PART-I
MENTAL ABILITY TEST (Q. Nos. 1 to 50)
Max. Marks - 50

Note: SHADE the correct alternatives in the OMR Answer Sheet provided, from amongst the ones given against the corresponding question in the Question Booklet. For shading the circles, use HB Pencil.

Directions: (Q 1 to 5): In the number series given below, one number is missing. Each series is followed by five alternatives (1), (2), (3), (4), and (5). One of them is the right answer. Identify and indicate it as per the "instructions".

1. 13, 74, 290, 650, ...
   (1) 1248 (2) 1470 (3) 1346 (4) 1452 (5) 1625
2. 1, 11, 35, 79, ...
   (1) 81 (2) 93 (3) 149 (4) 124 (5) 136
3. 1, 5, 15, 34, ...
   (1) 50 (2) 48 (3) 37 (4) 65 (5) 72
4. 3, 13, 31, 57, ...
   (1) 65 (2) 72 (3) 88 (4) 94 (5) 91
5. 2, 35, 104, 209, ...
   (1) 350 (2) 248 (3) 256 (4) 311 (5) 413

(Questions 6 to 10): In each of the following questions, a letter series is given, in which some letters are missing. The missing letters are given in the proper sequence as one of the alternative. Find the correct alternative

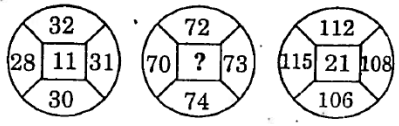
6. A_BBC_AAB_CCA_BBCC
   (1) BACB (2) ABBA (3) CABA (4) AABC (5) ACBA
7. BC_B_C_B_CCB
   (1) BBCB (2) CBBC (3) CBCB (4) BCBC (5) CCBB
8. C_BBB_ABBBB_ABBB_
   (1) BACBB (2) AABCB (3) ABACB (4) ABCCB (5) ABBCC
9. C_BCCD_CCDB_CDBCC_BC
   (1) DBCD (2) DBDD (3) BDAA (4) BDCD (5) DCBD
10. BA_B_AAB_A_B
    (1) AABB (2) BABB (3) BAAB (4) ABBA (5) ABAA

Directions: (Questions 11 to 15): Questions have become wrong due to wrong order of signs. Choose the correct order of signs from the five alternatives given under each question, so that the equations becomes right. Write it in your answer sheet against the corresponding question number.

11. $6+3=4\times22$
    (1) $\times+=$ (2) $+-\times$ (3) $=\times-$ (4) $+-=$ (5) $+\times-$
12. $12\div3=4\times11$
    (1) $+\div=$ (2) $\times+=$ (3) $+-=$ (4) $\times=-$ (5) $\div=\times$
13. $16\times4\div3=7$
    (1) $\div\times=$ (2) $-\div=$ (3) $+=-$ (4) $+-=$ (5) $\div+=$
14. $7\div3=8-13$
    (1) $\div+=$ (2) $\times-=$ (3) $\div=+$ (4) $-+=$ (5) $-\times=$
15. $15-3\times4=9$
    (1) $+\times=$ (2) $\times-=$ (3) $+-=$ (4) $\div+=$ (5) $+\div=$

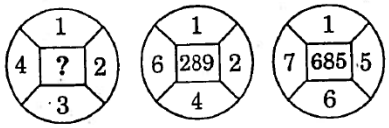
Directions (Questions 16 to 20): In these questions, numbers are placed in the figures on the basis of some rules. One place is vacant which is indicated as "?". Find out the correct alternatives to replace the question mark "?".

16.



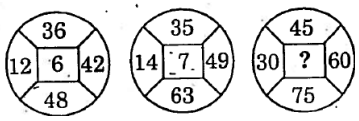
(1) 14 (2) 15 (3) 16 (4) 17 (5) 18

17.



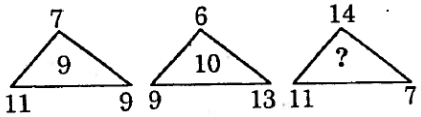
(1) 14 (2) 15 (3) 16 (4) 17 (5) 18

18.



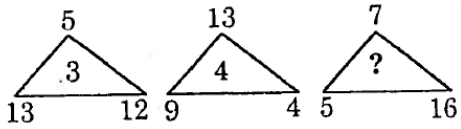
(1) 12 (2) 15 (3) 18 (4) 21 (5) 24

19.



(1) 7 (2) 9 (3) 4 (4) 5 (5) 10

20.



(1) 5 (2) 4 (3) 10 (4) 8 (5) 6

Directions (questions 21 to 25): Some letters are given in column I and some digits are given in column II. Each digit of column II represents only letter of column II represent any letter of column I. Study the columns and write the alternative letter after choosing the correct alternative against the corresponding question.

Column-I	Column-II
ABLM	24538
QRLBA	93526
PTQAB	52601
LRNPQ	93716
ATRNP	29071
MSPTQ	84106
QPNAR	16729
RABLS	29583
TSLBA	80325
PLQST	31860

21. The code for M is ....
(1) 0 (2) 8 (3) 1 (4) 6 (5) 4

22. The code for N is .....
(1) 9 (2) 6 (3) 1 (4) 7 (5) 2

23. The code for A is ....
(1) 9 (2) 5 (3) 2 (4) 8 (5) 3

24. The code for S is ...
(1) 3 (2) 2 (3) 5 (4) 0 (5) 8

25. The code of P is ...
(1) 3 (2) 8 (3) 0 (4) 1 (5) 6

Directions(Questions 26 to 30): There are six person in a family A, B, C, D, E and F.
(i) C is the sister of F.
(ii) A is the brother of the husband of E
(iii) D is the father of A and D is the grand father of F
(iv) There are two fathers, three brothers and a mother in the family.

On the basis of above details, choose the correct alternatives.

26. What is the relationship between E and F?
(1) Daughter (2) Son (3) Husband (4) Grandson (5) Father-in-law

27. What is the mother?
(1) E (2) D (3) C (4) B (5) A

28. How many male members are there in this family?
(1) One (2) Two (3) Three (4) Four (5) Five

29. Who is the husband of E?
(1) F (2) D (3) B (4) C (5) A

30. How many persons are there in the category of brothers?
(1) 1 (2) 2 (3) 4 (4) 2 (5) 3

Directions(Questions 31 to 35): There are four terms in each question. The term right to symbol :: have some relationship as the term of the left to symbol :: and out of the four, one term is missing, which is among one of the given five alternatives. Find the correct alternatives.

31. KMF : LLH :: RMS : ...?....
(1) TVT (2) SUS (3) SLR (4) SSU (5) SLU

32. GFH : EGG :: ....?....:FSS
(1) GHF (2) HRT (3) HGF (4) HFG (5) GEF

33. UVST : WTUR :: ....?.... : RILO
(1) PKJQ (2) TSUV (3) UVTS (4) TSVU (5) SRUT

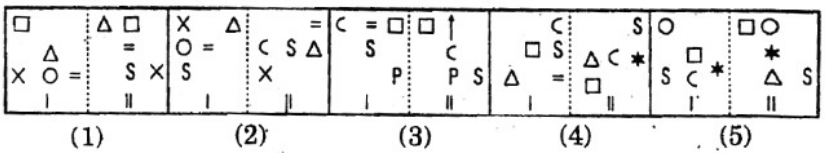
34. Newspaper : Editor :: Film : .... ? ....
(1) Actor (2) Producer (3) Director (4) Musician (5) Audience

35. Smoke : Pollution : War : .....
(1) Victory (2) Death (3) Army (4) Enemy (5) Treaty

Directions(Questions 36 to 40): In each of the following questions, in four out of the five figures of element I is related to element II in some particular way. Find out the figure in which the element is not related to element II.

36.

37.



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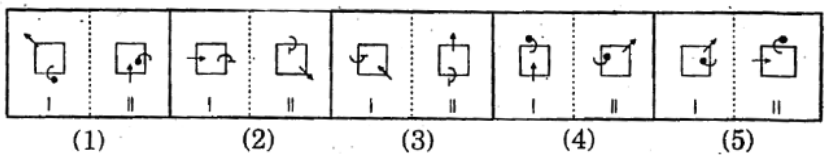

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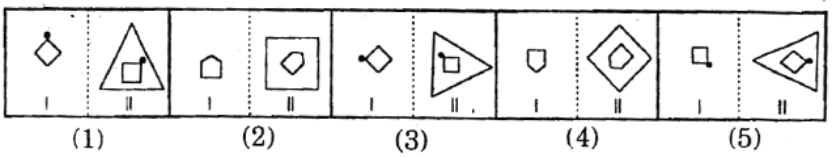

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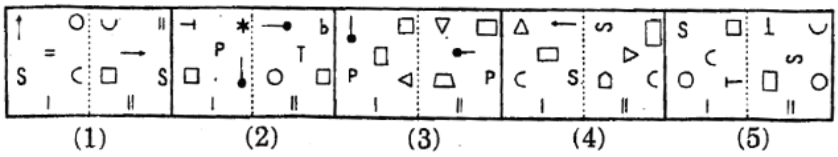
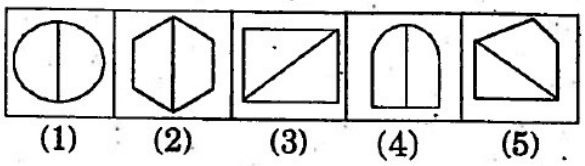


Directions(Questions 41 to 45): out of the five figure (1), (2), (3), (4), (5) given in each problem, four are similar in a certain way. Choose the figure which is different from the other figures.

41.



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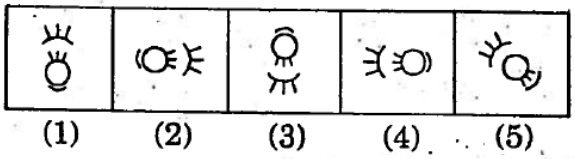

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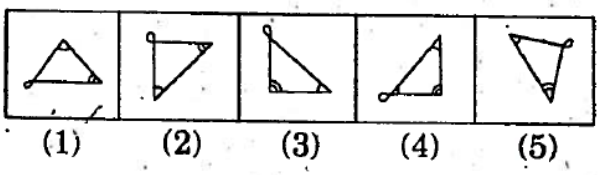

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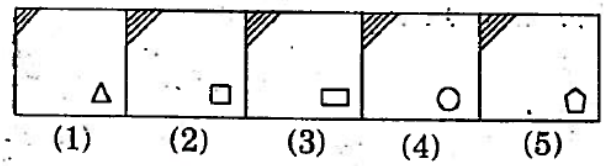

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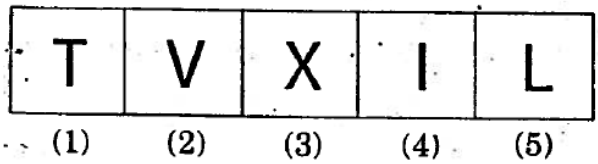
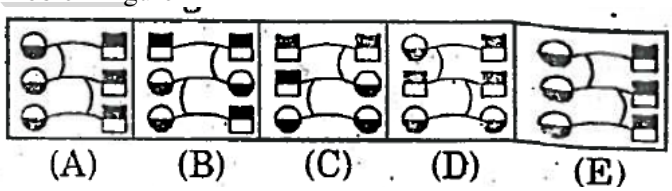
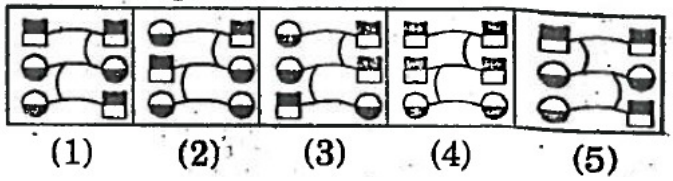


Directions(Qu wing questions consists of the five figures marked a, B, C, D and E called the problem figures followed by five alternatives marked 1, 2, 3, 4 and 5 called the answer figures. Select a figure which will continue the same series established by the five problem figures.

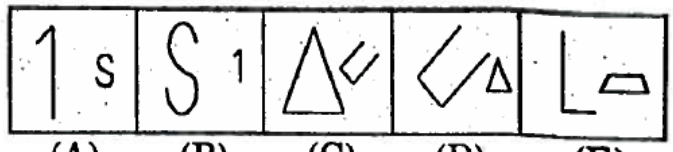
46. Problem figure



Answer figure

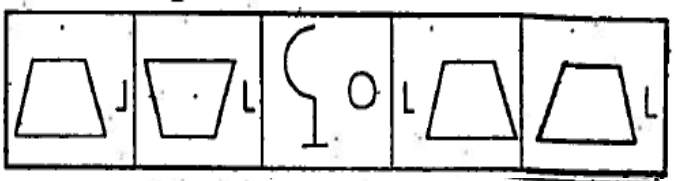


47. Problem figure



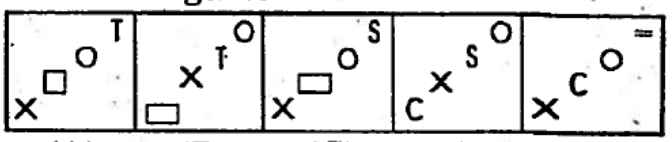
(A) (B) (C) (D) (E)

Answer figure



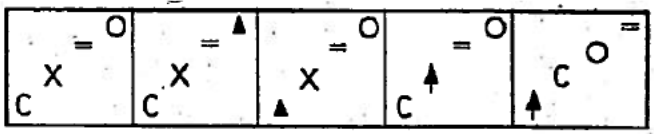
(1) (2) (3) (4) (5)

48. Problem figure



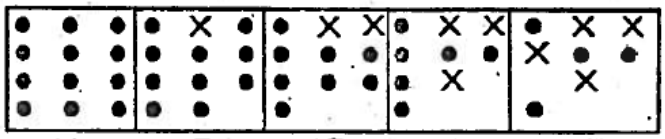
(A) (B) (C) (D) (E)

Answer figure



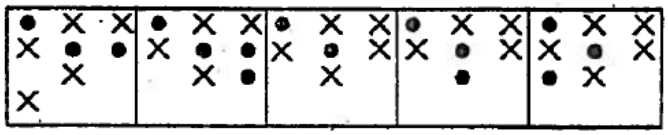
(1) (2) (3) (4) (5)

49. Problem figure



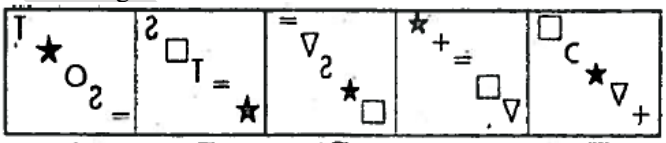
(A) (B) (C) (D) (E)

Answer figure



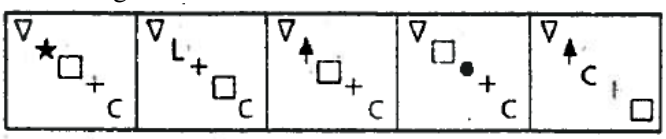
(1) (2) (3) (4) (5)

50. Problem figure



(A) (B) (C) (D) (E)

Answer figure



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

PART-II
LANGUAGE COMPREHENSIVE TEST
(Q. Nos. 51 to 100)
Max. Marks - 50

Note:

i) SHADE the correct alternatives in the OMR Answer Sheet provided, from amongst the ones given against the corresponding question in the Question Booklet. For shading the circles, use HB Pencil.

ii) Q. No. 51 to 100 of Language Comprehensive Test contains English Language along with a blank sheet for rough work.

Direction (Questions 51 to 55): Read the following passage and answer the questions given after it.

Nationalism, of course, is a curious phenomenon which at a certain stage in a country's history gives life, growth and unity but at the same time, it has a tendency to limit one because one thinks of one's country as something different from the rest of the world. One's perceptive changes and one is continuously thinking of one's own struggles and virtues and failing to the exclusion of their thoughts. The result is that the same nationalism, which is the symbol of growth for people, becomes a symbol of cessation of that growth in mind. Nationalism, when it becomes successful, sometimes goes on spreading in an aggressive way and becomes a danger internationally. Whatever line of through you follow, you arrive at the conclusion that some kind of balance must be found. Otherwise something good can turn into evil. Culture, which is essentially good, become not only static but aggressive and something that breeds conflict and hatred, when looked at from a wrong point of view. How will you find a balance, I don't know. Apart from the political and economic problems of the age, perhaps, that is the greatest problem today because behind it, there is tremendous search for something, which cannot be found. We turn to economic theories because they have an undoubted importance. It is folly to talk of culture or even of god, when human beings starve and die. Before one can talk about anything else, one must provide the normal essentials of life to human beings. That is where economics comes in. Human beings today are not in mood to tolerate this suffering and starvation and inequality, when they see that the burden is not equally shared. Others profit, while they only bear the burden.

51. Negative national feeling can make a nation..
(1) selfish (2) self centred (3) indifferent (4) dangerous

52. The greatest problem in the middle of the passage refers to the question....
(1) how to mitigate hardship to human beings.
(2) how to share the economic burden equally.
(3) how to contain the dangers of aggressive nationalism.
(4) how to curb international hatred

53. Aggressive nationalism ...
(1) endagers national unity.
(2) leads to stunted growth
(3) breeds threat to international relations.
(4) isolates a country.

54. 'Others' in the last sentence refer to .....
    (1) other neighbours
    (2) other nations
    (3) other people
    (4) other communities
55. Suitable title for this passage is ...
    (1) Nationalism and national problems
    (2) Nationalism is not enough
    (3) Nationalism breeds unity
    (4) Nationalism, a road to world unity.

Directions(Question 56 to 60): Read the following passage and answer the questions given after it.
Nehru was a many sided personality. He enjoyed reading and writing books, as much as he enjoyed fighting political and social evils or residing tyranny. In him, the scientist and the humanist were held in perfect balance. While he kept looking at special problems from a scientific standpoint, he never forgot that we should nourish the total man. As a scientist, he refused to believe in a benevolent power interested in men's affairs. But as a self proclaimed non-believer, he loved affirming his faith in life and the beauty of nature. Children he adored. Unlike, Wordsworth he did not see them as trailing clouds of glory from the recent sojourn in heaven. He saw them as a blossoms of promise and renewal, the only hope for mankind.

56. Nehru through that children...
    (1) were trailing clouds of glory.
    (2) held promise for a better future.
    (3) were like flowers to be loved and admired
    (4) held no hope for mankind
57. Nehru enjoyed ...
    (1) reading and writing books
    (2) fighting with benevolent power
    (3) respecting tyranny
    (4) resisting believers as he is a self proclaimed non believer.
58. Which of the statements reflects Nehru's point of view?
    (1) Humanism is more important than science.
    (2) Science is supreme and humanism is subordinate to it
    (3) Science and humanism are equally important.
    (4) There is no ground between humanism and science.
59. In this passage, "a benevolent power interested in men's affairs" means..
    (1) beauty of nature.
    (2) a supernatural power of god.
    (3) the spirit of science
    (4) the total man
60. A many sided personality means...
    (1) a complex person having varied interests.
    (2) a secretive person
    (3) a person having varied interests
    (4) a capable person

Direction (Questions 61 to 65): Read the following passage and answer the questions given after it.
The casual horrors and real disasters are thrown on a newspaper reader without discrimination. In the contemporary arrangements for circulating the news, an important element, evaluation is always weak and often wanting entirely. There is no point anywhere along the line somewhere someone puts his foot down for certain and says, "This is important and that does not amount to row of beans; deserves no ones attention and should travel the wires no farther". The junk is dressed up to look as meaningful as the real news.

61. Evaluation of news would imply....
    (1) less dependence on modern systems of communication.
    (2) More careful analysis of each news story and its value.
    (3) separating beans from junk.
    (4) discriminating horrors from disasters.

62. The writer of the above passage...
(1) Seems to be happy with the contemporary arrangements for circulating news.
(2) is shocked by the casual stories about horrors and disasters reported in the newspaper.
(3) wants better evaluation of news before publication.
(4) wants to put his foot down on news stories.

63. In the above passage, the phrase "amounts to a row of beans means that the news .....
(1) is weak and often waning entirely.
(2) deserves no one attention
(3) should travel the wires
(4) is junk, dressed up as real news.

64. Newspapers lack a sense of discrimination because ...
(1) they do not separate the real news from mere sensationalis
(2) they have to accept whatever is received on the wires.
(3) limited man power makes serious evolution impossible.
(4) people don't see the difference between 'junk' and 'real' news.

65. The passage implies that ....
(1) there has to be censorship on newspapers.
(2) there is no point in having censorship
(3) newspapers always dress up junk to look real
(4) one has to be strict in selecting news items.

Direction (Questions 66 to 71): In the following passage, there are some numbered blanks. Fill in the blanks by selecting the most appropriate word for each blank.

Recent discoveries show that Indians of early days _66_ to have been highly civilized in many ways. They had massive public buildings and comfortable dwelling houses _67_ mostly by brick. They had _68__ arrangements _69__ good sanitation and an elaborate drainage system. They knew how to write _70_ their language which has not yet been _71_ was not alphabetic but syllabic like the Sumerian language.

66.	(1) intend	(2) appear	(3) behave	(4) decided
67.	(1) designed	(2) formulated	(3) built	(4) construct
68.	(1) ignored	(2) made	(3) started	(4) less
69.	(1) inspite	(2) by	(3) from	(4) for
70.	(1) but	(2) because	(3) while	(4) since
71.	(1) talked	(2) written	(3) deciphered	(4) formed

Direction (Questions 72 and 73): The following sentences are from a paragraph. The first and the last sentences / parts are given. Choose the order in which the four sentences / parts (PQRS) should appear to complete the paragraph.

72. S_1 : The dictionary is the best friend of your task.

S_2 – .....

S_3 – .....

S_4 – .....

S_5 – .....

S_6 : Soon you will realize that this is an exciting task.

P: That may not be possible always.
Q: It is wise to look it up immediately.
R: Then it must be firmly written on the memory and traced at the first opportunity.
S: Never allow a strange word to pass unchallenged.
Choose the correct sequence from the options given below.
(1) PQRS (2) QRPS (3) SQPR (4) SPRQ

73. S_1 : Calcutta, unlike other cities, kept its trams.

S_2 – .....

S_3 – .....

S_4 – .....

S_5 – .....

S_6 : The foundation stone was laid in 1972.

P: As a result, there was horrendous congestion.
Q: It was going to be the first in south Asia.
R: They run down the centre of the road
S: To ease in, the city decided to build an underground railway line.
Choose the correct sequence from the given options.
(1) PRSQ (2) RPSQ (3) PSQR (4) SQRP

Direction: (Questions 74 to 77): for each of the following groups of four words, find the incorrectly spelt word.

74. (1) Imperative (2) ilicit (3) imminent (4) immature
75. (1) logical (2) ludicrucous (3) lonesome (4) laughter
76. (1) periphery (2) advertise (3) courteous (4) indefinite
77. (1) dismiss (2) dispel (3) disservice (4) describe

Direction (Questions 78 to 85): Select the most appropriate option to fill in the balnks from the given alternatives.

78. ..... you shout at your children, ... the
(1) more / more (2) the more / the more
(3) the more / the most (4) the most / the most
79. My laddus weren't ... a disaster ... I'd thought they would be, but they didn't taste very good.
(1) such /as (2) so / that (3) as / as (4) more / than
80. Radha : Your failure in the exam comes down to your lack of studying.
Uzma: I know. I needed to have ...
(1) prepared thoroughly more.
(2) thoroughly more prepared.
(3) thorough preparation more.
(4) prepared more thoroughly.
81. Anyone wishing to work as a secret agent must first undergo a ..... background investigation.
(1) tiny (2) handy (3) stingy (4) stringent
82. A : Did Priya apologize after the argument?
B: No, but she ... do so soon.
(1) had better (2) would rather (3) better had to (4) should rather
83. If you refuse to work hard, your endeavors will amount ... nothing.
(1) for (2) to (3) with (4) by
84. There is no reason ... over spilled milk.
(1) to cry (2) to save (3) to serve (4) to boil
85. Grain is commonly used as ..... for animals.
a) Commodity (2) fodder (3) implements (4) fumigation

–

Direction (Questions 86 to 90): Choose the one which best expresses the meaning of the given phrase.

86. At close quarters
(1) close examinations.
(2) live near to each other.
(3) live far to each other.
(4) in love

87. an apple of discord
(1) cause of wealth (2) cause of quarrel
(3) cause of happiness (4) cause of illness.

88. At large
(1) very famous (2) not famous (3) abscond (4) very far

89. take the bull by horns
(1) face a difficulty or danger confidently.
(2) run away from a difficulty or danger
(3) face a difficulty or danger boldly
(4) pull the bull's horns

90. buckle down
(1) work seriously
(3) drop a subject (4) go for a vacation

Direction (Questions 91 to 95): Select word which means the same as the given words.

91. abandon
(1) try (2) join (3) keep with (4) forsake

92. detest
(1) love (2) to hate intensely (3) neglect (4) to support

93. tentative
(1) prevalent (2) portable (3) wry (4) provisional

94. Obscure
(1) block (2) vague (3) obstruct (4) vague

95. Specific
(1) proper (2) uncommon (3) noteworthy (4) precise.

Direction (Questions 96 to 100): Select the word which means the opposite of the given word.

96. open minded
(1) zealous (2) prejudiced (3) shrewd (4) unpretentious

97. dependable
(1) judgementa (2) patient (3) fickle (4) cautious

98. impertinent
(1) healthy (2) respectful (3) inadequate (4) smooth

99. extravagance
(1) luxury (2) poverty (3) economical (4) cheapness

100. obscure
(1) implicit (2) obnoxious (3) explicit (4) pedantic

PART- III

APTITUDE TEST (Q. Nos. 101 to 200)

Max. Marks - 100

Note:

i. Subjects, Questions S1.No. and Marks allotted:

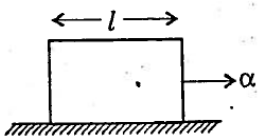
1.	Physics	101 to 113 Questions	13 Marks
2.	Chemistry	114 to 126 Questions	13 Marks
3.	Biology	127 to 140 Questions	14 Marks
4.	Mathematics	141 to 160 Questions	20 Marks
5.	History	161 to 172 Questions	12 Marks
6.	Geography	173 to 184 Questions	12 Marks
7.	Political Science	185 to 192 Questions	08 Marks
8.	Economics	193 to 200 Questions	08 Marks

ii. **SHADE** the circle having the correct alternative in the OMR Sheet provided, from among the ones given against the corresponding question in the Question Paper Booklet. For shading the circles, use **HB Pencil.**

PHYSICS

101. A car starts moving along a line, first with an acceleration $a = 5ms^{-2}$ starting from rest, then uniformly and finally decelerating at the same rate, comes to rest in the total time of 25 seconds (t_1), then average velocity during the time is equal to v = 72kmph. How long does the particle move uniformly?
1) 25 seconds 2) 2.5 hours 3) 1.5 hours 4) 15 second

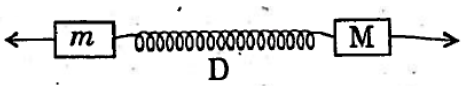
102. A uniform rod of length L and density ρ is being pulled along a smooth floor with horizontal acceleration α as shown in the figure. The magnitude of the stress at the transverse cross section through the mid-point of the rod is



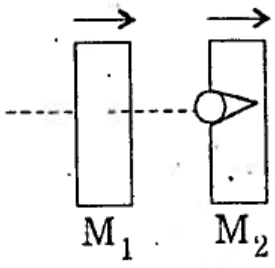
1) $\frac{\rho l\alpha}{4}$ 2) $4\rho l\alpha$ 3) $2\rho l\alpha$ 4) $\frac{\rho l\alpha}{2}$

103. An object is placed at a distance of 10 cm from the curved surface of a glass hemisphere of radius 10cm. Find the position of the image from the flat surface.
1) 26.67 cm 2) 2.67 cm 3) 2 cm 4) 19.67 cm

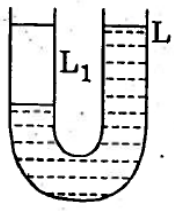
104. A dynamometer D (a force meter) is attached to two masses M= 10 kg and m = 1kg. forces F=2kgf and f = 1kgf are applied to the masses. Find out in which o cases gives maximum reading.
A) F is applied to M and f to m
B) F is applied to m and F to M
C) If M = m = 5kg (ignore m, M values in the problem)
D) If M is doubled to m. (Ignore m, M values in the problem)
1) A 3) C 4) D



105. A 20 g bullet pierces through a plate of mass M_1 = 1kg and then comes to rest inside a second plate of mass M_2 = 2.98 kg as shown in the figure. It is found that the two plates initially at rest and now move with equal velocities. Find the percentage loss in the initial velocity of the bullet when it is between M_1 and M_2. (Neglect any loss of material of the plates due to the action of bullet)
1) 15% 2) 25% 3) 50% 4) 72.5%

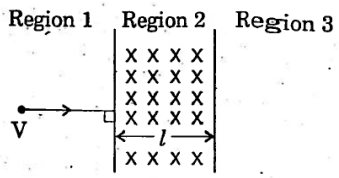


106. A U-tube of uniform cross section is partially filled with a liquid L. Another liquid L_1 which does not mix with liquid L is poured into one side. It is found that the liquid levels of two sides of the tube are the same. While level of liquid L has risen by 2 cm. If the specific gravity of liquid L is 1.1, the specific gravity of liquid L_1 must be
1) 1.1 2) 1.3 3) 1.001 4) 1.0



107. The road way bridge over a canal is in the form of an arc of a circle of radius 20m. What is the maximum speed with which a car can cross the bridge without leaving the ground at the highest point.
1) $10ms^{-1}$ 2) $12ms^{-1}$ 3) $14ms^{-1}$ 4) $16ms^{-1}$

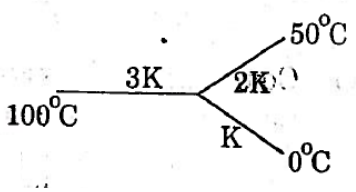
108. A particle of mass M and charge q moving with velocity v enters region-2 normal to the boundary as shown in the figure. Region-2 has uniform magnetic field B perpendicular to the plane of the paper. The length of the region-2 is *l*. choose the correct choice.



1) the particle enters region-3 only, if its velocity v > q*l*B/m
2) the particle enters region-3 only, if its velocity $v < qlB/m$
3) path length of the particle in region-2 is maximum when velocity $v = qlB/m$
4) time spend in region-2 is same for any velocity v as long as the particle return to region-1

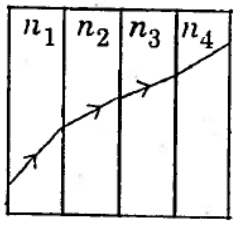
109. 6Ω and 12Ω resistors are connected in parallel. This combination is connected to series with a 10V battery and 6Ω resistor. What is the potential difference between the terminals of the 12Ω resistor?
1) 14 V 2) 16V 3) 10 V 4) 4V

110. Three rods of same dimensions have thermal conductivity 3K, 2K and K. They are arranged as show in the figure below. Then the temperature of the junction in steady state is



1) $\frac{100}{3}{}^0C$ 2) $\frac{200}{3}{}^0C$
3) $75\,{}^0C$ 4) —*C*

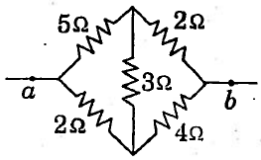
111. A ray of light passes through a transparent media with refractive index n_1, n_2, n_3, n_4 as shown in the figure. The surface of all the medias are parallel. If the emergent ray CD is parallel to the incident ray AB, we must have



1) $n_1 = n_2$ 2) $n_2 = n_3$
3) $n_3 = n_4$ 4) $n_4 = n_1$

112. The velocity of sound in hydrogen at 0 C is 1248 m/s. What will be velocity of sound in mixture of two parts by volume of hydrogen to one part of oxygen? (oxygen 16 is times heavier than hydrogen nearly)
1) 725 m/s 2) 653 m/s 3) 510 m/s 4) 430 m/s

113. Calculate the equivalent resistance between a and b of the following network of conductors.



1) 4Ω 2) 5Ω
3) 3Ω 4) 2Ω

CHEMISTRY

114. Some rocket engines use a mixture of hydrazine, N_2H_4 and hydrogen peroxide, H_2O_2 as the propellant. The reaction is given by the following equation

$N_2H_{4(l)} + 2H_2O_{2(l)} \rightarrow N_{2(g)} + 4H_2O_{(g)}$

How much of the excess reactant, remains unchanged? When 0.750 mol of N_2H_4 is mixed with 17g of H_2O_2?

a) 16 g of N_2H_4 b) 0.25 mol H_2O_2 c) 0.25 mol N_2H_4 d) 8.5 g H_2O_2

115. Which one of the following combinations is false?

Solution type	Particle size
1) Colloidal solution	10^{-5} to $10^{-7} cm$
2) True solution	10^{-7} to 10^{-8} cm
3) Suspension	10^{-9} to 10^{-12} cm

4) All are correct combinations

116. Which of the following is not an oxidation reaction?

1) bleaching of coloured objects using moist chlorine
2) rancidity of fats
3) thermite process involving the reaction of Iron (III) oxide (or) chromium (III) oxide, etc, with Aluminium
4) the poling process involving the removal of impurities from a molten metal

117. The gaseous hydrogen acetylene, C_2H_2 used in welder's torches, releases 1300 KJ, when 1 mole of C_2H_2 undergoes combustion, then which of the following is not true?

1) combustion of acetylene is an exothermic reaction
2) the balanced chemical reaction of combustion of acetylene is $C_2H_2 + 5O_2 \rightarrow 2CO_2 + H_2O$
3) 2 moles of water produced when 2 moles of acetylene reacts
4) 44 g of CO_2 produced, when 13 g of acetylene reacts

118. Following are the representative wave lengths in the infra-red, ultra violet and X-ray regions of the electromagnetic spectrum $\times$ $^{-}$ and $1.0\times10^{-10} m$. Which of the following statements is false?

1) the corresponding frequencies of X-ray, UV and IR are in the ratio of $10^4 : 10^2 : 1$
2) the corresponding energies of X-ray, UV and IR are in the ratio of $1 : 10^{-2} : 10^{-4}$
3) the corresponding velocities of X-ray, UV and IR are in the ratio of $1 : 10^2 : 10^4$
4) X-rays, UV and IR waves are electromagnetic waves. These are transverse waves

119. An atom has 2K, 8L and 5M electrons. Choose the correct statement(s) regarding it.

A) Trivalent anion of this atom will have 12 protons in its nucleus
B) Trivalent cation of this atom will have six p-electrons in it
C) This atom form an amphoteric oxide of formula X_2O_3
D) one of its allotrope is tetra atomic (X_4)

1) A and B 2) B only 3) B and C 4) B and D

120. Chlorine (Cl) and Oxygen form four different binary compounds. Analysis gives the following results:

Compound	Mass of O combined with 1.0 g Cl
A	0.226 g
B	0.903 g
C	1.354 g
D	1.579 g

Compound A has a formula that is some multiple of Cl_2O, then which of the following is incorrectly said?

1) compound B is Cl_2O_5 (or Cl_4O_{10} or Cl_6O_{15}, and so forth)
2) compound C is Cl_2O_6(or) ClO_3, or Cl_3O_9 and so forth)
3) compound D is Cl_2O_7 (or a multiple thereof)
4) the above data show that the law of multiple proportions holds for these compounds

121. The reusable booster rockets of the U.S space shuttle uses a mixture of aluminium and ammonium perchlorate for fuel. A possible equation for this reaction is

$$3Al_{(s)} + 3NH_4ClO_{4(s)} \rightarrow Al_2O_{3(s)} + AlCl_{3(s)} + 3NO_{(g)} + 6H_2O_{(g)}$$

What mass of NH_4ClO_4 should be used in the fuel mixture for every kilogram of Al?

1) 3 kg 2) 3.388 kg 3) 4.351 kg 4) 4 kg

122. All of the following processes involve a separation of either a mixture into its components, or a compound into elements. For each, decide whether a physical process or a chemical reaction is required

a) sodium metal is obtained from the substance sodium chloride

b) iron fillings are separated from sand by using a magnet

c) sugar crystals are separated from sugar syrup by evaporation of water

d) fine crystals of silver chloride are separated from a suspension of the crystals in water

e) copper is produced when zinc metal is placed in a solution of copper (II) sulphate, a

ionizes much like water $\left(2NH_3 \rightleftharpoons NH_4^+ + NH_2^-\right)$

If instead of water, ammonia is used as a solvent, the acid base neutralization reaction for the formation of NaCl is

1) $NaNH_4 + NH_2Cl \rightarrow NaCl + 2NH_3$ 2) $NaNH_2 + NH_4Cl \rightarrow NaCl + 2NH_3$

3) $NaNH_3 + NH_3Cl \rightarrow NaCl + 2NH_3$ 4) $NaNH_4 + NH_4Cl \rightarrow NaCl + 2NH_4^+$

125. The purity of a substance can be gauged by the following, except

1) its melting point 2) its boiling point 3) chromatography 4) physical appearance

126. You are presented with three bottles A, B, C each containing a different liquid. Bottles are labelled as follows:

Bottle A : ionic compound – boiling point 30 C

Bottle B : molecular compound – boiling point 29.2 C

Bottle C : molecular compound – boiling point 67.1^0C

Choose the correct statement

1) the compound most likely to be incorrectly identified is bottle A

2) the substance in bottle B has strongest intermolecular attractions

3) the substance in bottle C is highly volatile

4) a pure aqueous solution of compound in bottle B is a good conductor of electricity among the three

BIOLOGY

127. Minamata disease is due to
1) MIC gas 2) Methyl mercury 3) Lead nitrate 4) Cobalt chloride

128. The region in brain portion that controls hunger is
1) Medulla 2) Diencephalon 3) Cerebrum 4) Mid brain

129. What will happen, if the sperm containing 'X' chromosomes fertilizes the Ovum?
1) Female child born 2) Male child born 3) cannot guess 4) none

130. Which is not correct?
1) embryology – Aristotle 2) Taxonomy – Carolus Linnaeus
3) Paleohntology – Leonardo da Vinci 4) Cytology – Robert Brown

131. Permanent surgical method for birth control in male human beings is
1) Hysterectomy 2)Dialysis 3) Tubectomy 4) Vasectomy

132. Pernicisous anemia is caused due to the deficiency of
1) Biotin 2) Calciferol 3) Cyanocobalamine 4) Ascorbic acid

133. Match the item in column I with column II

Part I	Part II
a) Ribisomes	i) suicidal bags
b) Mitochondria	ii) control functions of cell
c) Nucleus	iii) protein synthesis
d) Lysosomes	iv) power house of the cell

1) a – iii, b – iv, c – ii, d – i 2) a – iii, b – iv, c – i, d – ii
3) a – iii, b – i, c – ii, d – iii 4) a – i, b – iii, c – ii, d – iv

134. The salinity of sea water is
1) 2.5% 2) 3.5% 3) 4.5% 4) 5.5%

135. Who discovered blood capillaries?
1) William Harvey 2) Girolamo Fabrici 3) Marcello Malpighi 4) Robert Brown

136. According to Charles Eltion, which is not correct?
1) Carnivores at the top of the pyramid
2) Energy trapping is high at the top of the Pyramid
3) Producers at the top of the Pyramid
4) 2 and 3

137. World conservation strategy was proposed by ICN in
1) 1948 2) 1980 3) 1990 4) 1993

138. Choose the incorrect pair
1) Ovary – Estrogen 2) Adrenal – Adrenalin
3) Pituitary – Thyroxine 4) Testis – Testosterone

139. If a rat is given a mild electric shock when it goes to a certain part of its cage, it eventually avoid going there. This is because of
1) Imitation 2) Conditioning 3) Instinct 4) Imprinting

140. The tongue of a person is exposed to a high salty taste, then
1) the person learns to taste salty things better
2) loves tasting salty things
3) hates tasting salty things
4) fails to taste a less salty thing just after the exposure

MATHEMATICS

141. When 31513 and 34369 are divided by a certain three digit number, the remainders are equal, then the remainder is ....
(1) 86 (2) 97 (3) 374 (4) 113

142. The greatest number of four digits which when divided by 3, 5, 7, 9 leaves the remainders 1, 3, 5, 7, 9 leaves the remainders 1, 3, 5, 7 respectively, is ...
(1) 9763 (2) 9673 (3) 9367 (4) 9969

143. e f g h is a four digit number. One hundredth o f e f g h is the mean of e f and g h, then the four digit number is ....
(1) 3648 (2) 4950 (3) 4590 (4) 4590

144. If $x^2 + xy + x = 12$ and $y^2 + xy + y = 18$, then the value of $x + y$ is ...
(1) 5 or –6 (2) 3 or 4 (3) 5 or 3 (4) 6 or –3

145. If $217x + 131y = 913$ and $131x + 217y = 827$, then the value of $x + y$ is ...
(1) 8 (2) 5 (3) 7 (4) 6

146. If $x = \dfrac{1}{2 - \dfrac{1}{2 - \dfrac{1}{2 - x}}}, (x \neq 2)$, then the value of x is ...
(1) 1 (2) 3 (3) 2 (4) 5

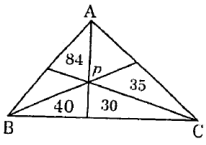
147. $x_1, x_2, x_3, \ldots$ are in A.P. If $x_1 + x_7 + x_{10} = -6$ and $x_3 + x_8 + x_{22} = ?$
(1) –21 (2) –15 (3) –18 (4) –31

148. If $\dfrac{2 + 5 + 8 + \ldots\ldots n \text{ terms}}{7 + 11 + 15 + \ldots . n \text{ terms}} = \dfrac{23}{35}$, then n value is ...
(1) 17 (2) 15 (3) 18 (4) 23

149. If the co-ordinates of the midpoints of the sides of a triangle are (1, 1), (2, –3) and (3, 4), then the centroid of the triangle is ...
(1) $\left(3, \dfrac{1}{3}\right)$ (2) $\left(\quad \dfrac{2}{\quad} \right)$ (3) (3, 1) (4) $\left(2, \dfrac{2}{3}\right)$

150. If two vertices of an equilateral triangle be (0, 0) and $\left(2, \dfrac{2}{3}\right)$, then the third vertex is ...
(1) $\left(0, 2 \quad 3\right)$ (3) $\left(3, \quad /3\right)$ (4) $\left(1, \sqrt{3}\right)$

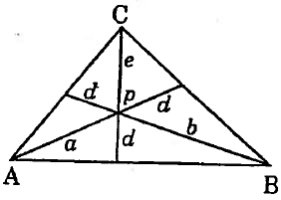
151. As shown in the given figure, ΔABC is divided into six smaller triangles by lines drawn from the vertices through a common interior point. The areas of four of 6 triangles are as ideicated, then the area of ΔABC is.....



(1) 238 (2) 464 (3) 315 (4) 412

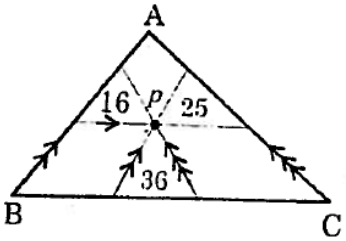
152. ABC is a right angled triangle with $\angle B = 90°$, m is the midpoint of AC and $Bm = \sqrt{117}\ cm$, $AB + BC = 30$, then the area of the triangle is ....
(1) $108\ cm^2$ (2) $248\,cm^2$ (3) $316\,cm^2$ (4) $156\,cm^2$

153. Let p be an interior point of ΔABC and extend lines from the vertices through p to the opposite sides. Let a, b, c and d divides the lengths of the segments indicated in the figure. Find the product of abc, if $a+b+c=43$ and $d=3$.



(1) 168 (2) 256 (3) 346 (4) 441

154. As shown in the figure in ΔABC, p is an interior point. Through the point p, three lines are drawn parallel to three sides as shown in the figure. If the areas of smaller triangles are 16, 25 and 36 square units respectively, then the area of ΔABC in square units is .....

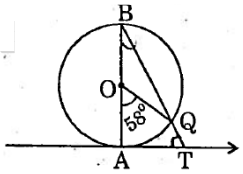


(1) 324 (2) 196 (3) 225 (4) 784

155. In an equilateral triangle ABC, the side BC is trisected at D, then $9AD^2$ is .....

(1) $7AB^2$ (2) $4AC^2$ (4) $\frac{3}{2}$ ^{2}

156. In the given figure, AB is the diameter of a circle with O and AT is a tangent. If $\angle AOQ = 58°$, then the value of $\angle ATQ$ is .....



(1) $52°$ (2) $61°$ (3) $46°$ (4) $75°$

157. The radii of two cylinders are in the ratio 2 : 3 and their heights are in the ratio 5:3, then the ratio of their volumes is ....

(1) 15 : 16 (2) 14 : 17 (3) 20 : 27 (4) 4 : 9

158. If the area of three adjacent faces of a cuboid are x, y and z respectively, then the volume of a cuboid is....

(1) xyz (2) $x+y+z$ (3) x^2yz (4) $xy+z$

159. If $\tan\theta + \cot\theta = 2,$ then the value of

(1) 4 (2) 2 (3) $\frac{3}{2}$ (4) 5

160. A bag contains 15 balls of which x are black and remaining are red. If the number of red balls are increased by 5, the probability of drawing the red ball is ....

(1) $\frac{1}{5}$ (2) $\frac{4}{5}$ (3) $\frac{3}{5}$ (4) $\frac{2}{5}$

HISTORY

161. "For this earth is not allotted to anyone nor is it presented to anyone as a gift. It is awarded by providence to people who in their hearts have the courage to conquer it, the strength to preserve it and the industry to put it to the plough." Whose ideology is this?
(1) Benito Mussolini (2) Adolf Hilter (3) Ho Chi Minh (4) Stalin

162. According to the census of 1921, 12 to 13 million people perished as a result of ...
(1) Fist World War (2) Epidemics (3) Famines (4) All the above

163. Find out the wrong statement about Giuseppe Mazzini?
(1) He was a member of the secret society of the Carbonari.
(2) He believed "The God had intended nations to be the natural units of mankind.
(3) He was the founder of young Europe
(4) None of the above

164. Who wrote the book "The History of the loss of Vietnam"?
(1) Phan Boi Chau (2) Ho Chi Minh
(3) Huynh Phu So (4) Phan Chu Trinh

165. Compulsory Elementary Education Act was made in England in the year
(1) 1829 (2) 1849 (3) 1860 (4) 1870

166. Who developed the concept of "The principle of the Garden City"?
(1) Andrew Means (2) Henry Mayhew (3) Ebenezer Howard (4) Haussman

167. Who wrote "Ninety five Theses" criticizing many of the practices and rituals of the Roman Catholic Church?
(1) Martin Luther (2) Thomas Pain (3) J.V. Schley (4) Richard M. Hoe

168. Kashi baba, a Kanpur mill worker wrote and published "Chhote Aur Bade Ka Sawal" in 1938 to show the links between ....
(1) Caste and Class exploitation. (2) Caste and Religion relation
(3) Income and Untouchability (4) Industrialists and Politicians

169. "Only a decade ago, they were as illiterate, helpess and hungry as our own masses, who could be more astonished then an unfortunate Indian like myself to see how they had removed the mountains of ignorance and helplessness in these few years." Name the Indian, who quoted this Russian revolution?
(1) M N Roy (2) Rabindranath Tagore
(3) Mahatama Gandhi (4) Jawaharlal Nehru

170. Find out the wrong statement related to Franklin Roosevelt.
(1) Announced New Deal Policy to eradicate economic depression.
(2) Introduced the much needed Social Security system.
(3) President of America during Second World War.
(4) None of the above.

171. The Ryotwari settlement was introduced by the British in the
(1) Madras Presidency (2) Bengal presidency
(3) Central Presidency (4) Assam Presidency

172. The famous Quit Indian resolution was passed on ....
(1) August 18, 1942 (2) April 4, 1942
(3) April 14, 1942 (4) August 8, 1942

GEOGRAPHY

173. Sikkim, West Bengal, Assam and Arunachal Pradesh have common frontiers with ...
(1) China (2) Bhutan (3) Bangladesh (4) Mayanmar

174. Which of these is not a Himachal Range?
(1) Dhaula Dhar (2) Pirpanjal Range (3) Kailash Range (4) Mahabharat Range

175. The Himalayas is divided into four major Geological sections. Choose among the following which is not one of them.
(1) Nepal Himalayas - Between Kali and Teesta.
(2) Mahabharat Himalayas – Between Indus and Gilgit.
(3) Kumaon Himalayas - Between Sutlej and Teesta
(4) Assam Himalayas – Between Teesta and Dihang.

176. Match list A with B and Select the correct answer using the codes given below the list

List – A	List – B
a) Hyderabad is warmer than Mumbai	(i) Altitude
b) Snowfall in Himalayas.	(ii) Mango showers.
c) North western plain gets rainfall in winter	(iii) Distance from sea
d) rainfall in summer	(iv) Western depression

	a	b	c	d
(1)	iii	ii	iv	i
(2)	ii	I	iii	iv
(3)	ii	I	iv	ii
(4)	iv	ii	I	iii

177. Which one of the following bio-reserves of India is not included in the world network of bio-reserve?
(1) Sunderbhan (2) Gulf of Mannar (3) Nanda Devi (4) Silent Valley

178. Highest Annual Growth Rate in India was recorded in these decades
(1) 1981, 1971, 1991 (2) 1991, 2001, 1971 (3) 1971, 2001, 1991 (4) 1961, 1971, 1981

179. Which of these is not related to Conservation of Resources?
(1) The club of Rome advocated resources conservation for the first time in a more systematic way in 1968.
(2) Brundtland Commission Report, 1987 introduced the concept of "Sustainable Development".
(3) E.F Schumacher is the author of the book "Small is Beautiful".
(4) Earth Summit was held in New York in 1997.

180. With reference to Indian agriculture, which of the following statements is not correct
(1) India is the largest producer as well as the consumer of pulses in the world.
(2) India is the second largest producer of rice in the world after China
(3) Tea is an important beverage crop introduced in India initially by the Persians.
(4) groundnut is a kharif crop and accounts for about half of the major oil seeds produced in the country.

181. In which of these following industries, limestone is not used?
(1) Cement industry. (2) Iron and Steel industry.
(3) Oil refinery industry. (4) None of the above.

182. Find the wrongly matched.
(1) Ferrous mineral - Iron ore
(2) Non-ferrous mineral - Mica
(3) Non-Metallic mineral - Limestone
(4) Fuel minerals - Coal

183. Identify the non-fibre crop?
(1) Hemp (2) Cotton (3) Natrual Silk (4) Rubber

184. The south-east Trade winds are attracted towards the Indian sub-continent in the month of June due to ...
(1) the effect of the westerlies
(2) the effect of Somaliya current.
(3) the presence of low atmospheric pressure over North-west India.
(4) None of the above

POLITICAL SCIENCE

185. Consider the following two statements on power sharing and select the answer using the codes given below.
(a) Power sharing is good for democracy
(b) It helps to reduce the possibility of conflicts between social groups.
Which of these statements are true and false?
(1) Both a and b are true(2) Both a and b are false
(3) a is true but b is false (4) a is false but b is true

186. Match the following countries and the path democracy ahs taken in that country

Country	Path to Democracy
a) Nepal	(i) End of One party Rule
b) Chile	(ii) King agreed to give up his powers
c) Ghana	(iii) End o fMilitary Dictatorship
d) Poland	(iv) Freedom from British Colonial Rule

Codes:

	a	b	c	d
(1)	(i)	(ii)	(iv)	(iii)
(2)	(ii)	(iii)	(iv)	(i)
(3)	(iii)	(ii)	(i)	(iv)
(4)	(iv)	(i)	(iii)	(ii)

187. Consider the following statements about pressure groups and parties
a) Pressure groups are the organized expression of the interests and views of specific social sections.
b) Pressure groups take positions on political issues
c) All pressure groups are political parties.
Which of the statements given above are correct?
(1) a, b, and c (2
(3) b and c (4) a and c

188. Match the ministry with the news that the ministry may have released

A	B
a) A new policy is being made to increase the jute exports from the country.	(i) Ministry of Defence
b) Telephone services will be made more accessible to rural areas	(ii) Ministry of Health
c) The price of rice and wheat sold under the public distribution system will got down.	(iii) Ministry of Commerce and Industry.
d) A pulse polio campaign will be launched	(iv) Ministry of Commerce and Industry.
e) The allowances of the soldiers posted on high altitudes will be increased.	v) Ministry of Communications and Information technology.

Codes:

	a	b	c	d	e
(1)	i	iii	ii	iv	v
(2)	iv	v	iii	ii	i
(3)	iii	v	ii	I	iv
(4)	ii	v	iii	iv	i

189. Find out the right which is not under the Indian Constitution?
(1) Freedom of Speech and Expression.
(2) Move freely through the Country
(3) Practice any profession
(4) None of the above

190. Find out the wrong statement about National Human Rights Commission.
(1) This is an independent Commission established by law in 1993
(2) Present Chairman for National Human Rights Commission is Justice Jeevan Reddy
(3) Like National Human Rights Commission, there are State Human Rights Commissions in 14 states of the country.
(4) There is no fee or any formal procedure to approach the National Human rights commission.

191. Find out the subject which is under concurrent list?
(1) Police (2) Communication
(3) Marriages and Divorce (4) None of the above

192. A struggle known as "Bolivia's water war" took place in ..... city.
(1) Cochabamba (2) Lapaz (3) Trinidad (4) Montero

ECONOMICS

193. Consider the following statements.
(i) Equitable allocation of resources.
(ii) Generation of employment.
(iii) Tax concession to big corporates
(iv) Universalization of public distribution
Which of the factors given above can bring inclusive growth in our country?
(1) (i), (ii), (iii) (2) (i), (ii), (iv) (3) (i), (iii), (iv) (4) (ii), (iii), (iv)

194. Which of the following is wrong related to Antyodaya Anna Yojana?
(1) Antyodaya Anna Yojana was launched in December 2000.
(2) 2 crore families have been covered under the antyodaya Anna Yojana
(3) Wheat is supplied at the rate of Rs.6 and rice at the rate of Rs. 7 under this scheme.
(4) None of the above

195. Find out the correct one related to under employment
(1) They do not want to work (2) They work in a lazy manner.
(3) They work less than what they are capable of doing (4) They are not paid for their work

196. Find out the wrong one about Secondary sector.
(1) Secondary sector is also called as industrial sector
(2) Manufacturing of bricks and sugar come under secondary sector
(3) The share of secondary sector is more in current GDP is India
(4) None of the above

197. Which among the following is money function?
(1) Medium of exchange (2) Unit of account (3) Store of value (4) All the above

198. Consider the following statements about Globalisation.
a) The most common route for investment by MNC's in countries around the world is to buy existing local companies.
b) Investment made by Multinational companies is called foreign investment.
c) Cargill Foods, an American company purchased and Indian company called Parakh Foods.
d) Ford Motors is one of the biggest German Automobile manufacturer.
Which of the given statements are True?
(1) a, c, d (2), a, b, c (3) b, c, d (4) a, b, c, d

199. In which year, did the Bengal Famine occur, which was responsible for the death of 30 lakh people in Bengal Province?
(1) 1933 (2) 1943 (3) 1953 (4) 1963

200. Find out the wrong one related to Annapurna Scheme (APS)
(1) Introduced in the year 2000.
(2) A scheme meant for indigent senior citizens.
(3) 10 kg of food grains are supplied freely under the scheme
(4) none of the above.

Vizag Centre KEY to
NTSE – 2017 – Stage I (Andhra Pradesh State)
(For class X Students)

DATE OF EXAM: 05-11-2017

Mental Ability

1. 1	2.3	3. 4	4. 5	5.1	6. 5	7. 3	8. 4	9. 1	10. 4
11. 1	12. 3	13. 5	14. 2	15. 4	16. 4	17. -	18. 2	19. 3	20. 5
21. 5	22. 4	23. 3	24. 5	25. 4	26. 2	27. 1	28. 4	29. 3	30. 5
31. 5	32. 2	33. 1	34. 3	35.2	36. 1	37. 4	38.3	39. 5	40. 2
41.5	42. 5	43. 4	44. 1	45. 4	46. 1	47. 5	48. 2	49. 3	50. 3

Language Comprehensive

51.2	52. 3	53. 4	54. 1	55. 2	56. 2	57. 4	58. 3	59. 4	60. 2
61.2	62. 3	63. 2	64. 1	65. 3	66. 2	67. 3	68. 2	69. 4	70. 1
71.3	72. 3	73. 2	74.2	75.2	76. 2	77. 4	78. 2	79. 1	80. 4
81.4	82. 1	83. 2	84. 1	85.2	86. 1	87. 2	88. 3	89. 1	90. 1
91.4	92. 2	93. 4	94. 2	95. 4	96. 2	97. 3	98. 2	99. 3	100. 3

Physics

101. 4	102. 4	103. 1	104. 2	105. 2	106. 1	107. 3	108. 3	109. 4	110.2
111.4	112. 3	113. 3							

Chemistry

114. 1	115.3	116.3	117.2	118.3	119.4	120.1	121.3	122.3	123.3
124.2	125.4	126.1							

Biology

127.2	128.2	129.1	130.1	131.4	132.3	133.1	134.2	135.3	136.4
137.2	138.3	139.2	140.4						

Maths

141.2	142. 1	143. 2	144. 1	145. 2	146. 1	147. 1	148. 2	149. 4	150.2
151. 3	152.1	153. 4	154. 2	155. 1	156. 2	157. 3	158. 1	159. 2	160. 1

History

161. 2	162.3	163. 4	164. 1	165. 4	166. 3	167. 1	168. 1	169. 2	170. 4
171. 1	172. 4								

Geography

173.2	174. 3	175. 3	176. 3	177. 4	178. 1	179. 4	180. 3	181. 3	182. 3
183. 4	184. 3								

Political Science

185.1	186. 2	187. 2	188. 2	189.2	190.2	191. 3	192. 1		

Economics

193. 2	194. 4	195. 3	196. 3	197. 4	198. 2	199. 2	200. 4		

NTSE 2017 SOLUTIONS – Stage I (Andhra Pradesh State)
(For class X Students)

MENTAL ABILITY TEST

1. 13, 74, 290, 650

   $2^2 + 3^2 = 13$

   $5^2 + 7^2 = 74$

   $11^2 + 13^2 = 290$

   $17^2 + 19^2 = 650$

   $23^2 + 29^2 = 1370$

2. 1, 11, 35, 79

   General term = $n^3 + n^2 - 1$

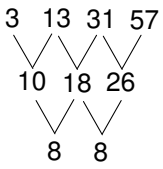
   $5^3 + 5^2 - 1 = 125 + 24 = 149$

3. 1, 5, 15, 34

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

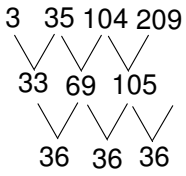
   $\frac{5(26)}{2} = 65$

4. 3, 13, 31, 57

   Next term = 57 + 34 = 91

5. 3, 35, 104, 209

   Next term = 209 + 141 = 350

6. A – BBC – AAB – CCA – BBCC

   ACBA

7. BC – BBC – B – CCB

   = BCCB / BCCB / BCCB

   = CBCD

8. C – BBB – ABBBB – ABBB –

   CA / BBBB / CA / BBBB / CA / BBBB

   = ABCCB

9. C – BCCD – CCDB – CDBCC – BC
CD / BCCD / BCCD / BCCD / BCCD / BC
= DBCD

10. BAAB / BAAB / BAAB
= ABBA

11. If the order is
$\times + =$
Then $6 \times 3 + 4 = 22$ is true

12. $+ - =$
as $12 + 3 - 4 = 11$

13. $\div + =$
as $16 \div 4 + 3 = 7$

14. $+ - =$
as $7 \times 3 - 8 = 13$

15. $\div + =$
as $15 \div 3 + 4 = 9$

16. $32 + 31 + 30 + 28 = 121 = (11)^2$
$70 + 72 + 73 + 74 = 289 = (17)^2$
$112 + 108 + 100 + 175 = 441 = (21)^2$

17. $1^3 + 2^3 + 3^3 + 4^3 = 100$
$1^2 + 2^3 + 3^3 + 6^3 = 289$
$1^3 + 5^3 + 6^3 + 7^3 = 685$

18. HCF of (12, 36, 42, 48) = 6
HCF of (14, 35, 49, 63) = 7
HCF of (30, 45, 60, 75) = 15

19. $7 - 5 + 11 = 9$
$13 - 9 + 6 = 10$
$11 - 14 + 7 = 4$

20. $5 + 12 + 13 = 30 = |3 - 0| = 3$
$13 + 9 + 4 = 26 = |2 - 6| = 4$
$7 + 5 + 16 = 28 = |2 - 8| = 6$

21-25.
$A \rightarrow 2$ (as 2 is common number in code for ATRNP & ABLMS)
$M \rightarrow 4$ (as 48 is common number in code for MSPTQ & ABLMS)
$S \rightarrow 8$ (as 48 is common number in code for MSPTQ & ABLMS)
$N \rightarrow 7$ (as 1 is common number in code for PTQAB & ATRNP)
$P \rightarrow 1$ (as 1 is common number in code for PTQAB & ATRNP)

26-30.

D is father of A and grandfather of F

So, A is father of F then D, A are two fathers

C is sister of F. So, C is daughter of A.

Only one mother O, it is evident that E is wife of A and hence the mother of C and F.

E is mother

F is the son of A

A made, B is brother → male of D, E → male

F male (as he is brother) Total 4

31. KMF → LLH

Jump → 1st letter → 1

2nd letter ← 1

3rd letter → 2

∴ RMS → SLU

32. GFH → EGG

1st letter ← 2

2nd letter → 1

3rd letter ← 1

∴ HRT → FSS

33. UVST → WTUR

1st letter → 2

2nd letter ← 2

3rd letter → 2

4th letter ← 2

34. News paper → editor

Film → Director

35. Smoke → Pollution

War → Death

36. -1

37. 4

38. 4

39. 5

40. 2

41. 5

42. 5

43. 4

44. 4

45. 4

46. 1

47. 5

48. 3

49. 1

50. 3

PHYSICS

101. (4)

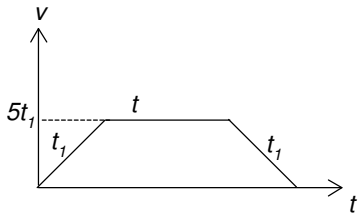
$t + 2t_1 = 25$.....(1)

$2 \times \frac{1}{2} \times 5t_1^2 + 5t_1.t = \frac{72 \times 1000}{60 \times 60} \times 25$

$t_1^2 + t.t_1 = 100$.....(2)

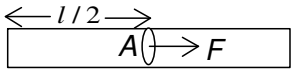
From eq. (1) and (2)

$t_1^2 - 25t_1 + 100 = 0 \qquad \Rightarrow t_1 = 5s \qquad t = 15s$



102. (4)

$F = \rho A.\frac{l}{2}\alpha \qquad \frac{F}{A} = \frac{1}{2}\rho l\alpha$



103. (1)

Refraction surface (1)

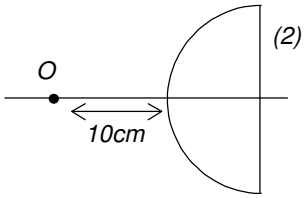
$\frac{\mu_2}{v} - \frac{\mu_1}{u} = \frac{\mu_2 - \mu_1}{R} \qquad v = -30\,\text{cm}$

At surface (2)

$u = -40\,\text{cm}$ Apparent shift $= \frac{40}{3}\,\text{cm}$

Distance of image from surface (2)

$= 40 - \frac{40}{3} = 26.67\,\text{cm}$



104. (2)

In centre of mass frame, equal and opposite force acts m both blocks.

In centre of mass frame, if the force on the block is F, then maximum expansion = $\frac{2F}{k}$

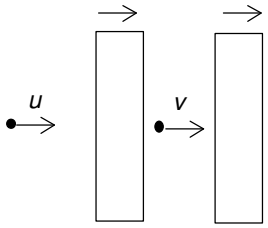
105. (2)

$0.02u = 1.v_1 + 0.02v$.....(1)

$0.02v = (2.98 + 0.02)v_1$.....(2)

Solving eq (1) and (2), $v = \frac{3}{4}u$

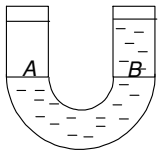
Percentage loss in velocity = $\frac{u - v}{u} \times 100 = 25\%$



106. (1)

Pressure at point A = pressure at point B

$\rho_1 g h_1 = \rho_2 g h_2 \Rightarrow \rho_1 = \rho_2$

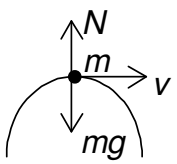


107. (3)

$mg - N = \frac{mv^2}{R}$

For maximum speed $N = 0$.

$\Rightarrow \frac{mv^2}{R} = mg \Rightarrow v^2 = Rg \qquad v = \sqrt{Rg} = 14 m/s$



108. (3)

$$r = \frac{mv}{qB}$$

The particle enters region–3 if $r > l$

thus $v > \frac{qlB}{m}$

Path length in region–2 is maximum if $r = l$

Time spend in region–2 if the particle returns back to region–1,

$$t = \frac{\pi r}{v} = \frac{\pi m}{qB}$$

109. (4)

$R_{eq} = 10\Omega$

$i = 1A$

$v_{12\Omega} = 10 - 1 \times 6 = 4v$

110. (2)

$$3K.\frac{100-T}{l} = 2K\frac{T-50}{l} + K\frac{T-0}{l}$$

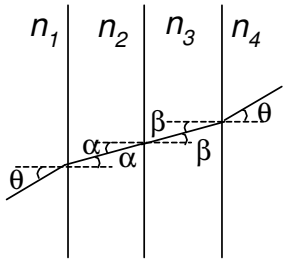
$$\Rightarrow T = \frac{200}{3}°C$$

111. (4)

$$\frac{\sin\theta}{\sin\alpha} = \frac{n_2}{n_1}$$

$$\frac{\sin\alpha}{\sin\beta} = \frac{n_3}{n_2}$$

$$\frac{\sin\beta}{\sin\theta} = \frac{n_4}{n_3}$$



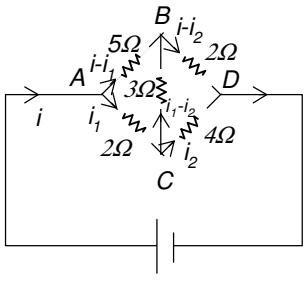
Multiplying these equations,

$$\frac{n_4}{n_1} = 1$$

112. (3)

Density of mixture = $\frac{2\times\rho + 1\times 16\rho}{2+1} = 6\rho$

113. (3)



In loop ABC,

$-2i_2 - 3(i_1 - i_2) + 5(i - i_1) = 0$.....(1)

In loop BCD,

$-3(i_1 - i_2) - 2(i - i_2) + 4i_2 = 0$.....(2)

In loop ACD,

$V - 2i_1 - 4i_2 = 0$.....(3)

Solving we get

$$R_{eq} = \frac{V}{i} = 3\Omega$$

CHEMISTRY

114. (1)

$$\underset{1mole}{N_2H_{4(l)}} + \underset{2\ moles}{2H_2O_{(l)}} \rightarrow N_{2(g)} + 4H_2O_{(g)}$$

$\Rightarrow$ 1 mole N_2H_4 can react with 2 moles of H_2O_2

$\Rightarrow$ 1 mole $N_2H_4 \rightarrow 2\times 34\ g\ of\ H_2O_2$

$\frac{1}{4}$ moles $N_2H_4 \rightarrow 17\ g\ of\ H_2O_2$

$\Rightarrow$ 0.25 moles of N_2H_4 is reacted

The amount of unreacted N_2H_4 = 0.75 – 0.25 = 0.5 moles N_2H_4

= 0.5 x 32 = 16 g N_2H_4

115. (3)

Collidal solution = $10^{-5} - 10^{-7}\ cm$

True solutions = less than $10^{-7}\ cm$

Suspensions = greater than $10^{-5}\ cm$

116. (3)

$Fe_2O_3 + 2Al \rightarrow Al_2O_3 + 2Fe$ (or) $Cr_2O_3 + 2Al \rightarrow Al_2O_3 + 2Cr$

It is a reduction of oxide ore to metal

117. (2)

$2C_2H_2 + 5O_2 \rightarrow 4CO_2 + 2H_2O$ is a balanced chemical reaction

118. (3)

	x-rays	UV – rays	IR – rays	Ratio
λ	$1\times10^{-10}\ m$	$1\times10^{-8}\ m$	$1\times10^{-6}\ m$	
$v = \frac{c}{\lambda}$	$c\times10^{10}\ m$	$c\times10^{8}\ m$	$c\times10^{6}\ m$	$10^4 : 10^2 : 1$
$E = hv$	$h\times c\times10^{10}$	$h\times c\times10^{8}$	$h\times c\times10^{6}$	$1 : 10^{-2} : 10^{-4}$

All electromagnetic radiations have some velocity

119. (4)

Electronic configuration (X) = $K^2L^8M^5$ (Z = 15)

$\Rightarrow X^{+3} = K^2L^8M^2 = 1s^2 2s^2 2p^6 3s^2$

Number of p electrons = 6

$\Rightarrow$ one of the allotropic forms of phosphorous is P_4

120. (1)

Compound A = $Cl_2O \Rightarrow 71g\ of\ Cl \rightarrow 16\,g\ of\ O$

$$1\,g\ of\ Cl \rightarrow \frac{16}{71} = 0.225$$

Compound B = $1\,g\ of\ Cl \rightarrow 0.903g\ of\ O$

$71\,g\ of\ Cl \rightarrow 71\times 0.903g\ of\ O$

= 64 g of O $\Rightarrow 4\ O-atoms$

$\therefore B = Cl_2O_4$ or Cl_4O_8 or Cl_6O_{16}

Compound C $\Rightarrow$ 1 g of Cl $\rightarrow$ 1.354 g of O

71 g of Cl $\rightarrow$ 71 x 1.354 g of O

= 96.134g of O

= 6 O – atoms

$\therefore$ C = Cl_2O_6 or ClO_3 or Cl_3O_4

Compound D = 1 g of Cl $\rightarrow$ 1.579g of O

= 71 g of Cl $\rightarrow$ 71 x 1.579 g of O

= 112 g of O

= 7 O-atoms

$\therefore$ D = Cl_2O_7 or Cl_4O_{14} This data shows law of multiple proportions

121. (3)

$3Al_{(s)} + 3NH_4ClO_{4(s)} \rightarrow Al_2O_{3(s)} + AlCl_{3(s)} + 3NO_{(g)} + 6H_2O_{(g)}$

3 moles of Al $\rightarrow$ 3 moles of NH_4ClO_4

3 x 27 g of Al $\rightarrow$ 3 x 117.5 g of NH_4ClO_4

1000 g of Al $\rightarrow \frac{3\times 117.5\times 1000}{3\times 27} = 4351.85\ g = 4.351kg$

122. (3)

123. (3)

SO_2 : 32 g of S $\rightarrow$ 32 g of O

9.02 g of S $\rightarrow$ 9.02 g of O

SO_3 : 32 g of S $\rightarrow$ 48 g of O

9.02 g of S $\rightarrow \frac{48\times 9.02}{32} = 13.53g$

124. (2)

$NH_3 + NH_3 \rightleftharpoons NH_4^+ + NH_2^-$

$\Rightarrow NaNH_2 + NH_4Cl \rightarrow NaCl + 2NH_3$

125. (4)

126. (1)

141. $31513 = x \pmod a$

$34369 = x \pmod a$

$\Rightarrow 2856 = 0 \pmod a$

$2856 = 3 \times 8 \times 7 \times 17$

Let us consider the factor 102.

Then remainder = 97.

142. Let number = x

$\Rightarrow x = 3a + 1, x = 5b + 3, x = 7c + 5, x = 9c + 7$

Let $a = b = c = d$

We observe first term = - 2

For sequence, the common difference = LCM (3, 5, 7, 9) = 315

n^{th} term = (-2) + (n – 1)315

Largest number = 9763

143. $\dfrac{1000e + 100f + 10g + h}{100} = \dfrac{10e + f + 10g + h}{2}$

$10e + f + \dfrac{g}{10} + \dfrac{h}{100} = 5e + \dfrac{f}{2} + 5g + \dfrac{h}{2}$

$5e + \dfrac{f}{2} = \dfrac{49h}{100} + \dfrac{49g}{10}$

$\Rightarrow e = 4, f = 9, h = 0, g = 5$

144. $x(x + y + 1) = 12 \qquad \dfrac{x}{y} = \dfrac{2}{3} \Rightarrow x = \dfrac{2y}{3}$

$y(x + y + 1) = 18$

$\Rightarrow \dfrac{3x}{2}\left(\dfrac{5x}{2} + 1\right) = 18$

$\Rightarrow x\left(\dfrac{5x}{2} + 1\right) = 12$

$\Rightarrow x = 2, \Rightarrow y = 3$

$\Rightarrow x + y = 5$

(or)

$\Rightarrow x = \dfrac{-12}{5}, y = \dfrac{-15}{5}$

$x + y = -6$

$\therefore 5 or -6$

145. $(217 + 131)(x + y) = 1740$

$x + y = \dfrac{1740}{348} = 5$

146. $x = \dfrac{1}{2 - x} \Rightarrow 2x - x^2 = 1$

$\Rightarrow x = 1$

147. $a+a+6d+a+ad=-6$
$a+5d=-2$
$a+2d+a+7d+a+11d=-11$
$3a+20d=-11$
$\Rightarrow 3a+(-8-4a)=-11$
$\Rightarrow -a=-3 \qquad \Rightarrow a=3$
$\qquad\qquad\qquad\quad a=-1$
$a+2d+a+7d+a+21d=9-30=-21$

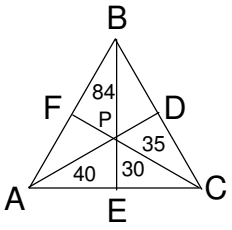
148. $\dfrac{2\left(4+(n-1)3\right)}{n\left(14+(n-1)4\right)}=\dfrac{23}{35}$
$\dfrac{3n+1}{4n+10}=\dfrac{23}{35}$

$13n=195\Rightarrow n=15$

149. Centroid $=\dfrac{1+2+3}{3},\dfrac{1-3+4}{3}$
$=\left(2,\dfrac{2}{3}\right)$

150. $(0,\ 0),\ (3,\sqrt{3})$
Third vertex $(0,2\sqrt{3})$

151. $\Rightarrow \dfrac{ar(\Delta CPA)}{ar(\Delta PCD)}=\dfrac{105}{35}=\dfrac{3}{1}$
Let BPD = a, APF = b (areas)
$\Rightarrow \dfrac{a+b+84}{a}=\dfrac{3}{1}\Rightarrow b+84=2a$
And
$\dfrac{\Delta ABF}{\Delta APF}=\dfrac{\Delta BEC}{\Delta PEC}$
$\Rightarrow \dfrac{124+b}{40}=\dfrac{64+a}{30}$
$\Rightarrow Area\ ABC=315$



152. $BD=\sqrt{117}$
$\dfrac{1}{2}\sqrt{117}\sqrt{x^2+\left(30-x\right)^2}=\dfrac{1}{2}(x)(30-x)$
$\Rightarrow 117\left(x^2+(30-x)^2\right)=\left(30x-x^2\right)^2$
$\Rightarrow x=12$
$\therefore Area=108$

153. A = 21, B = 21, C = 1

154. $ar(\Delta PHI) = 36, PHI \sim PED \Rightarrow \left(\frac{PE}{PH}\right)^2 = \frac{25}{36}$

$ar(\Delta PED) = 25, \quad \Rightarrow \frac{PE}{PH} = \frac{5}{11}$

$ar(\Delta PFG) = 16,$

So, $\frac{PH}{HE} = \frac{5}{11} \Rightarrow \frac{ar(\Delta PED)}{ar(\Delta EHC)} = \frac{25}{121}$

Area of PDIC = 60
Area of BHPG = 48
Area of PEAF = 40
$\therefore$ Area of ABC = 225

155. Let A(0, 0), B(2a, 0), C(a, $\sqrt{3}\,a$),

Then D$\left(\frac{4a}{3}, \frac{2\sqrt{3}}{3}\right)$

$\Rightarrow 9AD^2 = 28a^2$

$= 7\text{AB}^2$

156. $\angle ABT = 29$ as $\angle AOT = 58°$
$\Rightarrow \angle ATQ = 180 - 90 - 29$
$= 61$

157. $\frac{V_1}{V_2} = \frac{4}{9} \times \frac{5}{3} = \frac{20}{27}$

158. $lb = x, bh = y, lh = z$
$\Rightarrow volume = \sqrt{xyz}$

159. $\tan\theta + \cot\theta = 2$
$\Rightarrow \tan\theta = 1 \Rightarrow \tan^2\theta + \cot^2\theta = 2$

160. $I_1 \rightarrow$ when he draws red ball out of 15
$I_2 \rightarrow$ when he draws red ball out of 20
$P(I_1) = \frac{15-x}{15}, P(I_2) = \frac{20-x}{20}$
$\frac{20-x}{20} = 2\left(\frac{15-x}{15}\right)$
$60 - 3x = 120 - 8x$
$5x = 60$
$\Rightarrow x = 12$
$P(I_1) = \frac{1}{5}.$