

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: VERBAL ABILITY AND READING COMPREHENSION**SUB-SECTION: READING COMPREHENSION****Number of Questions = 24**

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

Perhaps the mass media and the mass audience will prove to be historical anomalies. What we have come to take for granted in the nature of newspapers, television, books, magazines, and their audiences may, in retrospect, come to be seen as curious artefacts of the primitive communications technologies that arose in the early stages of industrialization. The modern nation-state encompasses a socially and culturally diverse citizenry numbering in the tens or hundreds of millions and a productive industrial base whose yearly output, in billions of dollars, is difficult for the human mind to grasp. These are truly mass societies.

But is it possible that the engine of technology will spin out social and political effects anew? Perhaps we shall walk back down the other side of the industrial peak and return to a scale of human organization and communication more natural to participatory democracy. Sometimes the social effects of technological developments are cyclical rather than one-directional in character. That would be something new indeed, a post industrial society that would self-consciously use technology to return to smaller-scale institutions and a renewed commitment to the traditional norms of civic participation.

"Postindustrialism" is a curious term. It posits a grand sweep of history from the agricultural to the industrial and then the post industrial age. The term tells us only that the new era is significantly different from the preceding ones. It lacks a central concept such as agriculture or industry to define its character.

If there is a single concept that is the thrust of postindustrial society, it is, no doubt, the explosion of information. Indeed, the terms "information age" and "communications age" frequently are used interchangeably with "postindustrialism."

Most analyses of postindustrialism have focused on broad trends in employment, manufacturing technologies and structures, and economies. Relatively few have attempted to extrapolate from those trends to understand their impact on political and cultural life.

Among those who have speculated on such matter, most of their predictions have been quite sanguine. Masuda (1980), for example, stresses individualism and the increasing ability of citizens to control their own environments and to find information and education on issues of specialized interest conveniently and inexpensively... It is an intriguing utopian vision, for it would allow the individual to return to the self-reliance and individualism of the small town and villages of the eighteenth century, but with all the technical trappings and material wealth of the twentieth century.

Huntington (1974) is less sanguine. He is concerned that the politics of postindustrial society may strain the capacities of the political institutions that evolved in earlier times. He worries, for example, that "the mass media make it possible for 'magnetic and attractive personalities' to command the attention and mobilize the support of 'millions of unorganized citizens.' On the one hand, the citizen is drawn into politics; on the other, his feeling of impotence and the futility of politics escalate." As in the case of the transition from agricultural life to industrial society, he posits that the changes may occur too fast and in too disconnected a manner for political institutions to adjust. When that happens, just as in the earlier age, each group acts in its own interest with its own weapons. Furthermore, social strata that are in decline and are not integral to the new information economy may, as did the middle class of shopkeepers and small businessmen during the preceding transition, support extremist movements in a desperate attempt to reverse the economic changes. Or new cleavages, such as a standoff between the executive bureaucracy and the media, may lead to political paralysis.

1. According to the passage, which of the following is a difference between the terms "postindustrial age", "agricultural age" and "industrial age"?
 - (A) Postindustrial age lacks a central concept to define its character whereas agricultural and industrial ages are defined by a central concept.
 - (B) Postindustrial age is characterized by an explosion of information whereas agricultural and industrial ages are characterized by an explosion of agricultural and industrial techniques respectively.
 - (C) The term "postindustrialism" does not carry with it any inherent meaning but the terms "agricultural age" and "industrial age" are defined by a central concept.
 - (D) The term "postindustrialism" does not specify the central concept associated with that age whereas the preceding ages were defined by industry and agriculture.

 2. As can be inferred from the passage, what is the difference between industrialization and postindustrialism in the aspect of social impact?
 - (A) Industrialization has facilitated the expansion of society and enabled, in it, high levels of civic participation, whereas postindustrialism may result in a reduction in both the size of social structures and the levels of civic participation.
 - (B) Industrialization along with technological advancements has resulted in the formation of mass societies whereas postindustrialism may result in the resurgence of small towns and villages.
 - (C) Industrialization has not prompted optimum civic participation in society whereas postindustrialism may, with the use of technology, return to smaller social structures where the involvement of individuals could, in comparison, be harmonious.
 - (D) Industrialization has not been conducive to high levels of civic participation by individuals because of mass media and large societies, but postindustrialism may use technology to return to smaller societies where individuals have a chance to influence their society.

 3. According to the passage, which of the following developments does Huntington consider possible?
 - (A) In the age of postindustrialism, people who are not charismatic will not be able to lead people.
 - (B) The political institutions that developed during the industrial age may become obsolete in the postindustrial age.
- DIRECTIONS for questions 7 to 12:** The passage given below is followed by a set of six questions. Choose the best answer to each question.
4. In the postindustrial age, democratic political institutions will not survive and will be replaced by political institutions of other ideologies.
 5. The societies in the postindustrial age will be plagued by frequent extremist movements because of unequal development.

 6. Which of the following regarding postindustrial age is true, according to Masuda?
 - (A) According to Masuda, small towns and villages, similar to those in the eighteenth century, will flourish in the postindustrial age.
 - (B) Masuda predicts that small towns and villages will have abundance of technology and material wealth in the postindustrial age.
 - (C) According to Masuda, the postindustrial age will be marked by the self-reliance and individualism similar to the small towns and villages of the eighteenth century.
 - (D) Masuda predicts that individuals in the twentieth century will be able to inexpensively modify the information.

 7. According to Huntington, extremist movements
 - (A) may be supported by the middle class of shopkeepers and small businessmen who would want to reverse the economic changes.
 - (B) can stem from any group since the information age equips each group with its own weapons.
 - (C) may be supported by those whose relevance has diminished in the information age.
 - (D) may be supported either by the executive bureaucracy or by the media.

 8. Which of the following can be inferred from the statement "Sometimes the social effects of technological developments are cyclical rather than one-directional in character"?
 - (A) Earlier societal forms and traditions could enjoy a resurgence.
 - (B) The size of societies in the postindustrial age will most likely be larger than that in the industrial age.
 - (C) The role of mass media in the postindustrial age will not be as important as it was during the industrial age.
 - (D) The institutions in the postindustrial society could be vastly dissimilar to the institutions present in the age prior to the industrial age.

DIRECTIONS for questions 7 to 12: The passage given below is followed by a set of six questions. Choose the best answer to each question.

Few historical problems have received such unfortunate treatment at the hands of historians as that of the art of war in the Middle Ages. This arises from several causes. In particular, it is not easy to be deeply versed in the military problems of the period and at the same time to possess considerable knowledge of medieval historical writing, with its peculiar problems of historical criticism. This difficulty can be easily highlighted through a brief survey of the literature on the subject of medieval warfare. More than one army officer has devoted his spare time to the study of military life in bygone ages, but this has yielded few tangible results for the history of the Middle ages. Since their profession has given them no preparation in historical method, most of these military writers have not penetrated to the root of the specialized problem which arises. A notable example is that of H. Delpech, whose voluminous work *La tactique au XIIe siècle*,

published in 1886, was the result of eleven years of research. He tried to show that the armies of the thirteenth century based their operations on carefully thought-out tactics. These tactics were simple, to be sure, like the weapons of the time, but were quite logical and compatible with the means of warfare then available. Delpech amassed an enormous amount of material, for he studied accounts of the battles of the eleventh, twelfth, thirteenth and early fourteenth centuries, but lacked that historical background and critical faculty which are indispensable to study the art of medieval warfare. He accepted all estimates of the number of troops at their face value, just as they appear in the sources. He described battles without carefully sifting accounts of them, and texts from the period itself were often neglected in favour of later versions. Misled by exaggerated estimates of army strengths, he concluded that tactics were further advanced than they actually were. His work has been completely discredited by historians.

Delpech lacked the indispensable grounding in history and his work was much too imaginative. Other great works were, however, not written by officers but by trained historians: Sir Charles Oman, Hans Delbrück, Wilhelm Erben and Ferdinand Lot.

Sir Charles Oman, author of many works on general and military history, also wrote a book on the medieval art of war... His work is interesting, partly on account of his very full descriptions of battles, and also because he discussed English military affairs in great detail. But Oman was too facile. He did not get to the essentials of combat tactics, and his work lacks both synthesis and critical insight.

Perhaps the greatest master in the history of warfare is Hans Delbrück, a Berlin professor whose *Geschichte der Kriegskunst im Rahmen der politischen Geschichte* has been considered definitive. Delbrück studied military problems in the work of Carl von Clausewitz, the best theoretician on the conduct of war. He wrote a biography of Gneisenau, one of the most brilliant adversaries of Napoleon... He divided military history into periods in which there were tactical units, and periods in which these units were replaced by individual fighters. A tactical unit is a battle formation in which such discipline prevails that the individuals obey the orders of their commander as one. According to Delbrück, medieval knights of the twelfth and thirteenth centuries did not form tactical units. They were individual fighters, who put their personal honour, fame and reputation above all else. Thus the individual fighter was the basis of tactics at that time; combat formations were of less importance and by no means essential, and the theory of any real 'art of war' was excluded.

7. According to the passage, what is the primary reason for the "unfortunate treatment" of the art of medieval warfare at the hands of historians?
 - (A) Not many people are acquainted with the military problems of the Middle Ages.
 - (B) Military officers usually do not have sufficient time to study the art of war in medieval times.
 - (C) The historical records of wars that occurred in the mediaeval times usually exaggerate the military prowess of the time.
 - (D) It is not easy for a person to be able to critically analyse medieval historical writings as well as be well versed with the military problems of that period.
 8. Which of the following is a shortcoming of most military writers of medieval warfare, according to the author?
 - (A) Military writers hardly get any time to dig through volumes of data available on the subject of medieval warfare.
 - (B) Military writers are often unable to critically analyse in depth the available historical writings on medieval warfare.
 - (C) Military writers consider all historical writings to be true and cannot segregate exaggerations from facts.
 - (D) Military writers may not have time to write comprehensive volumes on history.
 9. Which of the following is not mentioned in the passage as a shortcoming on the part of Delpech in his work "*La tactique au XIIe siècle*"?
 - (A) Delpech, being a military writer, lacked the historical background required for studying medieval warfare.
 - (B) Delpech considered later versions of depictions of battles to be more reliable than the earlier versions.
- (C) Delpech did not crosscheck the facts present in the sources.
(D) Instead of analysing historical writings without any preconceptions, Delpech formed a hypothesis first and then set out to prove it right using historical writings on medieval warfare.
10. Which of the following statements is true regarding the Delbrück's and Delpech's analyses of medieval warfare?
 - (A) While Delbrück concluded that individual fighters were the basis of tactics in warfare during thirteenth century, Delpech believed that the tactics depended on the means of warfare available at the time.
 - (B) While Delbrück studied art of medieval warfare by analysing the life of Gneisenau, Delpech, in his work, discussed English military affairs in great detail.
 - (C) Both Delbrück and Delpech were misled by the exaggerated accounts of medieval warfare.
 - (D) While Delpech believed that the tactics of warfare in the medieval times were consistent with the available weapons of that time, Delbrück did not.
 11. As can be inferred from the passage, which of the following would be an appropriate theory of the 'art of war'?
 - (A) Such a theory would take into account the strengths and weaknesses of individuals while formulating battle strategies.
 - (B) Such a theory would involve tactical units and their formations in the battlefield.
 - (C) In such a theory, individuals who put personal glory above all else would be accorded special status as compared to other tactical units.
 - (D) Such a theory would involve tactical units whose commanders put personal honour, fame and reputation above all else.

12. Who among the following is not considered a trained historian in the passage?
(A) Sir Charles Oman
(C) Carl von Clausewitz
(B) Wilhelm Erben
(D) Ferdinand Lot

DIRECTIONS for questions 13 to 15: The passage given below is followed by a set of three questions. Choose the best answer to each question.

Cultural property, or patrimony, laws limit the transfer of cultural property outside the source country's territory, including outright export prohibitions and national ownership laws. Most art historians, archaeologists, museum officials and policymakers portray cultural property laws in general as invaluable tools for counteracting the ugly legacy of Western cultural imperialism.

During the late 19th and early 20th century – an era former Met director Thomas Hoving called "the age of piracy" – American and European art museums acquired antiquities by hook or by crook, from grave robbers or souvenir collectors, bounty from digs and ancient sites in impoverished but art-rich source countries. Patrimony laws were intended to protect future archaeological discoveries against Western imperialist designs. But as it turns out, those laws may not be an unalloyed good. In country after country, empirical data show that when rigid cultural property laws are put in place, major archaeological excavations and discoveries slow markedly, making source countries – and the world at large – culturally poorer.

I surveyed 90 countries with one or more archaeological sites on UNESCO's World Heritage Site list, and my study shows that in most cases the number of discovered sites diminishes sharply after a country passes a cultural property law. There are 222 archaeological sites listed for those 90 countries. When you look into the history of the sites, you see that all but 21 were discovered before the passage of cultural property laws.

Many variables may cause a drop-off in archaeological discoveries country by country, but statistically speaking, it's nearly impossible that the decline shown in the data isn't also related to the passage of cultural property laws.

Strict cultural patrimony laws are popular in most countries. But the downside may be that they reduce incentives for foreign governments, nongovernmental organizations and educational institutions to invest in overseas exploration because their efforts will not necessarily be rewarded by opportunities to hold, display and study what is uncovered. To the extent that source countries can fund their own archaeological projects, artifacts and sites may still be discovered. But the drop in World Heritage Site discoveries after passage of cultural property laws suggests that external sources aren't as active as they were and domestic funding isn't offsetting the loss.

The survey has far-reaching implications. It suggests that source countries, particularly in the developing world, should narrow their cultural property laws so that they can reap the benefits of new archaeological discoveries, which typically increase tourism and enhance cultural pride. This does not mean these nations should abolish restrictions on foreign excavation and foreign claims to artifacts.

13. Which of the following, if true, would most weaken the author's claim that the decline in archaeological discoveries is due to the passage of cultural property laws?
(A) Cultural property laws are present only in the developed countries.
(B) Cultural property laws in most of the countries came into existence only recently.
(C) Cultural property laws are beneficial to the local archaeologists but not to foreign ones.
(D) Cultural property laws prohibit foreign ownership of cultural artefacts.
14. Which of the following can be understood to be a reason for the decline in archaeological discoveries in the source countries after the passage of cultural patrimony laws?
(A) Most of the archaeological sites in the source countries were already discovered by the time the cultural patrimony laws were passed.
15. What is the primary purpose for most of the countries to pass cultural patrimony laws?
(A) To hasten the discovery of archaeological sites.
(B) To increase the funds available for financing archaeological excavations.
(C) To prevent prospective archaeological discoveries from leaving the country.
(D) To increase tourism and enhance national pride.

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

The worldwide Jewish population reached a peak of 16.7 million prior to World War II, but approximately 6 million Jews were systematically murdered during the Holocaust. Since then the population has slowly risen again, and as of 2015 was estimated at 14.3 million by the Berman Jewish Data Bank, or less than 0.2% of the total world population (roughly one in every 514 people). According to the report, about 43% of all Jews reside in Israel (6.2 million), and 40% in the United States (5.7 million), with most of the remainder living in Europe (1.4 million) and Canada (0.4 million). These numbers include all those who self-identified as Jews in a socio-demographic study or were identified as such by a respondent in the same household. The exact world Jewish population, however, is difficult to measure. In addition to issues with census methodology, disputes among proponents of secular, political, and ancestral identification factors regarding who is a Jew may affect the figure considerably depending on the source.

Israel is the only country with a consistently growing Jewish population due to natural population increase, though the Jewish populations of other countries in Europe and North America have recently increased due to immigration. In the diaspora, in almost every country, the Jewish population in general is either declining or steady, but Orthodox and Haredi Jewish communities, whose members often shun birth control for religious reasons, have experienced rapid population growth, with rates near 4% per year for Haredi Jews in Israel and similar rates in other countries.

Orthodox and Conservative Judaism discourage proselytization to non-Jews, but many Jewish groups have tried to reach out to the **assimilated** Jewish communities of the diaspora in order to increase the number of Jews. Additionally, while in principle Reform Judaism favours seeking new members for the faith, this position has not translated into active proselytism, instead taking the form of an effort to reach out to non-Jewish spouses of intermarried couples. There is also a trend of Orthodox movements pursuing secular Jews in order to give them a stronger Jewish identity so there is less chance of intermarriage. As a result of the efforts of these and other Jewish groups over the past twenty-five years, there has been a trend of secular Jews becoming more religiously observant, known as the Baal Teshuva movement, though the demographic implications of the trend are unknown. Additionally, there is also a growing movement of Jews by Choice by gentiles who make the decision to head in the direction of becoming Jews.

16. According to the passage, what is the main reason for an increase in the Jewish population in Europe and North America?
 - (A) Natural factors
 - (B) Better living conditions
 - (C) Immigration
 - (D) Intermarriage
17. How do the reformist Jews seek new members into the Jewish community?
 - (A) By approaching non-Jewish people married to Jews.
 - (B) By creating an influence on the non-Jews across the globe.
 - (C) By promising monetary gains to those converting to Judaism.
 - (D) All of the above.
18. Which of the following can be understood from the passage?
 - (A) Traditional Jews are against the idea of birth control because of unawareness regarding the birth control measures.
 - (B) Orthodox Jews want secular Jews to gain a stronger identity to reduce intermarriages in the Jewish community.
 - (C) Orthodox Jews want secular Jews to gain a stronger identity to make themselves strict observants of their religion.
 - (D) The word 'assimilated' in the context of the passage can be replaced by the word 'non-practising'.

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

Cancer biologists have long hoped to discover a single step that determines whether cells become cancerous. By targeting drugs at that step, physicians would be able to stop a cell from becoming cancerous just as a switchman stops a train from going down the wrong track. It turns out that a gene called p53 – a useless mutant form of which luckless families have passed from parent to child – may be that switch.

Not bad for a gene that first broke on the scene in a bad case of mistaken identity. In 1979, biologists discovered the protein (p53) that the p53 gene makes and in 1982, they isolated the p53 gene. But it seemed to cause, rather than suppress, cancer. Few researchers were interested in yet another of those oncogenes. It was not until 1989 that biologists separately discovered p53's true colours: it was a tumour killer. Some 2000 biologists dropped the date they brought to the dance and latched onto the new area of research. "Our interest converged on p53's ability (to suppress cancer) like no other molecule", recalls an oncologist who showed how rogue molecules can prevent p53 from performing its good deeds.

p53 acts as the cell's director of damage control. A healthy cell keeps a small number of p53 proteins around, continuously degrading them and replenishing the supply. But if carcinogens damage a cell's DNA and sets it on the path to cancer, the cell switches into high alert. If everything is working right, something signals the p53 to stop degrading "and tells it that it is time to be active", says molecular biologist Carol Pives of Columbia University. "The p53 supply builds up, p53 starts acting like an office clerk who, discovering a typo in an original document that is about to be copied, turns off the copier until he can fix the typo. p53 turns off the cell's copying machinery and stops the progression of cell cycle until the cell can repair its damaged DNA. p53 floats toward the cell's genes and slips into a specific stretch of DNA triggering expression of genes which make proteins that directly inhibit growth of the cell. The tumour-to-be is stopped dead. p53 also activates the transcription of proteins involved in DNA repair. Sometimes p53 acts more like a clerk so disgusted with the many typos that he just trashes the document: p53 activates the cell's suicide software, resulting in apoptosis (programmed cell death)."

Except when it doesn't. Even good genes can go bad, and most often, the p53 gene goes bad by undergoing a mutation, typically a spelling mistake. One of the 2362 chemical 'letters' (designated A, T, G and C) that make up the p53 gene changes into another letter. The p53 protein that the gene makes is garbled too. And proteins are not very forgiving of errors. A single wrong letter in a crucial part of the p53 gene produces a protein with a wrong molecule; the protein is now not able to suppress tumours.

The Li-Fraumeni families inherit their p53 mutations. If the sperm or egg from which a baby grew held a mutant p53, then every single cell in her body will also harbour a mutant copy. In theory, inheriting only one mutant p53 gene, from one parent, should not be a problem as long as the child inherits a healthy p53 gene from the other parent. The healthy copy should make enough p53 to keep tumours at bay. But p53 doesn't work that way.

First of all, each cell with one bad p53 gene is only one mutation away from completely lacking the function of this critical gene. That mutation can occur when the cell makes a spelling mistake as it copies its gene before dividing into two cells. Then the cell has lost its primary defense against cancer. A single mutant gene is enough to leave a cell with no healthy tumour-quashing p53. And just one out-of-control cell can give rise to deadly tumour.

But even a cell whose healthy p53 gene stays that way can be in trouble. The p53 proteins made by the genes, both good and bad, get together in groups of four to form a sinuous ribbon-like complex. If the mutant gene is churning out mutant proteins, then each four-ribbon tangle likely has a mutant among its strands. That is enough to keep the p53 ribbon from doing its job.

19. What does the author wish to imply when he says "It turns out that a gene called p53 may be that switch." (para 1)?
 - (A) If p53 is healthy and doing its job, it keeps the cell on the track of normalcy but if the p53 gene is absent, damaged or tied up by other molecules, the cell goes down the track towards cancer.
 - (B) The gene p53 is more an alternative cause of cancer than an alternative cure for cancer; p53 probably has more preventive powers in certain scenarios rather than curative powers.
 - (C) p53 does not really suggest any ways of treating cancer: this depends on pure luck.
 - (D) The mutant form of p53 keeps cancer away while the normal allele could result in a cell becoming cancerous.

20. When the author says "Some 2000 biologists dropped the date they brought to the dance" (para 2), "the date" most likely refers to
 - (A) The year 1989 when the character of p53 as a tumour suppressor gene was revealed, and when the perception among biologists that p53 is an oncogene was trashed.
 - (B) The previous research subject of the biologists, namely: the ability of p53 to kill tumours.
 - (C) The contemporary research subject of the biologists, namely: the ability of rogue molecules to prevent p53 from suppressing cancer.
 - (D) The erstwhile area of research interest of the biologists.

21. According to one biologist, the p53 gene is analogous to an office clerk, in all of the following aspects EXCEPT?
 - (A) p53 suspends the advancement of cell cycle, preventing replication of damaged DNA.
 - (B) During the growth arrest in a cell, p53 may activate the transcription of proteins involved in DNA repair.
 - (C) Just like an office clerk who is prone to committing typing errors, the p53 gene makes a garbled protein due to a spelling mistake in one of its chemical letters.
 - (D) If the situation is beyond redemption, p53 goes into the mode of obliteration of the cell.

22. The style of the above passage is
 - (A) argumentative (B) descriptive
 - (C) analytical (D) abstruse

23. According to the passage, which of the following is true about the Li-Fraumeni syndrome?
 - (A) Any cell with one bad p53 gene, could lose its defence against cancer with just one wrong mutation, since the bad p53 gene could destroy the good p53 gene.
 - (B) One single mutant gene inherited either from the sperm or the egg is insufficient to increase the risk of developing cancer.
 - (C) The good p53 gene cannot countervail the effects of a mutant p53 gene and it probably will be destroyed or be rendered ineffective by the latter.
 - (D) A mistake in one copy of a p53 gene can be "cancelled out" when there is no mistake in the other copy of the same gene.

24. With reference to the 'spelling mistake' or 'mutant p53 gene' as discussed in the passage, all of the following statements can be understood EXCEPT?
- A healthy p53 gene may not be able to offset the negative effects of the mutant p53 gene.
 - A healthy p53 gene can be useless if faced with or is surrounded by even a single mutant p53 gene.
 - A faulty p53 mutation – "a spelling mistake" – prevents the good p53 gene from performing its function i.e. halting tumour growth.
 - A mutated p53 gene may or may not produce a p53 protein with a wrong molecule and may or may not strip the cell of its defence against cancer.

SUB-SECTION: VERBAL ABILITY

Number of Questions = 10

DIRECTIONS for questions 1 to 5: The five sentences (labelled 1, 2, 3, 4 and 5) given in the following question, when properly sequenced, form a coherent paragraph. Decide on the proper order for the sentences and key in this sequence of five numbers as your answer.

- (1) Innate immunity also causes the common signs of inflammation including swelling, pain, heat and redness.
- (2) The immune system consists of two interrelated parts: innate immunity and adaptive immunity.
- (3) The adaptive response requires time and this is the reason that it can take a week (of illness) before an infection is cleared.
- (4) Innate immunity is the first line of defence and rapidly responds to invaders entering the body.
- (5) If the innate response fails to control an infection, the invaders are handled by adaptive immunity.

- (1) They boarded the ships and threw the chests of tea into Boston Harbour.
- (2) The British government responded harshly and the episode escalated into the American Revolution.
- (3) The Boston Tea Party was a political protest by the Sons of Liberty in Boston, on December 16, 1773.
- (4) The Tea Party has become an iconic event of American history, and other political protests such as the Tea Party movement after 2010 explicitly refer to it.
- (5) The demonstrators, in defiance of the Tea Act of May 10, 1773, destroyed an entire shipment of tea sent by the East India Company.

- (1) Inuit art refers to artwork produced by the Inuits, that is, the people of the Arctic previously known as the Eskimos.
- (2) But the establishment of southern markets for Inuit art in 1945 changed that.
- (3) The southern markets now claim to have the largest collection of contemporary Inuit art in the world.
- (4) Prints and figurative works carved in relatively soft stone such as soapstone, serpentinite, or argillite have also become popular.
- (5) Historically their preferred medium of artwork was walrus ivory.

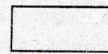
- (1) However, when we actually look closely at how deeply and widely music permeates our lives we might think differently.
- (2) Even the word "entertainment" ('hold together') might reclaim its essential meaning as something which is integral to our being.
- (3) And when we consider exactly how it functions, how we are moved by its power, it becomes obvious that music is not merely constructed in keys but it may well hold the key to our existence.
- (4) In the contemporary developed world, music is often considered a pastime or "mere" entertainment.
- (5) To regard it as 'central' rather than 'peripheral' might seem alien.

- (1) Due to this 'fearful' rule, upto a quarter of the population of Cambodia were murdered.
- (2) Despite controversy about the scale of the lethal violence due to the policies of the organization, we now find ample evidence to situate the proximate causes of mass murder, terror and ethnic purity in the Khmer Rouge-controlled state, Democratic Kampuchea (DK).
- (3) To make a long story short, our thesis is that DK, realized by the secret organization and opaque instrument of the Communist Party of Kampuchea (CPK) known as Angkar, set about the complete decivilization of Cambodia.
- (4) Besides murder, other hallmarks of the organization included terror, autarky, collectivisation, ethnic purity, and deliberate isolation.
- (5) For nearly four years, from April 1975 to January 1979, Angkar, the "organization" ruled Cambodia by fear.

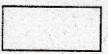
DIRECTIONS for questions 6 and 7: In the following question, there are sentences or fragments of sentences that form a paragraph. Identify the sentence(s) or fragments of sentence(s) that is/ are **correct** in terms of grammar and usage, including spelling, punctuation and logical consistency. Enter 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.]

- (1) In the little boutique book haven Hay-on-Wye, the annual Hay Festival nudges the idyllic Welsh market town into life.

- (2) The literature fest, famously dubbed 'Woodstock of the Mind' by Bill Clinton, is not just for the well-read, but the well-heeled.
- (3) Set in the stunning back-drop of Brecon Beacons National Park, the festival line-up this year included Salman Rushdie, Germaine Greer,
- (4) Joanne Harris and other erudite, intellectual giants. The festival celebrated the legacy of two of
- (5) the world's more intellectual writers, Cervantes and Shakespeare, on their 400th death anniversary.



7. (1) Work is one of societies most important institutions. It is the main mechanism through which spending power is allocated.
- (2) Yet work is a lesser generous, and lesser certain, provider of these benefits than it was once.
- (3) Since 2000 economic growth across the developed and developing worlds have failed to generate decent pay increases for most workers.
- (4) Now there is growing fear of a more fundamental threat to a world of work: the possibility that new technologies,
- (5) from machine learning to driverless cars, will cause havoc to employment.



DIRECTIONS for questions 8 to 10: Four alternative summaries are given below the text. Choose the option that best captures the essence of the text.

8. Because we have by now so deeply internalized writing, made it so much a part of ourselves, we find it difficult to consider writing to be a technology as we commonly assume printing and the computer to be. Yet writing (and especially alphabetic writing) is a technology, calling for the use of tools and other equipment: styls or brushes or pens, carefully prepared surfaces such as paper, animal skins, strips of wood, as well as inks or paints, and much more. Writing is, in a way, the most drastic of the three technologies. It initiated what print and computers only continue, the reduction of dynamic sound to quiescent space, the separation of the word from the living present, where alone spoken words can exist.
- (A) Writing is so commonplace nowadays that we don't realize that it is a technology like printing and computers, as they all require tools and specialized equipment.
- (B) Because we have internalized writing, we do not realize it is a technology like printing and computers, and uses its own tools. Writing is the most extreme of these, as it originated the changing of dynamic spoken sounds to static written words.
- (C) Writing is a technology, just like printing and computers, as it requires the use of tools and other equipment. But because we have internalized writing, we fail to realize that it is the most drastic of the three, as it started what the other two only continue.

- (D) Writing first turned living sound into inert space, thus initiating a drastic new technology, whose process printing and modern computers only continue, though we normally do not realize this, as we have deeply internalized writing.

9. There is a continuing tension between those who espouse growth and those who call for environment protection. When pushed, a growth protagonist will say "there must be a proper balance between environment and GDP growth". When pushed, an environmentalist will say "there must be balance between GDP growth and environment". Notice the slight shift in the sequence in the two statements. The first implies that a fetish is being made of the environment but in the final analysis a balance must indeed be struck. The second implies that a fetish is being made of economic growth but in the final analysis a balance must indeed be struck. Balance, therefore, is the key. Both sides will agree on the importance of faster economic growth and the need to factor in ecological concerns in the fast growth process. The problem lies when you go beyond "balance" as a general philosophical concept and try and give it some operational meaning. When hard choices need to be made about large projects that are considered central to economic growth, but are detrimental to the environment. Therefore every project must meet clearly defined, consistent and objective criteria, designed to safeguard the environment, before it is sanctioned.

(A) The growing conflict between proponents of economic growth and environmental activists can be resolved only by taking the middle-path and ensuring that large projects with environmental impacts fulfil clearly defined norms to safeguard the environment.

(B) There has to be a trade-off between economic growth and environmental protection, given the fact both economic growth and the environment are equally important to the future of the country. Both sides will never give in completely to the other's demand and hence the only way out is the middle path.

(C) Owing to our increased growth aspirations as well as the growing size of the environmental community, the conflict between the latter and those pursuing faster economic growth has been increasing. The conflict between the pro-growth and pro-environment camps stem from their inability to look at leaving their respective positions and exploring the possibility of chalking out a middle path that pursues economic growth but not at the expense of the environment.

(D) The author argues for a more nuanced, objective and consistent approach in dealing with economic and environmental problems in the hope that it will reduce the growing divide between people in the growth camp and those in the environment camp.

10. Once confined to fantasy and science fiction, time travel is now simply an engineering problem. Physicists schooled in Newton's laws believed that time moved along a straight, steady course, like a speeding arrow. Then came Einstein in the early 1900s. His equations showed that time is more like

a river. The more mass or energy you possess, the more the current around you varies. By moving at high velocity, for instance, you can make time slow down, and when you come to a stop, you'll be younger than if you'd remained at rest. Thus, a speedy spacecraft makes a fairly basic time machine.

- (A) Newton believed that time travel was impossible whereas Einstein advocated the possibility of designing a time machine.
- (B) Newton believed that time was like an arrow with a straight and steady course whereas

Einstein believed that the river of time could be diverted into a whirlpool.

- (C) Newton believed that by moving at high velocity one could beat the pace of time, whereas Einstein propounded the mass vs the flow of time theory.
- (D) Newtonian laws advocated that time was like a speeding arrow with a steady course, whereas Einstein's equations showed that time was like a river that, to a body in the current, varies with changing velocity.

SECTION II: DATA INTERPRETATION AND LOGICAL REASONING

SUB-SECTION: DATA INTERPRETATION

Number of Questions = 16

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

At the beginning of the year, Venky, a restaurant owner, installed, at the entrance to his restaurant, a gadget which counts the number of people who visit the restaurant. At the end of each day, the gadget displays the number of people who visited the restaurant during the day and the average number of people who visited the restaurant per day for the last five days (including that day). The following table presents the data displayed by the gadget at the end of the day for a few days between March 5th and March 20th:

Date	Number of people who visited	Average Number of people in the last five days
March 5 th	31	32.0
March 6 th	20	31.0
March 8 th	44	31.4
March 10 th	30	29.6
March 13 th	18	22.0
March 15 th	36	18.8
March 18 th	42	36.2
March 20 th	44	38.0

Further, it is also known that the number of people who visited the restaurant on March 7th is half the number of people who visited the restaurant on March 9th. Assume that no person visited the restaurant more than once during the above period.

DIRECTIONS for question 1: Type in your answer in the input box provided below the question.

1. How many people visited the restaurant on March 9th?

DIRECTIONS for question 2: Select the correct alternative from the given choices.

2. If the number of people who visited the restaurant on March 11th is less than that on March 14th, then which of the following can be the number of people who visited the restaurant on March 12th?
 - (A) 11
 - (B) 25
 - (C) 35
 - (D) 45

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

3. How many people visited the restaurant from March 1st to March 20th?

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

4. Which of the following statements is definitely false?
 - (A) The lowest number of people visited the restaurant on March 11th.
 - (B) The lowest number of people visited the restaurant on March 12th.
 - (C) The highest number of people visited the restaurant on March 17th.
 - (D) The highest number of people visited the restaurant on March 4th.

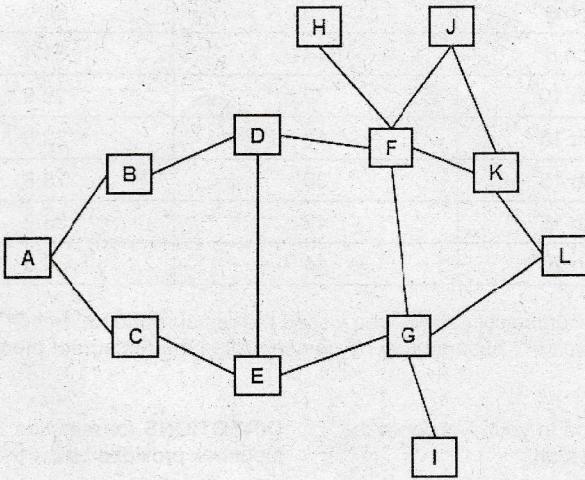
DIRECTIONS for questions 5 to 8: Answer these questions on the basis of the information given below.

In a city, there are twelve communication towers – A through L – each of which can be used for sending, receiving and relaying messages. Each tower has a unique two-digit identification number, called the Tower ID (TID). A message can be sent from any source tower to any destination tower by relaying it through other towers, using only the routes indicated in the network diagram below. When a message reaches its destination tower, it is not relayed any further. Each message contains information about the tower from which it originated and all the towers through which it was relayed. This information is present in the form of a string of numbers which is a concatenation of the TIDs of the source tower and all the relay towers, in that order, such that the leftmost TID represents the source tower and the rightmost TID represents the last relay tower from which the message was sent to the final destination tower.

For example, if tower J sends a message to tower L through tower K, the message, once it is received at tower L, will have the string of numbers in the form of < TID of J > < TID of K >.

Amar, an operator at tower L, received six messages numbered 1 to 6 during a particular week. While Amar had the TID strings for each message, he was not aware of the TIDs of the eleven towers (A through K). The table below gives the concatenated string of numbers for each message that he received:

Message Number	TID String
1	19 47 76 12
2	47 76 84 12
3	53 28 76 12
4	12 76 28
5	31 76 47 64 28
6	61 59 64 28 76 84 12



DIRECTIONS for question 5: Type in your answer in the input box provided below the question.

5. What is the TID of tower F?

DIRECTIONS for questions 6 to 8: Select the correct alternative from the given choices.

6. Which of the following towers relayed the maximum number of messages?
 (A) Tower J (B) Tower C
 (C) Tower G (D) Tower E

7. If a message has to be sent from the tower with TID 59 to the tower with TID 76, what is the minimum number of towers through which the message must be relayed?
 (A) 0 (B) 1
 (C) 2 (D) 3

8. Which of the following messages originated at Tower B?
 (A) Message Number 1
 (B) Message Number 6
 (C) Message Number 5
 (D) Message Number 3

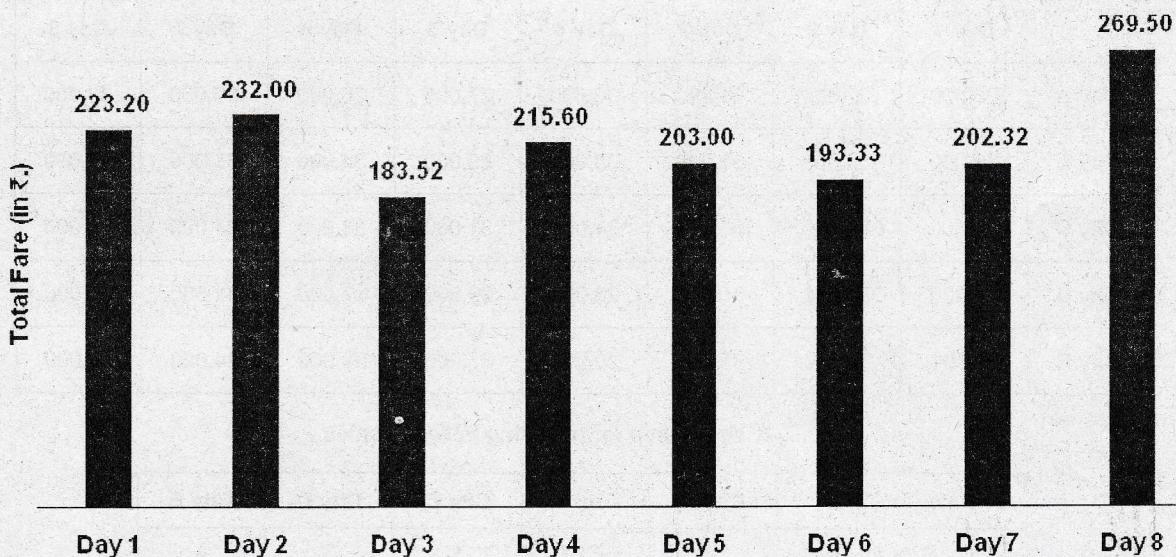
DIRECTIONS for questions 9 to 12: Answer these questions on the basis of the information given below.

Ravi uses a cab service, Hello Cabs, to travel to his office every day. However, he uses any one of the three available routes, each of a different distance, for travelling to his office on any day.

The total fare that Hello Cabs charges for any trip comprises two components:

- Distance Fare: Calculated as a per kilometer fare multiplied with the total distance travelled in the trip
- Duration Fare: Calculated as a per minute fare multiplied with the total duration of the trip – the per minute fare charged by Hello Cabs is ₹2 per minute.

The following bar graph presents the total fare (in ₹) that Hello Cabs charged Ravi on eight different days and the table presents the average speeds (in kmph) of the cab during Ravi's trip to office on each day:



Day	Average Speed (in kmph)
Day 1	15
Day 2	20
Day 3	25
Day 4	30
Day 5	30
Day 6	36
Day 7	19
Day 8	16

DIRECTIONS for question 9: Type in your answer in the input box provided below the question.

9. What is the per kilometer fare (in ₹) charged by Hello Cabs?

DIRECTIONS for questions 10 to 12: Select the correct alternative from the given choices.

10. What was the duration of Ravi's trip to his office on Day 5?
(A) 29 minutes
(B) 31 minutes
(C) 30 minutes 21 seconds
(D) 30 minutes 45 seconds

11. On which of the following days was the duration of Ravi's trip to his office the highest?
 (A) Day 1 (B) Day 2
 (C) Day 7 (D) Day 8
12. On how many days did Ravi travel along the longest of the three available routes to his office?
 (A) 1 (B) 2
 (C) 3 (D) 4

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

Ravi, a trader in silver, buys and sells silver from merchants across five different cities. The price of silver is not necessarily the same across the five cities on any particular day and Ravi travels between the five cities to buy and sell silver. However, it takes a few days to travel between any two cities. The first table (Table-1) gives the selling price (the price at which the merchants sell) of silver in different cities on eight consecutive days and the second table (Table-2) gives the time taken by Ravi to travel between any two cities:

Table-1: Price of Silver (₹/kg)

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8
City A	28,000	32,000	34,500	36,000	27,000	25,000	29,000	33,000
City B	33,000	32,000	31,000	36,000	29,000	34,000	31,000	27,000
City C	31,000	36,000	36,500	34,000	31,000	33,000	34,000	31,000
City D	30,000	32,000	31,500	28,000	29,500	37,000	34,500	33,000
City E	34,500	33,000	31,000	29,000	27,000	25,000	24,000	30,000

Table-2: Time taken for travelling between cities

Time (in Days)	City A	City B	City C	City D	City E
City A	-	3	1	3	4
City B	3	-	5	4	1
City C	1	5	-	2	2
City D	3	4	2	-	1
City E	4	1	2	1	-

Note: If Ravi started in City A on Day 1, he would reach City B after 3 days, i.e., on Day 4.

Further, it is also known that

- (i) on Day 1, Ravi was in City A and he did not have any silver with him at the beginning of the day.
- (ii) Ravi need not necessarily buy or sell silver in any city that he is in, but he can buy and sell silver in the same city, if he chooses to do so.
- (iii) Ravi can have a maximum of 10 kg of silver with him at any time and he can stay in any city for any number of days.
- (iv) on any day, the price at which the merchants in a city buy back the silver from Ravi is 10% less than the selling price of silver in that city on that day.
- (v) the cost of travelling between any two cities and the cost of staying in any city are negligible.

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

13. If Ravi purchased 10 kg of silver in City A on Day 2, what is the maximum profit that he could have made in selling this silver?
 (A) ₹15,000 (B) ₹13,000
 (C) ₹9,000 (D) ₹4,000

14. If Ravi purchased and sold silver exactly once during the eight days, what is the maximum profit percentage that Ravi could have achieved?

- (A) 22.4%
- (B) 23.75%
- (C) 24.2%
- (D) 25.7%

15. If Ravi travelled using the route ACDEB during the eight days, what is the maximum profit he could have made?
 (A) ₹1,00,000 (B) ₹1,10,500
 (C) ₹92,500 (D) ₹90,000
16. If Ravi visited each of the five cities exactly once during the eight days, what is the maximum profit that he could have made?
 (A) ₹1,00,000 (B) ₹92,500
 (C) ₹1,07,000 (D) ₹1,10,500

SUB-SECTION: LOGICAL REASONING

Number of Questions = 16

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

Tarun, the HR manager of Rivet Inc., visited five colleges – College A through College E – and conducted campus interviews in all the five colleges. Tarun selected fifteen students across all the five colleges. In each college, he interviewed students from five branches – Electronics, Electrical, Computer Science, Mechanical and Civil. Tarun selected at least two students from each branch across all the colleges and he selected at least two students from each college. The following information is known about the number of students he selected:

- (i) Tarun selected five students from College B.
- (ii) Tarun selected six students from Computer Science, of which two were from College B and the remaining four were all from a single college.
- (iii) There were two branches, such that all the students selected in that branch were from a single college.
- (iv) Tarun selected only two students from College A and only three students from Electronics.
- (v) The number of students that Tarun selected from College C was twice the number of students that he selected from College D.
- (vi) In each of College D and College E, he selected at least one student each from Mechanical and Civil.

DIRECTIONS for questions 1 to 3: Type in your answer in the input box provided below the question.

1. In how many colleges did Tarun select exactly two students?

2. How many Electronics students did Tarun select from College B?

3. For how many colleges were the students selected from that college all from a single branch?

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

4. In which college did Tarun select the second highest number of students?
 (A) College B
 (B) College E
 (C) College D
 (D) College C

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

During a particular week, five photographers visited a studio to print photos of the events that they had covered. Each photographer visited the studio on a different day between Monday and Friday and each photographer printed a different number of photos among 10, 20, 30, 40 and 50. Further, each photographer covered a different event among a Birthday, a Conference, a Convocation, an Inauguration and a Wedding. The following information is also known:

- (i) Tarun visited the studio two days after the photographer who covered the Wedding visited the studio.
- (ii) The five photographers who visited the studio, in no particular order, were:
 - the photographer named Pavan
 - the photographer who visited the studio on Monday
 - the photographer who covered the Birthday
 - the photographer who printed 20 photos
 - the photographer who visited the studio on Tuesday
- (iii) The photographer who printed 50 photos did not cover the Birthday.
- (iv) Ratan, who did not cover the Inauguration, printed 10 photos more than the photographer who visited the studio on Friday.
- (v) Harsh, who covered the convocation, visited the studio after the photographer who covered the Birthday.
- (vi) Pranav, who did not visit the studio on Monday, printed 10 photos, while the photographer who visited the studio on Thursday printed 40 photos.

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

5. Who among the following visited the studio on Tuesday?
 (A) Pranav (B) Harsh
 (C) Ratan (D) Tarun
6. How many photos were printed by the photographer who covered the Inauguration?
 (A) 10 (B) 20 (C) 40 (D) 50
7. The photographer who printed the minimum number of photos visited the studio on

 (A) Monday. (B) Tuesday.
 (C) Wednesday. (D) Friday.
8. Which of the following statements are true?
 (A) Pavan visited the studio on Thursday.
 (B) Ratan covered the Conference.
 (C) Tarun visited the studio on Friday.
 (D) Pranav visited the studio on Monday.

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

Each of five friends – Ankur, Jai, Manish, Naveen and Piyush – has a certain number of marbles with him. The number of marbles with each person is a distinct prime number. Further, each of the five friends is either a truth teller, who always speaks the truth, or a liar, who always lies, or an alternator, who alternates between telling the truth and a lie, in any order. It is known that exactly one of Ankur, Jai and Manish, is a truth teller, and each of them made three statements regarding the number of marbles that the five of them have.

Jai: *Piyush has three marbles.
I have two marbles more than Naveen.
Each of us has less than twenty marbles.*

Ankur: *The number of marbles that I have is not nineteen.
The difference between the number of marbles that Piyush has and the number of marbles that Manish has is eleven.
The lowest number of marbles with any person is 23.*

Manish: *The total number of marbles with the five of us is 53.
Naveen has eleven marbles.
Ankur has the highest number of marbles among the five of us.*

DIRECTIONS for question 9: Select the correct alternative from the given choices.

9. Who among Ankur, Jai and Manish is the truth teller?
(A) Ankur
(B) Jai
(C) Manish
(D) Either Jai or Manish

DIRECTIONS for question 10: Type in your answer in the input box provided below the question.

10. How many marbles does Piyush have?

DIRECTIONS for questions 11 and 12: Select the correct alternative from the given choices.

11. How many persons among the five have less than ten marbles?
(A) 0 (B) 2 (C) 3 (D) 4
12. Who among the five persons has the third highest number of marbles?
(A) Ankur (B) Jai
(C) Manish (D) Naveen

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

The Premier of Xanadu travelled to three different countries – Abyssinia, Bulgaria, and Cambodia – and met three delegates in each country – the President, the

Prime Minister, and the Foreign Minister. Further, the Premier visited each country only once and met all the three delegates in the country before leaving for any other country. The Premier started his trip on March 1st and was back in Xanadu by March 24th, meeting not more than one delegate on any day. It takes one day to travel between Xanadu and any of the three countries. Further, it takes two days to travel between Abyssinia and Bulgaria, one day to travel between Bulgaria and Cambodia, and two days to travel between Abyssinia and Cambodia. The Premier met each delegate for exactly one day, unless specified otherwise in the information given below.

The following information is also known about the Premier's trip to the three countries:

- (i) The Premier did not meet any of the delegates on any of the four Sundays that fell during the trip and the Premier did not meet the President of any country on a Monday or a Thursday or a Friday.
- (ii) The Premier spent at least seven days in Cambodia and met the President of Cambodia for two consecutive days.
- (iii) The Premier met the Prime Minister of Abyssinia on a Saturday.
- (iv) The Prime Minister of Bulgaria was not available for any meeting on or after March 9th.
- (v) The Foreign Minister of Abyssinia could meet the Premier only from March 9th to March 16th and the Premier met him for three consecutive days.
- (vi) The President of Abyssinia was available only after March 13th.
- (vii) The Premier wanted to meet the Prime Minister, the President, and the Foreign Minister of Bulgaria, in that order, on three consecutive days.

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

13. On which of the following days was the Premier definitely travelling?
(A) March 5th (B) March 20th
(C) March 11th (D) March 18th
14. Which country's President did the Premier meet on a Wednesday?
(A) Abyssinia
(B) Bulgaria
(C) Cambodia
(D) Cannot be determined
15. On which of the following days did the Premier definitely meet the Foreign Minister of Abyssinia?
(A) March 9th (B) March 11th
(C) March 13th (D) March 15th
16. In which of the following countries did the Premier meet the country's Prime Minister after meeting the country's President?
(A) Abyssinia
(B) Cambodia
(C) Bulgaria
(D) More than one of the above

SECTION III: QUANTITATIVE ABILITY
Number of Questions = 34

DIRECTIONS for question 1: Type in your answer in the input box provided below the question.

1. The vertical distance covered by a body falling freely under gravity is directly proportional to the square of the time for which it falls. If a body covers 300 m in the first 10 seconds of its free fall, what is the distance (in m) covered by the body in the next 10 seconds of its fall?

DIRECTIONS for question 2: Select the correct alternative from the given choices.

2. If a , b and c are non-zero real numbers, such that $8^a = 12^b = 18^c$, which of the following is true regarding a , b and c ?
 - (A) b is the arithmetic mean of a and c .
 - (B) b is the geometric mean of a and c .
 - (C) b is the harmonic mean of a and c .
 - (D) None of the above

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

3. There are V liters of milk in a beaker, out of which 12 litres of milk are replaced with water. This process of replacing 12 litres of the contents from the beaker with water is repeated two more times. If the final ratio of milk and water in the beaker is 27 : 98, find the value of V .

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

4. In a triangle, ABC, rightangled at B, E and F are points on AC, such that E is the midpoint of AC, while BF is perpendicular to AC. If $\frac{BF}{AE} = \frac{24}{25}$, find

$$\frac{AB}{BC} + \frac{BC}{AB}$$

$$(A) 2\frac{1}{24}$$

$$(B) 3$$

$$(C) 2\frac{1}{12}$$

$$(D) 2\frac{4}{15}$$

DIRECTIONS for question 5: Type in your answer in the input box provided below the question.

5. In how many ways can you arrange the letters of the word LUCIFER, if no two vowels should be together?

DIRECTIONS for question 6: Select the correct alternative from the given choices.

6. Find the minimum value of $\frac{16x^2 \sin^2 x + 9}{x \sin x}$, for $0 < x < \pi$.
 - (A) 25
 - (B) 24
 - (C) 17
 - (D) None of the above

15. P is a prime number, which is also a factor of 240. If P is a two-digit number, then find the maximum value of P.

(A) 71
(B) 83
(C) 97
(D) None of the above

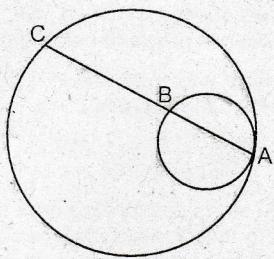
16. If $a \Psi b = (a - b)(a^3 + b^3)$, then find the value of $(11) \Psi (-11)$.

(A) 0
(B) 2662
(C) -6655
(D) 58564

17. In the figure below, the smaller circle touches the larger circle, internally, at the point A, and AB is a chord of the smaller circle, drawn such that the area of the larger segment formed is three times that of the smaller segment. If AB, when extended,

intersects the larger circle at C, such that $\frac{AB}{BC} = \frac{1}{2}$,

what fraction of the area of the outer circle is not included in the inner circle?



- (A) $\frac{3}{4}$ (B) $\frac{2}{3}$
(C) $\frac{8}{9}$ (D) $\frac{7}{8}$

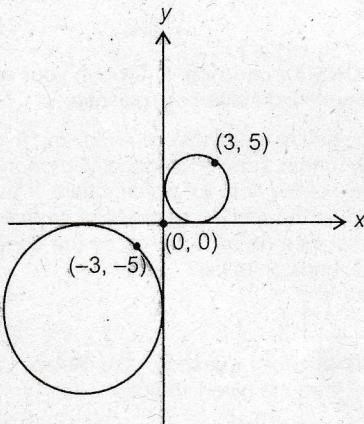
18. A young princess was walking in a garden full of flowers of five different varieties – Jasmynes, Tulips, Daffodils, Lilies and Roses. In how many ways can she pick 12 flowers for her grandmother?

(A) 5^{12}
(B) 12^5
(C) 792
(D) 1820

19. 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

20. Find the sum of the radii of the two circles in the figure given below.



- (A) $2\sqrt{34}$ (B) 14.
(C) 16. (D) None of the above

21. If the roots of the quadratic equation $x^2 + bx + c = 0$ are consecutive even integers, then find the value of its discriminant.

(A) 1
(B) 4
(C) 16
(D) Cannot be determined

22. Two of the angles in an acute-angled triangle are in the ratio 4 : 7. If all three angles (in degrees) of the triangle are integers, then the difference between any two of the three angles is at most

(A) 45°.
(B) 30°.
(C) 36°.
(D) None of the above

DIRECTIONS for question 23: Type in your answer in the input box provided below the question.

23. For how many integral values of x will $f(x) = |x - 1| + |x - 2| + |x - 3| + |x - 4|$ assume a minimum value?

DIRECTIONS for questions 24 to 26: Select the correct alternative from the given choices.

24. Sumanta said to Tamal, "When I was half as old as you are today, you were one-sixth as old as I am now". If Sumanta is eight years older than Tamal, what is the sum of their present ages?

(A) 48 (B) 64
(C) 60 (D) 56

25. The cost of 11 pencils and 11 erasers is ₹99. Mukesh has ₹33 with him, which is exactly sufficient to purchase three pencils and five erasers. However, he wants to purchase five pencils and three erasers for his daughter. How much extra money would Mukesh require?

(A) ₹6 (B) ₹12
(C) ₹24 (D) ₹39

26. The provisions for a garrison of 240 men are sufficient to last for exactly 120 days. If after the first 40 days, a re-enforcement of 60 men joins the garrison and every person decreases his daily consumption by 20%, for how many days more or less than the scheduled time will the provisions last?

(A) 10 days less
(B) 12 days more
(C) 40 days more
(D) None of the above

DIRECTIONS for question 27: Type in your answer in the input box provided below the question.

27. If an article is sold at $\frac{P}{2}\%$ ($P \neq 0$) discount, a profit

of $\frac{P}{2}\%$ is realized, but if it is sold at $P\%$ discount, a

loss of $\frac{P}{4}\%$ is incurred. If the article is sold at $\frac{P}{4}\%$ discount, then the percentage of profit or loss made on the article is

%.

DIRECTIONS for questions 28 and 29: Select the correct alternative from the given choices.

28. If in an infinite geometric progression, the sum of the squares of all the terms equals twice the square of the sum of all the terms, then find the common ratio of the progression.

(A) $-\frac{1}{3}$ (B) $-\frac{1}{2}$
(C) 1 (D) $\frac{1}{2}$

29. If $2a + 3b + 6c = 66$, where a , b and c are positive real numbers, find the maximum value of $a^6 b^2 c^3$.

(A) $2^{15} \times 3^{12}$ (B) $2^{10} \times 3^8 \times 11^3$
(C) $2^{12} \times 3^{14}$ (D) $2^{10} \times 3^{15}$

DIRECTIONS for questions 30 and 31: Type in your answer in the input box provided below the question.

30. Find the area (in sq. units) of the region enclosed by the graph of $|3x| + |4y| \leq 12$ and $x \leq 0$.

31. In a triangle ABC, medians AD and BE are perpendicular to each other. If the length of the median AD is 8 cm and the area of the triangle is 144 sq. cm, find the length (in cm) of the median BE.

DIRECTIONS for question 32: Select the correct alternative from the given choices.

32. If $x \in \mathbb{R} - \{-1, -3\}$, and $y = \frac{x+2}{(x+1)(x+3)}$, find the range of y .

(A) $[0, 3]$ (B) $[-2, 5]$
(C) $\left[\frac{1}{3}, \infty\right)$ (D) $(-\infty, \infty)$

DIRECTIONS for questions 33 and 34: Type in your answer in the input box provided below the question.

33. If $f(x) + f(3-x) = 20$, find the value of $f\left(\frac{1}{10}\right) + f\left(\frac{2}{10}\right) + \dots + f\left(\frac{29}{10}\right)$.

34. If a and b are positive integers, such that $3^{b+2} - 5^a = 604$ and $3^{a+1} + 5^b = 706$, then find the sum $a+b$.