

SECTION-A (Mathematical Ability)

- The equation of the directrix of the parabola $y^2 + 4y + 4x + 2 = 0$ is
(a) $x = -1$ (b) $x = 1$ (c) $x = -\frac{3}{2}$ (d) $x = \frac{3}{2}$
- If the equation $12x^2 + 7xy - py^2 - 18x + qy + 6 = 0$ represents two perpendicular lines, then the values of p and q are
(a) 12, 1 (b) 12, -1 (c) -12, 1 (d) -12, -1
- For $\frac{1}{2} \leq x \leq 1$, $\sin^{-1}(3x - 4x^3)$ is equal to
(a) $3 \sin^{-1} x$ (b) $3 \sin^{-1} x -$
(c) $-3 \sin^{-1} x$ (d) $-3 \sin^{-1} x$
- If α, β are roots of the equation $6x^2 + 11x + 3 = 0$ then
(a) $\cos^{-1} \alpha$ and $\cos^{-1} \beta$ are real
(b) $\operatorname{cosec}^{-1} \alpha$ and $\operatorname{cosec}^{-1} \beta$ are real
(c) $\cot^{-1} \alpha$ and $\cot^{-1} \beta$ are real
(d) None
- If $\alpha = \tan^{-1}\left(\frac{x\sqrt{3}}{2k-x}\right)$ and $\beta = \tan^{-1}\left(\frac{2x-k}{k\sqrt{3}}\right)$ then one value of $\alpha - \beta$ is
(a) 30° (b) 45° (c) 60° (d) None
- Vectors $2\hat{i} - \hat{j} + \hat{k}$ and $2\hat{i} - 4\hat{j} + \lambda\hat{k}$ are perpendicular if λ is equal to
(a) 16 (b) 4 (c) -8 (d) 8
- If $|\vec{a} \times \vec{b}| = |\vec{a}| |\vec{b}|$, then \vec{a} and \vec{b} are
(a) like parallel (b) unlike parallel
(c) coincident (d) perpendicular
- If the vector $\vec{c}, \vec{a} = x\hat{i} + y\hat{j} + z\hat{k}$ and $\vec{b} = \hat{j}$ are such that \vec{a}, \vec{c} and \vec{b} form a right handed system, then \vec{c} is
(a) 0 (b) $y\hat{j}$ (c) $z\hat{i} - x\hat{k}$ (d) $-z\hat{i} + x\hat{k}$
- The best average is
(a) arithmetic mean (b) median
(c) mode (d) None of these

- Which one of the following is not the measure of a location
(a) Mean (b) Median (c) mode (d) None
- The chances of throwing a total of 3 or 5 or 11 with two die is
(a) $\frac{5}{36}$ (b) $\frac{1}{9}$ (c) $\frac{2}{9}$ (d) $\frac{19}{36}$
- If $|\vec{a} + \vec{b}| = |\vec{a} - \vec{b}|$, $\vec{a}, \vec{b} \neq 0$, then
(a) \vec{a} is parallel to \vec{b} (b) \vec{a} is perpendicular to \vec{b}
(c) $|\vec{a}| = |\vec{b}|$ (d) None
- Let $\vec{a} = 3\hat{i} - \hat{j}$, $\vec{b} = \hat{i} - 2\hat{j}$, $\vec{c} = -\hat{i} + 7\hat{j}$ and $\vec{p} = \vec{a} + \vec{b} + \vec{c}$. Then \vec{p} in terms of \vec{a} and \vec{b} is
(a) $2\vec{a} - 3\vec{b}$ (b) $2\vec{a} + 3\vec{b}$
(c) $-2\vec{a} + 3\vec{b}$ (d) $-2\vec{a} - 3\vec{b}$
- The slope of the normal at the point $(at^2, 2at)$ of the parabola $y^2 = 4ax$ is
(a) $1/t$ (b) t (c) $-t$ (d) $-1/t$
- The point of the curve $y=x$ the tangent at which makes an angle of 45° with x-axis will be
(a) $(1/2, 1/4)$ (b) $(1/4, 1/2)$ (c) $(1/2, 1/2)$ (d) $(2, 4)$
- The equation of the chord of contact of the origin, with respect to the circle $x^2 + y^2 - 2x - 4y - 4 = 0$ is
(a) $x + 2y - 4 = 0$ (b) $x + 2y + 4 = 0$
(c) no chord exists (d) none
- If a, b, c are in A.P. and $a, c-b, b-a$ are in G.P. ($a \neq b \neq c$), then $a:b:c$ is
(a) 1:2:4 (b) 1:3:5 (c) 1:2:3 (d) none
- Maximum value of $\sin^6 \theta + \cos^6 \theta$ is
(a) $\frac{1}{4}$ (b) $\frac{1}{2}$ (c) 1 (d) None
- An additional observation 15 is included in a series of 11 observations and its mean remains unaffected. The mean of the series was
(a) 11 (b) 15 (c) 4 (d) 165

20. The pair of straight lines joinings the origin to the common points of $x^2 + y^2 = 4$ and $y = 3x + c$ are perpendicular if c^2 is equal to
(a) 20 (b) 40 (c) 13 (d) none
21. The Three lines
 $3x + 4y + 6 = 0$, $\sqrt{2}x + \sqrt{3}y + 2\sqrt{2} = 0$ and $4x + 7y + 8 = 0$
(a) concurrent (b) parallel (c) sides of triangle (d) none
22. From the top of a light house 60 meter high with its base at the sea level, the angle of depression of a boat is 15° . The distance of the boat from the foot of the light house is
(a) $\left(\frac{\sqrt{3}-1}{\sqrt{3}+1}\right)60$ meter (b) $\left(\frac{\sqrt{3}+1}{\sqrt{3}-1}\right)60$ meter
(c) $\frac{\sqrt{3}+1}{\sqrt{3}-1}$ meter (d) None
23. If $A = 60^\circ$, $a = 5$, $b = 4\sqrt{3}$ in $\triangle ABC$, then B is equal to
(a) 30° (b) 60° (c) 90° (d) none
24. In a $\triangle ABC$, if $\frac{\cos A}{a} = \frac{\cos B}{b} = \frac{\cos C}{c}$ and the side $a = 2$, then area of the triangle is
(a) 1 (b) 2 (c) $\sqrt{3}$ (d) $\sqrt{3}/2$
25. The general value of x satisfying the equation $2\sin^2 x - 3\sin x + 2 = 0$ is
(a) $n\pi + (-1)^n / 2$ (b) $n\pi + (-1)^n / 6$
(c) $n\pi + (-1)^n 5 / 6$ (d) $n\pi + (-1)^n 7 / 6$
26. The positive values of a which satisfies $\int_0^a (3x^2 + 4x - 5) dx = a^3 - 2$ are :
(a) 1, 2 (b) 2, 1/2 (c) 2, -1/2 (d) -2, 1/2
27. The value of λ for which the system of equations $x + y + z = 1$, $x + 2y + 2z = 3$, $x + 2y + yz = 4$ have no solution is
(a) 0 (b) 1 (c) 2 (d) 3
28. Value of $\int_2^4 \frac{\sqrt{x^2 - 4}}{x} dx$ is
(a) $\frac{2(3\sqrt{3} - 1)}{3}$
(b) $2(3\sqrt{3} - 1)$ (c) $2(3\sqrt{3} + 1)$ (d) $2(3\sqrt{3} - 1)$
29. The arithmetic mean of 9 observations is 100 and that of 6 is 80, the combined mean of all the 15 observations will be
(a) 80 (b) 90 (c) 92 (d) 100
30. If the product of the roots of the equation $ax^2 + bx + a^2 + 1 = 0$ is -2 , then a equals
(a) -1 (b) 1 (c) 2 (d) -2
31. The number of real solutions of $x^2 - 3|x| + 2 = 0$ is
(a) 1 (b) 2 (c) 3 (d) 4
32. If one root of $5x^2 + 13x + k = 0$ is reciprocal of the other, then
(a) $k = 0$ (b) $k = 5$ (c) $k = \frac{1}{6}$ (d) $k = 6$
33. If α, β are the roots of the equation $4x^2 + 3x + 7 = 0$, then the value of $\frac{1}{\alpha^3} + \frac{1}{\beta^3}$ is equal to
(a) $-\frac{27}{64}$ (b) $\frac{63}{16}$ (c) $\frac{225}{343}$ (d) None
34. The number of ways in which the letters of the word **TRIANGLE** can be arranged such that two vowels do not occur together is
(a) 120 (b) 240 (c) 14400 (d) None
35. At an election, a voter may vote for any number of candidates not greater than the number to be chosen. There are seven candidates and four members are to be chosen. The number of ways in which a person can vote is
(a) 95 (b) 96 (c) 97 (d) 98
36. If the third term of a G.P. is 4, then product of first five terms is
(a) 4^3 (b) 4^5 (c) 4^4 (d) None
37. In order to get at least once a head with probability ≥ 0.9 , the number of times a coin needs to be tossed is
(a) 3 (b) 4 (c) 5 (d) none
38. If $\frac{1}{q+r}, \frac{1}{r+q}, \frac{1}{p+q}$ are in A.P. then
(a) p, q, r are in A.P. (b) p^2, q^2, r^2 are in A.P.
(c) $1/p, 1/q, 1/r$ are in A.P. (d) None of these

39. Let $f(x) = |x-1|$, then
 (a) $f[x^2] = [f(x)]^2$ (b) $f(|x|) = |f(x)|$
 (c) $f(x+y) = f(x) + f(y)$ (d) None of these
40. A five digits number is formed by the digits 1,2,3,4,5,6 and 8. The probability that the number has even digit at both ends is
 (a) $2/7$ (b) $3/7$ (c) $4/7$ (d) $5/7$
41. The period of $\tan 3\theta$ is
 (a) $\frac{\pi}{3}$ (b) $\frac{2\pi}{3}$ (c) $\frac{3\pi}{4}$ (d) π
42. If $y = e^x + \sin x$, then $\frac{d^2x}{dy^2}$ is equal to
 (a) $e^x - \sin x$ (b) $-(e^x + \cos x)^{-2}$
 (c) $(\sin x - e^x)(\cos x + e^x)^{-3}$ (d) None of these
43. The two curves $y = x^3 + ax - 1$ and $y = 6x^2 + b$ touch each other at a point having abscissa 1, when
 (a) $a = 3, b = -3$ (b) $a = 0, b = 3$
 (c) $a = 0, b = -6$ (d) $a = 9, b = 3$
44. The Value of $\int_0^{x/2} |\sin x - \cos x| dx$ is equal to
 (a) 0 (b) $2\sqrt{2}$
 (c) $2(\sqrt{2} - 1)$ (d) $2(\sqrt{2} + 1)$
45. $\int \sqrt{\frac{1-x}{1+x}} dx$ is equal to
 (a) $\sin^{-1} x + \sqrt{1-x^2} + C$ (b) $\cos^{-1} x + \sqrt{1-x^2} + C$
 (c) $\sin^{-1} x - 2\sqrt{1-x^2} + C$ (d) $2\sin^{-1} x - \sqrt{1-x^2} + C$
46. $\int_0^1 \frac{dx}{(x^2+1)^{3/2}}$ is equal to
 (a) $\frac{1}{2}$ (b) $\frac{\sqrt{2}}{2}$ (c) 1 (d) $\sqrt{2}$
47. If $[x]$ is the greatest integer function $\int_{-2}^2 [x]^3 dx$ is equal to
 (a) 0 (b) -8 (c) -1 (d) -4
48. If a, b, and c are positive real numbers, the least value of $(a+b+c)\left(\frac{1}{a} + \frac{1}{b} + \frac{1}{c}\right)$ is

- (a) 9 (b) 3 (c) $10/3$ (d) $10/9$

49. $\int \frac{\sin 2x}{\sin^4 + \cos^4 x} dx$ is equal to
 (a) $\cos^{-1}(\cot^2 x) + c$ (b) $-\cot^{-1}(\tan^2 x) + c$
 (c) $\tan^{-1}(\cos^2 x) + c$ (d) $\tan^{-1}(\cos^2 2x) + c$
50. If $f(x) = f'(x)$ and $f(1) = 2$, then $f(3) =$
 (a) e^2 (b) $2e^2$ (c) $3e^2$ (d) $2e^3$

SECTION-B (Computer)

51. The address lines required for a 256 K work memory are :
 (a) 8 (b) 10 (c) 18 (d) 20
52. Multiplication of 47_8 and 52_8 is :
 (a) 3144_8 (b) 4147_8 (c) 3184_8 (d) 3146_8
53. What is the decimal equivalent of hexadecimal number 511 ?
 (a) FF1 (b) 1FF (c) 3FF (d) FF3
54. The result of the subtraction $FD_{16} - 88_{16}$ is
 (a) 75_{16} (b) 65_{16} (c) $5E_{16}$ (d) 10_{16}
55. The 9's compliments of 381 is
 (a) 372 (b) 508 (c) 618 (d) 390
56. Which of the following boolean algebra statements represent Commutative law ?
 (a) $(A+B)+C = A+(B+C)$
 (b) $A \bullet (B+C) = (A \bullet B) + (A \bullet C)$
 (c) $A+B = B+A$
 (d) $A+A = A$
57. What logic function is obtained by adding an inverter to the inputs of an AND gate?
 (a) OR (b) NAND (c) XOR (d) NOR
58. The Boolean expression $(x+y)(y+\bar{z})(z+\bar{x})$ is equal to :
 (a) xyz (b) $xy\bar{z}$
 (c) $(\bar{x}+z)y$ (d) $(x+\bar{z})y$
59. If $(41)_6 = (121)_b$ then b is :
 (a) 1 (b) 2 (c) 3 (d) 4
60. The 8 bit 2's complement of -45 is :
 (a) 00101101 (b) 11010010
 (c) 11010011 (d) 10101101

SECTION-C

(Analytical Ability & Logical Reasoning)

61. 1, 3, 7, 15, 31, 63, 127,
(a) 250 (b) 150 (c) 225 (d) 255

Directions(Questions 62 to 66): Study the following information carefully and answer the questions that follow

A team of five is to be selected from amongst five boys A,B,C,D and E and four girls P,Q,R and S. Some criteria for selection are:

A and S have to be together.

P cannot be put with R.

D and Q cannot go together.

C and E have to be together.

R cannot be put with B.

Unless otherwise stated, these criteria are applicable to all questions below.

62. If two of the members have to be boys, the team will consist of
(a) A, B, S, P, Q (b) A, D, S, Q, R
(c) B, D, S, R, Q (d) C, E, S, P, Q
63. If R be one of the members, the other members of the team are
(a) P,S,A,D (b) Q,S,A,D (c) Q,S,C,E (d) S,A,C,E
64. If two of the members are girls and D is one of the members, the members of the team other than D are
(a) P,Q,B,C (b) P,Q,C,E (c) P,S,A,B (d) P,S,C,E
65. If A and C are members, the other members of the team cannot be
(a) B,E,S (b) D,E,S (c) E,S,P (d) P,Q,E
66. If including P at least three members are girls, the members of the team other than P are
(a) Q,S,A,B (b) Q,S,B,D (c) Q,S,C,E (d) R,S,A,D

Directions(Questions 67- 68): Read the following information carefully and answer the questions given below:

Seven executives P, Q, R, S, T, U and W reach office in a particular sequence. U reaches immediately before P but does not immediately follow S. R is the last one to reach office. T follows immediately after P and is subsequently followed by W.

67. Among the executives, who reaches the office first?
(a) Q (b) S (c) U (d) None
68. Who ranks fourth in the sequence of reaching office?
(a) W (b) U (c) T (d) cannot be determined

Directions(Questions 69- 71): Read the following information carefully to answer the given questions:

Fifty books belonging to different subjects, viz. History (8), Geography (7), Literature (13), Psychology (8) and Science (14), are placed on a shelf. They are arranged in an alphabetical order subject to the condition that no two books of the same subject are placed together so long as books of other subjects are available. Unless otherwise mentioned, all counting is done from the left.

69. Which subject does the 40th book belong to ?
(a) Science (b) Psychology
(c) History (d) Literature
70. What is the position of the last book in Psychology?
(a) 36th (b) 37th (c) 38th (d) 39th
71. Counting from the right, to which subject does the 39th book belong?
(a) History (b) Psychology (c) Geography (d) Science
72. In a row of girls facing North, Reena is 10th to the left of Pallavi, who is 21st from the right end. If Malini, who is 17th from the left end, is fourth to the right of Reena, how many girls are there in the row?
(a) 37 (b) 43 (c) 44 (d) Data inadequate
73. Reaching the place of meeting 20 minutes before 8.50 hrs Sumit found himself thirty minutes earlier than the man who came 40 minutes late. What was the scheduled time of the meeting?
(a) 8.00 (b) 8.05 (c) 8.10 (d) 8.20

Directions(Questions 74 to 77): In each of the following questions, which one of the four interchanges in signs and numbers would make the given equation correct?

74. $6 \times 4 + 2 = 16$
(a) + and \times , 2 and 4 (b) + and \times , 2 and 6
(c) + and \times , 4 and 6 (d) none
75. $(3 \div 4) + 2 = 2$
(a) + and \div , 2 and 3 (b) + and \div , 2 and 4
(c) + and \div , 3 and 4 (d) No interchange, 3 and 4
76. $4 \times 6 - 2 = 14$
(a) \times to \div , 2 and 4 (b) - to \div , 2 and 6
(c) - to +, 2 and 6 (d) \times to +, 4 and 6
77. $(6 \div 2) \times 3 = 0$
(a) \div and \times , 2 and 3 (b) \times to -, 2 and 6
(c) \div and \times , 2 and 6 (d) \times to -, 2 and 3

78. A man travels 7 kms towards East, then he turns left and travels 8 kms. again he turns left and travels 10 kms. Finally, he turns left and travels 2 kms. In which direction is he from his starting point ?

(a) North - West (b) West
(c) East (d) North - East

79. In a certain code, MENTION, is written as LNEITNO . How is PATTERN written in that code ?

(a) APTTREM (b) PTAETNR
(c) OTAETNR (d) OTAETRN

80. In a certain code '37' means ' which class' and '583' means 'caste and class'. What is the code for 'castle' ?

(a) 3 (b) 7
(c) 8 (d) Either 5 or 8

Directions for (Qns. 81-83) : P, Q, R and S are brothers. They have four kids L, M, N and O. There are two boys and two girls and there is one pair of identical twins. S has no kids while the rest have at least one kid each. L and M are of same sex. P is not the father of L, Q is not father of N, R is not the father of O and M is the only child in the family.

81. Which are the twins ?
(a) L, N (b) N, O (c) L, O (d) none
82. Who is the father of the twins ?
(a) Q (b) R (c) P (d) none
83. Who is the father of M ?
(a) Q (b) R
(c) P (d) cannot be determined

Directions for (Qns. 84-87) : Six friends went to a Cyber Cafe . They are to be accommodated in a row of nine room, each to a room. A, E and F donot want to be in a room at the end of the row. B and A must not have anybody adjacent to their rooms. There is only an empty room between A and F. C is adjacent to both G and F. E is next to the room at the beginning.

84. Who has empty rooms on both sides ?
(a) F (b) B (c) A (d) E
85. Who is in the third room?
(a) G (b) C (c) No body (d) F
86. Which rooms are empty ?
(a) 1, 6, 8 (b) 1, 5, 8 (c) 4, 5, 6 (d) 5, 6, 8
87. What is the maximum number of consecutive rooms that are occupied ?
(a) 2 (b) 3 (c) 1 (d) 4
88. A and B are brothers. C and D are sisters. A's son is D's brother. How is B related to C ?
(a) Father (b) Brother
(c) Grandfather (d) Uncle
89. A is B's wife and C is A's sister . D is the father of C, while E is D's Son . What is the relation of E to B ?

(a) Brother (b) Brother- in- law
(c) Cousin (d) Father- in- law

90. Father's age is 4 times that of his son. 5 years back, it was 7 times. His age now is
(a) 30 (b) 35 (c) 40 (d) 45
91. If two numbers are in the ratio 6 : 13 and their least common multiple is 312, then the sum of the numbers is
(a) 75 (b) 57 (c) 76 (d) 67
92. In a class, 20 opted for physics, 17 for Maths, 5 for both and 10 for other subjects. The class contains how many students ?
(a) 35 (b) 42 (c) 52 (d) 60
93. A machine is sold at a profit of 10%. Had it been sold for Rs. 40 less, there would have been a loss of 10% . What was the cost price ?
(a) Rs.175 (b) Rs. 200 (c) Rs. 225 (d) Rs. 250

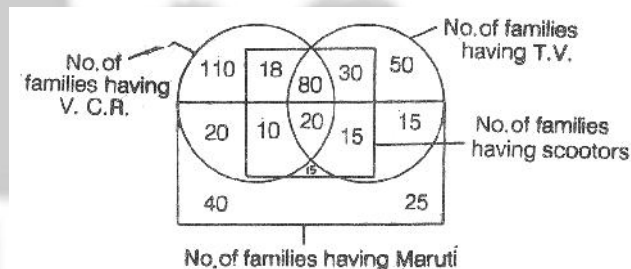
Direction (Q. 94 to 95) : In each questions below are two statements followed by two conclusions numbered I and II. You have to take the two given statements to be true even if they seem to be at variance from commonly known facts and decide which of the given conclusions logically follows from the two given statements disregarding commonly known facts.

Give Answer :

- (a) if only conclusion I follows
(b) if only conclusion II follows
(c) if either I or II follows
(d) if neither I nor II follows

94. **Statements :** 1. All cars are cats.
2. All fans are cats.
Conclusions : I. All cars are fans.
II. Some fans are cars.
95. **Statements :** 1. Some scooters are trucks.
2. All trucks are trains.
Conclusions : I. Some scooters are trains.
II. No truck is a scooter.

Direction (Q. 96 to 100) : Study the figure given below and answer the following ques-



96. Find out the number of families which have all the four things mentioned in the diagram :
(a) 40 (b) 30 (c) 35 (d) 20
97. Find out the number of families which have Scooters :
(a) 145 (b) 100 (c) 188 (d) 240

98. Find out the number of families which have V.C.R. and T.V. both :
(a) 84 (b) 24 (c) 104 (d) 129
99. Find out the number of families which have only one thing, i.e., either V.C.R. or T.V. or Scooter or Maruti :
(a) 160 (b) 184 (c) 225 (d) 254
100. Find out the number of families which have T.V. and scooter both but have neither V.C.R. nor Maruti :
(a) 15 (b) 30 (c) 4 (d) 50

SECTION-D (General English)

101. His life consists of of drinking punctuated by periods of drunken sleep.
(a) barrels (b) bouts
(c) bowls (d) pints
102. When the morning the murder was discovered.
(a) occurred (b) came
(c) arrived (d) happened
103. He lives in the world of
(a) allusions (b) illusions
(c) conclusions (d) delusions
104. There was a serious between the two brothers.
(a) alteration (b) alteration
(c) altercation (d) aberration
105. He lost the match easily because he had played a five set match in the earlier round.
(a) sensational (b) gruelling
(c) wonderful (d) controversial

DIRECTIONS for (Q. 106 to 110) : In the following question, choose the expression which is an improvement upon the italicised part. If none of the three expressions improves the sentence, then your answer is (d).

106. Eve-teasing is not only a moral offence **but** a crime punishable under law.
(a) as also a (b) as well as a
(c) but also a (d) No improvement
107. The detectives followed **on** several clues but failed to find the murderer.
(a) through (b) up
(c) by (d) No improvement
108. He stopped **to work** an hour ago.
(a) to working (b) to have worked
(c) working (d) No improvement
109. The summer has **set out**, and the days are getting warm.
(a) set off (b) set in
(c) set up (d) No improvement
110. It **was a week** since the exams began.

- (a) It is a week (b) It has been a week
(c) It had been a week (d) No improvement

DIRECTIONS for (Q. 111 to 113) : In these questions, choose the word from the four alternatives (a), (b), (c), and (d) which has the correct spellings.

111.
(a) detergent (b) datergent
(c) ditergent (d) detargent
112.
(a) commitee (b) committee
(c) committe (d) commatte
113.
(a) examination (b) examnation
(c) examinition (d) examimation

DIRECTIONS for (Q. 114 & 115) : In the following question, choose the word nearest in meaning to the italicised part.

114. He has travelled all over the continent by **hitchhiking** most the time.
(a) free ride (b) ride
(c) drive (d) drive freely
115. It is **futile** to argue with a person who does not want to understand.
(a) unnecessary (b) useless
(c) dangerous (d) infuriating

DIRECTIONS for (Q. 116 to 120) : Fill in the blanks with suitable words.

116. My mother upset the kettle of boiling water and her right hand badly.
(a) wounded (b) sizzled
(c) scorched (d) scalded
117. Please do not an offer made by the Chairman.
(a) refrain (b) refute
(c) refuse (d) refuge
118. The government is confident that the standard of living will begin to again soon.
(a) revive (b) lift
(c) flourish (d) rise
119. Sharing heavy responsibilities with colleagues does not involve loss of prestige, or of the authority of an institute's Head.
(a) deterioration (b) decrease
(c) diminution (d) loss
120. The problem of proliferation of nuclear arms is never going to be solved unless the two super powers agree to
(a) a solution (b) understand each other
(c) sit together (d) meet half-way