NITIE FULL LENGTH TEST

Instructions

1. DO NOT OPEN THE SEAL OF THIS BOOKLET. WAIT FOR THE SIGNAL TO START.
2. This booklet contains 44 pages including the blank ones. Immediately after opening the booklet, verify that all pages are printed properly.
3. Keep only the Admit Card, pencil eraser and sharpener with you. DO NOT keep with you books, rulers, slide rules, drawing instruments, calculators (including watch calculators), pagers, cellular phones, or any other device. These should be left outside the room.
4. This paper has 300 questions. The total time for the test is 150 minutes.
5. The paper is divided into five sections.
   - Section-I : 60 Questions
   - Section-II : 60 Questions
   - Section-III : 75 Questions
   - Section-IV : 75 Questions
   - Section-V : 30 Questions
6. Direction for answering the questions are given in the test booklet before each group of questions to which they apply. Read these directions carefully and answer the questions by darkening the appropriate ovals.
7. Wrong answers carry negative marks. There is only one correct answer for each question.
8. Do the rough work on the test booklet only and NOT on the answer sheet or any other paper.
9. Follow the instructions of the invigilator. Candidates found violating the instructions will be disqualified.
10. At the end of the test, remain seated. Do not leave the hall till the invigilator announces, "You may leave now." The invigilator will make the announcement only after collecting the test booklets and answer sheets from everyone in the room.

ANY CANDIDATE GIVING/SEEKING/RECEIVING ASSISTANCE OR FOUND COPYING WILL BE IMMEDIATELY DISQUALIFIED.

Section – I

1. This person is known as the 'Light of Asia' and whose birth place was in controversy recently. Identify him from the given options.
   a. Mahavira b. Buddha c. Confucius d. Prophet Mohammed

2. The battle of Plassey (1757) was fought between
   a. Robert Clive and Mir Jafar
   b. Robert Clive and Siraj-ud-Daula
   c. Admiral Watson and Siraj-ud-Daula
   d. Admiral Watson and Mir Qasim

3. ___ formula was to retain maximum unity between Hindus and Muslims but to divide India.
   a. Lord Wavell's
   b. Lord Curzon's
   c. Lord Mountbatten's
   d. Lord Lawrence's

4. The Constitution of India is regarded as
   a. Federal
   b. Unitary
   c. Federal in form and parliamentary in spirit
   d. Federal in form and unitary in spirit.

5. Who was the constitutional advisor to the drafting committee of the Constituent Assembly of India?
   a. B.N. Rao
   b. Dr. Sachidananda
   c. Dr. B.R. Ambedkar
   d. Dr. Rajendra Prasad

6. 'Winter Monsoon' is also known as
   a. South-West Monsoon
   b. South-East Monsoon
   c. North-West Monsoon
   d. North-East Monsoon

7. The 'asteroid belt' is mainly located between the planets
   a. Mars and Jupiter
   b. Jupiter and Saturn
   c. Mercury and Venus
   d. Venus and Mars

8. The 49th parallel separates
   a. North and South Korea
   b. Germany and France
   c. India and Palestine
   d. USA and Canada

9. 'Autumn Equinox' occurs on
   a. September 11 b. September 22 c. October 11 d. October 22

10. Sirocco, Solano, Bora and Harmattan are the names of
    a. mountains b. winds c. rivers d. cyclones

11. Which one of the following manufacturers in India takes pride in claiming itself to be the 'Wheels of the Nation'?
    a. MRF Tyres b. Apollo Tyres c. JK Tyres d. Ceat Tyres

12. FTV, the famous fashion channel is owned by
    a. Dolce and Gabana
    b. Michael Adams
    c. Yves Saint Laurent
    d. Giorgio Armani

13. Dettol is a brand of ___.
    a. Nicholas Piramal
    b. Reckitt-Beneckiser
    c. Johnson & Johnson
    d. Dey's Medical

14. 'Making Sense of it All' is the punchline associated with which of the following international news channel?
    a. CNN World
    b. Fox News
    c. BBC World
    d. Star News

15. Name the offshore from where Reliance Industries discovered natural gas recently.
    a. Cambay offshore
    b. Cauvery offshore
    c. Krishna-Godavari offshore
    d. Mahanadi offshore

16. The creator of the most selling toy in the world, who died recently is ___.
    a. Vernon L. Smith
    b. Ruth Handler
    c. Charles Schulz
    d. Ron Howard

17. 'Thorpedo', is the nickname of ___.
    a. Graham Thorpe
    b. James Thorpe
    c. Ian Thorpe
    d. Peter Thorpe

18. Which of the following works does not belong to Salman Rushdie?
    a. *The Riot*
    b. *Steps Across This Line*
    c. *Midnight's Children*
    d. *The Fury*

19. Imre Kertesz, who won the Nobel Prize for literature in 2002, belongs to ___.
    a. Portugal
    b. Hungary
    c. Germany
    d. Turkey

20. 'Hezbollah' is a militant outfit belonging to which of the following countries?
    a. Palestine
    b. Lebanon
    c. Syria
    d. Jordan

21. Newly appointed chairman and chief executive officer of the bankrupt WorldCom Inc.is
    a. Bernie Ebbers
    b. Michael Capellas
    c. John T. Chambers
    d. John Sidgmore

22. East Timor before its invasion by Indonesia in 1975, was a colony of
    a. France
    b. UK
    c. Portugal
    d. Holland

23. Booker Prize for 2002 has been won by Yann Martel for his work titled
    a. *Family Matters*
    b. *Fingersmith*
    c. *Dirt Music*
    d. *Life of Pie*

24. 2006 FIFA World Cup Football tournament is scheduled to be held at
    a. Brazil
    b. Spain
    c. Germany
    d. Argentina

25. 2008 Olympic Games is scheduled to be held at
a. Berlin b. Athens c. Beijing d. Paris

26. The most densely populated country in the world is
a. Mongolia b. Monaco c. Morocco d. Mozambique

27. The largest spoken language after Mandarin is
a. English b. Hindi c. Spanish d. Bangla

28. The UN recognises ____ languages as its official working languages.
a. 4 b. 5 c. 6 d. 7

29. Hundred and ninety first member of the United Nations is
a. Switzerland b. East Timor c. Tuvalu d. Nauru

30. According to the latest list of *Fortune*, the richest person below 40 years of age is
a. Mikhail Khodorkovsky b. Ernesto Bertarelli
c. Wang Yuso d. M.A. Aramburuzabala

31. Find the odd one out.
a. Oslo b. Vienna c. Madrid d. Ottawa

32. September 11 (known as the dark day in the history of USA because of those terrorist attacks)has recently been declared by the President George Bush as the ____ in the honour of those killed.
a. Black Day b. Martyres Day c. Patriot Day d. Peace Day

33. Jimmy Carter won the Nobel Peace Prize for 2002 recently. He was the key person behind the famous Camp David Accord that was signed between
a. Israel and Palestine b. Egypt and Palestine
c. Israel and Egypt d. Israel and Labenon

34. This country is known as the 'Land of Thousand Lakes' and is the host country to the cellular giant Nokia. Which country are we concerned here with?
a. Norway b. Austria c. Portugal d. Finland

35. French revolution began in which of the following years?
a. 1546 b. 1678 c.1789 d. 1884

36. Nike — the international shoe giant — is basically a greek term which means
a. Goddess of youth b. God of love c. Goddess of victory d. God of war

37. Romano Prodi is the president of
a. IOC b. European Commission
c. FIFA d. OPEC

38. The mascot of 14th Asian Games concluded recently, was named
a. Dubya b. Duria c. Ato d. Nik

39. The capital of Saudi Arabia is
a. Abu Dhabi b. Riyadh c. Dubai d. Doha

40. This person is described as the Tiger Woods of Management by Warren Buffett in one of the famous books. We are talking about
a. Jack Welch b. Philip Kotler c. C.K.Prahalad d. Peter Drucker

41. 'Tripitaka', is a sacred text of
a. Jainism b. Buddhism c. Hinduism d. Shintoism

42. *Empire Falls* is the winner of the Pulitzer Prize 2002 for fictional writing.This book is written by
a. Richard Russo b. Louis Menand c. David McCullough d. Carl Dennis

43. *A Beautiful Mind* — the winner of Oscar Award for the best movie 2002 — has been directed by
a. Robert Altman b. Peter Jackson c. David Lynch d. Ron Howard

44. Joseph S. Blatter is the present president of
a. International Hockey Federation (IHF)
b. International Olympic Committee (IOC)
c. Federation International de Football Association (FIFA)
d. International Cricket Council (ICC)

45. The first summit of the World Social Forum was held at
a. USA b. South Africa c. Brazil d. Australia

46. United Nations chief weapons inspector in Iraq presently is
a. Mohamed ElBaradei b. Frank Rich
c. Hans Blix d. Robert D. Blackwill

47. The cosmonaut to have the first spacewalk is
a. Neil Armstrong b.Yuri Gagarin c. John Glenn d. A. A. Leonov

48. World Ozone Day is celeberated on
a. June 5 b. July 11 c. August 27 d. September 16

49. According to the latest list of *Fortune*, the top ranking company in the world is
a. Exxon Mobile b. Wal-Mart Stores c. General Electric d. General Motors

50. Time magazine's man of the year 2002, wrote which of the following books?
a. *Step Across the Line* b. *One Last Mirror*
c. *Leadership* d. *Unless*

51. Who is credited with the invention of e-mail?
a. Andy Grove b. Ray Tomlison c. Craig Barrett d.Vinton G. Cerf

52. How many countries are members of European Union at present?
a. 10 b. 12 c.15 d. 20

53. The world record in 100 m race is held by
a. Maurice Green b. Ato Bolden c. Tim Montgomery d. Buch Reynolds

54. In 2002 Serena Williams did not win which of the following tennis tournaments?
a. French Open b. US Open c. Wimbledon d. Australian Open

55. The present Miss Universe 2002 belongs to
a. Russia b. Panama c. Greece d. France

56. 'Maoris' are the inhabitants of
a. Australia b. New Zealand c.Tanzania d. India

57. The famous 'Boston Tea Party' took place in which of the following years?
a. 1724 b. 1748 c. 1773 d. 1785

58. *Ulysses*, adjudged as the novel of the century, is a work of
a. James Joyce b. Ernest Hemingway
c. Somerset Maugham d. Pearl Buck

59. The headquarters of Food and Agricultural Organisation (FAO) is located in of the following countries and it was in news recently due to the eruption of a volcano there. Identify the country.
a. France b. Switzerland c. Italy d. USA

60. The fastest revolving planet in the solar system is
a. Venus b. Mercury c. Mars d. Earth

Section – II

Direction for questions 61 to 65 : Each question below consists of a word, followed by four words, choose the word that is most nearly same in meaning to the word in the question. Since some of the questions require you to distinguish fine shades of meaning, be sure to consider all the choices before deciding which one is best.

61. Floundering
a. Bumper b. Crazy c. Failing d. Touching

62. Embroiled
a. Tense b. Involved c. Alternating d. Attacked

63. Riveting
a. Burst b. Spilling c. Standstill d. Exciting

64. Stellar
a. Excellent b. Keen c. Savoury d. Bitter

65. Skulduggery
a. Unaffected b. Candid c. Deception d. Disappointing

Direction for questions 66 to 70 : Each question below consists of a word, followed by four words. Choose the word that is most nearly opposite in meaning to the words in the question. Since some of the questions require you to distinguish fine shades of meaning, be sure to consider all the choices before deciding which one is best.

66. Striking
a. Soften b. Compel c. Relevant d. Plain

67. Demystify
a. Dialect b. Humorous c. Cloud d. Obvious

68. Preposterous
a. Healthy b. Reasonable c. Brouhaha d. Reaction

69. Somnolent
a. Perky b. Novel c. Offensive d. Taboo

70. Plaintive
a. Established b. Irritating c. Gay d. Boudoir

Direction for questions 71 to 80 : In each of the following questions, a related pair of words is followed by four pairs of words. Select the pair that best expresses a relationship similar to that expressed in the original pair.

71. Histrionic : Theatre
    a. Dramatic : Dais
    b. Harmonic : Orchestra
    c. Forensic : Court
    d. Olden : Drama

72. Captious : Tolerant
    a. Notorious : Renowned
    b. Copious : Plentiful
    c. Homogenous : Similar
    d. Fastidious : Squeamish

73. Employee : Wages
    a. Scholar : Books
    b. Worker : Jobs
    c. Composer : Symphony
    d. Entrepreneur : Profits

74. Thesis : Propositions
    a. Composition : Paragraphs
    b. Encyclopedia : Premises
    c. Dissertation : Ideas
    d. Painting : Creative

75. Dissolute : Continent
    a. Distrait : Contrite
    b. Amoral : Mainland
    c. Resolute : Chaste
    d. Immoral : Restrained

76. Estranged : Aloof
    a. Ceasefire : Aggressive
    b. Reconciled : Friendly
    c. Unscathed : Virile
    d. Nuance : Indirect

77. Epiphany : Festival
    a. Furious : Indiscreet
    b. Belated : Disastrous
    c. Dirge : Song
    d. Belch : Stifle

78. Surety : Guarantor
    a. Insurance : Underwriter
    b. Seditious : Rebellion
    c. Genocide : Mass
    d. Lucre : Money

79. Sallow : Yellow
    a. Clouds : Steam
    b. Beleaguered : Opposition
    c. Ash : Quantity
    d. Ruddy : Red

80. Warren : Maze
    a. Belfry : Capital
    b. Circuitous : Indirect
    c. Tower : Bell
    d. Euphoria : Unpleasant

Direction for questions 81 to 90: In each of the following sentences, a part of the sentence is left unfinished. Beneath each sentence, four different ways of completing the sentence are indicated. Choose the best alternative from among the four.

81. Although alcoholism has long been regarded as a personality disorder, there is evidence to suggest that alcoholics are often the children of alcoholics and that they are born with a ____ the disease.
a. predisposition for b. liability for c. respect for d. declivity for

82. I want smiles through ____, bittersweet memories of ____ and the chance to offer some last bits of wisdom.
a. brilliance … reminiscence b. tears … the past
c. commitment … pragmatism d. competence … intention

83. In the outpouring of grief from Diana's supporters, the royal family found itself caught in a startling rip of public ____.
a. approval b. immorality c. favour d. rancour

84. Neither patience nor the silent, steely-eyed ____ Heather had learned to deploy with such ____ effect made any impression on Jean.
a. displeasure … withering b. pleasure … extract
c. fair … broadminded d. confusion … linguistic

85. One of the oddities of black-rhino behaviour is that their ____ in the wild can be offset by a ____ in captivity.
a. beauty … amazement b. breathtaking … delight
c. scenery … strength d. fierceness … calmness

86. Researchers ____ that we need diet and exercise to drop kilos.
a. apologize b. stress c. wish d. pull

87. Even a ____ step forward can help people regain confidence and convince themselves they can make even ____ changes.
a. small … bigger b. large … small c. tiny … giant d. microbe … macro

88. The US Navy points out that this is one of the world's most ____ trafficked areas of ocean, so the accident rate is bound to be relatively ____.
a. barging … favourable b. heavily … high
c. valid … vague d. presumptuous … vital

89. Quicksand is a pocket of ordinary sand that has water ____ flowing up through it from an underground source, such as a ____.
a. contracting … river b. dropping … sea c. trickling …well d. continuously … spring

90. The immediate risk is that a backlash against ____ science might strike at ____ science, impeding the chances of finding cures for ailments like Alzheimer's and Parkinson's, cancer and heart diseases.
a. trading … product b. free … general
c. renegade … responsible d. notation … accessible

Direction for questions 91 to 100: Choose the best alternative among the four.

91. a. It take considerable knowledge just to realize the extent of your own ignorance.
    b. It takes considerable knowledge just for realize the extent of your own ignorance.
    c. It takes considerable knowledge just to realize the extent of yours own ignorance.
    d. It takes considerable knowledge just to realize the extent of your own ignorance.

92. a. Violin virtuoso Joshua Bell is that rare prodigy who has matured into a world-class musician and a acclaimed interpreter of Mozart, Beethoven and Tchaiovsky.
    b. Violin virtuoso Joshua Bell is rare prodigy who has matured into a world-class musician and an acclaimed interpreter of Mozart, Beethoven and Tchaiovsky.
    c. Violin virtuoso Joshua Bell is that rare prodigy who has matured into a world-class musician and an acclaimed interpreter of Mozart, Beethoven and Tchaiovsky.
    d. Violin virtuoso Joshua Bell is that rare prodigy who has matured in a world-class musician and an acclaimed interpreter of Mozart, Beethoven and Tchaiovsky.

93. a. Tests confirmed that a network of hairlike blood vessels had grown out of exist vessels to nourish his heart.
    b. Tests confirmed that a network of hairlike blood vessels had grown out of existing vessels to nourish his heart.
    c. Tests confirmed that a net work of hairlike blood vessels had grown out of existing vessels to nourish his heart.
    d. Tests confirmed that a network of hairlike blood vessels had grown out of existing vessel to nourish his heart.

94. a. The brides psychological problems, and the mother-in-law's rigid sense of protocol and propriety, ultimately undermined their relationship.
    b. The bride's psychological problems, and the mother-in-law's rigid senses of protocol and propriety, ultimately undermined their relationship.
    c. The bride's psychological problems, and the mother-in-law's rigid sense of protocol and propriety, ultimate undermined their relationship.
    d. The bride's psychological problems, and the mother-in-law's rigid sense of protocol and propriety, ultimately undermined their relationship.

95. a. I trust that she will find living here less of a burden than is expected.
    b. I trust that she will find living here less of burden than is expected.
    c. I trust that she will find living here less of a burden than is expecting.
    d. I trust that she will find out that living here less of a burden than is expected.

96. a. A return to subsistent farming and cattle grazing inside the parks would be an ecological disaster.
    b. A return to subsistence farming and cattle grazing inside the parks would be an ecological disaster.
    c. A return to subsistence farming and cattle grazing in side the parks would be an ecological disaster.
    d. A return to subsistence farming and cattle grazing inside the parks would be an ecology disaster.

97. a. A foray into the annals of human achievement reveals that he is not alone in pursuing the thinkable in the quest for worldwide fame.
b. A foray into the annals of human achievement reveal that he is not alone in pursuing the unthinkable in the quest for worldwide fame.
c. A foray into the annals of human achievement reveals that he is not alone in pursuing the unthinkable in the quest for worldwide fame.
d. A foray into the annals of human achievement reveals that he is not alone in pursuing the unthinkable in the query for worldwide fame.

98. a. The past actual happened but history is only what someone wrote down.
b. The past actually happened but history is only what someone writing down.
c. The past actually happened but history is only at someone wrote down.
d. The past actually happened but history is only what someone wrote down.

99. a. Each embryo is a human being by dint of its genetic make-up.
b. Each embryo is a human be by dint of its genetic make-up.
c. Each embryo is a human being by dint of it's genetic make-up.
d. Each embryo is a human being by dint of its gene make-up.

100. a. To nurture a child at the expense of marital stability is to build a castle in the air.
b. To nurture a children at the expense of marital stability is to build a castle in the air.
c. To nurture a child at the expend of marital stability is to build a castle in the air.
d. To nurture a child at the expense of marital stable is to build a castle in the air.

Direction for questions 101 to 120: Read the passages given below and answer the questions that follow.

Passage – 1

A sexually harassing climate can make work intolerable, and when employees want to keep their jobs, it puts those being harassed in a situation of powerlessness. As studies of sexual harassment continually recognize, sexual harassment isn't about sex. It's about the abuse of power. The recent situation at the Mitsubishi Motors plant in Normal, Illinois tragically illustrates this point.

Opened in 1987, female employees at the Mitsubishi plant had been complaining about sexual misbehaviour on the factory floor since 1992. But those complaints were essentially ignored by management. In December 1996, 29 female employees had enough. They wanted to keep their jobs — which with overtime and shift premium pay could run as high as $60,000 a year — but they also wanted the relentless sex discrimination, sexual harassment, and sexual abuse by colleagues and supervisors to stop. They took their charges to the Equal Employment Opportunity Commission (EEOC). An investigation confirmed the women's charges. There was clear evidence of 'pervasive sexual harassment that management was well aware of' but did little to control. Some examples included: obscene, crude sketches of genital organs and sex acts, and names of female workers scratched into unpainted car bodies moving along the assembly line. Women were called sluts and whores and subjected to groping, forced sex play, and male flashing. Explicit sexual graffiti were scrawled

on rest-area and bathroom walls. One male line supervisor stated, “I don’t want any bitches on my line. Women don’t belong in the plant.”

In May 1996, EEOC filed suit against Mitsubishi. If the courts rule in favour of the EEOC, Mitsubishi could be held liable for compensatory and punitive damages in excess of $150 million. Additionally, the company has been hit by a class-action suit on behalf of the 29 women.

Following the EEOC suit, you’d think that corporate management would have moved quickly to correct the plant’s sexist environment and to appease female employees. It didn’t. Quite the opposite. It chose to fight. It urged employees to speak up in defence of the company — and their jobs — by setting up a free phone bank with numbers of local news outlets and the names, biography, and phone numbers of elected representatives. It even organized a demonstration to support the company outside the EEOC offices in Chicago and coerced employees by giving them ‘the choice’: They could sign up for a free round trip to the Chicago protest rally on one of the 50 Mitsubishi-chartered buses, get a free box lunch, and win the approval of their bosses. Or they could report, to the empty plant, clearly identifying themselves as disloyal.

Although executives at company headquarters in Tokyo claim to have begun actions to improve conditions at the Normal plant, a recent incident indicates the hostile and abusive work environment continues. Opening her locker to start her 5.30 a.m. shift, Terry Paz, one of the 29 complainants, found a handwritten note reading, “Die, bitch, you’ll be sorry.” She left the plant fearing for her life.

101. In the passage, what is the author primarily concerned with?
   a. Condemning Terry Paz as a coward
   b. Exposing women as a weaker sex in bargaining power
   c. Describing Japanese culture and contrasting it with American culture
   d. Illustrating the point that sexual harassment is about the abuse of power

102. In the passage, it is stated that
   a. the Mitsubishi Motors plant in Normal was established in 1997.
   b. there had been complaints of sexual misbehaviour on the factory floor since 1996.
   c. 29 female employees decided to fight sexual harassment in 1992.
   d. the EEOC filed suit against Mitsubishi in May 1996.

103. In the passage, the emphasis that the company gave employees the ‘choice’ is stated to
   a. ensure that the sexual harassment and abuse can be destroyed willingly.
   b. insist that employees actually had no choice at all since they were being forced to take part in the protest rally.
   c. demonstrate the coercive approach of the company in fighting the suit.
   d. show that employees would prefer a free lunch to the rewards of a suit.

104. In the passage, the author implies through various illustrations that the attitude of the men was actually
   a. chivalrous and cooperative.
   b. intolerant.
   c. highly vexed.
   d. very frivolous.

105. In the passage, which of the following issues is most similar to the abuse of power as is mentioned in the passage?
   a. A minister who embezzles funds meant for public service.
   b. A fireworks sweatshop that employs young children and exploits them to the hilt with the knowledge that they are destitute and desperate.
   c. A movie star who goes on a hunting expedition and shoots birds of an endangered species.
   d. A husband who seeks forced sex with his unwilling wife.

106. In the passage, the tone of the author is
   a. cynical. b. angry. c. argumentative. d. narrative.

Passage – 2

It was a plethora of gloomy predications that led the world's governments to sign the Kyoto treaty. And, although the science was less certain in 1997 than now, officials from the rich world were concerned enough to agree to mandatory cuts in their GHG emissions by an average of 5 per cent below levels in 1990, a target they said they would try to reach by 2008-12.

Greens have ever since howled that 5 per cent is an insignificant amount given the scale of the problem. They would like to see emissions reduced eventually by 80 per cent or more, and the rich world to emit no more per person than the poor: a Utopian approach known in the business as 'contraction and convergence'. A number of scientists, including those on Britain's Royal Commission on Environmental Pollution, also support this aim. But business, especially in America, has been equally vocal in insisting that any cuts would come only at a tremendous economic cost. In the end, the 5 per cent cuts agreed on in Kyoto represented nothing more scientific than a political compromise brokered by ministers.

The real significance of Kyoto was that rich countries had accepted that they should act to curb global warming, and that they should do it before requiring poor countries to do the same. They committed themselves to frequent updates and improvements of the treaty, the first substantive one of which is taking place in The Hague. And they agreed that cutting emissions might be so expensive that the treaty should allow countries innovative, flexible approaches to reduce compliance costs.

This last point is a central bone of contention in The Hague. A 5 per cent reduction may not sound like much, but it will be very hard to deliver. In part, that is because the calculation has been complicated by a long economic boom. The roaring American economy, for example, may have to slash its emission by 20 per cent or more from its likely levels at the end of the decade, if it is to meet its Kyoto targets. Most other rich countries will not have it much easier.

Besides targets, the treaty includes provisions for the international trading of emissions rights and the use of forests and soil as 'carbon sinks'. These will help. But how these mechanisms should be used remains a subject of intense disagreement.

There is a baffling array of technical details to be settled, but the key differences come in some key areas:
Use of market mechanisms. In principle, all signatories to Kyoto agree on 'flexibility'. One way of delivering

this is to allow countries to trade emissions permits among themselves. Other ideas include a clean development mechanism that would allow firms and countries to earn credits for investments that help poor countries clean up, and a joint implementation scheme that awards credits for projects carried out in other industrialized countries.

Such market-based instruments allocate the costs of cutting GHG emissions more efficiently, so that cuts can be made wherever in the world they are cheapest. America has had great success cutting sulphur dioxide emissions, which are a precursor to acid rain, through a domestic trading scheme that may be a good model for any Kyoto-inspired carbon trading. Britain and Norway are planning to start domestic trading of carbon dioxide emissions shortly, and there are hopes of pan-European trading by 2005.

The argument between the Americans and Europeans is not about the principle, but about whether to set limits on it. The Europeans want flexible mechanisms to account for at most half of any country's emission cuts: the Americans see no reason to set any ceiling.

Sinks. This could be an even thornier issue. New and growing plants are called sinks because they absorb carbon from the atmosphere and hold on to it for a long time; this argue advocates, reduces a country's net emissions. On this argument, reforestation and ending deforestation deserve credit for strengthening carbon sinks; so too might agricultural practices, such as not tilling soil.

Scientists agree that sinks are important, but then properties are not well understood. According to Robert Watson of the World Bank, who is also head of the IPCC panel, "We know how to measure carbon in trees and soil; but we need a measurement system that is very dense, frequent and complete." He thinks the real problem is not in the monitoring, but in 'getting the right accounting systems'. It will be politically tricky to define what exactly a sink is, how much credit to give for it and how much 'sinking' a country can do. On this issue too, the Americans are keen on the broadest and most generous definitions, while the Europeans want sharp curbs on the use of sinks.

Two new studies highlight some of the uncertainties. Researchers at Britain's Hadley Centre, a leader in climate modelling, have used their analysis to show that sinks may not be as permanent as their proponents argue. In a study just published in *Nature*, the group's models show that, as temperatures rise, forests may emit more carbon dioxide leading to greater warming. One of the group, Peter Cox, explains that "vegetation and soils, which currently absorb about a quarter of human-made carbon dioxide emissions, could accelerate future climate change by releasing carbon dioxide into the atmosphere as the planet warms." Another team of French and American researchers suggests that forests, oceans and other sinks might be highly variable in their effects from year to year — perhaps because of the effect of the El Nino weather pattern. Their research, reported in *Science*, shows that North America soaked up much more carbon in 1992-93 than it did in 1989-90.

107. What is a sink, according to the passage?
    a. They are carbon pockets in the environment that release carbon into the atmosphere.
    b. They are the end result of deforestation and wrong agricultural practices.
    c. They are new and growing plants that absorb carbon from the atmosphere.
    d. None of the above

108. What does the 5 per cent - 20 per cent debate in the passage refer to in the passage?
   a. The reluctance on the part of the developed countries to deliver on their promise.
   b. The Kyoto participants could not even fulfil the minimum reduction parameters.
   c. It's hard to fulfil the 5 per cent reduction in GHG emissions as the calculations were based on a complex economic scenario.
   d. None of the above

109. The disagreement between the Europeans and Americans was over which of the following points?
   a. The Americans want a very broad and generous definition for a 'sink' while the Europeans want sharp curbs on the use of sinks.
   b. The Americans are keen on domestic trading of carbon dioxide emissions and the Europeans argue in favour of international trading.
   c. America is in favour of cutting sulphur dioxide emissions and Europe is in favour of cutting carbon dioxide emissions.
   d. None of the above

110. The areas of technical details to be settled do not include
   a. the use of market mechanisms.
   b. the contentious issue of sinks.
   c. the Utopian approach of 'contraction and convergence'.
   d. None of the above

111. Peter Cox is mentioned in the passage in the context of
   a. articulating the need of a measurement system to help define a sink.
   b. reinforcing the World Bank's view that the right accounting systems are politically motivated.
   c. explaining that as temperatures rise, forests may emit more carbon dioxide leading to greater warming.
   d. suggesting that forests, oceans and other sinks might be highly variable in their effects from year to year because of the El Nino weather pattern.

112. Which of the following statements are true according to the passage?
   a. Proponents argue that sinks may not have a permanent effect on the climate.
   b. Vegetation and soils currently absorb about a quarter of human-made carbon dioxide emissions.
   c. The El Nino weather pattern leads to highly predictable results.
   d. South America soaked up lesser carbon than North America in 1992-93.

113. The leader in climate modelling is
   a. Science.
   b. Nature.
   c. Hadley Centre.
   d. Royal Commission on Environmental Pollution.

Passage – 3

What do a restaurateur, an architect, an entertainment executive, and a housewife have in common? Answer: All are individuals who are looking to Feng Shui for prosperity, balance, and well being in their lives, or in the lives of their clients. Feng Shui is experiencing a tremendous growth here in the United States and all other areas of the world. The United Kingdom, Australia, Canada, Western Europe, and Brazil are all seeking information about Feng Shui and what place it holds in their culture and lives. Internet, websites, books, television and other forms of media all contain an ambient buzz about Feng Shui.

So why is there this resurgence in popularity of a 2000 plus-year-old practice? What are people looking to have Feng Shui accomplish in their lives? Why now, is Feng Shui becoming something that everyone wants to have? There are so many questions about the timing of this expansion of Feng Shui. People are seeking this information out in all areas, the Internet, books, and by word-of-mouth. Feng Shui holds a lot of answers that people are seeking today.

With the new millennium relatively a few days away, people are looking for answers. At the end of every century there are doomsayers, predictions of disasters, and seekers of new information. If you watch today's popular media, including movies, books, and television, you will find more and more information about disaster prediction, end of the world stories, and other forms of negativity. Why? Because more and more people are buying into these 'end of the millennium' and 'end of the world' stories as the century mark comes closer.

Feng Shui is about balance, comfort and harmony. Feng Shui is not a religion or a mystical belief. Rather, it is a science that offers the ability to create a balance in your dwelling or place of work. It is no coincidence that with the end of this millennium, we are in a Tui cycle of Feng Shui. Tui is the Trigram that is associated with entertainment and communication. The movie industry is booming and the Internet is leading to communication never before seen in the world.

So is Feng Shui frivolous and a passing fad? Definitely not! Why? Because Feng Shui is not a fad, rather it has been a means to build one's prosperity and well-being for more than two millennia. Its resurgence in popularity might be attributed to this time period, but the science of Feng Shui remains squarely rooted in architecture, astronomy, physics, and design. The definition of science is as follows:

1. a. The observation, identification, description, experimental investigation, and theoretical explanation of phenomena.
   b. Such activities restricted to a class of natural phenomena.
   c. Such activities applied to an object of inquiry or study.
2. Methodological activities, discipline, or study.
3. Knowledge, especially that gained through experience.

Feng Shui uses observation, repeatable calculations and methodologies, and is based on the study of the environment around, both inside and out. Kan Yu, the original name for Feng Shui, means "Raise the head and observe the sky above. Lower the head and observe the environment around us." More precisely, Feng Shui is the scientific study of the natural and built environment. Chinese geomancy is another way of describing Feng Shui. Geomancy can be described as 'Earth Wisdom'. All in all, it is the study of environmental effects on people.

Feng Shui, at its most basic level, is about helping people. People are seeing the benefits of properly aligning their homes, offices, and new developments within the principles of Feng Shui. Utilizing these principles, people are creating comfortable, safe, and re-energizing environments for themselves and the people who visit their buildings or dwellings. More and more, architecture is seeking to use Feng Shui concepts. People are demanding it. With proper Feng Shui principles applied, people can see the results of happier attitudes, more prosperity, more sense of harmony and balance, and an improvement in health and well-being.

Clients have reported many results directly attributed to Feng Shui. One man had his asthma disappear. Salespeople report their sales have increased. Couples have realized a sense of calm in their relationship. People from all cross-sections of life are utilizing Feng Shui to create improvements in their environment thus creating improvements in their lives.

With society and media creating false impressions of doom and gloom, Feng Shui is finding resurgence due to this seeking spirit in people. They are looking for some order in this fast paced world. They go home to become grounded again. If in the chaos of modern living, one can find balance and harmony in their home or office through applying Feng Shui, doesn't it make sense that people utilize this age-old science?

114. The word 'resurgent' in the passage implies that
    a. Feng Shui is a relatively new scientific concept.
    b. Feng Shui has a limited application in people's eyes.
    c. there is a rather sudden universal interest in the practice of Feng Shui.
    d. Feng Shui has broadened its horizons in cyberspace.

115. The author uses the term 'rather, it is a science' to convey that
    a. Feng Shui is a fad to appease the affluent.
    b. Feng Shui is not a religious movement but a science.
    c. we are now reaping the benefits of science and technology through the movies and the Internet.
    d. None of the above

116. All of the below are cited as the roots of Feng Shui save
    a. astronomy. b. astrology. c. physics. d. design.

117. Science as a domain does not include the concept of
    a. observation, investigation and explanation of phenomena.
    b. empirical learning.
    c. systematic study.
    d. adaptation and manipulation of earlier theories.

118. Which of the following statements regarding Feng Shui is not supported by the passage?
    a. Feng Shui is about helping people lead happier lives.
    b. The environment plays a crucial role in determining our energy levels.
    c. Feng Shui concepts can be incorporated into architecture.
    d. None of the above

119. Kan Yu is

a. derived from the name Feng Shui.
b. the instruction to walk tall.
c. the ancient name for Feng Shui.
d. the opposite theory to geomancy.

120. We can infer from the passage that

a. people are neurotic in today's times.
b. Feng Shui is actively prescribed by practitioners.
c. people are looking for a measure of stability in the fast-paced world.
d. society and media are conniving against Feng Shui.

Section – III

121. If 'THOUSAND' is coded 'USHNOATD', then how will 'BUSINESS' be coded in the same language?
a. INUSSSEB b. INSUSEBS c. NIUSSEBS d. INUSSEBS

122. If 'watch' is called 'clock', 'clock' is called 'time', 'time' is called 'minute' and 'minute' is called 'hour', in a certain code language, then 'second' is a unit of
a. time b. minute c. clock d. hour

123. If '+' is coded as '×', '×' is coded as '÷', '÷' is coded as '–' and '–' is coded as '+', then = 3 + $\frac{5}{3} \div \left(\frac{7}{3} - 2\right) \times \left(\frac{2}{3} - 1\right) = ?$
a. 2.5 b. –42 c. $\frac{12}{5}$ d. –2.5

124. If '+' is coded as '–', '×' is coded as '+', '÷' is coded as '×' and '–' is coded as '÷', then
$\left\{\left(\frac{27}{7} \times \frac{8}{7}\right) \div \frac{7}{5}\right\} - 7 + 1 = ?$
a. 0 b. 1 c. –1 d. 2

125. A cyclist started travelling towards south. After travelling 500 m he turned right, then he again turned right and travelled 400 m. He again turned right and travelled a distance of 1 km straight. After taking rest for about 15 minutes, he turned left at an angle of 45° and travelled 45 km straight, then finally he turned right again at an angle of 45°. In which direction was he moving finally?
a. North-east b. East c. West d. South-west

126. When all the students of standard IV of ABC school were made to stand in ascending order of their heights, Ajay was standing at the 7th position. When they were standing in decreasing order of their height, Ajay was standing at the 35th position. How many students are there in the class?
(No two students have equal height.)
a. 42 b. 40 c. 41 d. Cannot be determined

127. If 1st, 3rd, 5th, 6th and 8th letters of the word 'REGULATE' are used to form a new meaningful word, then what will be the first letter of the word so formed? Mark 'X' as the answer if no meaningful word is formed out of these letters and 'M' if more than two meaningful words can be formed.
a. R b. L c. M d. X

128. If 'IMPOVERISH' is coded 'SVXVBJVLUI' in a certain coded language, then how will 'LUBRICATED' be coded in the same language?
a. VDJYOHEWFE b. WEKZPIFXHF c. VDJYOHFWGE d. VDJYOHEWGE

Direction for questions 129 to 133: Read the following letter sequence carefully and answer the questions that follow.

Y B Z A R S H I J K L M T U V G F E W X C D Q P O N.

129. Which of the following letter is the 5th letter to the right of the 8th letter to the left of 16th letter from your right?

a. I b. H c. J d. Z

130. If every alternate letter starting with Y is replaced with a natural number starting from l, then which character will be 14th to the left of 11th to the right of 5th character from your left?

a. 2 b. B c. 13 d. N

131. What will come in place of the question mark in the following series?

YAH LUF BRI ?

a. RHJ b. MUG c. MVF d. SJM

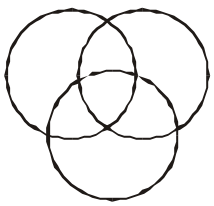
132. If letters of the series given above are written in reverse order, then which letter will be 5th letter to the left of 17th letter to the right of 20th letter from your right?

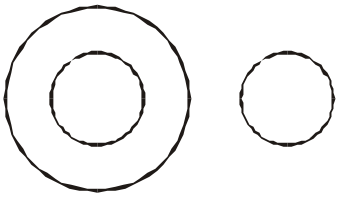
a. W b. J c. H d. I

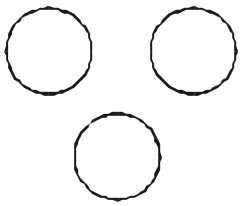
133. If it is possible to make a meaningful word from the 8th, 14th, 22nd and 23rd letter from your left in the given series, then which letter will be the first letter of that word. If no such word is formed, then mark 'X' as your answer and if more than one such word can be formed, then your answer would be 'M'.

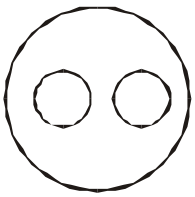
a. D b. Q c. X d. M

Direction for questions 134 to 138: The questions given below contain three groups of things. You have to choose one of the following four-numbered diagrams, which depicts the correct relationship among the three groups of things in each question.

a. 

b. 

c. 

d. 

134. Spain, America, Germany

135. Newspaper, Television, Radio

136. Diplomats, Bureaucrats, Advocate

137. Mangoes, Fruits, Pomegranates

138. Herbivores, Carnivores, Tiger

Direction for questions 139 to 143: Study the following information carefully and answer the questions given below.

A word arrangement machine, when given a particular input, rearranges it following a particular rule. The following is the illustration of the input and the steps of arrangement:

Input:	dare	the	name	cast	case	for	is	there
Step I:	is	the	name	cast	case	for	dare	there
Step II:	is	for	name	cast	case	the	dare	there
Step III:	is	for	the	cast	case	name	dare	there
Step IV:	is	for	the	case	cast	name	dare	there
Step V:	is	for	the	case	cast	dare	name	there

139. If following is the step III of an input, what will be its step I?

Step III: an is for future form not sin

a. an form future for is not sin
b. an not sin future form is for
c. an for is future form not sin
d. Cannot be determined

140. How many steps will be required to get the final output from the following input?

Input: India is willing to strengthen its dealing.

a. Four b. Five c. Six d. None of these

141. Which of the following is the step IV for the following input?

Input: pick me to clean five head heal

a. me to five head clean pick heal
b. me to five head pick clean heal
c. me to pick five head clean heal
d. me to five head pick heal clean

142. If step I of an input is ‘am till do still can care’, what step would be ‘am do can care till still’?

a. Step IV b. Step V c. Step VI d. Cannot be determined

143. If following is the step II of an input, what will be its step V?

Step II: of ear last Delhi then that free

a. of ear east free that then Delhi
b. of ear east free then that Delhi
c. of ear last that free then Delhi
d. None of these

Direction for questions 144 to 148: In each question given below, there are three statements followed by four conclusions numbered I, II, III and IV. You have to take the given statements to be true even if they seem to be at variance with commonly known facts and thus decide which of the given conclusions logically follow(s) from the given statements.

144. **Statements:** Some books are copies.
Some copies are files.
No file is a dictionary.

Conclusions:

I. Some copies are dictionary.
II. No book is a dictionary.
III. Some books are files.
IV. All copies are either books or files.

a. Only IV follows
b. Only I and II follow
c. Either III or IV follows
d. None follows

145. **Statements:** Some banks are hotels.
All hotels are restaurants.
No restaurant is hospital.

Conclusions:

I. No bank is hospital.
II. Some restaurants are hotels.
III. Some banks are restaurants.
IV. Some hospitals are hotels.

a. Only I and IV follow
b. Only II and III follow
c. Only II and IV follow
d. Only either II or III and I follow

146. **Statements:** Some pens are pencils.
Some pencils are sharpeners.
All rubbers are pencils.

Conclusions:

I. All rubbers are sharpeners.
II. Some rubbers are pens.
III. Some pens are sharpeners.
IV. No rubber is a pen.

a. Only II follows
b. Only I and IV follow
c. Only either II or IV follows
d. Only I and III follow

147. **Statements:** All fans are bulbs.
Some fans are tubelights.
Some bulbs are diamonds.

Conclusions:

I. Some tubelights are diamonds.
II. Some bulbs are fans.
III. Some diamonds are not tubelights.
IV. Some bulbs are not diamonds.

a. Only either I or III and II follow
b. Only I and II follow
c. Only II follows
d. Only III follows

148. **Statements:** No TV is radio.
Some radio are newspaper.
All newspapers are magazines.

Conclusions:

I. Some TV's are newspapers.
II. All magazines are newspapers.
III. Some magazines are radios.
IV. No magazine is TV.

a. Only either II or IV and III follow.
b. Only I and II follow
c. Only IV follows
d. Only III follows

Direction for questions 149 to 153: In each question below is given a statement followed by two conclusions numbered I and II. You have to assume everything in the statement to be true, then consider the two conclusions together and decide which of them logically follows beyond a reasonable doubt from the information given in the statement.

Mark the answer as:

a. if only conclusion I follows.
b. if only conclusion II follows.
c. if neither conclusion I nor II follows.
d. if both conclusions I and II follow.

149. **Statement:** An open school badminton championship was organised by Delhi Sports Council in the sports ground of B.D. Public School on October 23. Gagan Sharma of class X won the first prize.

Conclusions:

I. Gagan Sharma is a very good badminton player.
II. B.D. Public School lays a lot of emphasis on training its students in sports along with academics.

150. **Statement:** Right from class I, Kamna has been chosen as the class monitor every year, despite the fact that she had to study in various cities and schools due to the transferable nature of her father's job. And now, in class XII, she was unanimously elected the head girl of her school.

Conclusions:

I. Kamna has to work very hard in order to get adjusted in new schools.
II. Kamna possesses leadership qualities.

151. **Statement:** It was like watching the highlights section, the way Ganguly and Sehwag took the West Indies bowlers apart in an awesome display of power hitting in the third One-day cricket match yesterday.

Conclusions:

I. Ganguly and Sehwag are players of the Indian Cricket Team.
II. Ganguly and Sehwag played so well that West Indies lost the game finally.

152. **Statement:** It's been a long time since the Deming prize was instituted by the Union of Japanese Scientists and Engineers. But very, very few organisations outside Japan have had the honour of receiving it. In fact, the TVS Motor Company is the world's first motorcycle company to be awarded the prize.

Conclusions:

I. It is the first time that a non-Japanese company received the prize.

II. Judges of the Deming prize are partial and at most times try to select a Japanese company for the prize.

153. **Statement:** There was a time when the IAS was the exclusive territory of law and humanities students, when preparing for the civil services examination meant running from one library to another in search of relevant reading matter. It was really a difficult job.

Conclusions:

I. Now, graduates from other streams are also trying to make their way into the IAS.

II. Relevant reading matter required for preparation of civil services examination is now comparatively easily available.

Direction for questions 154 to 158: In each question below is given a statement followed by two assumptions, numbered I and II. An assumption is something supposed or taken for granted. You have to consider the statement and the following assumptions and decide which of the assumptions is implicit in the statement.

Mark the answer:

a. if only assumption I is implicit.

b. if only assumption II is implicit.

c. if neither assumption I nor II is implicit.

d. if both assumptions I and II are implicit.

154. **Statement:** ABC Coaching Institute has shown considerably improved results this year. Last year, the percentage of students of the institute who got selected in the competitive examinations was 25%.

Assumptions:

I. The percentage of students of the institute who got selected in the competitive examinations is more than 25% this year.

II. ABC coaching institute gives coaching for the preparation of competitive examinations.

155. **Statement:** After introducing spot fines for ticketless passengers, the Delhi Transport Corporation (DTC) will now fine its employees, who are not found performing their duties properly on the spot. This drive, however, will not entertain the complaints of the passengers.

Assumptions:

I. The move will discipline the drivers, conductors and other DTC personnel.

II. The move is not advantageous to passengers as it will not entertain the complaints of the passengers.

156. **Statement:** The Delhi Municipal Corporation (MCD) has sought help from financial consultants to prepare a fresh proposal for inviting private developers to construct new subways.

Assumptions:

I. MCD is facing a shortage of finance in starting the construction of new subways.

II. Earlier proposals for the construction of new subways were not adequate.

157. **Statement:** To ensure complete eradication of polio, the state health department has extended its pulse polio immunisation programme by five days.

Assumptions:

I. After the completion of the programme, no child in the state will be left deprived of the required polio drops.

II. The state health department is trying to eradicate polio completely.

158. **Statement:** With the state government and law enforcing agencies cracking down on illegal trade of wildlife products, poachers and traders are shifting shops outside the cities. Cities are now being used to strike deals, while the products — including animal skins, ivory, and shahtoosh shawls — are being delivered mostly outside, say wildlife officials.

Assumptions:

I. People involved in illegal trade always manage to find some or the other way to continue with their jobs.

II. Poachers and traders earn a lot of money very easily by illegal trade of wildlife products.

Direction for questions 159 to 163: In each question below is given a statement followed by two courses of action, numbered I and II. You have to assume everything in the statement to be true. Then decide which of the two suggested courses of action logically follows for pursuing. Mark the answer

a. if only course of action I follows.
b. if only course of action II follows.
c. if neither course of action I nor II follows.
d. if both courses of action I and II follow.

159. **Statement:** Electricity supply will be affected due to maintenance work from 9 a.m. to 4 p.m. on Monday in the eastern areas of Punjab — an announcement in a newspaper.

Courses of action:

I. People residing in the affected area should go to the electricity department and complain about the problem.

II. People residing in the affected area should try to complete all their work that require electricity before 9 a.m.

160. **Statement:** The number of suicide cases of students who failed in their board examinations is increasing day by day.

Courses of action:

I. All schools should organise programmes for the parents of their students to advise them not to put any extra pressure or expect more than required from their children as far as board results are concerned.

II. Board examinations should be banned, instead students should be valued on the basis of internal assessment.

161. **Statement:** More than 40 Himalayan lakes in India and Nepal are expected to overflow soon due to water released by melting glaciers. It happened as a result of global warming which is increasing due to increased emission of various gases like nitrous oxide, carbon dioxide and chloroflouro carbons into the atmosphere.

Courses of action:

I. More and more number of trees should be grown.

II. Some measures like check on emission of gases or alternatives should be found and applied to reduce the emission of various gases that leads to global warming.

162. **Statement:** Number of mosquitoes are increasing day by day because of the open and badly maintained drainage system in Ramesh Nagar area.

Courses of action:

I. DDT should be sprayed in order to kill these mosquitoes.

II. All the residents of the area should complain to the municipal committee and request them to cover all the drains in order to give a healthy and hygienic environment to them.

163. **Statement:** People residing in most of the villages do not get proper education.

Courses of action:

I. Well qualified teachers should be appointed in the schools of these villages.

II. Government should offer certain incentives like free food, clothes, etc., to attract the children towards studies.

Direction for questions 164 to 168: Read the information given below carefully and answer the questions that follow.

I. Six friends Aakash, Anu, Deepak, Richa, Sapna and Vandana are sitting around a circular table at equal distance from each other.

II. Sapna is sitting two places to the right of Richa who is exactly opposite Vandana.

III. Vandana is sitting two places to the left of Anu.

IV. Aakash is sitting adjacent to Richa.

164. Who is the person sitting between Sapna and Richa?

a. Aakash b. Deepak

c. Vandana d. Data inadequate

165. Sapna is not sitting at equal distance from

a. Aakash and Vandana b. Richa and Deepak

c. Richa and Anu d. All of these

166. Deepak is sitting to the

a. left of Anu b. left of Vandana

c. left of Sapna d. right of Richa

167. The angle subtended by Deepak and Richa at the centre of the table is

a. 60° b. 120° c. 90° d. 80°

168. Which of the following statements is not correct?
   a. Anu and Sapna are exactly opposite each other.
   b. Anu and Aakash are not at equal distance from Richa.
   c. Anu is to the immediate right of Deepak.
   d. Angle subtended by Richa and Deepak is same as the angle subtended by Akash and Vandana at the centre of the table.

Direction for questions 169 to 173: Read the following information carefully and answer the questions that follow.

Six dancers — Lakshmi, Madhumati, Rani, Rohini, Asha and Kriti perform six different dances: Kathakali, Kathak, Garba, Bharatnatyam, Kuchipudi and Western, not necessarily in the same order. They belong to six different states: U.P., M.P., Maharashtra, Orissa, Gujarat and Karnataka. Following things are known about their choices

I. Asha knows Kathak but does not belong to Gujarat and Maharashtra.
II. Rani and Kriti don't know both Bharatnatyam and Kathakali, but belong to Karnataka and U.P. respectively.
III. Dancer from M.P. knows Kathak.
IV. Lakshmi, Rani and Madhumati don't know Garba or Western.
V. Rohini can perform Western while Lakshmi knows Bharatnatyam.
VI. Lakshmi does not belong to Gujarat while Madhumati belongs to Orissa.

169. Kuchipudai is performed by
   a. Rani b. Rohini c. Kriti d. Madhumati

170. Rohini belongs to
   a. Orissa b. Maharashtra c. Gujarat d. None of these

171. Garba is performed by
   a. Rani b. Kriti c. Rohini d. Madhumati

172. Which of the following is definitely a false combination.
   a. Rani–Kuchipudi–Karnataka b. Lakshmi–Bharatnatyam–Maharashtra
   c. Rohini–Western–Gujarat d. Asha–Kathak–Orissa

173. Which of the following is definitely a true combination?
   a. Rani–Garba–Karnataka b. Kriti–Garba–M.P.
   c. Lakshmi–Bharatnatyam–Maharashtra d. Rohini–Western–Orissa

Direction for questions 174 to 178: Read the following information carefully and answer the questions that follow.

A family consists of seven members: A, B, C, D, E, F and G. There are three married couples. F is grandfather of E and is a doctor. B is an engineer and father of E. C is daughter-in-law of D who is a teacher by profession. G is E's uncle and a professor. There is one student, one housewife and one lawyer in the family. The student is unmarried and C is the sister-in-law of B.

174. Who is C's husband?
a. G b. B c. F d. E

175. Who is E's aunt?
a. A b. D c. C d. None of these

176. What is the profession of A?
a. Housewife b. Lawyer c. Student d. Data inadequate

177. Which of the following are married couples?
a. AF, BC and ED b. AB, CG and DF c. BC, AG and DF d. Data inadequate

178. Who is surely the grandmother of E?
a. F b. C c. D d. Data inadequate

Direction for questions 179 to 183: Read the following information carefully and answer the questions that follow.

Vigyan Jyoti Model School wants to employ a mathematics teacher for classes IX and X. Following is the selection criteria for this.

I. The candidate should be a graduate in mathematics from a recognised university.
II. He/she must possess a B.Ed. degree.
III. The candidate must have five years' experience of teaching mathematics to class IX and X students.
IV. The candidate must be between 25 and 40 years of age on January 31, 2003.
V. He/she must have good communication skills and must be fluent in English.

However, if the candidate fulfils all the above conditions except.

(A) (II) but has an M.A. degree in mathematics with at least 55% marks, his/her case will be referred to the principal of the school.
(B) (III) but has secured 60% in B.Ed. and 50% in M.A. (mathematics), his/her case will be referred to the chairman.

Based on the above criteria and the information given below, you have to take a decision in regard to each case. You are not to assume any information. If the given information is not adequate, then your answer should be 'candidate not to be selected'. Now mark your answers as

a. if the candidate is to be selected.
b. if the candidate is not to be selected.
c. if the case is to be referred to the principal.
d. if the case is to be referred to the chairman.

179. Mrs Shefali Rai has got B.A. (mathematics) and B.Ed. degree from a good university. She was born on October 5, 1972. She possesses good communication skills and is also fluent in speaking English. She taught in APS School for around 8 years.

180. Mrs Kavita Das is a mathematics graduate with 70% marks from a renowned university. She was born on July 10, 1970 and possesses good communication skills. She speaks English fluently. She has got an experience of $5\frac{1}{2}$ years for teaching mathematics to students of IX and X standard. She has an M.A. degree in mathematics with 65% marks.

181. Mrs Krishna Bhattacharya completed her graduation in mathematics from a reputed university. She also possesses B.Ed. degree and has been teaching IX and X standard students of a school for 7 years. She was born on January 5, 1966. She speaks English fluently and also has good communication skills.

182. Mr Amrit Singh has got good communication skills and fluency in English. He did his graduation in mathematics from a very good university. He secured 75% in B.Ed. and 60% marks in M.A. He has been working as a mathematics teacher in SPM School for $4\frac{1}{2}$ years. He was born on January 10, 1962.

183. Mrs Santosh Kumari was born of September 10, 1963. She possesses B.A. degree in mathematics and B.Ed. degree. She has an experience of 5 years of teaching mathematics to students of IX and X standard in Vidyamandir Public School.

184. While looking at the photograph of a man, a person said, “The sister of his father is the sister of my mother.” How is the person related to the man?
a. Sister b. Brother c. Cousin d. Aunt

185. Pointing to a lady, an old woman said, “She is the only daughter-in-law of the paternal grandmother of the sister of my father who is the only son of his parents’ ”. How is the lady related to the old woman?
a. Daughter b. Mother c. Grandmother d. Sister

Direction for questions 186 to 190: Below is given a passage followed by several possible inferences which can be drawn from the facts stated in the passage. You have to examine each inference separately in the context of the passage and decide upon its degree of truth or falsity, and then mark the answer as

a. if the inference is ‘definitely true’, i.e. it properly follows from the statements of facts given.
b. if the inference is ‘probably true’ though not ‘definitely true’ in the light of the facts given.
c. if the inference is ‘definitely false’, i.e. it cannot possibly be drawn from the facts given for it contradicts the given facts.
d. if the inference is ‘probably false’ though not ‘definitely false’ in the light of the facts given. (Mark ‘definitely false’ as the answer if data given is inadequate.)

Gujarat, this city is located in the western part of the country, traditionally being famous as a trading and business centre, becomes the worst victim of the natural calamity, the Earthquake which rocked on Republic Day, measuring a whopping 6.9-7.9 on the richter scale and mesmerized the whole life. The tremor wrought unbelievable destruction all around and is believed to have left a death toll of over 30,000 till the writing of this article and may swell to over 50,000. Defence Minister Mr George Fernandes on January 30, 2001 said, the death toll would exceed to one lakh. The worst earthquake hit area is Bhuj. Parts of Bhuj town disappeared from the face of the earth in the quake’s aftermath. It is not understood that why is it that despite detailed and well-researched reports after disasters in Latur, Uttarkashi, Jabalpur and even other major earthquakes the next time round we are faced with the same magnitude of disaster? Obviously, because the government has no comprehensive disaster management plans and never ever have had implementation checks. Jabalpur lay on seismic zone 3, but its structures were just not earthquake proof.

186. Bhuj was the epicentre of the earthquake that caused an unbelievable destruction in Gujarat.

187. The earthquake hit Gujarat on January 26, 2001.

188. There is no way to reduce the disaster that is caused by an earthquake.

189. Government is not at all concerned about the sufferers of the earthquake.

190. An earthquake measuring more than 6.9 on richter scale is very dangerous and can cause a severe damage.

Direction for questions 191 to 195: Each of the following questions consists of a statement followed by two arguments I and II. Mark the answer

a. if only argument I is strong.
b. if only argument II is strong.
c. if neither argument I nor II is strong.
d. if both arguments I and II are strong.

191. **Statement:** Should English be made an optional subject for the students in India?
Arguments:
I. No, English is a much widely spoken language in the world.
II. Yes, as it puts a lot of burden on small children.

192. **Statement:** Should universities increase the number of seats in various professional courses that are in demand?
Arguments:
I. Yes, this way more people will get a chance of following their desired careers.
II. No, as it will lead to an increase in the number of unemployed deserving persons.

193. **Statement:** Should beauty pageants be banned in India?
Arguments:
I. Yes, as they depict an alien culture which adversely affects our values.
II. No, because this is an area in which India has been doing really well.

194. **Statement:** Should there be an unemployment allowance for the unemployed youth in India?
Arguments:
I. Yes, because the government in India is by the people, of the people and for the people; so it becomes the government's duty to take care of all the problems of the people.
II. No, because this will increase lethargy in youth and they will be unwilling to work.

195. **Statement:** Should there be a complete ban on burning crackers on Diwali after 10 p.m.
Arguments:
I. Yes, because crackers cause a lot of pollution and putting this constraint of time will certainly help in reducing the same.
II. Yes, as the firecracker manufacturers use child labour to a large extent.

Section – IV

196. If the minimum value of $a(x-2)^2 + b(x-2) + c$ is 8, then the minimum value of $ax^2 + bx + c$ will be

a. 16 b. 12 c. a + b + c d. 8

197. The equation whose roots are diminished by 3 by the roots of the equation $x^4 - 5x^3 + 7x^2 + 7x + 11 = 0$ is

a. $x^4 + x^3 + 3x^2 + 22x + 14 = 0$ b. $x^4 + 7x^3 + x^2 + 22x + 41 = 0$

c. $x^4 + 7x^3 + 16x^2 + 22x + 41 = 0$ d. None of these

198. Let $\alpha, \beta, \gamma, \delta$ be the roots of the equation $x^4 + px^3 + qx^2 + rx + s = 0$, then $\Sigma\frac{\alpha}{\beta}$ = ?

a. $\frac{pr+4s}{s}$ b. $\frac{pr-4s}{s}$ c. $\frac{ps-4r}{s}$ d. $\frac{pq-4rs}{s}$

199. Equation $2x^3 + 6x^2 + x + 5 = 0$ has

a. all its roots real b. two equal roots

c. one real root and two imaginary roots d. Cannot be determined

200. If $ax + by = 1$, $cx^2 + dy^2 = 1$ have only one solution, then

a. $\frac{a^2}{c}+\frac{b^2}{d}=1$ b. $x=\frac{a}{c}$ c. $y=\frac{b}{d}$ d. All of these

201. Find the sum of the following series to n terms: 5 + 7 + 13 + 31 + 85 + ... +

a. $\frac{1}{2}[3^n+8n-1]$ b. $\frac{1}{2}[8^n+3n+1]$ c. $\frac{1}{2}[8n+5]$ d. None of these

202. If x, 1, z are in AP and x, 2, z are in GP, then x, 4 , z are in

a. AP b. GP c. HP d. None of these

203. If $\frac{3+5+7+\cdots+n \text{ terms}}{5+8+11+\cdots+10 \text{ terms}} = 7$, then the value of n is

a. 35 b. 36 c. 37 d. 40

204. The sum to n terms of the series 1.3.5 + 3.5.7 + 5.7.9 + ... is

a. $8n^3 + 12n^2 - 2n - 3$ b. $n(8n^3 + 11n^2 - n - 3)$

c. $n(2n^3 + 8n^2 + 7n - 2)$ d. None of these

205. The nth terms of the two series 3 + 10 + 17 + ... and 63 + 65 + 67 + ... are equal. Then the value of n is

a. 9 b. 13 c. 19 d. None of these

206. The real part of the complex number $(1 + i)^n$ is

a. $2^{\frac{n}{2}} \cos\frac{n\pi}{4}$ b. $2^n \cos\frac{n\pi}{4}$ c. $2^{-\frac{n}{2}} \cos n\pi$ d. $2^{-n} \cos\frac{n\pi}{2}$

207. If cube root of a + ib is x + iy, then $4(x^2 - y^2)$ is equal to

a. $\frac{a}{x}+\frac{b}{y}$ b. $\frac{a}{x}-\frac{b}{y}$ c. ax + by d. ax – by

208. If $\cos\alpha + \cos\beta + \cos\gamma = \sin\alpha + \sin\beta + \sin\gamma = 0$, then $\cos3\alpha + \cos3\beta + \cos3\gamma$ is equal to

a. 0 b. $3\sin(\alpha+\beta+\gamma)$ c. $3\sin\alpha\sin\beta\sin\gamma$ d. None of these

209. The locus of the point z satisfying the condition $\arg\left(\frac{z-1}{z+1}\right)=\frac{\pi}{3}$ is a

a. parabola b. circle
c. pair of straight lines d. None of these

210. Let z be a complex number. Then the angle between z and iz is

a. π b. 0 c. $\frac{\pi}{2}$ d. None of these

211. If A = {1, 2, 3} and B = {3, 8}, then $(A \cup B) \times (A \cap B)$ is

a. {(3, 1), (3, 2), (3, 3), (3, 8)} b. {(1, 3), (2, 3), (3, 3), (8, 3)}
c. {(1, 2), (2, 2), (3, 3), (8, 8)} d. {(8, 3), (8, 2), (8, 1), (8, 8)}

212. Which of the following is/are true?

I. $(A - B) \cap B = A$
II. $A - (A - B) = A \cap B$
III. $A - (B \cup C \cap D) = (A - B) \cap (A - C) \cap (A - D)$

a. I and II b. I and III c. II and III d. All are true

213. In a certain city only two newspapers A and B are published. It is known that 25% of the city population reads A and 20% reads B, while 8% read both A and B. It is also known that 30% of those who read A but not B, look into advertisements and 40% of those who read B but not A, look into advertisements while 50% of those who read both A and B look into advertisements. What percentage of the population reads an advertisement?

a. 13% b. 13.9% c. 14% d. None of these

214. If R be a relation from A = { 1, 2, 3, 4} to B = {1, 3, 5}, i.e. $(a, b) \in R \Leftrightarrow a < b$, then $R \circ R^{-1}$ is

a. {(1, 3), (1, 5), (2, 3), (2, 5), (3, 5), (4, 5)}
b. {(3, 1), (5, 1), (3, 2), (5, 2), (5, 3), (5, 4)}
c. {(3, 3), (3, 5), (5, 3), (5, 5)}
d. {(3, 3), (3, 4), (4, 5)}

215. If S is a finite set having n elements, then the total number of commutative binary operations on S is

a. $n^{\frac{n(n+1)}{2}}$ b. $n^{n^2} - n^{\frac{n(n+1)}{2}}$ c. $n^{n^2 - \frac{n(n-1)}{2}}$ d. $n^{\frac{n(n-1)}{2}}$

216. The middle term in the expansion of $\left(\frac{a}{x} + bx\right)^{12}$ will be

a. 924 a^6b^6 b. 924 $\frac{a^6b^6}{x}$ c. 924 $\frac{a^6b^6}{x^2}$ d. 924 $a^6b^6x^2$

217. The number of terms in the expansion of $(a + b + c)^n$ are

a. $\frac{(n+1)(n+2)}{2}$ b. n + 3 c. $\frac{n(n+1)}{2}$ d. None of these

218. If n = 15, then find the value of $\frac{C_1}{C_0} + 2\frac{C_2}{C_1} + 3\frac{C_3}{C_2} + \cdots + n\frac{C_n}{C_{n-1}}$.

a. 100 b. 120 c. – 120 d. None of these

219. $3 + \frac{5}{1!} + \frac{7}{2!} + \ldots$ is equal to

a. $(e^2 + 1)$ b. $(e + 1)^2$ c. $(e^2 + 3e - 1)$ d. None of these

220. Find the sum of the series $\frac{12}{2!} + \frac{28}{3!} + \frac{50}{4!} + \frac{78}{5!} + \cdots + \infty$

a. 5e – 4 b. 5e c. 5e + 4 d. None of these

221. If $\begin{vmatrix} a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{vmatrix} = D$, then $\begin{vmatrix} \lambda a_1 & a_2 & a_3 \\ b_1 & \lambda b_2 & b_3 \\ c_1 & c_2 & \lambda c_3 \end{vmatrix}$ is equal to

a. λ^3 D b. λD c. 3λD d. None of these

222. If ω be cube root of unity, then the value of $\begin{vmatrix} 1 & \omega^3 & \omega^2 \\ \omega^3 & 1 & \omega \\ \omega^2 & \omega & 1 \end{vmatrix}$ is

a. 3 b. 5 c. 2 d. None of these

223. The inverse of a symmetric matrix is

a. symmetric matrix b. skew-symmetric
c. diagonal matrix d. None of these

224. If $A=\begin{bmatrix}\cos\alpha & -\sin\alpha\\ \sin\alpha & \cos\alpha\end{bmatrix}$, then $\mathbf{A}^{-1}$ is

a. $\begin{bmatrix}-\cos\alpha & \sin\alpha\\ -\sin\alpha & \cos\alpha\end{bmatrix}$ b. $\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$ c. $\begin{bmatrix}\cos\alpha & \sin\alpha\\ -\sin\alpha & \cos\alpha\end{bmatrix}$ d. None of these

225. If $A=\begin{bmatrix}a & b\\ c & d\end{bmatrix}$, then

a. $|\text{adj } A| = |A|$ b. $|\text{adj } A| = |A^{-1}|$
c. $|\text{adj } A^{-1}| = |A|$ d. $(\text{adj } A^{-1}) = (|A|)^{-1}$

226. Which of the following is incorrect?

a. $A^2 - B^2 = (A + B)(A - B)$ b. $(A^T)^T = A$
c. $(AB)^n = A^nB^n$, where A, B commute d. $(A - I)(I + A) = O \Leftrightarrow A^2 = I$

227. If A is a skew-symmetric matrix and n is a positive integer, then A^n is a

a. symmetric matrix b. skew-symmetric matrix
c. diagonal matrix d. None of these

228. If A and B are any two square symmetric, then ___ is a skew-symmetric matrix.

a. $\frac{A + A'}{2}$ b. $\frac{A' + B'}{2}$ c. $\frac{A' - B'}{2}$ d. $\frac{B - B'}{2}$

229. Let $A=\begin{bmatrix}1 & 0 & 0\\ 5 & 2 & 0\\ -1 & 6 & 1\end{bmatrix}$, then the adjoint of A is

a. $\begin{bmatrix}2 & 0 & 0\\ -5 & 1 & 0\\ 32 & -6 & 2\end{bmatrix}$ b. $\begin{bmatrix}2 & -5 & 32\\ 0 & 1 & -6\\ 0 & 0 & 2\end{bmatrix}$ c. $\begin{bmatrix}-1 & 0 & 0\\ -5 & -2 & 0\\ 1 & -6 & -1\end{bmatrix}$ d. None of these

230. The system of equations $4x - 5y - 2z = 2$, $5x - 4y + 2z = 3$, $2x + 2y + 8z = 1$ is

a. consistent (unique solution) b. inconsistent
c. consistent (infinite solution) d. None of these

231. Eigenvalues of matrix $\begin{bmatrix}-3 & 2 & 2\\ -6 & 5 & 2\\ -7 & 4 & 4\end{bmatrix}$ are

a. 4, 2, 0 b. 1, 2, 3 c. –1, 10, –3 d. None of these

232. The rank of $\begin{bmatrix}1 & 3 & 4 & 7\\ 2 & 5 & 6 & 8\\ 7 & 19 & 24 & 37\end{bmatrix}$ is

a. 3 b. 2 c. 1 d. 4

233. ω is the cube root of unity, then the inverse of $A=\begin{bmatrix}1 & 1 & 1\\ 1 & \omega & \omega^2\\ 1 & \omega^2 & \omega\end{bmatrix}$ is

a. $\begin{bmatrix}1 & 1 & 1\\ 1 & \omega^2 & \omega\\ 1 & \omega & \omega^2\end{bmatrix}$ b. $\frac{1}{2}\begin{bmatrix}1 & 1 & 1\\ 1 & \omega^2 & \omega\\ 1 & \omega & \omega^2\end{bmatrix}$ c. $\frac{1}{4}\begin{bmatrix}1 & 1 & 1\\ 1 & \omega & \omega^2\\ 1 & \omega^2 & \omega\end{bmatrix}$ d. $\frac{1}{3}\begin{bmatrix}1 & 1 & 1\\ 1 & \omega^2 & \omega\\ 1 & \omega & \omega^2\end{bmatrix}$

234. For a square matrix A to be skew-Hermitian, its diagonal elements should be either purely imaginary or zero. This condition is

a. necessary but not sufficient
b. sufficient but not necessary
c. both necessary as well sufficient
d. neither necessary nor sufficient

235. $\begin{bmatrix}0 & 3+4i & 6+7i\\ -(3+4i) & 0 & 2+7i\\ -(6+7i) & -(2+7i) & 0\end{bmatrix}$ is

a. skew-Hermitian
b. skew-symmetric and Hermitian
c. skew-symmetric but not skew-Hermitian
d. None of these

236. Let X be a set containing n elements. If two subsets A and B of X are picked at random, the probability that A and B have the same number of elements, is

a. $\frac{^{2n}C_n}{2^{2n}}$ b. $\frac{1}{^{2n}C_n}$ c. $\frac{1.3.5\cdots(2n-1)}{2^n}$ d. $\frac{3^n}{4^n}$

237. A man is known to speak truth 3 out of 4 times. He throws a die and reports that it is a six. Find the probability that it is actually a six.

a. $\frac{3}{7}$ b. $\frac{5}{8}$ c. $\frac{3}{8}$ d. None of these

238. 10 different books and 2 different pens are given to 3 boys so that each gets equal number of things. The probability that the same boy does not receive both the pen is

a. $\frac{5}{11}$ b. $\frac{7}{11}$ c. $\frac{2}{3}$ d. $\frac{6}{11}$

239. A point is selected at random from the interior of a circle. The probability that the point is closer to the centre than the boundary of the circle is

a. $\frac{3}{4}$ b. $\frac{1}{2}$ c. $\frac{1}{4}$ d. None of these

240. A letter is known to have come either from LONDON or CLIFTON; on the postmark only the two consecutive letters ON are legible. The probability that it came from LONDON is

a. $\frac{5}{17}$ b. $\frac{12}{17}$ c. $\frac{17}{30}$ d. $\frac{3}{5}$

241. $\lim\limits_{x\to 0} \frac{(1-\cos 2x)\sin 5x}{x^2 \sin 3x}$ equals

a. $\frac{10}{3}$ b. $\frac{3}{10}$ c. $\frac{6}{5}$ d. $\frac{5}{6}$

242. $\lim\limits_{x\to 0} \frac{a^x - 1}{\sqrt{a+x} - \sqrt{a}}$ is

a. $2\sqrt{a}\ \log a$ b. $\sqrt{a}\ \log a$ c. $\log a$ d. Does not exist

243. $\lim\limits_{x \to 1} \left(\frac{1+x}{2+x}\right)^{\frac{1-\sqrt{x}}{1-x}} =$

a. $\left(\frac{1}{3}\right)$ b. $\left(\frac{1}{3}\right)^{\frac{1}{2}}$ c. $\left(\frac{2}{3}\right)^{\frac{1}{2}}$ d. Does not exist

244. If $f(x) = |x|^{|\sin x|}$, then $f'\left(-\frac{\pi}{4}\right)$ equals

a. $\left(\frac{\pi}{4}\right)^{1/\sqrt{2}} \left(\frac{\sqrt{2}}{2} \ln \frac{\pi}{4} - \frac{2\sqrt{2}}{\pi}\right)$ b. $\left(\frac{\pi}{4}\right)^{1/\sqrt{2}} \left(\frac{\sqrt{2}}{2} \ln \frac{4}{\pi} + \frac{2\sqrt{2}}{\pi}\right)$

c. $\left(\frac{\pi}{4}\right)^{1/\sqrt{2}} \left(\frac{\sqrt{2}}{2} \ln \frac{4}{\pi} - \frac{2\sqrt{2}}{\pi}\right)$ d. $\left(\frac{\pi}{4}\right)^{1/\sqrt{2}} \left(\frac{\sqrt{2}}{2} \ln \frac{\pi}{4} + \frac{2\sqrt{2}}{\pi}\right)$

245. The expression of $\frac{dy}{dx}$ of the function $y = a^{x^{a^{x^{\cdot^{\cdot^{\cdot^{\infty}}}}}}}$ is

a. $\frac{y^2}{x(1 - y \log x)}$ b. $\frac{y^2 \log y}{x(1 - y \log x)}$ c. $\frac{y^2 \log y}{x(1 - y \log x \log y)}$ d. $\frac{y^2 \log y}{x(1 + y \log x \log y)}$

246. If $f(x) = (x + 1) \tan^{-1}(e^{-2x})$, then $f'(0)$ is

a. $\frac{\pi}{2} + 1$ b. $\frac{\pi}{4} - 1$ c. $\frac{\pi}{6} + 5$ d. None of these

247. If $x = \sin^{-1}\left(2t\sqrt{1-t^2}\right)$ and $y = \frac{\pi}{2} - \cos^{-1} t$, then, the value of $\frac{d^2y}{dx^2}$ at $t = \frac{\pi}{3}$ is

a. 0 b. $\frac{1}{2}$ c. 1 d. None of these

248. x + 4y = 80, then the numbers x and y such that xy is maximum, is

a. 16, 16 b. 32, 12 c. 40, 10 d. 52, 7

249. The value of $\int \frac{ax^2 - b}{x\sqrt{c^2x^2 - (ax^2+b)^2}}\,dx$ is

a. $\sin^{-1}\left(\frac{ax + \frac{b}{x}}{c}\right) + k$ b. $\sin^{-1}\left(\frac{ax^2 + \frac{b}{x^2}}{c}\right) + k$

c. $\cos^{-1}\left(\frac{ax + \frac{b}{x}}{c}\right) + k$ d. $\cos^{-1}\left(\frac{ax^2 + \frac{b}{x^2}}{c}\right) = k$

250. $\int e^{\tan^{-1}x}\left(\frac{1+x+x^2}{1+x^2}\right)dx =$

a. $xe^{\tan^{-1}x} + C$ b. $x^2e^{\tan^{-1}x} + C$ c. $\frac{1}{x}e^{\tan^{-1}x} + C$ d. None of these

Direction for questions 251 and 252: Complete the following series.

251. 268 (29) 210
218 (?) 166

a. 25 b. 42 c. 26 d. 29

252. 5, 9, 15, ?, 33, 45, 59

a. 24 b. 22 c. 20 d. 23

Direction for questions 253 to 255: Each of the following number series contains a wrong number. Find out that number.

253. 17, 29, 53, 101, 199, 389, 773

a. 29 b. 53 c. 101 d. 199

254. 18, 46, 102, 212, 438, 886, 1782

a. 46 b. 102 c. 212 d. 438

255. 98, 61, 37, 21, 12, 8, 7

a. 61 b. 37 c. 21 d. 12

256. Pallavi and Richa start simultaneously from P and Q towards Q and P respectively. They meet on the way at T which is at a distance of 120 m from P. If Pallavi and Richa take 16 s and 25 s to reach their respective destinations from T, then what is the distance between P and Q?

a. 214 m b. 200 m c. 240 m d. 216 m

257. Excluding the stoppages, the speed of a bus is 54 km/hr and including the stoppages, it is 45 km/hr. For how many minutes does the bus stop per hour?

a. 12 min b. 10 min c. 17 min d. 15 min

258. I had to reach Rampur, which is 18 km away. After walking a few kilometres at 4 km/hr, I changed my speed to 3 km/hr. If I took 5 hr to reach Rampur, at what distance from Rampur, I changed my speed?

a. 9 km b. 3 km c. 12 km d. 6 km

Direction for questions 259 and 260: Answer the questions based on the following information given below. A and B are running (in the same direction) on a circular track of length 1 km. In a 50 m race A can give B a start of 100 m.

259. If both A and B start simultaneously on the circular track, then after how many rounds of A would the two be together for the first time?

a. 3 rounds b. 4 rounds c. 5 rounds d. 7 rounds

260. When A meets B for the first time, B has made three rounds. What is the lead that B gives to A?

a. 250 m b. 750 m c. 400 m d. 600 m

261. If **a** and **b** are two vectors such that **a**.**b** = 0 and **a** $\times$ **b** = **0**, then

a. **a** is parallel to **b** b. **a** is perpendicular to **b**

c. Either **a** or **b** is a null vector d. None of these

262. If a and b are unit vectors and θ is the angle between them, then

a. $\cos\frac{\theta}{2}=\frac{1}{2}|a-b|$ b. $\sin\frac{\theta}{2}=\frac{1}{2}|a-b|$ c. $\tan\frac{\theta}{2}=\frac{1}{2}|a-b|$ d. $\cot\frac{\theta}{2}=\frac{1}{2}|a-b|$

263. If **a** and **b** are unit vectors such that **a** $\times$ **b** is also a unit vector, then the angle between **a** and **b** is

a. 0 b. $\frac{\pi}{3}$ c. $\frac{\pi}{2}$ d. π

264. If **a** = (1, –1, 1) and **c** = (–1, –1, 0), then the vector **b** satisfying **a** $\times$ **b** = **c** and **a**.**b** = 1 is

a. (1, 0, 0) b. (0, 0, 1) c. (0, –1, 0) d. None of these

265. Two planes are perpendicular to one another. One of them contains vectors **a** and **b** and the other contains vectors **c** and **d**, then (**a** $\times$ **b**).(**c** $\times$ **d**) =

a. 1 b. 0 c. [**abc**] + [**bcd**] d. [**bcd**] + [**acd**]

266. If DELHI is given the number code 38, what is the difference between codes of MUMBAI and BOMBAY?

a. 2 b. 1 c. 0 d. 5

267. PREMONITION is coded 68530492904. How will you write MONITOR?

a. 1234567 b. 3049208 c. 3029408 d. 3049258

268. If $\sqrt[3]{3^a} = 5^{1/4}$ and $\sqrt[4]{5^b} = \sqrt{3}$, then the value of ab is

a. 3 b. $\frac{3}{4}$ c. 9 d. $\frac{3}{2}$

269. There are X consecutive integers and the largest of these integers is N. Thus, the third number from the beginning would be

a. N – X + 5 b. N – X – 1 c. N – X + 2 d. N – X + 3

270. Let $u_{n+1} = 2\ u_n + 1$ (n = 0,1, 2, ...) and $u_0 = 0$. Then u_{10} is nearest to

a.1023 b. 2047 c. 4095 d. 8192

Section – V

271. All of the following measures hardness of a material except
a. Brinell Hardness Number b. Knoop Hardness Number
c. Poisson Hardness Scale c. Mohs Hardness Scale

272. SixSigma practice as followed by corporations such as GE, Motorola and others means
a. 99.73% error-free output b. 99.999% error-free output
c. 0.9 defects per million opportunities d. 3.4 defects per million opportunities

273. A robot cannot be
a. programmable b. mobile c. intelligent d. reliable

274. Two blocks of masses 10 kg and 4 kg are connected by a spring of negligible mass and placed on a frictionless horizontal surface. An impulse gives a velocity of 14 m/s to the heavier block in the direction of the lighter block. The velocity of the centre of mass is
a. 30 m/s b. 20 m/s c. 10 m/s d. 5 m/s

275. A motor rated at 0.5 HP runs at a speed of 900 rpm. If the work done by the motor in one rotation is 9.95 J, find the efficiency of the motor.
a. 50% b. 90% c. 25% d. 40%

276. Newton's law of cooling is a special case of
a. Planck's law b. Carnot's law c. Stefan's law d. Kirchhoff's law

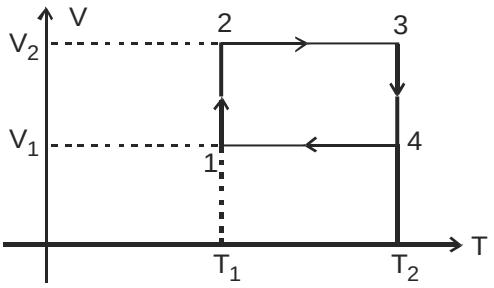
277. A steel wire of length 2 m is stretched through 4 mm. The cross-sectional area of the wire is 2 mm^2. The elastic potential energy stored in the wire in the stretched condition is [Young's modulus of steel = 2×10^{11} N/m^2]
a. 0.8 J b. 3.2 J c. 1.6 J d. 1.0 J

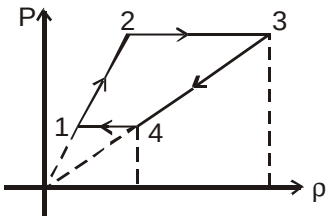
278. A boat carrying a number of stones is floating in a lake. If all the stones are unloaded into water in the lake, the water level of the lake will
a. remain unchanged
b. fall
c. rise
d. rise or fall depending upon the number of stones unloaded

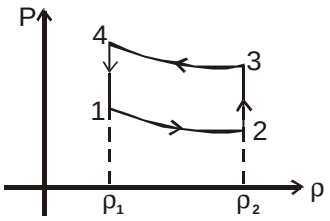
279. The temperature of a room heated by a radiator is 20°C when the outside temperature is –20°C and it is 10°C when the outside temperature is –40°C. The temperature of the radiator is
a. 60°C b. 90°C c. 50°C d. 70°C

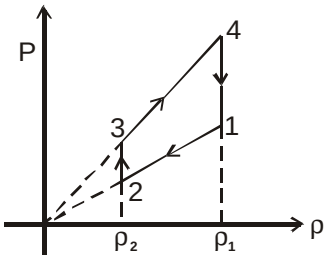
280. If the angle of friction is $\cos^{-1}(0.6)$, find the coefficient of friction.
a. 0.75 b. 1.33 c. 0.6 d. Cannot be determined

281. An ideal gas has been subjected to an isothermal–isochoric cycle 1 – 2 – 3 – 4 – 1 as shown in the figure. The same cycle in the P-ρ (pressure-density) coordinates is



a.


b.


c.


d. None of these

282. The force required to punch a hole of 2 cm square in a steel sheet of 1.8 mm thickness (shearing strength = 3.5×10^8 N/m^2) will be

a. 7×10^4 N b. 5.04×10^4 N c. 5.6×10^4 N d. 1.26×10^4 N

283. In the ISO system, screw thread is designated as M4 × 0.7. What does 0.7 represent?

a. Minor diameter b. Pitch of thread c. Major diameter d. Depth of thread

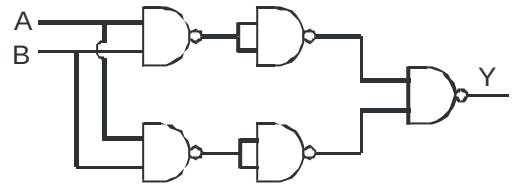
284. A diesel engine is also known as a

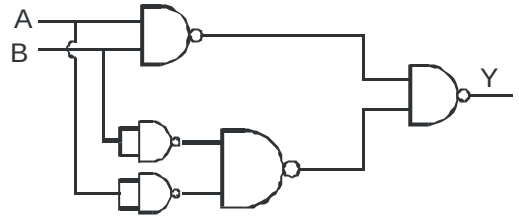
a. external combustion engine
b. reciprocating compression ignition engine
c. reciprocating spark ignition engine
d. gasoline engine

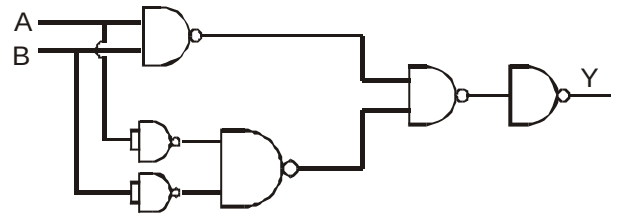
285. Fuel cells are

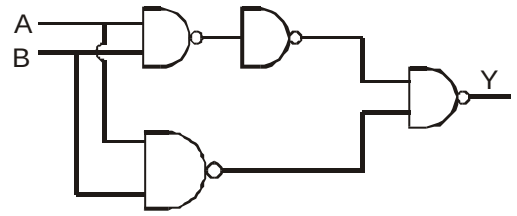
a. electronic devices
b. electromechanical devices
c. electrochemical devices
d. metallic devices

286. Realize X-NOR using NAND gates.

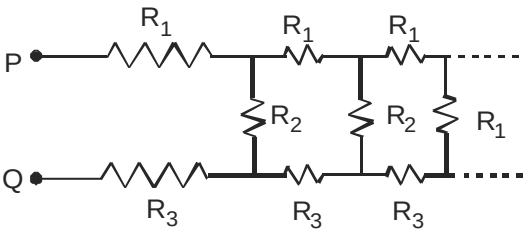
a. 

b. 

c. 

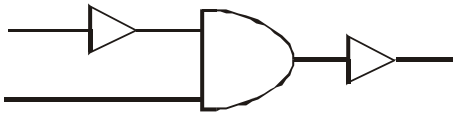
d. 

287. Find the resistance of the current between hour P and Q. Given $R_1 = 1\ \Omega$, $R_2 = 2\ \Omega$ and $R_3 = 3\ \Omega$

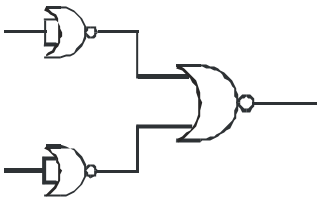


a. $2 + 2\sqrt{3}$ b. $2 - 2\sqrt{3}$ c. Both a and b c. None of these

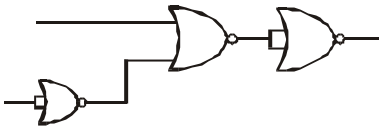
288. Realize the following circuit using NOR gates.



a.

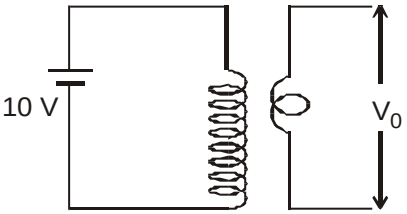


b.



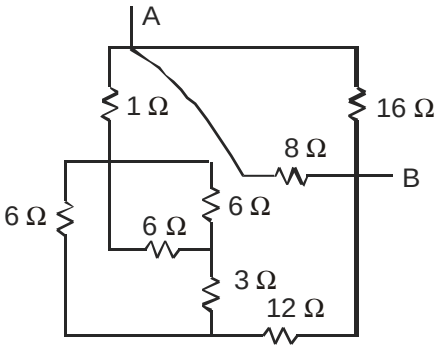
c. Both of (a) and (b)
d. None of these

289. A step-down transformer having turn ratio 10 : 1 has dc power supply of 10 V at its primary, find the voltage at secondary after 15 s.



a. 0 V b. 10 V c. 5 V d. 1 V

290. Find the equivalent resistance between point A and B.



a. 8 b. 12 c. 15 d. 4

291. Convert $(4372)_8$ to hexadecimal number.

a. $(8EA)_{16}$ b. $(8FA)_{16}$ c. $(ZEB)_{16}$ d. $(8AA)_{16}$

292. Which one of the following is a system software?
a. Oracle b. Solaris c. Maya d. dBase

293. In Boolean algebra, A + B + A = ?
a. A b. B c. A + B c. 1

294. In hexadecimal number system, the difference between largest four-digit number and smallest non-negative number is
a. 9999 b. AAAA c. FFFE d. FFFF

295. Evaluate

$$\begin{array}{r} (437)_9 \\ (347)_9 \\ +(743)_9 \\ \hline (\quad)_9 \end{array}$$

a. $(638)_9$ b. $(568)_9$ c. $(1527)_9$ d. $(1638)_9$

296. Divide $(10001111)_2$ by $(1101)_2$
a. $(1101)_2$ b. $(1011)_2$ c. $(1001)_2$ d. $(1110)_2$

297. In the CPU, the result of an arithmetic operation will be first available in
a. program counter b. memory c. accumulator d. disc

298. Language C was developed by which of the following companies?
a. Sun Microsystem b. AT&T Bell c. Microsoft d. IBM

299. Which of the following is a fastest access memory?
a. ROM b. RAM c. Cache memory d. PROM

300. Pick the odd one out from the following.
AIX, HP–VX, ULTRIX, SOLARIS
a. AIX b. SOLARIS c. ULTRIX d. None of these

NITIE - FLT

Answers & Explanations

1	b	2	b	3	c	4	d	5	a	6	d	7	a	8	d	9	b	10	b
11	c	12	b	13	b	14	c	15	c	16	b	17	c	18	a	19	b	20	b
21	b	22	c	23	d	24	c	25	c	26	b	27	b	28	c	29	b	30	a
31	d	32	c	33	c	34	d	35	c	36	c	37	b	38	b	39	b	40	a
41	b	42	a	43	d	44	c	45	c	46	c	47	d	48	d	49	b	50	c
51	b	52	c	53	c	54	d	55	b	56	b	57	c	58	a	59	c	60	b
61	c	62	b	63	d	64	a	65	c	66	d	67	c	68	b	69	a	70	c
71	c	72	a	73	d	74	c	75	d	76	b	77	c	78	a	79	d	80	b
81	a	82	b	83	d	84	a	85	d	86	b	87	a	88	b	89	d	90	c
91	d	92	c	93	b	94	d	95	a	96	b	97	c	98	d	99	a	100	a
101	d	102	d	103	c	104	b	105	b	106	d	107	c	108	c	109	a	110	c
111	c	112	b	113	c	114	c	115	b	116	b	117	d	118	b	119	c	120	c
121	d	122	b	123	c	124	a	125	b	126	c	127	c	128	d	129	a	130	b
131	d	132	d	133	b	134	c	135	c	136	a	137	d	138	b	139	d	140	a
141	b	142	a	143	d	144	d	145	b	146	c	147	a	148	d	149	a	150	b
151	c	152	c	153	d	154	b	155	c	156	d	157	b	158	c	159	b	160	a
161	d	162	b	163	a	164	a	165	c	166	a	167	b	168	b	169	a	170	c
171	b	172	d	173	c	174	a	175	c	176	d	177	b	178	c	179	b	180	c
181	a	182	b	183	b	184	c	185	c	186	b	187	a	188	c	189	c	190	a
191	a	192	a	193	c	194	b	195	a	196	d	197	c	198	b	199	a	200	d
201	a	202	c	203	a	204	c	205	b	206	a	207	a	208	d	209	b	210	c
211	b	212	c	213	b	214	c	215	a	216	a	217	a	218	b	219	d	220	b
221	d	222	a	223	a	224	c	225	a	226	a	227	d	228	d	229	a	230	b
231	d	232	b	233	d	234	a	235	c	236	a	237	c	238	a	239	c	240	b
241	a	242	a	243	c	244	c	245	c	246	b	247	a	248	c	249	a	250	a
251	c	252	d	253	d	254	c	255	a	256	d	257	b	258	d	259	c	260	a
261	c	262	b	263	c	264	b	265	b	266	b	267	b	268	d	269	d	270	a
271	c	272	d	273	c	274	c	275	d	276	c	277	c	278	b	279	a	280	b
281	c	282	b	283	b	284	b	285	c	286	b	287	a	288	b	289	a	290	b
291	b	292	b	293	c	294	d	295	d	296	b	297	c	298	b	299	c	300	d

Scoring table

Total questions	Total attempted	Total correct	Total wrong	Score	Time taken
300					

61. Flounder means to struggle, grope and blunder and is related to failing in the performance of a task.

62. A person who is embroiled in an issue is deeply involved, inextricably.

63. A riveting movie will be very engrossing and hence exciting.

64. Stellar is something having the qualities of a star, and hence excellent.

65. Skulduggery is trickery or unscrupulous behaviour or deception.

66. Anything striking is impressive and attracting attention – not plain.

67. Demystify is to clarify obscure beliefs or subjects, and to cloud is to make unclear by confusing the issue.

68. Preposterous is absurd, contrary to reason – not reasonable.

69. Somnolent is dull or sleepy and perky is lively or cheerful.

70. Plaintive is expressing sorrow, mournful or piteous – not really happy and carefree.

71. Histrionic means 'suitable for acting or the theatre'. Similarly, forensic means 'suitable to debate or a court of law'.

72. Captious (meaning 'fault-finding') and tolerant are antonyms. Notorious meaning 'known unfavourably' and renowned are also antonyms.

73. An employee works for wages. An entrepreneur works for profits.

74. A thesis is based on propositions that one attempts to formally prove. A dissertation is based on ideas that one attempts to formally convey.

75. Dissolute meaning 'loose in morals' and continent meaning 'restrained' or 'in control' are antonyms.

76. The second word is a characteristic of the first.

77. An epiphany is a Christian festival just as a dirge is a mournful song.

78. A guarantor provides a surety just as an underwriter provides insurance.

79. Sallow is a yellowish pale complexion just as ruddy is a reddish complexion.

80. A warren is a maze of paths just as circuitous is an indirect route.

81. Since children of alcoholics tend to be alcoholics, they must have been born with a predisposition for the disease.

82. *Tears* go with *smiles* and *the past* with *memories.*

83. *Rancour* meaning *anger* goes with *rip.*

84. Steely-eyed is used to describe strong or negative feelings and withering here means deprive of vigour and vitality.

85. *Fierceness* and *calmness* are opposite words that apply in the *wild-captivity* conditions.

86. *Stress* is to emphasize upon healthy habits.

87. *Small* and *bigger* give the opposite effect.

88. *Heavily* and *high* describe the gravity of the cause-effect.

89. A flow is continuous and a spring is an underground source of water.

90. *Renegade* and *responsible* give the opposite effect.

91. 'It take' in (a); 'for realize' in (b); and 'yours own ignorance' in (c) are wrong. Hence (d) is the correct answer.

92. 'a acclaimed interpreter' in (a); no 'that' in 'is that rare prodigy' in (b); and "matured in a world-class musician" in (d) are wrong. Hence, (c) is the correct answer.

93. 'exist vessels' in (a)' 'net work' in (c); and 'vessel' in (d) are wrong. Hence (b) is the correct answer.

94. 'brides' in (a); 'senses' in (b); and 'ultimate' in (c) are wrong. Hence (d) is the correct answer.

95. 'burden' without 'a' in (b); 'expecting' in (c); and 'find out that living' in (d) are wrong. Hence (a) is the correct answer.

96. "Subsistent" in (a); 'in side' in (c); and 'ecology' in (d) are wrong. Hence (b) is the correct answer.

97. 'thinkable' in (a); 'reveal' in (b); and 'query' instead of 'quest' in (d) are wrong. Hence (c) is the correct answer.

98. 'actual' in (a); 'writing down' in (b); and 'at' instead of 'what' in (c) are wrong. Hence (d) is the correct answer.

99. 'be' in (b); 'it's' in (c); and 'gene' in (d) are wrong. Hence (a) is the correct answer.

100. 'a children' in (b); 'expend' in (c); and 'stable' in (d) are wrong. Hence (a) is the correct answer.

101. Refer to the first paragraph.

102. Refer to paragraph 3.

103. The correct answer is (c) as the company was forcing employees to make a Hobson's choice.

104. The correct answer is (b) as is demonstrated by the comment of the male line supervisor in paragraph 2.

105. The correct answer is (b) as the female employees bore the abuse of power for as long as they did because they wished to retain their jobs.

106. The correct answer is (d) as the passage describes the sequence of events.

107. Refer to paragraph 9.

108. Refer to paragraph 4.

109. Refer to paragraph 10.

110. The Utopian approach is the Green's perception. (Paragraphs 1 and 2)

111. Refer to the last paragraph.

112. Refer to the last paragraph.

113. Refer to the last paragraph.

114. Refer to paragraph 2.

115. Refer to paragraph 4.

116. Refer to paragraph 5.

117. Refer to paragraph 5.

118. Refer to paragraph 7.

119. Refer to paragraph 6.

120. Refer to the last paragraph.

121. The alphabets are rearrange in a specific order, i.e. first alphabet moves to the seventh place, second moves to the third place and so on ….

122. We know that second is a unit of time and 'time' is called 'minute' in this code language.

123. Since '+' $\rightarrow$ '×', '×' $\rightarrow$ '÷', '÷' $\rightarrow$ '–' and '–' $\rightarrow$ '+', the given expression will be coded as $3 \times \frac{5}{3} - \left(\frac{7}{3} + 2\right) \div \left(\frac{2}{3} + 1\right)$

$= 5 - \frac{13}{3} \div \frac{5}{3}$

$= 5 - \frac{13}{3} \times \frac{3}{5} = \frac{25 - 13}{5} = \frac{12}{5}$.

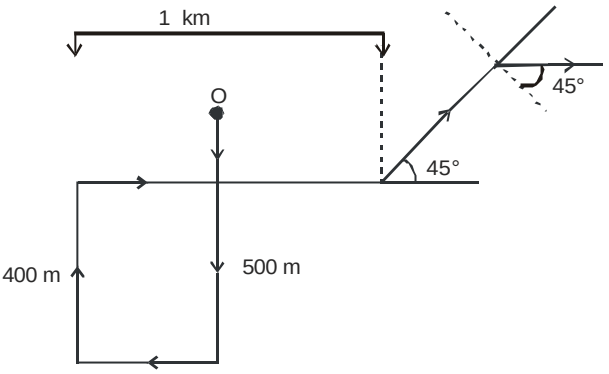
124. Since '+' $\rightarrow$ '–', '×' $\rightarrow$ '+', '÷' $\rightarrow$ '×' and '–' $\rightarrow$ '÷', the given mathematical expression will be coded as

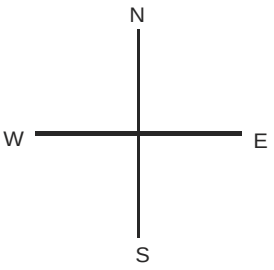
$\left\{\left(\frac{27}{7} + \frac{8}{7}\right) \times \frac{7}{5}\right\} \div 7 - 1$

$= \left\{\frac{27 + 8}{7} \times \frac{7}{5}\right\} \div 7 - 1$

$= \frac{35}{5} \div 7 - 1 = 7 \div 7 - 1 = 1 - 1 = 0.$

125. Let the initial and final point of the path travelled by the cyclist be O and F respectively. The path travelled by the cyclist is shown in the following figure.





We can easily see, that finally the cyclist was travelling in the east direction.

126. Total number of students = 35 + 7 – 1
= 42 – 1 = 41.

127. Letters at first, third, fifth, sixth and eighth positions are R, G, L, A and E. The words that can be formed using these letters are REGAL, GLARE, and LARGE.
So we mark M as the answer.

128. Letters are coded at an interval of +10, +9, +8 ..., +1 letters.

129.

Y B Z A R S H I J K L M T U V G F E W X C D Q P O N

Eighth letter to the left	Fifth letter to the right	Sixteenth letter to the right

130. The changed series is

1 B 2 A 3 S 4 I 5 K 6 M 7 U 8 G 9 E 10 X 11 D 12 P 13 N

Fourteenth character to the left	Fifth character from the left	Eleventh character to the right

131. Choice (d) is the correct answer as the logic is each letter of every sequence of three letters, is separated by 2 letters between them.

132. The reversed series is

N O P Q D C X W E F G V U T M L K J I H S R A Z B Y

Twentieth letter from the right	Fifth letter to the left	Seventeenth letter to the right

133. The letters are I, U, D, Q. Meaningful word using these letters is QUID. Thus, the correct choice is (b).

134. All of them are different countries. Hence, answer is (c).

135. Newspaper, television and radio are three different branches of the media. Hence answer is (c).

136. Some diplomats are bureaucrats. Some bureaucrats can be advocates and some advocates are diplomats. Hence answer is (a).

137. Both mangoes and pomegranates are all different types of fruits. Hence, answer is (d).

138. Herbivores and Carnivores are two different groups of animals. Tiger belongs to the group of Carnivores. Hence answer is (b).

Questions 139 to 143:

The word with the least number of letters interchanges its position with the first word of the input in the first step. If two or more words have the same number of letters, then the one that comes first in dictionary interchanges its position with the first word. Finally, the machine arranges the word in an order in which words with lesser number of letters come first and if they have same numbers of letters then the words are arranged in alphabetical order. In the second step the appropriate word interchanges its position with the second word. The process goes on till they get arranged in the required order.

139. Previous steps cannot be determined.

140. Input: India is willing to strengthen its dealing.
Step I: is India willing to strengthen its dealing.
Step II: is to willing India strengthen its dealing.
Step III: is to its India strengthen willing dealing.
Step IV: is to its India dealing willing strengthen.

141. Input: pick me to clean five head heal.
Step I: me pick to clean five head heal.
Step II: me to pick clean five head heal.
Step III: me to five clean pick head heal.
Step IV: me to five head pick clean heal.

142. Step I: am till do still can care.
Step II: am do till still can care.
Step III: am do can still till care.
Step IV: am do can care till still.

143. Step II: of ear east Delhi then that free.
Step III: of ear east free then that Delhi.
Step IV: of ear east free that then Delhi.
Step IV: is the last step.

144. Here none of the conclusions follows. I does not follow as some copies are files + No file is a dictionary would be $\rightarrow$ Some copies are not dictionaries. And some books are copies + Some copies are files would not result in anything. II and IV also do not follow. Hence, none follows.

145. Only II and III follow. From all hotels are restaurants we get the implication that some restaurants are hotels. And from some banks are hotels + All hotels are restaurants, we get some banks are restaurants as the outcome. I and IV do not follow in anyway. Hence, choice (b) is the answer.

146. Here no conclusion follows individually, but conclusion II and IV from a complementary pair. Therefore, choice (c) is the answer.

147. Only conclusion II follows and not rest of them individually, but conclusion I and III do form a complementary pair. Hence, choice (a) is the answer.

148. Choice (d) is the correct option as some radios are newspapers + All newspapers are magazines $\rightarrow$ Some radios are magazines whose conversion will give some magazine are radios. Rest of the conclusions do not follow individually.

149. I follows as it is clearly given in the statement that Gagan Sharma won the first prize. So we can conclude that he is a good player. II certainly does not follow because it is not mentioned in the statement whether any student of B. D. Public School won or even participated in the game, moreover the given information is not enough to safely conclude the second conclusion.

150. I does not follow as it is not the issue being discussed in the passage. II follows definitely as Kamna was regularly selected as the monitor or the headgirl, so she must at least have good leadership qualities.

151. I does not follow because we are not allowed to use any extra information except that given in the statement while solving these questions. It is clear from the statement that the two players played really well but this cannot imply that they won also. So even II does not follow.

152. I does not follow as we cannot decide from the statement that TVS motors is a non-Japanese company. Also, according to the statement, a very few non-Japanese companies have received the award earlier. So this is not the first company. II does not follow because we cannot say anything about the judges. It may be possible that Japanese companies really deserve the award.

153. Both follow. They are implied clearly from the tone of the passage.

154. I is not implicit. It is actually an inference of the given statement. Clearly, II is implicit.

155. None is implicit. I because we cannot predict the results of the drive before its implementation. II is not implicit because it is certainly wrong to state that the move is not advantageous.

156. I is implicit because it is given in the statement that MCD is looking for financial help from external sources, so it is obvious that it is facing a shortage of finance.
II is also implicit because preparing a fresh proposal means earlier proposals were not good enough or there were certain other problems related to them.

157. I is too much to be considered as an assumption. So it is not implicit. II is implicit because it is mentioned in the statement that the health department has extended pulse polio immunisation programme by five days.

158. I is not implicit as 'always' makes it doubtful. II is again not implicit as nothing is mentioned about the earnings of the traders.

159. I is not the right course of action because the electricity supply is being affected due to a genuine problem and it has been announced in the newspaper, so complaining about it will not solve the problem. II is the right course of action.

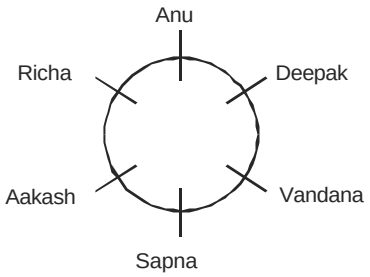
160. I definitely follows as this will certainly help in reducing the mental pressure on students. II is not the right course of action. Banning board examinations is not a very practical idea.

161. Both follow. I because growing trees will certainly help in solving the problem. II also follows. The measures will arrest global warming in the long run.

162. I definitely does not follow because use of DDT is banned nowadays and then killing mosquitoes cannot help to resolve the problem because they will come again if a proper action is not taken to cover the drains. Therefore, II follows.

163. I is clearly the appropriate course of action. II does not follow because the problem given in the statement is the lack of educational facilities. It is not at all given that children of these villages are not interested in studying.

Questions 164 to 168:
The sitting arrangement can be depicted in the following manner.



On the basis of the above diagram, rest of the questions can be solved very easily.

Questions 169 to 173:
All the above questions can be answered using the table below that we finally arrive at after analysing the given information.

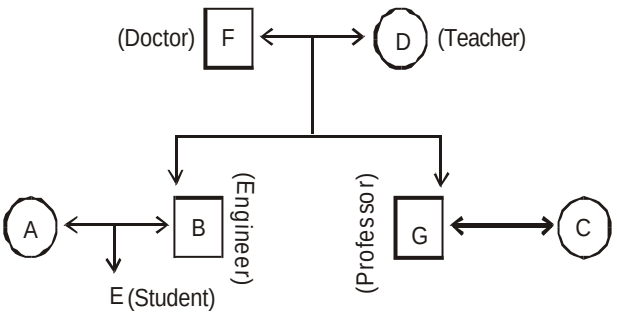
Name	Dance	Place
Lakshmi	Bharatnatyam	Maharashtra
Madhumati	Kathakali	Orissa
Rani	Kuchipudi	Karnataka
Rohini	Western	Gujarat
Asha	Kathak	M.P.
Kriti	Garba	U.P.

Using (i) and (iii), we have
Asha—Kathak—M.P. as one of the combinations. … (A)
Using (ii), (iv) and (A), we get
Rani—Kuchipudi—Karnataka … (B)

Since now Lakshmi and Madhumati both either know Kathakali or Bharatnatyam, the options left for Rohini and Kriti are Garba and Western. So using (v), i.e. Rohini knows western implies Kriti knows Garba. Again using (v), Lakshmi knows Bharatnatyam whereas Madhumati knows Kathakali.

Using (A), (B), (ii) and (vi), Lakshmi belongs to Maharashtra and Rohini belongs to Gujarat.

Questions 174 to 178:
The family tree can be drawn using the information given. It is as follows.



Either A and C are housewife and lawyer. We are not sure who is which.
All the questions can be answered using this tree.

Questions 179 to 183:

179. Data given is inadequate. The subject taught and classes are not mentioned while giving the details of his working experience. So answer is choice (b).

180. The candidate does not have B. Ed. degree but secured 65% marks in M. A. (mathematics). So using (A), the answer is choice (c).

181. She will be selected because she fulfils all the conditions.

182. The candidate does not fulfil conditions (III) and (IV), so he won't be selected.

183. Data given is not adequate. Nothing is mentioned about her communication skills and fluency in English. So answer is (b).

184. 'The sister of his father is the sister of person's mother', implies 'Person's mother is also the sister of man's father'. So it is clear that the person is the man's cousin.

185. 'Parental grandmother of the sister of my father' means 'parental grandmother of my father'. Now daughter-in-law of the parental grandmother of my father is the mother of my father as my father is the only son of his parents. So the lady is the old woman's grandmother.

186. As Bhuj was the most affected area, so it is possible that Bhuj was also the epicentre of the earthquake. So it is probably true.

187. It is given clearly in the passage that earthquake rocked on republic day, i.e. January 26 and the defence minister gave his speech on January 30, 2001. So it is definitely true that the earthquake hit Gujarat on January 26, 2001.

188. The last line of the passage 'But its structures were just not earthquake proof' implies that those structures can be made earthquake proof. So there are ways to reduce the damage. So the statement is definitely false.

189. Nothing is mentioned about the government's concern for the sufferers. So the statement is definitely false.

190. As it is given in the passage that the earthquake measuring whopping 6.9–7.9 on richter scale in Gujarat caused a severe damage in that area, so obviously the statement is definitely true.

191. I is a strong argument because as English is a widely spoken language, students must be encouraged to learn it. II is not a strong argument because this is certainly not a good reason of making a subject like English optional. Other approaches can be applied to reduce the burden on children.

192. I is valid as it ia a strong argument. II is not valid as it is a very biased view. We cannot say that it will give rise to the number of unemployed peole.

193. None is strong as they are not supported by persuasive reasons.

194. II is a valid argument as it is supported by strong and correct reasons. I is not valid as 'taking care of all the problems' is not government's concern for sure.

195. I is a strong argument as it is supported by correct and valid reasoning. II is not a very strong argument in the context of the statement given.

196. The minimum value of $ax^2 + bx + c$ as well as the minimum value of $ap^2 + bp + c$ depend on a, b, c.
$\therefore$ The minimum value of the expression $ax^2 + bx + c$ is 8.

197. The given equation is $x^4 - 5x^3 + 7x^2 + 7x + 11 = 0$.
Let the required equation be
$A_0x^4 + A_1x^3 + A_2x^2 + A_3x + A_4 = 0$.
The coefficient A_0, A_1, A_2, A_3 are obtained by synthetic division

3	1	–5	7	7	11
		3	–6	3	30
	1	–2	1	10	$41 = A_4$
		3	3	12	
	1	1	4	$22 = A_3$	
		3	12		
	1	4	$16 = A_2$		
		3			
	1	$7 = A_1$			
	$1 = A_0$				

$\therefore$ The required equation is
$x^4 + 7x^3 + 16x^2 + 22x + 41 = 0$

198. The given equation is $x^4 + px^3 + qx^2 + rx + s = 0$.
Here $\Sigma\alpha = -p$, $\Sigma\alpha\beta = q$, $\Sigma\alpha\beta\gamma = -r$, $\alpha\beta\gamma\delta = s$.

$$\therefore \Sigma\frac{\alpha}{\beta} = \alpha\left(\frac{1}{\beta}+\frac{1}{\gamma}+\frac{1}{\delta}\right)+\beta\left(\frac{1}{\alpha}+\frac{1}{\gamma}+\frac{1}{\delta}\right)+$$

$$\gamma\left(\frac{1}{\alpha}+\frac{1}{\beta}+\frac{1}{\delta}\right)+\delta\left(\frac{1}{\alpha}+\frac{1}{\beta}+\frac{1}{\gamma}\right)$$

$$= \left[\alpha\left(\frac{1}{\alpha}+\frac{1}{\beta}+\frac{1}{\gamma}+\frac{1}{\delta}\right)-1\right]+\left[\beta\left(\frac{1}{\alpha}+\frac{1}{\beta}+\frac{1}{\gamma}+\frac{1}{\delta}\right)-1\right]$$

$$+\left[\gamma\left(\frac{1}{\alpha}+\frac{1}{\beta}+\frac{1}{\gamma}+\frac{1}{\delta}\right)-1\right]+\left[\delta\left(\frac{1}{\alpha}+\frac{1}{\beta}+\frac{1}{\gamma}+\frac{1}{\delta}\right)-1\right]$$

$$= (\alpha+\beta+\gamma+\delta)\left(\frac{1}{\alpha}+\frac{1}{\beta}+\frac{1}{\gamma}+\frac{1}{\delta}\right)-4 = \Sigma\alpha.\Sigma\frac{1}{\alpha}-4$$

$$= \Sigma\alpha\left(\frac{\Sigma\alpha\beta\gamma}{\alpha\beta\gamma\delta}\right)-4 = (-p)\frac{(-r)}{s}-4 = \frac{pr-4s}{s}$$

199. If we put –x in place of x.
The expression will be $-2x^3 + 6x^2 - x + 5 = 0$.
In this expression, sign is changed three times.
Hence, all three roots are real.

200. We have $ax + by = 1 \Rightarrow y = \frac{1-ax}{b}$

Putting this value in the second equation, we get

$$cx^2 + \frac{d}{b^2}(1-ax)^2 = 1$$

$\Rightarrow (b^2c + a^2d)x^2 - 2adx + d - b^2 = 0$ ... (i)
This quadratic equation will have equal roots if
$D = 4a^2d^2 - 4(b^2c + a^2d)(d - b^2) = 0$
$\Rightarrow -4b^2cd + 4b^4c + 4a^2b^2d = 0$

$$\Rightarrow \frac{a^2}{c} + \frac{b^2}{d} = 1$$

201. The sequence of differences between successive terms is 2, 6, 18, 54, ... Clearly, it is a GP. Let T_n be the nth term of the given series and S_n be the sum of its n terms. Then

$S_n = 5 + 7 + 13 + 31 + 85 + ... + T_{n-1} + T_n$ ...(i)
Also $S_n = 5 + 7 + 13 + 31 + ... + T_{n-2} + T_{n-1} + T_n$ ...(ii)
Subtracting (ii) from (i), we get
$0 = 5 + [2 + 6 + 18 + 54 + \cdots + (T_n - T_{n-1}) - T_n]$

$$\Rightarrow 0 = 5 + 2\frac{(3^{n-1}-1)}{(3-1)} - T_n \Rightarrow T_n = 5 + (3^{n-1} - 1) = 4 + 3^{n-1}$$

$$\therefore S_n = \sum_{k=1}^{n} T_k = \sum_{k=1}^{n} (4 + 3^{k-1}) = \sum_{k=1}^{n} 4 + \sum_{k=1}^{n} 3^{k-1}$$

$$\Rightarrow 4n + (1 + 3 + 3^2 + \cdots + 3^{n-1}) = 4n + 1 \times \left(\frac{3^n - 1}{3 - 1}\right)$$

$$= 4n + \left(\frac{3^n - 1}{2}\right) = \frac{1}{2}[3^n + 8n - 1]$$

202. x, 1, z are in AP $\Rightarrow 2 = x + z$
x, 2, z are in GP $\Rightarrow 4 = xz$ ... (i)
(i) does not satisfy $8 = x + z$ and $16 = xz$ but it satisfies $4 = \frac{2xz}{x+z}$ $\therefore$ x, 4, z are in HP.

203. $$\frac{3 + 5 + 7 + ... + \text{n terms}}{5 + 8 + 11 + ... + 10 \text{ terms}} = 7$$

$$\Rightarrow \frac{\frac{n}{2}[6 + (n-1)2]}{\frac{10}{2}[10 + (10-1)3]} = 7 \Rightarrow \frac{n[n+2]}{5[37]} = 7$$

$\Rightarrow n^2 + 2n = 35 \times 37$
$\Rightarrow (n + 37)(n - 35) = 0 \Rightarrow n = 35$

204. The rth term of the series is given by
$t_r = (2r - 1)(2r + 1)(2r + 3) = 8r^3 + 12r^2 - 2r - 3$
Therefore, S_n, the sum to n terms of the series, is given by

$$S_n = 8\sum_{r=1}^{n} r^3 + 12\sum_{r=1}^{n} r^2 - 2\sum_{r=1}^{n} r - 3n$$

$= 2n^2(n + 1)^2 + 2n(n + 1)(2n + 1) - n(n + 1) - 3n$
$= n(2n^3 + 4n^2 + 2n + 4n^2 + 6n + 2 - n - 1 - 3)$
$= n(2n^3 + 8n^2 + 7n - 2)$

Alternative method:
We have
$(2r + 5)t_r = (2r - 1)(2r + 1)(2r + 3)(2r + 5)$
$= (2r - 1)\, t_{r+1} \Rightarrow 8t_r = (2r - 1)\, t_{r+1} - (2r - 3)\, t_r$
Putting r = 1, 2, 3 ..., n we get
$8t_1 = t_2 + t_1$
$8t_2 = 3t_3 - t_2$
$8t_3 = 5t_5 - 3t_3$
... ...
$8t_n = (2n - 1)t_{n+1} - (2n - 3)t_n$
Adding the relations above,
we get $8S_n = (2n - 1)t_{n+1} + t_1$
$= (2n - 1)(2n + 1)(2n + 3)(2n + 5) + 1 \times 3 \times 5$
$= (4n^2 + 8n - 5)(4n^2 + 8n + 3) + 15$
$= (4n^2 + 8n)^2 - 2(4n^2 + 8n) - 15 + 15$
$= 16n^4 + 64n^3 + 64n^2 - 8n^2 - 16n$
$= 8n(2n^3 + 8n^2 + 7n - 2)$
$\Rightarrow S_n = n(2n^3 + 8n^2 + 7n - 2)$

205. nth term of the series 3 + 10 + 17 + ... is
$T_n = 3 + (n - 1)7 = 7n - 4$
nth term of the series 63 + 65 + 67 + ... is
$T_n' = 63 + (n - 1)2 = 2n + 61$
Therefore, $T_n = T_n' \Rightarrow 7n - 4 = 2n + 61$
$\Rightarrow n = 13$

206. $$(1 + i)^n = \left[\sqrt{2}\left(\cos\frac{\pi}{4} + i\sin\frac{\pi}{4}\right)\right]^n$$

$$= 2^{\frac{n}{2}}\left(\cos\frac{n\pi}{4} + i\sin\frac{n\pi}{4}\right)$$

$\therefore$ Real part of $(1 + i)^n$

$$= 2^{\frac{n}{2}}\cos\frac{n\pi}{4}$$

207. Given that $(a + ib)^{1/3} = x + iy$
$\Rightarrow (a + ib) = (x + iy)^3$
$\therefore a + ib = (x^3 - 3xy^2) + i(3x^2y - y^3)$
Comparing real and imaginary parts, we get
$\therefore x^3 - 3xy^2 = a,\ 3x^2y - y^3 = b$
or $x(x^2 - 3y^2) = a,\ y(3x^2 - y^2) = b$

$$\text{or } x^2 - 3y^2 = \frac{a}{x},\ 3x^2 - y^2 = \frac{b}{y}$$

$$\text{or } (x^2 - 3y^2) + (3x^2 - y^2) = \frac{a}{x} + \frac{b}{y}$$

$$\text{or } 4(x^2 - y^2) = \frac{a}{x} + \frac{b}{y}$$

208. $\cos\alpha + \cos\beta + \cos\gamma = 0$ ... (i)
$\sin\alpha + \sin\beta + \sin\gamma = 0$ ... (ii)
Multiplying (ii) by i and adding to (i), we get
$(\cos\alpha + i\sin\alpha) + (\cos\beta + i\sin\beta)$
$+ (\cos\gamma + i\sin\gamma) = 0$ ... (iii)
Let $z_1 = \cos\alpha + i\sin\alpha$, $z_2 = \cos\beta + i\sin\beta$ and
$z_3 = \cos\gamma + i\sin\gamma$
$\therefore$ From equation (iii) $z_1 + z_2 + z_3 = 0$ ... (iv)
$\therefore z_1^3 + z_2^3 + z_3^3 = 3z_1z_2z_3$.

Therefore, $(\cos\alpha + i\sin\alpha)^3 + (\cos\beta + i\sin\beta)^3 + (\cos\gamma + i\sin\gamma)^3$
$= 3(\cos\alpha + i\sin\alpha)(\cos\beta + i\sin\beta)(\cos\gamma + i\sin\gamma)$
or $(\cos3\alpha + i\sin3\alpha) + (\cos3\beta + i\sin3\beta) + (\cos3\gamma + i\sin3\gamma)$
$= 3\cos[(\alpha + \beta + \gamma) + i\sin(\alpha + \beta + \gamma)]$
Equating real and imaginary part, we get
$\cos3\alpha + \cos3\beta + \cos3\gamma = 3\cos(\alpha + \beta + \gamma)$
$\sin3\alpha + \sin3\beta + \sin3\gamma = 3\sin(\alpha + \beta + \gamma)$

209. Let z = x + iy. Then

$$\frac{z-1}{z+1} = \frac{(x-1)+iy}{(x+i)+iy} = \frac{[(x-1)+iy]\,[(x+1)-iy]}{(x+1)^2+y^2}$$

$$= \frac{\left(x^2+y^2-1\right)+2iy}{(x+1)^2+y^2} = \frac{x^2+y^2-1}{(x+1)^2+y^2} + \frac{i\,2y}{(x+1)^2+y^2}$$

Therefore, $\arg\left(\frac{z-1}{z+1}\right) = \frac{\pi}{3} \Rightarrow \tan\frac{\pi}{3} = \frac{2y}{x^2+y^2-1}$

$\Rightarrow x^2+y^2-\frac{2}{\sqrt{3}}y-1=0$, which is the equation of a circle.

210. Because the multiplication of a complex number by i rotates through it by a right angle in positive direction.

211. We have $A \cup B = \{1, 2, 3, 8\}$ and $A \cap B = \{3\}$
$\therefore (A \cup B) \times (A \cap B)$
$= \{(1, 3), (2, 3), (3, 3), (8, 3)\}$

212. (i) $(A - B) \cap B = \phi$
For (ii) and (iii), use Venn diagram.

213. Let A and B denote the sets of people who read paper A and paper B respectively.
Then n(A) = 25, n(B) = 20, n (A ∩ B) = 8
Hence, n(A – B) = n(A) – n(A ∩ B) = 25 – 8 = 17
n (B – A) = n(B) – n(A ∩ B) = 20 – 8 = 12
Now percentage of people reading an advertisement
= [(30% of 17) + (40% of 12) + (50% of 8)]
= 13.9%

214. We have
R = {(1, 3), (1, 5), (2, 3), (2, 5), (3, 5), (4, 5)}
Therefore,
R^{-1} = {(3, 1), (5, 1), (3, 2), (5, 2), (5, 3), (5, 4)}
Hence, R o R^{-1} = {(3, 3), (3, 5), (5, 3), (5, 5)}

215. Since under a commutative binary operation on a set S ordered pairs (a, b) and (b, a) are mapped to the same element, so the total number of commutative binary operations on S is equal to

$$n^{\frac{n(n-1)}{2}+n} = n^{\frac{n(n+1)}{2}}$$

216. Middle term of $\left(\frac{a}{x} + bx\right)^{12} = {}^{12}C_6 \left(\frac{a}{x}\right)^6 (bx)^6$.

$= 924\, a^6b^6$

217. $[(a+b)+c]^n$

$= C_0(a+b)^n + C_1(a+b)^{n-1}C + \cdots + C^n$

$= (n+1) + n + (n-1) + \cdots + 1$

$= \frac{(n+1)(n+2)}{2}$

218. We know that

$$\frac{C_1}{C_0} + 2.\frac{C_2}{C_1} + 3.\frac{C_3}{C_2} + \cdots + n.\frac{C_n}{C_{n-1}} = \frac{n(n+1)}{2}$$

Putting n = 15, we have $\frac{15\times(15+1)}{2} = 120$

219. $T_n = \frac{2n+1}{(n-1)!} = \frac{2(n-1)+3}{(n-1)!} = \frac{2}{(n-2)!} + \frac{3}{(n-1)!}$
Put n = 1, 2, 3, …

$T_1 = 0 + \frac{3}{0!}$, $T_2 = \frac{2}{0!} + \frac{3}{1!}$, $T_3 = \frac{2}{1!} + \frac{3}{2!}$ etc.

$\therefore$ Sum $= 2\left(1 + \frac{1}{1!} + \frac{1}{2!} + \ldots\right) + 3\left(1 + \frac{1}{1!} + \frac{1}{2!} + \ldots\right)$

$= 2e + 3e = 5e$

220. Let T_n be the nth term of the given series.

Then, $T_n = \frac{t_n}{(n+1)!}$, $n = 1, 2, 3, \cdots$ where t_n is the nth term of the series 12 + 28 + 50 + 78 + ...
To find t_n we shall use the method of difference as given below:
Let $S_n = 12 + 28 + 50 + 78 + \ldots + t_{n-1} + t_n$ ... (i)
Then, $S_n = 12 + 28 + 50 + \ldots + t_{n-1} + t_n$ ... (ii)
Subtracting (ii) from (i), we get $0 = 12 + [16 + 22 + 28 + \ldots + (t_n - t_{n-1})] - t_n$

$$0 = 12 + \left(\frac{n-1}{2}\right)\{2\times16 + (n-1-1)\times6\} - t_n$$

$\Rightarrow t_n = 3n^2 + 7n + 2$

Therefore, $T_n = \frac{3n^2+7n+2}{(n+1)!} = \frac{3(n^2-1)+7(n+1)-2}{(n+1)!}$

$\Rightarrow T_n = \frac{3(n-1)(n+1)}{(n+1)!} + 7\frac{(n+1)}{(n+1)!} - \frac{2}{(n+1)!}$

$\Rightarrow T_n = \frac{3(n-1)}{n!} + \frac{7}{n!} - \frac{2}{(n+1)!}$

$$= \frac{3}{(n-1)!} - \frac{3}{n!} + \frac{7}{n!} - \frac{2}{(n+1)!}$$

$$\Rightarrow T_n = \frac{3}{(n-1)!} + \frac{4}{n!} - \frac{2}{(n+1)!}$$

Therefore,

$$\frac{12}{2!} + \frac{28}{3!} + \frac{50}{4!} + \cdots = \sum_{n=1}^{\infty} T_n = \sum_{n=1}^{\infty} \left[\frac{3}{(n-1)!} + \frac{4}{n!} - \frac{2}{(n+1)!} \right]$$

$$= 3\sum_{n=1}^{\infty} \frac{1}{(n-1)!} + 4 \sum_{n=1}^{\infty} \frac{1}{n!} - 2 \sum_{n=1}^{\infty} \frac{1}{(n+1)!}$$

$= 3e + 4(e - 1) - 2(e - 2) = 5e$

221. Expand the second determinant to get
$\lambda a_1 (\lambda^2 b_2 c_3 - c_2 b_3) - a_2 (\lambda b_1 c_3 - c_1 b_3)$
$+ a_3 (b_1 c_2 - \lambda b_2 c_1)$.
Hence, options (a), (b) and (c) are not valid.

222. Given $\omega^3 = 1$ or $(\omega - 1)(\omega^2 + \omega + 1) = 0 \Rightarrow \omega = 1$ or $\omega^2 + \omega + 1 = 0$

$$\therefore D = \begin{vmatrix} 1 & 1 & \omega^2 \\ 1 & 1 & \omega \\ \omega^2 & \omega & 1 \end{vmatrix} = \begin{vmatrix} 0 & 1 & \omega^2 \\ 0 & 1 & \omega \\ \omega^2 - \omega & \omega & 1 \end{vmatrix}$$

$$= (\omega^2 - \omega)(\omega - \omega^2) = 3$$

223. Let A be a symmetric matrix. Then $AA^{-1} = I$
$\Rightarrow (AA^{-1})^T = I \Rightarrow (A^{-1})^T A^T = I$
$\Rightarrow (A^{-1})^T = (A^T)^{-1} \Rightarrow (A^{-1})^T = (A)^{-1}$ {as $A^T = A$}
$\Rightarrow A^{-1}$ is a symmetric matrix.

224. Use options and prove $AA^{-1} = I$

225. If A is n × n order matrix and $|A| \neq 0$, then $|\text{adj } A| = |A|^{n-1}$. Here n = 2, hence |adj A| = |A|

226. We have $(A + B)(A - B) = A^2 - AB + BA - B^2$.
$\therefore$ Option (a) is not true, since $AB \neq BA$.

227. Since A is a skew-symmetric matrix, therefore $A^T = -A$

$$\Rightarrow (A^T)^n = (-A)^n \Rightarrow (A^n)^T = \begin{cases} A^n, \text{ if } n \text{ is even} \\ -A^n, \text{ if } n \text{ is odd} \end{cases}.$$

228. As $\frac{1}{2}(B - B')' = \frac{1}{2}(B' - (B')') = \frac{1}{2}(B' - B) = -\frac{1}{2}(B - B')$

$\therefore \frac{1}{2}(B - B')$ is skew-symmetric.

229. $\text{Adj. } A = \begin{bmatrix} 2 & 0 & 0 \\ -5 & 1 & 0 \\ 32 & -6 & 2 \end{bmatrix}$

230. The given system is AX = B, where

$$A = \begin{bmatrix} 4 & -5 & -2 \\ 5 & -4 & 2 \\ 2 & 2 & 8 \end{bmatrix}, X = \begin{bmatrix} x \\ y \\ z \end{bmatrix} \text{ and } B = \begin{bmatrix} 2 \\ 3 \\ 1 \end{bmatrix}$$

$|A| = 4(-32 - 4) + 5(40 - 4) - 2(10 + 8)$

$$\text{Also, adj}A = \begin{bmatrix} -36 & 36 & -18 \\ -36 & 36 & -18 \\ 18 & -18 & 9 \end{bmatrix} \text{ and}$$

$$(\text{adj}A)B = \begin{bmatrix} -36 & 36 & -18 \\ -36 & 36 & -18 \\ 18 & -18 & 9 \end{bmatrix} \begin{bmatrix} 2 \\ 3 \\ 1 \end{bmatrix} = \begin{bmatrix} 18 \\ 18 \\ -9 \end{bmatrix} \neq 0$$

$\therefore$ The system of equations have no solution and hence it is inconsistent.

231. Let $A = \begin{bmatrix} -3 & 2 & 2 \\ -6 & 5 & 2 \\ -7 & 4 & 4 \end{bmatrix}$. Then

$$|A - \lambda I| = 0$$

$$\Rightarrow \begin{bmatrix} -3-\lambda & 2 & 2 \\ 6 & 5-\lambda & 2 \\ -7 & 4 & 4-\lambda \end{bmatrix} = 0$$

$$\Rightarrow -(3+\lambda)[(5-\lambda)(4-\lambda) - 8] + 2[-14 - 6(4-\lambda)] + 2[24 + 7(5-\lambda)] = 0$$

$$\Rightarrow -\lambda^3 + 6\lambda^2 + 13\lambda + 6 = 0$$

or $\lambda^3 - 6\lambda^2 - 13\lambda - 6 = 0$

$$\Rightarrow (\lambda + 1)(\lambda^2 - 7\lambda - 6) = 0$$

Thus, the eigen values are $\lambda = -1, \frac{7 \pm \sqrt{73}}{2}$

232. Use $R_3 - 2(R_1 + R_2)$ and then $R_3 - R_1$

$$\Rightarrow A \sim \begin{bmatrix} 1 & 3 & 4 & 7 \\ 2 & 5 & 6 & 8 \\ 1 & 3 & 4 & 7 \end{bmatrix}$$

$$A \sim \begin{bmatrix} 1 & 3 & 4 & 7 \\ 2 & 5 & 6 & 8 \\ 0 & 0 & 0 & 0 \end{bmatrix} \therefore R(A) = 2$$

233. Here, $A^2 = 3I$, $\therefore A = 3I \cdot A^{-1}$

$$\Rightarrow A^{-1} = \frac{1}{3}A = \frac{1}{3}\begin{bmatrix} 1 & 1 & 1 \\ 1 & \omega^2 & \omega \\ 1 & \omega & \omega^2 \end{bmatrix}$$

234. In every skew-Hermitian matrix, the diagonal elements are either purely imaginary or zero. Hence, the condition is necessary. But, in a square matrix, although the diagonal elements are purely imaginary or zero and yet it may not be a skew-Hermitian matrix. For example,

$$A=\begin{bmatrix} 0 & 2 & 1 \\ i+j & 0 & 2 \\ 3 & 1 & -i \end{bmatrix}$$

Hence, the condition is not sufficient.

235. Standard result.

236. We know that the number of subsets of a set containing n elements is 2^n. Therefore, the number of ways of choosing A and B is $2^n \cdot 2^n = 2^{2n}$. We also know that the number of subsets (of X) which contain exactly r elements is ${}^nC_r$. Therefore, the number of ways of choosing A and B, so that they have the same number elements is

$$\left({}^nC_0\right)^2+\left({}^nC_1\right)^2+\left({}^nC_2\right)^2+\cdots+\left({}^nC_n\right)^2=\frac{2^nC_n}{2^{2n}}$$

237. Let E_1, E_2 and A be the events defined as follows E_1 = Six occurs, E_2 = Six does not occur, A = The man reports that it is a six.

We have $P(E_1)=\frac{1}{6}$, $P(E_2)=\frac{5}{6}$

Now, $P\left(\frac{A}{E_1}\right)$ = Probability that the man reports that there is a six on the die given that six has occurred on the die = Probability that the man speaks truth = $\frac{3}{4}$

$P\left(\frac{A}{E_2}\right)$ = Probability that the man reports that there is a six on the die given that six has not occurred on the die
= Probability that the man does not speak truth

$=\frac{1-3}{4}=\frac{1}{4}$

We have to find $P\left(\frac{E_1}{A}\right)$, i.e. the probability that there is six on the die given that the man has reported that there is a six. By Bayes' rule, we have

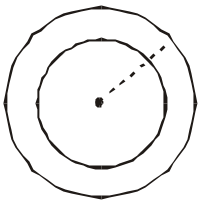
$$=P\left(\frac{E_1}{A}\right)=\frac{P(E_1)\,P\left(\frac{A}{E_1}\right)}{P(E_1)\,P\left(\frac{A}{E_1}\right)+P(E_2)\,P\left(\frac{A}{E_2}\right)}$$

$$=\frac{\left(\frac{1}{6}\right)\times\left(\frac{3}{4}\right)}{\left(\frac{1}{6}\right)\times\left(\frac{3}{4}\right)+\left(\frac{5}{6}\right)\times\left(\frac{1}{4}\right)}=\frac{3}{8}$$

238. $n(S) = {}^{12}C_4 \times {}^8C_4 \times {}^4C_4$. n(E) = n(S) – the number of ways in which one boy gets both the pens
$= n(S) - {}^{10}C_2 \times {}^8C_4 \times {}^4C_4 \times (3!)$

$$\therefore P(E) = 1 - \frac{{}^{10}C_2 \times {}^8C_4 \times {}^4C_4 \times (3!)}{{}^{12}C_4 \times {}^8C_4 \times {}^4C_4} = 1-\frac{6}{11}=\frac{5}{11}$$

239.



n(S) = The area of the circle of radius r

n(E) = The area of the circle of radius $\frac{r}{2}$

$$\therefore \text{The required probability} = \frac{n(E)}{n(S)}=\frac{\pi\cdot\left(\frac{r}{2}\right)^2}{\pi r^2}=\frac{1}{4}$$

240. We define the following events:
A_1: Selecting a pair of consecutive letters from the word LONDON
A_2: Selecting a pair of consecutive letters from the word CLIFTON. E : Selecting a pair of letters 'ON'.

Then $P(A_1 \cap E) = \frac{2}{5}$; as there are 5 pairs of consecutive letters out of which 2 are ON.

$P(A_2 \cap E) = \frac{1}{6}$ as there are 6 pairs of consecutive letters of which one is ON.
∴ The required probability

$$=P\left(\frac{A_1}{E}\right)=\frac{P(A_1\cap E)}{P(A_1\cap E)+P(A_2\cap E)}=\frac{\frac{2}{5}}{\frac{2}{5}+\frac{1}{6}}=\frac{12}{17}$$

241. $\lim\limits_{x\to 0}\frac{(1-\cos 2x)\sin 5x}{x^2\sin 3x}=\lim\limits_{x\to 0}\frac{1-\cos 2x}{x^2}.\lim\limits_{x\to 0}\frac{\sin 5x}{\sin 3x}$

$$=\lim_{x\to 0}2\left(\frac{\sin x}{x}\right)^2\cdot\lim_{x\to 0}\left(\frac{\sin 5x}{5x}\cdot\frac{3x}{\sin 3x}\cdot\frac{5x}{3x}\right)$$

$$=2\times\frac{5}{3}=\frac{10}{3}$$

242. $\lim\limits_{x\to 0}\frac{a^x-1}{\sqrt{a+x}-\sqrt{a}}$

$$=\lim_{x\to 0}\frac{a^x-1}{x}\times\frac{x}{a+x-a}\times\left(\sqrt{a+x}+\sqrt{a}\right)$$

$$=\lim_{x\to 0}\frac{a^x-1}{x}\times\lim_{x\to 0}\left(\sqrt{a+x}+\sqrt{a}\right)=2\sqrt{a}\,\log a$$

243. $\lim_{x\to 1}\left(1-\frac{1}{2+x}\right)^{\frac{1}{1+\sqrt{x}}} = \left(1-\frac{1}{2+1}\right)^{\frac{1}{1+1}}$

$= \left(\frac{2}{3}\right)^{\frac{1}{2}}$

244. In the neighbourhood of $-\frac{\pi}{4}$, we have $f(x) = (-x)^{-\sin x} = e^{-\sin x \log(-x)}$

$\Rightarrow f'(x) = e^{-\sin x\log(-x)}\left(-\cos x\cdot\log(-x)-\frac{\sin x}{x}\right)$

$\Rightarrow f'(x) = (-x)^{-\sin x}\left(-\cos x\cdot\log(-x)-\frac{\sin x}{x}\right)$

$\Rightarrow f'\left(-\frac{\pi}{4}\right) = \left(\frac{\pi}{4}\right)^{\sqrt{2}}\left(\frac{-1}{\sqrt{2}}\log\frac{\pi}{4}+\frac{4}{\pi}\times\frac{-1}{\sqrt{2}}\right)$

$= \left(\frac{\pi}{4}\right)^{\sqrt{2}}\left(\frac{\sqrt{2}}{2}\log\frac{4}{\pi}-\frac{2\sqrt{2}}{\pi}\right)$

245. We have, $y = a^{x^{a^{x^{\cdot^{\cdot^{\cdot^{\infty}}}}}}}$

$\Rightarrow y = a^{x^y} \Rightarrow \log y = x^y \log a$
$\Rightarrow \log(\log y) = y\log x + \log(\log a)$
Differentiation w. r. t. x, we get

$\frac{1}{\log y}\frac{1}{y}\frac{dy}{dx} = \frac{dy}{dx}\cdot\log x + \frac{y}{x}$

$\Rightarrow \frac{dy}{dx} = \frac{y^2\log y}{x(1-y\log x\log y)}$

246. We have, $f(x) = (x+1)\tan^{-1}(e^{-2x})$, therefore,

$f'(x) = \tan^{-1}(e^{-2x}) + \frac{(x+1)(-2)}{1+e^{-4x}}e^{-2x}$

$\Rightarrow f'(0) = \tan^{-1}(1) - \frac{2}{2} = \frac{\pi}{4} - 1$

247. $y = \frac{\pi}{2} - \cos^{-1}t = \sin^{-1}t$

$\Rightarrow t = \sin y$

$x = \sin^{-1}(2t\sqrt{1-t^2})$

$= \sin^{-1}(2\sin y\sqrt{1-\sin^2 y})$
$= \sin^{-1}(2\sin y\cos y)$
$= 2y$

$\therefore \frac{dy}{dx} = \frac{1}{2}$

$\Rightarrow \frac{d^2y}{dx^2} = 0 \ \forall$ x and t

248. $x = 80 - 4y$
$xy = (80 - 4y)\times y$
$p = 80y - 4y^2$ where $p = xy$
$p' = 80 - 8y$
$p' = 0$ at $y = 10$
$p'' < 0$, i.e. product will be maximum for
$y = 10$ and $x = 40$

249. $\int\frac{ax^2-b}{x\sqrt{c^2x^2-(ax^2+b)^2}}dx = \int\frac{a-\frac{b}{x^2}}{\sqrt{c^2-\left(ax+\frac{b}{x}\right)^2}}dx$

$= \int\frac{1}{\sqrt{c^2-\left(ax+\frac{b}{x}\right)^2}}d\left(ax+\frac{b}{x}\right) = \sin^{-1}\left(\frac{ax+\frac{b}{x}}{c}\right)+k$

250. Put $\tan^{-1}x = t$ and $\frac{dx}{1+x^2} = dt$, we get

$\int e^{\tan^{-1}}\left(\frac{1+x+x^2}{1+x^2}\right)dx = \int e^t(\tan t + \sec^2 t)dt$

$= e^t\tan t + C = e^{\tan^{-1}x}.x + C$

[Using $\int e^x\{f(x)+f'(x)\}dx = e^x f(x) + C$]

251. $210 = 268 - 2(29)$, therefore, $166 = 218 - 2(?) \Rightarrow 2(?) = 52$
or $? = \frac{52}{2} = 26$

252. The difference series is 4, 6, 8, 10, 12, 14.
Hence, ? = 15 + 8 = 23

253. Answer is 199. As we can see that

$17 \xrightarrow[+12]{} 29 \xrightarrow[+24]{} 53 \xrightarrow[+48]{}$
$101 \xrightarrow[+96]{} \underline{199} \xrightarrow[+192]{} 389 \xrightarrow[+384]{} 773$

Thus, 101 + 96 = 197 (and not 199)

254. Answer is 212. As we can see that
18 + 5 = 23, 23 × 2 = 46, 46 + 5 = 51, 51 × 2 = 102,
102 + 5 = 107, 107 × 2 = 214,
214 + 5 = 219, 219 × 2 = 438, 438 + 5 = 443,
443 × 2 = 886, 886 + 5 = 891, 891 × 2 = 1782
Thus, 107 × 2 = 214 (and not 212)

255. Answer is 61.

$98 \xrightarrow[-6^2]{} \underline{61} \xrightarrow[-5^2]{} 37 \xrightarrow[-4^2]{} 21$
$\xrightarrow[-3^2]{} 12 \xrightarrow[-2^2]{} 8 \xrightarrow[-1^2]{} 7$

Thus, 98 – 36 = 62 (and not 61).

256. Richa travels 120 m in 25 s.
$\Rightarrow$ Her speed is 4.8 m/s

We have $\frac{\text{Speed of Pallavi}}{\text{Speed of Richa}} = \sqrt{\frac{25}{16}} = \frac{5}{4}$

$\therefore$ Speed of Pallavi = $\frac{5}{4} \times 4.8 = 6$ m/s

Pallavi takes 16 s to reach Q from T, so distance between T and Q is $16 \times 6 = 96$ m.
$\therefore$ Distance between P and Q is 120 + 96 = 216 m

257. Due to stoppages it covers 9 km less in 1 hr.

Time taken to cover 9 km = $\frac{9}{54} \times 60 = 10$ min

Hence, on average, the bus stops for 10 min every hour.

258. Let the distance from Rampur = y

$\frac{18 - y}{4} + \frac{y}{3} = 5$

$= 54 + y = 60$
$\Rightarrow y = 6$

259. A can give B a lead of 200 m for every 1000 m, i.e. every kilometre. This means that when A covers 1,000 m, B covers 800 m. Suppose speed of A is 25 m/s and that B is 20 m/s.

A will meet B for the first time after $\frac{1000}{25 - 20} = 200$ s

In 200 s, A will have made

$200 \div \frac{1000}{25} = \frac{200 \times 25}{1000} = 5$ rounds

260. When B completes 3 rounds (3,000 m), A would have completed 3,750 m in the same time. Hence, when B starts running, A must have been 250 m ahead of him (or) B gives A a lead of 250 m.

261. $\mathbf{a}.\mathbf{b} = 0 \Rightarrow \mathbf{a} \perp \mathbf{b}$ or $\mathbf{a} = \mathbf{0}$ or $\mathbf{b} = \mathbf{0}$; $\mathbf{a} \times \mathbf{b} = \mathbf{0} \Rightarrow \mathbf{a} \parallel \mathbf{b}$ or $\mathbf{a} = \mathbf{0}$ or $\mathbf{b} = \mathbf{0}$, hence either **a** or **b** is a null vector.

262. $a = \frac{\vec{a}}{|\vec{a}|}$, $b = \frac{\vec{b}}{|\vec{b}|}$ and $|a| = 1$, $|b| = 1$,

$\therefore \cos\theta = \frac{\vec{a} \cdot \vec{b}}{|\vec{a}||\vec{b}|} = a \cdot b$ ...(i)

Now $(a - b)^2 = a.a - 2a.b + b.b$
$\therefore |a - b|^2 = |a|^2 - 2|a||b|\cos\theta + |b|^2$

$\therefore |a - b|^2 = 1 - 2\cos\theta + 1 = 2(1 - \cos\theta) = 4\sin^2\left(\frac{\theta}{2}\right)$.

$\therefore \sin\left(\frac{\theta}{2}\right) = \frac{1}{2}|a - b|$

263. $|a \times b| = |\sin\theta| = 1 \Rightarrow \theta = \frac{\pi}{2}$

Alternatively : Consider **i**, **j** and **k** unit vectors where **i** and **j** is **a** and **b**.

264. Let $\mathbf{b} = b_1\mathbf{i} + b_2\mathbf{j} + b_3\mathbf{k}$. But $(\mathbf{i} - \mathbf{j} + \mathbf{k}).(b_1\mathbf{i} + b_2\mathbf{j} + b_3\mathbf{k}) = 1$
$\Rightarrow b_1 - b_2 + b_3 = 1$ ...(i) and

$\mathbf{a} \times \mathbf{b} = \begin{vmatrix} i & j & k \\ 1 & -1 & 1 \\ b_1 & b_2 & b_3 \end{vmatrix} = -\mathbf{i}(b_2 + b_3) + \mathbf{j}(b_1 - b_3) + \mathbf{k}(b_2 + b_1) =$

$\mathbf{c} = -\mathbf{i} - \mathbf{j}$. Therefore, $b_2 + b_3 = 1$, $b_1 - b_3 = -1$,
$b_2 + b_1 = 0$. By solving the equations, we get
$b_1 = 0$, $b_2 = 0$ and $b_3 = 1$.

265. Vectors $\mathbf{a} \times \mathbf{b}$ and $\mathbf{c} \times \mathbf{d}$ are perpendiculars to the two given planes which are perpendicular to each other, therefore $\mathbf{a} \times \mathbf{b} \perp \mathbf{c} \times \mathbf{d} \Rightarrow (\mathbf{a} \times \mathbf{b}).(\mathbf{c} \times \mathbf{d}) = 0$

266. **Ref** : A B C D E F G H ... V W X Y Z
Codes: 1 2 3 4 5 6 7 8 ... 22 23 24 25 26
DELHI = 38 $\Rightarrow$ 4 + 5 + 12 + 8 + 9 = **38**. Thus, we get
MUMBAI 13 + 21 + 13 + 2 + 1 + 9 = **59** and
BOMBAY 2 + 15 + 13 + 2 + 1 + 25 = **58**.
Thus, 59 – 58 = 1

267. Compare digits with letters to get equivalents of letters.

268. $3^a = 5^{3/4}$ ... (i)
$5^b = 3^2$ ... (ii)

Combining the two, we have ab = $\frac{3}{2}$

269. If the largest of X consecutive integers is N, then the smallest is (N – X + 1). Hence, the third from beginning is (N – X + 1) + 2 = N – X + 3

270. $u_1 = 2u_0 + 1 = 1$. $u_2 = 2u_1 + 1 = 2 + 1$
$u_3 = 2u_2 + 1 = 2(2 + 1) + 1 = 2^2 + 2 + 1$
$u_4 = 2u_3 + 1 = 2(2^2 + 2 + 1) + 1 = 2^3 + 2^2 + 2 + 1$
. . . . . .
. . . . . .
So $u_{10} = 2^9 + 2^8 + \ldots + 2 + 1$ (a GP with a = 1, r = CR = 2, n = 10) $\Rightarrow u_{10}$

$= \frac{1(2^{10} - 1)}{2 - 1} = 2^{10} - 1 = 1024 - 1 = 1023$

271. Factual

272. SixSigma is not defined on output but on total opportunities.

273. All the other options are part of the standard definition of a robot.

274. $(10 + 4)\, V_{cm} = 10 \times 14$
$V_{cm} = 10$ m/s

275. Time taken for one rotation = $\frac{60}{900}$ s = 0.067 s.

Efficiency = $\frac{\text{Workdoneinonerotation}}{\text{Power}\times\text{Timeforonerotation}} \times 100\%$

$= \frac{9.95}{0.5\times746\times0.067} \times 100\%$

$\approx$ 40%

276. Factual

277. Elastic potential stored = $\frac{1}{2}$ y × (Strain)^2 × Volume

$= \frac{1}{2} \times 2 \times 10^{11} \times \left(\frac{4\times10^{-3}}{2}\right)^2 \times 2 \times 2 \times 10^{-6}$

= 1.6 J

278. Volume of water displaced,

$\mathbf{V}_1 = \frac{W_1 + W_2}{\rho_1}$ [ρ_1 is density of water]

After unloading weight W_2,
the volume of water displaced,

$V_2 = \left(\frac{W_1}{\rho_1} + \frac{W_2}{\rho_2}\right)$ [ρ_2 is density of stone]

Since $\rho_2 > \rho_1$, hence $V_1 > V_2$.

279. At steady state for room-radiator system, heat released to the room
= heat released outside
T – 20 = K[20 – (–20)] = 40 K ... (i)
Also, T – 10 = K [10 – (–40)] = 50 K ... (ii)
So (ii) divided by (i)

$\frac{T-10}{T-20} = \frac{50K}{40K} \Rightarrow T = 60°C$

280. $\theta = \cos^{-1}(0.6)$

$\Rightarrow \cos\theta = 0.6 = \frac{3}{5}$

$\therefore \tan\theta = \frac{4}{3} = 1.33$

or $\mu = 1.33$

281. According to ideal gas equation,

$PV = nRT = \frac{m}{M}RT$

But $\rho = \frac{m}{V}$

If V is constant, ρ is constant (2 – 3, 4 – 1).

Also $p = \left(\frac{RT}{M}\right)\rho$

If t is constant, relationship between p and ρ is a straight line passing through origin (3 – 4, 1 – 2).

282. The shearing stress is exerted on the rectangular surface (2 cm × 2 cm × 0.18 cm), i.e. the boundary of the hole.
$\therefore$ Area of this surface = $4 \times 2 \times 10^{-2} \times 0.18 \times 10^{-2}$ m^2
$= 1.44 \times 10^{-4}$ m^2
Hence, Force = Shearing stress × Area
$= 3.5 \times 10^8 \times 1.44 \times 10^{-4}$ N
= 5.04 × 104 N

283. 4 represents nominal size of the screw.

284. Diesel engine is an internal combustion engine where fuel self-ignites by the built-up of a strong pressure.

285. Fuel cells are similar to battery in which fuels are consumed as energy is released.

286. For X-NOR

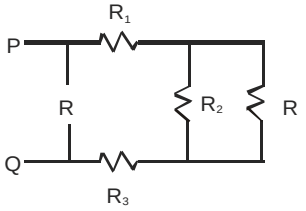
$Y = AB + \overline{A}\,\overline{B}$

Or $\overline{Y} = \overline{AB + \overline{A}\,\overline{B}}$

$\overline{AB}\cdot\overline{\overline{A}\,\overline{B}}$

Hint $\Rightarrow$ Use De Morgan's theorem.

287. Let R be the resistance between P and Q. Since it is an infinite chain it can be redrawn as



$R = R_1 + R_2 \parallel R + R_3$

$R = R_1 + \frac{R_2 R}{R_2 + R} + R_3$

$R = 1 + \frac{2R}{2+R} + 3$

$R = 4 + \frac{2R}{R+2}$

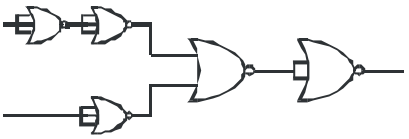
$R^2 - 4R - 8 = 0$

$R = 2 \pm 2\sqrt{3}$

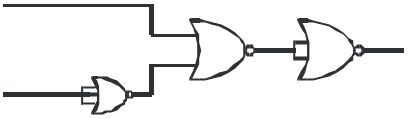
Neglecting $2 - 2\sqrt{3}$ (because it is negative)

we have $2 + 2\sqrt{3}$

288. These two gates get nullified.

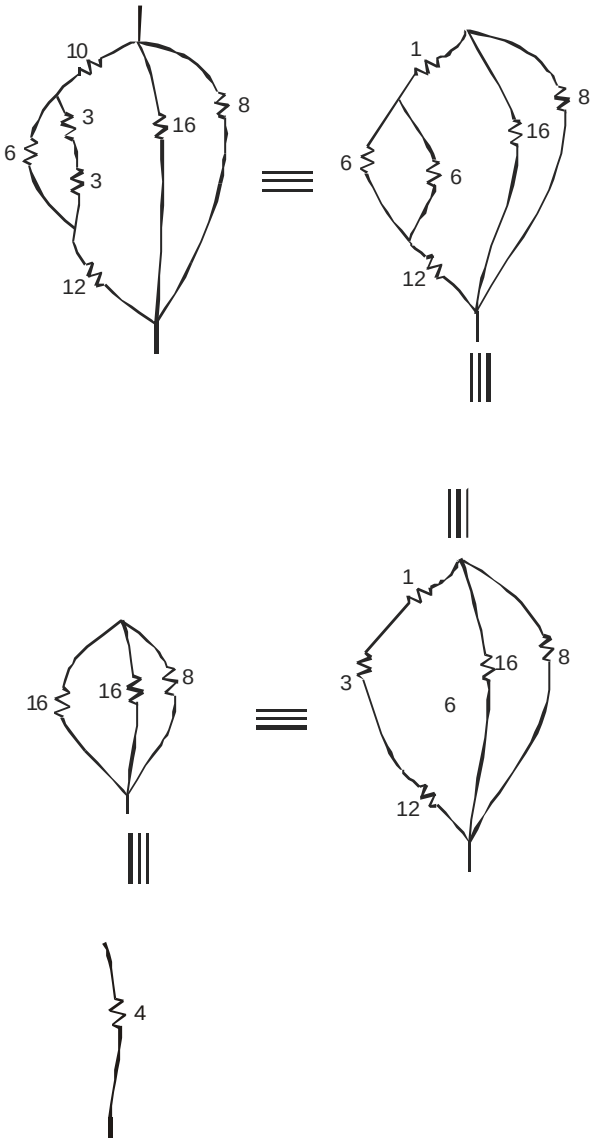


So we can redraw the circuit

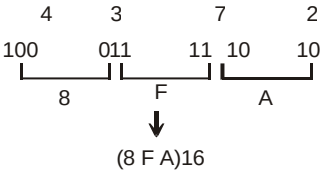


289. 0 V. Transformer works with ac only. As for emi to take place, varying magnetic field is required while dc does not supply varying magnetic field.

290.



291.



293. $A + B + A = A + A + B = A + B$ ($\because A + A = A$)

294. Largest four-digit hexadecimal number = F F F F
Smallest four-digit hexadecimal number = 0 0 0 0
Therefore, difference = F F F F

295.
$$\begin{array}{r} 437 \\ 347 \\ 743 \\ \hline (1638)_9 \end{array}$$

296. $(10001111)_2 = (143)_{10}$
$(1101)_2 = (13)_{10}$
$\frac{143}{13} = (11)_{10} = (1011)_2$

300. All of the above are different version of UNIX implemented by different companies.