NUMERICAL ABILITY

1. The roots of $ax^2+bx+c=0$ are real and positive. a, b and c are real. Then $ax^2+b|x|+c=0$ has

(a) no roots
(b) 2 real roots
(c) 3 real roots
(d) 4 real roots

2. If $(z + 1/z)^2 = 98$, compute $(z^2 + 1/z^2)$.

3. Round-trip tickets to a tourist destination are eligible for a discount of 10% on the total fare. In addition, groups of 4 or more get a discount of 5% on the total fare. If the one way single person fare is Rs 100, a group of 5 tourists purchasing round-trip tickets will be charged Rs _____.

4. In a survey, 300 respondents were asked whether they own a vehicle or not. If yes, they were further asked to mention whether they own a car or scooter or both. Their responses are tabulated below. What percent of respondents do not own a scooter?

		Men	Women
Own vehicle	Car	40	34
	Scooter	30	20
	Both	60	46
Do not own vehicle		20	50

5. When a point inside of a tetrahedron (a solid with four triangular surfaces) is connected by straight lines to its corners, how many (new) internal planes are created with these lines?

(a) 6
(b) 8
(c) 4
(d) 10

6. A tourist covers half of his journey by train at 60 km/h, half of the remainder by bus at 30 km/h and the rest by cycle at 10 km/h. The average speed of the tourist is km/h during his entire journey is

(a) 36
(b) 30
(c) 24
(d) 18

7. The current erection cost of a structure is Rs.13,200. If the labour wages per day increase by 1/5 of the current wages and the working hours decrease by 1/24 of the current period, then the new cost of erection in Rs. is

(a) 16,500
(b) 15,180
(c) 11,000
(d) 10,120

8. What is the average of all multiples of 10 from 2 to 198?

(a) 90
(b) 100
(c) 110
(d) 120

9. The value of $\sqrt{12+\sqrt{12+\sqrt{12+\ldots}}}$ is

(a) 3.464
(b) 3.932
(c) 4.000
(d) 4.444

10. Which number does not belong in the series below?

2, 5, 10, 17, 26, 37, 50, 64

(a) 17
(b) 37
(c) 50
(d) 64

11. Consider the equation:

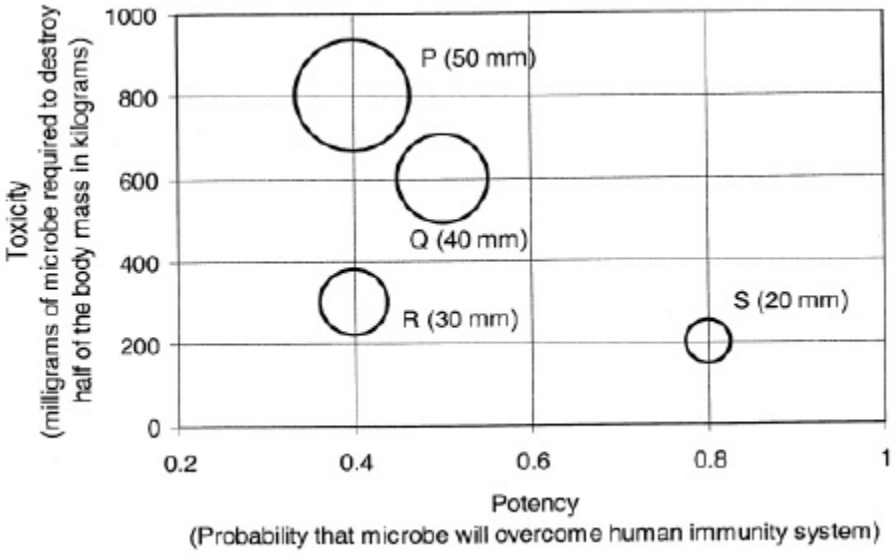
$(7526)_8 - (Y)_8 = (4364)_8$, where $(X)_N$ stands for X to the base N. Find Y.

(a) 1634
(b) 1737
(c) 3142
(d) 3162

12. If log(P) = (1/2) log(Q) = (1/3) log(R), then which of the following options is TRUE?

(a) $P^2 = Q^3R^2$
(b) $Q^2 = PR$
(c) $Q^2 = R^3P$
(d) $R = P^2Q^2$

13. P, Q, R and S are four types of dangerous microbes recently found in a human habitat. The area of each circle with its diameter printed in brackets represents the growth of a single microbe surviving human immunity system within 24 hours of entering the body. The danger to human beings varies proportionately with the toxicity, potency and growth attributed to a microbe shown in the figure below:



A pharmaceutical company is contemplating the development of a vaccine against the most dangerous microbe. Which microbe should the company target in its first attempt?

(a) P
(b) Q
(c) R
(d) S

14. A transporter receives the same number of orders each day. Currently, he has some pending orders (backlog) to be shipped. If he uses 7 trucks, then at the end of the 4^{th} day he can clear all the orders. Alternatively, if he uses only 3 trucks, then all the orders are cleared at the end of the 10^{th} day. What is the minimum number of trucks required so that there will be no pending order at the end of 5^{th} day?

(a) 4
(b) 5
(c) 6
(d) 7

15. A container originally contains 10 litres of pure spirit. From this container 1 litre of spirit replaced with 1 litre of water. Subsequently, 1 litre of the mixture is again replaced with 1 litre of water and this process is repeated one more time. How much spirit is now left in the container?

(a) 7.58 litres
(b) 7.84 litres
(c) 7 litres
(d) 7.29 litres

16. The cost function for a product in a firm is given by 5q2, where q is the amount of production. The firm can sell the product at a market price of Rs.50 per unit. The number of units to be produced by the firm such that the profit is maximized is

(a) 5
(b) 10
(c) 15
(d) 25

17. A political party orders an arch for the entrance to the ground in which the annual convention is being held. The profile of the arch follows the equation $y = 2x - 0.1x^2$ where y is the height of the arch in meters. The maximum possible height of the arch is

(a) 8 meters
(b) 10 meters
(c) 12 meters
(d) 14 meters

18. An automobile plant contracted to buy shock absorbers from two supplies X and Y. X supplies 60% and Y supplies 40% of the shock absorbers. All shock absorbers are subjected to a quality test. The ones that pass the quality test are considered reliable. Of X's shock absorbers, 96% are reliable. Of Y's shock absorbers, 72% are reliable.

The probability that a randomly chosen shock absorber, which is found to be reliable, is made by Y is

(a) 0.288
(b) 0.334
(c) 0.667
(d) 0.720

19. Which of the following assertions are CORRECT?

P: Adding 7 to each entry in a list adds 7 to the mean of the list
Q: Adding 7 to each entry in a list adds 7 to the standard deviation of the list
R: Doubling each entry in a list doubles the mean of the list
S: Doubling each entry in a list leaves the standard deviation of the list unchanged

(a) P, Q
(b) Q, R
(c) P, R
(d) R, S

20. Given the sequence of terms, AD CG FK JP, the next term is

(a) OV
(b) OW
(c) PV
(d) PW

21. 25 persons are in a room. 15 of them play hockey, 17 of them play football and 10 of them play both hockey and football. Then the number of persons playing neither hockey nor football is:

(a) 2
(b) 17
(c) 13
(d) 3

22. If 137 + 276 = 435 how much is 731 + 672?

(a) 534
(b) 1403
(c) 1623
(d) 1513

23. 5 skilled workers can build a wall in 20 days; 8 semi-skilled workers can build a wall in 25 days; 10 unskilled workers can build a wall in 30 days. If a team has 2 skilled, 6 semi-skilled and 5 unskilled workers, how long it will take to build the wall?

(a) 20 days
(b) 18 days
(c) 16 days
(d) 15 days

24. You are given three coins: one has heads on both faces, the second has tails on both faces, and the third has a head on one face and a tail on the other. You choose a coin at random and toss it, and it comes up heads. The probability that the other face is tails is

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

25. Given Set A = {2, 3, 4, 5} and Set B = {11, 12, 13, 14, 15}, two numbers are randomly selected, one from each set. What is the probability that the sum of the two numbers equals 16?

(a) 0.20
(b) 0.25
(c) 0.30
(d) 0.33

26. Based on the given statements, select the most appropriate option to solve the given question.

If two floors in a certain building are 9 feet apart, how many steps are there in a set of stairs that extends from the first floor to the second floor of the building?

Statements:
(I) Each step is 3/4 foot high.
(II) Each step is 1 foot wide.

(a) Statement I alone is sufficient, but statement II alone is not sufficient.
(b) Statement II alone is sufficient, but statement I alone is not sufficient.
(c) Both statements are sufficient, but neither statement alone is sufficient.
(d) Statements I and II together are not sufficient.

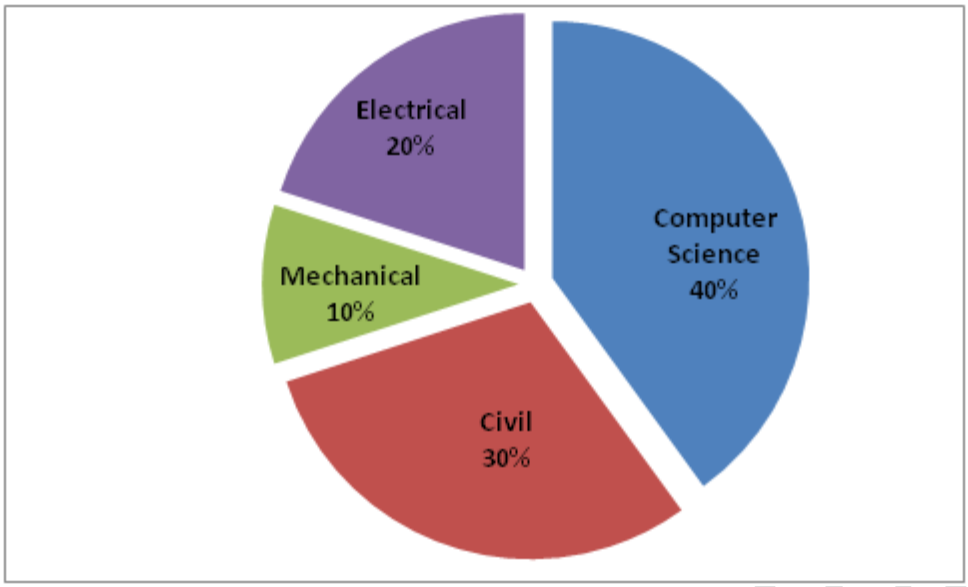
27. The number of students in a class who have answered correctly, wrongly, or not attempted each question in an exam, are listed in the table below. The marks for each question are also listed. There is no negative or partial marking.

Q No.	Marks	Answered Correctly	Answered Wrongly	Not Attempted
1	2	21	17	6
2	3	15	27	2
3	1	11	29	4
4	2	23	18	3
5	5	31	12	1

What is the average of the marks obtained by the class in the examination?

(a) 2.290
(b) 2.970
(c) 6.795
(d) 8.795

28. The pie chart below has the breakup of the number of students from different departments in an engineering college for the year 2012. The proportion of male to female students in each department is 5:4. There are 40 males in Electrical Engineering. What is the difference between the numbers of female students in the civil department and the female students in the Mechanical department?



29. The probabilities that a student passes in mathematics, physics and chemistry are m, p and c respectively. Of these subjects, the students has 75% chance of passing in at least one, a 50% chance of passing in at least two and a 40% chance of passing in exactly two. Following relations are drawn in m, p, c:

I. $p + m + c = 27/20$
II. $p + m + c = 13/20$
III. $(p) \times (m) \times (c) = 1/10$

(a) Only relation I is true.
(b) Only relation II is true.
(c) Relations II and III are true.
(d) Relations I and III are true.

30. Based on the given statements, select the most appropriate option to solve the given question.

What will be the total weight of 10 poles each of same weight?

Statements:
I. One fourth of the weight of the pole is 5 Kg.
II. The total weight of these poles is 160 Kg more than the total weight of two poles.

(a) Statement I alone is not sufficient.
(b) Statement II alone is not sufficient.
(c) Either I or II alone is sufficient.
(d) Both statements I and II together are not sufficient.

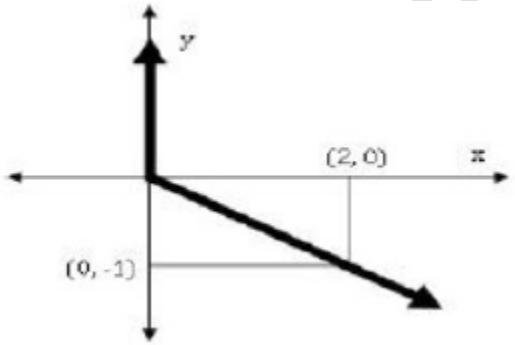
31. If ROAD is written as URDG, then SWAN should be written as:

(a) VXDQ
(b) VZDQ
(c) VZDP
(d) UXDQ

32. A function f(x) is linear and has a value of 29 of x = – 2 and 39 at x = 3. Find its value at x = 5.

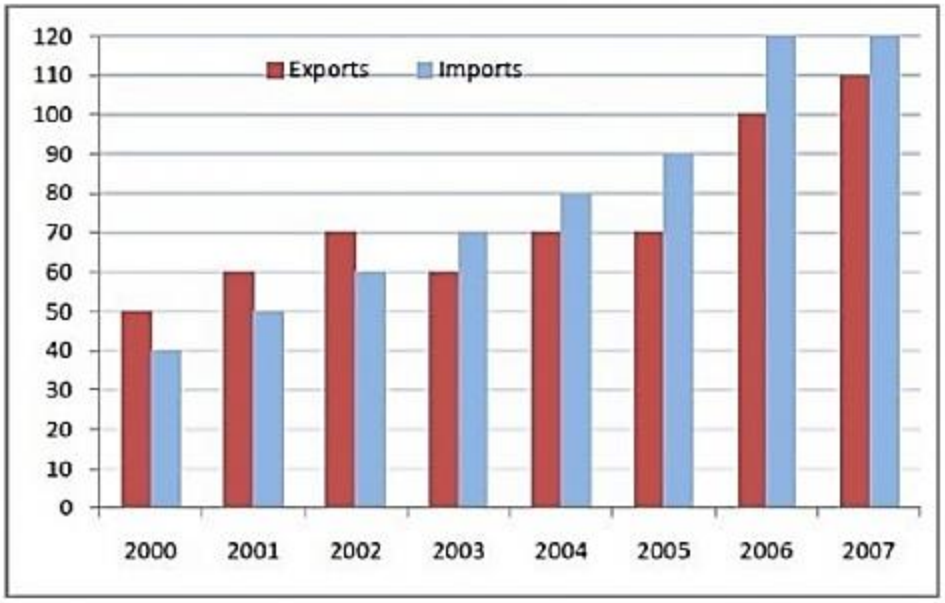
(a) 59
(b) 45
(c) 43
(d) 35

33. Choose the most appropriate equation for the function drawn as thick line, in the plot below.



(a) x = y – |y|
(b) x = – (y – |y|)
(c) x = y + |y|
(d) x = – (y + |y|)

34. The exports and imports (in crores of Rs.) of a country from the year 2000 to 2007 are given in the following bar chart. In which year is the combined percentage increases in imports and exports the highest?

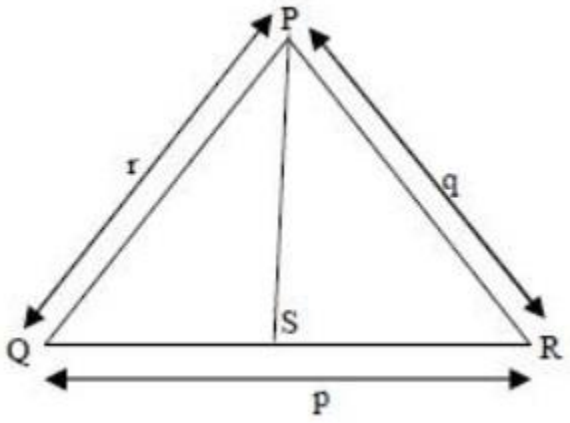


(a) 2004
(b) 2005
(c) 2006
(d) 2007

35. A function f(x) is linear and has a value of 29 at $x = -2$ and 39 at $x = 3$. Find its value at $x = 5$.

(a) 59
(b) 45
(c) 43
(d) 35

36. In a triangle PQR, PS is the angle bisector of ∠QPR and ∠QPS= 60°. What is the length of PS?



(a) $\frac{q+r}{qr}$

(b) $\frac{qr}{q+r}$

(c) $\sqrt{(q^2+r^2)}$

(d) $\frac{(q+r)^2}{qr}$

37. The table below has question-wise data on the performance of students in an examination. The marks for each question are also listed. There is no negative or partial marking in the examination.

Q.No	Marks	Answered Correctly	Answered Wrongly	Not Attempted
1	2	21	17	6
2	3	15	27	2
3	2	23	18	3

What is the average of the marks obtained by the class in the examination?

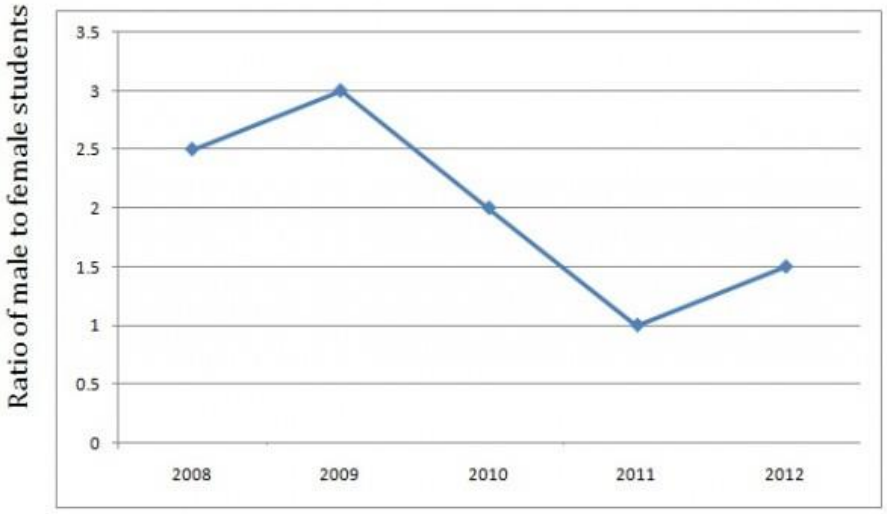
(a) 1.34

(b) 1.74

(c) 3.02

(d) 3.91

38. The ratio of male to female students in a college for five years is plotted in the following line graph. If the number of female students in 2011 and 2012 is equal, what is the ratio of male students in 2012 to male students in 2011?



(a) 1.1

(b) 2:1

(c) 1.5:1

(d) 2.5:1

39. Find the sum of the expression

$$\frac{1}{\sqrt{1}+\sqrt{2}}+\frac{1}{\sqrt{2}+\sqrt{3}}+\frac{1}{\sqrt{3}+\sqrt{4}}+\cdots+\frac{1}{\sqrt{80}+\sqrt{81}}$$

(a) 7 (b) 8
(c) 9 (d) 10

40. Out of all the 2-digit integers between 1 and 100, a 2-digit number has to be selected at random. What is the probability that the selected number is not divisible by 7?

(a) 13/90 (b) 12/90
(c) 78/90 (d) 77/90