NIMCET-2017 SET-D

Anthropologist have placed together the little they know about the history of left-handedness and right-handedness from indirect evidence. Though early men and women did not leave written records, they did leave tools, bones, and pictures. Stone Age hand axes and hatchets were made from stones that were carefully chipped away to form sharp cutting edges. In some, the pattern of chipping shows that these tools and weapons were made by right handed people, designed to fit comfortably into a right hand. Other Stone Age implements were made by or for left-handers Prehistoric pictures, painted on the walls of caves, provide further clues to the handedness of ancient people. A right-hander finds it easier to draw faces of people and animals facing toward the left, whereas a left-hander finds it easier to draw faces facing toward the right. Both kinds of faces have been found in ancient painting. On the whole, the evidence seems to indicate that prehistoric people were either ambidextrous or about equally likely to be left or right handed. But in the Bronze Age, the picture changed. The tools and weapons found from that period are mostly made for right handed use. The predominance of right handedness among humans today had apparently already been established.

1. Which of the following development occurred around the time of Bronze Age? **NIMCET-2017**
   (a) The establishment of written records
   (b) A change in the styles of cave painting
   (c) A increase in human skill in the handling of tools
   (d) The prevalence of right handedness
2. What is the main idea conveyed through the passage? **NIMCET-2017**
   (a) The purpose of ancient implements
   (b) The significance of prehistoric cave paintings
   (c) The history of right-handedness and left-handedness
   (d) The pattern of chipping ancient tools
3. What is the indirect evidence through which the preferred handedness of the Stone Age people could be understood? **NIMCET-2017**
   (a) Pertified forms of vegetation
   (b) Patterns of stone chippings
   (c) Fozzilized waste material
   (d) fossilized foot prints
4. According to the passage, a person who is right - handed is more likely to draw people and animals that are facing **NIMCET-2017**
   (A) upward (B) downward
   (C) toward the right (D) toward the left
5. What does the word "picture mentioned with reference to Bronze Age mean? **NIMCET-2017**
   (a) Faces to Animals and people
   (b) People's view from inside a cave
   (c) People's tendency to work with either hand
   (d) The kinds of paint used on cave walls
6. Choose the one which is nearest in meaning to the work "TURN UP". **NIMCET-2017**
   (a) Show up (b) Come up
   (c) Land up (d) Crop up
7. The phrase "Ready to believe" means **NIMCET-2017**
   (a) Credulous (b) Creditable
   (c) Credible (d) Incredible
8. Choose the appropriate word from among the choices to fill in the blank in sentence:
   "If you drink too much, it will _____ your judgment" **NIMCET-2017**
   (a) impair (b) impede (c) impose (d) impel
9. Choose the set of words for each blank that best fits the meaning of the following sentence as a whole;
   _____ green and black tea are obtained from the same plant, there are quite a few significant differences _____ them. **NIMCET-2017**
   (a) Since, among (b) However, in
   (c) Though, between (d) Because, across
10. Choose the correct alternative which can be substituted for the given words / sentence:
    A person who travels to a sacred place as an act of religious devotion **NIMCET-2017**
    (a) Hermit (b) Pilgrim (c) Saint (d) Medicant
11. Pick out of the most effective word from the given words to fill in the blanks to make the sentence meaningfully complete:
    Some people _____ themselves into believing that they are indispensable to the organization they work for. **NIMCET-2017**
    (a) keep (b) fool (c) delude (d) denigrate
12. Fill in the blank with appropriate phrase to make the sentence meaningfully complete.
    _____ bad weather, the trip will be postponed to next week. **NIMCET-2017**
    (a) In case (b) In case of
    (c) In case to (d) In case from
13. In the following sentence, choose the most suitable one word for the expression:
    "A book containing summarized information on al branches of knowledge" **NIMCET-2017**
    (a) dictionary (b) Anthology
    (c) encyclopedia (d) directory
14. Pick out the most effective word from the given words to fill in the blanks to make the sentence meaningful completely?
    The man was about to move his bike into the compound of his apartment when a passer by _____ down the motor cycle **NIMCET-2017**
    (a) forced (b) fell (c) turned (d) knocked
15. Which of the following refers to the idiom "under the sun"? **NIMCET-2017**
    (a) Anything and everything
    (b) A large number of things
    (c) A few things
    (d) Something
16. Choose a phrasal verb to replace the explanation in brackets:
    When we arrive at the station, we (descend from) _____ the train **NIMCET-2017**
    (a) get down (b) stand down
    (c) get off (d) stand out
17. Choose the suitable word from the following and fill in the blank:
    The medal was awarded for the student's _____ conduct and courage **NIMCET-2017**
    (a) non receptive (b) exemplary
    (c) unreliable (d) disputable
18. Which of the following is correctly spelt word?

NIMCET-2017

(a) Hiderence (b) Hindrence
(c) Hindarrence (d) Hindrance

19. Which of the following statements is grammatically correct? **NIMCET-2017**
(a) The earth revolves round the Sun
(b) I have not seen him since four years
(c) She met an one-eyed man
(d) One of the books borrowed by the students are famous

20. Choose the set of words from among the alternatives given, which when inserted in the sentence best suit the meaning of the sentence.
The _____ of evidence was on the side of plaintiff since all but one witnesses testify his story was ____
NIMCET-2017
(a) paucity, accurate (b) prosperity, far-fetched
(c) preponderance, correct (d) accuracy, insufficient

21. Consider the equation $(40)_x = (132)_y$ in some bases x and y. Then a possible set of values of x and y are **NIMCET-2017**
(a) 8 and 12 (b) 12 and 8
(c) 6 and 12 (d) 12 and 6

22. The smallest integer that can be represented by an 8-bit number in 2's complement form is **NIMCET-2017**
(a) – 256 (b) – 128 (c) – 127 (d) – 255

23. Which of the following is a functionally complete set of gates?
I. NAND II. NOR **NIMCET-2017**
(a) I but not II (b) II but not I
(c) Neither I nor II (d) Both I and II

24. The total number of binary functions that can be defined using n boolean variables is **NIMCET-2017**
(a) $2^n - 1$ (b) 2^n (c) 2^{n+1} (d) None of these

25. Which one of the following Boolean algebraic rule is correct? **NIMCET-2017**
(a) A.A' = 1 (b) A + AB = A + B
(c) A + A'B = A + B (d) A(A + B) = B

26. The representation of a floating point binary number + 1001.11 in 8-bit fraction and 6-bit exponent format is **NIMCET-2017**
(a) Fraction : 01001110 exponent : 000100
(b) Fraction : 00001001 exponent : 000011
(c) Fraction : 10010000 exponent : 110000
(d) Fraction : 00100100 exponent : 011000

27. Which term is redundant in the expression AB + A'C + BC? **NIMCET-2017**
(a) BC (b) A'C (c) AB (d) None of these

28. Let the memory access time is 10 milliseconds and cache hit ratio 15%. The effective memory access time is **NIMCET-2017**
(a) 2 milliseconds (b) 1.5 milliseconds
(c) 1.85 microseconds (d) 1.85 milliseconds

29. Which of the following is the representation of decimal number (-147) in 2's compliment notation on a 12-bit machine? **NIMCET-2017**
(a) 111101101100 (b) 110001001101
(c) 111101101101 (d) 000001101001

30. The first instruction of bootstrap loader program of an operating system is stored in **NIMCET-2017**
(a) RAM (b) Hard Disk
(c) BIOS (d) None of these

31. A, B, C, D, E and F are six friends from a club. There are two house wives, one lecturer, one architect, one accountant and one lawyer in the group. There are three married couples. The lawyer B is married to D, who is a house wife. No lady is either an architect or an accountant. C, the accountant is married to F, who is a lecturer. If E is not a house wife, what is the profession of E? **NIMCET-2017**
(a) Lawyer (b) Architect
(c) Lecturer (d) Accountant

32. There are five books A, B, C, D and E placed on a table. If A is placed below E, C is placed above D, B is placed below. A and D is placed above E, then which of the following books touches the surface of the table. **NIMCET-2017**
(a) C (b) B (c) A (d) E

33. The following series is obtained by considering representation of decimal 99 in different number systems. The next two numbers in the sequence are
99, 90, 83, 78, _____, _____ **NIMCET-2017**
(a) 71, 69 (b) 69, 57 (c) 67, 59 (d) 69, 63

34. Two persons S and M have made the following statements among themselves.
- S says that I am certainly not over 40 years.
- M says that I am 38 years and you are at least 5 years older than me.
- S says you are at least 39 years.

If all the above statements are wrong, what are the ages of M and S? **NIMCET-2017**
(a) 36 and 40 (b) 36 and 41
(c) 37 and 40 (d) cannot be determined

35. Five children were administered psychological tests to know their intellectual levels. In the report psychologists pointed that child A is less intelligent than child B. The child C is less intelligent than child D. The child B is less intelligent than child C and child A is less intelligent than child E. which child is most intelligent? **NIMCET-2017**
(a) D only (b) E only (c) D or E (d) Neither D nor E

36. From a group of 7 men and 6 women, a committee f 5 persons with more males than females is to be formed. In how many ways can this be done?
NIMCET-2017
(a) 564 (b) 645 (c) 735 (d) 756

37. What is the largest number of positive integers to be picked up randomly so that the sum or difference of any two of the chosen numbers is divisible by 10?
NIMCET-2017
(a) 2 (b) 5 (c) 7 (d) 10

Questions 38 to 40 are based on the following :
- In a family of six persons A, B, C, D, E and F, there are two married couples.
- D is the grandmother of A and mother of B
- C is wife of B and mother of F
- F is granddaughter of E

38. Who among the following is one of the couples?
NIMCET-2017
(a) CD (b) DE (c) EB (d) None of these

39. Which of the following is true? **NIMCET-2017**
(a) A is brother of F (b) A is sister of F
(c) B has two daughters (d) None of these

40. What is C to A? **NIMCET-2017**
(a) Daughter (b) Mother
(c) Father (d) cannot be determined

41. Four passengers in a train find that they form an interesting group. Two of them are lawyers and the other two are doctors. Two of them speak Bengali and the other two speak Hindi and no two of the same profession speak the same language. They also found that two of them are Christians and two are Muslims and no two of the same religion speak the same language. The Hindi speaking doctor is a Christian. Then which of the following statement logically follows? **NIMCET-2017**
(a) The Bengali speaking lawyer in a Muslim.
(b) the Christian lawyer speaks Bengali.
(c) The Bengali speaking doctor is a Christian.
(d) The Bengali speaking doctor is a Muslim.

42. The missing number in the following series 336, 210, 120, 60, _____, 6 is **NIMCET-2017**
(a) 24 (b) 30 (c) 34 (d) 40

43. If the day after the day after tomorrow is three days before Friday, then today is **NIMCET-2017**
(a) Tuesday (b) Thursday
(c) Saturday (d) Monday

44. Find the missing term of the following series:
DCXW, HGTS, …., POLK, TSHG **NIMCET-2017**
(a) KLOP (b) LKOP (c) KLPO (d) LKPO

Questions 45 to 47 are based on the following:

In an amusement park seven friends – Feroz, Gautam, Harish, Javed, Kumar, Laxman and Mohan are deciding who will ride the roller coaster. There is time for only one ride before the park closes.

- If Feroz rides Gautam must ride.
- If Gautam and Harish both ride, Javed cannot ride.
- If Harish and Javed both ride, Laxman cannot ride.
- Jf Javed rides, either Kumar or Mohan must ride.
- Kumar and Laxman, cannot both ride, but one of them must ride.
- Kumar and Mohan cannot both ride.

45. If Feroz and Harish both ride, what is the greatest number of people who can ride? **NIMCET-2017**
(a) 5 (b) 7 (c) 4 (d) 6

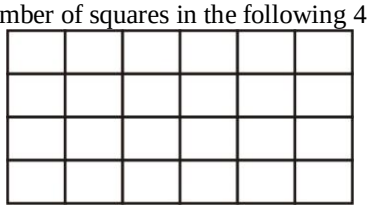
46. If Javed and Mohan both ride, which of the following is true? **NIMCET-2017**
(a) Gautam cannot ride (b) Harish must ride
(c) Feroz cannot ride (d) Laxman must ride

47. Which of the following is an acceptable combination of riders if only three people ride? **NIMCET-2017**
(a) Harish, Javed and Laxman
(b) Harish, Javed and Kumar
(c) Feroz, Gautam and Javed
(d) Gautam, Kumar and Laxman

48. A caterpillar crawls up a pole of 75 inches high, standing from the ground. Each day it crawls up 5 inches and each night it slides down 4 inches. When will it reach the top of the pole? **NIMCET-2017**
(a) At the end of 70 days (b) At the end of 71 days
(c) At the end of 72 days (d) At the end of 73 days

49. A man's investment doubles in every 5 years. If he invested Rs. 5000 in each of the years 1990, 1995, 2000 and 2005, then what was the total amount received by him in 2010? **NIMCET-2017**
(a) Rs. 140000 (b) Rs. 30000
(c) Rs. 70000 (d) Rs. 150000

50. The number of squares in the following 4×6 grid is



NIMCET-2017
(a) 36 (b) 44 (c) 51 (d) 54

51. A cube is made up of 125 one cm. square cubes placed on a table. How many squares are visible only on three sides? **NIMCET-2017**
(a) 4 (b) 8 (c) 12 (d) 16

52. Three thieves rob a bakery of bread, one after the other. Each thief takes half of what is present and half a bread. If 3 breads remains at the end, what is the number of breads that were present initially? **NIMCET-2017**
(a) 24 (b) 31 (c) 37 (d) 41

Questions 53 to 57 are based on the following :

A, B, C, D, E, F, G and H are sitting around a circular table facing the centre. Each one of them has a different profession viz. doctor, engineer, architect, teacher, clerk, shopkeeper, banker and businessman.

- A sits third to right of teacher.
- D sits second to left of G.
- G is not an immediate neighbor of teacher.
- Only one person sits between B, the shopkeeper and the teacher.
- The one who is an architect sits third to right of the shopkeeper.
- H sits between architect and engineer.
- E is not an immediate neighbor of H.
- Engineer sits third to the right of clerk.
- Only one person sits between the businessman and F.

53. Who sits exactly between the architect and businessman? **NIMCET-2017**
(a) C and H (b) Clerk
(c) Banker and Shopkeeper (d) Doctor

54. Who sits immediately right to the businessman? **NIMCET-2017**
(a) Teacher (b) Doctor
(c) Clerk (d) Banker

55. E is neither a businessman nor a doctor. Who among the following is the clerk? **NIMCET-2017**
(a) C (b) D (c) E (d) G

56. Which of the following is true with respect to the given sitting arrangement? **NIMCET-2017**
(a) E is an immediate neighbor of the engineer.
(b) E is an architect.
(c) The clerk is an immediate neighbor of the banker.
(d) The teacher sits between H and the engineer.

57. What is the profession of H? **NIMCET-2017**
(a) Architect (b) shopkeeper
(c) Banker (d) Teacher

Questions 58 to 61 are based on the following :

There are six teachers A, B, C, D, E and F in a school. Each teacher has to teach two subjects, one compulsory and the other optional. D's optional is History, while three others have it as a compulsory subject. E and F have Physics as one of their subjects. F's

compulsory subject is Mathematics, which is an optional subject of both C and E. History and English are A's subjects but in terms of compulsory and optional subjects, they are reverse of D's. Chemistry is an optional subject of one of the teachers. There is only one female teacher, who has English as her compulsory subject.

58. What is C's compulsory subject? **NIMCET-2017**
(a) Physics (b) Chemistry
(c) English (d) History

59. Who among the following the chemistry as a subject? **NIMCET-2017**
(a) A (b) B (c) C (d) D

60. Which of the following groups of teachers has History as the compulsory subject? **NIMCET-2017**
(a) B, C and D (b) C and D
(c) A, B and C (d) A, C and D

61. Disregarding which is compulsory or optional subject, who has the same two subject combination as that of F? **NIMCET-2017**
(a) B (b) E (c) D (d) A

62. John is 20 years older than Steve. In 10 years, Steve's age will be half that of John. What is Steve's age now? **NIMCET-2017**
(a) 2 (b) 8 (c) 10 (d) 20

63. Pointing to a boy, Aruna said to Pushpa, "The mother of his father is the wife of your maternal grand-father". How is Pushpa related to that boy? **NIMCET-2017**
(a) Sister (b) Niece
(c) cousin sister (d) Wife

64. Which of the following pairs of numbers follow the numbers in the series 2, 4, 12, 24, 72, ___, ___? **NIMCET-2017**
(a) 144, 432 (b) 288, 332
(c) 332, 288 (d) 432, 144

65. P, Q, R, S, T and U are sitting in two rows, three in each row facing each other.
- R is second to the left of P.
- Q and T are facing each other.
- S and P are diagonally opposite to each other.
- Q is not a neighbor of R.

Which of the following are sitting in a row? **NIMCET-2017**
(a) P, Q, R (b) P, U, S
(c) U, T, S (d) P, T, R

66. Raghav left his home for office in car. He drove 15 km straight towards North and then turned eastwards and covered 8 km. He then turned to left and covered 1 km. He again turned left and drove for 20 km and reached office. How far and in which direction is his office from the home? **NIMCET-2017**
(a) 20 km North-West (b) 15 km North-West
(c) 30 km North-West (d) 25 km North

67. In an entrance test there are multiple choice questions, with four possible answers to each question of which one is correct. The probability that a student knows the answer to a question is 90%. If the student gets the correct answer to a question, then the probability that he was guessing is **NIMCET-2017**
(a) $\frac{37}{40}$ (b) $\frac{1}{37}$ (c) $\frac{36}{37}$ (d) $\frac{1}{9}$

68. If TRANSFER is coded as RTNAFSRE, then ELEPHANT would be coded as **NIMCET-2017**
(a) LEPEHATN (b) LEPEAHTN
(c) LEEPAHTN (d) LEPEAHNT

69. Which two of the following numbers comes next in the following sequence:
61, 57, 50, 61, 43, 36, 61 ……. **NIMCET-2017**
(a) 29, 61 (b) 29, 20 (c) 29, 22 (d) 31, 61

70. How many minimum number of colours will be required to paint all the sides of a cube without the adjacent sides having the same colours? **NIMCET-2017**
(a) 3 (b) 4 (c) 5 (d) 6

71. In the following sequence, which pair of numbers fill in the blanks?
1, 1, 3, 2, 8, 5, 21, 13, ___, ___ **NIMCET-2017**
(a) 54, 33 (b) 34, 55 (c) 55, 34 (d) 33, 54

72. A and B are independent witnesses in a case. The chance that A speaks truth is x and B speaks truth is y. If A and B agree on certain statement, the probability that the statement is true is **NIMCET-2017**
(a) $\frac{xy}{xy+(1-x)(1-y)}$ (b) $\frac{xy}{(1-x)(1-y)}$
(c) $\frac{(1-x)(1-y)}{xy+(1-y)(1-x)}$ (d) $\frac{x+y}{xy+(1-x)(1-y)}$

73. The harmonic mean of two numbers is 4. Their arithmetic mean A and the geometric mean G satisfy the relation $2A + G^2 = 27$, then the two numbers are **NIMCET-2017**
(a) 4 and 2 (b) 6 and 3
(c) 5 and 7 (d) 4 and 1

74. If in a triangle ABC, the altitudes from the vertices A, B, C on opposite sides are in HP, then sin A, sin B, sin C are in **NIMCET-2017**
(a) HP
(b) Arithmetico-Geometric progression
(c) AP
(d) GP

75. A man is known to speak the truth 2 out of 3 times. He threw a dice cube with 1 to 6 on its faces and reports that it is 1. Then the probability that it is actually 1 is **NIMCET-2017**
(a) 1/2 (b) 1/7 (c) 2/7 (d) 5/7

76. Let A and B be two events such that
$P\left(\overline{A \cup B}\right)=\frac{1}{6}, P(A \cap B)=\frac{1}{4}$, and $P\left(\overline{A}\right)=\frac{1}{4}$,
where $\overline{A}$ stands for complement of event A. Then the events A and B are **NIMCET-2017**
(a) independent but not equally likely
(b) mutually exclusive and independent
(c) equally likely and mutually exclusive
(d) equally likely but not independent

77. The mean and variance of a random variable X having a binomial distribution are 4 and 2 respectively. Then P(X = 1) is **NIMCET-2017**
(a) 1/32 (b) 1/16 (c) 1/8 (d) $\frac{1}{4}$

78. If $\overline{X}$ is the mean of a distribution of X, then under usual notation $\sum_{i=1}^{n} f_i\left(x_i-\overline{x}\right)$ is **NIMCET-2017**
(a) Mean deviation about mean
(b) Standard deviation

(c) 1
(d) 0

79. If E_1 and E_2 are two events associated with a random experiment such that $P(E_2) = 0.35$, $P(E_1 \text{ or } E_2) = 0.85$ and $P(E_1 \text{ and } E_2) = 0.15$, then $P(E_1)$ is **NIMCET-2017**
(a) 0.25 (b) 0.35 (c) 0.65 (d) 0.75

80. Find a matrix X such that 2A + B + X = 0, where $A\begin{bmatrix}-1 & 2\\ 3 & 4\end{bmatrix}$ and $B=\begin{bmatrix}3 & -2\\ 1 & 5\end{bmatrix}$ **NIMCET-2017**
(a) $\begin{bmatrix}1 & 2\\ 7 & 13\end{bmatrix}$ (b) $\begin{bmatrix}-1 & -2\\ -7 & -13\end{bmatrix}$
(c) $\begin{bmatrix}13 & 2\\ 7 & 1\end{bmatrix}$ (d) $\begin{bmatrix}-13 & -2\\ -7 & -1\end{bmatrix}$

81. If $\sin^{-1}\frac{2a}{1+a^2}+\sin^{-1}\frac{2b}{1+b^2}=2\tan^{-1}n$ then **NIMCET-2017**
(a) $n=\frac{(a-b)}{(1+ab)}$ (b) $n=\frac{ab}{(a-a)}$
(c) $n=\frac{(a+b)}{(1-ab)}$ (d) $n=\frac{(1-ab)}{(1+ab)}$

82. The value of A that satisfies the equation a sinA + b cos A = c is equal to **NIMCET-2017**
(a) $\tan^{-1}\left(\frac{a}{b}\right)\pm\cos^{-1}\left(\frac{c}{\sqrt{a^2+b^2}}\right)$
(b) $\tan^{-1}\left(\frac{c}{b}\right)\pm\sin^{-1}\left(\frac{a}{\sqrt{a^2+b^2}}\right)$
(c) $\tan^{-1}\left(\frac{a}{b}\right)\pm\sin^{-1}\left(\frac{c}{\sqrt{a^2+b^2}}\right)$
(d) None of these

83. If $\tan x=\frac{-3}{4}$ and $\frac{3\pi}{2}<x<2\pi$, then the value of $\sin 2x$ is **NIMCET-2017**
(a) $\frac{7}{25}$ (b) $\frac{-7}{25}$ (c) $\frac{24}{25}$ (d) $\frac{-24}{25}$

84. α, β are the roots of an equation $x^2-2x\cos\theta+1=0$, then the equation having α^n and β^n is **NIMCET-2017**
(a) $x^2-(2\cos n\theta)x+1=0$
(b) $2x^2-(2\cos n\theta)x-1=0$
(c) $x^2+(2\cos n\theta)x+1=0$
(d) $x^2+(2\cos n\theta)x-1=0$

85. The equation $(x-a)^3+(x-b)^3+(x-c)^3=0$ has **NIMCET-2017**
(a) All three real roots
(b) One real and two imaginary roots
(c) Three real roots, namely x = a, y = b, z = c
(d) None of these

86. Three positive numbers whose sum is 21 are in arithmetic progression. If 2, 2, 14 are added to them respectively then resulting numbers are in geometric progression. Then which of the following is not among the three numbers? **NIMCET-2017**
(a) 25 (b) 13 (c) 1 (d) 7

87. In a triangle ABC, set $\angle C=\frac{\pi}{2}$. If r is the inradius and R is circumradius of the triangle ABC, then 2(r + R) equals **NIMCET-2017**
(a) a + c (b) a+b+c (c) a + b (d) b + c

88. Find the principal value of $\cot^{-1}\left(-\sqrt{3}\right)$ **NIMCET-2017**
(a) $\pi/2$ (b) $\pi/6$ (c) $7\pi/6$ (d) $5\pi/6$

89. If $\cos\theta=\frac{4}{5}$ and $\cos\phi=\frac{12}{13}$, with θ and ϕ both in the fourth quadrant, the value of $\cos(\theta+\phi)$ is **NIMCET-2017**
(a) $-\frac{16}{25}$ (b) $-\frac{33}{65}$ (c) $\frac{33}{65}$ (d) $\frac{16}{65}$

90. The value of sin36° is **NIMCET-2017**
(a) $\frac{\sqrt{10+2\sqrt{5}}}{4}$ (b) $\frac{\sqrt{10-2\sqrt{5}}}{4}$
(c) $\frac{\left(\sqrt{5}+1\right)}{4}$ (d) $\frac{\left(\sqrt{5}-1\right)}{4}$

91. Express (cos 5x – cos 7x) as a product of sines or cosines or sines and cosines. **NIMCET-2017**
(a) 2 cos 4x cos x (b) 2 sin 4x sin x
(c) 2 sin6x sin x (d) 2 cos 6x cos x

92. If non zero numbers a, b, c are in A.P., then the straight line $\frac{x}{a}+\frac{y}{b}+\frac{1}{c}=0$ always passes through a fixed point, then the point is **NIMCET-2017**
(a) (1, -2) (b) $\left(1,-\frac{1}{2}\right)$ (c) (-1, 2) (d) (-1, -2)

93. If the lines x + (a – 1)y + 1 = 0 and $2x + a^2y – 1 = 0$ are perpendicular, then the condition satisfied by a is **NIMCET-2017**
(a) |a| = 2 (b) 0 < a < 1
(c) – 1 < a < 0 (d) a = - 1

94. If $a\hat{i}+\hat{j}+\hat{k},\hat{i}+\hat{j}+c\hat{k}\,(a\neq b\neq c\neq 1)$ are co-planar, then the value of $\frac{1}{1-a}+\frac{1}{1-b}+\frac{1}{1-c}$ is **NIMCET-2017**
(a) -1 (b) -1/2 (c) 1/2 (d) 1

95. If $x^2 + 3xy + 2y^2 – x – 4y – 6 = 0$ represents a pair of straight lines, their point of intersection is **NIMCET-2017**
(a) (0, 0) (b) (8, 5) (c) (8, - 5) (d) (-2, 5)

96. The equation of the tangent line to the curve y = 2x sin x at the point $\left(\frac{\pi}{2},\pi\right)$ is **NIMCET-2017**
(a) $y = 2x + 2\pi$ (b) y = 2x
(c) $y = - 2x + 2\pi$ (d) y = - 2x

97. If the graph of $y = (x – 2)^2 – 3$ is shifted by 5 units up along y-axis and 2 units to the right along the x-axis, then the equation of the resultant graph is **NIMCET-2017**
(a) $y = x^2 + 2$ (b) $y = (x – 2)^2 + 5$
(c) $y = (x + 2)^2 + 2$ (d) $y = (x – 4)^2 + 2$

98. The direction cosines of the vector $\vec{a}=\left(-2\hat{i}+\hat{j}-5k\right)$ are **NIMCET-2017**

(a) -2, 1, - 5 (b) $\frac{1}{3},\frac{-1}{6},\frac{-5}{6}$

(c) $\frac{2}{\sqrt{30}},\frac{1}{\sqrt{30}},\frac{5}{\sqrt{30}}$ (d) $\frac{-2}{\sqrt{30}},\frac{1}{\sqrt{30}},\frac{-5}{\sqrt{30}}$

99. The equation of the hyperbola with centre at the origin, length of the transverse axis is 6 and one focus at (0, 4) is **NIMCET-2017**

(a) $\frac{y^2}{9}+\frac{x^2}{7}=1$ (b) $\frac{y^2}{9}-\frac{x^2}{7}=1$

(c) $\frac{y^2}{7}+\frac{x^2}{9}=1$ (d) $\frac{y^2}{7}-\frac{x^2}{9}=1$

100. If $\vec{a},\vec{b},\vec{c}$ are vectors such that $\vec{a}+\vec{b}+\vec{c}=0$ and $|\vec{a}|=7,|\vec{b}|=5,|\vec{c}|=3,$ then the angle between the vectors $\vec{b}$ and $\vec{c}$ is **NIMCET-2017**

(a) 60° (b) 30° (c) 45° (d) 90°

101. Let A and B be two sets containing four and two elements respectively. The number of subsets of the set A × B, each having at least three elements is **NIMCET-2017**

(a) 270 (b) 239 (c) 219 (d) 256

102. Let $\vec{a},\vec{b}$ and $\vec{c}$ be three vectors having magnitudes 1, 1 and 2 respectively. If $\vec{a}\times(\vec{a}\times\vec{c})-\vec{b}=0$ then the acute angle between $\vec{a}$ and $\vec{c}$ is **NIMCET-2017**

(a) π/4 (b) π/6 (c) π/3 (d) None of these

103. Let $\vec{a},\vec{b},\vec{c}$ be vectors such that $|\vec{a}|=2,|\vec{b}|=3,|\vec{c}|=5$ and $\vec{a}+\vec{b}+\vec{c}=\vec{0}.$ The value of $\vec{a}.\vec{b}+\vec{b}.\vec{c}+\vec{c}.\vec{a}$ is **NIMCET-2017**

(a) 38 (b) – 38 (c) 19 (d) – 19

104. If $\vec{a}=(\hat{i}+2j-3k)$ and $\vec{b}=(3\hat{i}-j+2k)$ then the angle between $(\vec{a}+\vec{b})$ and $(\vec{a}-\vec{b})$ is **NIMCET-2017**

(a) π/3 (b) π/4 (c) π/2 (d) 2π/3

105. The number of elements in the power set P(S) of the set S = {2, {1, 4}} is **NIMCET-2017**

(a) 2 (b) 4 (c) 8 (d) 10

106. If $(1-x+x^2)^n=a_0+a_1x+a_2x^2+...+a_{2n}x^{2n},$ then $a_0+a_2+a_4+...+a_{2n}$ is **NIMCET-2017**

(a) $\frac{3^n+1}{2}$ (b) $\frac{3^n-1}{2}$ (c) $\frac{1-3^n}{2}$ (d) $3^n+\frac{1}{2}$

107. m distinct animals of a circus have to be placed in m cages, one in each cage. There are n small cages and p small animals (n < p < m). The large animals are so large that they do not fit in small cage. However, small animals can be put in any cage. The number of ways of putting the animals into cages is **NIMCET-2017**

(a) $\{^{(m-n)}P_p\}\{^{(m-n)}P_{(m-p)}\}$ (b) $^{(m-n)}C_p$

(c) $\{^{(m-n)}C_p\}\{^{(m-n)}C_{(m-p)}\}$ (d) $^{(m-n)}P_p$

108. Let f(a) be a polynomial of degree four, having extreme values at x = 1 and x = 2. If $\lim_{x\to0}\left[1+\frac{f(x)}{x^2}\right]=3,$ then f(2) is **NIMCET-2017**

(a) 0 (b) 4 (c) – 8 (d) – 4

109. The maximum value of $4\sin^2x+3\cos^2x+\sin\frac{x}{2}+\cos\frac{x}{2}$ is **NIMCET-2017**

(a) 4 (b) $3+\sqrt{2}$ (c) 9 (d) $4+\sqrt{2}$

110. The solution of $(e^x+1)\,y\,dy=(y+1)e^x dx$ is **NIMCET-2017**

(a) $e^y=c(e^x+1)(y+1)$ (b) $e^y=e^x+y+1$

(c) $y=(e^x+1)(y+1)$ (d) None of these

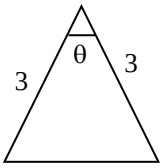
111. The slope of the function

$$f(x)=\begin{cases}x^2\sin\left(\frac{1}{x}\right) & ,x\neq0\\ 0 & ,x=0\end{cases}$$

NIMCET-2017

(a) 1 (b) 0 (c) – 1 (d) None of these

112. What is the largest area of an isosceles triangle with two edges of length 3?



NIMCET-2017

(a) 3 (b) 3/2 (c) 9 (d) 9/2

113. The value of $\int_0^{\pi}x^3\sin x\,dx$ is **NIMCET-2017**

(a) π^3 - 6π (b) -π^3 - 6π

(c) -π^3 + 6π (d) π^3 + 6π

114. Evaluate $\lim_{x\to0}\frac{x\tan x}{(1-\cos x)}$ **NIMCET-2017**

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

115. Evaluate $\int_0^1 x(1-x)^n\,dx$ **NIMCET-2017**

(a) $\frac{-1}{(n+1)(n+2)}$ (b) $\frac{1}{(n+1)(n+2)}$

(c) (n + 1) (n + 2) (d) (n – 1) (n – 2)

116. The critical point and nature for the function f(x, y) = x^2 – 2x + $2y^2$ + 4y – 2 is **NIMCET-2017**

(a) (1, 1), Maximum (b) (1, -1), Maximum

(c) (1, 1), Minimum (d) (1, -1), Minimum

117. If $y=\cos^2x^2,$ find $\frac{dy}{dx}$ **NIMCET-2017**

(a) $4x^2\sin x^2\cos x^2$ (b) $-4x\cos x^2\sin x^2$

(c) $2x\sin x^2\cos x^2$ (d) $-2x\cos x^2\sin x^2$

118. The derivative of $(x^3+e^x+3^x+\cot x)$ with respect to x is **NIMCET-2017**

(a) $3x^2+e^x+3^x(\log3)-\cos ec^2x$

(b) $3x^2+e^x+3^x(\log3)+\cos ec^2x$

(c) $3x^2+e^x+3^x(\log3)-\sec^2x$

(d) $3x^2+e^x+3^x(\log3)+\sec^2x$

119. The solution of the differential equation $\frac{dy}{dx}=e^{x+y}+x^2e^y$ is **NIMCET-2017**

(a) $e^{x-y}+\frac{x^3}{3}+c$ (b) $e^{x}+e^{-y}+\frac{x^3}{3}=c$

(c) $e^{x}-e^{-y}+\frac{x^3}{3}=c$ (d) None of these

120. Difference {- log (log x), x > 1} with respect to x **NIMCET-2017**

(a) 1/(x log x) (b) 1/log x

(c) 1/x (d) x log x

ANSWERS NIMCET-2017 SET-D

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

NIMCET-2017 SOLUTIONS

1. **Ans. (d)**
2. **Ans. (c)**
3. **Ans. (b)**
4. **Ans. (d)**
5. **Ans. (c)**
6. **Ans. (a)**
7. **Ans. (a)**
8. **Ans. (a)**
9. **Ans. (c)**
10. **Ans. (d)**
11. **Ans. (c)**
12. **Ans. (b)**
13. **Ans. (c)**
14. **Ans. (d)**
15. **Ans. (a)**
16. **Ans. (c)**
17. **Ans. (b)**
18. **Ans. (d)**
19. **Ans. (d)**
20. **Ans. (c)**
21. **Ans. (d)**
22. **Ans. (b)**
23. **Ans. (d)**
24. **Ans. (d)**
25. **Ans. (c)**
26. **Ans. (a)**
27. **Ans. (d)**
28. **Ans. (b)**
29. **Ans. (c)**
30. **Ans. (a)**

31. **Ans. (a)** According to given information :

	Housewife	Lecturer	Accountant	Architect	Lawyer
A	ý	ý	ý	ý	þ
B	þ	ý	ý	ý	ý
C	ý	ý	þ	ý	ý
D	þ	ý	ý	ý	ý
E	ý	ý	ý	þ	ý
F	ý	þ	ý	ý	ý

E is Architest. Hence B

32. **Ans. (b)** According to the given condition only following arrangement is possible

C
D
E

A
B

So B lies at the bottom. Hence B.

33. **Ans. (a)** In the series the decimal 99 is written in different bases as:
$(99)_{10} = 9*10+9 = 99$ $(90)_{11} = 9*11+0 = 99$
$(83)_{12} = 8*12+ 3 = 99$ $(78)_{13} = 7*13+ 8 = 99$
$(71)_{14} = 7*14+1 = 99$ $(69)_{15} = 6*15+9 = 99$
So the missing number are 71 and 69. Hence A

34. **Ans. (d)** **Given Condition are:**
i) $S \leq 40$
ii) $M = 38$ and $S \geq 43$ because difference in their ages is
iii) $M \geq 39$. And if all the condition are wrong Then:
i) $S > 40$
ii) $M \neq 38$ and $S < 43$
iii) $M < 39$.
Which implies that that value for S & M are (38, 40), (37,41) respectively.
Hence Age of both cannot be determined.

35. **Ans. (c)** Given That A<B, C<D, B<C, A<E. Hence A<B<C<D and A<E. So the most intelligent person is either D or E. Hence C.

36. **Ans. (d)** From a Group of 7 men and 6 women, five persons are to be selected with at least 3 men. So we can have (5 men) or (4 men and 1 woman) or (3 men and 2 woman)
$= ({}^5C_5)+({}^5C4 * {}^6C1)+({}^5C3 * {}^6C2)$.
$=[7\times6/2\times1]+[(7\times6\times5/3\times2\times1)\times6]+[(7\times6\times5/3\times2\times1)\times(6\times5/2\times1)]$.
$=21+210+525=756$. Hence D.

Question 38-40

According to question E (grandfather) and D (grandmother) has B as their Son. B and C are Couple and has two children F (daughter) and A.

38. **Ans. (b)** DE is the couple. Hence B

39. **Ans. (d)** None of these as gender of A is not known.

40. **Ans. (b)** Mother. Hence B

41. **Ans. (b)** According to question:

Lawyer	Doctor	Doctor/ lawyer	Doctor/ lawyer
Christan	Christian	Muslim	Muslim
Bengali	Hindi	Hindi/Bengali	Hindi/Bengali

Hence B Lawyer Christian Bengali.

42. **Ans. (a)** Given Series is as : 7^3-7, $6^3 - 6$, $5^3 - 5$, 4^3 - 4, 3^3 -3, 2^3 -2. So missing number is 24. Hence A

43. **Ans. (c)** Three days before Friday is Tuesday. Day after Day after tomorrow is 3 days before Tuesday, which is Saturday. Hence C.

44. **Ans. (d)** According to given series:

D +4	H +4	L +4	P +4
C +4	G +4	K +4	O +4
X -4	T-4	P -4	L -4
W -4	S -4	O -4	K -4

So LKPO is the missing number. Hence D

45. **Ans. (a)** Feroz, Gautam, harish, Mohan, Laxman total 5 member. Hence A

46. **Ans. (d)** If Javed and Mohan both rides, then Kumar must not rides (as per condition 4). (From condition 5) One out of Kumar and Laxman must rides. So lakman must ride is true. Hence D

47. **Ans. (b)** If only three member rides than members are Harish, javed, Kumar. Hence B

48. **Ans. (b)** Caterpillar jumps up 5 inches in the morning and slip 4 inches down in the night. So he finally moves up 1 inch in a day. So in 70 days he will moves up 70 inches. On the 71st day he will jump up 5 inches and reach the top. Hence B

49. **Ans. (d)** As investment double in 5 years.

(1990) 5000	(1995) 10000	(2000) 20000	(2005) 40000	(2010) 80000
	(1995) 5000	(2000) 10000	(2005) 20000	(2010) 40000
		(2000) 5000	(2005) 10000	(2010) 20000
			(2005) 5000	(2010) 10000
			Total	150000

50. **Ans. (c)** Total number of squares are 50
Number of 1*1 squares are 24
Number of 2*2 squares are 15
Number of 3*3 squares are 8
Number of 4*4 squares are 3.

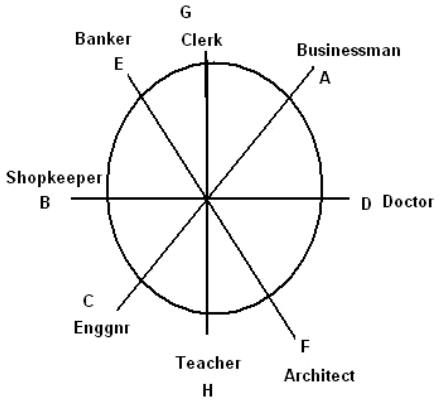
51. **Ans. (x)**

52. **Ans. (b)** Let the Number of breads be X

	Total breads	STOLEN	LEFT
First thief	X	X/2 + 1/2 = (X+1)/2	(X-1)/2
Second thief	(X-1)/2	(X-1)/4 +1/2 = (X+1)/4	(X-3)/4
Third Thief	(X-3)/4	(X-3)/8 +1/2 = (X+1)/8	(X-7)/8

Now (X-7)/8 = 3(given). So X = 31. Hence B

Question 53- 57



53. **Ans. (d)** Doctor sits between Architect and businessman. Hence D

54. **Ans. (c)** Clerk sit immediately right of businessman. Hence C

55. **Ans. (d)** G is the clerk. Hence D

56. **Ans. (c)** Clerk is the neighbor of Banker. Hence C

57. **Ans. (d)** Profession of H is teacher. Hence D

Question 58-61

Teachers	Complusory	Optional	Gender
A	History	English	Male
B	History	Chemistry	Male
C	History	Math	Male
D	English	History	Female
E	Physics	Math	Male
F	Math	Physics	Male

58. **Ans. (d)** HISTORY. HENCE D

59. **Ans. (b)** TEACHER B. HENCE OPTION B.

60. **Ans. (c)** A, B AND C. HENCE OPTION C

61. **Ans. (b)** TEACHER E. HENCE OPTION B

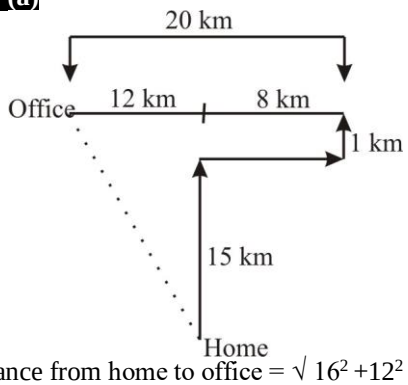
62. **Ans. ()** Let steve's age =x, then John age = x+20. After 10 years Steve age = x+10, John age = x+30. According to question: ½ (x+30) = x+10. So, X = 10. Steve Age now is 10 years. Hence C.

63. **Ans. (c)** Clearly pushpa is cousion sister of the boy. Hence C

64. **Ans. (a)** Given series is as 2*2 =4, 4*3=12. Again 12*2=24, 24*3= 72 Now 72*2 = 144 and 144*3 = 432. So missing numbers are 144 and 432. Hence A.

65. **Ans. (d)** From Given statement the arrangement is:
S Q U
R T P. So PTR are sitting in one row. Hence D

66. **Ans. (a)**



Distance from home to office = $\sqrt{16^2+12^2}$ = $\sqrt{256+144} = \sqrt{400} = 20$ north west. Hence

67. **Ans. (b)** P(A) = P(HC knows the answer) $= \frac{90}{100}$

P(B) = p(HC gives answer) $= \frac{10}{100}$

P(G) = P(correct) $= \frac{1}{4} \Rightarrow$ P(HC answer correctly)

= P(A ∩ E) + P (B ∩ E)

= P(A) . P(E) + P(B) . P(E)

$= \frac{90}{100}.\frac{1}{4}+\frac{10}{100}.\frac{1}{4}$

⇒ Required probability

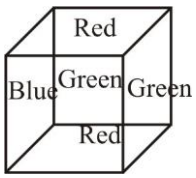
$= \frac{\frac{10}{100}.\frac{1}{4}}{\frac{90}{100}.1+\frac{10}{100}.\frac{1}{4}} = \frac{1}{37}$

68. **Ans. (b)** Position of every 2 consecutive alphabets are interchanged. So ELEPHANT will be coded as LEPEAHTN. Hence B

69. **Ans. (c)** In the series after 61 the difference between the two number is of 7. So the missing number are 29 and 22 respectively. Hence C

70. **Ans. (a)** By painting opposite sides with the same colour, we can paint all the sides without the adjacent sides having same colour. So we need 3 colour. Hence A

70. **Ans. ()**



Man – Four colour needed.

71. **Ans. (c)**

72. **Ans. (a)** P (A speaks truth) = x
P (B speaks truth) = y

$P(\overline{A}) = 1-x$

$P(\overline{B}) = 1-y$

P(A, B agree) $= P(AB)+P(\overline{A}\overline{B})$

$= P(A).P(B)+P(\overline{A}).P(\overline{B})$

$= xy+(1-x)(1-y)$

P(statement is true) = P(AB) = xy

⇒ Required probability $= \frac{xy}{xy+(1-x)(1-y)}$

73. **Ans. (b)** Here harmonic mean = 4
Arithmetic mean = A
Geometric mean = G

From Choices (a) ⇒ A.M $= \frac{4+2}{2} = 3$

G $= \sqrt{8}$

⇒$2A + G^2 = 6 + 8 = 14 \neq 27$

(b) $\Rightarrow A = \frac{6+3}{2} = \frac{9}{2}$

$G = \sqrt{18}$

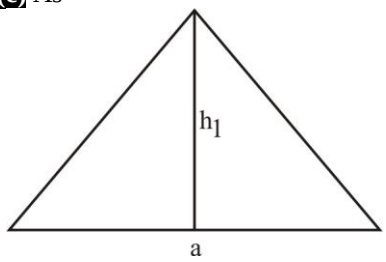
$\Rightarrow 2A + G^2 = 2.\frac{9}{2} + 18 = 27.$

$\Rightarrow$ satisfy

Now by $G^2 = AH \Rightarrow 18 = \frac{9}{2}.H \Rightarrow H = 4$

$\Rightarrow$ Ans. (b)

74. **Ans. (c)** As



$\Delta = \frac{1}{2}ah_1 = \frac{1}{2}bh_2 = \frac{1}{2}ch_3$

$\Rightarrow h_1 = \frac{2\Delta}{a}, h_2 = \frac{2\Delta}{b}, h_3 = \frac{2\Delta}{c}$

Now by sine laws

a = ksinA, b = ksin B, c = k sin C

$\Rightarrow h_1 = \frac{2\Delta}{k\sin A}, h_2 = \frac{2\Delta}{k\sin B}, h_3 = \frac{2\Delta}{k\sin C}$

as h_1, h_2, h_3 are in HP

$\Rightarrow$ sinA, sin B, sinC are in A.P.

75. **Ans. (c)** P (speaks truth) = P(T) $= \frac{2}{3}$

Two cases can be

Man speaks truth and 1 occur and man speak lie and 1 does not appear $= \frac{2}{3}.\frac{1}{6} + \frac{1}{3}.\frac{5}{6} = \frac{7}{18}$

$\Rightarrow$ Required probability $= \frac{2/18}{7/18} = \frac{2}{7}$

76. **Ans. (a)** $P\left(\overline{A \cup B}\right) = \frac{1}{6} \Rightarrow P(A \cup B) = 1 - \frac{1}{6} = \frac{5}{6}$

$P(A \cap B) = \frac{1}{4}$, $P\left(\overline{A}\right) = \frac{1}{4} \Rightarrow P(A) = \frac{3}{4}$

By $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$\frac{5}{6} = \frac{3}{4} + P(B) - \frac{1}{4}$

$\Rightarrow P(B) = \frac{5}{6} - \frac{1}{2} = \frac{2}{6} = \frac{1}{3}$

Now $P(A).P(B) = \frac{3}{4}.\frac{1}{3} = \frac{1}{4}$

Also $P(A \cap B) = \frac{1}{4}$

But $P(A) \neq P(B)$

$\Rightarrow$ A and B are independent but not equally likely

77. **Ans. (a)** Here mean

m = np = 4

Variance = npq = 2 $\Rightarrow$ 4q = 2

$\Rightarrow q = \frac{1}{2} \Rightarrow p = 1 - \frac{1}{2} = \frac{1}{2}$

$\Rightarrow$ by np = 4 $\Rightarrow n.\frac{1}{2} = 4 \Rightarrow n = 8$

$\Rightarrow P(X = 1) = {}^nC_1 p.q^{n-1} = {}^8C_1.\frac{1}{2}.\left(\frac{1}{2}\right)^7$

$= 8.\frac{1}{2^8} = \frac{1}{2^5} = \frac{1}{32}$

78. **Ans. (d)** As $\sum_{i=1}^{n} f_i\left(x_i - \bar{x}\right)$

$= \sum_{i=1}^{n} f_i x_i - \sum_{i=1}^{n} f_i \bar{x}$

$= n\bar{x} - n\bar{x} = 0$

79. **Ans. (c)** $P(E_2) = .35$, $P(E_1 \cup E_2) = .85$

$P(E_1 \cap E_2) = .15$, $P(E_1) = ?$

Now $P(E_1 \cup E_2) = P(E_1) + P(E_2) - P(E_1 \cap E_2)$

$.85 = P(E_1) + .35 - .15$

$.85 = P(E_1) + .20 \Rightarrow P(E_1) = .65$

80. **Ans. (b)** As 2A + B + X = 0

$\Rightarrow$ X = - (2A + B)

$= -\left(2\begin{bmatrix} -1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 3 & -2 \\ 1 & 5 \end{bmatrix}\right)$

$= -\begin{bmatrix} 1 & 2 \\ 7 & 13 \end{bmatrix} = \begin{bmatrix} -1 & -2 \\ -7 & -13 \end{bmatrix}$

81. **Ans. (c)** $\sin^{-1}\left(\frac{2a}{1+a^2}\right) + \sin^{-1}\left(\frac{2b}{1+b^2}\right) = 2\tan^{-1} n$

$\Rightarrow 2\tan^{-1} a + 2\tan^{-1} b = 2\tan^{-1} n$

$\Rightarrow \tan^{-1} a + \tan^{-1} b = \tan^{-1} n$

$\Rightarrow \tan^{-1}\left(\frac{a+b}{1-ab}\right) = \tan^{-1} n$

$\Rightarrow n = \frac{a+b}{1-ab}$

82. **Ans. (a)** a sinA + b cosA = c …(i)

Let's take a = k sin θ

b = k cos θ $\Rightarrow \tan\theta = \frac{a}{b}$

$\Rightarrow \theta = \tan^{-1}\left(\frac{a}{b}\right)$

$\Rightarrow k^2 = a^2 + b^2 \Rightarrow k = \sqrt{a^2 - b^2}$

(1) becomes

k sin θ sin A + k cosθ cos A = c

$\Rightarrow \cos(A - \theta) = \frac{c}{k} = \pm\frac{c}{\sqrt{a^2 + b^2}}$

$\Rightarrow A - \theta = \cos^{-1}\left(\pm\frac{c}{\sqrt{a^2 + b^2}}\right)$

$\Rightarrow A = \theta \pm \cos^{-1}\frac{c}{\sqrt{a^2 + b^2}}$

$= \tan^{-1}\frac{a}{b} \pm \cos^{-1}\frac{c}{\sqrt{a^2+b^2}}$

83. **Ans. (d)** If $\tan x = \frac{-3}{4}$ and $\frac{3\pi}{2} < x < 2\pi$

$\Rightarrow \sin 2x = \frac{2\tan x}{1+\tan^2 x} = \frac{2(-3/4)}{1+(-3/4)^2} = \frac{-3/2}{1+\frac{9}{16}}$

$\Rightarrow \sin 2x = \frac{-3/2}{\frac{25}{16}} = \frac{-24}{25}$

Now $\frac{3\pi}{2} < x < 2\pi$

$\Rightarrow 3\pi < 2x < 4\pi \Rightarrow$ III and IV ___

$\Rightarrow \sin 2x = -ve = \frac{-24}{25}$

84. **Ans. (a)** As Q.E. $x^2 - 2x\cos\theta + 1 = 0$

$\alpha, \beta = \frac{+2\cos\theta \pm \sqrt{4\cos^2\theta - 4}}{2}$

$= \cos\theta \pm i\sin\theta = \text{cis}(\pm\theta)$.

$\alpha^n, \beta^n = \text{cis}(\pm n\theta) = \cos(n\theta) \pm i\sin(n\theta)$

$\Rightarrow S = \alpha^n + \beta^n = 2\cos(n\theta)$

$P = \alpha^n . \beta^n = \text{cis}(n\theta) . \text{cis}(-n\theta)$

$= \text{cis}(n\theta - n\theta) = \text{cis}\ 0 = 1$

$\Rightarrow$ Q.E is $x^2 - Sx + P = 0$

$\Rightarrow x^2 - 2\cos(n\theta)x + 1 = 0$

85. **Ans. (b)** As $f(x) = (x-a)^3 + (x-b)^3 + (x-c)^3$

$\Rightarrow f' = 3[(x-a)^2 + (x-b)^2 + (x-c)^2] > 0$

$\Rightarrow f(x)$ is strictly increasing fn.

Also take $x_1 < a, b, c$

$x_2 > a, b, c$

we have $f(x_1) < 0, f(x_2) > 0$

$\Rightarrow f(x_1)\, f(x_2) < 0$

$\Rightarrow$ Atleast one real root lie in (x_1, x_2)

But f(x) is S.I.

$\Rightarrow$ only one real root others are imaginary.

86. **Ans. (a)** Let three nos. be a – d, a, a + d

$\Rightarrow$ Their sum = $3a = 21 \Rightarrow a = 7$

So nos. are

7 – d, 7, 7 + d

Now add 2, 2, 14 we have 9 – d, 9, 21 + d are in G.P

$\Rightarrow 9^2 = (9-d)(21+d)$

$81 = 189 - 12d - d^2$

$\Rightarrow d^2 + 12d - 108 = 0$

$\Rightarrow (d+18)(d-6) = 0$

$\Rightarrow d = -18, 6$

As nos. are +ve $\Rightarrow d = 6$

$\Rightarrow$ Nos. are a – d, a, a + d

7 – 6, 7, 7 + 6

1, 7, 13

$\Rightarrow$ (a) choice not there.

87. **Ans. (c)**

Here $\angle C = \frac{\pi}{2}$

$r = (s-c)\tan\frac{C}{2}$

$= (s-c)\tan\frac{\pi}{4} = S - C$

$= \frac{a+b+c}{2} - c = \frac{a+b-c}{2}$

$R = \frac{c}{2\sin C} = \frac{c}{2\sin\frac{\pi}{2}} = \frac{c}{2}$

$\Rightarrow r + R = \frac{a+b-c}{2} + \frac{c}{2} = \frac{a+b}{2}$

$\Rightarrow 2(r + R) = a + b$

88. **Ans. (d)** Principal value of $\cot^{-1}(-\sqrt{3})$

As $\cot^{-1}|-\sqrt{3}| = \theta = \frac{\pi}{6}$

$\Rightarrow$ principal value of $\cot^{-1}(-\sqrt{3}) = \pi - \theta = \pi - \frac{\pi}{6}$

$= \frac{5\pi}{6}$

89. **Ans. (c)** Here $\cos\theta = \frac{4}{5} \Rightarrow \sin\theta = \pm\sqrt{1-\frac{16}{25}}$

$= \sqrt{\frac{9}{25}} = \pm\frac{3}{5}$

θ in IV quadrant

$\sin\theta < 0 \Rightarrow \sin\theta = -\frac{3}{5}$

and $\cos\phi = \frac{12}{13} \Rightarrow \sin\phi = \sqrt{1-\frac{144}{169}} = \pm\frac{5}{3}$

ϕ in IV quadrant

$\Rightarrow \sin\phi < 0 \Rightarrow \sin\phi = \frac{-5}{13}$

Now $\cos(\theta + \phi)$

$= \cos\theta\ \cos\phi - \sin\theta\ \sin\ \phi$

$= \frac{12}{13}.\frac{4}{5} - \left(\frac{-3}{5}\right)\left(-\frac{5}{13}\right)$

$= \frac{48}{65} - \frac{15}{65} = \frac{33}{65}$

90. **Ans. (b)** As $\sin 36° = \frac{\sqrt{10-2\sqrt{5}}}{4}$

91. **Ans. (c)** $\cos 5x - \cos 7x$

$= 2\sin\left(\frac{5x+7x}{2}\right)\sin\left(\frac{7x-5x}{2}\right)$

$= 2\sin 6x \sin x.$

92. **Ans. (a)** As a, b, c $\Rightarrow$ A.P. $\Rightarrow \frac{1}{a}, \frac{1}{b}, \frac{1}{c} \Rightarrow$ H.P.

$\Rightarrow \frac{2}{b} = \frac{1}{a} + \frac{1}{c}$

$\Rightarrow \frac{1}{a} + \frac{1}{c} - \frac{2}{b} = 0 \Rightarrow \frac{1}{a} - \frac{2}{b} + \frac{1}{c} = 0$

$\Rightarrow \frac{x}{a}+\frac{y}{b}+\frac{1}{c}=0 \Rightarrow$ passes through (1, -2)

93. **Ans. (d)** Here slope of lines are

$m_1=-\frac{1}{a-1}$

$m_2=-\frac{2}{a^2}$

Now they are perpendicular.

$\Rightarrow m_1, m_2 = -1$

$\Rightarrow\left(\frac{-1}{a-1}\right)\left(-\frac{2}{a^2}\right)=-1$

$-a^2(a-1)=2$

$-a^3+a^2-2=0$

$a=-1 \Rightarrow$ satisfies

94. **Ans. (d)** As $ai + j + k = 0$

$i + bj + k = 0$

$I + j + ck = 0$

Are coplanar $\Rightarrow \begin{vmatrix} a & 1 & 1 \\ 1 & b & 1 \\ 1 & 1 & c \end{vmatrix}=0$

$\Rightarrow$ Apply $C_2 \to C_2 - C_1$, $C_3 \to C_3 - C_1$

$\Rightarrow \begin{vmatrix} a & 1-a & 1-a \\ 1 & b-1 & 0 \\ 1 & 0 & c-1 \end{vmatrix}=0$

$\Rightarrow a(b-1)(c-1)-(1-a)(c-1)-(b-1)(1-a)=0$

$\Rightarrow a(1-b)(1-c)+(1-a)(1-c)+(1-b)(1-a)=0$

Divide by $(1-a)(1-b)(1-c)$

$\Rightarrow \frac{a}{1-a}+\frac{1}{1-b}+\frac{1}{1-c}=0$

Add 1 to both sides

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

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

95. **Ans. (c)**

$ax^2 + by^2 + 2hxy + 2yx + 2hy + c = 0$

Part of intersection

$\Rightarrow P\left(\frac{hf-bg}{ab-h^2}, \frac{hg-af}{ab-h^2}\right)$

Here a = 1, b = 2, $h=\frac{3}{2}, g=-\frac{1}{2}$, f = - 2, c = - 6

$\Rightarrow P\left(\frac{\left(\frac{3}{2}\times(-2)\right)-2\left(-\frac{1}{2}\right)}{1.2-\left(\frac{3}{2}\right)^2}, \frac{\frac{3}{2}\left(-\frac{1}{2}\right)-1.(-2)}{1.2-\left(\frac{3}{2}\right)^2}\right)$

$\Rightarrow P\left(\frac{-2}{-\frac{1}{4}}, \frac{\frac{5}{4}}{-\frac{1}{4}}\right) \Rightarrow P(8,-5)$

96. **Ans. (b)** $y = 2x \sin x$

$\frac{dy}{dx}=2[\sin x + x\cos x]$

at $\frac{\pi}{2} \Rightarrow \frac{dy}{dx}=2[1]=2$

$\Rightarrow$ Equation of tangent at $\left(\frac{\pi}{2}, \pi\right)$

$y-\pi=2\left(x-\frac{\pi}{2}\right) \Rightarrow y=2x$

97. **Ans. (d)** $y = (x - 2)^2 - 3$

$\Rightarrow Y = y + 5 \Rightarrow y = Y - 5$

$X = x + 2 \Rightarrow x = X - 2$

$\Rightarrow y = (x - 2)^2 - 3$

Becomes

$Y - 5 = (X - 2 - 2)^2 - 3$

$Y - 5 = (X - 4)^2 - 3$

$\Rightarrow Y = (X - 4)^2 + 2$

98. **Ans. (d)** $\vec{a}=(-2i+j-5k) \Rightarrow |\vec{a}|=\sqrt{30}$

$\hat{a}=\frac{\vec{a}}{|\vec{a}|}=\frac{-2i+j-5k}{\sqrt{30}}$

DC's of $\vec{a}=\left(\frac{-2}{\sqrt{30}}, \frac{1}{\sqrt{30}}, \frac{-5}{\sqrt{30}}\right)$

99. **Ans. (b)** Here length of transverse axis's

$2a = 6 \Rightarrow a = 3$

Focus $(0, \pm ae) = (0, 4)$

$\Rightarrow ae = 4$

$b^2 = a^2(e^2 - 1) = a^2e^2 - a^2$

$= 4^2 - 3^2 = 7$

$\Rightarrow$ Hyperbola is $\frac{y^2}{a^2}-\frac{x^2}{b^2}=1$

$\frac{y^2}{9}-\frac{x^2}{7}=1$

100. **Ans. (a)** $a + b + c = 0$

$\Rightarrow b + c = - a$

$|b + c|^2 = |a|^2 = |a|^2$

$|b|^2 + |c|^2 + 2|b||c| \cos\theta = |a|^2$

$5^2 + 3^2 + 2(5)(3)\cos\theta = 7^2$

$30 \cos\theta = 15$

$\Rightarrow \cos\theta=\frac{1}{2} \Rightarrow \theta = 60°$

101. **Ans. (c)** $n(A) = 4$

$n(B) = 2$

$\Rightarrow n(A \times B) = 8$

No of subsets having 3 or more elements.

$= {}^8C_3 + {}^8C_9 + \ldots\ldots {}^8C_8$

$= 2^8 - [{}^8C_0 + {}^8C_1 + {}^8C_2]$

$= 256 - [1 + 8 + 28]$

$= 256 - [37]$

$= 219$

102. **Ans. (d)**

Here $|a| = |b| = 1 \Rightarrow$ Let's take a = k, b = j

$|c| = 2 \Rightarrow \vec{c} = i + \sqrt{3}j$

Here $|a| = |b| = 1$

$|c| = 2$

$a\times(a\times c)=b$

$\Rightarrow |a\times(a\times c)| = |b|$

$|a||a||c|\sin\theta = |b|$

1.1.2. $\sin\theta = 1$

$\Rightarrow \sin\theta = \frac{1}{2} \Rightarrow \theta = \frac{\pi}{6}$

103. **Ans. (d)** |a| = 2, |b| = 3, |c| = 5, Also $\vec{a}+\vec{b}+\vec{c}=0$

$|a + b + c|^2 = 0$

$|a|^2 + |b|^2 + |c|^2 + 2[a.b + b.c + a.c] = 0$

$2^2 + 3^2 + 5^2 + 2(a.b + b.c + c.a) = 0$

$-2[a.b + b.c + c.a] = 38$

$\Rightarrow a.b + b.c + c.a = -19.$

104. **Ans. (c)** Here a + b = 4i + j – k

a – b = - 2i + 3j – 5k

Here (a + b) . (a – b) = - 8 + 3 + 5 = 0

$\Rightarrow$ (a + b) $\perp$ a – b = 0

105. **Ans. (b)** Here S = {2, {1, 4}}

$\Rightarrow n(S) = 2 \Rightarrow n(P(S)) = 2^2 = 4$

106. **Ans. (a)** If $(1 - x + x^2)^n = a_0 + a_1x + \ldots. + a_{2n}x^{2n}$

Put x = 1, x = -1 then add.

Put x = 1

$(1 - 1 + 1)^n = a_0 + a_1 + \ldots. a_{2n}$ …(1)

x = - 1

$\Rightarrow (1 + 1 + 1)^n = a_0 - a_1 + a_2 \ldots. + a_{2n}. \ldots (2)$

$3^n = a_0 - a_1 + a_2 - \ldots.. a_{2n} \ldots. (2)$

$3^n + 1 = 2[a_0 + a_2 + a_4 + \ldots\ldots]$

$\Rightarrow a_0 + a_2 + a_4 + \ldots. = \frac{3^n+1}{2}$

107. **Ans. (w)** Total animals = m

Small animals = p

Large animals = m – p

Small cages = n

Larges cages = m – n

At first large animal to be put in large cages ${}^{m-n}P_{m-p}$

. ${}^{p-n}P_p$

108. **Ans. (a)** As f(x) has extreme values at x = 1, 2

Let $f(x) = a_0x^4 + a_1x^3 + a_2x^2 + a_3x + a_4$

$\Rightarrow f'(1) = 0 = f'(2)$

$\lim_{x\to0}\left[1+\frac{f(x)}{x^2}\right] = 3$

$\Rightarrow \lim_{x\to0}1 + \lim_{x\to0}\frac{f(x)}{x^2} = 3$

$\lim_{x\to0}\frac{f(x)}{x^2} = 2$

Now at $x = 0 \Rightarrow x^2 = 0$

$\Rightarrow \lim_{x\to0} f(x) = 0$

$\Rightarrow a_4 = 0 \Rightarrow f(x) = a_0x^4 + a_1x^3 + a_2x^2 + a_3x$

$\Rightarrow$ By L'Hospital $\Rightarrow f' = 4a_0x^3 + 3a_1x^2 + 2a_2x + a_3$

$f'' = 12a_0x^2 + 6a_1x + 2a_2$

$\lim_{x\to0}\frac{f'(x)}{2x} = 2$

Again $x = 0 \Rightarrow 2x \to 0$

$\Rightarrow \lim_{x\to0} f'(x) = 0 \Rightarrow a_3 = 0$

$\Rightarrow \lim_{x\to0}\frac{f''(x)}{2} = 2 \Rightarrow f''(2) = 4$

109. **Ans. (d)** From choices it's clear at $\frac{\pi}{2}$

$= 4\sin^2\frac{\pi}{2} + 3\cos^2\frac{\pi}{2} + \sin\frac{\pi}{4} + \cos\frac{\pi}{4}$

$= 4(1) + 3(0) + \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}}$

$= 4 + \sqrt{2}$

110. **Ans. (a)** $\frac{dy}{dx} = \frac{e^x(y+1)}{(e^x+1).y}$

$\int\frac{y}{y+1}dy = \int\frac{e^x}{e^x+1}dx$

$\int\frac{(y+1)-1}{y+1}dy = \int\frac{e^x}{e^x+1}dx$

$= \int\left(1-\frac{1}{y+1}\right)dy = \int\frac{e^x}{e^x+1}dx$

$y - \log(y + 1) = \log(e^x + 1) + \log c$

$y = \log(y + 1) + \log(e^x + 1) + \log c$

$y = \log(c(y + 1)(e^x + 1)$

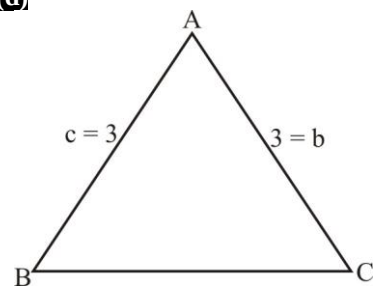
$\Rightarrow c(y + 1)(e^x + 1) = e^y$

111. **Ans. (b)** Slope $= \frac{df}{dx}$

$= \frac{df}{dx} = \lim_{h\to0}\frac{f(x)-f(0)}{x-0} = \lim_{x\to0}\frac{x^2\sin\frac{1}{x}}{x}$

$= \lim_{x\to0} x\sin\frac{1}{x} = 0$

112. **Ans. (d)**



$\Delta = \frac{1}{2}bc\sin\theta$

$= \frac{1}{2}.3.3.\sin\theta \le \frac{9}{2}$

113. **Ans. (a)** $\int x^3\sin x dx$

$= -x^3\cos x + \int 3x^2\cos x$

$= -x^3\cos x + 3\left[x^2\sin x - \int 2x\sin x dx\right]$

$= -x^3\cos x + 3x^2\sin x - 6\int x\sin x dx$

$= -x^3\cos x + 3x^2\sin x - 6[-x\cos x + \sin x]$

$\Rightarrow \int_0^{\pi} x^3 \sin x dx = [-x^3 \cos x + 3x^2 \sin x$

$+6x\cos x - 6\sin x]_0^{\pi}$

$= -\pi^2\cos\pi + 3\pi^2 \sin\pi + 6\pi \cos\pi - 6 \sin\pi$

$= +\pi^3 - 6\pi$

114. **Ans. (d)** $\lim_{x\to 0} \frac{x\tan x}{1-\cos x} \to \frac{0}{0}$ form

Apply L' Hospital rule.

$$\lim_{x\to 0} \frac{\tan x + x\sec^2 x}{\sin x} = \lim_{x\to 0} \frac{\frac{\tan x}{x} + \sec^2 x}{\frac{\sin x}{x}} = \frac{1+1}{1} = 2$$

115. **Ans. (b)**

$$I = \int_0^1 x(1-x)^n dx$$

$$= \int_0^1 (1-x).x^n dx \text{ as } = \int_0^a f(x)dx = \int_0^a f(a-x)dx = 0$$

$$= \int_0^1 \left(x^n - x^{n+1}\right)dx$$

$$= \left|\frac{x^{n+1}}{n+1} - \frac{x^{n+2}}{n+2}\right|_0^1 = \frac{1}{n+1} - \frac{1}{n+2} = \frac{1}{(n+1)(n+2)}$$

116. **Ans. (d)** Here $f(x, y) = x^2 - 2x + 2y^2 + 4y - 2$

$$\frac{\partial f}{\partial x} = f_x = 2x - 2 = 0 \Rightarrow x = 1$$

$$\frac{\partial f}{\partial y} = 4y + 4 = 0 \Rightarrow y = -1$$

Now $A = \frac{\partial^2 f}{\partial x^2} = 2$

$$B = \frac{\partial^2 f}{\partial x \partial y} = 0$$

$$C = \frac{\partial^2 f}{\partial y^2} = 4$$

Now $AC - B^2 = 2.4 = 8 > 0$

And $A = 2 > 0 \Rightarrow$ min at (1, -1)

117. **Ans. (b)** $y = \cos^2 x^2$

$$\frac{dy}{dx} = 2\cos x^2 \left(-\sin x^2\right).2x$$

$= -4x \cos x^2 \sin x^2$

118. **Ans. (a)** $f = x^3 + e^x + 3^x + \cot x$

$$\frac{df}{dx} = 3x^2 + e^x + 3^x \log 3 - \text{cosec}^2 x$$

119. **Ans. (b)** $\frac{dy}{dx} = e^{x+y} + x^2 e^y = e^y\left(e^x + x^2\right)$

$\Rightarrow e^{-y}dy = \left(e^x + x^2\right)dx$

$\Rightarrow$ Integrate both sides.

$$-e^{-y} = e^x + \frac{x^3}{3} + c$$

$$\Rightarrow e^x + e^{-y} + \frac{x^3}{3} = c$$

120. **Ans. (w)** $y = -\log(\log x)$

$$\frac{dy}{dx} = -\frac{1}{\log x} \times \frac{1}{x}$$