T.I.M.E.
Triumphant Institute of Management Education Pvt. Ltd.

Ref: AIMCAT2015

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 5:* The passage given below is accompanied by a set of five questions. Choose the best answer to each question.

Do world-class swimmers' hearts function differently than the hearts of elite runners? ...Cardiologists and exercise scientists already know that regular exercise changes the look and workings of the human heart. The left ventricle [...] receives oxygen-rich blood from the lungs and pumps it out to the rest of the body, using a rather strenuous twisting and unspooling motion, as if the ventricle were a sponge being wrung out before springing back into shape. Exercise requires that considerable oxygen be delivered to working muscles, placing high demands on the left ventricle. In response, it typically becomes larger and stronger in athletes than it is in sedentary people and functions more efficiently, filling with blood a little earlier and more fully and untwisting with each heartbeat a bit more rapidly, allowing the heart to pump more blood more quickly.

...[D]ifferent types of exercise often produce subtly different effects. A 2015 study found that competitive rowers, whose sport combines endurance and power, had greater muscle mass in their left ventricles than runners, making their hearts strong but potentially less nimble during the twisting that pumps blood to muscles. These past studies compared the cardiac effects of land-based activities. Few have examined swimming, even though it is not only a popular exercise but also a unique exercise. Swimmers, unlike runners, lie prone, in buoyant water and hold their breaths, all of which could affect cardiac demands and how the heart responds and remakes itself. So, for the new study, researchers set out to map the structure and function of elite swimmers' and runners' hearts. They focused on world-class performers because those athletes would have been running or swimming strenuously for years, presumably exaggerating any differential effects of their training, the researchers reasoned.

Eventually they recruited 16 national-team runners and another 16 comparable swimmers, male and female, [and] asked the athletes to visit the exercise lab after not exercising for 12 hours and then, when on site, to lie quietly. They checked heart rates and blood pressures and finally examined the athletes' hearts with echocardiograms...

It turned out, that [all] the athletes enjoyed enviable heart health. Their heart rates hovered around 50 beats per minute, with the runners' rates slightly lower than the swimmers'. But all athletes' heart rates were much lower than is typical for sedentary people. The athletes also had relatively large, efficient left ventricles... But there were interesting, if small, differences between the swimmers and runners. While all athletes' left ventricles filled with blood earlier than average and untwisted more quickly during each heartbeat, those desirable changes were amplified in the runners...

...[T]hese differences do not necessarily show that the runners' hearts worked better than those of the swimmers... Since swimmers exercise in a horizontal position their hearts do not have to fight gravity to get blood back to the heart, unlike in upright runners. Posture does some of the work for swimmers, and so their hearts reshape themselves only as much as needed for the demands of their sport. The findings [...] might provide a reason for swimmers sometimes to consider logging miles on the road to intensify the remodelling of their hearts. Of course, the athletes here were tested while resting, not competing, and it is not clear whether any variations in their ventricles would be meaningful during races... Also, athletes might have been born with unusual cardiac structures that somehow allowed them to excel at their sports, instead of the sports changing their hearts.

1. Which of the following is not an inference that can be drawn from the passage?
   (A) A lower heartbeat rate is an indicator of a healthy heart.
   (B) Greater muscle mass in the heart reduces its agility.
   (C) The heart functions differently while resting and during strenuous physical activity.
   (D) The heart functions most efficiently when athletes indulge in both running and swimming.

2. The remodelling of the heart is different in swimming than in the case of running because
   (A) the latter needs the heart to do more work than the former.
   (B) the latter is a land-based activity whereas the former is a water-based activity.
   (C) the former is a more strenuous activity than the latter as the former involves fighting gravity.
   (D) the former needs the heart to pump less oxygen to the muscles than the latter.

3. Which of the following studies will the author approve of in order to widen the scope of the arguments in the passage?
   (A) A study of heartbeat rates in a sedentary person involved in strenuous physical activity
   (B) A study of heartbeat rates in an athlete immediately after the act of swimming or running
   (C) A study of the differences in cardiac structures of athletes and those of non-athletes
   (D) A study of the differences between cardiac structures of athletes after years of professional training and the same before they had started training

4. World-class performers were selected for the study comparing the heart rates and blood pressure of athletes because
   (A) years of putting their hearts under duress will amplify any changes caused by physical training like swimming and running.
   (B) the results will be more pronounced in athletes who haven't exercised for 12 hours.
   (C) such athletes will have hearts which are healthy and robust, and ideal for the study.
   (D) years of training would have accelerated the remodelling of their cardiac structures.

5. The author mentions the 2015 study about competitive rowers to elucidate that
   (A) sports that need both endurance and power demand more from the heart than other sports.
   (B) the cardiac structure of the heart is affected differently by training in different sports.
   (C) the effects of different sports on the heart are only subtly different from one another.
   (D) the greater the muscle mass of the left ventricles, the less nimble they are during the twisting that pumps blood.

DIRECTIONS *for questions 6 to 9:* The passage given below is accompanied by a set of four questions. Choose the best answer to each question.

The Bengal famine of 1943 was the only one in modern Indian history not to occur as a result of serious drought, according to a study that provides scientific backing for arguments that Churchill-era British policies were a significant factor contributing to the catastrophe.

Researchers in India and the US used weather data to simulate the amount of moisture in the soil during six major famines in the subcontinent between 1873 and 1943. Soil moisture deficits, brought about by poor rainfall and high temperatures, are a key indicator of drought.

Five of the famines were correlated with significant soil moisture deficits. An 11% deficit measured across much of north India in 1896-97, for example, coincided with food shortages across the country that killed an estimated 5 million people.

However, the 1943 famine in Bengal, which killed up to 3 million people, was different, according to the researchers. Though the eastern Indian region was affected by drought for much of the 1940s, conditions were the worst in 1941, years before the most extreme stage of the famine, when newspapers began to publish images of the dying on the streets of Kolkata, then named Calcutta, against the wishes of the colonial British administration. In late 1943, thought to be the peak of the famine, rain levels were above average, said the study published in February in the journal Geophysical Research Letters...

Food supplies to Bengal were reduced in the years preceding 1943 by natural disasters, outbreaks of infections in crops and the fall of Burma – now Myanmar – which was a major source of rice imports, into Japanese hands.

But the Nobel prize-winning economist Amartya Sen argued in 1981 that there should still have been enough supplies to feed the region, and that the mass deaths in 1943 came about as a combination of wartime inflation, speculative buying and panic hoarding, which together pushed the price of food out of the reach of impoverished Bengalis. More recent studies, including those by the journalist Madhushree Mukerjee, have argued that the famine was exacerbated by the decisions of Winston Churchill's wartime cabinet in London. Mukerjee has presented evidence the cabinet was warned repeatedly that the exhaustive use of Indian resources for the war effort could result in famine, but it opted to continue exporting rice from India to elsewhere in the empire.

Rice stocks continued to leave India even as London was denying urgent requests from India's viceroy for more than one million tonnes of emergency wheat supplies in 1942-43. Churchill has been quoted as blaming the famine on the

fact that Indians were "breeding like rabbits", and asking how, if the shortages were so bad, Mahatma Gandhi was still alive. Mukerjee and others also point to Britain's "denial policy" in the region, in which huge supplies of rice and thousands of boats were confiscated from coastal areas of Bengal in order to deny resources to the Japanese army in case of a future invasion...

Though India's population has vastly increased since the British colonial era, the country has largely eliminated famine deaths owing to more efficient irrigation practices, improvements in seed yields, a stronger food distribution and welfare system and better transport links, which allow emergency food stocks to be moved quickly to deprived areas.

6. In the passage, the author is trying to establish that
(A) the culpability for the Bengal famine lies squarely with Winston Churchill.
(B) the fall of Burma led to shortage of rice supplies which in turn led to the famine.
(C) the Bengal famine is by and large a man-made problem.
(D) Britain's 'denial' policy' in the region triggered the famine.

7. It can be inferred from the last para of the passage that:
(A) high rate of population increase is a cause for famine deaths.
(B) inefficient food circulation may lead to famine deaths.
(C) lowering water wastage can lower the risk of famines.
(D) part of the problem during the British era was the seed yield.

8. Which of the following, if true, will least weaken Amartya Sen's argument mentioned in the passage?
(A) Deaths were equally distributed amongst all economic sections of society.
(B) Food prices after 1943 became lower than they were in 1943 because of the lives claimed by the famine.
(C) Food prices increased only because there weren't enough supplies to feed the region.
(D) Food prices in 1943 were lower than they were in the next two years.

9. The 'scientific backing' referred to in the first para of the passage can be inferred to be:
(A) data proving that five of the six major famines between 1873 and 1943 were related to significant soil moisture deficits.
(B) the evidence that soil moisture deficits brought about by poor rainfall and high temperatures are a key indicator of drought.
(C) the data that the eastern Indian region was affected by drought for much of the 1940s.
(D) the evidence that the worst of the drought conditions didn't overlap with the Bengal famine of 1943.

DIRECTIONS *for questions 10 to 14:* The passage given below is accompanied by a set of five questions. Choose the best answer to each question.

We're living in an age of radicalism. But today's radicalism is unusual. First, we have radical anger without radical policies...The left-wing radicals talk a lot against the systems of oppression and an institutionalized injustice. But they are nothing like the radicals of the 1930s or the 1960s.

Today's radicals do not want to upend the meritocracy, which is creating a caste system of inherited inequality. They don't want to stop technical innovation, which is displacing millions of workers. They don't have plans to reverse individualism, which atomizes society and destroys community.

Second, today's radicalism is more about identity than social problems...Consider the angry commentary you hear during a given day. How much of it is addressing a problem we face, and how much of it is denouncing people we dislike?

Third, today's radicalism assumes that war is the inherent state of things. The key influence here is Saul Alinsky... One of his first big assertions is that life is warfare. It is inevitably a battle between the people and the elites, the haves and the have-nots, or, as his heirs would add, between the whites and the blacks, the Republicans and the Democrats, Islam and the West...

Fourth, there is the low view of human nature. Today's radicals conduct themselves on the presumption that since life is battle, moral decency is mostly a hypocritical fraud. To get anything done the radical has to commit evil acts for good causes. "The ethics of means and ends is that in war the end justifies almost any means," Alinsky writes. "Ethical standards must be elastic to stretch with the times," he adds [in his book Rules for Radicals]. "Ethics are determined by whether one is losing or winning."

What can we conclude about the radicals? Well, they are wrong that our institutions are fundamentally corrupt. Most of our actual social and economic problems are the bad by-products of fundamentally good trends. Technological innovation has created wonders but displaced millions of workers. The meritocracy has unleashed talent but widened inequality. Immigration has made America more dynamic but weakened national cohesion. Globalization has lifted billions out of poverty but pummelled the working classes in advanced nations.

What's needed is reform of our core institutions to address the bad by-products, not fundamental dismantling. That sort of renewal means doing the opposite of everything the left/right radicals do. It means believing that life can be more like

a conversation than a war if you open by starting a conversation. It means collectively focusing on problems and not divisively destroying people. It means believing that love is a genuine force in human affairs and that you can be effective by appealing to the better angels of human nature.

Today's radicalism is fundamentally spiritual, even if it's played out in the political sphere. It's driven by the radicals' need for more secure identity, to gain respect and dignity, to give life a sense of purpose and meaning.

The radicals are looking for meaning and purpose in the wrong way and in the wrong place, and they're destroying our political world in the process. But you've got to give them one thing: They are way ahead of the rest of us. They are organized, self-confident, aggressive and driving history. The rest of us are dispersed, confused and in retreat.

10. The author attributes the rise of today's radicalism to:
(A) fundamental dismantling of institutions.
(B) a focus on individual identity.
(C) technological innovation.
(D) the self-confidence and aggression of radicals.

11. All of the following would find resonance with the author's ideas in the passage EXCEPT that:
(A) our institutions are governed by sound fundamentals.
(B) radicals don't have to commit evil acts to promote good causes.
(C) social and economic problems are by-products of fundamentally corrupt institutions.
(D) ethical standards need not be flexible to suit the times.

12. The author's suggestion to ameliorate the present situation is to:
(A) return to spirituality.
(B) give the radicals a sense of dignity.
(C) address the problems cohesively.
(D) dismantle the core institutions.

13. Which of the following has not been mentioned by the author about today's radicalism to explain why it is unlike radicalism in the bygone era?
(A) It is more about active censure than finding solutions.
(B) An identity crisis takes priority over relevant issues in society.
(C) The bar is quite low for humanity and its values.
(D) It encourages meritocracy and creates inequality.

14. Which of the following cannot be inferred from the passage?
(A) Radicals are more organised when it comes to building communities.
(B) Radicals are more focused on claiming their own place in society than in fixing society itself.
(C) Technological innovation, meritocracy, and immigration are not fundamentally flawed concepts.
(D) Constructive dialogue, and not brash aggression, defines those who do not subscribe to radicalism.

DIRECTIONS *for questions 15 to 19:* The passage given below is accompanied by a set of five questions. Choose the best answer to each question.

For language lovers, the facts are grim: Anglophones simply aren't learning them anymore. In Britain, despite four decades in the European Union, the number of A-levels taken in French and German has fallen by half in the past 20 years, while what was a growing trend of Spanish-learning has stalled...

Why learn a foreign language? After all, the one you already speak [...] is the world's most useful and most important language. English is not just the first language of the obvious countries; it is now the rest of the world's second language...Nonetheless, compelling reasons remain for learning other languages...First, learning any foreign language helps you understand all languages better... Second, there is the cultural broadening. Literature is always best read in the original. Poetry and lyrics suffer particularly badly in translation. And learning another tongue helps the student grasp another way of thinking. Though the notion that speakers of different languages think differently has been vastly exaggerated and misunderstood, there is a great deal to be learned from discovering what the different cultures call this [or] that ...

The practical reasons are just as compelling. In business, if the team on the other side of the table knows your language but you don't know theirs, they almost certainly know more about you and your company than you do about them and theirs — a bad position to negotiate from. Many investors in China have made fatally stupid decisions about companies they could not understand... Virtually any career, public or private, is given a boost with knowledge of a foreign language.

So, which one should you learn? [A]n answer seems to leap out: Mandarin. China's economy continues to grow at a pace that will make it bigger than America's within two decades at most. China's political clout is growing accordingly. Its businessmen are buying up everything from American brands to African minerals to Russian oil rights. If China is the country of the future, is Chinese the language of the future?

Probably not. Remember Japan's rise? Just as spectacular as China's, if on a smaller scale, Japan's economic growth led many to think it would take over the world. It was the world's second-largest economy for decades... So, is Japanese the world's third-most useful language? Not even close ... And the key reason for Japanese's limited spread will also put the brakes on Chinese.

This factor is the Chinese writing system (which Japan borrowed and adapted centuries ago). The learner needs to know at least 3,000-4,000 characters to make sense of written Chinese, and thousands more to have a real feel for it. Chinese, with all its tones, is hard enough to speak. But the mammoth feat of memory required to be literate in Mandarin is harder still...Fewer and fewer native speakers learn to produce characters in traditional calligraphy...

... If I was asked what foreign language is the most useful, [...] my answer would be French... As their empire spun off and they became a medium-sized power after the Second World War, the French [...] established La Francophonie. This club, bringing together all the countries with a French-speaking heritage, has 56 members, almost a third of the world's countries...[French] can enhance your enjoyment of art, history, literature and food, while giving you an important tool in business and a useful one in diplomacy. It has native speakers in every region on earth and attracts more tourists than any other country...

15. Which of the following does the author not imply through his argument in favour of learning new languages?
(A) The first language of a person is connected to the way of thinking of the person.
(B) Insights can be gained by understanding words used in various cultures for known things.
(C) Bilingualism and multilingualism may enhance the job prospects of an individual.
(D) Business negotiations are hampered when one party doesn't understand the language of the other party.

16. The author is predisposed towards French as the foreign language to learn, NOT because:
(A) it has a positive impact on the quality of one's lifestyle.
(B) it pays dividends to know the language of the most popular tourist destination in the world.
(C) it helps one understand the heritage of a third of the world's countries, which speak French.
(D) French would be expedient for international business.

17. The author provides the example of Japan to explain that
(A) the popularity of a country's language doesn't necessarily stem from the size of its economy.
(B) the speed of economic growth of a country boosts the popularity of its language.
(C) Chinese like Japanese is a tough language to learn and adopt.
(D) the Chinese writing system is detrimental to Mandarin's popularity.

18. All of the following are impediments to the popularity of Mandarin EXCEPT that:
(A) the number of native speakers learning to produce Chinese calligraphy is dwindling
(B) there are thousands of characters one needs to know to comprehend the language.
(C) the language demands a lot out of one's memory.
(D) the tones in Chinese make it a tough language to speak.

19. The author is least likely to agree with which of the following?
(A) A country's economic heft and political clout do not guarantee the popularity of its language.
(B) The ease with which a language can be learnt is a contributing factor toward its popularity.
(C) A language's role as a diplomatic and business tool is enhanced by the number of countries where it is spoken.
(D) The impact of language on thinking is overrated.

DIRECTIONS *for questions 20 to 24:* The passage given below is accompanied by a set of five questions. Choose the best answer to each question.

Humanity's power to control the four-letter code of life has advanced by leaps and bounds. A new gene-editing technology called CRISPR/Cas9 has been the subject of particular excitement.

CRISPRs are elements of an ancient system that protects bacteria from viruses. Bacteria capture DNA snippets from invading viruses and use them to create DNA segments (CRISPR arrays) which allow bacteria to 'remember' the viruses. If the viruses attack again, the bacteria produce RNA segments from the CRISPR arrays to target the viruses' DNA, cutting it apart using the Cas9 enzyme. CRISPRs have evolved over millions of years to trim pieces of genetic information from one genome and insert it into another.

This bacterial antiviral defense can be used to quickly edit the DNA of any organism in the lab. Researchers create a small piece of RNA with a short "guide" sequence that attaches (binds) to a specific target sequence of DNA in a genome. The RNA also binds to the Cas9 enzyme which cuts the DNA at the targeted location, allowing for the removal of unwanted sequences or inserting foreign sequences.

Whether scientists should use CRISPR/Cas9's power to create gene-edited babies is a matter of heated debate. Many people are worried that CRISPR/Cas9 could lead to new classes of genetically enhanced people and discrimination against others born with uncorrected genetic diseases. There are always ethical concerns when genome editing, using technologies such as CRISPR/Cas9, is used to alter human genomes for imparting beneficial traits such as height or intelligence.

On November 26th 2018, CRISPR has caused more unease than optimism. Dr He Jiankui [expert in DNA sequencing at the Southern University of Science and Technology, in Shenzhen] announced that he had edited the genomes of human embryos using CRISPR technology to remove the *CCR5* gene (that enables HIV virus to infect cells), and that twin girls, named Lulu and Nana, had been born through in vitro fertilization (assisted reproduction that involved sperm from an HIV positive male and eggs from female donors). .... But Dr He might have inadvertently caused mutations in other parts

of the genome, which could have unpredictable health consequences. (He claims to have found no such mutations). Also, *CCR5* is thought to help people fight off the effects of various other infections, such as that caused by the West Nile virus. If the gene is disabled, the girls could be vulnerable. ... Dr He's work appears to have had the scantiest oversight and violates regulations.

But Dr He claimed that he addressed this concern by sequencing the entire genomes of two cells from each embryo. This showed that both *CCR5* copies were disabled in one twin, but only one in the other. The parents were fully aware of that, and decided to implant both embryos anyway. After the implantation, he twice sequenced fetal DNA that had leaked into the mother's blood, and also DNA from umbilical-cord blood, a fetal tissue. When the babies were born, he also sequenced cells from various tissues. He concluded, as a result, that there might be one potential off-target mutation, that no mutation existed in the 609 cancer-associated genes he tested and that no large chunks of DNA were missing. How accurate his sequencing was and whether it covered the entire [human] genome are matters of conjecture. ...

In a nutshell, we don't know the limits of new technologies (superior genomes!), can't guess what lifetime effects a single gene alteration will have on a single individual, and have no idea what effects alteration of genes in sperm or ova or a fetus will have on future generations. For these reasons, we have no knowledge of whether a particular modification of the human germline will be ultimately catastrophic, and no basis for considering that tampering with heritable genes can be humane or ethical. Dr Zhai Xiaomei, the executive director of the Centre for Bioethics, China, warns that China might become a fertile ground for scandals if its regulatory capacity is not greatly strengthened. As George Church, a geneticist at Harvard University, says: _____

20. All of the following are true of the CRISPR/Cas9 system discussed in the passage EXCEPT?
(A) CRISPR is a bacterial anti-viral system turned into a powerful gene-editing tool.
(B) CRISPRs work by using an RNA sequence that homes in on a specified location in a strand of the target DNA.
(C) An application of the CRISPR/Cas9 technology involves making changes to the target DNA by replacing an existing segment with a different DNA sequence.
(D) It is not possible to genetically alter one's athletic power, intellectual ability or other characteristics using the CRISPR/Cas9 technology.

21. Which of the following is the primary concern of the author in this passage?
(A) To explain a recent scientific development and predict its eventual consequences
(B) To outline several reasons for a trend and recommend measures to address it
(C) To highlight potential concerns of implementing a certain research technique
(D) To present the results of a scientific methodology and propose further studies to enhance the future of humanity

22. All of the following views or findings can be anticipated as possible objections to the claim of Dr He Jiankui in the passage EXCEPT:
(A) Scientists do not fully understand the scope of the unintended damage CRISPR does to DNA elsewhere in the genome.
(B) The deactivation of the CCR5 gene might leave one vulnerable to other diseases.
(C) The DNA sequencing that Dr He Jiankui did covered only about 80% of the genome, leaving a lot of scope for error.
(D) People without a working version of the CCR5 gene are immune to HIV infection.

23. Which of the following can serve as the most suitable title to this passage?
(A) How will gene editing technologies reshape humanity?
(B) Are we ready for enhanced genomes of individuals calibrated to our choice?
(C) Is the CRISPR baby controversy the start of a terrifying new chapter in gene editing?
(D) Using CRISPR for altering genomes: Should we or shouldn't we?

24. Which of the following can serve as the most apt comment of the geneticist George Church so as to complete the blank provided at the end of the last paragraph?
(A) Can we use this newfound superpower technology in a useful way that will benefit the planet and its people – or will this be a race for scientific glory and profit or doom?
(B) The genie is already out of the bottle, it needs to be put back and better oversight of places such as fertility clinics, where back-room genome-tinkerers may lurk, is necessary.
(C) Since the risks to unborn children from genetic engineering mistakes are not currently known, and are likely substantial, few researchers support the no-regulation view with regards to modifying the human genome.
(D) The reality is that we have crossed the rubicon: humans are on the verge of finally being able to modify their own evolution.

DIRECTIONS *for questions 25 and 26*: 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 five sentences and key in the sequence of five numbers as your answer, in the input box given below the question.

25. (1) However, the origin of the April Fish in France is quite obscure.
(2) That tradition dates to 1564.
(3) Maybe it was reminiscent of the ichtus used by Christians in the Roman era.
(4) In France, April Fools' Day is known for the "poisson d'avril".
(5) People play an April Fools trick by sticking a paper fish onto the back of as many adults as possible and then run away yelling "Poisson d'Avril!" (April Fish!)

26. (1) But there has been scant evidence of a smell associated with neurodegenerative disorders.
(2) Although scent is not used nearly as often in modern medicine, it still has its place.
(3) Hippocrates, Galen, Avicenna and other ancient physicians frequently used odour as a diagnostic tool.
(4) Paramedics are taught to spot the fruity smell on the breath of hyperglycaemic diabetics and gastroenterologists are trained to detect the odour of digested blood.
(5) Now, one has been found for Parkinson's disease.

DIRECTIONS *for question 27*: Five sentences related to a topic are given in the question below. Four of them can be put together to form a meaningful and coherent short paragraph. Identify the odd one out. Choose its number as your answer and key it in.

27. (1) It did not: no city nabbed the promised headquarters though local governments wooed the firm with juicy incentives.
(2) The gambit might have produced a fascinating experiment in urban development, and a departure from the concentration of top tech firms in a few favoured places.
(3) A year ago, the e-commerce giant said it would open a second headquarters and solicited bids from cities keen on the 50000 new jobs and $5 bn in investment it would bring.
(4) The decision to bring tens of thousands of high-paying jobs to two of America's richest metropolitan cities is a notable example of a broader trend.
(5) In the end, Amazon disappointed everyone.

DIRECTIONS *for questions 28 and 29*: The paragraph given below is followed by four summaries. Choose the option that best represents the author's primary position in the paragraph.

28. As with its philosophical history, Existential -Phenomenology takes the human condition in all its wondrous manifestations as the focus of investigation. Existential-Phenomenology emphasises the unfolding nature of human experience and brings a curiosity to what it means to be human. Its aim is to reveal the way in which each individual constructs his or her particular way of being and comes to understand the world. One of the key aims of Existential -Phenomenology is to facilitate a process of reflection and description that reveals with ever more detail and clarity the meaning that arises from our lived experience. We are not trying to merely explain 'why' things happen to be the way they are, but instead to describe 'how' we find ourselves to be – the process with which we involve ourselves.
(A) Existential-Phenomenology calls attention to the hidden processes that occur between people – the intersubjective nature of our relationships.
(B) Existential-Phenomenology provides the valuable opportunity of uncovering the contradictions, discrepancies and paradoxes that we experience in our everyday lives.
(C) Existential-Phenomenology is an organic process, a therapeutic approach that engages with and challenges you to explore and reflect solely on your personal history.
(D) Existential-Phenomenology endeavours to understand the way in which we create our own lives and selves by the way we live and come to construct an understanding of the world.

29. Stephen Covey in his book "Seven Habits" explains the difference between what he describes as the personality ethic and the character ethic. The personality ethic does not challenge us; neither does it bring about deep changes within us. As we look around and within ourselves and recognize the problems created as we live and interact within the personality ethic, we begin to realize that there are deep, fundamental problems that cannot be solved at the superficial level on which they were created. We need a new level, a deeper level of thinking – a paradigm based on character and on the principles that accurately describe the territory of an effective human being and his interactions – to solve the deep concerns. Covey calls this the "Inside-out" approach, which means to start first with self; even more fundamentally, to start with the most inside part of self – with your paradigms, your character and your motives.
(A) All the problems that we face, except for the fundamental ones, can be solved with the same level of thinking that we were at when we created them.
(B) In the character ethic vs personality ethic debate, 'character ethic' trumps 'personality ethic': the former emphasises deep changes in us, while the latter falls back on methods or techniques.
(C) A character-based, inside-out approach is necessary to effectively counter the problems that we have created when living within the personality ethic.
(D) Inside-out is a dramatic paradigm shift for most people and ensures a continuing process of renewal, leading to progressively higher forms of effective interdependence.

DIRECTIONS *for questions 30 and 31*: Five sentences related to a topic are given in the question below. Four of them can be put together to form a meaningful and coherent short paragraph. Identify the odd one out. Choose its number as your answer and key it in.

30. (1) In short, to study Latin is to study history.
(2) But his contemporary, Virgil, is majestic.
(3) Horace can be a drag – like a bad weekend columnist, always wittering on about his garden and his cellar, except when coming out with quotable drivel about how sweet it is to die in battle.
(4) He set himself the most daunting task – giving Rome its own "Iliad" and "Odyssey", in a single epic, while staying on the right side of an emperor – and pulled it off.
(5) Latin's literature has stood the test of millennia: Ovid is diverting, Lucretius is stimulating, Cicero is riveting.

31. (1) Remarkably, extreme events of diversification and extinction happen more frequently than a typical Gaussian distribution would predict.
(2) Throughout life's history on earth, biological diversity has gone through ebbs and flows -- periods of rapid evolution and of dramatic extinctions.
(3) Evidence for these ecological changes is found throughout the early and middle Cambrian fossil record but is even more apparent in deposits of exceptional preservation.
(4) We know this, at least in part, through the fossil record of marine invertebrates left behind since the Cambrian period.
(5) Instead of the typical bell-shaped curve, the fossil record shows a fat-tailed distribution, with extreme, outlier, events occurring with higher-than-expected probability.

DIRECTIONS *for questions 32 and 33*: 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 five sentences and key in the sequence of five numbers as your answer, in the input box given below the question.

32. (1) But neither commercially sourced monarchs nor local individuals raised indoors did.
(2) A graduate student discovered this genetic shortfall after buying dozens of monarchs and binding them to a short pole – a common method to test what direction an insect wants to fly.
(3) In what may be a cautionary tale for citizen scientists trying to save North America's iconic monarch butterfly, new research has found that butterflies raised in captivity are sometimes unable to migrate – some as a result of missing genes and others for want of the right environmental cues.
(4) Tethered wild-caught monarchs consistently headed south, the same direction they fly during their annual journeys from the United States and Canada to Mexico.
(5) They tended to head in random directions.

33. (1) That doesn't mean we should surrender to some kind of post-truth nihilism.
(2) We fight to define ideas and practices against the will of our opponents, even when we know those definitions won't last.
(3) Nothing's fixed forever, and everything's always at stake.
(4) Instead, critics and activists must search for the breaking points of hegemonic discourse, those weak spots in the architecture of domination.
(5) Modern politics and culture involve a permanent contest of values.

DIRECTIONS *for question 34*: The paragraph given below is followed by four summaries. Choose the option that best represents the author's primary position in the paragraph.

34. What characterizes indigenous philosophies? Because they are so culturally diverse, no beliefs can be said to be held by all indigenous peoples. However, there are some ideas that are particularly popular among indigenous societies. This makes a lot of sense when you consider the nature of those societies. Primarily, of course, to be indigenous means to be the 'first' peoples of a colonized land. However, indigenous nations and communities often aren't the very first inhabitants of a land. Many of the Native American nations of the Great Plains were not there first but were pushed onto the plains by the conquerors in the East (and in doing so pushed other nations off the plains). Being indigenous, then, is about more than just being 'first'. It is about a connection to the land. Without that connection we would have left our territories long ago, but many of our ancestors consciously stayed and fought their colonizers. In other words, our very identities as indigenous peoples depend on the thoughts and ideas that drive our stubborn devotion to our land.
(A) Indigenous philosophies are an amalgamation of the identities of all the peoples who have inhabited a land, and not just of those who were the 'first'.
(B) The nature of an indigenous society, whose identity is defined by the thoughts and ideas which explain its unwavering attachment to its land, helps understand the idea of indigenous philosophies, which are the most popular beliefs held by indigenous peoples.
(C) It is not indigenous philosophies which define the identity of the corresponding indigenous societies, but the stubbornness with which some societies are devoted to their land.
(D) It is the indigenous philosophy that helps indigenous societies maintain a stubborn devotion to their land, and this devotion, in turn, defines their identities.

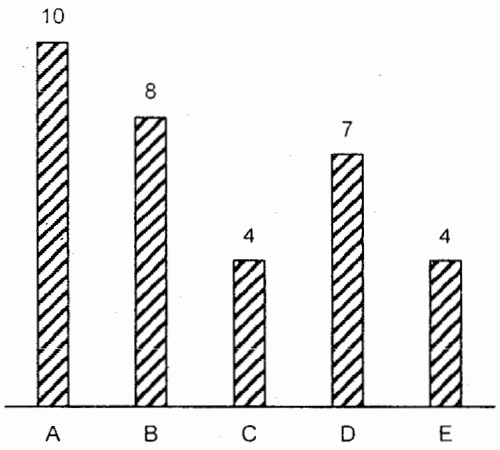
SECTION – II
Number of Questions = 32

DIRECTIONS *for questions 1 to 4*: Answer the questions on the basis of the information given below.

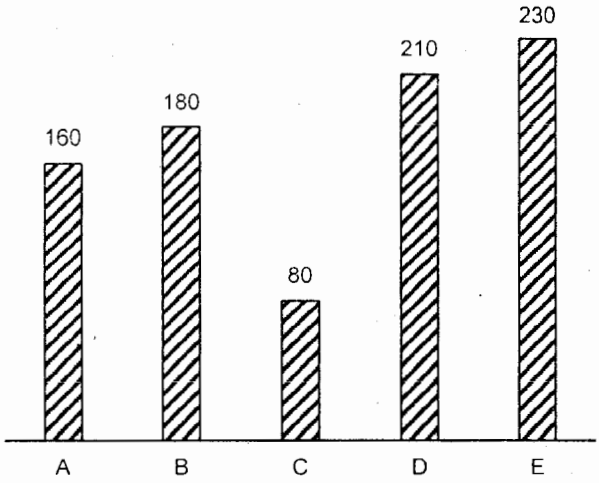
Five companies, A through E, manufacture writing pads. The Total Cost for each company comprises two components – Fixed Cost and Variable Cost.

During a particular month, the number of writing pads manufactured by the five companies, A through E, are in the ratio 2 : 4 : 5 : 7 : 9, respectively. The following bar graphs provide, for each company, the average Fixed Cost incurred per unit manufactured during the month and the Total Variable Cost incurred during the month.

Fixed Cost (in ₹) per Unit



Total Variable Cost (in ₹ '000)



DIRECTIONS *for questions 1 and 2:* Select the correct alternative from the given choices.

1. Among the five companies, for which company is the Total Cost incurred the third highest?
(A) A (B) D (C) E (D) B

2. If E incurred the highest Total Cost across the five companies, what is the maximum number of writing pads manufactured by C?
(A) 7960 (B) 7690 (C) 6790 (D) 6970

DIRECTIONS *for questions 3 and 4:* Type in your answer in the input box provided below the question.

3. If the Variable Cost per unit for one of the five companies is ₹20, what is the maximum number of writing pads manufactured by E?

4. If the difference between the Total Cost per unit for A and for B is ₹37, what is the Total Cost (in ₹) incurred by D?

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

During a summer morning, Hari was observing from his balcony all the vehicles that passed by on the road that ran by his house. He observed that only trucks and cars passed by his house that morning. Everytime a truck passed by his house, he placed a ₹5 coin in a box, which was initially empty, and everytime a car passed by his house, he placed four ₹1 coins in the box.

Hari initially had a total of 85 ₹5 coins and 28 ₹1 coins with him.

If, at any point of time, he did not have enough ₹1 coins to place in the box when a car passed by his house, he placed a ₹5 coin in the box and took a ₹1 coin out from the box.

- After the 10th vehicle passed by his house, there were 27 ₹1 coins and 3 ₹5 coins in the box.
- After the 20th vehicle passed by his house, there were 27 ₹1 coins and 12 ₹5 coins in the box.
- After the 30th vehicle passed by his house, there were 24 ₹1 coins and 22 ₹5 coins in the box.

DIRECTIONS *for questions 5 and 6:* Select the correct alternative from the given choices.

5. What is the maximum number of cars that could have passed by his house before the 6th truck passed by his house?
(A) 7 (B) 10 (C) 13 (D) 16

6. Among the first 30 vehicles that passed by his house, how many were trucks?
(A) 12 (B) 14 (C) 22 (D) 16

DIRECTIONS *for questions 7 and 8:* Type in your answer in the input box provided below the question.

7. After the last vehicle passed by his house, the number of cars and trucks that passed by his house were in the ratio 2 : 1. Further, more than 30 vehicles passed by his house.

What is the minimum number of ₹5 coins in the box after the last vehicle passed by his house?

8. After the last vehicle passed by his house, the number of cars and trucks that passed by his house were in the ratio 2 : 1. Further, more than 30 vehicles passed by his house.

What is the minimum number of ₹5 coins that Hari has left?

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

Rajesh has three different types of cubes:

- 1-unit cubes, i.e., cubes of side 1 unit
- 2-unit cubes, i.e., cubes of side 2 units
- 3-unit cubes, i.e., cubes of side 3 units.

All the 1-unit cubes are painted Blue on all sides; all the 2-unit cubes are painted Red on all sides; all the 3-unit cubes are painted Green on all sides.

He uses these cubes to form cubes of larger sizes. Any cube that he forms does not have any hollow spaces inside the cube.

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

9. If Rajesh made a cube of side 5 units using exactly two different types of cubes, the number of 1-unit cubes that he would have used is at least
(A) 98. (B) 125. (C) 61. (D) 0.

10. If Rajesh made a cube of side n units using exactly one 3-unit cube, such that all the visible faces of the cube of side n units are completely Red, what is the minimum number of cubes that he would have used?
(A) 27 (B) 75 (C) 128 (D) 94

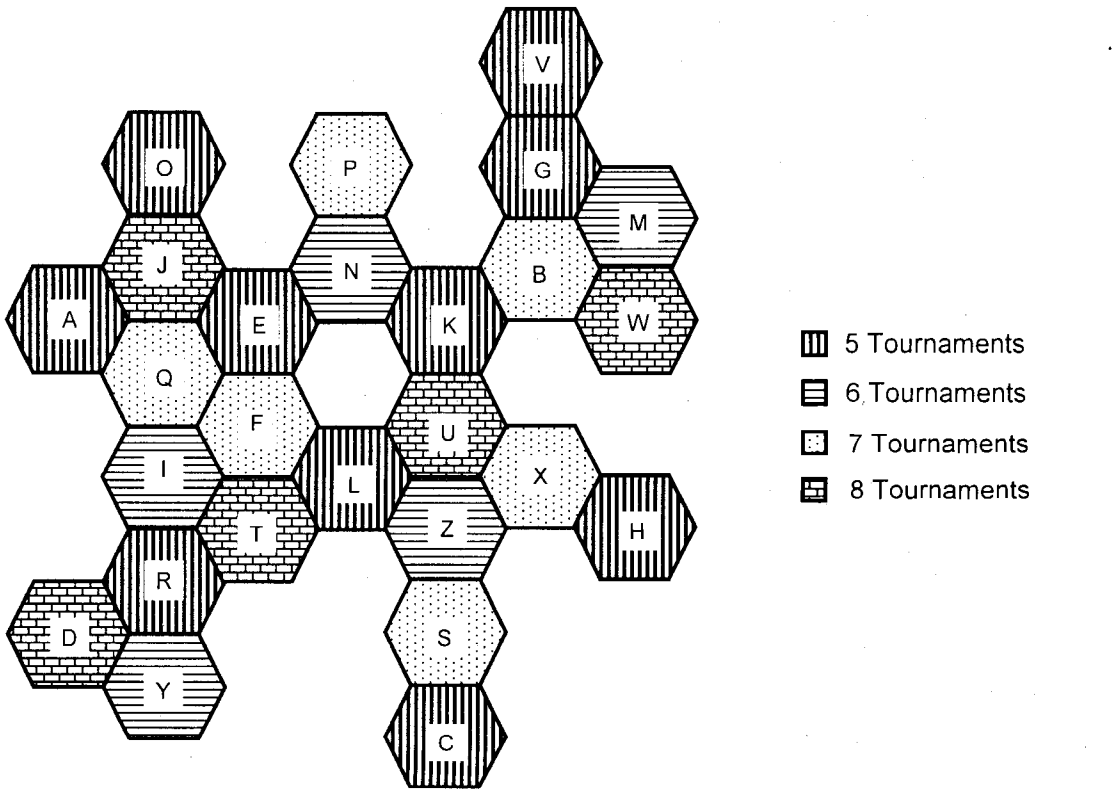
11. If Rajesh made a cube of side n units, where $n \leq 9$, using exactly one 1-unit cube, such that all the visible faces of the cube of side n units are of the same colour, what is the maximum number of 3-unit cubes that he would have used?
(A) 0 (B) 9 (C) 26 (D) 18

12. If Rajesh made a cube of side 9 units such that he used at least one 1-unit cube, at least one 2-unit cube and at least one 3-unit cube, what is the minimum number of cubes that he would have used?
(A) 40 (B) 46 (C) 52 (D) 48

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

During a particular year, 26 tennis players, A through Z, participated in several tennis tournaments. In any tournament, each player participated either as Singles (in which each player plays individually) or as part of a Doubles team (in which two players play as a team), but not both. No player teamed up with the same player in more than one tournament.

In the tile map given below, each hexagonal tile represents a tennis player. Any pair of players played as a Doubles team in a tournament if and only if the pair of hexagons which represent the two players are adjacent to each other (i.e., the two hexagons share a side). Further, the shading of any hexagon represents the number of tournaments that the player participated (either in Singles or as part of Doubles team) during the year. This information is provided in the legend alongside the tile map.



DIRECTIONS *for questions 13 to 16:* Select the correct alternative from the given choices.

13. What is the highest number of tournaments played as Singles by any player during the year?
(A) 4 (B) 7 (C) 6 (D) 5

14. Considering all the Doubles teams that were formed among these 26 players during the year, how many teams had at least one player who did not play more than 6 tournaments during the year?
(A) 29 (B) 31 (C) 33 (D) 35

15. For any player, S_1 represents the set of all players with whom he played as part of Doubles team, during the year. S_2 represents the set of the number of tournaments that each player in S_1 played as Singles.

For which of the following players is the sum of all elements in S_2 the highest?
(A) F (B) U (C) R (D) J

16. For any player, S_1 represents the set of all players with whom he played as part of Doubles team, during the year. S_2 represents the set of the number of tournaments that each player in S_1 played as Singles.

For how many players is the sum of all elements in S_2 less than 5?
(A) 6 (B) 7 (C) 5 (D) 4

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

In an exam hall, exactly 25 chairs were arranged in the form of a 5 × 5 grid, all facing the same direction, to seat the candidates scheduled to appear for a particular exam. The five rows of the grid are labelled Row 1 through Row 5, while the five columns are labelled Column 1 through Column 5.

On the exam day, exactly 15 candidates, A through O, appeared for the exam and occupied 15 chairs, while the rest of the chairs were empty.

The following tables provide the number of chairs that were occupied in each row and in each column of the grid and some of the candidates who were sitting in that row/column:

Row	No. of Chairs Occupied	Candidates
1	3	A, F
2	2	J, O
3	3	D, K
4	4	E, B
5	3	M, N

Column	No. of Chairs Occupied	Candidates
1	2	N, O
2	4	C, G
3	3	A, J
4	3	M, D
5	3	H, I

DIRECTIONS *for question 17:* Select the correct alternative from the given choices.

17. Which of the following chairs is definitely empty?
(A) The chair in Row 5 and Column 2
(B) The chair in Row 4 and Column 4
(C) The chair in Row 3 and Column 3
(D) The chair in Row 1 and Column 2

DIRECTIONS *for questions 18 and 19:* Each of the following questions is followed by two statements, I and II. Assess whether the question can be answered using the information provided in the statements and enter your answer, in the input box provided below the question, as

(1) if the question can be answered using statement I alone but not using statement II alone.
(2) if the question can be answered using statement II alone but not using statement I alone.
(3) if the question can be answered using either statement I or statement II alone.
(4) if the question can be answered using both statement I and statement II together.
(5) if the question cannot be answered even by using both statement I and statement II together.
(6) if the question can be answered using neither statement I nor statement II.

18. In which chair is F sitting?

I. K is sitting in the fifth column.
II. E is sitting in the same column as K.

19. Are B and G sitting in the same row?

I. L is sitting in the same row as H.
II. C is not sitting in the same row as N.

DIRECTIONS *for question 20:* Select the correct alternative from the given choices.

20. How many of the following pairs of persons are definitely not sitting in the same column?

I. B, L II. B, K III. L, E

(A) 0 (B) 1 (C) 2 (D) 3

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

During a particular day, Raghu, the coach of a school basketball team, was asked to select a team comprising exactly six students from nine students, A through I.

(i) One of the nine students approached Raghu and requested Raghu that he would not prefer to be in the team, if B is in the team.
(ii) Later, another student approached Raghu and requested him that he would prefer to be in the team only if A is not in the team.
(iii) Then, a third student approached Raghu and requested him that he would prefer to be in the team only if neither G nor H is in the team.

Raghu, being the coach, is not obliged to satisfy any of the requests made by the students. However, he decided to list some of the possible teams that he can form if he were to satisfy all the three requests and came up with the following possible teams: **ABDFGH**, **BDEFGH**, **CDEFGH**.

DIRECTIONS *for questions 21 and 22:* Select the correct alternative from the given choices.

21. Who was the first student who approached Raghu?
(A) C (B) E
(C) I (D) Either C or I

22. In how many ways can Raghu form the team satisfying all the three conditions?
(A) 3 (B) 4 (C) 6 (D) 8

DIRECTIONS *for questions 23 and 24:* Type in your answer in the input box provided below the question.

23. If Raghu wanted to form a team such that only the requests of the last two students who approached him are satisfied, in how many ways can he form a team?

24. If Raghu wanted to form a team such that only the requests of the first two students who approached him are satisfied, in how many ways can he form a team?

DIRECTIONS *for questions 25 to 28:* Answer the questions on the basis of the information given below.

In a company, there are exactly four departments – Marketing, Strategy, Operations and Finance. Each employee of the company belongs to exactly one department. Further, each employee in any department can have a designation of Analyst, Officer, Manager or Supervisor. In any department, the number of Analysts is greater than that of Officers, which, in turn, is greater than that of Managers, which, in turn, is greater than that of Supervisors. At least one Supervisor is present in each department.

It is also known that

(i) the number of Analysts in Strategy is the same as the number of Officers in Operations.
(ii) the number of Officers in Finance is the same as the number of Managers in Marketing.
(iii) the number of Analysts in Finance is the same as the number of Officers in Strategy.
(iv) the total number of employees in each department is the same.

DIRECTIONS *for questions 25 to 28:* Select the correct alternative from the given choices.

25. What is the minimum number of employees in the company?
(A) 76 (B) 84 (C) 88 (D) 96

26. If the number of employees in the company is the minimum possible, what is the maximum number of Managers in Operations?
(A) 3 (B) 4 (C) 5 (D) 6

27. If the number of Managers in at least two of the four departments is the same, what is the minimum total number of Supervisors in the company?
(A) 4 (B) 10 (C) 8 (D) 7

28. If there are 30 employees in each department, what is the minimum number of Analysts in Finance?
(A) 7 (B) 8 (C) 9 (D) 10

DIRECTIONS *for questions 29 to 32:* Answer the questions on the basis of the information given below.

Six candidates, A through F, participated in a dancing contest in which each candidate was given a score on a scale of 0 to 100 on each of four parameters – Movement, Coordination, Skill and Costume. The following table provides the scores given to each of the six persons in each parameter:

	A	B	C	D	E	F
Movement	67	78	69	81	56	91
Coordination	84	60	72	68	81	84
Skill	92	81	79	61	80	65
Costume	51	72	61	70	84	68

The winner of the contest was decided in the following manner:

(i) For each candidate, the difference between his highest score in any parameter and his lowest score in any parameter is calculated. This is called the Deviation of that candidate.
(ii) For each candidate, the Average Score across the four parameters is calculated.
(iii) For each candidate, the Performance Index of that candidate is calculated by subtracting his Deviation from his Average Score.
(iv) The six candidates are ranked, from 1 to 6, in the descending order of their Performance Index and the candidate ranked first is declared the winner of the contest.

DIRECTIONS *for questions 29 to 32:* Select the correct alternative from the given choices.

29. Which candidate won the competition?
(A) B (B) C (C) D (D) F

30. How many candidates have a Deviation greater than that of the candidate ranked second?
(A) 2 (B) 3 (C) 4 (D) 5

31. For which of the following pairs of candidates is the difference between their Performance Index greater than the difference between their Average Scores?
(A) B and C (B) C and E
(C) D and E (D) E and F

32. For how many candidates is the number of candidates with a Deviation greater than theirs the same as the number of candidates with an Average Score greater than theirs?
(A) 0
(B) 1
(C) 2
(D) More than 2

SECTION – III
Number of Questions = 34

DIRECTIONS *for questions 1 and 2:* Select the correct alternative from the given choices.

1. Under simple interest, if a sum becomes three times itself in eight years, in how many years will it become 30 times itself?
(A) 80 years (B) 96 years
(C) 116 years (D) 120 years

2. For an infinite geometric progression, with common ratio r, if the ratio of the sum to infinite terms to the sum to n terms is approximately 1.1444, which of the following combinations of values can r and n assume?
(A) $r = 0.547, n = 5$
(B) $r = 0.772, n = 8$
(C) $r = 0.697, n = 7$
(D) $r = 0.711, n = 9$

DIRECTIONS *for question 3:* Type in your answer in the input box provided below the question.

3. What is the last digit of $258^{35} + 393^{58}$?

DIRECTIONS *for question 4:* Select the correct alternative from the given choices.

4. An ex-circle of a given triangle is drawn outside the triangle, tangent to one of the sides of the triangle, such that the other two sides, when extended, are also tangent to it. An equilateral triangle of side a is taken and all its three possible ex-circles are drawn. A circle C is then drawn, passing through the centres of all the three ex-circles. If the area of circle C is 9π sq.units, what is the value of a (in units)?

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

DIRECTIONS *for questions 5 to 7:* Type in your answer in the input box provided below the question.

5. In a triangle ABC, if $\frac{\sin B - \sin A}{\sin B + \sin A} = \frac{1}{4}$ and side BC measures 24 cm, find the measure (in cm) of side AC.

6. A student wrote N consecutive natural numbers, starting from 1, on a blackboard and then found their sum. Another student came along and erased the least number on the board and found the sum of the remaining numbers. In this manner students came along and erased the least number on the board, in each case finding the sum of the remaining numbers, until the number left on the board was N. If the average of all the sums found by the students is 188, find N.

7. How many triangles having integer sides (in cm) can be formed with a perimeter of 45 cm?

DIRECTIONS *for questions 8 to 14:* Select the correct alternative from the given choices.

8. A shopkeeper purchases ten watches at a price of ₹2000 each. He later finds out that two of the watches are defective and cannot be sold. What should be the selling price of each watch that he sells, if he is to earn a 15% profit overall?
(A) ₹2,300 (B) ₹2,375
(C) ₹2,875 (D) ₹3,125

9. If the ratio of the ages of two boys, A and B, in 2010 was $\frac{3}{5}$, which of the following can be the ratio of their ages in 2016?
(A) $\frac{12}{19}$ (B) $\frac{13}{23}$ (C) $\frac{4}{7}$ (D) $\frac{9}{17}$

10. Two cylinders have equal height and the difference in their curved surface areas is 440 sq.cm. What is the greatest possible difference in their radii, given that their height (in cm) is a multiple of 5?
(A) 14 cm (B) 7 cm (C) 10 cm (D) 12 cm

11. A tank is one-third full and a drain pipe at the bottom of the tank can empty it in 15 minutes. If water is now pumped into the tank, without closing the drain pipe, at a rate such that the tank is filled in 10 minutes, then find the ratio of the rate at which the water is pumped in and the rate at which the drain empties the tank.
(A) 3 (B) 4 (C) 5 (D) 2

12. Nine mangoes, four apples and six pineapples cost ₹114. If four mangoes, six apples and nine pineapples also cost ₹114, what is the cost of five mangoes?
(A) ₹30 (B) ₹45
(C) ₹40 (D) Cannot be determined

13. PQRS is a rectangle, of area 200 sq units, with length and breadth in the ratio of 2 : 1 (PQ > QR). PQT is a triangle in which PT = QT. If PT cuts SR at L and QT cuts SR at M and the area of triangle SLP is 30 square units, then the length (in units) of the altitude of the triangle PQT, through T, is

(A) $\frac{50}{3}$. (B) 20. (C) $\frac{70}{3}$. (D) 25.

14. Find the area (in sq. units) included between the curve $x^2 + y^2 - 6x - 8y = 0$ and the coordinate axes such that for any point (x, y) within that area, $xy < 0$.
(Take $\pi = \frac{22}{7}$)

(A) 18 (B) 24 (C) $15\frac{2}{7}$ (D) $21\frac{5}{7}$

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

15. If the product of three consecutive natural numbers is $153n$, when n is a natural number, find the minimum possible value of n.

[ ]

DIRECTIONS *for questions 16 and 17:* Select the correct alternative from the given choices.

16. Find the sum of the series

$$S = \frac{6}{1^4 + 1^2 + 1} + \frac{12}{2^4 + 2^2 + 1} + \frac{\quad}{\quad + 3^2 + 1} + \ldots + \frac{162}{27^4 + 27^2 + 1} + \frac{168}{28^4 + 28^2 + 1}.$$

(A) $3\frac{7}{813}$ (B) $\frac{270}{271}$ (C) $3\frac{1}{813}$ (D) $2\frac{250}{813}$

17. Two boys Ajay and Bijay start simultaneously from P towards Q. At the same time another boy, Chatur, started from Q towards P. After Bijay travelled exactly one-third of the distance PQ, both Ajay and Bijay reversed their direction (but maintained their respective speeds) and travelled towards P, while Chatur continued in his initial direction and met Ajay exactly at P. Which of the following ratios can be found using the information given?

I. Ratio of the speeds of Ajay and Bijay
II. Ratio of the speeds of Bijay and Chatur
III. Ratio of the speeds of Chatur and Ajay

(A) Only II (B) Only III
(C) I, II and III (D) None of I, II and III

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

18. There are three sets – A, B and C. The number of elements in $A \cap B \cap C$ is three, whereas the number of elements in $A \cup B \cup C$ is 30. If the number of elements in $A \cap B$, $B \cap C$ and $A \cap C$ are equal and each of A, B and C has 16 elements, find the number of elements in $A \cap B$.

[ ]

DIRECTIONS *for questions 19 to 23:* Select the correct alternative from the given choices.

19. All integers from 1 to 2000 are written on a blackboard. A single operation consists of erasing any two of the integers on the board and then writing their product on the board. After 1998 such operations,
(A) precisely two numbers will be left on the board but their product will depend on the order in which the operations are performed.
(B) precisely two numbers will be left on the board and their product is unique.
(C) only one number will be left on the board and it is unique.
(D) only one number will be left on the board but it will depend upon the order in which the operations are performed.

20. If $a \Psi b = (a - b)(a^3 + b^3)$, then find the value of $(11) \Psi (-11)$.
(A) 0 (B) 2662 (C) – 6655 (D) 58564

21. M and N are two candles cylindrical in shape and of equal length. M burns out completely in six hours, whereas N burns out completely in ten hours. If both the candles are lit simultaneously, after how many minutes will the length of N be three times that of M?
(A) 330 (B) 270 (C) 300 (D) 290

22. Two persons, A and B, are approaching the foot of a tower, from opposite directions, at same speeds. If at a certain point of time, the angles of elevation of the top of the tower as seen by A and B are 60° and 30° respectively, and A took 15 minutes from that moment to reach the foot of the tower, then after how much more time (in minutes) will B do the same?
(A) 15 (B) 30 (C) 45 (D) 60

23. If a number 'x' is chosen at random from the set of integers from 1 to 100, then the probability that $x + \frac{50}{x+1} < 50$ is

(A) $\frac{12}{25}$ (B) $\frac{49}{100}$ (C) $\frac{1}{2}$ (D) $\frac{47}{100}$

DIRECTIONS *for question 24:* Type in your answer in the input box provided below the question.

24. For making an alloy, three metals, lead, zinc and iron, are to be mixed in the ratio of 2 : 3 : 5 respectively. What is the maximum quantity of alloy that can be made with 6 kg lead, 10 kg zinc and 14 kg iron?

[ ] kg

DIRECTIONS *for question 25:* Select the correct alternative from the given choices.

25. In a triangle ABC, let AD, BE and CF be the medians to BC, CA and AB respectively and let G be the point of intersection of the medians. If the quadrilaterals AFGE, BFGD and CDGE are represented as Q_1, Q_2 and Q_3 respectively, then which of the following statements is/are true?

I. If Q_3 is concyclic, then AE $=\sqrt{3}$ GD.
II. If Q_1, Q_2 and Q_3 are all concyclic, then triangle ABC is right-angled.
III. If Q_1, Q_2 and Q_3 are all concyclic, then triangle ABC is equilateral.

(A) I and II only
(B) I and III only
(C) Only III
(D) Only I

DIRECTIONS *for questions 26 and 27:* Type in your answer in the input box provided below the question.

26. A grid of lines comprises 21 equidistant lines parallel to the x axis and 31 equidistant lines parallel to the y axis. A straight line is now drawn from one corner of the grid to the diagonally opposite corner. At how many distinct points does the diagonal line intersect the lines in the grid?

27. How many line segments, each of length 10 units, lie in the co-ordinate plane, such that they are parallel to the x-axis, with both their endpoints satisfying the equation $(4x + 3y - 10)(2x - 6y - 17) = 0$?

DIRECTIONS *for question 28:* Select the correct alternative from the given choices.

28. If $2a_n = a_{n-1} + a_{n+1}$, $a_8 = 46$ and $a_5 = 28$, then which of the following is true?
(A) $a_{11} = 62$ (B) $a_{10} = 58$
(C) $a_9 = 54$ (D) $a_7 = 42$

DIRECTIONS *for question 29:* Type in your answer in the input box provided below the question.

29. If $4x + 3y - 2z = 10$ and x, y and z are distinct positive integers less than 10, what is the maximum value that x can assume?

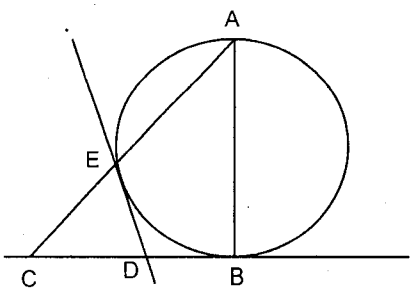
DIRECTIONS *for questions 30 and 31:* Select the correct alternative from the given choices.

30. Find the maximum distance between any two points lying in the area enclosed by the graph of $|y| = 10\sqrt{2} - |x|$.
(A) $5\sqrt{2}$ (B) $10\sqrt{2}$
(C) 20 (D) $20\sqrt{2}$

31. If the LCM of two distinct double-digit numbers, a and b, is divisible by 12, what is the maximum possible value of the product ab?
(A) 9504 (B) 9696
(C) 9732 (D) 9312

DIRECTIONS *for question 32:* Type in your answer in the input box provided below the question.

32. In the figure given below, AB is the diameter of the circle and BC is tangent to the circle. If CA intersects the circle at E and the tangent to the circle at E intersects BC at D, find the measure of ED (in cm), given that BC measures 16 cm.



DIRECTIONS *for questions 33 and 34:* Select the correct alternative from the given choices.

33. In the octal number system, if the ratio of a two-digit number to the number formed by reversing its digits is 4 : 5, find the sum of the two numbers, when expressed in the decimal system.
(A) 77 (B) 63 (C) 81 (D) 55

34. Find the range of x, if $\frac{1}{x-2} > \frac{1}{2x}$.

(A) (0, 2)
(B) (−1, 5)
(C) $(-1, 0) \cup (3, \infty)$
(D) $(-2, 0) \cup (2, \infty)$