage that
   (A) "The Little Fourteen-Year-Old Dancer" was the most impressionistic of Degas' sculptures.
   (B) "The Little Fourteen-Year-Old Dancer" was Degas' favourite sculpture.
   (C) sculptures made in beeswax, clay or plaster can be cast in bronze for longevity.
   (D) Degas didn't want his sculptures to be put on display.

DIRECTIONS *for questions 10 to 15:* The passage given below is accompanied by a set of six questions. Choose the best answer to each question.

As a planetary body forms, precious metals such as gold and iridium are stripped from its rocky mantle and passed into its metallic core. Successive impacts with other objects then re-enrich the mantle in these elements — a process known as late accretion. Measurements of lunar rocks show that the Moon is greatly depleted in precious metals compared with Earth. This deficit implies that the ratio of mass added to Earth during late accretion compared with that added to the Moon is more than 1,000:1, which is substantially different from the predicted ratio of about 20:1. In a paper [by] Zhu et al., it is shown that inefficient delivery of material from glancing impacts, combined with an early hot, molten stage on the Moon, can explain this anomalous input-mass ratio.

An analysis of the mass and composition of material added to a planetary body can be used to examine the body's formation... The low abundances of precious metals in lunar rocks has prompted the proposal of competing models to explain the anomalous input-mass ratio between Earth and the Moon...At one extreme, these models include delivery of material by a few massive impactors (larger than 2,500 kilometres in diameter) that preferentially struck Earth. At the other, focusing of small objects (less than 10 m in diameter) on to Earth might have produced similar effects. It has also been suggested that the difference in precious-metal abundances between Earth and the Moon was caused by a drop in the flux of impacts during the period between 4.5 billion and 4.1 billion years ago, just after the Solar System formed. These models generally assume that the Moon retained about half of the mass that was transferred to it by impactors.

Using millions of computational impact simulations, Zhu and colleagues examined the fraction of impactor mass that could be retained by planetary bodies. The authors simulated impacts at different velocities (10–20 km per second), and at low angles (20°) to high angles (80°) with respect to the body's surface. They found that material from larger impactors is less effectively retained than that from smaller counterparts, and that high-angle impacts deliver a larger mass fraction to the body than do low-angle impacts.

In the case of Earth, these results imply that the retention of impactor mass is generally high for all but the most glancing impacts with the most massive objects. For the Moon, which has a mass only about 1% of that of Earth, the shallower the angle of impact, and the more massive the impactor, the greater the likelihood that material would be lost... Using crater diameters to establish the frequency and size of impactors striking the Moon, Zhu et al. discovered that impactor-mass retention probably changed modestly over time, and that the average retention was about 20%, which is around three times lower than previous estimates.

Inefficient retention of material from objects striking the Moon partially offsets the difference between the theoretically and geochemically determined Earth–Moon input-mass ratios. Zhu and colleagues then argue that about 50% of late-accretion input mass was lost to the Moon's deep interior or core before 4.35 billion years ago, and that this loss explains any remaining discrepancy. Later, once the Moon had cooled, late-accretion input mass was distributed into the lunar mantle and crust...

The suggestion of inefficient mass retention from glancing impacts negates the requirement for the proposed temporally varying impact fluxes. [However], Zhu et al. assume that the penetration of impactors through the lunar crust, which is about 40 km thick, would lead to all retained impactor material entering the mantle. But, in reality, this material would pollute both the crust and the mantle. Finally, because only a relatively small number of lunar rocks have been analysed, models such as the authors' that can reproduce precious-metal abundances in the Moon through simulations have limited resolution.

10. All the following have been mentioned as reasons behind the anomalous input-mass ratio of the moon EXCEPT:
    (A) the size of the moon is only about 1% of that of the earth.
    (B) moon has been struck by objects at shallower angles.
    (C) moon has been struck by larger impactors.
    (D) moon was in a hot molten stage at some point when struck by impactors.

11. Which of the following statements, if true, most weakens any of the author's concerns against the research results of Zhu et al.?

(A) Temporally varying impact fluxes are extremely important to get an accurate picture of the late accretion mass.

(B) The size of lunar rocks analysed in the studies more or less represents the average size of rocks that bombard the lunar surface.

(C) The lunar crust samples have a negligible percentage of precious metals from impactors which bombarded the surface.

(D) Rocks recovered from the lunar crust have the same percentage of late accretion mass as the expected percentage in the mantle of the moon.

12. Which of the following is the most reasonable inference from the data presented in the passage?

(A) Earth's crust is thicker than the lunar crust.

(B) Successive impacts by other rocks are not the only source for re-enriching a planetary body with precious metals.

(C) The percentage of small impactors, of size less than 10m in diameter, that struck the earth's surface is greater than that of small impactors which struck the lunar surface.

(D) The greater mass of the earth as compared to that of the moon increases the probability of the retention of impactor mass in case of earth.

13. Which of the following is not an assumption made by Zhu et al. while examining the fraction of impactor mass that could be retained by planetary bodies?

(A) Velocities can be varied to simulate the impact of varying sizes and masses of impactors.

(B) The lunar mantle didn't have any precious metals prior to the impact.

(C) It is the thickness of the crust and not the density which affects the impact-mass retained in the mantle.

(D) The moon was in a hot molten stage only until 4.35 billion years ago.

14. An answer to which of the following questions could further deepen the scope of the studies presented by Zhu et al.?

(A) Are there any other elements on the lunar surface apart from precious metals?

(B) Is the composition of the lunar crust the same as that of the earth's crust?

(C) Are the sizes of the impactors which hit the earth and the moon comparable?

(D) What is the difference in composition of lunar rocks found in the mantle and in the crust?

15. Which of the following doesn't accurately represent the information directly or indirectly provided in the passage?

(A) Late accretion increases the concentration of some precious metals in the mantle of a planetary body.

(B) The cooling stage of the earth happened much before the onset of the hot, molten stage of the Moon.

(C) Theoretical estimates of late accretion mass of the moon are made assuming that half the impact mass is retained.

(D) The Solar System was formed more than 4.5 billion years ago.

DIRECTIONS *for questions 16 to 18:* The passage given below is accompanied by a set of three questions. Choose the best answer to each question.

...Social scientists are inclined towards materialistic explanations...The alternative to this materialistic reductionism is to say that ideas matter...A non-material factor is cultural norms and social institutions...Economists prefer to examine people as individuals. However, individuals get their ideas mostly from other people. The world of mental phenomena is predominantly a cultural world. And these mental-cultural factors in social behaviour make economics less deterministic and less individualistic than many economists would prefer it to be...[T]his reduces the advantage of mathematical modelling relative to verbal reasoning.

Also, mathematical modelling [may] wane due to the shifting media landscape. As of now, academic economists still must publish in journals to be successful, and these require mathematical modelling. However, in the age of the internet [...] as economists increasingly make use of other forums, including social media, this may break the lock that print journals currently hold on career prospects. That in turn could facilitate more variety in the means of expression, breaking the monopoly currently held by mathematical modelling.

...[Also] related to the decline in the prominence of modelling is economists likely recognizing that, the simple model of *homo economicus* – portrayal of humans as agents who are consistently rational, narrowly self-interested – has only limited applicability. The biggest threat to the assumption of *homo economicus* is not alternative theories of individual psychology, such as those in behavioural economics. In fact, behavioural economics has been caught up in "replication crisis", an ongoing methodological crisis [because of] scientific studies being difficult or impossible to replicate or reproduce. Rather, the need to go beyond the assumption of *homo economicus* will mostly arise from a recognition of the importance of culture as a determinant of behaviour...

Because ideas and cultural context matter, there are many potential causal factors in economic phenomena... Unfortunately, this means that it is possible for different economists to arrive at — and to stick with — different conclusions based on predilections...And this points to a plausible development in economic theory [...] that over the next 20 years academic economics will congeal into a discipline, like sociology today, which is definitively shaped by an ideologically driven point of view. Among highly educated people, ideological polarization is increasing. Economists have always had their biases about which sorts of theories seemed reasonable; some of these biases are idiosyncratic... But going forward, biases are increasingly likely to be driven by political viewpoints rather than by other considerations...

16. According to the author, what tilts the scales in favour of verbal reasoning compared to mathematical modelling is
   (A) the extent to which cultural factors undermine the predictability of individualistic models.
   (B) that the predictability of economics suffers because of the influence of mental-cultural factors in social behaviour.
   (C) the desire amongst economists to steer the discipline away from determinism and individualism.
   (D) the increasing influence of social media where verbal reasoning is a more important tool than mathematical modelling.

17. Which of the following can be inferred from the author's argument about the waning importance of *homo economicus*?
   (A) The theory of *homo economicus* considers the fact that humans accept ideas from other humans.
   (B) The theory of *homo economicus* is more reliable than 'behavioural economics' which is plagued with a replication crisis.
   (C) Culture may lead to overriding of choices derived from rational and self-interested motives.
   (D) Mathematical modelling works even without the assumption of *homo economicus*.

18. According to the author, the future of the discipline of academic economics will be
   (A) ideologically driven due to the growing influence of political viewpoints in shaping ideas and cultural context.
   (B) driven by the inherent idiosyncrasies and biases of economists which will find a channel in their theories.
   (C) skewed by idiosyncrasies which will come to play a role in the thinking of economists subscribing to different cultures.
   (D) shaped by the ideological polarization in the predilections of economists which will possibly outweigh other considerations in their theories.

DIRECTIONS *for questions 19 to 24:* The passage given below is accompanied by a set of six questions. Choose the best answer to each question.

...Psychological medications such as Xanax, Ritalin and aspirin help modify undesirable behaviours, thought patterns and the perception of pain. They purport to treat the underlying chemical cause rather than the social, interpersonal or psychodynamic causes of pathology. Self-knowledge gained by introspection and dialogue is no longer our primary means for modifying psychological states. By prescribing such medication, physicians are implicitly admitting that cognitive and behavioural training is insufficient and impractical, and that 'the brain', of which non-specialists have little explicit understanding, is in fact the level where errors occur. Indeed, drugs are reliable and effective because they implement the findings of neuroscience and supplement (or in many cases substitute for) our humanist discourse about self-development and agency. In using such drugs, we become transhuman hybrid beings who build tools into the regulatory plant of the body.

Recreational drugs, on the other hand, are essentially hedonic tools that allow for stress-release and the diminishment of inhibition and sense of responsibility. Avenues of escape are reached through derangement of thought and perception; many find pleasure in this transcendence of quotidian experience and transgression of social norms...

In this historical moment, drugs fuel a culture where human nature is increasingly considered to be controllable through technology. But the essential question is this: do drugs enhance or diminish human agency, the ability to modulate one's own thought processes?

Whether a drug boosts attention, tamps down inhibitions or deranges the senses in service of euphoria, use can become ingrained and can spiral out of control until one can be said to be addicted to the effects of the drug. The overuse of recreational drugs and socially acceptable stimulants seems to negate, distort or inflate one's sense of agency, at which point an individual becomes dependent on drugs to cope in professional and social situations. In these cases, drugs, in the long term, are indeed counter-productive tools: they both occlude agency and compromise self-development.

Psychopharmacology implies that distinct mental illnesses are somehow natural kinds of personality formations defined by neurochemical profiles. For instance, in claiming that I have attention deficit hyperactivity disorder (ADHD) I am contextualising all my behaviours within a totalising abnormality that requires a pharmaceutical cure – a treatment beyond the capacities of my introspection and social support network. Practitioners prescribing such drugs in such a scenario are de facto technicians of the mind. They are easing our pain, but they are also dispensing cultural tools that allow us to selectively reduce or augment our sense of personal agency and power to set our own path.

One question to ask then is: How many individuals have found, through these tools, a sweet spot that blends augmentation of the will and alleviation of pain? If the number is large, then drugs fall into the same category as cars, electric guitars and mobile phones; tools that, if used judiciously, can ameliorate our quality of life. From that perspective, drugs are just one of many tools, including the tool of talk therapy, that serve to secure an appropriate sense of agency. And yet a somewhat worrisome consideration arises – maybe maintaining a sense of agency is not the best indicator of the appropriateness of a given tool. In our transhuman future, we are likely to abandon the psychodynamic tools of self-actualisation for cocktails offering the illusion of agency and escape.

19. The tacit admission of physicians that the author alludes to in the first para can be invalidated if it is proven that:
(A) medication has a side-effect on cognitive and behavioural traits.
(B) introspection and dialogue can bring about positive changes in a person's psychological state.
(C) undesirable behaviours and thought patterns have a chemical reason.
(D) non-specialists can also develop an explicit understanding of the brain.

20. The difference between psychological medications and recreational drugs is that:
(A) the former aims to alter thinking, while the latter aims to disrupt it.
(B) the former aids in introspection, while the latter aids in socializing.
(C) the former induces responsible behaviour, while the latter induces carefree behaviour.
(D) the former helps in restraining oneself, whereas the latter helps in reducing inhibitions.

21. To 'build tools into the regulatory plant of the body' is:
(A) an analogy to describe the manipulation of brain for curing psychological issues and for recreation through medications.
(B) a metaphor for transforming human beings into hybrid beings who can be cured consistently of psychological illnesses through medication.
(C) a metaphor for modifying behaviour through the use of medication.
(D) an analogy for using medications as a way of modifying the functioning of the brain.

22. Which of the following best points out the author's reservations against using a sense of agency as the best indicator of appropriateness of a tool?
(A) Cocktails providing an illusion of free will might become more popular.
(B) The need for fulfilment of potential might be ignored in favour of pursuing the illusion of escape.
(C) It is not possible to blend both the augmentation of the will and alleviation of pain.
(D) Self-actualisation might be preferred to the illusion of agency and escape.

23. The author's opinion about psychopharmacology is best summarised by which of the following?
(A) Some abnormalities are beyond the healing powers of introspection and social support networks.
(B) Through psychopharmacology, physicians are making individuals believe that drugs can give us a sense of agency.
(C) Practitioners prescribing psychological medications help in easing the pain of individuals.
(D) Contextualising behaviours within a totalising abnormality can help in curing mental ailments.

24. Which of the following, if true, weakens the author's argument against using drugs?
(A) A person's capacity to reflect and push his or her own limits is accentuated by pharmaceutical cure.
(B) Psychological medication adversely affects a person's discretionary faculties.

(C) It is impossible to find the right balance of drugs that blend augmentation of will and alleviation of pain.
(D) Self-actualisation can only be achieved when one finds a way to ameliorate the quality of one's life.

DIRECTIONS *for question 25:* The sentences given in the following question, when properly sequenced, form a coherent paragraph. Each sentence is labelled with a number. Decide on the proper order for the four sentences and key in the sequence of four numbers as your answer, in the input box given below the question.

25. (1) Reporting on what he found there, in an article for the *New Masses*, he proclaimed: "Everywhere the symbol of the hammer and sickle; some of it's pretty hasty, some of it's garlanded tropical bombast, but by God, it's painting."
(2) The kind of painting that the novelist had in mind is epitomised by Diego Rivera's "Sugar Cane" (1931), a scene of plantation life filled with tropical scenery and plenty of bombast, and this will be a part of the exhibition.
(3) In 1927, John Don Passos, an American writer and artist, returned from a long stay in Mexico where he had been soaking up the vibrant cultural scene south of the border.
(4) "Paint the Revolution: Mexican Modernism 1910-1950", a fascinating exhibition that has just opened at the Philadelphia Museum of Art and will travel to the Museo del Palacio de Bellas Artes in Mexico City next year, takes its name from that essay and largely confirms the writer's judgment.

DIRECTIONS *for question 26:* In the following question, there are sentences or fragments of sentences that form a paragraph. Identify the sentence(s) or fragments of sentence(s) that is/ are **correct** in terms of grammar and usage, including spelling, punctuation and logical consistency. Enter the number corresponding to the sentence(s) or fragments of sentence(s) in the input box provided below the question. [Note: Enter your answer in increasing order only. For example, if you think that the fragments (2) and (4) are **correct**, then enter 24 (but not 42) in the input box.]

26. (1) As a blind prophet, the observatory perched atop Cerro Pachón in Chilean Andes ponders the heavens.
(2) Eyeless for now, the Large Synoptic Survey Telescope (LSST) will from 2022 turn into the biggest digital camera on Earth. Taking 3,200 megapixel snaps with
(3) an exposure time of 15 seconds, to capture an area 40 times the size of the full moon, the LSST will map almost the entire southern hemisphere once every three nights,
(4) for a decade. The picture so generated will assess how matter, in the form of stars and galaxies, are distributed,
(5) shedding light about the clash of forces that have bought the universe to its current state, and thus scrying its future.

DIRECTIONS *for question 27:* In the question, there are five sentences, with each sentence having a pair of words, numbered 1 and 2, that are italicized and highlighted. In each sentence, from the pairs of italicized and highlighted words, select the appropriate word to form the correct sentence. Then enter (in the input box provided below the question) the correct sequence of numbers corresponding to the appropriate words in each of the sentences, in the same order that the sentences appear in the question. For example, if you think that the appropriate words for the sentences are 1, 2, 1, 2 and 2 respectively, then enter your answer as 12122.

27. (i) An honest person cannot **dissemble (1)** / **disassemble (2)** his true feelings.
    (ii) Novak Djokovic has a **penchant (1)** / **perchance (2)** for performing well in crucial matches.
    (iii) As he is not good at catching the **niceness (1)** / **niceties (2)** in the behaviour of his colleagues, Raju is often misunderstood as being sarcastic.
    (iv) The weary traveller decided to rest **awhile (1)** / **a while (2)** before proceeding with his arduous journey.
    (v) My mother who accompanied me to Stephen Hawking's lecture "Questioning the Universe" at the Tata Institute of Fundamental Research, Mumbai, found the talk too **obtuse (1)** / **abstruse (2)** to understand.
    (vi) While talking to us about the state of historical monuments in our country, our class teacher suddenly went on a tangent making an **allusion (1)** / **illusion (2)** to the works of Pable Picasso.

DIRECTIONS *for question 28:* The sentences given in the following question, when properly sequenced, form a coherent paragraph. Each sentence is labelled with a number. Decide on the proper order for the four sentences and key in the sequence of four numbers as your answer, in the input box given below the question.

28. (1) For decades, this has meant that products have had to be "designed for manufacture", which essentially means their components must incorporate features that can be readily shaped by machines in order to be glued, screwed or welded together by people or robots.
    (2) The beautifully sculpted "concept" cars that regularly appear at motor shows never get built, at least not in the form they left the design studio, because they are inevitably too difficult and expensive to engineer for mass production.
    (3) Now, a combination of powerful computer-aided design (CAD) software and new manufacturing methods is changing the game: CAD systems rather than technical drawings and blueprints are used to conceive new products.
    (4) When great designs are turned into products, compromises are made.

DIRECTIONS *for question 29:* In the following question, there are sentences or fragments of sentences that form a paragraph. Identify the sentence(s) or fragments of sentence(s) that is/ are **correct** in terms of grammar and usage, including spelling, punctuation and logical consistency. Enter the number corresponding to the sentence(s) or fragments of sentence(s) in the input box provided below the question. [Note: Enter your answer in increasing order only. For example, if you think that the fragments (2) and (4) are **correct**, then enter 24 (but not 42) in the input box.]

29. (1) Pericles was a prominent and influential Greek statesman, orator and general of Athens during it's golden age − specifically the time between the Persian and the Peloponnesian wars.
    (2) He was descended, through his mother, from the powerful and historically influential Alcmaeonid family.
    (3) Pericles had a profound influence on Athenian society that Thucydides, a contemporary historian, acclaimed him as "the first citizen of Athens".
    (4) Pericles promoted the arts and literature; it is principal through his efforts that Athens acquired the reputation of being the educational and cultural center of the ancient Greek world.
    (5) He started an ambitious project that generated most of the surviving structures in the citadel of the Acropolis (including the Parthenon).

DIRECTIONS *for question 30:* In the question, there are five sentences, with each sentence having a pair of words, numbered 1 and 2, that are italicized and highlighted. In each sentence, from the pairs of italicized and highlighted words, select the appropriate word to form the correct sentence. Then enter (in the input box provided below the question) the correct sequence of numbers corresponding to the appropriate words in each of the sentences, in the same order that the sentences appear in the question. For example, if you think that the appropriate words for the sentences are 1, 2, 1, 2 and 2 respectively, then enter your answer as 12122.

30. (i) Our most difficult experiences become the **crucible (1)** / **crucifix (2)** that forge our character and develop the internal powers, the freedom to handle difficult circumstances in the future and to inspire others to do so as well.
    (ii) Governments across the world should make a conscious effort to spread awareness about the **insidious (1)** / **invidious (2)** effects of global warming.
    (iii) With inflation reaching unprecedented levels, the common man **comprehends (1)** / **apprehends (2)** that he may not be able to make both ends meet.
    (iv) The subordinate's **fructuous (1)** / **fatuous (2)** behaviour was laughable and invited the ire of his boss.
    (v) The thieves took the curfew to be a **nugatory (1)** / **nuggety (2)** one and hence, they did not give any importance to its observance.
    (vi) It is **ingenuous (2)** / **ingenious (1)** to suppose that there was no vested interest in his decision.

31. (1) As I grew into the habit of analysing myself – in fact, it became a favourite pastime – I began to suspect that my obsession with miniatures stemmed from a desire for control: that it felt good to contain things.

(2) This impulse was not unrelated to another developing desire to encapsulate the world through storytelling, to construct stories like little dioramas.

(3) Perhaps children are particularly drawn to miniatures because they have no choice but to navigate the world as something built to a scale they don't share.

(4) "Every narrative is a miniature", writes the literary critic Susan Stewart, and I loved both from early on.

DIRECTIONS *for question 32:* In the following question, there are sentences or fragments of sentences that form a paragraph. Identify the sentence(s) or fragments of sentence(s) that is/ are correct in terms of grammar and usage, including spelling, punctuation and logical consistency. Enter the number corresponding to the sentence(s) or fragments of sentence(s) in the input box provided below the question. [Note: Enter your answer in increasing order only. For example, if you think that the fragments (2) and (4) are correct, then enter 24 (but not 42) in the input box.]

32. (1) Some heartbreaks are beautiful, some are good, and some are downright ugly.

(2) The season finale of Game of Thrones was an ugly heartbreak due to the way it throws a spanner on years of character development and carefully designed subplots.

(3) The Cricket World Cup Final is an example of a good heartbreak, although keeping everyone on knife's edge until the last moment.

(4) Many Indians continued to support the Kiwis, even though it was they who had ended the march of the Indian team to the tournament Final.

(5) The Wimbledon Final is an example of a beautiful heartbreak, for not many a player in the history of the game has showed the poise Roger Federer displayed in the face of a defeat he didn't deserve.

DIRECTIONS *for question 33:* In the question, there are five sentences, with each sentence having a pair of words, numbered 1 and 2, that are italicized and highlighted. In each sentence, from the pairs of italicized and highlighted words, select the appropriate word to form the correct sentence. Then enter (in the input box provided below the question) the correct sequence of numbers corresponding to the appropriate words in each of the sentences, in the same order that the sentences appear in the question. For example, if you think that the appropriate words for the sentences are 1, 2, 1, 2 and 2 respectively, then enter your answer as 12122.

33. (i) The emotionally *affective (1) / effective (2)* content in Murakami's novels stays with you long after you've consigned the book to grandma's trunk.

(ii) There is *historic (1) / historical (2)* precedent to suggest that companies make blunders when it comes to identifying trendsetting ideas which are priceless.

(iii) Iron Man is a hero to a generation that believes being *nonchalant (1) / nonplussed (2)* in the face of danger is cool.

(iv) Few booklovers *condone (1) / castigate (2)* the protagonist's obsession in Nabokov's Lolita, despite its poetic language.

(v) *Uninterested (1) / disinterested (2)* umpiring has ensured that cricket has stayed clean and clear of bias.

(vi) Many universities choose to *proscribe (1) / prescribe (2)* Salman Rushdie's Satanic Verses to steer away from any controversy still lingering around its subject.

DIRECTIONS *for question 34:* In the following question, there are sentences or fragments of sentences that form a paragraph. Identify the sentence(s) or fragments of sentence(s) that is/ are correct in terms of grammar and usage, including spelling, punctuation and logical consistency. Enter the number corresponding to the sentence(s) or fragments of sentence(s) in the input box provided below the question. [Note: Enter your answer in increasing order only. For example, if you think that the fragments (2) and (4) are correct, then enter 24 (but not 42) in the input box.]

34. (1) A global obsession, superhero movies are seen by hundreds of millions, arguably the most consumed stories in human history.

(2) We can trace the changing status of women, evolving ideas about masculinity, war, crime, journalism, the C.I.A. or anything else by Hollywood treatments over the decades.

(3) Logan, the most gritty and realistic of 2017's top movies, works as an allegory for America's ongoing struggle against racism and on the pull of paternity and tribe in the face of oppression.

(4) The extraordinary success of "Black Panther" rests in part on creating a counter-myth to centuries of racist depictions of Africa, where it sets a hidden kingdom wiser and more technologically advanced than the wildest visions of Afro-Centrism.

(5) Most of the others fail to make sense even within the fantastical logic of their own worlds — why, for instance, do superheroes and villains hurl large objects at each other, when this, clearly, has no effect?
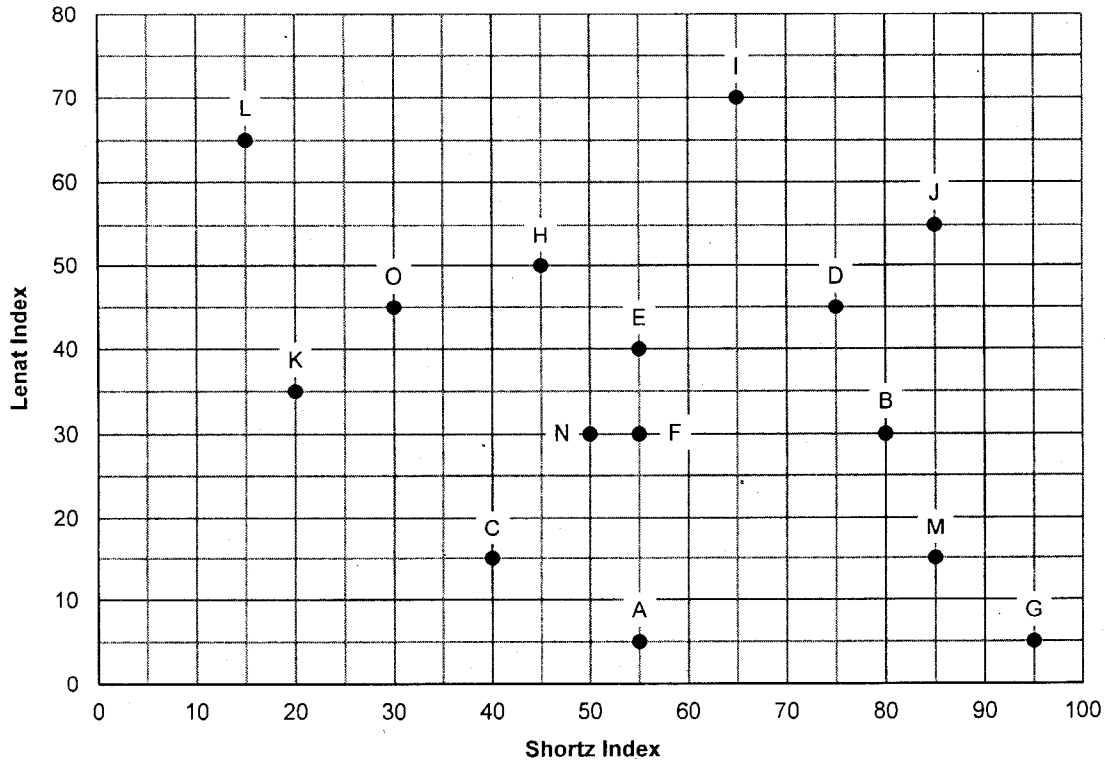
DIRECTIONS *for questions 1 to 4:* Answer the questions on the basis of the information given below.

Kranti plotted a scatter chart which provides information on two metrics – Shortz Index and Lenat Index – for a certain number of countries. For any country, the product of Shortz Index and Lenat Index divided by 100 is called Fame Index (FI) of the country, while the Shortz Index divided by the Lenat Index is called the Infamy Index (II) of that country.

The scatter chart plotted by Kranti is provided below:

DIRECTIONS *for questions 1 and 2:* Type in your answer in the input box provided below the question.

1. For how many countries is its FI greater than that of country F?

2. For how many countries is its II greater than its FI?

DIRECTIONS *for questions 3 and 4:* Select the correct alternative from the given choices.

3. The ratio of FI to II is called the Social Standing Index (SSI) of the country.

   What is the highest SSI of any country?
   (A) 36   (B) 42.25   (C) 49   (D) 30.25

4. The ratio of FI to II is called the Social Standing Index (SSI) of the country.

   For how many of the given countries is its SSI less than its II?
   (A) 3   (B) 4   (C) 5   (D) 6

DIRECTIONS *for questions 5 to 8:* Answer the questions on the basis of the information given below.

Two students, Harish and Lalit, were asked by their teacher, Karthik, to memorize the population of five states – A through F. However, each student only memorized the population of four of the five states.

Karthik then gave two different sets of True or False questions on the populations of the five states, one each to Harish and Lalit. For any question, if Harish can deduce the answer to any question with the information that he memorized, he answered that question correctly. Otherwise, he guessed a random answer. For any question, if Lalit can deduce the answer to any question with the information that he memorized, he intentionally answered that question incorrectly. Otherwise, he guessed a random answer.

Each of Harish and Lalit were able to deduce the answers to exactly four questions with the information that they memorized.

The following is the set of questions given to each of them and the answers that they gave:

Harish		Lalit	
Q1	The population of B greater than that of A.	Q1	The population of C is 20 mn more than that of B.
Ans	**True**	Ans	**False**
Q2	The population of A is 20 mn.	Q2	The population of E is 30 mn.
Ans	**True**	Ans	**True**
Q3	The population of D is less than that of C.	Q3	The population of A is 10 mn more than that of D.
Ans	**False**	Ans	**False**
Q4	The population of E is 40 mn.	Q4	The population of B is 40 mn.
Ans	**True**	Ans	**True**
Q5	The population of C is 10 mn more than that of E.	Q5	The difference in population of C and E is 20 mn.
Ans	**False**	Ans	**False**
Q6	The population of C is 50 mn.	Q6	The population of E is less than that of D.
Ans	**True**	Ans	**False**

DIRECTIONS *for questions 5 to 8:* Select the correct alternative from the given choices.

5. What is the population of E?
   (A) 20 mn (B) 30 mn (C) 50 mn (D) 70 mn

6. If the population of no two states is the same, which of the following states would have the highest population?
   (A) B (B) C (C) D (D) A

7. What is the minimum possible sum of the population of the five states?
   (A) 220 mn   (B) 210 mn
   (C) 240 mn   (D) 200 mn

8. The answer given by Lalit to which question would Karthik definitely evaluate as correct?
   (A) Q2   (B) Q3
   (C) Q6   (D) Q4

DIRECTIONS *for questions 9 to 12:* Answer the questions on the basis of the information given below.

Five companies – A through E – sells one or more products among Motorcycles, Cars, Buses, Trucks and Bicycles. No company sells any product other than the above-mentioned five and the revenue of any company from any product that it sells is not zero. The bar graph below provides, for each company, the percentage of revenue from each product that it sells. The table provided alongside the bar graph provides, for each product, the total revenue of all the companies, among the five, that sell that product.
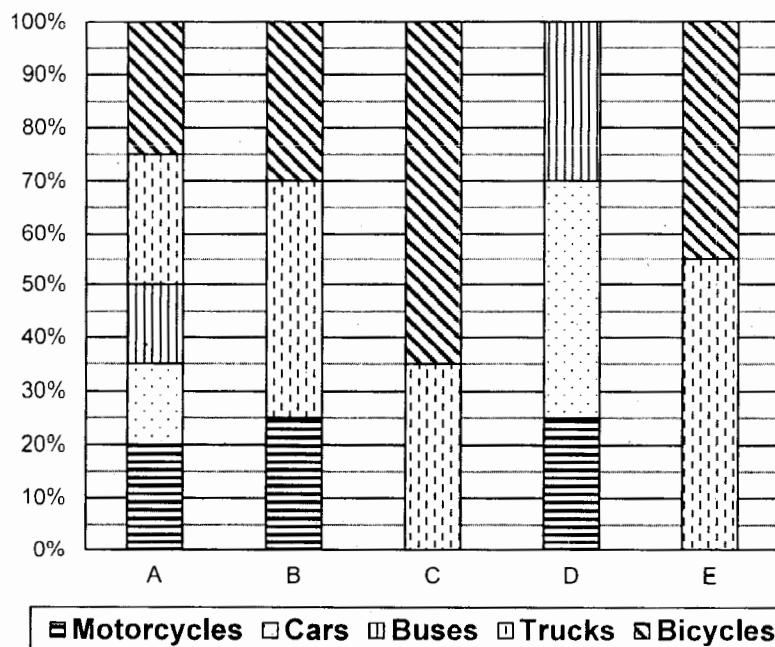
Product	Total Revenue (in ₹mn)
Motorcycles	156
Cars	144
Buses	105
Trucks	376
Bicycles	359

▭ **Motorcycles** ▭ **Cars** ▥ **Buses** ▯ **Trucks** ▨ **Bicycles**

DIRECTIONS *for questions 9 to 12:* Select the correct alternative from the given choices.

9. What is the revenue of company B from selling Trucks?
   (A) ₹45 mn   (B) ₹90 mn
   (C) ₹99 mn   (D) ₹105 mn

10. Which company has the highest revenue?
    (A) A   (B) C   (C) D   (D) E

11. What is the highest revenue of any company from selling Bicycles?
    (A) ₹165 mn   (B) ₹144 mn
    (C) ₹120 mn   (D) ₹105 mn

12. For how many companies is the revenue from any product that they sell more than ₹50 mn?
    (A) 5   (B) 4
    (C) 3   (D) 2

DIRECTIONS *for questions 13 to 16:* Answer the questions on the basis of the information given below.

In the following chart, the number of literate females and the fraction of population who are literate is provided for ten countries – A through J. The number of literate females (in mn) is given along the horizontal axis, while the overall literacy percentage is provided along the vertical axis. Further, each country is represented by a rectangle whose width (i.e., along the horizontal axis) is proportional to the number of males in the country and whose height (along the vertical axis) is proportional to the literacy percentage among males in the country.

For each country, the centre of the rectangle represents the number of literate females and the overall literacy percentage.

Note: The number of literate males in A is 400,000 and the number of illiterate males in A is 600,000.

No. of Literate Females (mn)
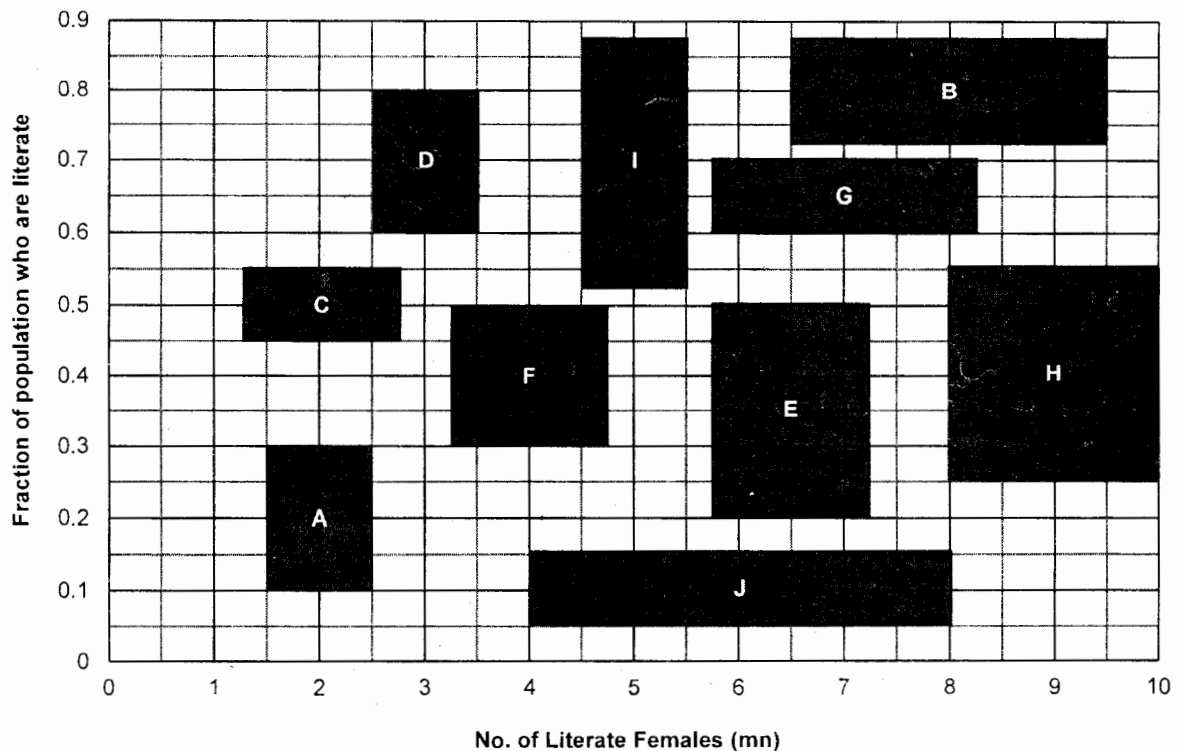
DIRECTIONS *for questions 13 and 14:* Select the correct alternative from the given choices.

13. Which of the ten countries has the highest population?
    (A) E   (B) B
    (C) H   (D) J

14. Which of the ten countries has the second highest number of females?
    (A) J   (B) E
    (C) H   (D) A

DIRECTIONS *for questions 15 and 16:* Type in your answer in the input box provided below the question.

15. What is the population (in mn) of country F?

16. What is the number of illiterate males (in mn) in country G?

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

In the month of November 2018, Piyush, a class teacher, kept track of the number of children that were present in his class on each of the thirty days of the month. The number of children in the class on any day varied by at most 8 between any two consecutive days. Further, on a particular day of the month, the number of children in the class was four, which was the minimum number of children present in the class on any day of the month. Further, the number of days for which the number of children present in the class was n was exactly $n - 3$.

DIRECTIONS *for questions 17 and 18:* Type in your answer in the input box provided below the question.

17. What is the maximum possible number of children present in the class on any day?

18. If the highest number of children present in the class on any day was x, what is the lowest possible value of x?

DIRECTIONS *for questions 19 and 20:* Select the correct alternative from the given choices.

19. If the number of children in the class was n for exactly eleven consecutive days and on any other day, the number of children in the class was not n, what is the maximum possible number of children in the class on any day?
(A) 18   (B) 17   (C) 19   (D) 20

20. If the number of children in the class was n for ten days, from November 1st to November 10th, and on any other day, the number of children in the class was not n, what is the maximum possible number of children in the class on any day?
(A) 16   (B) 15   (C) 17   (D) 18

DIRECTIONS *for questions 21 to 24:* Answer the questions on the basis of the information given below.

Hari, Rahul and Pranav were analysing data on the number of students in a class who like each subject among Chemistry, Physics, Botany and Zoology. Each student in the class likes at least one of these four subjects.

- Hari classified the four subjects into three groups – Hard Science (HS) comprising Chemistry and Physics as one group, Botany (B) as a separate group and Zoology (Z) as a separate group.

- Rahul also classified the four subjects into three groups – Dull Subjects (DS) comprising Zoology and Physics as one group, Chemistry (C) as a separate group and Botany (B) as a separate group.

- Pranav also classified the four subjects into three groups – Important Subjects (IS) comprising Botany and Zoology as one group, Physics (P) as a separate group and Chemistry (C) as a separate group.

Any student who likes at least one subject in a group is said to have a preference for the group. Each of Hari, Rahul and Pranav made a Venn diagram, which is provided below, providing information on the number of students who have a preference for the groups that he has defined.
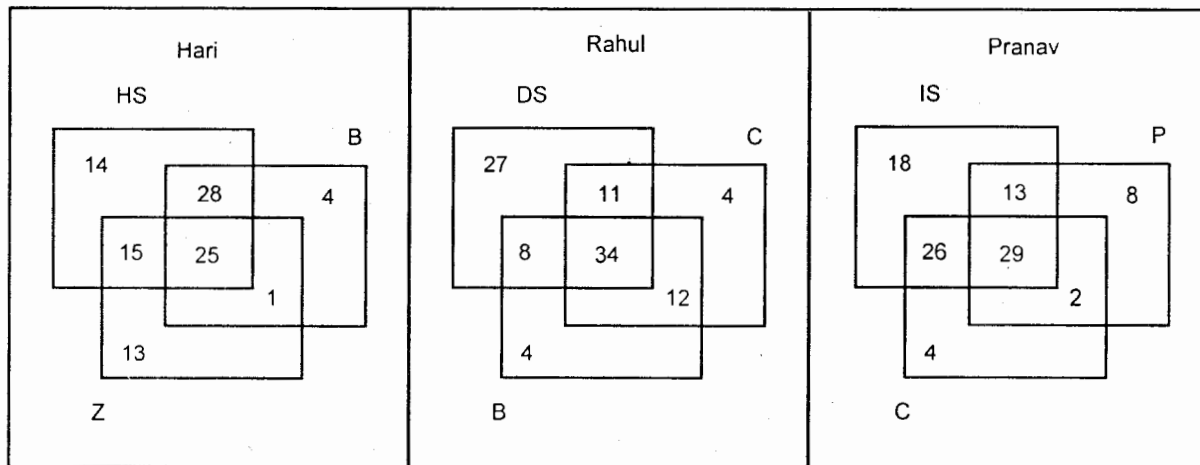
DIRECTIONS *for questions 21 to 24:* Select the correct alternative from the given choices.

21. How many students like only Physics and Zoology?
(A) 4   (B) 5   (C) 6   (D) 7

22. What is the minimum number of students who like both Chemistry and Zoology?
(A) 27   (B) 29   (C) 25   (D) 23

23. What is the maximum possible number of students who like all the four subjects?
(A) 15   (B) 13
(C) 27   (D) 20

24. If the number of students who like both Chemistry and Zoology is 30, how many students do not like only Chemistry?
(A) 3   (B) 4   (C) 5   (D) 6

Five horses – Whispering Death, Nice Guy, Pony Express, Black Knight and Lazy Suzy – participated in a race. Each horse had a different jockey among Jack, Rory, Ted, Philip and Westin. Further, the shirt of each jockey was of a different colour among Blue, Red, Yellow, Green and Pink.

It is also known that

(i) Jack's shirt was Green, while the shirt of Black Knight's jockey was Red.
(ii) The jockey of Lazy Suzy was Philip and his shirt was not Blue.
(iii) Ted's shirt was not Blue, while Westin was not the jockey of Nice Guy.
(iv) The shirt of Whispering Death's jockey was not Blue, while Rory's shirt was Yellow.

25. Who was the jockey of Pony Express?
    (A) Jack   (B) Rory
    (C) Ted   (D) Westin

26. What was the colour of the shirt of Lazy Suzy's jockey?
    (A) Green   (B) Pink
    (C) Yellow   (D) Cannot be determined

27. Who was the jockey of Black Knight?
    (A) Jack   (B) Westin
    (C) Ted   (D) Rory

28. If the colour of the shirt of Whispering Death's jockey was not Green, who was the jockey of Nice Guy?
    (A) Rory   (B) Westin
    (C) Ted   (D) Jack

In a hockey match between Metropolis Magnates and Gotham Gators, exactly six players, A through F, scored goals. The number of goals scored by them were 3, 4, 7, 9, 10 and 12, not necessarily in the same order.

Of the six players, three players played for Metropolis Magnates, while three players played for Gotham Gators.

It is also known that

(i) no other player scored any goal between the first and last goal that A scored. The same is the case with B, C and D.
(ii) the last goal that C scored was the 10th goal of the match, while B scored more than three goals.
(iii) exactly 12 goals were scored after D scored his last goal.
(iv) the first person to score a goal for Metropolis Magnates scored the last five goals of the match.
(v) the last person to score a goal for Gotham Gators scored the first five goals of the match.
(vi) A, who played for Metropolis Magnates, scored his first goal after B scored his last goal.
(vii) F, who played for Gotham Gators, scored less goals than E.
(viii) the number of goals scored by Metropolis Magnates and Gotham Gators (in that order) at different points of the match are as follows: 6-5, 6-11 and 14-11.

29. How many goals did D score?

30. What is the total number of goals scored by Metropolis Magnates?

31. How many goals were scored by both the teams combined before A scored his last goal?
    (A) 21   (B) 23   (C) 25   (D) 29

32. If it can be said that B definitely scored the nth goal of the match, how many values can n take?
    (A) 1   (B) 2   (C) 0   (D) 3

SECTION – III
Number of Questions = 34

1. A number M has exactly six factors. If the reciprocal of each factor of M is a terminating number, then how many values can M assume?

2. Which of the following numbers given in the octal system is divisible by 7?

    (A) $(23765)_8$ (B) $(24625)_8$
    (C) $(45326)_8$ (D) $(36453)_8$

3. The total cost of a product includes two parts – the production cost and the marketing cost. If the production cost and the marketing cost increase by 20% and 30% respectively, the total cost increases by 28%. The marketing cost is how many times the production cost?

    (A) 2   (B) 3   (C) $\frac{3}{2}$ (D) 4

4. The difference of the digits of a two-digit number is 8. How many such numbers exist?
    (A) 2   (B) 4   (C) 5   (D) 3

5. There is a family comprising a father and a mother, along with six children – A, B, C, D, E and F. They have to attend a party, for which they decide that only one among the father or the mother can attend, along with any number of children, subject to the following constraints:

(a) Neither B nor C will go along with their mother.
(b) F goes, only if A or D goes.

In how many different ways can the family attend the party?

6. The income of A is ₹15,000 and it is equal to the expenditure of B. If the ratio of the savings of A to the savings of B is 2 : 1, which of the following statements is definitely true?
   (A) The combined income of A and B is more than ₹45,000.
   (B) The combined expenditure of A and B is not less than ₹20,000.
   (C) A's expenditure added to twice of B's income is equal to ₹45,000.
   (D) B's expenditure added to twice of A's income is equal to ₹30,000.

7. The lengths of the sides of a triangle are 11 cm, 14 cm and 19 cm. If each side of the triangle is increased by 20%, then what is the percentage increase in the product of the circumradius and the inradius of the triangle?
   (A) 21%   (B) 20%
   (C) 44%   (D) None of the above

8. S = {1, 2, 3........., 400}. For how many non-empty subsets of S is the product of the elements of the subset equal to an even number?
   (A) $2^{400} - 2^{300}$ (B) $2^{400} - 2^{100}$
   (C) $2^{400} - 2^{200}$ (D) 2^{200}

9. A line, L, passing through the points (1, 1) and (2, 0) meets the *y*–axis at A. The line passing through the point $\left(\frac{1}{2}, 0\right)$ and perpendicular to L meets the *y*–axis at B and the line L at C. Find the area of the triangle ABC.
   (A) $\frac{25}{16}$ (B) $\frac{16}{9}$ (C) $\frac{32}{19}$ (D) $\frac{40}{23}$

10. The cost of an eraser is one-twelfth that of a pen and two-thirds that of a pencil. If the cost of two pens is ₹33 more than the cost of five pencils, then find the cost of one pen, two pencils and three erasers.
   (A) ₹30   (B) ₹36   (C) ₹48   (D) ₹33

11. A rectangular sheet of paper was folded along the line joining the midpoints of its longer sides. The rectangle which resulted had the same ratio of its longer and shorter sides as that of the original rectangle. If the breadth of the original rectangle is $\sqrt{2}$ cm, find the area (in sq.cm) of the smaller rectangle.
   (A) $\frac{3\sqrt{2}}{4}$ (B) $\sqrt{2}$ (C) $\frac{3\sqrt{2}}{2}$ (D) $4\sqrt{2}$

12. Some friends planned to contribute equally to jointly buy a CD player. However, two of them decided to withdraw at the last minute. As a result, each of the others had to shell out one rupee more than what they had planned for. If the price (in ₹) of the CD player is an integer between 1000 and 1100, find the number of friends who actually contributed.

13. If a copper wire of diameter 1.5 cm and length 80 m is melted completely and recast to form a solid spherical ball of radius R cm, then find the value of R (in cm).
   (A) 15   (B) 12   (C) 20   (D) 25

14. There are two variants of detergents – A and B. Detergent A contains 75% soap and 25% bleach, while detergent B contains 85% soap and 15% bleach. In what ratio should the detergents A and B be mixed, so that the resultant mixture contains 79% soap in it?
   (A) 2 : 3   (B) 3 : 4   (C) 5 : 4   (D) 3 : 2

15. Find the value of $\sin^2 A + \sin^2 B + \sin^2 C$, if A, B and C are the angles of a right angled triangle.

16. Two tanks, T_1 and T_2, of equal capacities, are provided with inlet taps, A and B, of different flow rates, respectively. Tap A begins to fill the first tank. Seven minutes later, tap B is opened. Nine minutes after that, the total quantity of water in the two tanks is just enough to fill one tank completely. Exactly *t* minutes after that both the tanks are full. What is the value of *t*?

17. The visibility on a certain road is limited to a distance of 80 m due to fog. A car travelling on that road crossed a cart moving in the same direction. If the speed of the cart and the car are 8 km/hr and 44 km/hr respectively, then for how long (in seconds) will the car be visible to the driver of the cart after it overtook the cart?

18. Which of the following is true regarding *a*, *b*, *c* and *d*, if $a = 2^{\frac{1}{3}}$, $b = 3^{\frac{1}{4}}$, $c = 4^{\frac{1}{5}}$ and $d = 5^{\frac{1}{6}}$?
   (A) *c* > *a* > *d* > *b*   (B) *c* > *b* > *d* > *a*
   (C) *c* > *b* > *a* > *d*   (D) *c* > *d* > *b* > *a*

19. In a triangle ABC, there are 5, 6 and 4 points, different from the vertices A, B and C of the triangle, on the three sides, AB, BC and CA respectively. How many distinct triangles can be drawn using the 18 points (including the vertices A, B and C)?

20. If P and Q are two natural numbers, and an operation $\oplus$ is defined such that $P \oplus Q = \sqrt{3\sqrt{\frac{P}{Q}} + 3\sqrt{\frac{Q}{P}}}$, which of the following is an integer?
(A) $27 \oplus 8$ (B) $64 \oplus 27$
(C) $8 \oplus 64$ (D) None of the above

21. If, in a class, the number of students who passed in at most 0, 1, 2, 3, 4 and 5 subjects is 3, 7, 9, 14, 15 and 22 respectively, find the number of students who passed in at least 3 subjects.
(A) 8   (B) 13   (C) 14   (D) 15

22. The number of integer values of x that satisfy the inequality $|x - 1| |x - 2| \le 10$ is

23. If the sum of two positive numbers p and q is 4, find the minimum possible value of the expression $\left(p + \frac{1}{p}\right)^2 + \left(q + \frac{1}{q}\right)^2$.

(A) 36.25   (B) 14   (C) 12.5   (D) 4

24. If a leap year is chosen at random, what is the probability that there are exactly 52 Sundays in it?

(A) $\frac{1}{7}$ (B) $\frac{2}{7}$ (C) $\frac{5}{7}$ (D) $\frac{6}{7}$

25. If $(x - y)(x^2 + y^2) = 965$ and $(x + y)(x^2 - y^2) = 1805$, where x and y are positive integers, find the value of xy.

26. If the sum of the cubes of the sides of a triangle equals thrice the product of those sides, find the type of the triangle.
(A) Right angled   (B) Isosceles
(C) Equilateral   (D) Cannot be determined

27. The number of parrots and mynas in an aviary is in the ratio of 5 : 8. If 21 birds of each type are added to the existing lot, then the ratio would change to 4 : 5. How many parrots and mynas are there in the aviary?
(A) 26   (B) 39   (C) 52   (D) 65

28. If the cube root of $45 + 29\sqrt{2}$ is $a + \sqrt{b}$, then find the value of $2a^3 + 3b^2$.

29. There is a point A on the side PQ of a square PQRS. If PA = 4.5 inches and the area of the triangle AQR is 50 sq.inches, what is the perimeter of the square PQRS?
(A) 40 inches   (B) 45 inches
(C) 60 inches   (D) 50 inches

30. If $L = \frac{p + q}{p - q}$, $M = \frac{q + r}{q - r}$ and $N = \frac{r + p}{r - p}$, what is the value of LM + MN + NL?
(A) −1   (B) 0   (C) 1   (D) 2

31. The unit's digit of 723^{327} is
(A) 1.   (B) 3.   (C) 7.   (D) 9.

32. In a certain theatre, there are 300 seats. When the price of a ticket was ₹60, the theatre ran to a full house. For every ₹3 increase in the price of the ticket, the strength of the audience dropped by 10.The maximum possible revenue that the theatre owner will earn from the sale of tickets is
(A) ₹18600.   (B) ₹19050.
(C) ₹18750.   (D) ₹19350.

33. If $13^{\left(\log_x 872\right)} = 5^{\left(\log_{25} 961\right)} + 7^{\left(\log_{\sqrt{7}} 29\right)}$, then the value of x is
(A) $\sqrt{13}$.   (B) $13\sqrt{3}$.   (C) 169.   (D) 13.

34.
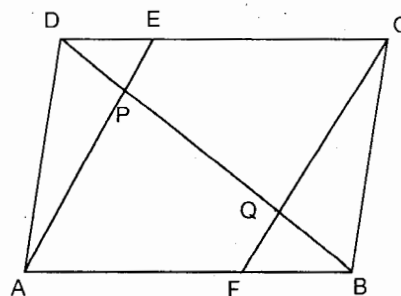
In the figure above, ABCD is a parallelogram, where DE : EC = BF : FA = 2 : 5. If BD = 18 cm, what is the length of PQ?
(A) 8 cm
(B) 9 cm
(C) 10 cm
(D) Cannot be determined