PART – A
MATHEMATICS

1. If $\frac{e^x}{1-x} = a_0 + a_1x + a_2x^2 + \ldots\ldots a_nx^n + \ldots$, then $a_n - a_{n-1}$ is equal to :

   (a) 1 (b) $\frac{1}{n!}$ (c) $\frac{1}{(n-1)!}$ (d) $\frac{1}{n!} - \frac{1}{(n-1)!}$

2. The area bounded between two curves $x^2 + y^2 = \pi^2$ and $y = \sin x$ in first quadrant is:

   (a) $\frac{\pi^3 - 8}{4}$ (b) $\frac{\pi^3 - 8}{2}$ (c) $\frac{\pi^3 - 16}{4}$ (d) None of these

3. $\int e^x (1 + \tan x + \tan^2 x)\, dx$ is equal to:

   (a) $e^x \sec x + c$ (b) $e^x \sin x + c$ (c) $e^x \cos x + c$ (d) $e^x \tan x + c$

4 The angle of intersection of circles $x^2 + y^2 = 4$ and $x^2 + y^2 - 2x - 2y = 0$ is:

   (a) 30^o (b) 45^o (c) 60^o (d) 90^o

5. If I_1, I_2 are integrating factors of the equations $xy' + 2y = 1$ and $xy' - 2y = 1$ then:

   (a) $I_1 = -I_2$ (b) $I_1I_2 = x^2$ (c) $I_1 = x^2I_2$ (d) $I_1I_2 = 1$

6. The number of integral values of k for which the equation $3\cos x + \sin x = 3k - 2$ has a solution is:

   (a) 1 (b) 3 (c) 4 (d) 5

7. Let $f : R \to R$ be such that $f(1) = 3$ and $f'(1) = 6$. $\lim_{x \to 0} \left(\frac{f(1+x)}{f(1)}\right)^{\frac{1}{x}}$ is equal to:

   (a) 1 (b) e (c) e^2 (d) e^3

8. Given $A = \sin^2\theta + \cos^4\theta$, then for all real θ

   (a) $1 \le A \le 2$ (b) $¾ \le A \le 1$ (c) $13/6 \le A \le 1$ (d) $¾ \le A \le 3/16$

9. If a vector $\vec{a}$ points north-east and a vector $\vec{b}$ points north-west such that $|\vec{a}| = |\vec{b}| = 5$, then the magnitude and direction of the vector $\vec{a} - \vec{b}$ must be

   (a) $\sqrt{150}$ towards east (b) $5\sqrt{2}$ towards east

   (c) 10 towards east (d) 10 towards west

10. If the letter of the word "CRICKET" are arranged in all possible ways and these words are written out as in a dictionary, then the rank of the word "CRICKET" is

    (a) 411 (b) 529 (c) 531 (d) None of these

11. If $f(x) + f(1 - x) = 2$, then the value of $f\left(\frac{1}{2001}\right) + f\left(\frac{2}{2001}\right) + \ldots + f\left(\frac{2000}{2001}\right)$ is

    (a) 2000 (b) 2001 (c) 1999 (d) 1998

12. Three letters are written to different persons and addresses on the envelopes are also written. Without looking at the addresses, the probability that letters go into right envelopes is.

    (a) 1/27 (b) 1/6 (c) 1/9 (d) 1/8

13. If $a_1, a_2, a_3, \ldots$ form a G.P. and $a_1 > 0$. i = 1, 2…, then $\Delta = \begin{vmatrix} \log a_n & \log a_{n+1} & \log a_{n+2} \\ \log a_{n+3} & \log a_{n+4} & \log a_{n+5} \\ \log a_{n+6} & \log a_{n+7} & \log a_{n+8} \end{vmatrix}$ to equal to

    (a) $\log a_{n+8} - \log a_n$ (b) $2 \log a_{n+4}$ (c) 0 (d) None of these

14. Given $x^2 + x + 1 = 0$. Find the value of $\left(x + \frac{1}{x}\right)^2 + \left(x^2 + \frac{1}{x^2}\right)^2 + \left(x^3 + \frac{1}{x^3}\right)^2 + \ldots + \left(x^{27} + \frac{1}{x^{27}}\right)^2$

(a) 54 (b) 28 (c) 7 (d) None of these

15. If p is a real number such that $0 < p < 1$ and x and y are real numbers with $x < y$, then

(a) $p^x < p^y$ (b) $p^x > p^y$ (c) $p^y > p^x > 1$ (d) $p^y > 1 > p^x$

16. The value of 'a' and 'b' so that $\lim_{x\to\infty}\left(\frac{x^2+1}{x+1} - ax - b\right) = 0$ is

(a) a = 0, b = 0 (b) a = 1, b = – 1 (c) a = – 1, b = 1 (d) a = 2, b = – 1

17. The maximum possible area that can be enclosed by a wire of length 20 cm, by bending it in the form of a sector, is

(a) 10 (b) 25 (c) 30 (d) None of these

18. $\int_0^{1.5} [x^2]$, where [ ] denotes the greatest integers function, equals.

(a) $2 + \sqrt{2}$ (b) $2 - \sqrt{2}$ (c) $-2 + \sqrt{2}$ (d) $-2 - \sqrt{2}$

19. Let f (x) = (x – 4) (x – 5) (x – 6) (x – 7) then:

(a) f ' (x) = 0 has four roots

(b) three roots of f ' (x) = 0 lie in $(4, 5) \cup (5, 6) \cup (6, 7)$

(c) the equation f ' (x) = 0 has only one root

(d) three roots of f ' (x) = 0 lie in $(3, 4) \cup (4, 5) \cup (5, 6)$

20. On a set P = {4, 6, 8} the relation R = {(4, 4), (8, 8), (4, 6), (6, 4)} is

(a) symmetric and transitive but no reflexive

(b) symmetric and reflexive but not transitive

(c) reflexive and transitive but not symmetric

(d) an equivalence relation

21. Eigen values of matrix $\begin{bmatrix} -3 & 2 & 2 \\ -6 & 5 & 2 \\ -7 & 4 & 4 \end{bmatrix}$ are:

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

22. The maximum slope of the curve $-x^3 + 6x^2 + 2x + 1$ is

(a) 14 (b) 16 (c) 19 (d) – 13

23. If $y = x + x^2/2 + x^3/3 + \ldots\infty$, then x is

(a) $y + y^2/2! + y^3/3! + \ldots$ (b) $y - y^2/2! + y^3/3! - \ldots$

(c) $y + y^2/2 + y^3/3 + \ldots$ (d) $y - y^2/2 + y^3/3 - \ldots$

24. If $\vec{a}$ is vector $\perp$ to the vectors $\vec{b} = \hat{i} + 2\hat{j} + 3\hat{k}$ and $\vec{c} = -2\hat{i} + 4\hat{j} + \hat{k}$ and satisfies the condition: $\vec{a}.(\hat{i} - 2\hat{j} + k) = -6$, then $\vec{a} = ?$

(a) $5\hat{i} - \frac{7}{2}\hat{j} - 4\hat{k}$ (b) $10\hat{i} + 7\hat{j} - 8\hat{k}$

(c) $5\hat{i} - \frac{7}{2}\hat{j} + 4\hat{k}$ (d) none of these

25. Each of the angle between vectors; $\vec{a}$, $\vec{b}$ and $\vec{c}$ is equal to 60^0. If $|\vec{a}| = 4$, $|\vec{b}| = 2$ and $|\vec{c}| = 6$, then the modulus of $\vec{a} + \vec{b} + \vec{c}$ is:

(a) 10 (b) 15 (c) 12 (d) None of these

26. The number of ways in which one can arrange 5 identical white balls and 4 identical black balls in a row so that two black balls do not lie side by side is

(a) 15 (b) 20 (c) 625 (d) None of these

27. The function f (x) = $\begin{cases} x, x \le 1 \\ x-1, x>1 \end{cases}$ is

(a) continuous at x = 1 (b) differential at x = 1

(c) not differentiable at x = 1 (d) both (a) and (b)

28. The value of $a^4 + b^4 + c^4 + d^4$ can not be less than:

(a) 2 abcd (b) 3 abcd (c) 4 abcd (d) None of these

29. The number of real roots of the equation $(x^2 + 6x)^4 - (x + 3)^2 + 9 = 0$ is:

(a) 0 (b) 1 (c) 4 (d) 2

30. The function $4x^3 + 6x^2 + 12x - 5$

(a) is a decreasing function of x (b) always increases with x

(c) has a maximum at x = 1 (d) has a minimum at x = 0

31. The normal to the curve $x^y = y^x$ at the point (2, 2) meets the x axis at the point:

(a) (– 1, 0) (b) (0, 0) (c) (1, 0) (d) (4, 0)

32. If $\int_0^{b-c} f(x + c)\,dx = k \int_c^b f(x)\,dx$ then the value of k is :

(a) – 1 (b) 1 (c) 0 (d) ∞

33. The value of the expression log tan 1° + log tan 2° +…….+ log tan 89° is

(a) tan 1° (b) 1 (c) log (tan 1°) (d) zero

34. The range of the function f(x) = $\frac{1+x^2}{x^2}$ is equal to

(a) (0, 1) (b) [0, 1] (c) (1, ∞) (d) [1, ∞)

35. $\cos^{-1} ½ + 2\sin^{-1} ½$ is equal to

(a) $\pi/4$ (b) $\pi/6$ (c) $\pi/3$ (d) $2\pi/3$

36. The sum of perimeters of a circle and a square is l. if the sum of areas is least, then

(a) side of the square is double the radius of the circle

(b) side of the square is ½ of the radius of the circle

(c) side of the square is equal to the radius of the circle

(d) none of these

37. If tan ax – tan bx = 0, then the values of x form a series in

(a) A.P (b) G.P (c) H.P (d) None of these

38. $\int_0^{\pi/4} \log (1 + \tan\theta)\,d\theta$ = ?

(a) $\pi/8 \log 2$ (b) $-\pi/8 \log 2$ (c) $\pi/8 \log 2^2$ (d) None of these

39. If $x_r = \text{Cos}\left(\frac{\pi}{4^r}\right) + i\text{Sin}\left(\frac{\pi}{4^r}\right)$, then $x_1 x_2 x_3 \ldots \infty$ is:

(a) $2\text{Sin}\frac{\pi}{4^r}$ (b) $2\text{Cos}\frac{\pi}{4^r}$ (c) $2(1 + \sqrt{3}\,i)$ (d) $½ (1 + \sqrt{3}\,i)$

40. $\int_0^{\pi/2} \cos^5\theta \sin^3\theta d\theta$ is equal to

(a) 1/32 (b) $\pi/24$ (c) 1/16 (d) 1/24

PART – B
ANALYTICAL REASONING

Directions for questions 41 to 45: An organization has three officers A, B, C and five secretaries D, E, F, G, H. The management is planning to open a new branch office in another city using three secretaries and two officers of the present staff. To do so they plan to separate certain individuals who do not function together. The guidelines are

(a) Officers A and C cannot be in the same team.
(b) C and E should be separated because they do not work well together.
(c) D and G should not be together because of professional rivalry.
(d) D and F should not be in the same team for their dislike.

41. If A moves as one of the officers, which of the following is NOT a possible contingent?
(a) ABDEH (b) ABDGH (c) ABEGH (d) ABFGH

42. If C and F are moved to the new office how many contingents are possible?
(a) 1 (b) 2 (c) 3 (d) 4

43. If C is sent to the new office then who cannot go with C?
(a) B (b) D (c) F (d) G

44. Who must go to the new office?
(a) B (b) D (c) E (d) G

45. If D does go to the new office, which of the following is (are) true?
(I) C cannot go (II) A cannot go (III) H must go
(a) I only (b) II only (c) I and II only (d) III and I only

Directions for questions 46 to 50: The letters B, D, F, H, J, L, N stand for seven consecutive integers from 1 to 10 not necessarily in order.

(a) H is 3 less than B.
(b) D is the middle term.
(c) L is as much less than D as F is greater than H.
(d) N is greater than F.

46. The fifth integer is
(a) B (b) F (c) N (d) J

47. B is as much greater than L as which integer is less than N.
(a) J (b) H (c) F (d) B

48. If B is 7 then the sum of J and N is
(a) 16 (b) 14 (c) 12 (d) 10

49. B – L =?
(a) 2 (b) 3 (c) 4 (d) None of these

50. The greatest possible value of F is how much greater than the smallest possible value of H?
(a) 3 (b) 5 (c) 7 (d) 2

51. How many numbers begin or end with 2 between 100 and 300?
(a) 100 (b) 180 (c) 110 (d) None of these

52. A ship went on a voyage. After it had traveled 180 miles, a plane started with 10 times the speed of the ship. Find the distance when they meet from starting point in miles.
(a) 100 (b) 180 (c) 200 (d) 220

53. There are N stations on a railroad. After adding X stations on the rail route, 46 additional tickets have to be printed. Find N and X.
(a) 11, 2 (b) 10, 3 (c) 12, 5 (d) 13, 3

54. Three friends divided some candies equally. After all of them ate 4 candies the total number of candies remaining is equal to the number of candies each had after division. Find the original number of candies divided.
(a) 12 (b) 15 (c) 18 (d) 30

55. City X is 200 km east of city Y, and city Z is 150 km directly north of city Y. What is the shortest distance in km between X and Z?
(a) $50\sqrt{7}$ (b) 175 (c) 200 (d) 250

56. Ram has 5 five rupee coins and 5 two rupee coins. The number of two rupee coins is half that of one rupee coins and one fourth that of 50 paise coins. How much money Ram has?
(a) 35 (b) 55 (c) 40 (d) 45

57. In Astrology Jupiter goes round the earth once in 12 years and Saturn goes round the earth once in 30 years. What is the time interval between two conjunctions of the Saturn and Jupiter at the same location in the Zodiac?
(a) 60 (b) 30 (c) 120 (d) 12

58. A class consists of 70 boys and 50 girls. 40% of boys and 70% of girls were present on a day. What is the ratio of number of girls who attended the class to the number of boys who did not attend the class?
(a) 5:6 (b) 6:5 (c) 2:3 (d) 4:5

59. Tank A has 576 liters of water and decreasing at the rate of 10 litres per minute. Tank B has 226 liters of water and increasing at 20 liters per minute. How many seconds will it take the two tanks to have the same amount of water?
(a) 500 (b) 600 (c) 650 (d) 700

60. What is the smallest integer k such that $r^3 = s^2 = k$ where r and s are positive integers?
(a) 121 (b) 27 (c) 64 (d) 81

61. When two dice are rolled together the number that has the highest probability to roll is
(a) 6 (b) 7 (c) 5 (d) 9

62. Divide Rs. 594 between three people giving the first one half of the second's share and the second one third of the third's share.
(a) 66, 132 & 396 (b) 33, 165 & 396 (c) 66, 198 & 330 (d) 198, 198 & 198

63. A ball moves 120 meters per second and strikes an object in three seconds. If it moves at 100 meters per second, how long does it take to strike the same object?
(a) 12/5 s (b) 9/5 s (c) 10/5 s (d) 18/5 s

64. On selling 150 mangoes, a person earns a profit equal to the selling price 30 mangoes. Calculate his gain percentage.
(a) 100 (b) 50 (c) 25 (d) 35

65. A clock takes 4 seconds to strike 4. How long will it take to strike 10?
(a) 4 s (b) 8 s (c) 10 s (d) 12 s

66. A bag contains 15 blue balls, 8 green balls, 7 red balls and 10 white balls. The minimum number of balls that must be drawn from the bag to ensure at least one ball of each color is
(a) 4 (b) 25 (c) 26 (d) 34

67. I propose to take 30 consecutive terms of the series 100, 99, 98, 97,…… At which term must I begin so that the sum is 1155?
(a) 51 (b) 53 (c) 55 (d) 49

68. Today is Saturday. What day of the week will it be after 27 days?
(a) Monday (b) Friday (c) Wednesday (d) Saturday

69. If the following names were arranged as in dictionary, which would be the third?
(a) Suniti (b) Suneethy (c) Suneeti (d) Suneetti

70. Pointing to a photograph Suraj said, "His daughter Shanti is granddaughter of my mother." Whose photograph was it?
(a) Suraj's brother (b) Suraj's Son (c) Suraj's Uncle (d) Suraj's Nephew

Directions for questions 71 to 73: Lee is senior to John and earns more than Harry. Israel is junior to Mac and senior to Harry and earns less than Khan. Jack is senior to Nimmy and junior to Harry and earns less than Nimmy and more than Khan. Nimmy is senior to Lee and earns less than Harry.

71. Who is the senior most?
(a) Harry (b) Mac (c) John (d) Lee

72. Which of the following is true?
(a) Nimmy is senior to Mac and earns more than Jack.
(b) Israel is senior to Lee and earns more than Jack
(c) Israel is senior to Nimmy and earns less than Nimmy
(d) Harry is senior to Nimmy and earns less than Nimmy

73. The person who earns the most is:
(a) Harry (b) Mac (c) John (d) Lee

74. A sequence of odd numbers is formed as follows; 1, 3, 3, 3, 5, 5, 5, 5, 5, 7, 7, 7, 7, 7, 7, 7, ……. What is the number at the 200^{th} place?
(a) 39 (b) 29 (c) 27 (d) 31

75. If Z = 53 and HAT = 61 then CAT will be equal to:
(a) 41 (b) 61 (c) 51 (d) 60

76. In a certain code:
'358' means 'buy butter bread'
'367' means 'eat one bread'
'375' means 'one butter bread'
Which digit in that code means 'eat'?
(a) 6 (b) 8 (c) 7 (d) 3

77. What is the value of 'B' in the following multiplication?

$$\begin{array}{r} 1\ A\ 5\ B \\ \times\quad\ 4\ 5 \\ \hline 5\ 2\ 7\ B \\ 4\ 2\ 2\ A\ A \\ \hline 4\ 7\ 4\ 7\ B \end{array}$$

(a) 5 (b) 4 (c) 1 (d) 3

Directions for questions 78 – 79: In the following questions, a statement is given followed by two conclusions, marked I and II. Read the statement and the given conclusions and mark your answer as:

(a) if only conclusion I is true.

(b) if only conclusion II is true.

(c) if both conclusions I and II are true.

(d) if none of the given conclusions is true.

78. **Statement:**
All doctors are intelligent.
Some women are doctors.
Conclusions:
I. All intelligent people are women.
II. Some women are intelligent.

79. **Statement:**
All teachers in my school are courteous.
Bimla is not courteous.
Conclusions:
I. Bimla is not a teacher in my school.
II. Bimla must learn to be courteous.

Directions for questions 80 to 81: Study the following information to answer these questions.

In a certain code "il be pee" means "roses are blue",

"sik hee" means "red flowers" and "pee mit hee" means "flowers are vegetables".

80. How is 'red' written in that code?
(a) hee (b) sik
(c) Cannot be determined (d) None of these

81. How is 'vegetables are red flowers' written in that code?
(a) il sik mit hee (b) mit pee sik hee
(c) Cannot be determined (d) None of these

Directions for questions 82 to 84: Read the following information and answer the given questions.

Seven students P, Q, R, S, T, U and V take a series of tests. No two students get the same marks. V always scores more than P. P always scores more than Q. Each time either R scores the highest and T gets the least, or alternatively S scores the highest and U or Q scores the least.

82. If S is ranked sixth and Q is ranked fifth, which of the following can be true?
(a) V is ranked first or fourth (b) R is ranked second or third
(c) P is ranked second (d) U is ranked third or fourth

83. If R gets the most, V should be ranked not lower than:
(a) Second (b) Third (c) Fourth (d) Fifth

84. If S is ranked fifth, which of the following must be true?
(a) U gets more than V (b) V gets more than S
(c) P gets more than R (d) P gets more than V

85. If 100! is divisible by 6^n, then the maximum value of n is:
(a) 16 (b) 33 (c) 45 (d) 48

86. The average of the squares of seven-consecutive integers is 53. The average of these integers is:
(a) 4 (b) 5 (c) 6 (d) 7

87. At how many points, does the curve $f(x) = x^4 + 2x^2 + 1$ intersect the x-axis?
(a) 0 (b) 1 (c) 2 (d) 4

88. Let $x < 0$, $0 < y < 1$ and $z > 1$, then which of the following must be false?
(a) $xyz > 0$ (b) $xyz < 1$ (c) $x^2yz > 0$ (d) $x^2 - y^2 > 0$

89. If $\log_2 x + \log_4 x + \log_{16} x = \frac{7}{2}$, then the value of x is:
(a) $\frac{1}{2}$ (b) 1 (c) 2 (d) 4

90 If you start from a point, walk 6 km north, 3 km east, 1 km south and $5\sqrt{2}$ km north-east, how for are you from the starting point?
(a) $2\sqrt{41}$ km (b) $(5\sqrt{2} + \sqrt{34})$ km (c) $(5\sqrt{2} + 4)$ km (d) $4\sqrt{41}$ km

91. Complete the series: 5, 20, 24, 6, 2, 8, ?
(a) 12 (b) 4 (c) 1/2 (d) 1

92. In a queue, Sadiq is 14^{th} from the front and Joseph is 17^{th} from the end, while Jane is in between Sadiq and Joseph. If Sadiq be ahead of Joseph and there be 48 persons in the queue, how many persons are there between Sadiq and Jane?
(a) 5 (b) 6 (c) 7 (d) 8

93. I go 10 m to the east, then I turn left and go 5 m, I turn left again and go 10m and then again I turn left and go 10 m. In which direction am I from the starting point?
(a) East (b) West (c) North (d) South

94. If 20 – 2 = 20, 25 – 4 = 50, 30 – 8 = 120 then 24 – 6 =?
(a) 8 (b) 36 (c) 72 (d) 12

95. A couple married in 1980 had two children, one in 1982 and the other in 1984. Their combined ages will equal the years of the marriage in
(a) 1986 (b) 1985 (c) 1987 (d) 1988

PART – C
COMPUTER AWARENESS

96. The binary value of 272.5625 is:
(a) 100010000.1101 (b) 100010000.0011 (c) 10010001.1001 (d) 100010000.1001

97. If m = 7, n = 10 and k = 2, then the value of the expression n – m % 2 * n / k > n % m is:
(a) 5 (b) 1 (c) 4 (d) 6

98. Instructions in a program are interpreted by:
(a) RAM (b) Processor (c) ROM (d) none of the above

99. The input device that is used to read data from a multiple choice question paper is:
(a) OCR (b) MICR (c) Bar Code Reader (d) OMR

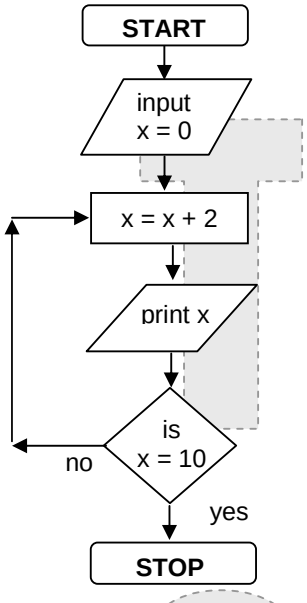
100. The decimal value of $(76.25)_8$ is:
(a) 62.328 (b) 60.826 (c) 50.765 (d) 126.45

101. Which of the following is not a secondary storage device?
(a) RAM (b) Hard disk (c) Floppy disk (d) Magnetic tape

102. Find the odd man out.

(a) Small talk (b) C (c) C++ (d) Java

103. What will be printed by the following flowchart?



(a) Factorial of first 10 numbers (b) First 5 even numbers

(c) First 5 odd numbers (d) Sum of 5 even numbers

104. The decimal value of 1011.101 is:

(a) 11.625 (b) 10.75 (c) 10.625 (d) None of these

105. The truth table shown below represents:

A	B	O/P
0	0	1
0	1	1
1	0	1
1	1	0

(a) AND gate (b) NOR gate (c) NAND gate (d) EX-NOR gate

PART – D
GENERAL ENGLISH

Directions for questions 106 and 107: In each of the following questions, a related pair of words or phrases is followed by four pair of words or phrases. Select the pair that best expresses a relationship similar to that expressed in the original pair.

106. **DEPOSIT : WITHDRAW**

(a) tax : income (b) lend : borrow (c) come : arrive (d) mend : repair

107. **INSINUATE : CHARGE**

(a) hint : quiet (b) say : deny (c) hint : collude (d) hint : affirm

Directions for questions 108 and 109: Each question consists of a word printed in capital letters, followed by four words or phrases. Choose the word or phrase that is most similar in meaning to the word in capital letters:

108. **FRIABLE :**

(a) capable of growing (b) easily crumbled

(c) compliant (d) cookable

109. **CHAGRIN :**

(a) mockery (b) disgust

(c) annoyance (d) unpleasantness

Directions for questions 110 and 111: Each question consists of a word printed in capital letters, followed by four words or phrases. Choose the word or phrase that is most nearly opposite in meaning to the word in capital letters

110. **SEPULCHRAL :**

(a) Healthy (b) Morbid (c) Old (d) Growing

111. **VANQUISH :**

(a) Create (b) Eliminate (c) Regurgitate (d) Topmost

Directions for question 112 to 114: Read the following passage and answer the questions, based on what is stated or implied in the passage.

Cleopatra seduced Mark Antony amid heaps of rose petals, legend says. Ever since, people have perfumed themselves to attract or at least to avoid offending - others Billions of dollars are spent on scents to soothe, revitalise, provoke and excite.

Long dismissed as the basest of the five senses, smell may be the most powerful. Suddenly what Helen Keller called the "fallen angel" of the senses is the object of serious attention. In pinpointing how smell affects our minds and bodies, researchers are discovering it exerts more influence over us than previously thought.

"There is an invisible universe at the tips of our noses", says Alan Hirsch, a Chicago neurologist and founder of the Smell & Taste Treatment and Research Foundation Ltd. This self-described "Magellan of the nasal passages" conducts some of America's most curious and controversial olfactory research.

Among his findings: the scent of green apples may reduce the pain of migraines; barbecue smoke makes spaces seem smaller, mixed floral scents may spur people to buy tennis shoes and finish a maze faster and sniffing banana, green apple or peppermint could help people to lose weight.

Hirsch's coup d'odeur was a study where he exposed 31 men to 46 different scents to determine which excited them sexually. The winner a mix of pumpkin pie and lavender that increased penile blood flow by 40 percent. Musk, the scent of the seventies, garnered only a seven percent increase. The biggest loser: cranberry at two percent.

Scent may snare us well before birth. Research at Philadelphia's Monell Chemical Senses Centre suggests we could be influenced by odours in uterus, through scents absorbed by our mothers. Exposure to odorous compounds in the womb may make us more likely to find those scents attractive later on in life. Garlic lovers, thus might be made than born.

Above our nasal cavity is the area responsible for smell - the olfactory epithelium. No bigger than a postage stamp it contains millions of receptor cells that end in cilia swimming in a layer of mucus. Much about these cells' function is unknown and the process through which we perceive and recognise odours is a mystery.

First, to have an odour, a substance must be volatile enough to give off its molecules. We can't smell marble and glass, for example we can smell blue cheese.

Odour molecules waft into our nostrils on air currents. During normal breathing only a fraction of air reaches the top of the nasal cavity. That's why when we're trying to smell something; we sniff, which sets off mini-tornadoes in the nose, whisking more odour molecules past the receptor cells. These delicate fronds of the brain then fire messages that arrive in other parts of the brain.

Smell is directly wired to the limbic system - one of the oldest parts of the brain in the evolutionary sense, and the part that loves, lusts, rages and remembers. Because of that, a whiff of a scent from the past can evoke a flood of feelings and memories. In neurons and synapses lie the truth of Rudyard Kipling's words: "Smells are surer than sounds or sights to make your heartstrings crack."

112. Alan Hirsch discovered all the following except
    (a) scent of green apples reduces pain of migraines
    (b) sniffing banana helps people lose weight
    (c) floral scents spur people to play tennis
    (d) sniffing peppermint helps people lose weight
113. The size of the olfactory epithelium is as big as a
    (a) flower (b) postage stamp (c) envelope (d) fraud
114. The scent of the seventies was
    (a) cranberry (b) green apples (c) musk (d) banana

Directions for questions 115 and 116: In each of the following questions, a sentence is given with a blank followed by four alternatives.Choose the word or phrase that most correctly completes the sentence.

115. "Mr. Patil was not there yesterday." "Well, _____".
    (a) I wasn't either (b) I was also not (c) I too wasn't (d) neither was I
116. It is time that we seriously _____ about the welfare of our country.
    (a) may start thinking (b) should start thinking
    (c) started thinking (d) are going to start thinking

Directions for questions 117 and 118: Each question consists of certain statements. You have to select the option representing the most logical sequencing of the given statements.

117. A. Flowers have attractive colours. B. Colours of flowers attract insects.
    C. Insects pollinate the flowers D. Flowers have pollen
    E. Colour of flower helps in pollination F. Pollination is done by insects.
    (a) ABC (b) BCE (c) AEF (d) DEF
118. A. P weds Q after divorcing R. B. S weds R before R weds P.
    C. Q weds S after divorcing P. D. Q and R are of the opposite sex.
    E. R and P is a happy couple F. P is a double divorcee.
    (a) ACD (b) BCE (c) ACF (d) ABE

Directions for questions 119 and 120: Each sentence given in the questions has two blank, each blank indicating that something has been omitted. Beneath the sentence are four sets of words. Choose the set of words for each blank that best fits the meaning of the sentence as a whole.

119. If you don't look _____ you will ____ in difficulty.
    (a) carefully, be (b) sharp, get (c) sharp, fall (d) carefully, get
120. Where boasting _____ dignity _____
    (a) stop, begins (b) ends, begins (c) completes, starts (d) finishes, starts

Answer Key

1. (b)	2. (a)	3. (d)	4. (b)	5. (d)	6. (a)	7. (c)	8. (b)
9. (b)	10. (c)	11. (a)	12. (b)	13. (c)	14. (a)	15. (b)	16. (b)
17. (b)	18. (b)	19. (b)	20. (a)	21. (b)	22. (a)	23. (b)	24. (d)
25. (a)	26. (a)	27. (c)	28. (c)	29. (c)	30. (b)	31. (d)	32. (b)
33. (d)	34. (c)	35. (d)	36. (a)	37. (a)	38. (a)	39. (d)	40. (d)
41. (b)	42. (a)	43. (b)	44. (a)	45. (d)	46. (b)	47. (b)	48. (d)
49. (c)	50. (b)	51. (b)	52. (c)	53. (a)	54. (c)	55. (d)	56. (b)
57. (a)	58. (a)	59. (d)	60. (c)	61. (b)	62. (a)	63. (d)	64. (c)
65. (d)	66. (d)	67. (b)	68. (d)	69. (d)	70. (a)	71. (b)	72. (c)
73. (d)	74. (b)	75. (c)	76. (a)	77. (a)	78. (b)	79. (a)	80. (b)
81. (b)	82. (d)	83. (c)	84. (b)	85. (d)	86. (d)	87. (a)	88. (a)
89. (d)	90. (a)	91. (a)	92. (d)	93. (d)	94. (c)	95. (a)	96. (d)
97. (b)	98. (b)	99. (d)	100. (a)	101. (a)	102. (b)	103. (b)	104. (a)
105. (c)	106. (b)	107. (d)	108. (b)	109. (c)	110. (a)	111. (a)	112. (c)
113. (b)	114. (c)	115. (d)	116. (c)	117. (b)	118. (c)	119. (d)	120. (b)