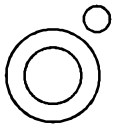
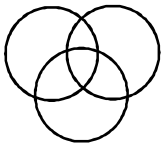
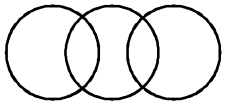
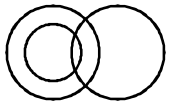
## Section - I : MENTAL ABILITY

❖ ***Q.No. 1 to Q.No. 25 Single correct answer type: In this type there is only one correct answer. Choose only one option for an answer : (Correct Answer : +3, Wrong Answer : –1, Unattempted: 0)***

1. Choose the correct Venn diagram for the following. Musician, Scientist, Artist.

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

2. Anil, introducing a girl in a party , said she is the wife of the grandson of my mother. How is anil related to the girl ?

(A) Father (B) Grandfather (C) Husband (D) Father-in-law

3. Identify the missing term 9,19, 40,_____170.

(A) 80 (B) 82 (C) 83 (D) 84

4. If 11$^{th}$ January 1997 was a sunday. What day of the week was on 7$^{th}$ January 2000?

(A) Friday (B) Sunday (C) Monday (D) Saturday

5. EARN is related to RANE and BON is related to NODB in the same way as TEAR is related to

(A) AERT (B) ATRE (C) ARET (D) REAT

6. A,B,C,D,E are sitting around a circle. If D is an right of A, B is second to the left of C, then who is second to the right of D?

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

7. Rahul puts his timepiece on the table in such a way that at 6 PM hour hand points to north. In which direction the minute hand will point at 9 : 15 PM?

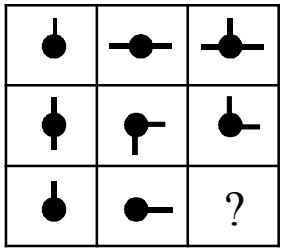
(A) South -East (B) South (C) North (D) West

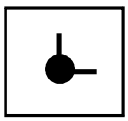
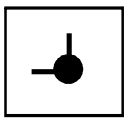
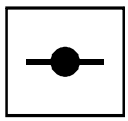
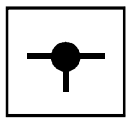
8. 

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

9. 4,18,48,100,____. ?

(A) 150 (B) 163 (C) 180 (D) 210

10. 

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

11. A merchant has 1000 kg of sugar part of which he sells at 8% profit and the rest at 18% profit. He gains 14% on the whole. The quantity sold at 18 % profit is

(A) 400kg (B) 560 kg (C) 600 kg (D) 640 kg

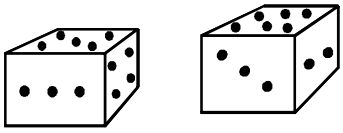
12. Neena returned house 3 days earlier than the time she had told mother, Neen's sister Veena reached fine days later than the day Neena was supposed to return. If Neena returned on Tursday, on what day did Veena return___

(A) Friday (B) Saturday (C) Wednesday (D) None

13. Which of the following animal is different from the rest

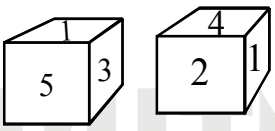
(A) Chicken (B) Snake (C) Frog (D) Crocodile

14. Two positions of a dice are shown below. If 1 is at the bottom which number will be on the top?



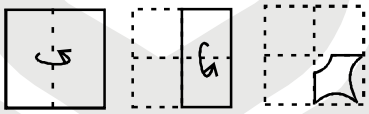
(A) 4 (B) 3 (C) 2 (D) 5

15. Two position of dice are shown dice and cube below. Identify the number opposite to face numbered 2?

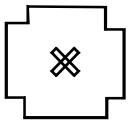
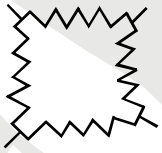
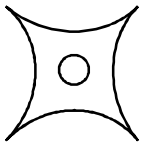



(A) 6 (B) 3 (C) 1 (D) 4

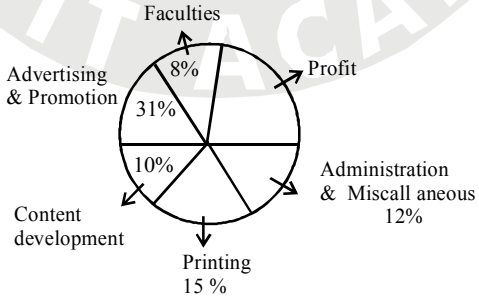
16. A paper is folded in 3 steps in the given sequence & then cut___.



If the paper is opened again, identify the shape formed.

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

17. If sales made by XYZ in year 2015 is crores, then find the expense inward on printing in 2015




(A) 10 Crores (B) 5 Crores (C) 9 Crores (D) 12 Crores

18. If a mirror is placed on line MN, then identify correct image of given word.

W A T E R

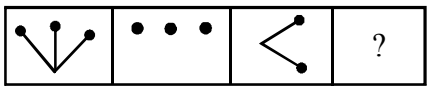
(A) Я E ⊥ A W (B) Я Ǝ ⊥ A W

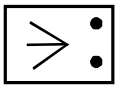
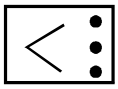
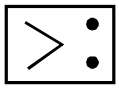
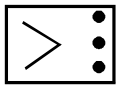
(C) Я Ǝ T A W (D) Я Ǝ ⊥ A M

19. Identify next number in the sequence 15, 29, 56, 108, 208, ?

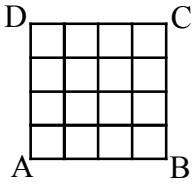
(A) 404 (B) 400 (C) 416 (D) 410

20. Select suitable figure following the sequence given



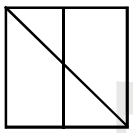
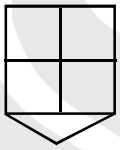
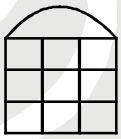
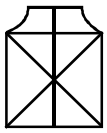

(A)  (B)  (C)  (D) 

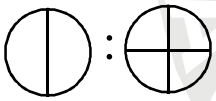
21. Identify number of squares in the given figure

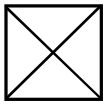


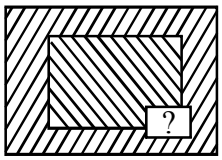

(A) 16 (B) 9 (C) 25 (D) 30

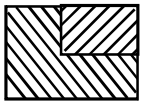
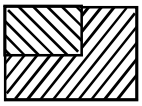
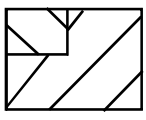
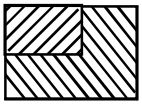
22. Which of the following contains the given image

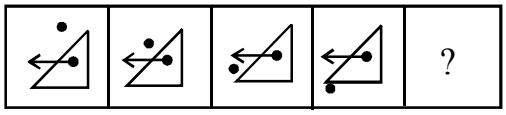
(A)  (B)  (C)  (D) 

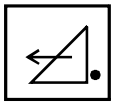
23. If  then  : ?

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

24. 


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

25. 


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

## Section - II : SCIENCE

❖ ***Q.No. 26 to Q.No.35 Single correct answer type: In this type there is only one correct answer. Choose only one option for an answer : (Correct Answer : +3, Wrong Answer : –1, Unattempted: 0)***

26. The least count of a vernier calliper is 0.01 cm and if the zero mark of the vernier scale is to the right of zero of the main scale and the vernier coinciding is 7 when the jaws are in contact, then the zero error is _____ cm.

(A) $+ 6 \times 0.01$ (B) $+ 7 \times 0.01$ (C) $- 7 \times 0.01$ (D) $- 6 \times 0.01$

27. A body having a mass 100 gram is allowed to fall freely under the action of gravity. Its kinetic energy after 10 seconds is $(\text{take } g = 1000 \text{ cm/sec}^2)$

(A) 5 joules (B) 50 joules (C) 500 joules (D) 5000 joules

28. If vectors $2\hat{i} + 2\hat{j} - 2\hat{k}$, $5\hat{i} + y\hat{i} + \hat{k}$ are perpendicular to each other. The value of 'y' is

(A) 4 (B) – 4 (C) – 2 (D) 2

29. An electron will have highest energy in the set

(A) 3, 2, ,1, 1/2 (B) 4, 2, –1, 1/2 (C) 4,1,0,–1/2 (D) 5,0,0,1/2

30. Metals are lustrous in nature, having shiny appearance. Arrange the reasons given below in a sequence.

(A) Emission of radiation or light energy by excited electrons make a metals shiny in appearance

(B) The electrostatic forces of attraction between metal ions and the mobile electrons is called metallic bond

(C) The positive metal ions are surrounded by pool of electrons

(D) When light falls on the crystal, electrons get excited

31. The percentage of nitrogen in urea is about

(A) 46 (B) 85 (C) 18 (D) 28

32. Alikunhi is famous for development of the technique of

(A) hypophysation (B) composite fish culture

(C) mariculture (D shell culture

33. The botanical name if Sunn hemp is

(A) Crotolaria juncea (B) Lens culinaris

(C) Trifolium alexandrium (D) Sesbania aculeata

34. Plasmolysis in a plant cell is defined as

(A) Break down (lysis) of plasma membrane in hypotonic medium.

(B) Shrinkage of cytoplasm in hypertonic medium.

(C) Shrinkage of nucleoplasm.

(D) None of them

35. Which of the following soil is transported by air?

(A) alluvial (B) aeolian (C) elluvial (D) glacial

❖ ***Q.No. 36 to Q.No.40 Multiple correct answer type: In this type there are one or more than one correct answer. Marks will be awarded only if all the correct options are marked.***

**(Correct Answer : +4, Wrong Answer : 0)**

36. A geostationary satellite is going round the earth in an orbit. Then which of the following statements are true ?

(A) It is like a freely falling body (B) It possesses acceleration throughout its journey

(C) It is moving with constant speed (D) It is moving with constant velocity

37. Write the following statements in a sequential order to find the depth of the ocean bed by using sonar.

(a) The depth of the ocean bed can be found by $d = \frac{vt}{2}$.

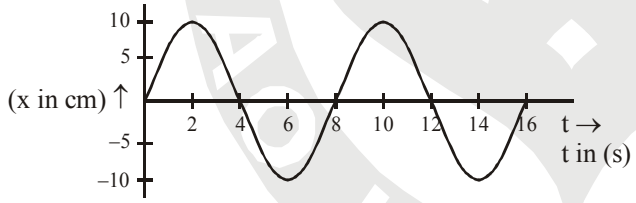
(b) At the bottom of a ship two devices, one is transmitter which produces ultrasonics and a receiver for the detection of the reflected ultrasonics from the ocean bed are fixed.

(c) The velocity of ultrasonics in ocean water is 'v' and the time taken to receive the reflected ultrasonics from the ocean bed be 't'.

(d) If the depth of ocean bed is 'd', then $v = \frac{d + d}{t} = \frac{2d}{t}$.

(A) a,b,c,d (B) b,c,d,a (D) d,a,b,c (D) c,a,b,d

38.




The following graph shows the displacement of the bob from mean position versus time. The time period and the amplitude of the bob are

(A) T = 4 s (B) A = 5 cm (C) T = 8 s (D) A = 10 cm

39. Which among the following elements cause water pollution

(A) Mercury (B) Lead (C) Arsenic (D) $CO_2$

40. Regarding successful forest conservation strategy, find the incorrect statements given here

(a) Protection of animals at the highest trophic level

(b) Protection of only consumers

(c) Protection of only herbivores

(d) Comprehensive programme to protect all the physical and biological components

(A) (a) only (B) (b) only (C) (d) only (D) Both (b) & (c)

❖ ***Q.No.41 Matrix Match Type: In this type statements are given in 2 columns which have to be matched. The statements in Column – I are labeled with choices A, B, C and D, while the statements in Column- II are labeled with choices p,q,r,s and t. For each option in column-I, there is only one correct option available in column-II :***

***(Correct Answer : + 1.25 marks for each correct match, Wrong Answer : 0)***

41. Match the column

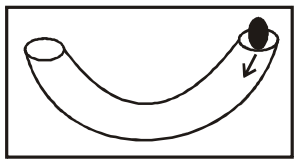
| **Column – I** | **Column – II** |
|---|---|
| (A) Elastic potential energy | (p) increases kinetic energyx |
| (B) Simple pendulum | (q) $\sqrt{\frac{GM}{R}}$ |
| (C) Work | (r) effect of latitude on 'g' |
| (D) $g_{equator} < g_{poles}$ | (s) stretched rubber band |
| | (t) time period changes with change in length |

❖ ***Q.No. 42 to Q.No.46 Integer type: The answer to each question is an integer ranging from 0 to 9 :***

***(Correct Answer : +4, Wrong Answer : 0)***

42. Calculate the time of flight of a body which is thrown upto a height of 5 m from the ground.

43. A marble is droped into a friction less U-tube as shown in the figure. If the tube is semicircular with mean radius 5 cm and the mass of the ball is 2 gram, find its velocity at the bottom of tube. Take $g = 10\ ms^{-2}$.



44. The period to which elements with atomic number 47 belongs is

45. Molecular formula of acetic acid is $CH_3COOH$. The number of atoms present in its empirical formula is

46. From the given list, find out the total number of infections diseases.

Typhoid, Leprosy, Leukemia, Marasms, Measles, Tuberculosis, Diabetes

## Section - III : MATHEMATICS

❖ ***Q.No. 47 to Q.No.56 Single correct answer type: In this type there is only one correct answer. Choose only one option for an answer : (Correct Answer : +3, Wrong Answer : –1, Unattempted: 0)***

47. If $A=\{1,2,3\}$ and $B=\{2,6,7\}$, then $(A-B)\cup(B-A)=$

(A) $\phi$ (B) $\mu$ (C) $\{1,2,3,6,7\}$ (D) $\{1,3,6,7\}$

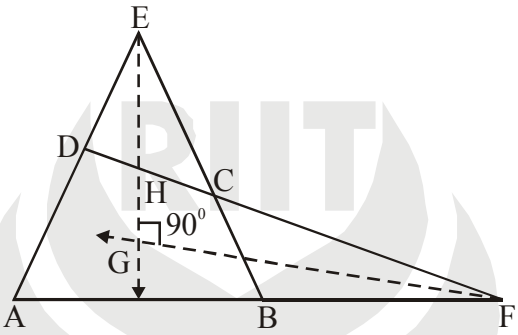
48. The pair of linear equations $2x+5y=k$ and $29x+15y=18$ has infinitely by many solutions if

(A) $k=3$ (B) $k=6$ (C) $k=9$ (D) $k=18$

49. If $\alpha,\beta$ are the roots of $ax^2-2bx+c=0$, then $\alpha^3\beta^3+\alpha^2\beta^3+\alpha^3\beta^2=$

(A) $\frac{c^2(2b+c)}{a^3}$ (B) $\frac{bc^2}{a^3}$ (C) $\frac{c^3}{a^3}$ (D) $\frac{c^2(b+2c)}{a^3}$

50. In the given figure, ABCD is a cyclic quadrilateral, $\angle ABC=70^0$, $\overrightarrow{FG}$ bisects $\angle CFA$, $\overrightarrow{EG}$ bisects $\angle DEB, \angle DCE=60^0$ and $\angle EGF=90^0$. Find $\angle HEC$




(A) $20^0$ (B) $40^0$ (C) $25^0$ (D) $45^0$

51. The vertices of a triangle are (6,6) , (0,6) and (6,0). The distance between its circumcentre and centroid is

(A) $2\sqrt{2}$ (B) 2 (C) $\sqrt{2}$ (D) 1

52. If the numbers a, b, c, d , e form an A.P., then the value of $a-4b+6c-4d+e$ is

(A) 0 (B) 2 (C) – 1 (D) 1

53. If $\sec\theta+\tan\theta=\frac{4}{3}$, then $\sec\theta\tan\theta=$

(A) $\frac{175}{24}$ (B) $\frac{25}{576}$ (C) $\frac{27}{576}$ (D) $\frac{175}{576}$

54. A bag contains three green marbles, four blue marbles, and two orange marbles. If a marbles is picked at random, then the probability that it is not an orange marble is

(A) $\frac{1}{4}$ (B) $\frac{1}{3}$ (C) $\frac{4}{9}$ (D) $\frac{7}{9}$

55. The mean of a set of 12 observations is 10 and of another set of 8 observations is 12. The mean of combined set is _____

(A) 11 (B) 10.8 (C) 11.2 (D) 0.6

56. If the sum of the zeroes of the quadratic polynomial $f(t)=kt^2+2t+3k$ is equal to the product, find the value of k.

(A) $\frac{-2}{3}$ (B) $\frac{2}{3}$ (C) $\frac{1}{3}$ (D) $\frac{-1}{3}$

❖ ***Q.No. 57 to Q.No.61 Multiple correct answer type: In this type there are one or more than one correct answer. Marks will be awarded only if all the correct options are marked.***
***(Correct Answer : +4, Wrong Answer : 0)***

57. If the median of the distribution given below is 28.5, then which is true statement ?

| Class interval | 0-10 | 10 – 20 | 20 – 30 | 30 – 40 | 40 – 50 | 50 – 60 | Total |
|---|---|---|---|---|---|---|---|
| No.of students | 5 | x | 20 | 15 | y | 5 | 60 |

(A) $x = 8$ (B) $y = 7$ (C) $x + y = 15$ (D) $x - y = 1$

58. The coordinates of the mid points of the line segment joining the points (3p, 4) and (–2,2q) are (5,p) then

(A) $p = 4$ (B) $q = 6$ (C) $p + q = 6$ (D) $p - q = 2$

59. If $\alpha, \beta$ are roots of the equation $x^2 - 5x + 6 = 0$, find the value of $\alpha^2 - \beta^2$

(A) 5 (B) 13 (C) – 13 (D) – 5

60. A relation $R : Z \to Z$ is such that $R = \{(x, y) / y = 2x + 1\}$ is a

(A) one to one relation (B) many to one relation (C) one to many relation (D) many to many relation

61. If $\begin{bmatrix} 2 & 4 \\ p & 1 \end{bmatrix}\begin{bmatrix} -1 & 2 \\ 3 & 1 \end{bmatrix} = \begin{bmatrix} 10 & q \\ -2 & r \end{bmatrix}$ then

(A) $pq = 4(r - 1)$ (B) $pq = 4r$ (C) $p + q = r + 2$ (D) $p + q = r - 1$

❖ ***Q.No.62 Matrix Match Type: In this type statements are given in 2 columns which have to be matched. The statements in Column – I are labeled with choices A, B, C and D, while the statements in Column- II are labeled with choices p,q,r,s and t. For each option in column-I, there is only one correct option available in column-II :***
***(Correct Answer : + 1.25 marks for each correct match, Wrong Answer : 0)***

62. Match the column

| **Column_I** | **Column_II** |
|---|---|
| (A) Sum of the first 20 terms of A.P. –6,0,6,12....is | p) 7500 |
| (B) Sum of the first 14 terms of and A.P. is 1050 and its first term is 10. Its $20^{th}$ term is | q) 1020 |
| (C) Sum of the A.P. 1 + 3 + 5 + ....+ 199 is | r) 200 |
| (D) Sum of all odd numbers between 100 and 200 is | s) 10000 |
| | t) 100 |

❖ ***Q.No. 63 to Q.No.67 Integer type: The answer to each question is an integer ranging from 0 to 9 :***
***(Correct Answer : +4, Wrong Answer : 0)***

63. If $\frac{5 - \sqrt{3}}{2 + \sqrt{3}} = a + b\sqrt{3}$, then $a + b$ is equal to

64. If number of subset of $\{\{1\}. \{2,3\}, 4, 5\}$ is $2^{\lambda}$, then $\lambda$ is equal to

65. If volume of hollow sphere of outer radius 9 cm and inner radius 6 cm is $\lambda\pi\,cm^3$, then $\frac{\lambda}{171}$ is

66. If $a, 2(a + 5)$ and $2(4a - 5)$ are in A.P., find value of a.

67. If $A = \begin{bmatrix} p & -1 \\ q & 1 \end{bmatrix}$, $B = \begin{bmatrix} 1 & -1 \\ 1 & 2 \end{bmatrix}$ and $(A + B)^2 = A^2 + 2AB + B^2$, then $q - p$ is equal to

# ANSWER KEY

## Section - I : MENTAL ABILITY

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | (A) | 2. | (D) | 3. | (C) | 4. | (D) | 5. | (A) | 6. | (C) |
| 7. | (D) | 8. | (A) | 9. | (C) | 10. | (A) | 11. | (C) | 12. | (A) |
| 13. | (A) | 14. | (B) | 15. | (B) | 16. | (C) | 17. | (C) | 18. | (C) |
| 19. | (D) | 20. | (C) | 21. | (D) | 22. | (D) | 23. | (C) | 24. | (B) |
| 25. | (C) | | | | | | | | | | |

## Section - II : SCIENCE

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 26. | (B) | 27. | (C) | 28. | (B) | 29. | (B) | 30. | (B) | 31. | (A) |
| 32. | (A) | 33. | (A) | 34. | (B) | 35. | (B) | | | | |
| 36. | (ABC) | 37. | (ABCD) | 38. | (CD) | 39. | (ABC) | 40. | (ABD) | | |
| 41. | $(A-s; B-t; C-p; D-r)$ | | | | | | | | | | |
| 42. | (2) | 43. | (1) | 44. | (5) | 45. | (4) | 46. | (4) | | |

## Section - II : MATHEMATICS

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 47. | (D) | 48. | (B) | 49. | (A) | 50. | (C) | 51. | (C) |
| 52. | (A) | 53. | (D) | 54. | (D) | 55. | (B) | 56. | (A) |
| 57. | (ABCD) | 58. | (ACD) | 59. | (AD) | 60. | (A) | 61. | (AC) |
| 62. | $(A-s; B-r; C-p; D-q)$ | | | | | | | | |
| 63. | (6) | 64. | (4) | 65. | (4) | 66. | (6) | 67. | (1) |