## SECTION 3

1. A spherical balloon is inflated and its radius is increasing at 4 cm/second. At what rate would the volume be increasing when its radius is 14cm?
   (1) ? $(56)^3$ cm³/sec
   (2) 9856 cm³/sec
   (3) 10,000cm³ /sec
   (4) None of these

2. When $(629)^{24}$ is divided by 21, find the remainder.
   (1) 1
   (2) 2
   (3) 5
   (4) 11

3. If $\dfrac{a\ ?\ b}{a\ ?\ b}\ ?\ \dfrac{(a\ ?\ b)^3}{(a\ ?\ b)^3}$, what set(s) of a and b is/are correct?
   A. S_1 = {a= any real value, b=0}
   B. S_2 = {a= 0, b= any real value}
   C. S_3 = {a= 0, b =0}
   (1) Only A
   (2) Only B
   (3) Only A and B
   (4) All A, B and C

4. Which of the following is the lowest?
   (1) $30^2 - 12^2 - 3^2$
   (2) $35^2 - 14^2 - 6^2$
   (3) $30^2 - 10^2 - 5^3$
   (4) $33^2 - 17^2 - 1^2$

5. a, b and c are the sides of a triangle. Equations $ax^2 + bx + c = 0$ and $3x^2 + 4x + 5 = 0$ have a common root. Then angle C is equal to
   (1) 60^0
   (2) 90^0
   (3) 120^0
   (4) None of these

6. Sum of all prime numbers less than 50 is
   (1) more than 500
   (2) less than 200
   (3) a prime number
   (4) an even number

7. N = abc is a three-digit number, a, b and c being their respective digits. N is a perfect square of an even number. To find N which of following informations is/are necessary/ sufficient?
   A.   a, b, c are three consecutive digits but not in order.
   B.   N is divisible by 18.
   C.   Units digit of N^2 is c.
   (1)   Only A and B together are sufficient
   (2)   A and C together are sufficient
   (3)   Only B and C together are sufficient
   (4)   Either A and C together or B and C together are sufficient

8. Let x, y, z be three positive integers satisfying y = 3x, z = 4x, x + y + z = 3k, k is an integer. Which of the following is the smallest value of k for which x, y, z are even number?
   (1) 8
   (2) 10
   (3) 12
   (4) 16

9.   N = aebfcg is a six- digit number where a, b, c, e, f, g are six digit;
      If a = e, b = f and c = = g then which of the given informations is not correct?
      (1)   If g = 4 then N is divisible by 44.
      (2)   If a + b + c = 6 then N is divisible by 33.
      (3)   If g= 8, then for different values of a, b, c and e, N may be a perfect square
      (4)   If b = c = 0, then N is not a perfect square.

10.   N = abcd is a four digit number and M= xyz is a three-digit number. N? M is
      (1)   a five digit number when a = x= 1
      (2)   a six digit number when a = 3 and x = 3
      (3)   a seven digit number when a = 6 and x = 2
      (4)   an eight digit number when a = b = c = d = x = y = z = 9

11.   N = $(A7A)^{17}$ is a perfect square. Which of the following statement is FALSE?
      (1)   A is an even digit.
      (2)   A is divisible by 3
      (3)   When N is divided by 13 we get remainder 3.
      (4)   None of these

Directions Q. 12 - 13: Read the following information carefully and answer the questions given below.

Coffee = 14 Coke = 14
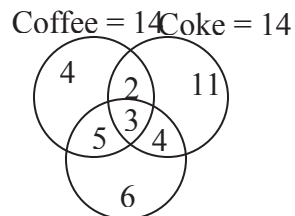
The above diagram shows the liking of Tea and coffee(hot drink) and coke (cold drink) among students in a particular class. This diagram is based on the survey conducted in the month of February.

12.   When another survey was conducted in June among the same students the result was different. All of them liked Coke. 12 liked Tea, but no one liked Coffee. How many students liked only Coke?
      (1) 40   (2) 23   (3) 20   (4) 11

13.   When another survey was conducted in December among the same students, the result was again different. All of them liked at least one hot drink. 16 liked Coke. No one liked all the three drinks. Which of the following conclusions is true?
      (1)   No one liked Coke and Coffee.
      (2)   Some liked Coke and Tea.
      (3)   Number of students who liked both Tea and Coffee is less than 20.
      (4)   Only 10 liked both Tea and Coffee.

14. A mother purchase three shirts of the same color but of different size for her three sons. All the three shirts were kept in a box in a dark room. The three boys took one shirt each at random from the box. What is the probability that none of the boys this own shirt?
    (1) ½ (2) 1/3 (3) 2/3 (4) 1/4

15. Product of three consecutive numbers is 2730. What is the sum of three numbers?
    (1) 39 (2) 42 (3) 45 (4) None of these

Directions Q. 16 – 18: Read the following information carefully and answer the questions given below.
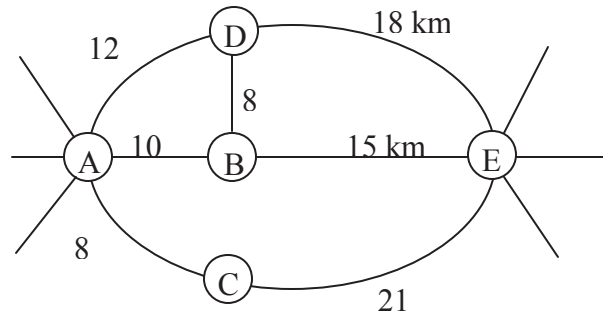
The above figure shows the roadmap plan of 5 towns A, B, C, D and E. The computerised car has the software of this roadmap plan in its computer. To follow the route the driver has to feed instructions. Not necessarily all of the instructions at one time, into the computer. One instruction can be used for more than one time in a single set of instructions. The three types of instructions are as follows:

Instructions Type	Explanations of instructions
GOTO (X, Y)	The car is instructed to move from x to y through shortest route.
ROUTE (X, Y, Z)	The car is instructed to move from X to Z via the town Y; Y is situated on the shortest route from X to Z.
BACK (X, Y)	The car is instructed to go from X to Y and back to X through shortest route.

16. A person lives in town A. He has to reach E. He wants to visit all the other three towns. What set of instructions should he feed into the computer so that he travels the minimum distance?
    (1)   GOTO (A, D), GOTO (D, B), GOTO (B, A) ROUTE (A, C, E)
    (2)   BACK (A, C), ROUTE (A, D, B), GOTO (B, E)
    (3)   BACK (A, C), GOTO (A, D), GOTO (D, B) GOTO (B, E)
    (4)   None of these

17. Mr. Goswami lives in town B. He has to go to town C. he wants to visit all the other three towns. He plans his routes such that he can travel for minimum distance. Find the minimum of instructions to be fed into the computer.
    (1) 3 (2) 4 (3) 5 (4) None of these

18. The direct road from A to D is destroyed to flood. A person wants to use the computerised car to go from A to D. which of the three set of instructions can't be used by him?
    (1) ROUTE (A, B, E), GOTO((E, D)
    (2) GOTO (A, B), GOTO (B, D)
    (3) ROUTE (A, C, E), GOTO (E, D)
    (4) None of these

19. A circle is instructed in a regular octagon. The same circle circumscribes a regular hexagon. Find the ratio of the areas of the circle, the hexagon and octagon.
    (1) $2? : 3?3 : 16(?2 - 1)$ (2) $? : 3?3 : 4(?2 - 1)$
    (3) $2?/3 : 2?3 : 4(?2 - 1)$ (4) None these.

20. Find the remainder when N = 1821? 1823? 1827 is divisible by 12.
    (1) 9   (2) 12   (3) 15   (4) 18

**Directions: Q 21 - 25:** are based on the following:

Sun Ltd. and Star Ltd. are two rivals always trying to outdo each other. The following table gives the payoffs for Sun Ltd. for various strategies that they adopt and the corresponding strategies adopted by Star Ltd. e.g. If Sun Ltd. adopts strategy B, and Star Ltd. adopts strategy A, then Sun Ltd. gains 6000 while Star Ltd. loses 6000. In addition to this, for implementing any particular strategy, both have to incur certain expenses, which are given in the table "Expenses".

Payoffs for Sun Ltd.				
		Star Ltd.		
	Strategy	A	B	C
	A	8000	12000	8000
Sun Ltd.	B	6000	- 2000	0
	C	8000	16000	4000
Expenses				
Strategy		A	B	C
Star Ltd.		7000	8000	8000
Sun Ltd.		8000	2000	8000

21. If Star Ltd. adopts strategy A, which strategy should Sun Ltd. adopt for maximum gain?
    (1) A   (2) B   (3) C   (4) A or C

22. If Star Ltd. adopts strategy B, what is Sun Ltd.'s maximum possible gain?
    (1) 10000   (2) 0   (3) 12000   (4) None of these

23. If Sun Ltd. adopts strategy B, what strategy should Star Ltd. adopt to minimise Sun's gain, regardless of what its own gain will be?
    (1) A   (2) B   (3) C   (4) A or C

24. Of the following, which would be the most intelligent move on the part of Star Ltd?
    (1) If Sun Ltd. adopts strategy A, adopt strategy B.
    (2) If Sun Ltd. adopts strategy B adopt strategy B.
    (3) If Sun Ltd. adopts strategy C adopt strategy B.
    (4) If Sun Ltd. adopts strategy C adopt strategy A.

25.   If both the companies adopt strategy C, then which of the following is true?
        I.   Star Ltd.'s net loss is 12000.
        II.   Sun Ltd.'s gain is 4000.
        III.   Sun Ltd.'s loss is 4000
        (1) I only   (2) I & III   (3) II only   (4) III only

Directions Q. 26 - 30: Refer to the diagram given below:
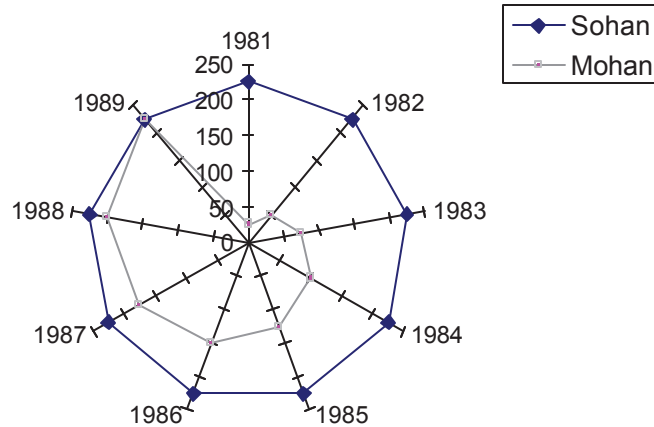
MARKS OBTAINED BY TWO STUDENTS

26.   Sohan's average for the first six years was:
        I.   equal to that of the last six years.
        II.   equal to that of the middle six years.
        III.   225
        (1) III only   (2) I & III   (3) I, II & III   (4) II & III

27.   When was Mohan's score exactly half of Sohan's in the given nine years?
        (1) 1984   (2) 1985   (3) 1986   (4) never

28.   How can Mohan's scoring pattern be best described?
        (1)   It increases by 50% every year.
        (2)   It increases by 25% every year.
        (3)   It increases by 50 every year.
        (4)   It increases by 25 every year.

29.   What is the difference between the total scores of Mohan and Sohan?
        (1) 700   (2) 825   (3) 900   (4) 225

30.   In how many of the given years was Sohan's score exactly thrice that of Mohan's score?
        (1) one   (2) two   (3) three   (4) four

Directions Q. 31 - 35: The table shows the raw material requirements for a crank-shaft machining line of a major automobile manufacturer located in western India:

RAW MATERIAL REQUIREMENT (Units)

| Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Units	50	25	30	20	5	6	2	10	15	20	25	10	5	20	10

The Company policy requires that adequate raw material has to be maintained at least a day in advance.

31. If the raw material inventory on Day 0 was 165 units, the manager requires to place on order latest by which day?
    (1) 8th   (2) 9th   (3) 10th   (4) 11th

32. If the raw material inventory on Day 0 was 73 units and the manager orders for 17, 53 and 86 units on the first, second and fourth day respectively, when does he need to order next?
    (1) 10th day   (2) 11th day   (3) 13th day   (4) 14th day

33. If the raw material supplier starts acting fishy and delays his supplies by 48 hrs, then which day's production will be hit if the starting inventory on day 0 is 163 units and an order is placed on the morning of day 7?
    (1) None   (2) Day 8   (3) Day 9   (4) Day 10

34. If the cost of placing on order is Rs. 650/per order, determine the minimum cost incurred in Q.32 if we consider the whole cycle of 15 days.
    (1) Rs. 1,950   (2) Rs. 650   (3) Rs. 2,600   (4) Rs. 3,250

35. If the daily pilferage is 5 units, find the minimum number of units to be ordered through the whole cycle if we start with an inventory on Day 0 of 100 units? (assume that we end with zero inventory)
    (1) 296   (2) 153   (3) 75   (4) 228

Directions Q. 36 - 40: The following pie - chart shows the percentage of students passed in an examination from different parts of the country in 1999.
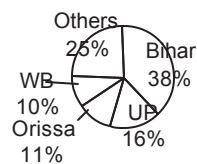
The following graph shows the percentage of students who passed their graduation (freshers) in 1999.
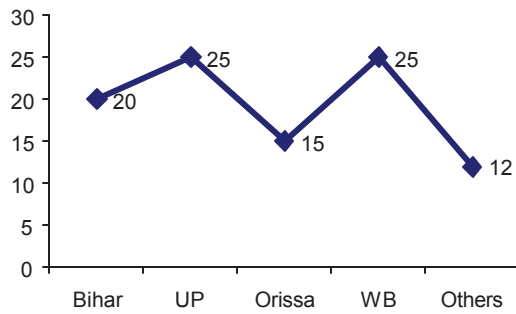
36. If in 1999 the total passed candidates from different parts of the country was 650, then how many non fresher candidates from Bihar passed the examination in 1999?
(1) 200 (2) 195 (3) 198 (4) 204

37. If in 1999 the total number of freshers from WB was 160, then how many non - fresher candidates passed the exam from others?
(1) 1398 (2) 1588 (3) 1608 (4) 1408

38. If total passed candidates from UP in 1999 was 112, what is the ratio between the number of freshers from Bihar and that of non - freshers from Orissa?
(1) 760 : 187 (2) 187 : 760 (3) 40 : 11 (4) None of these

39. If there is an increase of 10% and 20% candidates from Bihar and Others in the year 2000 respectively, and the number of total passed candidates from Orissa in 1999 was 77, what would be the approximate total passed candidates from Bihar and Others in 2000?
(1) 210 (2) 480 (3) 450 (4) 500

40. If the non-fresher candidates from UP in 1999 was 60, how many candidates passed the exam from all parts of the country?
(1) 500 (2) 300 (3) 350 (4) 450

Directions Q. 41 to 44: are based on the following information:

- Ghosh Babu's new interest is psychology. He has identified various personality patterns and given them names. These personality patterns are inter-related as follows:
- All Alessandras, Belissimas, Cassandras, Desdemonas, Elissimas and Firdauses are Queens.
- All Alessandras are Belissimas.
- No Belissima that is not an Alessandra is a Firdaus.
- Some Cassandras are Alessandras.
- All Desdemonas are Cassandras.
- Some Cassandras are not Belissimas.
- No Desdemona is an Alessandra.
- All Queens and only Queens that are neither Belissimas nor Cassandras are Elissimas.

41. Which of the following is true?
(1) All Firdauses are Alessandras.
(2) Some Firdauses are Alessandras.

(3)   All Firdauses are either Alessandras, Cassandras or Elissimas.
(4)   Some Firdauses are Cassandras.

42.   Which of the following is not true?
(1)   No Desdemonas are Belissimas.
(2)   Some Belissimas are Desdemonas.
(3)   Some Firdauses are both Belissimas and Cassandras.
(4)   Some Queens are neither Belissimas nor Elissimas.

43.   Which of the following cannot be said to be true or false?
I.   No Belissima or Cassandra is an Elissima.
II.   Some Cassandras are Belissimas but not Alessandras.
III.   No Belissima is both an Alessandra and a Desdemona.
(1) I only   (2) II only   (3) III only   (4) I & II

44.   Peter is not a Belissima, therefore,
(1)   Peter is an Elissima
(2)   If Peter is a Queen, he is an Elissima or Cassandra.
(3)   If Peter is not an Elissima, he is a Cassandra.
(4)   None of the above

Directions: Each of the questions 45- 52 is followed by two statements. As the answer,
    Mark 1, if the question can be answered with the help of statement I alone,
    Mark 2, if the question can be answered with the help of statement II alone,
    Mark 3, if both statement I and statement II are needed to answer the question, and
    Mark 4, if the question cannot be answered even with the help of both the statements.

45.   Is line MN perpendicular to the X-axis?
I. M = (5, 12)   II. N lies on the X-axis at a distance of 5 units from the origin.

46.   What is the value of x?
I. $\log_2 2^x = x$ II. $\log_3 x = 0$

47.   How much tax did Mrs. X pay?
I.   Gauri paid twice the amount that Rajat did last year.
II.   Rajat paid Rs. 9800 as tax this year.

48.   A, B, C and D are points on a straight line. Is AB = BC = CD?
I.   AC = 2 CD   II.   AB = BC

49.   What is the area of the isosceles trapezium?
I.   Of the two parallel sides, one is 6 cm. smaller than the other.
II.   The line joining the midpoints of the non-parallel sides is 13 cm. in length and is
        at a distance of 2 cm. from the base.

50.   If a and b are integers, is (a/4 + b/5) an integer?
I.   The cube root of a is an even number which is $1/10^{th}$ the value of b.
II.   a is divisible by 5 and b is divisible by 4.

51.   A cube is painted on all sides and is cut into smaller cubes, all of the same size. How
        many of the smaller cubes do not have any side painted?
I.   8 of the smaller cubes are painted on the three sides.
II.   The number of smaller cubes is 64.

52. Is x/y prime?
    I.   x is divisible by 3 but not by 9
    II.   y is a multiple of 6

53. On 1st January 1969, a person purchases Rs. 10,000, 4% debentures. On 1st Jan. 1970, he sells ¾ of it at a discount of 6% and invests the proceeds in steel shares at Rs. 470 per share. He sells the remaining debentures at Rs. 105 and purchases bonds at a price of Rs. 75 per bond. Each bond pays Rs. 5. Each share pays Rs. 16. Find the alternation in his annual income in 1970?
    (1) Rs. 15 decrease   (2) Rs. 25 increase
    (3) Rs. 15 increase   (4) None

54. Which of the following is NOT true?
    (1) $|a + b| = |b + a|$
    (2) $|a - b| = |b - a|$
    (3) $|a + b| < |a| + |b|$
    (4) $|a - b| > |a| - |b|$

55. Find the least number which when divided by 35, 45, and 55 leaves the remainder 18, 28, and 38 respectively.
    (1) 3465   (2) 17   (3) 3449   (4) 3448

56. Between two numbers whose sum is 6 ½ an even number of arithmetic means is inserted; the sum of these means exceeds their number by unity. How many means are there?
    (1) 12   (2) 6   (3) 24   (4) None

57. A trader buys goods from Delhi to sell in Bombay where he gets 20% higher price realisation. Per journey, he spends Rs. 2000 on travelling, Rs. 2500 as bribe to the parcel authority and makes a net profit of Rs. 20,000. Find the total value of goods purchased by the dealer in 7 journeys to Delhi.
    (1) Rs. 1,22,500   (2) Rs. 2,45,000   (3) Rs. 8,57,500   (4) None

58. A family consists of the father, mother, two sons and the youngest daughter. The age of father is four times the age of the second son. The age of the first son is in the ratio of 3 : 1 with that of his sister. The mother is 3.5 times older than the second son. The age of the second son is 2/3 times of the first son. The age of the youngest daughter is 5 years. Find the sum of all the ages.
    (1) 115 yrs   (2) 105 yrs   (3) 205 yrs   (4) 210 yrs

59. A can do a piece of work in 36 days, B in 54 days and C in 72 days. All of them began together but A left 8 days and B left 12 days before the completion of the work. How many days in all did C put in till the entire work was finished?
    (1) 48 days   (2) 24 days   (3) 12 days   (4) None

60. A person travels through 5 cities - A, B, C, D, E. Cities E is 2 km west of D. D is 3 km north-east of A. C is 5 km north of B and 4 km west of A. If this person visits these cities in the sequence B - C - A - E - D, what is the effective distance between cities B and D?
    (1) 13 km   (2) 9 km   (3) 10 km   (4) 11 km

ESSAY TOPIC:

Discuss the following statement in the space provided (1 page was given separately to give the response)

Asked at the age of 83, as to which of his project would he choose as his master- piece, Frank Lloyd Wright the architect answered "The next one"