1. What geometric figure does the equation $x^2 + y - 5x + 10 = 0$ represent?
(a) Straight Line
(b) Circle
(c) Parabola
(d) None of these

2. Which of the following has emerged as India's best university in a countrywide National Institute Ranking Framework (NIRF) of educational institutes released recently?
(a) IISc., Bangalore
(b) University of Delhi
(c) JNU, New Delhi
(d) BHU, Varanasi

3. Which of the following is the 'First Green Train Corridor' inaugurated by the Railway Minister in July 2016?
(a) Rameshwaram - Munamadurai
(b) Kalka - Shimla Junction
(c) Delhi - Varanasi
(d) Jammu - Katra

4. The matrix A of order n x n is given by A=I-X(X'X)$^{-1}$ X' where I is an identity matrix and X' is the transpose of X. What can you conclude about the order of X?
(a) X has n rows
(b) X has n columns
(c) X has n rows and n columns
(d) None of these

5. Among the options given choose the word that is spelt incorrectly:
(a) Tiptoing
(b) Tippling
(c) Tattletale
(d) Contiguous

6. Leukaemia is
(a) Cancer of the blood
(b) Deformation of bones in human body
(c) A disease which makes bones brittle
(d) Cancer of glands

7. Which bank has launched a unique credit card 'UNNATI' for which any customer with a balance of at least Rs. 25000/- in his/her savings account with the bank would be eligible?
(a) HDFC Bank
(b) ICICI Bank
(c) Axis Bank
(d) SBI

8. Find the word closest in meaning to the word "LOQUACITY"
(a) misery
(b) fantasy
(c) repetition
(d) talkativeness

9. The area enclosed between the curves $y^2 = x$ and $y = x$ is
(a) $\frac{2}{3}$ (b) $\frac{1}{2}$
(c) $\frac{1}{3}$ **(d) $\frac{1}{6}$**

10. The domain and range respectively of the function $\int(x) = \sqrt{x^2 + 1}$ are
(a) $(-\infty, -1] \cup [1, \infty)$ and $[1, \infty)$
(b) $(-\infty, \infty)$ and $[1, \infty)$
(c) $(-\infty, -1] \cup [1, \infty)$ and $(-\infty, -1] \cup [1, \infty)$
(d) $(-\infty, \infty)$ and $[-\infty, -1] \cup [1, \infty)$

11. Match the following:
Person
A. Bhavish Aggarwal
B. Binny Bansal
C. Chandra Shekhar Ghosh
D. Rana Kapoor
Field
i. Ola
ii. Bandhan Bank
iii. Yes Bank
iv. Flipkart
(a) A-ii, B-iii, C-i, D-iv
(b) A-i, B-ii, C-iii, D-iv
(c) A-i, B-iv, C-ii, D-iii
(d) A-iii, B-ii, C-i, D-iv

12. Two dice are tossed once. The probability of getting an even number on the first die or a total of 8 is
(a) 1/36
(b) 3/36
(c) 11/36
(d) None of the above

13. $\sum_{i=1}^{n}(X_i - A)^2$ equals
(a) $\sum_{i=1}^{n} X_i^2 - 2A \sum_{i=1}^{n} X_i + A^2$
(b) $\sum_{i=1}^{n} X_i^2 - 2nA \sum_{i=1}^{n} X_i + nA^2$
(c) $\sum_{i=1}^{n} X_i^2 - 2A \sum_{i=1}^{n} X_i + nA^2$
(d) $\sum_{i=1}^{n} X_i^2 - 2nA \sum_{i=1}^{n} X_i + n^2A^2$

14. Choose the option that fits the blank to complete the sentence
There are_____ views on the issue of giving bonus to employees.

(a) Independent

(b) Divergent

(c) Modest

(d) Adverse

15. UDAY is:

(a) Scheme related to urban youth

(b) A plan for the development of urban infrastructure

(c) Plan to aid ailing electricity distribution companies

(d) Scheme for the development of university infrastructure

16. The idiom "mind your P's and Q's" means:

(a) behave politely and follow social conventions

(b) spell correctly

(c) write legibly and correctly

(d) ignore minor details

17. There may be cause and effect relationship between the two statements. These two statements may be the effect of the same cause or independent causes. These statements may be independent causes without having any relationship. Read both the statements in the question and mark your answer accordingly

I. The school authority has started special coaching classes for XII Std. Students after school hours

II. The parents of the XII Std. Students have withdrawn their wards from private coaching classes

(a) Statement I is the cause and statement II is its effect;

(b) Statement II is the cause and statement I is its effect;

(c) Both the statements I and II are independent causes;

(d) Both the statements I and II are effects of some common causes;

18. The derivative of the function $y = \sqrt{x}(x + 1)^5 e^x$ at $x = 1$ is

(a) 128e

(b) 4

(c) 32e

(d) 96e

19. The question given below is followed by two statements, I and II. Study the information given in the two statements and assess whether the statements are sufficient to answer the question and choose the appropriate option from among the choices given below.

What percentage of questions were attempted by Ramya in the exam?

I. 30% of the questions are attempted by both Ramya and Swathi,

II. The number of questions attempted by Ramya but not by Swathi is (5/8)th of the total number of questions attempted by Ramya.

(a) The question can be answered by using one of the statements alone but not by the other.

(b) The question can be answered by using either statement alone.

(c) The question can be answered by using both the statements together, but cannot be answered by using either statement alone.

(d) The question cannot be answered even by using both the statements together.

20. What is the rank of India on the 2016 Global Hunger Index (GHI) released by the International Food Policy Research Institute (IFPRI)?

(a) 80

(b) 55

(c) 97

(d) 30

21. The idiom "at a stone's throw" means:

(a) make a correct choice

(b) a short distance

(c) aim accurately

(d) pelt stones at the enemy

22. Examine the statements I,II and III and answer.

i. The mean, median and mode of any set of numbers are smaller than the maximum number in the set.

ii. The standard deviation of a set of numbers is always positive.

iii. In a set of numbers, the number of elements that are smaller than the mean is always equal to the number of elements that are larger than the mean,

(a) I and II are true

(b) I and III are true
(c) II and III are true
(d) I, II and III are true

23. All of the following categories are covered under priority sector except one. Identify that one.
(a) Social Infrastructure
(b) Micro, Small and Medium Enterprises (MSME)
(c) Consumer Finance
(d) Renewable Energy

24. Choose the option that fits the blank to complete the sentence
Man who has committed such an _____ crime must get the most severe punishment.
(a) Injurious
(b) Uncharitable
(c) Unworthy
(d) Abominable

25. Find the word closest in meaning to the word "AUDACIOUS"
(a) Useless
(b) Bold
(c) Foolish
(d) Necessary

26. Among the options given, choose the word that is spelt incorrectly:
(a) Aggressive
(b) Counterfiet
(c) Arrival
(d) Serendipity

27. Which state has the lowest sex ratio in India as per Census 2011?
(a) Haryana
(b) Sikkim
(c) Uttar Pradesh
(d) Punjab

28. The following question consists of a question followed by two statements numbered I and II given below it. You have to decide whether the data provided in the statements are sufficient to answer the question. Read both the statements and give the answer
If X's age is exactly twice of Y's age, what is X's age?
I. Eight years ago X's age was exactly three times Y's age

II. Ten years from now, X's age will be exactly 1.5 times Y's age
(a) The data in the statement I alone is sufficient to answer the question but the data in statement II alone is not sufficient to answer the question;
(b) The data in the statement II alone is sufficient to answer the question but the data in statement I alone is not sufficient to answer the question;
(c) Data in both statement I and statement II together are necessary to answer the question;
(d) The data either in statement I alone or in statement II alone is sufficient to answer the question

29. In the following question, two statements numbered I and II are given.
There may be cause and effect relationship between the two statements. These two statements may be the effect of the same cause or independent causes. These statements may be independent causes without having any relationship. Read both the statements in the question and mark your answer accordingly
I. There has been a steady increase in the per capita income of people in India in recent years
II. There is a substantial increase in the literacy rate of India
(a) Statement I is the cause and statement II is its effect;
(b) Statement II is the cause and statement I is its effect;
(c) Both the statements I and II are independent causes;
(d) Both the statements I and II are effects of some common causes;

30. The most suitable antonym for the word "Affectation" will be:
(a) Revengeful
(b) Affectionate
(c) Concentration
(d) Artlessness

31. A and B are two independent events where $P(A \cup B) = 0.7$ and $P(A) = 0.4$. What is the value of $P(B)$?

(a) 0.3
(b) 0.5
(c) 0.6
(d) 0.7

32. Headquarters of International Red Cross is situated at:
(a) Paris
(b) The Hague
(c) Geneva
(d) Vienna

33. The courier charges for sending packages to a certain destination are Rs. 65 for the first 250 gms and Rs. 10 for each additional 100 grams of part thereof. If the charge for a package is Rs. 155, what could be its weight in grams?
(a) 1155
(b) 1145
(c) 1040
(d) 950

34. Bob Dylan, the Nobel prize winner for Literature in 2016 is a
(a) sportsperson
(b) philanthropist
(c) songwriter
(d) novelist

35. Four boys Monu, Baba, Tilu and Addi are standing on a ladder. Monu is further up the ladder than Baba. Baba is in between Monu and Tilu. If Addi is further up than Monu, then who is the second boy from the bottom?
(a) Monu
(b) Baba
(c) Tilu
(d) Cannot be determined

36. A, B, C, D, E and 0 are matrices of order n x n. It is known that A.B = A.C and D.E = 0.
Examine the statements I and II and choose the correct option.
I. B=C
II. D=0 or E=0
(a) I is true
(b) II is true
(c) I and II are true
(d) None of these

37. Exchange rate in India is determined by
(a) RBI
(b) Forces of Demand and Supply
(c) IMF
(d) Finance Ministry

38. In the following question, some symbols have been used for certain mathematical operations as indicated below: X for "greater than"; © for "not less than"; ÷ for "not equal to"; Ø for "equal to"; + for "not greater than"; Δ for "less than". Using these symbols, choose the correct alternative for the following question:
If pXqΔr, it follows that
(a) r+q©p
(b) p©q+r
(c) q©pXr
(d) pØq+r

39. In the diagram provided, ASB is a quarter circle and PQRS is a rectangle with sides PQ = 8 and PS = 6.
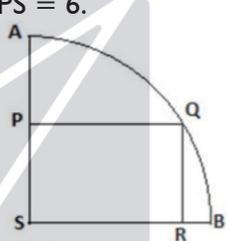
What is the length of the arc AQB?
(a) 5π
(b) 10 π
(c) 14 π
(d) 14

40. Find the word closest in meaning to the word "FUDDLE"
(a) Focus
(b) Confuse
(c) Cheat
(d) Fudge

41. The word "Magniloquent" means:
(a) Mean-minded
(b) Humorous
(c) Miserly
(d) Boastful

42. In the following question, some symbols have been used for certain mathematical operations as indicated below: X for "greater than"; © for "not less than"; ÷ for "not equal to"; Φ for "equal to"; + for "not greater than"; Δ for "less than". Using these symbols, choose the correct alternative for the following question
If pΔqΔr, it does not imply that
(a) pXrXq
(b) pΔrXq

(c) rXqXp
(d) qXpΔr

43. The shape of the curve $y = x^2 - 8x + 18$ is best represented by the sketch

(a)
(b)
(c)
(d)
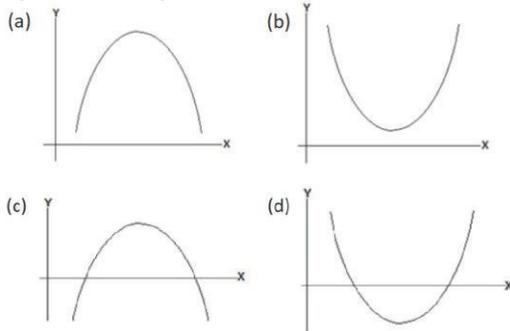
Answer: (b)

44. Which of the following is/are true:
   i. Qatar is the largest exporter of LNG (Liquefied Natural Gas)
   ii. Saudi Arabia is the largest exporter of Petroleum oil.
   iii. Qatar and Saudi Arabia are the members of GCC (Gulf Cooperation Council)
   iv. Qatar is host of FIFA World Cup 2022
   (a) i, ii and iii only
   (b) i, ii and iv only
   (c) ii, iii and iv only
   (d) All of the above

45. If B is a square matrix and $B^2 = B$, what is the value of $(I + B)^3 - 7B$?
   (a) B
   (b) I - B
   (c) I + B
   (d) I

46. Which among the following is the longest bridge over water in India:
   (a) Dhola Sadiya Bridge
   (b) Mahatma Gandhi Setu
   (c) Bandra Worli Sea Link
   (d) Vikramshila Setu

47. Two equal circles of maximum possible size are cut out of a rectangular card of size 16 cm by 8 cm. What is the approximate area of the card paper left after removing the circles?
   (a) 13 cm^2
   (b) 27 cm^2
   (c) 54 cm^2
   (d) 104 cm^2

48. MPC is a

(a) Parliamentary committee that looks after civil matters
(b) Committee that formulates monetary policy of India
(c) A big multinational company
(d) Multilateral forum that decides policy on common interest for member countries.

49. Among the options given, choose the word that is spelt incorrectly:
   1. Picnicking
   2. Fraudulent
   3. Froliking
   4. Filing

50. Half the people on a bus get off at each stop after the first, and no one gets on after the first stop. If only one person gets off at stop number 7, how many people got on to the bus at the first stop?
   (a) 128
   (b) 64
   (c) 32
   (d) 16

51. For the function $f(x)$ whose sketch is provided, examine the statements I, II and III where $f'(x)$ is the value of the first derivative of $f(x)$ and choose the correct option
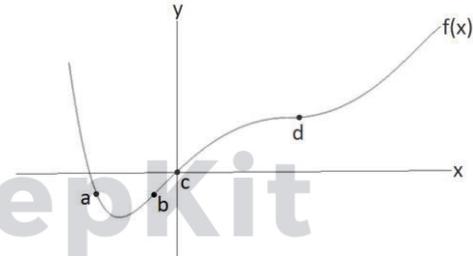
   I. $f'(x) > 0$ at b, $f(x) = 0$ at c
   II. $f(x) < 0$ at a, $f'(x) = 0$ at d
   III. $f(x) > 0$ at d, $f'(x) < 0$ at a
   (a) I and II are true
   (b) II and III are true
   (c) I and III are true
   (d) I, II and III are true

52. Choose the option that fits the blank to complete the sentence
   Although he never learnt to read, his exceptional memory and enquiring mind eventually made his a very _____ man.
   (a) Dedicated
   (b) Erudite

(c) Pragmatic
(d) Benevolent

53. The sum of the series $\frac{2}{3} + \frac{8}{9} + \frac{26}{27} + \frac{80}{81} + \frac{242}{243} +$ …. upto n terms, is

(a) $n - \frac{1}{2}(1 - 3^{-n})$
(b) $n - 1 - 3^{-n}$
(c) $n - 3^{-n}$
(d) None of these

54. Choose the correct word or phrase to complete the English grammar question.
I'll _____ their cat while they are away on holiday.
(a) be looking into
(b) be looking at
(c) be looking after
(d) be looking over

55. The idiom "face the music" means:
(a) conduct a choir
(b) work as a music director
(c) accept difficult or unpleasant consequences
(d) attend a music concert

56. $\lim_{h \to 0} \frac{\sqrt[4]{81+h} - 3}{h}$ equals
(a) 0
(b) 1/4
(c) 1/36
(d) 1/108

57. Look at this series: F2, _____ , D8, C16, B32,... What number should fill the blank?
(a) A16
(b) G4
(c) E4
(d) E3

58. Choose the option that fits the blank to complete the sentence
Rajeev failed the examination because none of his answers were _____ to the questions asked.
(a) Allusive
(b) Revealing
(c) Pertinent
(d) Referential

59. Which bank recently introduced a range of Gender neutral titles (Mx, Ind, M, Mre, Msr, Myr, PR, Sai, Ser and Misc) for transgender and other customers who don't identify as male or female.
(a) Citibank
(b) Standard Chartered
(c) Barclays
(d) HSBC

60. Find the number of triangles in the given figure.

(a) 12
(b) 18
(c) 22
(d) 26

61. Among the options given, choose the word that is spelt incorrectly:
(a) Infinity
(b) Foundling
(c) Mimiking
(d) Arguable

62. If a- b = 1, then the value of $a^3 - b^3 - 3ab$ is
(a) 0
(b) 1
(c) -1
(d) -3

63. The following question consists of a question followed by two statements numbered I and II given below it. You have to decide whether the data provided in the statements are sufficient to answer the question. Read both the statements and give the answer
Among five boys A, B, C, D, E and F, who is the tallest?
I. D is taller than A and C
II. B is shorter than E but taller to D
(a) Data in the statement I alone is sufficient to answer the question but the data in statement II alone is not sufficient to answer the question;
(b) The data in the statement II alone is sufficient to answer the question but the data in statement I alone is not sufficient to answer the question;

(c) Data in both statement I and statement II together are necessary to answer the question;
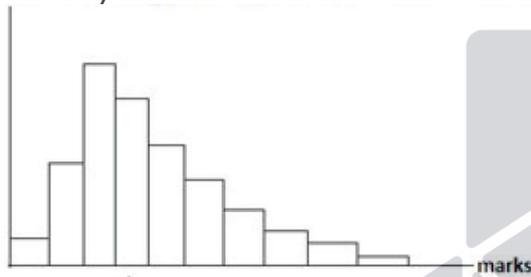
(d) The data either in statement I alone or in statement II alone is sufficient to answer the question

64. Rate of interest on savings account is determined by:
   (a) RBI
   (b) Ministry of Finance
   (c) Indian Bank Association
   (d) Individual Banks

65. If the histogram representation of the marks scored by students in an examination is:

Which of the options is true, regarding the distribution of students' marks in the examination?
   (a) Mean > Median
   (b) Median < Mode
   (c) Mode > Mean
   (d) Standard deviation is negative

66. $(\log_{243} 27).(\log_9 9\sqrt{3})$
   (a) 3/2
   (b) 3/4
   (c) 1/4
   (d) 1/3

67. The sum of the series, $a_1^2 - a_2^2 + a_3^2 - a_4^2 + \ldots\ldots. + a_{2n-1}^2 - a_{2n}^2$, where $a_1, a_2, a_3, \ldots\ldots a_2$ are in arithmetic progression, is
   (a) $\frac{2n-1}{n}(a_1^2 - a_{2n}^2)$
   (b) $\frac{n}{2n-1}(a_1^2 - a_{2n}^2)$
   (c) $\frac{2n-1}{n}(a_{2n}^2 - a_{2n-1}^2)$
   (d) $\frac{n}{2n-1}(a_{2n}^2 - a_{2n-1}^2)$

68. N K Singh Committee was constituted to recommend the Government of India in the field of:
   (a) Goods and Services Taxes
   (b) Fiscal Responsibility and Budget Management Act
   (c) Power sharing between the center and state
   (d) Judicial Activism

69. The river Satluj originates in
   (a) Jammu and Kashmir
   (b) Himachal Pradesh
   (c) Uttarakhand
   (d) Tibet

70. The idiom "the sword of Damocles" means:
   (a) the sharpest sword in the world
   (b) an imminent danger
   (c) the sword presented to Damocles
   (d) have a sharp tongue

71. The most suitable antonym for the word "Abet" will be:
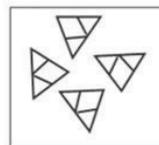   (a) Gamble
   (b) Deter
   (c) Pray
   (d) Release

72. The inequality $\frac{5}{x} < 10$ is equivalent to x
   (a) $x \in (-\infty, -2) \cup (0.5, \infty)$
   (b) $x \in (-\infty, -0.5) \cup (0.5, \infty)$
   (c) $x \in (0.5, \infty)$
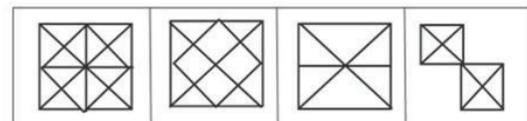   **(d) $x \in (-\infty, 0) \cup (0.5, \infty)$**

73. Which team was defeated by India to claim eleventh junior hockey world cup 2016?
   (a) Germany
   (b) Australia
   (c) Netherlands
   (d) Belgium

74. Find out which of the figure (1), (2), (3) and (4) can be formed from the piece given in the figure (X).

(a) 1
(b) 2

(c) 3
(d) 4

75. If there is a loss of 11 percent in selling an article at Rs. 178, at what price should it be sold to earn a profit of 11 percent?
(a) 200
(b) 232
(c) 222
(d) 242

76. The most suitable antonym for the word "Temerity" will be:
(a) Caution
(b) Bold
(c) Sourness
(d) Preparedness

77. Which of the following has launched 'Dulari Kanya' a special scheme to check infant mortality in the state?
(a) Himachal Pradesh
(b) Haryana
(c) Uttar Pradesh
(d) Arunachal Pradesh

78. Choose the correct word or phrase to complete the English grammar question.
He made his children _____ their homework every afternoon.
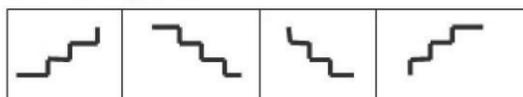**(a) do**
(b) to do
(c) studied
(d) to study

79. Select the suitable figure from the answer figure that would replace the cross mark (X)

Problem Figures:

(A)   (B)   (C)   (D)

Answer Figures:

(1)   (2)   (3)   (4)

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

80. Match the following:

Person
A. Ajay Pal Singh Banga
B. Satya Nadella
C. Shantanu Narayen
D. Sunder Pichai

Company CEO
i. Master Card
ii. Adobe
iii. Google
iv. Microsoft

(a) A-ii, B-iii, C-i, D-iv
(b) A-i, B-ii, C-iii, D-iv
(c) A-iii, B-i, C-iv, D-ii
(d) A-i, B-iv, C-ii, D-iii

81. Ms. Harita Kaur has the distinction of being the first Indian woman
(a) To be inducted in Indian Army
(b) Doctor to create test tube baby
(c) Pilot to fly an aircraft solo in the IAF
(d) Ambassador to a foreign country

82. 'Ace against Odds' is the autobiography of
(a) P. Gopichand
(b) Saina Nehwal
(c) M. S. Dhoni
(d) Sania Mirza

83. GST Bill 2014 is related to which of the following constitutional amendments?
(a) 100
(b) 115
(c) 121
(d) 122

Directions for Questions 84 to 87: Five friends, Amol, Mandar, Piyu, Shashi and Reena attended Sagar's birthday party, where they partook of the sumptuous snacks and dinner. Each of the five friends gifted Sagar a different article — a fountain pen, a cellphone, a shirt, a jacket and an I-Pod and Sagar, in return gifted each of them a different article — a video game, a sweater, a perfume, a calculator and a pair of sunglasses. The following is additional information about the gifts given by the friends and the gifts received from Sagar.

- Amol gifted the shirt and received the video game in return.
- Shashi did not gift the I-Pod but received the perfume in return.

- Mandar did not gift an electronic item and received the calculator in return.
- The person who gifted the jacket received the sweater in return and Reena received the pair of sunglasses.

84. Who among the following gifted the jacket?
(a) Mandar
(b) Shashi
(c) Reena
(d) None of these

85. Which of the following statements is true?
(a) Two of the friends who did not gift electronic items, received electronic items in return
(b) Piyu gifted the jacket and Shashi gifted the I-Pod
(c) Shashi neither gifted nor did he receive an electronic item
(d) The person who gifted the cellphone received the calculator in return

86. Which of the following is the correct combination of friend, article gifted and article received in return?
(a) Piyu-Fountain Pen-Sunglasses
(b) Shashi-I-Pod-Perfume
(c) Reena-I-Pod-Sunglasses
(d) None of these

87. Which of the following is false?
(a) Only one friend whose name does not start with a vowel, received an electronic item in return.
(b) The friend whose name appears last in alphabetical order, gifted an electronic item and received a non-electronic item in return
(c) In alphabetical order the friend who gifted the I-Pod appears before atleast two other friends
(d) The friend whose name in alphabetical order appears in the middle neither gifted nor received an electronic item

Directions for Question 88 to 91: Answer the question on the basis of the information given below:
Mr. Suzuki, a car dealer, sold cars of only two brands, A and B, in the previous year. This year, he introduced a new brand, C. The number of cars of brand A and brand B sold in the previous year were in the ratio 3:2, and the ratio of the number of cars sold in the previous year to that sold in this year is 2:3 for brand A and 2:5 for brand B. Further, the number of cars of brand C sold this year forms 81% of the total number of cars sold this year.

88. Find the number of cars of brand C sold this year, given that a total of 24 cars of brand A were sold in the previous year.
(a) 324
(b) 648
(c) 162
(d) 243

89. What is the percentage increase in the total number of cars sold this year when compared to the total number of cars sold in the previous year?
(a) 400%
(b) 600%
(c) 900%
(d) 1000%

90. In the next year, Mr. Suzuki wants to increase sales by 80%, compared to the total sales this year, by keeping the sales of each of A,B and C at the same level as that in this year and introducing a new brand D. By what percent will the number of cars of brand D (to be sold next year) be more than the total number of cars sold last year?
(a) 400%
(b) 600%
(c) 900%
(d) 700%

91. If a total of 380 cars were sold this year, and the sales of C this year were nil, instead of 81% of total sales, then how many cars of brand A were sold in the previous year?
(a) 140
(b) 120
(c) 100
(d) 160

Directions for Question 92 to 96: Answer on the basis of the information given below:
Five roommates — Randy, Sally, Terry, Uma and Vernon — each do one housekeeping task — mopping , sweeping , laundry, vacuuming,

or dusting — one day a week, Monday through Friday.

- Vernon does not vacuum and does not do his task on Tuesday
- Sally does the dusting, and does not do it on Monday or Friday
- The mopping is done on Thursday
- Terry does his task, which is not vacuuming, on Wednesday
- The laundry is done on Friday, and not by Uma
- Randy does his task on Monday

92. When does Sally do the dusting?
(a) Friday
(b) Monday
(c) Tuesday
(d) Wednesday

93. What task does Terry do on Wednesday?
(a) Vacuuming
(b) Dusting
(c) Mopping
(d) Sweeping

94. What day is the vacuuming done?
(a) Friday
(b) Monday
(c) Tuesday
(d) Wednesday

95. What task does Vernon do?
(a) Vacuuming
(b) Dusting
(c) Mopping
(d) Laundry

96. What day does Uma do her task?
(a) Monday
(b) Tuesday
(c) Wednesday
(d) Thursday

Directions for Question 97 to 100: Read the following passage and answer questions that follow:

In economics as in most other disciplines, we use models to illustrate complex subjects, such as relationships between the economy and the environment. In using these models, however, we should also be sensitive to their limitations.

Models are simplified characterizations of reality. For example, although a road map, by design, leaves out a lot, it is a useful guide to reality. The map shows how various locations relate to each other and gives an overall perspective. It cannot, however, capture the unique details which characterize any particular location. The map highlights only those characteristics that are crucial for the purpose at hand. Through simplification, less is held in view so that more can be understood of what is retained. Models allow us to rigorously study issues which are interrelated and global in scale, but through their selectivity, models may yield conclusions that are wrong. What is omitted may turn out, in retrospect, to be crucial in understanding a particular dimension. Models are therefore useful abstractions that should always be viewed with scepticism.

97. "A map gives an overall perspective" means:
(a) a map simplifies reality
(b) a map highlights important characteristics
(c) a map provides a complete picture
(d) a map provides a useful guide to reality

98. Models simplify reality because:
(a) their conclusions may be wrong
(b) what they omit may be crucial
(c) more can be understood of what is included
(d) they should be viewed with scepticism

99. Which of these statements follow from the above:
i. A model is a map
ii. A map is a model
iii. Models characterize reality
iv. Maps are used in economics
(a) i
(b) iii
(c) ii and iii
(d) iv

100. Models are used to:
(a) show buildings
(b) make maps
(c) illustrate relationships
(d) hide limitations

Answer key

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

Explanatory Answers:

1. $x^2 + y - 5x + 10 = 0$
    The general form of a prabola's equation is either $y = ax^2 + bx + c$ or $x = ay^2 + by + c$.
    $\therefore$ the given equation $x^2 + y - 5x + 10 = 0$ is of parabola.

4. Let the order of the matrix X is n_1 x n_2.
    $A = I - X (X'X)^{-1} X'$
    As A is a matrix of order n x n.
    $\therefore$ I and $X(X'X)^{-1}$ are also of order n x n.
    For $X (X'X)^{-1} X'$
    As we know any tow matrices or eligible for multiplication of the number of columns of Ist matrix is equal to the number of rows of IInd matrix.
    Order of $[\underset{n_2 \times n_1}{X'} \quad \underset{n_1 \times n_2}{X}] = [X'X]_{n_2 \times n_2}$
    $\underset{n_1 \times n_2}{X} \quad [\underset{n_2 \times n_1}{X' \quad X}] \to (X[X'X]^{-1})_{n_1 \times n_2}$
    Now
    $\underset{n_1 \times n_2}{x(X'X)^{-1}} \quad \underset{n_2 \times n_1}{X'} = \underset{n_1 \times n_1}{X(X'X)^{-1}X}$
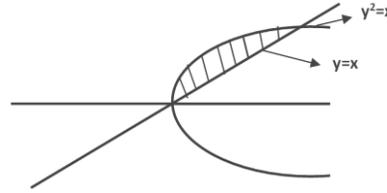   And we know that order of A and $X(X X')^{-1} X'$ must be same.
    $\therefore$ order of $X(X X')^{-1} X'$ must be n x n.

$\therefore n_{I \times} n_{I} = n \times n$

$\therefore$ rows in X must be n.

9. $y^2 = x$ and $y = x$

   Intersection point ($y^2 = x$ and $y = x$)

   $x^2 = x \Rightarrow x = 0, 1$

   $\therefore$ Area $= \int_0^1 (\sqrt{x} - x)dx = \frac{2}{3}x^{3/2} - \frac{x^2}{2}]_0^1$

   $Area = \frac{2}{3} - \frac{1}{2} = \frac{1}{6} \ sq \ unit$

10. $F(x) = \sqrt{x^2 + 1}$

    Domain $= (-\infty, \infty)$

    Range $= [1, \infty]$

12. As two dice are tossed

    $\therefore$ Total number of outcomes $= 6^2 = 36$

    $E = \{(2, 1) (2, 2) (2, 3)…..(2, 6) (4, 1) (4, 2) …. (4, 6) (6, 1) (6,2)…. (6, 6) (5, 3), (3, 5)\}$

    $\therefore P(E) = \frac{20}{36} = \frac{5}{9}$

13. $\sum_{i=1}^{n}(x_i^2 + A^2 - 2Ax_i)$

    $= \sum_{i=1}^{n}(x_i^2 + A^2 - 2Ax_i)$

    $= \sum_{i=1}^{n} x_i^2 + \sum_{i=1}^{n} A^2 - 2A \sum_{i=1}^{n} x_i$

    $\sum_{i=1}^{n} -2A \sum_{i=1}^{n} + nA^2$

18. $y = \sqrt{x}(x + 1)^5 e^x$

    $\therefore log y = \frac{1}{2} log x + 5 \log(x + 1) + x$

    $\frac{1}{y}\frac{dy}{dx} = \frac{1}{2x} + \frac{5}{x+1} + 1$

    $\frac{dy}{dx} = y\left(\frac{1}{2x} + \frac{5}{x+1} + 1\right)$

    $\frac{dy}{dx} = 32e\left[\frac{1}{2} + \frac{5}{2} + 1\right]$

    $\frac{dy}{dx}\Big]_{x=1} = 128e.$

19. According to the question, we have to find the percentage of questions that were attempted by ramya in the exam.

    → Using statement I alone and II alone, we cannot find the percentage of questions that were attempted by Ramya in the exam.

    But, if we use both the statement together then

    Let Ramya → R, Swati → S

    $\therefore R \cap S = 30\%$

    $R \cap S' = \frac{5}{8}R$

    $\Rightarrow R - (R \cap S) = \frac{5}{8}R$

    $\Rightarrow \frac{3}{8}R = 30\%$

    $\Rightarrow R = 80\%$

22. Statement I and II both are true.

28. x = 2y   - (1)

    (According to question) (Using statement I alone)

    x −8 = 2(y− 8)   - (2)

    Using (1) and (2), we can easily find the age of x.

    (using statement II alone)

    x +10 = 2(y + 10)   - (3)

using (1) and (3) also we can easily find the age of x.

31. $P(A \cup B) = 0.7$

$P(A) = 0.4$

A and B are independent events.

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

$\Rightarrow P A \cup B) = P(A) + P(B) - P(A) P(B)$

$0.7 = 0.4 + P(B) - 0.4 P(B)$

$\Rightarrow P(B) = \frac{1}{2} = 0.5$

33. Let x be the weight of the package

$\therefore 65 + \frac{(x-250)}{100} 10 = 155$

$\therefore x = 1150 \, gm.$

$\therefore$ The weight must be lying between 1050 gm and 1150 gm.

but 1145 gm is the only option which is lying between 1050 gm and 1150 gm.

36. There are many matrices through which can easily eliminate the statement I and II

$\therefore$ None of the option is true.

39.

As we have given in the figure PQ=8cm and PS=6cm.

$\therefore$ using pythogars theorem

$\therefore SQ = 10 \, cm.$

$\therefore$ radius $= 10$ cm.

$\therefore$ length of the arc $AQB = \frac{90}{360} \times 2\pi \times 10$

$= 5\pi$

43. $y = x^2 - 8x + 18$

As there are no value of x for which $y = x^2 - 8x + 18$ is zero.

As the slope of $x^2 - 8x + 18$ is $-ve$ and then $+ve$.

$\therefore$ option 2 is the correct answer.

47. Let d be the diameter of the circle.
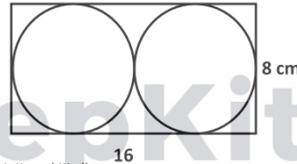
$\therefore 2d = 16$

$d = 8$

r= 4cm.

$\therefore$ Area of remaining paper

$= 16 \times 8 - (2\pi (4)^2)$

$= 128 - 32 \times 3.14$

$= 27.52 \, cm^2 \approx 27 cm^2.$

51. By the graph we can easily conclude that statement I, II, and III all are true.

53. $\frac{2}{3} + \frac{8}{9} + \frac{26}{27} + \frac{80}{81} + \frac{243}{243} + \cdots$

$= 1 - \frac{1}{3} + 1 - \frac{1}{9} + 1 - \frac{1}{27} + \cdots$

$= n - \left(\frac{1}{3} + \frac{1}{9} + \frac{1}{27} + \cdots \right)$

$= n - \frac{1}{3} \frac{\left(1 - \left(\frac{1}{3}\right)^n\right)}{1 - \frac{1}{3}}$

$S = n - \frac{1}{2}(1 - 3^{-n})$

56. $\lim_{h \to 0} \frac{\sqrt[4]{81+h} - 3}{h}$

Which is a $\frac{0}{0}$ form.

∴ by L' Hospital law

$$\lim_{h \to 0} \frac{\frac{1}{4}(81+h)^{-\frac{3}{4}}}{1} = \frac{1}{4 \times 27} = \frac{1}{108}$$

62. a-b = 1

Let a=1, b=0

∴ $a^3 - b^3 - 3ab = 1^3 - 0^3 - 3.1.0 = 1$

65. By taking Suitable example, we can conclude that Mean > Median in the given histogram.

66. $(\log_{243} 27)(\log_9 9\sqrt{3})$

$$= \frac{\log 27}{\log 243} \times \frac{\log 9\sqrt{3}}{\log 9}$$

$$= \frac{\log 3^3}{\log 3^5} \times \frac{\log \frac{3^5}{2}}{\log 3^2} = \frac{3}{5} \times \frac{5}{2} \times \frac{1}{2} = \frac{3}{4}.$$

67. Let $n = 2$

∴ There are 4 terms.

Let $a_1 = 1, a_2 = 2, a_3 = 3, a_4 = 4$ are the terms which are in A.P.

∴ $a_1^2 - a_2^2 + a_3^2 - a_4^2 = 1^2 - 2^2 + 3^2 - 4^2 = 1 - 4 + 9 - 16 = -10$

Option II, is the only option which satisfy.

72. Option IV is the only option which satisfy the inequality.

75. 89% C.P = 178

C. P $= \frac{178}{89} \times 100$

S.P when it is sold at 11% of profit

$= 111\%$ of $\frac{178}{89} \times 100 = Rs. 222.$