HELD ON 20-07-2014 (First Sitting)

GENERAL INTELLIGENCE & REASONING

Directions (1-6) : In each of the following questions, select the related word/letter/number from the given alternatives.

1. Natural : Artificial :: Cotton : ?
   - (1) Wool
   - (2) Nylon
   - (3) Silk
   - (4) Jute

2. Crime : Punishment :: Honesty : ?
   - (1) Award
   - (2) Recognition
   - (3) Reward
   - (4) Pride

3. VOHA : WPIB :: CJQX : ?
   - (1) DKRY
   - (2) YRKD
   - (3) RKDY
   - (4) YDKR

4. PRINTING : RPNIITGN :: PROTOCOL : ?
   - (1) RPTOCOOL
   - (2) RPOTCOLO
   - (3) PRTOOCOL
   - (4) RPTOCOLO

5. 20 : 11 :: 102 : ?
   - (1) 52
   - (2) 49
   - (3) 61
   - (4) 96

6. 6415 : 5304 :: 7896 : ?
   - (1) 6705
   - (2) 6905
   - (3) 6907
   - (4) 6785

Directions (7-11) : In each of the following questions, find the odd words/numbers/letters from the given alternatives.

7. (1) Anthropology
   (2) Psychology
   (3) Taxology
   (4) Sociology

8. (1) Time : Seconds
   (2) Pressure : Barometer
   (3) Length : Metre
   (4) Volume : Litre

9. (1) 56
   (2) 28
   (3) 36
   (4) 35

10. (1) 3 : 30
    (2) 5 : 128
    (3) 8 : 515
    (4) 9 : 731

11. (1) APPLE
    (2) ANGLE
    (3) ADORE
    (4) AMPLE

12. Number of letters skipped in between adjacent letters in the series increases by one. Which of the following series observes the rule above ?
    - (1) CPTOV
    - (2) HJHQV
    - (3) HCFKP
    - (4) IKNRW

13. Which one of the given responses would be a meaningful order of the following ?
    - (A) Ghee
    - (B) Milk
    - (C) Curd
    - (D) Cow
    - (E) Butter
    - (1) (E), (A), (B), (D), (C)
    - (2) (D), (B), (E) (C), (A)
    - (3) (D), (B), (C), (E), (A)
    - (4) (C), (B), (E), (D), (A)

14. Arrange the following words as per order in the dictionary.
    - (A) Concession
    - (B) Conception
    - (C) Conciliator
    - (D) Conceive
    - (E) Concerned
    - (1) (D), (E), (C), (B), (A)
    - (2) (D), (B), (E) (C), (A)
    - (3) (D), (B), (E), (A), (C)
    - (4) (D), (C), (E), (B), (A)

15. Which one set of letters when sequentially placed at the gaps in the given letter series shall complete it ?
    a _ ca _ ca _ caa _
    - (1) caca
    - (2) cacc
    - (3) caac
    - (4) ccca

Directions (16-18) : In each of the following questions, choose the correct alternative from the given ones that will complete the series.

16. MNBA, OPDC, QRFE, ?
    - (1) STGH
    - (2) STKH
    - (3) STKJ
    - (4) STHG

17. 512, 256, 128, ?, 32, 16, 8
    - (1) 52
    - (2) 61
    - (3) 64
    - (4) 56

18. 30, 130, 630, ?
    - (1) 1260
    - (2) 3130
    - (3) 1030
    - (4) 3103

19. X is four years older than Y who is twice as old as Z. If the total ages of X, Y and Z be 34, how old is X?
    - (1) 8
    - (2) 10
    - (3) 12
    - (4) 16

20. Pointing to Vinod, Radha said, "His sister is my mother's only daughter". How is Radha related to Vinod ?
    - (1) Cousin
    - (2) Daughter
    - (3) Mother
    - (4) Sister

21. Madhavi and Shalini are good in Dramatics and Computer Science. Anjana and Madhavi are good in Computer Science and Physics. Anjana, Purnima and Nirmala are good in Physics and History. Nirmala and Anjana are good in Physics and Maths. Purnima and Shalini are good in History and Dramatics.
    Who is good in Physics, History and Dramatics ?
    - (1) Nirmala
    - (2) Purnima
    - (3) Anjana
    - (4) Shalini

22. From the given alternative words, select the word which can be formed using the letters of the given word.
    IMMEDIATELY
    - (1) DIALECT
    - (2) LIMITED
    - (3) DIAMETER
    - (4) DICTATE

23. From the given alternative words, select the word which cannot be formed using the letters of given word.
    TAMBOURINE
    - (1) BROMINATE
    - (2) OBTAINER
    - (3) BOATMAN
    - (4) MINARET

24. If alphabets are serially numbered, one of the answers given below has a meaningful word hidden in it. Identify the answer.
    - (1) 5, 18, 5, 8, 1, 3, 5
    - (2) 20, 5, 1, 3, 8, 5, 18
    - (3) 5, 1, 3, 5, 20, 8, 18
    - (4) 18, 5, 3, 8, 1, 5, 20

25. If JOSEPH is coded as FKO-ALD, then how GEORGE will be coded in that code language?
(1) CADMNO (2) CAKNIT
(3) CAKNCA (4) JAKINS

26. If BUILDING is coded as 41527596 and RIVER as 85308, what will be the code for BRIDGE ?
(1) 485067 (2) 485670
(2) 458760 (4) 485760

27. Following words are written in a code language. Study them carefully and find out the word to the given code.
CAR – $\phi \alpha \delta$
SIT – $\eta \psi \kappa$
WELL – σ i y y
MAP – $\mu \alpha \beta$
Given code : $\phi \alpha$ y μ
(1) CALL (2) CALM
(3) CART (4) CARE

28. An aeroplane covers a distance at a 340 kmph in 8 hours. To cover the same distance in $2\dfrac{2}{3}$ hours, it must travel at what speed ?
(1) 660 km/hr
(2) 700 km/hr
(3) 680 km/hr
(4) 1020 km/hr

29. If '+' means '÷'; '−' means '+'; 'x' means '−' and '÷' means 'x', then, $8 \div 4 - 6 + 3 \times 4 = ?$
(1) 4 (2) 14
(3) 28 (4) 30

30. Some equations are solved on the basis of a certain system. Find the correct answer for the unsolved equation on that basis.
$58 \times 12 = 4,\ 37 \times 96 = 5,$
$11 \times 20 = 2,\ 42 \times 12 = ?$
(1) 2 (2) 3
(3) 4 (4) 5

31. Select the correct combination of mathematical signs to replace * signs and to balance the given equation
$33 * 11 * 3 * 6 = 115$
(1) + − x (2) x ÷ −
(3) ÷ x − (4) − x ÷

Directions (32 – 34) : In each of the following questions, find the missing number from the given responses.

32.
72	44	68
91	?	86
43	66	37

(1) 33 (2) 22
(3) 11 (4) 55

33.
8	2	9
3	9	6
6	4	9
30	22	?

(1) 63 (2) 24
(3) 52 (4) 12

34.
8	3	12
2	3	6
4	3	3
4	3	?

(1) 5 (2) 6
(3) 7 (4) 15

35. Govind starts from his house towards West. After walking a distance of 25 metres he turned towards right and walked 10 metres. He then turned left and moving a distance of 10 metres, turned to his left again and walked 40 metres. He now turns to the left and walks 5 metres. Finally he turns to his left. In which direction is he walking now ?
(1) North (2) South
(3) East (4) West

36. 'A' walks 10 metres in front and 10 metres to the right. Then every time turning to his left, he walks 5, 15 and 15 metres respectively. How far is he now from his starting point?
(1) 5 metres (2) 10 metres
(3) 20 metres (4) 25 metres

Directions (37 – 38) : In each of the following questions, one/two statements are given followed by two conclusions/assumptions, I and II. You have to consider the statements to be true, even if they seem to be at variance from commonly known facts. You are to decide which of the given conclusions/assumptions can definitely be drawn from the given statements. Indicate your answer.

37. Statements

All cows are animals.

All deers are cows.

Conclusions

I. All deers are animals.

II. All animals are cows.

(1) Only conclusion I follows.
(2) Only conclusion II follows.
(3) Both conclusions I and II follow.
(4) Neither conclusion I nor II follows.

38. Statement : Regular reading of newspapers enhances one's general knowledge.

Assumptions

I. Newspaper contains a lot of general knowledge.

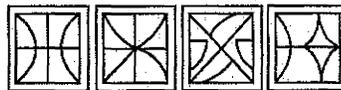II. Enhancement of general knowledge enables success in life.

(1) Only I is implicit
(2) Only II is implicit
(3) Both I and II are implicit
(4) Neither I nor II is implicit

39. Among the four answer figures, which one can be formed from the cut out pieces given below in the question figure ?

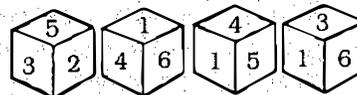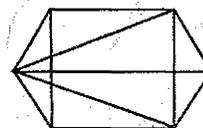**Question Figure :**

Answer Figures :

(1) (2) (3) (4)

40. Four positions of a dice are given below. Identify the number at the bottom when top is 1.
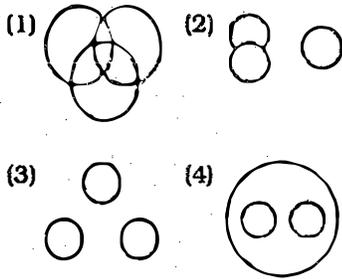

(1) 6 (2) 3
(3) 2 (4) 5

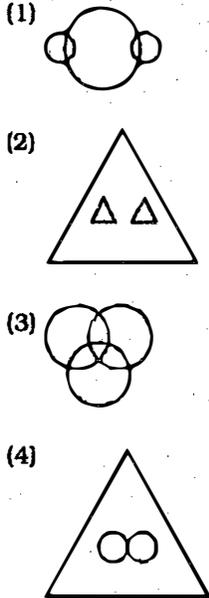**41.** Find the number of triangles in the given figure :

(1) 11 (2) 14
(3) 16 (4) 22 or more

Directions (42–43) : In each of the following questions, identify the diagram that best represents the relationship among classes given below.
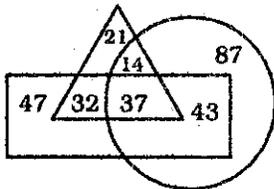
42. Physician, Physical Education Instructor and Physicist

(1) (2)

(3) (4)

**43.** Profit, Dividend, Bonus.

(1)

(2)

(3)

(4)

44. In the given figure, the triangle represents Graduates, rectangle represents Married Persons and circle represents Women. What is the number of those Women who are Graduates but not Married ?
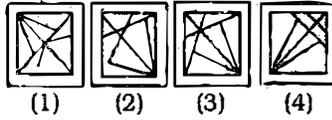

(1) 21   (2) 14
(3) 32   (4) 37

Directions (45–46) : In each of the following questions, which answer figure will complete the pattern in the question figure ?
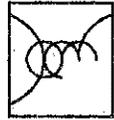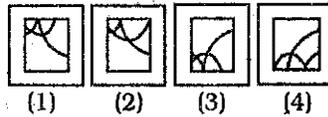
45. Question Figure :

Answer Figures :

  (1)   (2)   (3)   (4)
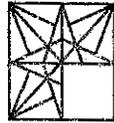
46. Question Figure :

Answer Figures :

  (1)   (2)   (3)   (4)

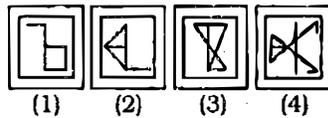**47.** From the given answer figures, select the one in which the question figure is hidden/embedded.

Question Figure :

Answer Figures :

  (1)   (2)   (3)   (4)

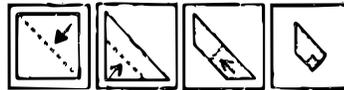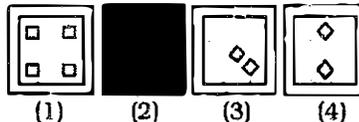**48.** A piece of paper is folded and cut as shown below in the question figures. From the given answer figures, indicate how it will appear when opened.
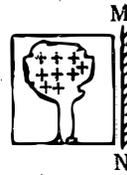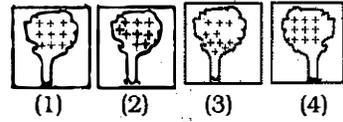
Question Figures :

Answer Figures :

  (1)   (2)   (3)   (4)

49. If a mirror is places on the line MN, then which of the answer figures is the right image of the given figure ?

Question Figure :

Answer Figures :

  (1)   (2)   (3)   (4)

50. A word is represented by only one set of numbers as given in any one of the alternatives. The sets of numbers given in the alternatives are represented by two classes of alphabets as in two matrices given below. The columns and rows of Matrix I are numbered from 0 to 4 and that of Matrix II are numbered from 5 to 9. A letter from these matrices can be represented first by its row and next by its column, e.g. 'T' can be represented by 31, 76 etc., and 'N' can be represented by 12, 79 etc., Similarly, you have to identify the set for the word given below.

LOVE

Matrix-I

	0	1	2	3	4
0	G	V	E	A	C
1	R	O	N	G	L
2	M	N	E	L	I
3	O	T	I	T	A
4	N	L	N	E	P

Matrix-II

	5	6	7	8	9
5	R	E	O	N	G
6	N	P	V	E	L
7	M	T	I	O	N
8	E	A	I	C	O
9	N	T	A	R	L

(1) 23, 12, 67, 68
(2) 69, 78, 76, 86
(3) 99, 98, 67, 68
(4) 14, 30, 67, 68

51. Wildlife Protection Act was implemented in India in
    (1) 1972 (2) 1986
    (3) 1964 (4) 1956

52. Which one of the following is a Sedimentary Rock ?
    (1) Granite (2) Charnockite
    (3) Basalt (4) Arkose

53. Highly specialized form of agriculture in which crops like coffee, tea and rubber are cultivated refer to
    (1) multiple cropping
    (2) plantation agriculture
    (3) terrace farming
    (4) extensive farming

54. International Ozone Day is celebrated on
    (1) 5th September
    (2) 16th September
    (3) 11th September
    (4) 20th September

55. In India, there are many coal fields found in
    (1) Cauvery Valley
    (2) Krishna Valley
    (3) Ganga Valley
    (4) Damodar Valley

56. The newly hatched tadpole breaths through its
    (1) Lung
    (2) External gills
    (3) Internal gills
    (4) All of the above

57. Virus in Latin means
    (1) Sweet (2) Small
    (3) Fluid (4) Poison

58. The biological process in which both aerobes and anaerobes degrade organic matter is
    (1) Manuring (2) Composting
    (3) Digesting (4) Nitrifying

59. **Statement I :** Complex tissue is made up of more than one type of cells.
    Statement II : Meristems are examples of permanent tissue.
    (1) Statement I is correct, but Statement II is incorrect.
    (2) Statement I is incorrect, but Statement II is correct.

(3) Both statements I and II are correct.
(4) Both statements I and II are incorrect.

60. The cuticle is absent in
    (1) Leaf (2) Stem
    (3) Root (4) Fruit

61. Intercalary meristems are found in
    (1) Node
    (2) Lateral bud
    (3) Terminal bud
    (4) Inter node

62. Super conductors are substances that
    (1) offer minimum resistance to flow of electric current
    (2) conduct electricity at low temperature
    (3) conduct electricity at high temperature
    (4) offer high resistance to the flow of electric current.

63. A thin oil film on a water surface appears coloured because of
    (1) reflection (2) interference
    (3) diffraction (4) polarization

64. A tachometer is a device used to measure
    (1) gravitational pull
    (2) speed of rotation
    (3) surface tension
    (4) dispersive power

65. When cathode rays strike a target of high atomic weight, they give rise to
    (1) α-rays
    (2) β and γ rays
    (3) X-rays
    (4) positive rays

66. Different computers are connected to a LAN by a cable and

    (1) modem
    (2) interface card
    (3) special wires
    (4) telephone

67. Which one of the following was the top exporter company of software in 2001 in India ?
    (1) Infosys (2) TCS
    (3) Sun (4) Wipro

68. The major use of sulphur is in the manufacture of

(1) H_2SO_4 (2) H_2S
(3) SO_2 (4) Fungicide

69. Atoms of different elements have
    (1) same atomic number and same electronic configuration
    (2) different atomic number and same eletronic configuration
    (3) different atomic number and different number of valence electrons
    (4) same number of electrons and neutrons

70. Which of the following pairs is correctly matched ?
    (1) Vitamin-A : Scurvy
    (2) Vitamin-B : Rickets
    (3) Vitamin-C : Nightblindness
    (4) Vitamin-E : Reproduction

71. Organic compounds are
    (1) Covalent compounds
    (2) Ionic compounds
    (3) Co-ordination compounds
    (4) Interstitial compounds

72. Major pesticidal properties are present in
    (1) Jatropha (2) Castor
    (3) Pongamia (4) Jamun

73. The 'Greenhouse effect' is mainly due to increase in atmospheric
    (1) Ozone (2) Nitrogen
    (3) Sulphur dioxide
    (4) Carbon dioxide

74. Which of the following is **not** dealt under Section 3(3) of the Environment (Protection) Act, 1986 ?
    (1) The Biodiversity Authority
    (2) The Coastal Zone Management Authority
    (3) Authority set-up to monitor the State of Notified Ecologically Sensitive Ar-

    (4) Protection of Plant Varieties and Farmers Right Authority

75. Which of the following statements is true ?
    (1) Animals worry about raising their family
    (2) Animals make several feeding trips in a day

(3) Animals often behave sensibly

(4) Animals do not know meaning of brotherhood

76. Green blocks are referred to
    (1) Green cover
    (2) Green Ministry
    (3) Bio-bricks
    (4) Pro-biotic curd

77. India celebrated its "Polio free status" during the month of
    (1) December 2013
    (2) January 2013
    (3) January 2010
    (4) February 2014

78. Telangana State is the bifurcation of
    (1) Tamil Nadu
    (2) Andhra Pradesh
    (3) Seemandhra
    (4) Odisha and Tamil Nadu

79. Which of the following is **not** correct ?
    (1) CISF - Central Industrial Security Force
    (2) BSF - Border Security Force
    (3) UNDP - United Nation's Development Project
    (4) SIT- Special Investigation Team

80. A book entitled "The Hindus : An Alternative History" is written by
    (1) Shobha De
    (2) B.R. Ambedkar
    (3) Wendy Doniger
    (4) Salman Rushdie

81. The father of Economics is
    (1) Marshall   (2) Adam Smith
    (3) J.M. Keynes
    (4) Karl Marx

82. Which country awards Nobel Prize ?
    (1) France   (2) Sweden
    (3) Switzerland
    (4) U.S.A.

83. The first nuclear explosion in India was conducted at
    (1) Pokhran   (2) Bombay
    (3) Nellie   (4) Sriharikota

84. Jawahar Rozgar Yojana was introduced in

(1) Fifth Five Year Plan
(2) Sixth Five Year Plan
(3) Seventh Five Year Plan
(4) Eighth Five Year Plan

85. The sweetmeat is referred to
    (1) Camel meat
    (2) Goat meat
    (3) Feta cheese
    (4) Petha of Agra

86. Capital market deals with
    (1) Short term fund
    (2) Long term fund
    (3) Cash
    (4) Both long and short term funds

87. The new Agricultural Strategy in India was introduced in
    (1) 1956   (2) 1966
    (3) 1976   (4) 1986

88. The sale of branded articles is common in a situation of
    (1) excess capacity
    (2) monopolistic competition
    (3) monopoly
    (4) pure competition

89. Production refers to
    (1) destruction of utility
    (2) creation of utilities
    (3) exchange value
    (4) use of a product

90. The law of diminishing returns applies to
    (1) All sectors
    (2) Industrial sector
    (3) Agricultural sector
    (4) Service sector

91. Bureaucracy literally means a system of government by _____
    (1) Elected representative
    (2) Nominated representative
    (3) Officials
    (4) Group of landlords

92. A federal government is in the shape of
    (1) Command by the Centre
    (2) Appeal from the States
    (3) Agreement between the Centre and the States
    (4) Single Party Rule

93. Parliamentary or Presidential Government can be distinguished mainly by
    (1) its federal nature

(2) the rigidity of the Constitution

(3) the employer-employee relations

(4) the legislative-executive relations

94. The phrase "equality before law" used in Article-14 of Indian Constitution has been borrowed from _____
    (1) U.S.A.   (2) Germany
    (3) Britain   (4) Greece

95. Who said, 'The State exists because crime exists in society, otherwise there would be no need of a State' ?
    (1) Herbert Spencer
    (2) J.S. Mill   (3) John Locke
    (4) Tocqueville

96. The Quit India Resolution (1942) proposed the starting of a non-violent mass struggle on the widest possible scale. Who gave the mantra "Do or Die" for this struggle ?
    (1) Mahatma Gandhi
    (2) Subhash Chandra Bose
    (3) Jawaharlal Nehru
    (4) Sardar Vallabhbhai Patel

97. Napoleon got finally overthrown in the Battle of Waterloo in the year
    (1) 1814   (2) 1813
    (3) 1815   (4) 1816

98. Who was the first Woman President of Indian National Congress ?
    (1) Sarojini Naidu
    (2) Sucheta Kripalani
    (3) Rajkumari Amrit Kaur
    (4) Annie Besant

99. The famous Sun Temple at Konark was built by
    (1) Prataparudra
    (2) Anantavarman
    (3) Narasimha–I
    (4) Narasimha–II

100. Ashok spread Buddhism all over India and Ceylon by
    (1) Teaching the Triratnas
    (2) Sending the Dharma Mahamatras
    (3) Waging wars
    (4) Becoming a Buddhist Monk

QUANTITATIVE APTITUDE

101. In what ratio must 25% of alcohol be mixed with 50% of alcohol to get a mixture of 40% strength alcohol ?
(1) 1 : 2
(2) 2 : 1
(3) 2 : 3
(4) 3 : 2

102. Find two mean proportionals between 2 and 54.
(1) 6 and 18
(2) 6 and 12
(3) 12 and 18
(4) 6 and 9

103. A man had 7 children. When their average age was 12 years, a child aged 6 years died. The average age of remaining six children is
(1) 13 years
(2) 10 years
(3) 11 years
(4) 14 years

104. The average marks obtained by 22 candidates in an examination are 45. The average marks of the first 10 candidates are 55 and those of the last eleven are 40. The number of marks obtained by the eleventh candidate is
(1) 45
(2) 0
(3) 50
(4) 47.5

105. A shop-keeper sold a sewing machine for ₹ 1,080 at a loss of 10%. At what price should he have sold it so as to gain 10% on it ? (in ₹)
(1) 1,069
(2) 1,200
(3) 1,230
(4) 1,320

106. A man invested ₹ 27,000 in $12\frac{1}{2}$% stock at 108, then his yield percentage is
(1) $18\frac{3}{4}$%
(2) $11\frac{31}{54}$%
(3) 15%
(4) $8\frac{1}{2}$%

107. Sarita and Julie start walking from the same place in the opposite directions. If Julie walks at a speed of $2\frac{1}{2}$ km/hr and Sarita at a speed of 2 km/hr, in how much time will they be 18 km apart ?
(1) 4.0 hrs
(2) 4.5 hrs
(3) 5.0 hrs
(4) 4.8 hrs

108. Two trains 125 metres and 115 metres in length, are running towards each other on parallel lines, one at the rate of 33 km/hr and the other at 39 km/hr. How much time (inseconds) will they take to pass each other from the moment they meet ?
(1) 8
(2) 10
(3) 12
(4) 15

109. A sum of money at compound interest will amount to ₹ 650 at the end of the first year and ₹ 676 at the end of the second year. The amount of money is
(1) ₹ 1,300
(2) ₹ 650
(3) ₹ 1,250
(4) ₹ 625

110. The simplest form of the expression
$$\frac{p^2-p}{2p^3+6p^2}+\frac{p^2-1}{p^2+3p}+\frac{p^2}{p+1} \text{ is}$$
(1) $2p^2$
(2) $\frac{1}{2p^2}$
(3) $p+3$
(4) $\frac{1}{p+3}$

111. If $a+b+c=4\sqrt{3}$ and $a^2+b^2+c^2=16$, then the ratio $a:b:c$ is
(1) 1 : 1 : 1
(2) $1:\sqrt{2}:\sqrt{3}$
(3) 1 : 2 : 3
(4) None of these

112. If $x+\frac{1}{x}=2$, then the value of $\left(x^2+\frac{1}{x^2}\right)\left(x^3+\frac{1}{x^3}\right)$ is
(1) 20
(2) 4
(3) 8
(4) 16

113. If a, b, c be all positive integers, then the least positive value of $a^3+b^3+c^3-3abc$ is
(1) 1
(2) 2
(3) 4
(4) 3

114. If $a+b=1$, $c+d=1$ and $a-b=\frac{d}{c}$, then the value of c^2-d^2 is
(1) $\frac{a}{b}$
(2) $\frac{b}{a}$
(3) 1
(4) –1

115. When $f(x)=12x^3-13x^2-5x+7$ is divided by $(3x+2)$, then the remainder is
(1) 2
(2) 0
(3) –1
(4) 1

116. If $x=3t$, $y=\frac{1}{2}(t+1)$, then the value of t for which $x=2y$ is
(1) 1
(2) $\frac{1}{2}$
(3) –1
(4) $\frac{2}{3}$

117. If $x^2+\frac{1}{5}x+a^2$ is a perfect square, then a is
(1) $\frac{1}{100}$
(2) $\pm\frac{1}{10}$
(3) $\frac{1}{10}$
(4) 10

118. In a cyclic quadrilateral ABCD $m\angle A+m\angle B+m\angle C+m\angle D=$?
(1) 90°
(2) 360°
(3) 180°
(4) 120°

119. In a right angled triangle, the circumcentre of the triangle lies
(1) inside the triangle
(2) outside the triangle
(3) on midpoint of the hypotenuse
(4) on one vertex

120. If two angles of a triangle are 21° and 38°, then the triangle is
(1) Right-angled triangle
(2) Acute-angled triangle
(3) Obtuse-angled triangle
(4) Isosceles triangle

121. Angle between the internal bisectors of two angles of a triangle ∠B and ∠C is 120°, then ∠A is
(1) 20°
(2) 30°
(3) 60°
(4) 90°

122. BE and CF are two medians of ΔABC and G the centroid. FE cuts AG at O. If OG = 2 cm, then the length of AO is
(1) 2 cm
(2) 4 cm
(3) 6 cm
(4) 8 cm

123. Let ABC be an equilateral triangle and AX, BY, CZ be the altitudes. Then the right statement out of the four given responses is

(1) AX = BY = CZ

(2) AX ≠ BY = CZ

(3) AX = BY ≠ CZ

(4) AX ≠ BY ≠ CZ

124. O is the circumcentre of ΔABC, given ∠BAC = 85° and ∠BCA = 55°, find ∠OAC.

(1) 40°   (2) 50°

(3) 60°   (4) 80°

125. The angles of a triangle are in the ratio 2 : 3 : 7. The measure of the smallest angle is

(1) 30°   (2) 60°

(3) 45°   (4) 90°

126. If $x \sin 60°.\tan 30° = \sec 60°.\cot 45°$, then the value of x is

(1) 2   (2) $2\sqrt{3}$

(3) 4   (4) $4\sqrt{3}$

127. If θ = 60°, then

$$\frac{1}{2}\sqrt{1+\sin\theta} + \frac{1}{2}\sqrt{1-\sin\theta}$$ is equal to

(1) $\cot\dfrac{\theta}{2}$ (2) $\sec\dfrac{\theta}{2}$

(3) $\sin\dfrac{\theta}{2}$ (4) $\cos\dfrac{\theta}{2}$

128. Given that $1^2 + 2^2 + 3^2 + ... + 10^2 = 385$, the value of $2^2 + 4^2 + 6^2 + ... + 20^2 =$

(1) 770   (2) 1540

(3) 1155   (4) $(385)^2$

129. The value of

$$5\frac{1}{3} \div 1\frac{2}{9} \times \frac{1}{4}\left(10 + \frac{3}{1 - \frac{1}{5}}\right)$$ is

(1) 15   (2) $\dfrac{67}{25}$

(3) $\dfrac{128}{11}$ (4) $\dfrac{128}{99}$

130. A and B together can dig a trench in 12 days, which A alone can dig in 28 days; B alone can dig it in

(1) 20 days   (2) 21 days

(3) 22 days   (4) 23 days

131. A pipe can fill a cistern in 9 hours. Due to a leak in its bottom, the cistern fills up in 10 hours. If the cistern is full, in how much time will it be emptied by the leak ?

(1) 70 hours   (2) 80 hours

(3) 90 hours   (4) 100 hours

132. A skilled, a half skilled and an unskilled labourer work for 7, 8 and 10 days respectively and they together get ₹ 369 for their work. If the ratio of their each day's work is $\dfrac{1}{3} : \dfrac{1}{4} : \dfrac{1}{6}$, then how much does the trained labourer get (in rupees) ?

(1) 164   (2) 102.50

(3) 201.50   (4) 143.50

133. Two cubes have their volumes in the ratio 27 : 64. The ratio of their surface areas is

(1) 9 : 25   (2) 16 : 25

(3) 9 : 16   (4) 4 : 9

134. The radius of the base of a Conical tent is 12 m. The tent is 9 m high. Find the cost of canvas required to make the tent, if one square metre of canvas costs ₹ 120

(Take π = 3.14)

(1) ₹ 67, 830   (2) ₹ 67, 800

(3) ₹ 67, 820   (4) ₹ 67, 824

135. The difference between the radii of the bigger circle and smaller circle is 14 cm and the difference between their areas is 1056 cm². Radius of the smaller circle is

(1) 7 cm   (2) 5 cm

(3) 9 cm   (4) 3 cm

136. If the discount is equal to one fifth of the marked price and the loss is half the discount, then the percentage of loss is

(1) $10\dfrac{1}{9}\%$ (2) $11\dfrac{1}{9}\%$

(3) $12\dfrac{1}{9}\%$ (4) $13\dfrac{1}{9}\%$

137. Two successive discounts of 10% and 5%, in this order, are given on a bill of ₹ 110. Find the net amount of money payable to clear the bill.
(answer to the nearest rupee)

(1) ₹ 94   (2) ₹ 95

(3) ₹ 96   (4) ₹ 97

138. The true discount on ₹ 1, 860 due after a certain time at 5% is ₹ 60. Find the time after which it is due.

(1) 10 months   (2) 8 months

(3) 9 months   (4) 1 year

139. If the sum of two angles is 135° and their difference is $\dfrac{\pi}{12}$, then the circular measure of the greater angle is

(1) $\dfrac{2\pi}{3}$ (2) $\dfrac{3\pi}{5}$

(3) $\dfrac{5\pi}{12}$ (4) $\dfrac{\pi}{3}$

140. If $\dfrac{2\tan^2 30°}{1 - \tan^2 30°} + \sec^2 45° - \sec^2 0°$ = $x \sec 60°$, then the value of x is

(1) 2   (2) 1

(3) 0   (4) –1

141. If $\tan\theta = \dfrac{\sin\alpha - \cos\alpha}{\sin\alpha + \cos\alpha}$, then $\sin\alpha + \cos\alpha$ is

(1) $\pm\sqrt{2}\sin\theta$ (2) $\pm\sqrt{2}\cos\theta$

(3) $\pm\dfrac{1}{\sqrt{2}}\sin\theta$ (4) $\pm\dfrac{1}{\sqrt{2}}\cos\theta$

142. If $7\sin^2\theta + 3\cos^2\theta = 4$, $(0° < \theta < 90°)$, then the value of $\tan\theta$ is
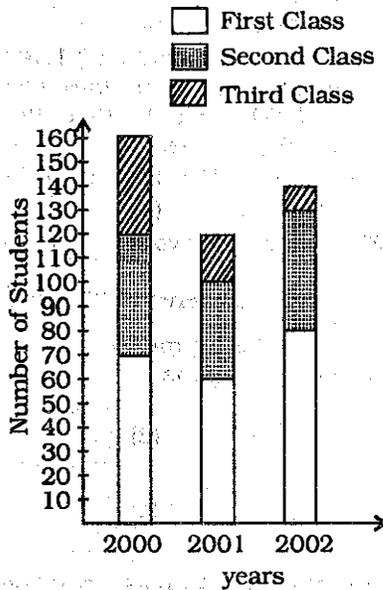
(1) $\dfrac{1}{\sqrt{3}}$ (2) $\dfrac{1}{2}$

(3) 1   (4) $\sqrt{3}$

143. If $\tan 9° = \dfrac{p}{q}$, then the value of $\dfrac{\sec^2 81°}{1 + \cot^2 81°}$ is

(1) $\dfrac{q}{p}$ (2) 1

(3) $\dfrac{p^2}{q^2}$ (4) $\dfrac{q^2}{p^2}$

Directions (144-147) : The sub divided bar diagram given below depicts the result of Class XII students of a school for three years. Study the diagram and answer the questions given below :

☐ First Class
▦ Second Class
▨ Third Class

144. The percentage of students passed with Second class in the year 2000 is
(1) $33\frac{1}{4}\%$ (2) $32\frac{1}{4}\%$
(3) $30\frac{1}{4}\%$ (4) $31\frac{1}{4}\%$

145. The percentage of students passed with First class in the year 2001 is
(1) 50%   (2) 45%
(3) 60%   (4) 65%

146. The number of students passed with Third class in the year 2002 is
(1) 130   (2) 10
(3) 140   (4) 20

147. The number of students passed with Second class in the year 2002 is
(1) 80   (2) 130
(3) 50   (4) 100

Directions (148-150) : Pie-charts show the expenses on various heads in construction of a house. Study the pie-chart.
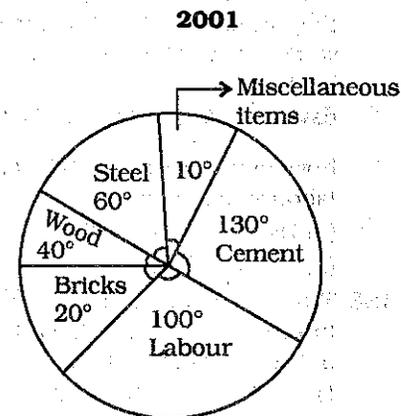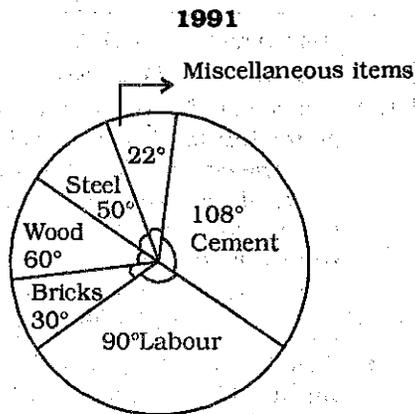
1991

2001

148. What percentage of the total amount is being spent on cement in 1991 ?
(1) 18%   (2) 30%
(3) 48%   (4) 60%

149. The percentage increase in the amount spent on labour from 1991 to 2001, given that the total amount spent on the construction of the house is ₹3,60, 000 in 1991 and ₹8,64,000, in 2001 is
(1) $3\frac{1}{9}\%$ (2) $43\frac{1}{3}\%$
(3) $41\frac{2}{3}\%$ (4) $2\frac{2}{9}\%$

150. If the total cost of constructing the house is ₹3,60,000 in 1991 and ₹8,64,000, in 2001, what is the amount spent on Steel in 1991 and 2001 ?
(1) ₹2,16,000, ₹4,32,000
(2) ₹60,000, ₹84,000
(3) ₹80,000, ₹2,10,000
(4) ₹50,000, ₹1,44,000

ENGLISH COMPREHENSION

Directions (151-153) : In the following questions, choose the word opposite in meaning to the given word.

151. Barbarous
(1) Ancient   (2) Civilized
(3) Gentle   (4) Savage

152. Heighten
(1) Widen   (2) Decrease
(3) Strengthen   (4) Dissolve

153. Dubious
(1) Shady   (2) Delirious
(3) Laconic   (4) Certain

Directions (154-158) : In the following questions, four alternatives are given for the Idiom/Phrase printed in bold in the sentence. Choose the alternative which best expresses the meaning of the Idiom/Phrase.

154. To be a successful lawyer, one must know how to **dot one's i's and corss one's t's.**
(1) complete one task at a time
(2) write great letters
(3) deal with paperwork
(4) be detailed and exact

155. When Ramu lost the money, he was **down in the dumps.**
(1) accusing others of stealing
(2) searching everywhere (check spelling)
(3) sad and depressed
(4) very angry at himself

156. He **turned up his nose at my offer.**
(1) was taken aback by my offer
(2) found it hard to believe my offer
(3) treated my offer with contempt
(4) could not accept my offer

157. There are no **hard and fast** rules that cannot be relaxed on such an occasion.
(1) that is difficult to solve
(2) that can be altered
(3) that is very quick
(4) that cannot be altered

158. Her father **strained every nerve** to enable her to get settled in life.
(1) worked very hard
(2) spent a huge amount
(3) tried all tricks
(4) bribed several persons

159. The speaker got confused, and started to **contradict himself.**
(♦) oppose himself
(2) argue against
(3) reject
(4) No improvement

160. The number of people going abroad for vacations is **ever increasing** every year.
(1) ever increasing
(2) increasing (3) shooting
(4) No improvement

161. Looking at the pictures of his old home made him **nostalgic.**
(1) romantic (2) historical
(3) philosophic
(4) No improvement

162. I met him **in the way.**
(1) on the way
(2) at the way
(3) during the way
(4) No improvement

163. I shall appreciate if you kindly accept my proposal.
(1) I would appreciate if
(2) I shall appreciate it if
(3) I would have appreciate if
(4) No improvement

164. Rajesh is **not very-well** these days.
(1) in poverty (2) unwell
(3) indifferent
(4) No improvement

165. Nothing about the accident **has come to her knowledge.**
(1) was learnt by her
(2) has been known by her
(3) is known to her
(4) No improvement

166. Will you **let me borrow some money** in this hour of need ?
(1) lend me some rupees

(2) let me borrow a few rupees
(3) lend me some money
(4) No improvement

167. The autumn **season** of Parliament will begin on Monday.
(1) session
(2) cession
(3) mission
(4) No improvement

168. The boy said that **he has read** the book.
(1) he has already read
(2) he had read
(3) he has finished to read
(4) No improvement

Directions (169-175) : In the following questions, out of the four alternatives, choose the one which can be substituted for the given words/sentences.

169. A state where no law and order exists
(1) Monarchy (2) Mobocracy
(3) Anarchy (4) Democracy

170. He is my **partner in crime.**
(1) Friend (2) Accomplice
(3) Neighbour (4) Companion

171. Her speech **could not be heard** by those sitting in the last few rows.
(1) Imperceptible
(2) Indelible
(3) Inaudible (4) Ineffable

172. A short trip or excursion
(1) Rambler (2) Jaunt
(3) Detour (4) Stroller

173. Motive or incitement to action
(1) Remark (2) Contract
(3) Proposition (4) Incentive

174. Science or practice of map drawing
(1) Chirography
(2) Xerography
(3) Cartography
(4) Pictography

175. A speaker's platform
(1) Stage (2) Stand
(3) Pulpit (4) Podium

Directions (176-177) : In the following questions, four words are given in each question, out of which only one word is correctly spelt. Find the correctly spelt word.

176. (1) Conoiseeur
(2) Conoisseur
(3) Connoisseur
(4) Cannoisseur

177. (1) Miscellaneous
(2) Miscelaneous
(3) Missicellaneous
(4) Miscelleneous

Directions (178-187) : In the following questions, you have two brief passages with 5 questions following each passage. Read the passages carefully and choose the best answer to each question out of the four alternatives.

Passage I (Q. Nos. 178 to 182)

Opera refers to a dramatic art form, originating in Europe, in which the emotional content is conveyed to the audience as much through music, both vocal and instrumental, as it is through the lyrics. By contrast, in musical theatre an actor's dramatic performance is primary, and the music plays a lesser role. The drama in opera is presented using the primary elements of theatre such as scenery, costumes and acting. However, the words of the opera, or libretto, are sung rather than spoken. The singers are accompanied by a musical ensemble ranging from a small instrumental ensemble to a full symphonic orchestra.

178. It is pointed out in the passage that opera
(1) has developed under the influence of musical theatre
(2) is a drama that is not dependent on music.
(3) is not a high-budget production.
(4) is originated in Europe.

179. We can understand from the passage that
(1) audiences are captivated more by the lyrics than by the music.
(2) in opera lyrics are as important as the music.
(3) orchestras in operas do not vary in size.
(4) musical theatre relies, above all, on music.

180. it is stated in the passage that

(1) acting and costumes are secondary to music in musical theatre.

(2) many people find musical theatre more captivating than opera.

(3) music in musical theatre is not as important as it is in opera.

(4) an opera requires a huge orchestra as well as a large choir.

181. A libretto is

(1) the main character who is the liberator at the climax of the scene.

(2) the words of the opera.

(3) a musical composition which is played in a slow leisurely manner.

(4) the sequence of well controlled, graceful movements performed as a display of skill.

182. The word "conveyed" also means

(1) transmit   (2) tote

(3) keep   (4) dissuade

Passage II (Q. Nos. 183 to 187)

These days we hear a lot about science, but scientists, the men and women who do the work and make the discoveries, seem distant and strange to us. Science often appears to be very difficult and sometimes even magical. It is difficult of course, but we are wrong if we believe that we cannot understand it. The chief thing about the scientific method is that we get the answers to questions by making tests. The man, to take an example, who finds his bicycle tyre is flat will pump some air into it. Suppose one hour later the tyre is flat again, if the man is wise, he will first test the valve in water. If he finds air is escaping from it he will put in a new piece of valve-rubber and then pump up the tyre. All should then be well again. This man is using a simple form of scientific method.

If the man was very 'unscientific' he might say to himself that an evil spirit had caused the tyre to go flat.

183. What do people talk a lot about these days ?

(1) science

(2) magic

(3) men and women

(4) work

184. What is the common man's attitude towards scientists ?

(1) They are wrong.

(2) They seem distant and strange.

(3) They are wise.

(4) They are difficult.

185. If we use the scientific method how do we get answers to questions ?

(1) By believing

(2) By example

(3) By making tests

(4) By methods

186. If a man does not use the scientific approach, what will he attribute the flat tyre to ?

(1) An evil spirit

(2) The rubber valve

(3) The bicycle

(4) Magic

187. The antonym of believe is

(1) reveal   (2) disbelieve

(3) agree   (4) deny

Directions (188-192) : In the following questions, some parts of the sentences have errors and some are correct. Find out which part of a sentence has an error. The number of that part is the answer. If a sentence is free from error, then your answer is (4) i.e. No error.

188. They dreamed of a society (1)/ where everyone (2)/ were equal. (3)/ No error (4)

189. On Senegal (1)/ it is considered impolite (2)/ if you do not share your food. (3)/ No error (4)

190. We discussed about the problem thoroughly (1)/on the eve of the examination (2)/ that I found it very easy to work it out. (3)/ No error (4)

191. The wise father told him (1)/ that the mangoes had gone bad as they were (2)/ in contact with the one rotten mango. (3)/ No error (4)

192. The box of eggs (1)/ are lying (2)/ on the table. (3)/ No error (4)

Directions (193-197) : In the following questions, sentences are given with blanks to be filled in with an appropriate word(s). Four alternatives are suggested for each question. Choose the correct alternative out of the four.

193. James Watt _____ the steam engine.

(1) invented   (2) discovered

(3) founded   (4) find

194. After saying that Beverly made too many mistakes, Bob added insult to injury by saying _____.

(1) they were small mistakes

(2) she worked very slowly

(3) her work was excellent

(4) work at a remarkable pace

195. Losing that job was a blessing in disguise because she _____.

(1) get a much better job

(2) lost her house

(3) unemployed for years

(4) was able to shop

196. All teachers agree that Paresh is the _____ intelligent boy in his class.

(1) more   (2) most

(3) very   (4) only

197. The State is home to several destinations of _____ beauty.

(1) paralleled

(2) unparalleled

(3) inequal   (4) equal

Directions (198-200) : In the following questions, out of the four alternatives, choose the one which best expresses the meaning of the given word.

198. Tepid

(1) Hot   (2) Warm

(3) Cold   (4) Boiling

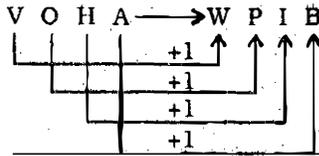**199.** Canny

(1) Obstinate   (2) Proud

(3) Stout   (4) Clever

200. Humane

(1) Sympathetic

(2) Spirit

(3) Straight

(4) Source

ANSWERS
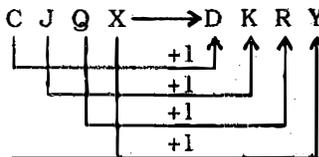
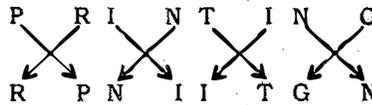|			
1. (2)	2. (3)	3. (1)	4. (4)
5. (1)	6. (4)	7. (3)	8. (2)
9. (3)	10. (4)	11. (3)	12. (4)
13. (3)	14. (3)	15. (2)	16. (4)
17. (3)	18. (2)	19. (4)	20. (4)
21. (2)	22. (2)	23. (3)	24. (2)
25. (3)	26. (4)	27. (2)	28. (4)
29. (4)	30. (2)	31. (2)	32. (4)
33. (1)	34. (2)	35. (1)	36. (1)
37. (1)	38. (1)	39. (1)	40. (3)
41. (4)	42. (3)	43. (2)	44. (2)
45. (3)	46. (1)	47. (2)	48. (2)
49. (2)	50. (4)	51. (1)	52. (4)
53. (2)	54. (2)	55. (4)	56. (2)
57. (4)	58. (2)	59. (1)	60. (3)
61. (4)	62. (1)	63. (2)	64. (2)
65. (3)	66. (2)	67. (2)	68. (1)
69. (3)	70. (4)	71. (1)	72. (*)
73. (4)	74. (4)	75. (2)	76. (3)
77. (4)	78. (2)	79. (3)	80. (3)
81. (2)	82. (2)	83. (1)	84. (3)
85. (4)	86. (2)	87. (2)	88. (2)
89. (2)	90. (1)	91. (3)	92. (3)
93. (4)	94. (3)	95. (1)	96. (1)
97. (3)	98. (4)	99. (3)	100. (2)
101. (3)	102. (1)	103. (1)	104. (2)
105. (4)	106. (2)	107. (1)	108. (3)
109. (4)	110. (2)	111. (1)	112. (2)
113. (3)	114. (2)	115. (4)	116. (2)
117. (3)	118. (2)	119. (3)	120. (3)
121. (3)	122. (3)	123. (1)	124. (2)
125. (1)	126. (3)	127. (4)	128. (2)
129. (1)	130. (2)	131. (3)	132. (4)
133. (3)	134. (4)	135. (2)	136. (2)
137. (1)	138. (2)	139. (3)	140. (2)
141. (2)	142. (1)	143. (4)	144. (4)
145. (1)	146. (2)	147. (3)	148. (2)
149. (*)	150. (4)	151. (2)	152. (2)
153. (4)	154. (4)	155. (3)	156. (3)
157. (4)	158. (1)	159. (4)	160. (2)
161. (4)	162. (1)	163. (2)	164. (2)
165. (3)	166. (3)	167. (1)	168. (2)
169. (3)	170. (2)	171. (3)	172. (2)
173. (4)	174. (3)	175. (4)	176. (3)
177. (1)	178. (4)	179. (2)	180. (3)
181. (2)	182. (1)	183. (1)	184. (2)
185. (3)	186. (1)	187. (2)	188. (3)
189. (1)	190. (1)	191. (3)	192. (2)
193. (1)	194. (2)	195. (1)	196. (2)
197. (2)	198. (2)	199. (4)	200. (1)

EXPLANATIONS

1. (2) Cotton is a natural fibre while nylon is an artificial fibre.

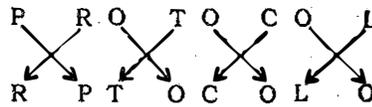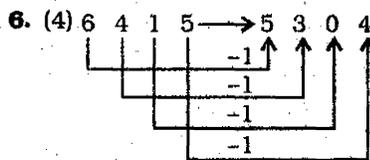2. (3) Punishment is given for a crime. Similarly, honesty is rewarded considerably.

3. (1)

V O H A ⟶ W P I B

Similarly,

C J Q X ⟶ D K R Y

4. (4)

P R I N T I N G
R P N I I T G N

Similarly,

P R O T O C O L
R P T O C O L O

5. (1) 20 + 2 = 22;

$$\frac{22}{2} = 11$$

Similarly,

102 + 2 = 104

$$\frac{104}{2} = 52$$

6. (4) 6 4 1 5 ⟶ 5 3 0 4

Similarly,

7 8 9 6 ⟶ 6 7 8 5
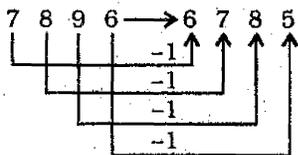
7. (3) Except Taxology, all other branches of study are associated with human beings.

8. (2) Except in the pair Pressure-Barometer, in all other pairs the second is the unit of the first.

Barometer is a scientific instrument used for measuring atmospheric pressure.

9. (3) The number 36 is a perfect square.

36 = 6 × 6
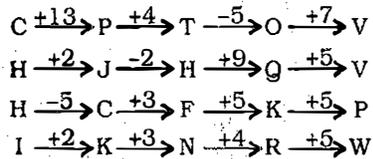
10. (4) $(3)^3 + 3$

⇒ 27 + 3 = 30

$(5)^3 + 3$

⇒ 125 + 3 = 128

$(8)^3 + 3$

⇒ 512 + 3 = 515

$(9)^3 + 3$

⇒ 729 + 3 = $\boxed{732}$

11. (3) Except in the word ADORE, in all other words, the first and the last letters are Vowels. In ADORE, there are three Vowels.

12. (4)

$$C \xrightarrow{+13} P \xrightarrow{+4} T \xrightarrow{-5} O \xrightarrow{+7} V$$
$$H \xrightarrow{+2} J \xrightarrow{-2} H \xrightarrow{+9} Q \xrightarrow{+5} V$$
$$H \xrightarrow{-5} C \xrightarrow{+3} F \xrightarrow{+5} K \xrightarrow{+5} P$$
$$I \xrightarrow{+2} K \xrightarrow{+3} N \xrightarrow{+4} R \xrightarrow{+5} W$$

13. (3) Meaningful order of words:
(D) Cow
↓
(B) Milk
↓
(C) Curd
↓
(E) Butter
↓
(A) Ghee

14. (3) Arrangement of words as per order in dictionary :
(D) Conceive
↓
(B) Conception
↓
(E) Concerned
↓
(A) Concession
↓
(C) Conciliator

15. (2)
a[c]c / a[a]c / a[c]c / a a[c]

16. (4) M $\xrightarrow{+2}$ O $\xrightarrow{+2}$ Q $\xrightarrow{+2}$ [S]

N $\xrightarrow{+2}$ P $\xrightarrow{+2}$ R $\xrightarrow{+2}$ [T]

B $\xrightarrow{+2}$ D $\xrightarrow{+2}$ F $\xrightarrow{+2}$ [H]

A $\xrightarrow{+2}$ C $\xrightarrow{+2}$ E $\xrightarrow{+2}$ [G]

17. (3) $512 \div 2 = 256$

$256 \div 2 = 128$

$128 \div 2 = \boxed{64}$

$64 \div 2 = 32$

$32 \div 2 = 16$

$16 \div 2 = 8$

18. (2) $30 + 100 = 130$

$130 + (100 \times 5) = 630$

$630 + (500 \times 5) = 3130$

19. (4) Suppose, the age of Z
= x years

Age of Y = $2x$ years

Age of X = $2x + 4$ years

According to question

$x + 2x + 2x + 4 = 34$

$\Rightarrow 5x = 34 - 4$

$\therefore x = \dfrac{30}{5} = 6$

Age of X = $2x + 4$

$= 2 \times 6 + 4 = 16$ years

20. (4) Only daughter of Radha's mother means Radha herself. Therefore, Radha is sister of Vinod.

21. (2)

Person	Subjects				
	Dramatics	Computer Science	Physics	History	Maths
Madhavi	✓	✓	✓	✗	✗
Shalini	✓	✓	✗	✓	✗
Anjana	✗	✓	✓	✓	✓
Purnima	✓	✗	✓	✓	✗
Nirmala	✗	✗	✓	✓	✓

Purnima is good in Physics, History and Dramatics.

22. (2) There is no 'C' letter in the given word. Therefore, the words DIALECT and DICTATE cannot be formed.

There is no 'R' letter in the given word. Therefore, the word DIAMETER cannot be formed.

[IM] M E ■ A [TEL] Y ⇒

LIMITED

23. (3) There is only one 'A' in the given word. Therefore, the word BOATMAN cannot be formed.
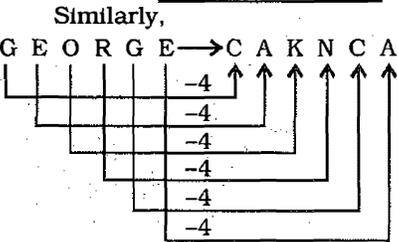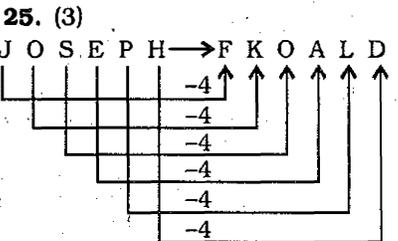
[TAMBO] U [RINE] ⇒

BROMINATE

[TA] M [BO] U [RINE] ⇒

OBTAINER

[TAM] B O U [RINE] ⇒

MINARET

24. (2) 5 18 5 8 1 3 5

↓ ↓ ↓ ↓ ↓ ↓ ↓

E R E H A C E

25. (3)

20 5 1 3 8 5 18

↓ ↓ ↓ ↓ ↓ ↓ ↓

T E A C H E R

5 1 3 5 20 8 18

↓ ↓ ↓ ↓ ↓ ↓ ↓

E A C E T H R

18 5 3 8 1 5 20

↓ ↓ ↓ ↓ ↓ ↓ ↓

R E C H A E T

J O S E P H ⟶ F K O A L D

−4

−4

−4

−4

−4

−4

Similarly,

G E O R G E ⟶ C A K N C A

−4

−4

−4

−4

−4

−4

26. (4) B U I L D I N G

↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓

4 1 5 2 7 5 9 6

R I V E R

↓ ↓ ↓ ↓ ↓

8 5 3 0 8

Therefore,

B R I D G E

↓ ↓ ↓ ↓ ↓ ↓

4 8 5 7 6 0

27. (2) C A R   S I T

↓ ↓ ↓   ↓ ↓ ↓

φ α δ   η ψ κ

W E L L   M A P

↓ ↓ ↓ ↓   ↓ ↓ ↓

σ ι y y   μ α β

Therefore,

φ α y μ

↓ ↓ ↓ ↓

C A L M

28. (4) Distance covered by aeroplane = $340 \times 8 = 2720$ km

$\text{Speed} = \dfrac{\text{Distance}}{\text{Time}}$

$\dfrac{2720}{\frac{8}{3}} = \dfrac{2720 \times 3}{8}$

$= 1020$ kmph

29. (4)

$+ \Rightarrow \div$	$- \Rightarrow +$
$\times \Rightarrow -$	$\div \Rightarrow \times$

$8 \div 4 - 6 + 3 \times 4 = ?$

$? = 8 \times 4 + 6 \div 3 - 4$

$\Rightarrow ? = 32 + 2 - 4 = \boxed{30}$

30. (2) $58 \times 12 = 4$

$\Rightarrow (5 + 8) + (1 + 2) \Rightarrow 4$

$\Rightarrow 13 + 3 \Rightarrow 4 \Rightarrow \sqrt{16} = 4$

$37 \times 96 = 5$

$\Rightarrow (3 + 7) + (9 + 6) \Rightarrow 5$

$\Rightarrow 10 + 15 \Rightarrow 5 \Rightarrow \sqrt{25} = 5$

$11 \times 20 = 2$

$\Rightarrow (1 + 1) + (2 + 0) \Rightarrow 2$

$\Rightarrow 2 + 2 \Rightarrow 2$

$\Rightarrow \sqrt{4} = 2$

42×12

$\Rightarrow (4 + 2) + (1 + 2)$

$6 + 3 = 9$

$\Rightarrow \sqrt{9} = 3$

31. (2) $33 * 11 * 3 * 6 = 115$

$\Rightarrow 33 \times 11 \div 3 - 6 = 115$

$\Rightarrow \left(\dfrac{33 \times 11}{3}\right) - 6 = 115$

$\Rightarrow 11 \times 11 - 6 = 115$

$\Rightarrow 121 - 6 = 115$

32. (4) First Row

$72 + 44 = 116$

$116 - 68 = 48$

Second Row

$91 + ? - 86 = 48 + 12$

$\Rightarrow 91 + ? = 60 + 86$

$\Rightarrow ? = 146 - 91 = 55$

Third Row

$43 + 66 = 109$

$109 - 37 = 60 + 12 = 72$

33. (1) First Column

$8 \times 3 + 6 = 24 + 6 = 30$

Second Column

$2 \times 9 + 4 = 18 + 4 = 22$

Third Column

$9 \times 6 + 9 = 54 + 9 = \boxed{63}$

34. (2) First Column

$8 \times 2 \times 4 = 64$

$\sqrt[3]{64} = 4$

Second Column

$3 \times 3 \times 3 = 27$

$\sqrt[3]{27} = 3$
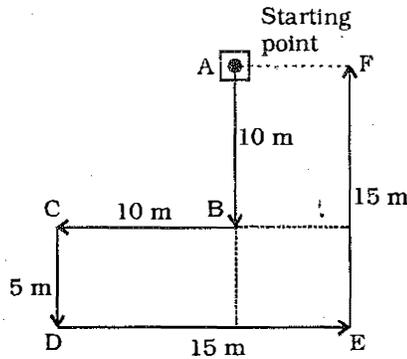
Third Column

$12 \times 6 \times 3 = 216$

$\sqrt[3]{216} = 6$

35. (1)

North

West ←——→ East

South
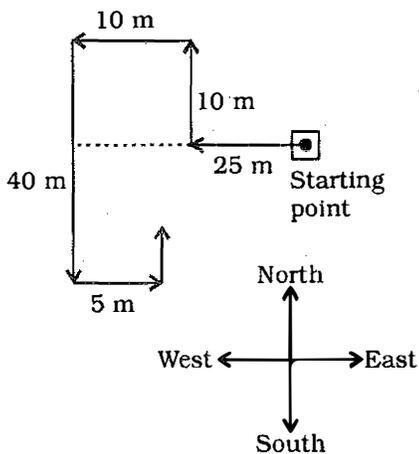
It is clear from the diagram that, now he is walking towards North.

36. (1)

Required distance = AF

= 5 metres

37. (1) Both the Premises are Universal Affirmative (A-type).

All deers are cows.

All cows are animals.

A + A ⇒ A-type of Conclusion "All deers are animals"

This is Conclusion I.

38. (1) Clearly assumption I is implicit in the statement. If regular reading of newspapers enhances one's general knowledge, it implies that newspapers contain a lot of general knowledge.
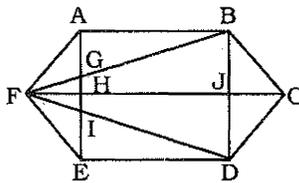
Assumption II is a long drawn conclusion.

39. (1)

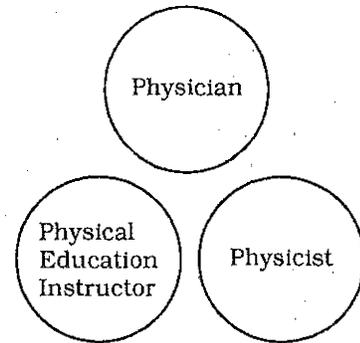**40.** (3) The numbers 3, 4, 5 and 6 are on the faces adjacent to the number 1. So, 2 lies opposite 1.
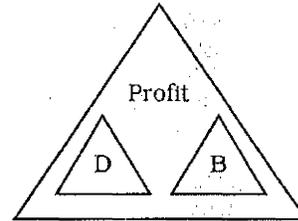
41. (4)

The triangles are :

Δ AGF; Δ GHF; Δ FIH; Δ FIE;

Δ AFH; Δ AIF; Δ FEA; Δ FIG;

Δ FEG; Δ FEH; Δ BAG; Δ BJC;

Δ CDJ; Δ CBD; Δ DEI; Δ AFB;

Δ DEF; Δ FJB; Δ FCB; Δ FCD;

Δ FJD; Δ FBD

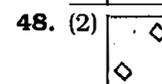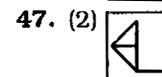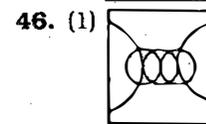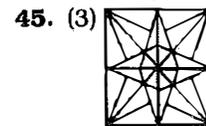**42.** (3) Physician, Physical Education Instructor and Physicist are different from one another.

43. (2) Dividend is different from Bonus. But both are parts of Profit.

44. (2) The required region should be common to the triangle and the circle but outside the rectangle. Such region is marked '14'.

45. (3)

46. (1)

47. (2)

48. (2)

49. (2)
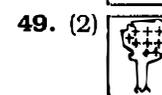
50. (4) L ⇒ 14, 23, 41, 69, 99

O ⇒ 11, 30, 57, 78, 89

V ⇒ 01, 67,

E ⇒ 02, 22, 43, 56, 68, 85

Option	L	O	V	E
(1)	23	12	67	68
(2)	69	78	76	86
(3)	99	98	67	68
(4)	14	30	67	68

51. (1) The Wildlife Protection Act, 1972 is an Act of the Parliament of India enacted for protection of plants and animal species. It extends to the whole of India, except the State of Jammu and Kashmir.

52. (4) Arkose is a detrital sedimentary rock, specifically a type of sandstone containing at least 25% feldspar. It is commonly coarse-grained and usually either pink of gray (depending on the color of feldspar).

53. (2) Plantation agriculture is a form of commercial farming where crops are grown for profit. Usually, only one type of crop is grown in a plantation. Common examples include rubber, coffee, tea, bananas, sugar cane, oil palm, cocoa and tobacco.

54. (2) The United Nations (UN) International Day for the Preservation of the Ozone Layer is celebrated on September 16 every year. This event commemorates the date of the signing of the Montreal Protocol on Substances that Deplete the Ozone Layer in 1987.

55. (4) The Damodar valley is rich in coal. It is considered as the prime centre of coking coal in the country. The important coalfields in the basin are Jharia, Raniganj, West Bokaro, East Bokaro, Ramgarh, South Karanpura and North Karanpura.

56. (2) A tadpole resembles a fish and breathes through external gills. Adult frogs breathe through their lungs and exchange gases through their skin and the lining of their mouths.

57. (4) The word Virus has been derived from the Latin 'virus' referring to poison and other noxious substances. A virus is a small infectious agent that replicates only inside the living cells of other organisms.

58. (2) Composting is the depomposition of plant remains and other once-living materials to make an earthy, dark, crumbly substance that is excellent for enriching soil. It is the chief way to recycle wastes.

59. (1) A meristem is the tissue in most plants containing undifferentiated cells (meristematic cells), found in zones of the plant where growth can take place. Meristems give rise to permanent tissues.

60. (3) The epidermis of the stem and the leaf is usually surrounded by a thin, covering called cuticle. It is formed by a waxy substance called cutin. It is meant for preventing excessive evaporation of water. Cuticle is absent in the root epidermis.

61. (4) Intercalary meristem is meristem at the base of the internode in monocot stems (particularly grass stems). Only the apical meristem is active. If the tip of the stem is removed, the uppermost intact intercalary meristem becomes the apical meristem and starts intercalary growth.

62. (1) A superconductor is a material that can conduct electricity or transport electrons from one atom to another with no resistance. No heat, sound or any other form of energy is released from the material when it reaches the temperature at which it becomes superconductive.

63. (2) A thin oil film on a water surface appears coloured because of thin-film interference which involves the interference of light waves reflecting off the top surface of a film with the waves reflecting from the bottom surface. The refractive index of oil is larger than that of water, therefore the reflection on the back side occurs.
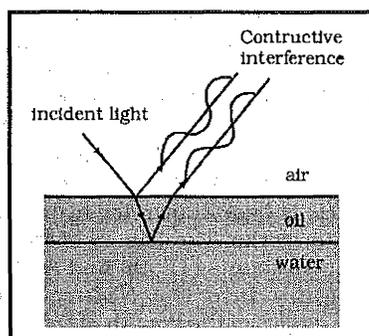
64. (2) A tachometer is an instrument measuring the rotation speed of a shaft or disk, as in a motor or other machine. The device usually displays the revolutions per minute (RPM).

65. (3) When cathode rays strike a solid target of high atomic weight and high melting point such as tungsten, molybdenum, etc, they give rise to a highly penetrating radiation called the X-rays (LIT Physics by Dr. P.K Agarwal).

66. (2) A Network Interface Card (NIC) is a device that allows computers to be joined together in a network, typically a Local Area Network (LAN). The network interface card acts as an interpreter, allowing the machine to both send and receive data on a LAN. Information Technology (IT) specialists often use these cards to setup wired or wireless networks.

67. (2) Tata Consultancy Services emerged the country's No. 1 software exporter in 2001-02 with an export earning of Rs. 3,882 crore. Infosys occupied the second position with Rs. 2,553 crore while Wipro was the third-largest software exporter with export revenue of Rs. 2,298 crore.

68. (1) The major use of sulphur is in the manufacture of sulphuric acid (H_2SO_4) which is one of the most important compounds made by the chemical industry. It is used to make, literally, hundreds of compounds needed by almost every industry.

69. (3) Each element's atoms have a different number of protons, neutrons, and electrons, which is why they have different atomic numbers, difference in valence electrons and other properties. Their reactivity also varies because of the number and activeness of the electrons in the atom.

70. (4) Vitamin E is a fat soluble vitamin that is essential in many physiological processes. It plays an important role in the health and maintenance of proper reproductive system

function. Without vitamin E the body cannot reproduce. It is also essential during pregnancy and is needed for the proper health and development of the fetus.

71. (1) Organic compounds are always covalent compounds because it is more energetically favorable for carbon to covalently bond. Organic compounds, such as carbohydrates, lipids, proteins and nucleic acids, are all examples of covalent compounds.

72. (*) **More than one option is correct.**
Jatropha curcas is known for its insecticidal, pesticidal and fungicidal properties. It is used in rural Bengal for dhobi itch (a common fungal infection of the skin). Pesticidal properties have also been reported from Pongamia Pinnata (Karanja) especially against nematodes [Research Journal of Chemical Sciences, Vol. 2(7), 16-20, July (2012].

73. (4) Carbon dioxide is the primary greenhouse gas that is contributing to recent climate change, 72% of the totally emitted greenhouse gases is carbon dioxide (CO_2), 18% Methane and 9% Nitrous oxide (NOx). Carbon dioxide emissions therefore are the most important cause of global warming.
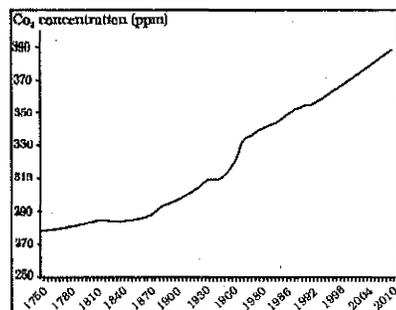
74. (4) The Protection of Plant Varieties and Farmers' Rights Act, 2001 provides for the Protection and Plant Varieties and Farmers' Rights Authority. The act was enacted to provide for the establishment of an effective system for protection of

plant varieties, the rights of farmers and plant breeders, and to encourage the development and cultivation of new varieties of plants.

75. (2) Animal Kingdom is usually a short day; they take several feeding trips in a day. Big birds and antelope feed several times a day.

76. (3) Green Blocks are comprised of blocks throughout the neighborhood that pledge to be greener by working together to improve quality of life, clean, and beautify their neighborhood. They are also known as bio-bricks.

77. (4) India celebrated its "Polio free status" during February 2014. However, the World Health Organization declared 11 countries including India polio free in March 2014, meaning the disease has been eradicated in 80% of the world. India's last polio case was reported on January 13,2011.

78. (2) In February 2014, Andhra Pradesh Reorganisation Act, 2014 was passed by the parliament of India for the formation of Telangana state comprising ten districts from northwestern Andhra Pradesh. It was officially formed on 2 June 2014.

79. (3) UNDP stands for United Nations Development Programme. It is the United Nations global development network which advocates for change and connects countries to knowledge, experience and resources to help people build a better life.

80. (3) The Hindus : An Alternative History is a book by American Indologist, Wendy Doniger which the author describes as an "alternative to the narrative of Hindu history that they tell. It was published in March 2009.

81. (2) Adam Smith is known as 'Father of Modern Economics.' He is best known for two classic works: The Theory of Moral Sentiments (1759), and An Inquiry into the Nature and Causes of the Wealth of Nations (1776).

82. (2) The Nobel Prize is a set of annual international awards bestowed in a number of categories by Swedish and Norwegian committees in recognition of cultural and/or scientific advances. The will of the Swedish inventor Alfred Nobel established the prizes in 1895.

83. (1) Smiling Buddha (Pokhran-I) is an assigned codename of India's first nuclear weapon explosion, which took place on 18 May 1974. The device was detonated by the Indian Army in the army base, Pokhran Test Range, Rajasthan.

84. (3) Jawahar Rozgar Yojna was launched on April 1, 1989 by merging National Rural Employment Program (NREP) and Rural Landless Employment Guarantee Programme (RLEGP). It was launched at the end of Seventh Five Year Plan.

85. (4) Petha, a translucent soft candy from Agra and other parts of North India and Pakistan, is known as sweetmeat. It is made from the ash gourd vegetable.

86. (2) Capital markets are financial markets for the buying and selling of long-term debt or equity-backed securities. These markets channel the wealth of savers to those who can put it to long-term productive use, such as companies or governments making long-term investments.

87. (2) In India, a new agricultural strategy was initiated in 1966-67. This initiative heralded the introduction of High Yield Variety of wheat to tackle food security and led to the Green Revolution in India.
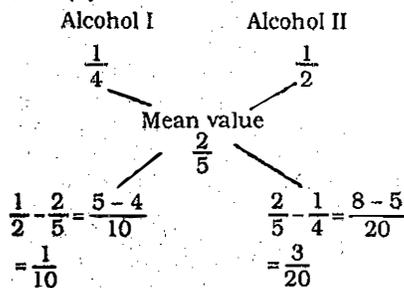
88. (2) Monopolistic competition is a type of imperfect competition such that many producers sell products that are differentiated from one another (e.g. by branding or quality) and hence are not perfect substitutes. Textbook examples of industries with market structures

similar to monopolistic competition include restaurants, cereal, clothing, shoes, and service industries in large cities.

89. (2) Production refers to "the creation of utility having value-in-exchange." The process of production may create six types of utilities: form utility, time utility, place utility, ownership utility, service utility and knowledge utility.

90. (1) The classical economists were of the opinion that – the law of diminishing returns applies only to agriculture and to some extractive industries, such as mining, fisheries urban land, etc. However, it is applicable to other sectors such as manufacturing as well.

91. (3) Bureaucracy refers to government by many bureaus, administrators, and petty officials. It essentially refers to a large group of people who are involved in running a government but who are not elected.

92. (3) A federation is a political entity characterized by a union of partially self-governing states or regions under a central (federal) Government. The governmental or constitutional structure found in a federation is marked by agreement between the centre and the states.

93. (4) In a parliamentary system, the executive branch derives its democratic legitimacy from, and is held accountable to, the legislature; the executive and legislative branches are thus interconnected. In a presidential system, the head of state often is also the head of government, and the executive branch does not derive its democratic legitimacy from the legislature.

94. (3) The concept of "equality before the law" has been borrowed from the British Common Law upon which English Legal System was founded. However, "equal protection of laws" has its link with the American Constitution.

95. (1) Herbert Spencer in his 'Social Statics' (1851) argued that the state is the offspring of evil, bearing about it all the marks of its parentage. It exists because crime exists. It is not strong—or, despotic—when crime is great; there is more liberty—less government—when crime diminishes.

96. (1) The Quit India speech made by Mahatma Gandhi on August 8, 1942 is remembered due to his call for 'Do or Die.' It was a radical departure from his earlier stances advocating passive resistance.

97. (3) The Battle of Waterloo was fought on Sunday, 18 June 1815, near Waterloo in present-day Belgium, then part of the United Kingdom of the Netherlands. A French army under the command of Napoleon was defeated by the armies of the Seventh Coalition, comprising an Anglo-allied army under the command of the Duke of Wellington.

98. (4) Annie Besant was the first woman President of Indian National Congress. She presided over the 1917 Calcutta session of the Indian National Congress.

99. (3) Konark Sun Temple is a 13th-century Sun Temple (also known as the Black Pagoda), at Konark, in Odisha. It was supposedly built by king Narasimhadeva I of Eastern Ganga Dynasty around 1250.

100. (2) For the spread of Buddhism, Asoka sent missionaries (dharma mahamatras) all over India and beyond. The missionaries sent by Ashoka to the other countries were well received by them and the conversions took place easily because of the influence and the personal power Ashoka exercised.

101. (3)

Alcohol I   Alcohol II

$$\frac{1}{4} \qquad\qquad \frac{1}{2}$$

Mean value

$$\frac{2}{5}$$

$$\frac{1}{2} - \frac{2}{5} = \frac{5-4}{10} \qquad \frac{2}{5} - \frac{1}{4} = \frac{8-5}{20}$$

$$= \frac{1}{10} \qquad\qquad = \frac{3}{20}$$

∴ Required ratio $= \dfrac{1}{10} : \dfrac{3}{20}$

$= 2 : 3$

102. (1) $\dfrac{2}{x} = \dfrac{y}{54}$

$\Rightarrow xy = 2 \times 54 = 6 \times 18$

103. (1) Total age of remaining 6 children $= 12 \times 7 - 6$

$= 84 - 6 = 78$ years

∴ Their average age $= \dfrac{78}{6}$

$= 13$ years

104. (2) Marks obtained by eleventh candidate

$= 22 \times 45 - (10 \times 55 + 11 \times 40)$

$= 990 - (550 + 440)$

$= 990 - 990 = 0$

105. (4) Cost price of sewing machine $= 1080 \times \dfrac{100}{90}$

$=$ Rs. 1200

∴ S.P. for a profit of 10%

$= \dfrac{1200 \times 110}{100} =$ Rs. 1320

106. (2) Value of Rs. 100 stock

$=$ Rs. 108

∴ Income on investing Rs. 108

$=$ Rs. $\dfrac{25}{2}$

∴ Income on investment of Rs. 27000

$=$ Rs. $\left(\dfrac{25}{2 \times 108} \times 27000 \right)$

$=$ Rs. 3125

∴ Gain per cent

$= \dfrac{3125}{27000} \times 100$

$= \dfrac{625}{54} = 11\dfrac{31}{54} \%$

107. (1) Relative speed

$= \left(\dfrac{5}{2} + 2 \right)$ kmph $= \dfrac{9}{2}$ kmph

Time $= \dfrac{\text{Distance}}{\text{Relative speed}} = \dfrac{18}{\dfrac{9}{2}}$

$= \dfrac{18 \times 2}{9} = 4$ hours

108. (3) Relative speed

= (33 + 39) kmph

= 72 kmph

$= \left(\dfrac{72 \times 5}{18} \right)$ m/sec.

= 20 m./sec.

∴ Time taken in crossing

$= \dfrac{\text{Length of both trains}}{\text{Relative speed}}$

$= \dfrac{125 + 115}{20} = \dfrac{240}{20}$

= 12 seconds

109. (4) Principal = Rs. P (let)

Rate = R% per annum

$\therefore A = P \left(1 + \dfrac{R}{100} \right)^T$

$\Rightarrow 650 = P \left(1 + \dfrac{R}{100} \right)$

$\Rightarrow \dfrac{650}{P} = \left(1 + \dfrac{R}{100} \right)$ ...(i)

Again, $676 = P \left(1 + \dfrac{R}{100} \right)^2$

$\Rightarrow 676 = P \left(\dfrac{650}{P} \right)^2$

$= \dfrac{P \times 650 \times 650}{P^2}$

$\Rightarrow P = \dfrac{650 \times 650}{676}$ = Rs. 625

110. (2) Expression

$= \dfrac{p^2 - p}{2p^3 + 6p^2} + \dfrac{p^2 - 1}{p^2 + 3p} \div \dfrac{p^2}{p+1}$

$= \dfrac{p(p-1)}{2p^2(p+3)} + \dfrac{(p+1)(p-1)}{p(p+3)} \div$

$\dfrac{p^2}{p+1}$

$= \dfrac{p(p-1)}{2p^2(p+3)} \times \dfrac{p(p+3)}{(p+1)(p-1)} \times$

$\dfrac{(p+1)}{p^2}$

$= \dfrac{1}{2p^2}$

111. (1) $(a + b + c)^2 = a^2 + b^2 + c^2 +$

$2ab + 2bc + 2ca$

$\Rightarrow (4\sqrt{3})^2 = 16 + 2(ab + bc + ca)$

$\Rightarrow 48 = 16 + 2(ab + bc + ca)$

$\Rightarrow 2(ab + bc + ca) = 48 - 16 = 32$

$\Rightarrow ab + bc + ca = 16$

$\therefore a = b = c = \dfrac{4\sqrt{3}}{3} = \dfrac{4}{\sqrt{3}}$

$\therefore a : b : c = 1 : 1 : 1$

112. (2) $x + \dfrac{1}{x} = 2$

On squaring both sides,

$x^2 + \dfrac{1}{x^2} + 2 = 4$

$\Rightarrow x^2 + \dfrac{1}{x^2} = 4 - 2 = 2$

Again, $x + \dfrac{1}{x} = 2$

On cubing both sides,

$\left(x + \dfrac{1}{x} \right)^3 = 8$

$\Rightarrow x^3 + \dfrac{1}{x^3} + 3 \left(x + \dfrac{1}{x} \right) = 8$

$\Rightarrow x^3 + \dfrac{1}{x^3} + 3 \times 2 = 8$

$\Rightarrow x^3 + \dfrac{1}{x^3} = 8 - 6 = 2$

$\therefore \left(x^2 + \dfrac{1}{x^2} \right) \left(x^3 + \dfrac{1}{x^3} \right)$

$= 2 \times 2 = 4$

113. (3) $a^3 + b^3 + c^3 - 3abc$ will be minimum if $a = b = 1, c = 2$

∴ Least value = $1 + 1 + 8 - 3 \times$

$1 \times 1 \times 2 = 10 - 6 = 4$

114. (2) $\dfrac{d}{c} = a - b$

$\Rightarrow \dfrac{c}{d} = \dfrac{1}{a-b} = \dfrac{a+b}{a-b}$

$\Rightarrow \dfrac{c+d}{c-d} = \dfrac{a+b+a-b}{a+b-a+b} = \dfrac{a}{b}$

(By componendo and dividendo)

$\Rightarrow \dfrac{1}{c-d} = \dfrac{a}{b}$

$\Rightarrow (c - d) = \dfrac{b}{a}$

$\Rightarrow c^2 - d^2 = (c + d)(c - d) = \dfrac{b}{a}$

115. (4) By remainder theorem,

Remainder $= f \left(-\dfrac{2}{3} \right)$

$\because f(x) = 12x^3 - 13x^2 - 5x + 7$

$\therefore f \left(-\dfrac{2}{3} \right) = 12 \left(\dfrac{-2}{3} \right)^3 - 13 \left(\dfrac{-2}{3} \right)^2$

$- 5 \left(\dfrac{-2}{3} \right) + 7$

$= - \dfrac{12 \times 8}{27} - \dfrac{13 \times 4}{9} + \dfrac{10}{3} + 7$

$= - \dfrac{32}{9} - \dfrac{52}{9} + \dfrac{10}{3} + 7$

$= \dfrac{-32 - 52 + 30 + 63}{9}$

$= \dfrac{9}{9} = 1$

Second Method

$3x + 2 \overline{) 12x^3 - 13x^2 - 5x + 7 } (4x^2 - 7x + 3$

$\quad \underline{12x^3 \pm 8x^2}$

$\quad\quad - 21x^2 - 5x$

$\quad\quad \underline{\mp 21x^2 \mp 14x}$

$\quad\quad\quad\quad 9x + 7$

$\quad\quad\quad\quad \underline{9x \pm 6}$

$\quad\quad\quad\quad\quad\quad 1$

116. (2) $x = 2y$

$\Rightarrow 3t = 2 \times \dfrac{1}{2} (t + 1)$

$\Rightarrow 3t = t + 1 \Rightarrow 3t - t = 1$

$\Rightarrow 2t = 1 \Rightarrow t = \dfrac{1}{2}$
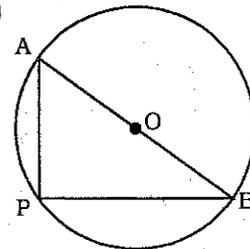
117. (3) $x^2 + \dfrac{1}{5} x + a^2$

$= x^2 + 2x \dfrac{1}{10} + \left(\dfrac{1}{10} \right)^2 - \left(\dfrac{1}{10} \right)^2 + a^2$

$\therefore a^2 - \left(\dfrac{1}{10} \right)^2 = 0 \Rightarrow a^2 = \left(\dfrac{1}{10} \right)^2$

$\Rightarrow a = \dfrac{1}{10}$

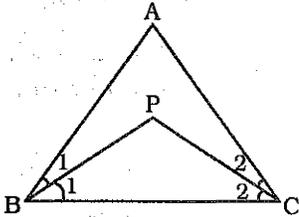**118.** (2) The sum of opposite angles of a concyclic quadrilateral is 180°.

119. (3)

$\angle APB = 90°$

AB = Diameter = hypotenuse of Δ APB
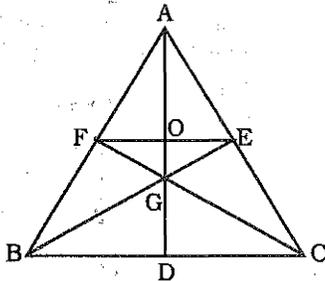
The angle of a semi-circle is a right angle.

120. (3) Third angle of triangle

$= 180° - (21° + 38°)$

$= 180° - 59° = 121° > 90°$

i.e., obtuse angle

121. (3)

$\angle BPC = 120°$

$\therefore \angle PBC + \angle PCB = 180° - 120°$

$= 60°$

$\therefore \angle ABC + \angle ACB = 2 \times 60°$

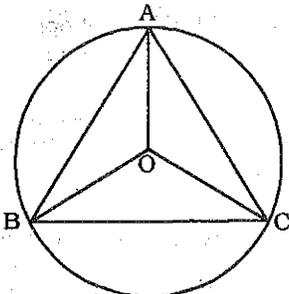$= 120°$

$\therefore \angle BAC = 180° - 120° = 60°$

122. (3)

$OG = \dfrac{1}{3} AO$

$\Rightarrow AO = 3 \times OG$

$= 3 \times 2 = 6$ cm

123. (1) In an equilateral Δ ABC,

$\angle A = \angle B = \angle C = 60°$

$AB = BC = CA$

124. (2)

$\angle BAC = 85°$

$\therefore \angle BOC = 2 \times 85° = 170°$

$\angle BCA = 55°$

$\therefore \angle AOB = 2 \times 55° = 110°$

$\therefore \angle AOC = 360° - 170° - 110°$

$= 360° - 280° = 80°$

$\therefore \angle OAC = \angle OCA = \dfrac{1}{2}(180° - 80°)$

$= \dfrac{1}{2} \times 100 = 50°$

125. (1) The smallest angle

$= \dfrac{2}{(2 + 3 + 7)} \times 180°$

$= \dfrac{2}{12} \times 180° = 30°$

126. (3) $x.\sin 60°.\tan 30°$

$= \sec 60°.\cot 45°$

$\Rightarrow x \times \dfrac{\sqrt{3}}{2} \times \dfrac{1}{\sqrt{3}} = 2 \times 1$

$\Rightarrow x = 2 \times 2 = 4$

127. (4) $\dfrac{1}{2}\sqrt{1 + \sin\theta} + \dfrac{1}{2}\sqrt{1 - \sin\theta}$

$= \dfrac{1}{2}\left(\sqrt{1 + \sin 60°} + \sqrt{1 - \sin 60°}\right)$

$= \dfrac{1}{2}\left(\sqrt{1 + \dfrac{\sqrt{3}}{2}} + \sqrt{1 - \dfrac{\sqrt{3}}{2}}\right)$

$= \dfrac{1}{2\sqrt{2}}\left(\sqrt{2 + \sqrt{3}} + \sqrt{2 - \sqrt{3}}\right)$

$= \dfrac{1}{2\sqrt{2}} \times \dfrac{1}{\sqrt{2}}\left(\sqrt{4 + 2\sqrt{3}} + \sqrt{4 - 2\sqrt{3}}\right)$

$= \dfrac{1}{4}\left(\sqrt{(\sqrt{3} + 1)^2} + \sqrt{(\sqrt{3} - 1)^2}\right)$

$= \dfrac{1}{4}\left(\sqrt{3} + 1 + \sqrt{3} - 1\right)$

$= \dfrac{2\sqrt{3}}{4} = \dfrac{\sqrt{3}}{2} = \cos 30°$

$= \cos\dfrac{\theta}{2}$

128. (2) $1^2 + 2^2 + 3^2 + ... + 10^2 = 385$

$\therefore 2^2 + 4^2 + 6^2 + ... + 20^2$

$= 2^2 (1^2 + 2^3 + 3^2 + ... + 10^2)$

$= 4 \times 385 = 1540$

129. (1) Expression

$= \dfrac{16}{3} \div \dfrac{11}{9} \times \dfrac{1}{4}\left(10 + \dfrac{3}{\dfrac{5-1}{5}}\right)$

$= \dfrac{16}{3} \times \dfrac{9}{11} \times \dfrac{1}{4}\left(10 + \dfrac{15}{4}\right)$

$= \dfrac{16}{3} \times \dfrac{9}{11} \times \dfrac{1}{4}\left(\dfrac{40 + 15}{4}\right)$

$= \dfrac{16}{3} \times \dfrac{9}{11} \times \dfrac{1}{4} \times \dfrac{55}{4} = 15$

130. (2) B's 1 day's work = (A + B)'s 1 day's work – A's 1 day's work

$= \dfrac{1}{12} - \dfrac{1}{28} = \dfrac{7 - 3}{84}$

$= \dfrac{4}{84} = \dfrac{1}{21}$

$\therefore$ Required time = 21 days

131. (3) Part of the tank emptied by the leak in 1 hour $= \dfrac{1}{9} - \dfrac{1}{10}$

$= \dfrac{10 - 9}{90} = \dfrac{1}{90}$

$\therefore$ Required time = 90 hours

132. (4) Skilled : half skilled : un-skilled $= \dfrac{1}{3} : \dfrac{1}{4} : \dfrac{1}{6}$

$= \left(\dfrac{1}{3} \times 12\right) : \left(\dfrac{1}{4} \times 12\right) : \left(\dfrac{1}{6} \times 12\right)$

$= 4 : 3 : 2$

Share of the trained labourer

$= \dfrac{28}{(7 \times 4 + 8 \times 3 + 2 \times 10)} \times 369$

$= \dfrac{28}{(28 + 24 + 20)} \times 369$

$= \dfrac{28}{72} \times 369 = $ Rs. 143.50

133. (3) Edges of cubes = x and y units (let)

$\therefore$ Ratio of volumes $= \dfrac{x^3}{y^3}$

$\therefore \dfrac{x^3}{y^3} = \dfrac{27}{64} \Rightarrow \dfrac{x}{y} = \dfrac{3}{4}$

$\therefore$ Ratio of surface areas $= \dfrac{6x^2}{6y^2}$

$= \dfrac{x^2}{y^2} = \left(\dfrac{3}{4}\right)^2 = \dfrac{9}{16}$

134. (4) Slant height of the tent (l)

$$= \sqrt{12^2 + 9^2}$$

$$= \sqrt{144 + 81} = \sqrt{225}$$

= 15 metre

∴ Curved surface area of the tent $= \pi r l$

= (3.14 × 12 × 15) sq. metre

∴ Total cost

= Rs. (3.14 × 12 × 15 ×120)

= Rs. 67824

135. (2) Radius of the larger circle

= R cm

Radius of the smaller circle

= r cm

∴ R – r = 14 cm

and $\pi (R^2 - r^2) = 1056$

$$\Rightarrow R^2 - r^2 = \frac{1056}{\pi} = \frac{1056 \times 7}{22}$$

$$\Rightarrow R^2 - r^2 = 336$$

$$\Rightarrow (R + r)(R - r) = 336$$

$$\Rightarrow R + r = \frac{336}{14} = 24 \text{ cm}$$

∴ (R + r) – (R – r) = 24 – 14

$$\Rightarrow 2r = 10 \Rightarrow r = 5 \text{ cm}$$

136. (2) Marked price = Rs. x

Discount = Rs. $\dfrac{x}{5}$

S.P. $= x - \dfrac{x}{5} = $ Rs. $\dfrac{4x}{5}$

Loss = Rs. $\dfrac{x}{10}$

∴ C.P. $= \dfrac{4x}{5} + \dfrac{x}{10}$

$$= \frac{8x + x}{10} = \text{Rs. } \frac{9x}{10}$$

∴ Loss per cent $= \dfrac{\frac{x}{10}}{\frac{9x}{10}} \times 100$

$$= \frac{100}{9} = 11\frac{1}{9}\%$$

137. (1) Single equivalent discount

$$= \left(10 + 5 - \frac{10 \times 5}{100}\right)\%$$

= 14.5 %

∴ Amount to be paid

= (100 – 14.5)% of 110

$$= \frac{110 \times 85.5}{100} = \text{Rs. } 94.05$$

≈ Rs. 94

138. (2) Present worth = 1860 – 60

= Rs. 1800

$$\text{Time} = \frac{100 \times \text{True Discount}}{\text{Present worth} \times \text{Rate}}$$

$$= \frac{100 \times 60}{1800 \times 5} = \frac{2}{3} \text{ year}$$

$$= \left(\frac{2}{3} \times 12\right) \text{ months} = 8 \text{ months}$$

139. (3) Two angles = A and B where A > B.

∴ A + B = 135°

$$= \left(\frac{135 \times \pi}{180}\right) \text{ radian}$$

$$\Rightarrow A + B = \left(\frac{3\pi}{4}\right) \text{ radian} \quad ....(i)$$

$$A - B = \frac{\pi}{12} \quad ....(ii)$$

On adding these equations,

$$2A = \frac{3\pi}{4} + \frac{\pi}{12}$$

$$= \frac{9\pi + \pi}{12} = \frac{10\pi}{12} = \frac{5\pi}{6}$$

$$\therefore A = \frac{5\pi}{12} \text{ radian}$$

140. (2) $\dfrac{2\tan^2 30°}{1 - \tan^2 30°} + \sec^2 45° - \sec^2 0° = x \sec 60°$

$$\Rightarrow \frac{2 \times \left(\frac{1}{\sqrt{3}}\right)^2}{1 - \left(\frac{1}{\sqrt{3}}\right)^2} + \left(\sqrt{2}\right)^2 - 1 = x \times 2$$

$$\Rightarrow \frac{\frac{2}{3}}{1 - \frac{1}{3}} + 2 - 1 = x \times 2$$

$$\Rightarrow \frac{2}{3} \times \frac{3}{2} + 1 = x \times 2$$

$$\Rightarrow 2 = x \times 2 \Rightarrow x = \frac{2}{2} = 1$$

141. (2) $\tan \theta = \dfrac{\sin \alpha - \cos \alpha}{\sin \alpha + \cos \alpha}$

∴ $1 + \tan^2 \theta$

$$= 1 + \frac{(\sin \alpha - \cos \alpha)^2}{(\sin \alpha + \cos \alpha)^2}$$

$$\Rightarrow \sec^2 \theta$$

$$= \frac{(\sin \alpha + \cos \alpha)^2 + (\sin \alpha - \cos \alpha)^2}{(\sin \alpha + \cos \alpha)^2}$$

$$\Rightarrow \sec^2 \theta = \frac{2(\sin^2 \alpha + \cos^2 \alpha)}{(\sin \alpha + \cos \alpha)^2}$$

$$\Rightarrow \frac{1}{\cos^2 \theta} = \frac{2}{(\sin \alpha + \cos \alpha)^2}$$

$$\Rightarrow \frac{1}{\cos \theta} = \frac{\pm\sqrt{2}}{\sin \alpha + \cos \alpha}$$

$$\Rightarrow \sin \alpha + \cos \alpha = \pm \sqrt{2} \cos \theta$$

142. (1) $7 \sin^2 \theta + 3\cos^2 \theta = 4$

On dividing both sides by $\cos^2 \theta$

$7 \tan^2 \theta + 3 = 4 \sec^2 \theta$

$\Rightarrow 7 \tan^2 \theta + 3 = 4(1 + \tan^2 \theta)$

$\Rightarrow 7 \tan^2 \theta + 3 = 4 + 4 \tan^2 \theta$

$\Rightarrow 7 \tan^2 \theta - 4 \tan^2 \theta = 4 - 3$

$\Rightarrow 3 \tan^2 \theta = 1$

$$\Rightarrow \tan^2 \theta = \frac{1}{3}$$

$$\Rightarrow \tan \theta = \frac{1}{\sqrt{3}}$$

143. (4) $\tan 9° = \dfrac{p}{q}$

$$\therefore \frac{\sec^2 81°}{1 + \cot^2 81°} = \frac{\sec^2 81°}{\text{cosec}^2 81°}$$

$$= \frac{1}{\cos^2 81°} \times \sin^2 81°$$

$$= \tan^2 81° = \tan^2 (90° - 9°)$$

$$= \cot^2 9° = \frac{q^2}{p^2}$$

144. (4) Number of students who stood second in the year 2000

= 50

∴ Required percentage

$$= \frac{50}{160} \times 100$$

$$= \frac{125}{4} = 31\frac{1}{4}\%$$

145. (1) Required percentage

$$= \frac{60}{120} \times 100$$

$$= 50\%$$

146. (2) Number of students who passed with third class in 2002 = 10

147. (3) Number of students who passed with second class in 2002

$$= 130 - 80 = 50$$

148. (2) ∵ $360° \equiv 100\%$

$$\therefore 108° \equiv \frac{100}{360} \times 108 = 30\%$$

149. (*) Expenditure on labourers :

Year 1991 ⟹ $\frac{360000 \times 90}{360}$

$$= Rs.\ 90000$$

Year 2001 ⟹ $\frac{864000 \times 100}{360}$

$$= Rs.\ 240000$$

Percentage increase

$$= \frac{240000 - 90000}{90000} \times 100$$

$$= 166.7\%$$

150. (4) Expenditure on steel :

Year 1991 ⟹ $\frac{360000}{360} \times 50$

$$= Rs.\ 50000$$

Year 2001 ⟹ $\frac{864000}{360} \times 60$

$$= Rs.\ 144000$$

151. (2) **Barbarous (Adjective)** = coarse; extremely cruel and shocking; uncivilized; showing a lack of education and good manners.

152. (2) **Heighten (Verb)** = make stronger; strengthen; intensify; increase.

Decrease (Verb) = to make or become smaller.

Look at the sentence :

Tension has heightened after the recent bomb attack.

153. (4) **Dubious (Adjective)** = doubtful, suspicious, uncertain, vague.

Certain (Adjective) = having no doubts.

Look at the sentences :

She wasn't certain that he had seen her.

I was rather dubious about the whole idea.

154. (4) **Dot your i's and cross your 't's** = to pay attention to the small details when you are finishing a task.

155. (3) **Down in the dumps** = feeling unhappy; depressed.

156. (3) **Turn your nose up at something** = to refuse something, especially because you do not think it good enough for you.

157. (4) **Hard and fast** = that cannot be changed in any circumstances.

158. (1) **Strain every nerve/sinew (to do something)** = to try as hard as you can do something.

159. (4) **Argue against** = to give reasons against something.

160. (2) The use of 'ever' is Superfluous.

161. (4) **Nostalgic** = a feeling of sadness mixed with pleasure and affection.

162. (1) **On the way** = during the journey

164. (2) Unwell = ill/sick.

166. (3) **Look at the sentences:**

Will you lend me some money?

Will you give me your book ?

167. (1) **Sessoin** = a formal meeting or series of meetings of a parliament.

168. (2) Reporting Verb is in past tense.

Hence, Reported speech should be in past tense.

172. (2) **Stroller** = a person who is enjoying a relaxed walk.

Jaunt = excursion; a short journey that you make for pleasure.

Detour = diversion

173. (4) **Incentive** = something that encourages you to do something.

175. (4) **Podium** = a small platform that a person stands on when giving a speech; rostrum.

176. (3) **Connoisseur** = an expert on matters involving the judgement of skill in art, food or music etc.

177. (1) **Miscellaneous** = various

181. (2) **Libretto** = the words that are sung or spoken in an opera.

182. (1) **Convey** = communicate; transmit.

188. (3) Everyone is a singular subject. Hence was/is equal ...... should be used.

189. (1) In Senegal should be used. In India, there is democracy.

190. (1) Here, use of about is superfluous.

191. (3) It is not proper to use 'the' before a cardinal number.

Hence, in contact with a rotten mango should be used.

192. (2) Here, 'The box' is subject, not 'eggs'. Hence, is lying (singular) should be used.

193. (1) **Invent** = to produce something that has not existed before.

Discover = to find something that was hidden.

194. (2) **Add insult to injury** = to make worse.

198. (2) **Tepid (Adjective)** = lukewarm, slightly warm, sometimes in a way that is not pleasant.

199. (4) **Canny (Adjective)** = intelligent, careful and showing good judgement.

200. (1) **Humane (Adjective)** = showing kindness towards people and animals; sympathetic.

Look at the sentence :

The animals should be given a humane treatment.