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Test Booklet Code

E4

Aptitude Cum Scholarship Test

Q. No.	Subject	Nature of Questions	No. of Questions	Marks	Negative	Total
1 to 20	SECTION - I	MCQ	20	+ 4	0	80
	MENTAL ABILITY					
21 to 40	SECTION - II		20	+ 4	0	80
	SCIENCE					
41 to 60	SECTION - III		20	+ 4	0	80
	MATHEMATICS					
TOTAL				TOTAL	240	

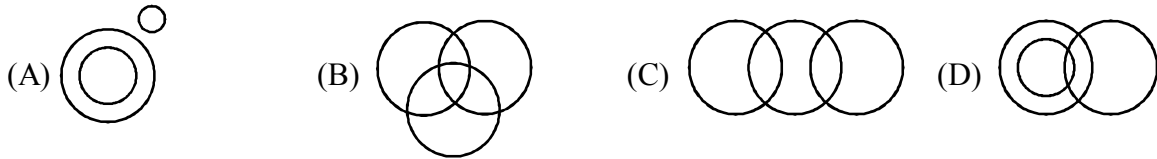
Important Instructions:

1. The test is of 1 hours 30 min duration and Test Booklet contains 60 questions. Each question carries 4 marks. For each correct response, the candidate will get 4 marks. For each incorrect response Zero marks. The maximum marks are 180.
2. Use Blue/Black Ball point Pen only for writing particulars on this page/marking responses.
3. Rough work is to be done on the space provided for this purpose in the Test Booklet only.
4. On completion of the test, the candidate must hand over the Answer Sheet to the Invigilator before leaving the Room/ Hall. *The candidates are allowed to take away this Test Booklet with them.*
5. The CODE for this Booklet is E4.
6. The candidates should ensure that the Answer Sheet is not folded. Do not make any stray marks on the Answer Sheet. Do not write your Roll No. anywhere else except in the specified space in the Test Booklet/Answer Sheet.
7. Each candidate must show on demand his/her Admission Card to the Invigilator.
8. No candidate, without special permission of the Superintendent or Invigilator, would leave his/her seat.
9. Use of Electronic/Manual Calculator is prohibited.
10. The candidates are governed by all Rules and Regulations of the examination with regard to their conduct in the Examination Hall. All cases of unfair means will be dealt with as per Rules and Regulations of this examination.
11. No part of the Test Book let and Answer Sheet shall be detached under any circumstances.
12. The candidates will write the Correct Test Booklet Code as given in the Test Booklet / Answer Sheet in the Attendance Sheet.

Section - I : MENTAL ABILITY

❖ *Q.No. 1 to Q.No. 20 Single correct answer type: In this type there is only one correct answer. Choose only one option for an answer : (Correct Answer : +4, Wrong Answer : 0, Unattempted: 0)*

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



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 11th January 1997 was a Sunday. What day of the week was on 7th 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?

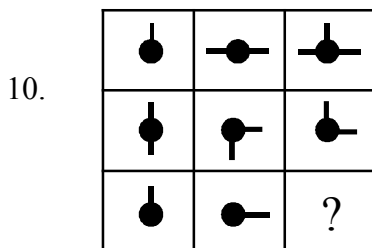
- (A) South -East (B) South (C) North (D) West

8. :

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

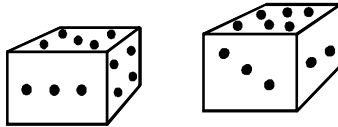
9. 4, 18, 48, 100, _____, ?

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

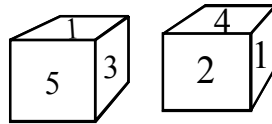


- (A) (B) (C) (D)

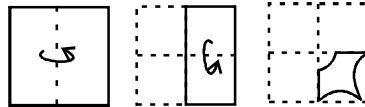
11. A merchant has 1000 kg of sugar part of which he sells at 8% profit and the rest at 18% profit. He gains 14% on the whole. The quantity sold at 18 % profit is
 (A) 400kg (B) 560 kg (C) 600 kg (D) 640 kg
12. Neena returned home 3 days earlier than the time she had told mother, Neen's sister Veena reached five days later than the day Neena was supposed to return. If Neena returned on Thursday, 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?



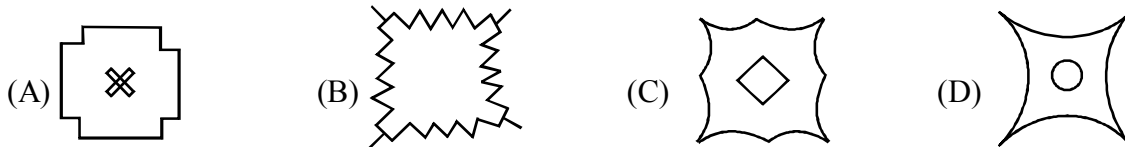
- (A) 4 (B) 3 (C) 2 (D) 5
15. Two position of dice are shown dice and cube below. Identify the number opposite to face numbered 2?



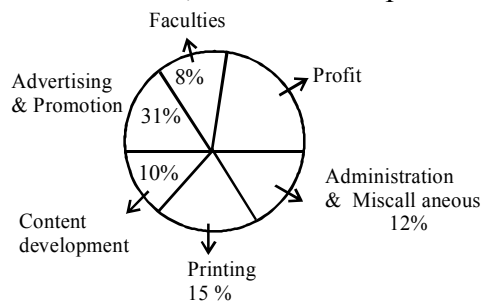
- (A) 6 (B) 3 (C) 1 (D) 4
16. A paper is folded in 3 steps in the given sequence & then cut ____.



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



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.



- (A) Я E L A W (B) Я E L A W
 (C) Я E T A W (D) Я E L A W

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

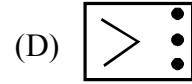
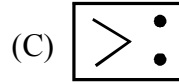
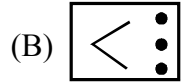
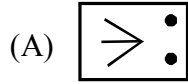
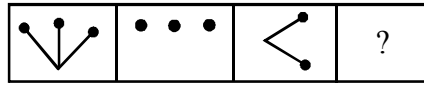
(A) 404

(B) 400

(C) 416

(D) 410

20. Select suitable figure following the sequence given



Section - II : SCIENCE

- ❖ *Q.No. 21 to Q.No. 30 Single correct answer type: In this type there is only one correct answer. Choose only one option for an answer : (Correct Answer : +4, Wrong Answer : 0, Unattempted: 0)*
21. 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) $- 6 \times 0.01$
22. A body having a mass 100 gram is allowed to fall freely under the action of gravity. Its kinetic energy after 10 seconds is (take $g = 1000 \text{ cm/sec}^2$)
(A) 5 joules (B) 50 joules (C) 500 joules (D) 5000 joules
23. If vectors $2\hat{i} + 2\hat{j} - 2\hat{k}$, $5\hat{i} + y\hat{j} + \hat{k}$ are perpendicular to each other. The value of 'y' is
(A) 4 (B) -4 (C) -2 (D) 2
24. 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
25. 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
26. The percentage of nitrogen in urea is about
(A) 46 (B) 85 (C) 18 (D) 28
27. Alikunhi is famous for development of the technique of
(A) hypophysation (B) composite fish culture
(C) mariculture (D) shell culture
28. The botanical name if Sunn hemp is
(A) *Crotalaria juncea* (B) *Lens culinaris*
(C) *Trifolium alexandrium* (D) *Sesbania aculeata*
29. 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
30. Which of the following soil is transported by air?
(A) alluvial (B) aeolian (C) elluvial (D) glacial

❖ **Q.No. 31 to Q.No. 35 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)

31. 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

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

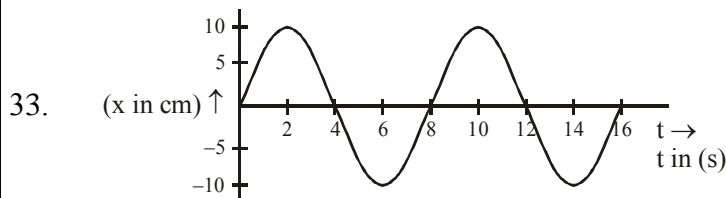
(a) The depth of the ocean bed can be found by $d = \frac{vt}{2}$.

(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 (C) d,a,b,c (D) c,a,b,d



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

34. Which among the following elements cause water pollution

- (A) Mercury (B) Lead (C) Arsenic (D) CO₂

35. 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.36 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 : + 4 marks for each correct match, Wrong Answer : 0)

36. Match the column

Column – I

Column – II

(A) Elastic potential energy

(p) increases kinetic energy

(B) Simple pendulum

$$(q) \sqrt{\frac{GM}{R}}$$

(C) Work

(r) effect of latitude on 'g'

(D) $g_{\text{equator}} < g_{\text{poles}}$

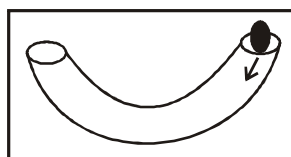
(s) stretched rubber band

(t) time period changes with change in length

- ❖ **Q.No. 37 to Q.No. 40 Integer type:** The answer to each question is an integer ranging from 0 to 9 :

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

37. Calculate the time of flight of a body which is thrown upto a height of 5 m from the ground.
38. A marble is dropped 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 $g = 10 \text{ ms}^{-2}$.

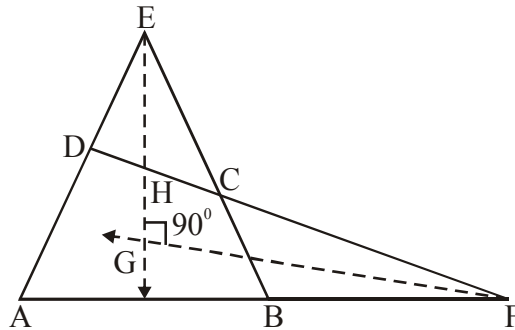


39. The period to which elements with atomic number 47 belongs is
40. Molecular formula of acetic acid is CH_3COOH . The number of atoms present in its empirical formula is

Section - III : MATHEMATICS

❖ *Q.No. 41 to Q.No.50 Single correct answer type: In this type there is only one correct answer. Choose only one option for an answer : (Correct Answer : +4, Wrong Answer : 0, Unattempted: 0)*

41. If $A = \{1,2,3\}$ and $B = \{2,6,7\}$, then $(A - B) \cup (B - A) =$
 (A) ϕ (B) μ (C) $\{1,2,3,6,7\}$ (D) $\{1,3,6,7\}$
42. 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) $k = 18$
43. If α, β 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) $\frac{c^2(b+2c)}{a^3}$
44. In the given figure, ABCD is a cyclic quadrilateral, $\angle ABC = 70^\circ$, \overline{FG} bisects $\angle CFA$, \overline{EG} bisects $\angle DEB$, $\angle DCE = 60^\circ$ and $\angle EGF = 90^\circ$. Find $\angle HEC$



- (A) 20° (B) 40° (C) 25° (D) 45°
45. 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
46. 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
47. 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) $\frac{175}{576}$
48. 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) $\frac{7}{9}$
49. 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
50. 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. 51 to Q.No. 55 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)**

51. 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) $x - y = 1$
52. 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) $p - q = 2$
53. If α, β 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
54. A relation $R : Z \rightarrow Z$ 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
55. 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.56 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 : + 4 marks for each correct match, Wrong Answer : 0)

56. Match the column

Column_I

- (A) Sum of the first 20 terms of A.P. $-6, 0, 6, 12, \dots$ is
 (B) Sum of the first 14 terms of and A.P. is 1050 and its first term is 10. Its 20th term is
 (C) Sum of the A.P. $1 + 3 + 5 + \dots + 199$ is
 (D) Sum of all odd numbers between 100 and 200 is

Column_II

- p) 7500
 q) 1020
 r) 200
 s) 10000
 t) 100

- ❖ **Q.No. 57 to Q.No. 60 Integer type: The answer to each question is an integer ranging from 0 to 9 : (Correct Answer : +4, Wrong Answer : 0)**

57. If $\frac{5 - \sqrt{3}}{2 + \sqrt{3}} = a + b\sqrt{3}$, then $a + b$ is equal to
58. If number of subset of $\{\{1\}, \{2, 3\}, 4, 5\}$ is 2^λ , then λ is equal to
59. If volume of hollow sphere of outer radius 9 cm and inner radius 6 cm is $\lambda \pi \text{ cm}^3$, then $\frac{\lambda}{171}$ is
60. If $a, 2(a + 5)$ and $2(4a - 5)$ are in A.P., find value of a .

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)

Section - II : SCIENCE

21. (B) 22. (C) 23. (B) 24. (B) 25. (B) 26. (A)
27. (A) 28. (A) 29. (B) 30. (B)
31. (ABC) 32. (ABCD) 33. (CD) 34. (ABC) 35. (ABD)
36. $(A - s; B - t; C - p; D - r)$
37. (2) 38. (1) 39. (5) 40. (4)

Section - II : MATHEMATICS

41. (D) 42. (B) 43. (A) 44. (C) 45. (C)
46. (A) 47. (D) 48. (D) 49. (B) 50. (A)
51. (ABCD) 52. (ACD) 53. (AD) 54. (A) 55. (AC)
56. $(A - s; B - r; C - p; D - q)$
57. (6) 58. (4) 59. (4) 60. (6)