Section - 1 (Mathematics)

1. If $\frac{d}{dx}\left\{\cos^{-1}\left(\frac{1-x}{1+x}\right)\right\}=\frac{1}{f(x)\{1+f^2(x)\}}$, then

$$\int\frac{d\{f^2(x)\}}{f(x)+f^2(x)}=?$$

(a) $2\log|1+f^2(x)|+C$

(b) $2\log|1+f(x)|+C$

(c) $\log|1+f(x)|+C$

(d) none of these

2. What real x can satify the equation

$$(\sqrt{3-\sqrt{3}})^{x^2-2}=(4-\sqrt{3})^{\frac{x^2}{2}-1}-1\ ?$$

(a) 0 (b) 1 (c) no real x (d) none

3. Which interval is not included in the solution set of

$$\frac{1}{1-2^{x-1}}<\frac{1}{2^x-1}?$$

(a) (1, 2) (b) $(0,\log_2 4/3)$

(c) $[\log_2 4/3, 1]$ (d) None of these

4. Let $\log_{48}4,\ y=\log_{24}8,\ z=\log_{32}6\ ;\sum x=p,$ $\sum xy=q$ and xyz = r then :

(a) p + q = 2r (b) q + 2r = 1

(c) q + r = 1 (d) none of these

5. $\sum_{r=1}^{\infty}(r^2-r+3)x^{r-1}=?$

(a) $3+2x(1-x)^{-2}$ (b) $\frac{3x+2}{(1-x)^3}$

(c) $\frac{3(x^2+1)-4x}{(1-x)^3}$ (d) None of these

6. If the eccentricity of the hyperbola $x^2-y^2\sec^2\sim=5$ is $\sqrt{3}$ times the eccentricity of the ellipse $x^2\sec^2\sim+y^2=25$, then a value of $\sim$ is :

(a) ® / 6 (b) ® / 4 (c) ® / 3 (d) ® / 2

7. If $b^2x^2+a^2y^2=a^2b^2(a>b)$ and $x^2-y^2=c^2$ are a set of orthogonal curves then :

(a) $a^2+b^2=2c^2$ (b) $b^2-a^2+c^2=0$

(c) $a^2-b^2=2c^2$ (d) $a^2>2c^2$

8. The equation $2\sin^2x-(p+3)\sin x+2p-2=0$ possesses a real solution, if :

(a) $0\le p\le 1$ (b) $-1\le p\le 3$

(c) $4\le p\le 6$ (d) $p\ge 6$

9. If $\int\frac{dx}{x\sqrt{(1-x^3)}}=a\ \log\left|\frac{\sqrt{(1-x^3)}-1}{\sqrt{(1-x^3)}+1}\right|+b,$ then a=

(a) 1/3 (b) 2/4 (c) -1/3 (d) -2/3

10. If $\frac{1}{a}+\frac{1}{a-2b}+\frac{1}{c}+\frac{1}{c-2b}=0$ and a,b,c are not in A.P., then :

(a) a,b,c are G.P. (b) a, $\frac{b}{2}$, c are in A.P.

(c) a, $\frac{b}{2}$, c are in H.P. (d) a, 2b, c are in H.P.

11. The maximum value of $\sin\left(x+\frac{®}{6}\right)+\cos\left(x+\frac{®}{6}\right)$ in the interval $\left(0,\frac{®}{2}\right)$ is attained at :

(a) $\frac{®}{12}$ (b) $\frac{®}{6}$ (c) $\frac{®}{3}$ (d) $\frac{®}{2}$

12. The vectors $x\hat{i}+3\hat{j}+7\hat{k}$ and $\hat{i}+y\hat{j}-z\hat{k}$ are collinear, then the value of $\frac{xy^2}{z}$ is equal to :

(a) $\frac{9}{7}$ (b) $-\frac{9}{7}$ (c) $\frac{6}{7}$ (d) $-\frac{6}{7}$

13. If two vertice A and B of ΔABC have the coordinates (3, -2) and (5, 4) respectively and the orthocentre is at the origin O, then the coordinates of the orthocentre of ΔOAC are :

(a) (5, 4) (b) (3, -2) (c) (0, 0) (d) none

14. From 100 cards numbered 1 to 100, two cards drawn one by one with replacement. Then probability that both are divisible by 5 is :
(a) 1/5 (b) 1/10 (c) 1/25 (d) 1/15

15. The area of the region bounded by the curves y = |x - 1| and y = 3 - |x| is :
(a) 3 sq. units (b) 4 sq. units
(c) 6 sq. units (d) 2 sq. units

16. $\int_0^{\pi/2} \frac{\sin x}{1+\cos x+\sin x}dx =$

(a) $\frac{\pi}{4}$ (b) $\frac{\pi}{4}+\log\sqrt{2}$

(c) $\frac{\pi}{4}-\log\sqrt{2}$ (d) $\frac{\pi}{4}-\log 2$

17. If A, B, C are the angles of ΔABC and

$$\begin{vmatrix} 1 & & \\ 1+\sin A & 1+\sin B & 1+\sin C \\ \sin A+\sin^2 A & \sin B+\sin^2 B & \sin C+\sin^2 C \end{vmatrix} = 0$$

then the triangle :
(a) is equilateral (b) is isosceles
(c) is right angled (d) cannot determined

18. If in a ΔABC , a = 6, b = 3 and cos(A - B) = $\frac{4}{5}$ then :

(a) $\angle C = \frac{\pi}{4}$ (b) $\angle A = \sin^{-1}\frac{2}{\sqrt{5}}$

(c) area (ΔABC) = 9 (d) $\angle C = \frac{\pi}{3}$

19. If 1, ω, ω^2 are cube roots of unity and if

$$\begin{bmatrix} 1+\omega & 2\omega \\ -2\omega & -b \end{bmatrix} + \begin{bmatrix} a & -\omega \\ 3\omega & 2 \end{bmatrix} = \begin{bmatrix} 0 & \omega \\ \omega & 1 \end{bmatrix},$$ then

a^2+b^2 is equal to :

(a) $1+\omega^2$ (b) ω^2-1 (c) $1+\omega$ (d) $(1+\omega)^2$

20. If A + B = 45° then (cotA - 1) (cotB - 1) is equal to :
(a) 1 (b) 1/2 (c) -1 (d) 2

21. In triangle ABC if $\angle A = 60^\circ$, a = 5, b = 4 then c is root of the equation :

(a) $c^2-5c-9=0$ (b) $c^2-4c-9=0$

(c) $c^2-10c+25=0$ (d) $c^2-5c-49=0$

22. If, in hyperbola, the distance between the foci is 10 and the transverse axis has length 8, then the length of its latus-rectum is :
(a) 9 (b) 9/2 (c) 32/3 (d) 64/3

23. Triangle ABC has vertices (0, 0), (11, 60) and (91, 0). If the line y = kx cuts the triangle into two triangles of equal area, then k is equal to :
(a) 30/51 (b) 4/7 (c) 7/4 (d) 30/91

24. The equation of one of the diameters of the circle $x^2+y^2-6x+2y=0$ is :
(a) x + y = 0 (b) x - y = 0
(c) 3x + y = 0 (d) x + 3y = 0

25. $\lim_{n\to\infty}\left(\frac{1}{n+1}+\frac{1}{n+2}+\ldots+\frac{1}{2n}\right) =$

(a) $\log_e 2$ (b) $\log_e 3$

(c) $\log_e(-2)$ (d) $\log_e 4$

26. The straight lines (m - 1) x + my - 5 = 0 and mx + (2m - 1) y + 7 = 0 will intersect on the x-axis when the value of m will be :
(a) 5/12 (b) 7/12 (c) 12/5 (d) 12/7

27. The sum of all two digits natural numbers which when leave a remainder 5 when they are divided by 7 is equal to :
(a) 715 (b) 702 (c) 615 (d) 602

28. If $\tan^{-1}(x+2)+\tan^{-1}(x-2)-\tan^{-1}(1/2)=0,$ then one of the values of x is equal to :
(a) -1 (b) 5 (c) 1/2 (d) 1

29. The number of solutions of $\cos 2\theta = \sin\theta$ in $(0, 2\pi)$ is :
(a) 1 (b) 2 (c) 3 (d) 4

30. Let a be the greatest value and α be the maximum value of $f(x)=x(x-1)^2,\ 0\le x\le 2$. Then the ratio a : α =
(a) 3 : 1 (b) 25 : 2 (c) 27 : 2 (d) 14 : 1

31. One of the points on the parabola $y^2=12x$ with focal distance 12 is :

(a) (3, 6) (b) $(9, 6\sqrt{3})$

(c) $(7, 2\sqrt{21})$ (d) $(8, 4\sqrt{6})$

32. If $\int \frac{x+2}{2x^2+6x+5}dx = p\int \frac{4x+6}{2x^2+6x+5}dx +$ $q\int \frac{dx}{2x^2+6x+5}$ then p + q =

(a) 1/3 (b) 1/2 (c) 1/4 (d) 3/4

33. If the distinct numbers a, b, c are in G.P. while (a - b), (c - a), (b - c) are in H.P., then $\frac{a+c}{b} =$

(a) 2 (b) -2 (c) 3 (d) -4

34. If $(3x)^{\log 3} = (4y)^{\log 4}$, $4^{\log x} = 3^{\log y}$, then $\frac{x+y}{x-y} =$

(a) 3 (b) 4 (c) 5 (d) 7

35. $\int_0^{\pi/4} \log(1+\tan x)dx =$

(a) $\frac{\pi}{4}\log 2$ (b) $\frac{\pi}{8}\log 2$ (c) $\frac{\pi}{2}\log 2$ (d) $\log 2$

36. The larger area bounded by $y^2 = 4x$ and $x^2 + y^2 - 2x - 3 = 0$ is :

(a) $2\pi - \frac{4}{3}$ (b) $2\pi + \frac{4}{3}$ (c) $2\pi + \frac{8}{3}$ (d) $2\pi + \frac{2}{3}$

37. $\lim_{x\to 1}(1-x)\tan\frac{\pi x}{2} =$

(a) $1/\pi$ (b) π (c) $\pi / 2$ (d) $2/\pi$

38. If $y = e^{3x}$, then $\left(\frac{d^2y}{dx^2}\right)\left(\frac{d^2x}{dy^2}\right)$ is :

(a) 1 (b) e^{-3x} (c) $3e^{-3x}$ (d) $-3e^{-3x}$

39. The period of f(x) = |sin x| + |cos x| is :

(a) $\pi / 2$ (b) π (c) $3\pi / 2$ (d) 2π

40. $\int_2^3 \frac{\sqrt{x}dx}{\sqrt{5-x}+\sqrt{x}} =$

(a) 1 (b) 1/2 (c) 1/3 (d) 2

41. The function $f(x)\frac{x}{\log x}$ increases on the interval :

(a) $(0,\infty)$ (b) (0, e) (c) (e, ∞) (d) none

42. If $\int \frac{dx}{\sqrt{1-\tan^2 x}} = \frac{1}{a}\sin^{-1}(a \sin x) + C$, then a =

(a) $\sqrt{2}$ (b) $\sqrt{3}$ (c) $\sqrt{5}$ (d) none

43. $I_n = \int_0^{\pi/4} \tan^n x\, dx,\ n > 2,$ then $I_n + I_{n-2}$ forms :

(a) A.P. (b) G.P. (c) H.P. (d) A.G.P.

44. $\int \frac{dx}{x\sqrt{5x^2-3}} = a(gof)(x) + C,$ then :

(a) $g(x) = \tan^{-1}x,\ f(x) = \sqrt{\frac{5}{3}x^2 - 1},\ a = \frac{1}{\sqrt{3}}$

(b) $g(x) = \sqrt{\frac{5}{3}x^2 - 1},\ f(x) = \tan^{-1}x,\ a = \frac{1}{\sqrt{3}}$

(c) $g(x) = \tan^{-1}x,\ f(x) = \frac{1}{2}\sqrt{5x^2-3},\ a = \frac{1}{\sqrt{5}}$

(d) None of these

45. $\int_{-1}^{1}(x - [x])dx =$

(a) 1 (b) 2 (c) 0 (d) 1/2

46. In a ΔABC, if $A = 60^\circ$ + B, a = 6, b = 2, then cos C is equal to :

(a) 1/5 (b) 1/7 (c) 1/9 (d) 1/8

47. $\int x^2 e^{x^3}\cos(e^{x^3})\, dx =$

(a) 3 sin (e^{x^3}) (b) sin (e^{x^3})

(c) $\frac{1}{3}\sin(e^{x^3})$ (d) $-\frac{1}{3}\sin(e^{x^3})$

48. 2^{60} when divided by 7 leaves the remainder :

(a) 5 (b) 6 (c) 1 (d) 2

49. If the standard deviation of the observation -5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, is $\sqrt{10}$. The standard deviation of observations 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25 will be :

(a) $\sqrt{10} + \sqrt{10}$ (b) $\sqrt{10} + 20$ (c) $\sqrt{10}$ (d) none

50. In a city 20% of the population travels by car, 5% travels by bus and 10% travels by both car and bus. Then the persons travelling by car or bus is :
(a) 80% (b) 40% (c) 60% (d) 70%

SECTION - 2 ENGLISH

Directions (Q.51 and Q.55) : In the following questions, groups of four words are given. In each group, one word is correctly spelt. Find the correctly spelt word.

51.
(a) excution (b) excitment
(c) expedition (d) extrection

52.
(a) externel (b) extrovart
(c) introvert (d) exect

53.
(a) expact (b) impact
(c) exite (d) fronteer

54.
(a) intruison (b) interesting
(c) interstingly (d) entertening

55.
(a) supremecy (b) suppressor
(c) surfiet (d) surender

Directions (Q.56 and Q.60) : In the following questions, a part of the sentence is printed **bold**. Below are given alternatives to the **bold** part at (1), (2) and (3), which may improve the sentence. Choose the correct alternative. In case no improvement is needed, your answer is (4).

56. In the desert, the sun is the master, all else **resigns** before its merciless rays.
(a) collapses (b) falls
(c) retires (d) No improvement

57. I intend **to learn** French next year.
(a) learning (b) learn
(c) have learnt (d) No improvement

58. The police **needed** him for armed robbery.
(a) liked (b) was after
(c) were looking to (d) No improvement

59. There is **no more room** for you in this compartment.
(a) no more seat (b) no more space
(c) no more accommodation (d) No improvement

60. It is easy to see why cities grew **on the river banks**.
(a) along the river banks (b) in the river banks
(c) upon the river banks (d) No improvement

Directions (Q.61 and Q.65) : In the following questions, four alternatives are given for the idiom/phrase in **bold** in the sentence. Choose the alternative which best expresses the meaning of the idiom/phrase.

61. She is a **fair-weather friend**.
(a) a good friend
(b) a friend who meets difficulties
(c) one who deserts you in difficulties
(d) a favourable friend

62. To **die in harness** means to die while
(a) riding a horse (b) in a stable
(c) in a uniform (d) still in sevice

63. To **keep under wraps** means to keep something
(a) covered (b) protected (c) unpacked (d) secret

64. After independence Indian agriculture rose **like a phoenix** due to the Green Revolution.
(a) with a new life (b) with a start
(c) with roya gait (d) with vengeance

65. His failure at the election has been **a sore point with** him for a long time.
(a) Something which hurts
(b) Something that brings fear to
(c) Something memorable for
(d) Something pleasurable to

Directions (Q.66 and Q.70) : In the following questions, out of the four alternatives, choose the one which can be substituted for the given words/sentence.

66. The worship of idols or images
(a) Atheism (b) Theism (c) Idolatry (d) Iconoclasm

67. Something that is poisonous or unhealthy
(a) Trivial (b)Toxic (c) Torpid (d) Tragic

68. A remedy for all diseases
(a) Amnesia (b) Panacea (c) Intelligentsia (d) Parasol

69. A hater of mankind
(a) Misanthrope (b) Misogynist
(c) Philanthropist (d) Misogamist

70. Irresistible craving for alcoholic drinks
(a) Megalomania (b) Dispsomania
(c) Kleptomania (d) Pyromania

Section-3 (Analytical Ability & Logical Reasoning)

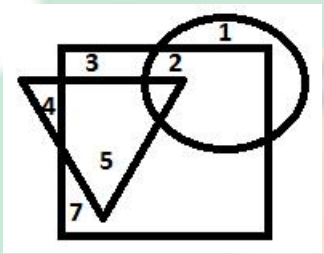
71. 'A' man starts from a point and walks 2 km towards North. turns towards his right and walks 2 kms, turns right and again and walks. What is the direction now he is facing ?
(a) South (b) South-East
(c) North (d) West

72. P is Q's brother. R is Q's mother. S is R's father. T is S's mother. How is P relate to T ?
(a) Granddaughter (b) Great grandson
(c) Grandson (d) Grandmother

73. If you are eleventh in a queue starting either end, how many are there in the queue ?
(a) Eleven (b) Twenty
(c) Twenty one (d) Twenty two

74. If CONSCIOUSLY is written as PEBNPJEXNKM, then SOIL is written as :
(a) NEKJ (b) NEJK (c) JENK (d) ENJK

75. When a survey was made regarding the preferences in the watching of TV channel, a few said that they watch only ZTV channel, the others liked only Sun TV channel, while others Asianet TV Channel. A small percentage said that they watch all the three TV channel. In the figure given below the circle indicates the Asianet TV channel, the square ZTV and the triangle the Sun TV channel. Which number in the figure indicates the fact that some people watch all the three TV channels ?



(a) 2 (b) 5 (c) 6 (d) 3

76. 1438, 1429, 1417, 1402, ?
(a) 1378 (b) 1384 (c)1387 (d) 1392

77. Six toys are quite identical to look at, but only one of them is less in weight. It is to be identified using the balance minimum number of times. What is that minimum number of using the balance ?
(a) Once (b) 2 times
(c) 3 times (d) More than 3 times

78. If C = 3 and FEAR is coded as 30, then what will be the code number for HAIR ?
(a) 35 (b) 36 (c) 30 (d) 33

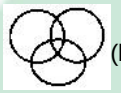
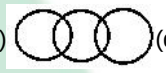
79. If Z = 26, NET = 39, then NUT = ?
(a) 50 (b) 53 (c) 55 (d) 56

80. If a trian runs at 40 km/hour, it reaches its destination late by 11 minutes. But if it runs at 50 km/hour, it is late by 5 minutes only. The correct time (in minutes) for the train to complete the journey is :
(a) 13 (b) 15 (c) 19 (d) 21

81. At what time between 3 and 4 o'clock are the hands of a clock together?
(a) $49\frac{1}{11}$ minutes past 3 (b) $16\frac{4}{11}$ minutes past 3
(c) $10\frac{10}{11}$ minutes past 3 (d) $43\frac{7}{11}$ minutes past 3

82. How many numbers from 1 to 100 are not divisible by 2, 3 and 5?
(a) 266 (b) 500 (c) 333 (d) none

83. Six persons A, B, C, D, E and F are standing in a circle. B is between F and C; A is between E and D, F is to the left of D. Who is between A and F?
(a) B (b) C (c) D (d) E

84. Which one of the following diagrams correctly represents the relationship among the classes-Tennis fans, Cricket players and Students ?
(a)  (b)  (c)  (d) 

85. If sky is called sea, sea is called water, water is called air, air is called cloud and cloud is called river, then what do we drink when thirsty?
(a) River (b) Sky (c) Water (d) Air

86. Grain : Stock :: Stick : ?
(a) Heap (b) String (c) Bundle (d) Collection

87. What terms will fill the blank spaces?
Z, X, V, T, R, __, __
(a) M, N (b) N, M (c) P, N (d) O, K

88. In a certain code, PAPER is written as SCTGW. How is MOTHER written in that code?
(a) QRVLGW (b) PQRSXY (c) PQVJGT (d) none

Directions (Q.89 to 91) : These questions are based on the data given below :

The number of lotus flowers in a pond on any morning is double the number of lotus flowers that was there the previous night. At sunset 1/3 rd of what were there in the morning get spoiled and during the day time half the flowers that were there in the morning are plucked for sale.

89. What will be the number of flowers on the 4th day in the morning, if the number of flowers on the night of first day is 54?
(a) 24 (b) 12 (c) 18 (d) 48

90. If on the night of the 3rd day there are 27 lotus flowers, what will be the number of flowers for sale on the 6th day?
(a) 3 (b) 6 (c) 18 (d) 48

91. On which day and time will there be only 2 flowers left, if on Monday morning there were 36 flowers?
(a) Tuesday morning (b) Wednesday morning
(c) Tuesday evening (d) Cannot be determined

92. Court is related to justice in the same way as school is related to
(a) Teacher (b) Student (c) Education (d) Class

Directions (Q.93 to 96) : These questions are based on the data given below :

Seven boys DGMPQRT participated in a race. Q was behind T but ahead of M who was a few spaces ahead of R.G and P were behind D who was behind R.

93. Who was winner?
(a) M (b) R (c) D (d) none

94. Who was fifth in the race?
(a) G (b) R (c) D (d) M

95. How many boys were there between Q and D?
(a) 1 (b) 2 (c) 3 (d) none

96. Who was the last?
(a) P (b) R (c) G (d) Either G or P

97. What should come in the place of the question mark (?) in the following letter series?

BXJ ETL HPN KLP ?
(a) NHR (b) MHQ (c) MIP (d) NIR

98. How many 3's are there in the following sequence which are neither preceded by 6 nor immediately followed by 9?

9 3 6 6 3 9 5 9 3 7 8 9 1 6 3 9 6 3 9
(a) One (b) Two (c) Three (d) Four

99. Pointing to a boy in the photograph Madhu said, "His sister is the only daughter of my father", how is the boy related to Madhu's father?
(a) Father (b) Brother (c) Son (d) Cousin

100. Uma ranked 8th from the top and 37th from the bottom in a class. How many students are there in the class?
(a) 47 (b) 46 (c) 45 (d) none

101. "Paddy" is related to "Field" in the same way as "Steel" is related to :
(a) Factory (b) Iron (c) Ore (d) Wagon

Directions (Q.102 to 104) : These question are based on the data given below:

A cube painted white on all the faces, is cut into 125 cubes of equal size. Now answer the questions 102 to 104.

102. How many cubes are painted on one face only ?
(a) 54 (b) 8 (c) 16 (d) 27

103. How many cubes are painted on two sides only?
(a) 64 (b) 12 (c) 36 (d) 48

104. How many cubes are not painted on one face only?
(a) 66 (b) 27 (c) 25 (d) 44

105. Kitu walks towards East and then towards South. After walking some distance he turns towards West and then turns to his left. In which direction is the walking now?
(a) North (b) South (c) East (d) West

106. The minimum number of colours needed to paint all the sides of a cube such that no two adjacent sides have the same colour is :
(a) 2 (b) 4 (c) 3 (d) 6

107. My mother is twice as old as my sister and my father is 24 years older than me. At the time of my sister's birth, I was 5. My sister is 25 now. What is the difference in the age of my parents?
(a) 3 years (b) 4 years (c) 5 years (d) 6 years

108. A straight road runs from north to south, it has two turnings towards east and three turnings towards west. In how many ways can a person coming from east get on the road and go west
(a) 2 (b) 3 (c) 9 (d) 6

109. In the question below, there is some relationship between the first two groups of letters. The same relationship obtains between the third group of letters and one o the four alternative letter groups. Pick the correct alternative
PNDY : QMEX :: JRSF : ?
(a) KQRE (b) KSTE (c) KSRE (d) KQTE

110. Anil travels 4 miles towards north. He turns to the left and travels 6 miles. Then he turns right and travels 4 miles. How far is he from the starting point?
(a) 5 miles (b) 6 miles (c) 10 miles (d) 8 miles

Section - 4 (Computer)

111. The address lines required for 512 K word memory are :
(a) 10 (b) 19 (c) 20 (d) none

112. Octal equivalent of the hexadecimal number B2F16 is :
(a) 2627426 (b) 2625426 (c) 2826426 (d) 5457426

113. Decimal value of $(122)_{16} \div (22)_8$ lies in the interval
(a) (15.5, 16) (b) (16, 16.5)
(c) (16.5, 17) (d) (17, 17.5)

114. Which one of the following units **CANNOT** be used to measure the speed of computer?
(a) MIPS (b) MFLOPS (c) FLOPS (d) BAUD

115. Two's complement of the binary number 1011.01 is :
(a) 0100.10 (b) 0100.11
(c) 1011.10 (d) 0100.01

116. Flip-Flop circuits can be used for
(a) scaling (b) rectification
(c) modulation (d) counting

117. Windows operating system released in 2009 has been named as
(a) Windows Vista (b) Windows 7
(c) Windows 8 (d) Windows XP++

118. Which one of the following in NOT a permanet storage device?
(a) Pen drive (b) Hard disk (c) Compact disk (d) RAM

119. Which one of the following is **NOT** a search engine?
(a) Zing (b) Google (c) Yahoo (d) Bink

120. The Boolean expression $\overline{(\overline{x+y})} \oplus \overline{(x \oplus y)}$ is equivalent to
(a) OR gate (b) NAND gate (c) NOR gate (d) XOR gate