Nirmal Vidya

I I T A C A D E M Y

ADMISSION TEST

Two Year Classroom Program

(XI STUDYING)

IQ & PCM

Time: 120 Min. **Maximum Marks: 175**

INSTRUCTIONS

Please read the instructions carefully. You are allotted 5 minutes specifically for this purpose.

1. *There are **105** questions in this paper.*
2. *Each question has only ONE, correct answer. In case you wish to change an answer, erase the old answer and mark your fresh choice.*
3. *For each correct answer in IQ 2 marks and PCM 3 marks will be awarded. For each wrong answer 1 mark will be deducted.*
4. *Question No. 1 to 20 of IQ, 21 to 35 of Physics, 36 to 50 of Chemistry and 51 to 65 of Mathematics.*
5. *Use of calculator is not permitted.*
6. *Use of Logarithmic table is not permitted.*
7. *Darken the bubble by pencil only.*
8. *Write your Roll number, Name at the specified space on the OMR Sheet.*
9. *All the notations used in this paper are standard.*

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TO BE FILL IN CAPITAL LETTERS

NAME OF THE STUDENT: _____

FATHER NAME : _____

ROLL NO : _____ **TEST DATE:** _____

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IQ

Direction: (Q. 1 – 4) In each of the following questions, a number series is given with one term missing. Choose the correct alternative that will continue the same pattern and fill in the blank spaces :

1. 2, 9, 28, 65, (…..)
   (A) 121 (B) 195
   (C) 126 (D) 103

2. 2, 5, 9, (…..), 20, 27
   (A) 14 (B) 16
   (C) 18 (D) 24

3. –2, 0, 2, 8, 14, (…..), 34
   (A) 24 (B) 22
   (B) 20 (D) 18

4. 4, 5, 9, 18, 34, (…..)
   (A) 43 (B) 49
   (C) 50 (D) 59

Directions (Questions 5 – 6) : In each of the following questions, a matrix of certain characters is given. These characters follow a certain trend, column-wise. Find out this trend and choose the missing character accordingly.

5.

1	3	7
5	12	14
25	?	28
125	192	56

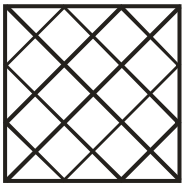
(A) 64 (B) 56
(C) 48 (D) 40

6.

7	11	14
8	?	10
9	10	16
6	10	8

(A) 18 (B) 20 (C) 9 (D) 16

7. How many triangles are in the below figure?



(A) 28 (B) 32 (C) 36 (D) 40

8. In a row of 21 girls, when Monika was shifted by four places towards the right, she beccomes 12th from the left end. What was her earlier position from the right end of the row?
(A) 9th (B) 10th
(C) 11th (D) 14th

9. A is the widow of B, B and C were the only children of E, C is unmarried and is a doctor. D is the grand daughter of E and studies science. How is A related to D?
(A) Aunt (B) Mother
(C) Sister (D) Sister-in-law

10. A man goes 5 km east, then he turns right and goes 4 km, then he turns left and goes 5 km. Which direction is the from the starting point
(A) North-west (B) North-east
(C) South-East (D) West

11. A starts from his office and walks 3 km. towards north. Then he turns right and walks 2 km. and then right and walks 5 km. then again right and walks 2 km. and then right and walks 2 km. When is he from the starting point.
(A) 5 km. (B) 10 km.
(C) 20 km. (D) in his own office

Directions (Q. 12 – 13) : In the following questions, select the one which is different from the other.

12. (A) SESSION (B) MONTH
(C) WEEK (D) FORTNIGHT

13. (A) ADIOVF (B) DGKOTX
(C) BEJQZK (D) GIKMOQ

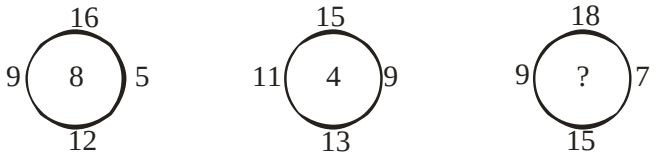
14. 'Calf' is related to 'Cow' in the same way as 'Colt' is related to _____
(A) Mule (B) Donkey
(C) Lion (D) Dog

15. Between two book-ends in your study are displayed your five favourite puzzle books. If you decide to arrange the five books in every possible combination and moved just one book every minute, how long would it take you?
(A) 1 hour (B) 2 hours
(C) 3 hours (D) 4 hours

16. Which word cannot be formed by using the letters of the given word?
C O R R I G E N D U M
(A) GENDER (B) ERROR
(C) MURDER (D) DANGER

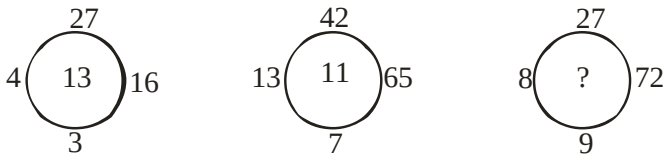
Direction : (Q. 17 – 18) Find the missing number (?) in the circles

17.



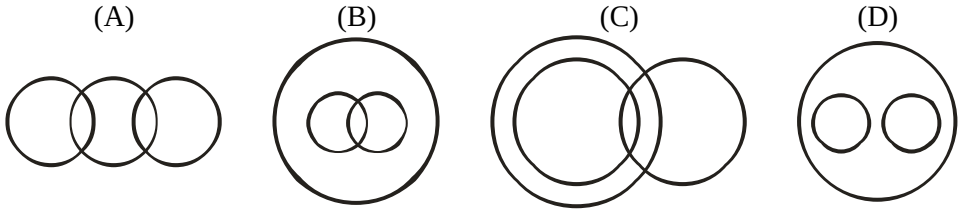
(A) 24 (B) 5
(C) 28 (D) 22

18.



(A) 9 (B) 12
(C) 15 (D) 18

Direction : (Q. 19 – 20) In the following circle figure which one shows the best relationship to the given sets of things



19. Frog, Terrestrial, Aquatic

20. Males, Brothers, Doctors

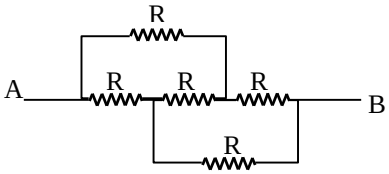
PHYSICS

21. Six charges each equal to +Q are placed at the corners of a regular hexagon of each side x. What is the electric potential at the intersection of the diagonals?

(A) $\frac{1}{4\pi\varepsilon_o}\frac{36Q}{x}$ (B) $\frac{1}{4\pi\varepsilon_o}\frac{6Q}{x}$

(C) $\frac{1}{4\pi\varepsilon_o}\frac{Q}{x}$ (D) zero

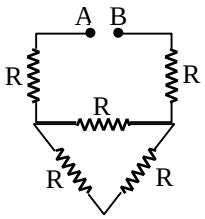
22. What is the resistance across A and B in the figure?



(A) $\frac{R}{5}$ (B) $\frac{R}{3}$

(C) R (D) 3R

23. What is the equivalent resistance across A and B in figure, if R = 3 Ω?



(A) 9 Ω (B) 12 Ω

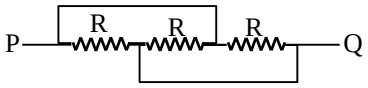
(C) 15 Ω (D) 8 Ω

24. A wire of radius r has resistance R. If its is stretched to a wire of r/2 radius, then the resistance becomes

(A) 2R (B) 4R

(C) 16R (D) zero

25. The equivalent resistance between points P and Q is



(A) R (B) R/2

(C) R/3 (D) R/4

26. Force between two parallel current carrying conductors is F. If the current in each conductor is doubled, the force between them will be

(A) 0.25 F (B) 0.50 F

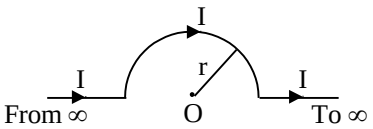
(C) 2 F (D) 4 F

27. No force acts on the charge fired through a magnetic field, when the angle between its velocity and magnetic field is

(A) π (B) $\frac{3\pi}{4}$

(C) $\frac{\pi}{2}$ (D) $\frac{\pi}{4}$

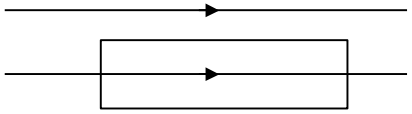
28. What is the magnetic field at the center of the semicircle in the figure below?

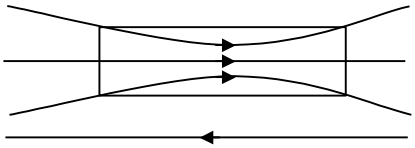


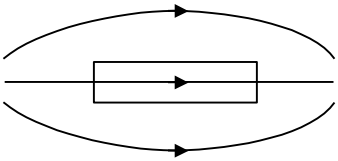
(A) $\frac{\mu_o}{4\pi}\frac{2I}{r}$ (B) $\frac{\mu_o}{4}\frac{I}{r}$

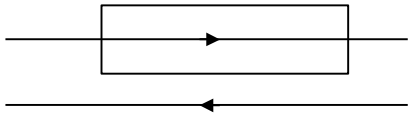
(C) $\frac{\mu_o}{4\pi}\frac{2I}{r}(1+\pi)$ (D) zero

29. A rectangular pieces of soft iron is placed in a uniform magnetic field. Which of the following correctly represents the lines of force in the region of space?

(A) 

(B) 

(C) 

(D) 

30. A coil of one turn is made of a wire of certain length and then from the same length a coil of two turns is made. If the same current is passed in both the cases, then the ratio of the magnetic induction at their centers will be

(A) 2 : 1 (B)1 : 4

(C) 4 : 1 (D) 1 : 2

31. A mirror always form virtual image of the same size as the object. What is the focal length of the mirror?

(A) 1 cm (B) 1 m

(C) more than 1 m but not infinity (D) infinity

32. An object is placed at a distance x from the principal focus of a concave mirror of focal length f. What will be the magnification of the image?

(A) $\frac{x}{f}$ (B) $\frac{f}{x}$

(C) $1+\frac{f}{x}$ (D) $1-\frac{f}{x}$

33. The angle of minimum deviation of a prism depends upon

(A) angle of incidence (B) angle of reflection

(C) angle of prism (D) none of the above

34. If the angle of incidence is i and hat of refraction is r. Then the speed of light in the medium to which the light is refracted from air is

(A) $\nu = c\frac{\sin r}{\sin i}$ (B) $\nu = c\frac{\sin i}{\sin r}$

(C) $\nu = c\frac{\sin i}{\cos r}$ (D) $\nu = c\frac{\cos i}{\cos r}$

35. Convex lens of power 4D and a concave lens of power 3D are placed in contact. What is the equivalent power of the combination?

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

(C) 1 D (D) $\frac{3}{4}$D

36. Consider the following reaction

$$Al(s) + aHCl\ (aq) \longrightarrow AlCl_3\ (aq) + bH_2(g).$$

when a, b are coefficients for balancing of above reaction the value of a, and b must be
(A) 5, 3 (B) 3, 3/2 (C) 6, 1/2 (D) 1,1/2

37. Which of the following are combination reactions?

(i) $2KClO_3 \xrightarrow{\text{Heat}} 2KCl + 3O_2$ (ii) $MgO + H_2O \rightarrow Mg(OH)_2$

(iii) $4Al + 3O_2 \rightarrow 2Al_2O_3$ (iv) $Zn + FeSO_4 \rightarrow ZnSO_4 + Fe$

(A) (i) and (iii) (B) (iii) and (iv)
(C) (ii) and (iv) (D) (ii) and (iii)

38. Which of the following is/are obtained as product of corrosion of certain metals

(A) $CuCO_3 \cdot xCu(OH)_2$ (B) $Fe_2O_3 \cdot xH_2O$
(C) Ag_2S (D) All of these

39. Acid-base neutralization reaction is

(A) endothermic (B) exothermic
(C) neither endothermic nor exothermic (D) both endothermic and exothermic

40. Green coating on copper in rainy season is due to the formation of

(A) $CuCO_3$ (B) $Cu(OH)_2$ (C) $CuCO_3.Cu(OH)_2$ (D) CuS

41. Which of the following is correctly represent the molecular formula for baking soda?

(A) Na_2CO_3 (B) $NaHCO_3$
(C) $Na_2CO_3 .10H_2O$ (D) $Na_2CO_3.H_2O$

42. A lustrous non-metal is

(A) diamond (B) iodine
(C) sulphur (D) phosphorus

43. Consider the following table?

Metal	$ZnSO_4$ (aq)	$FeSO_4$ (aq)	$CuSO_4$ (aq)	$Al_2(SO_4)_3$ (aq)
Zn	-	Displaced	Displaced	No reaction
Fe	No reaction	-	Displaced	No reaction
Cu	No reaction	No reaction	-	No reaction
Al	Displaced	Displaced	Displaced	-

From the above data, the decreasing order of reactivity of metals is
(A) Al > Cu > Fe > Zn (B) Al > Zn > Fe > Cu
(C) Al > Zn > Cu > Fe (D) Al > Fe > Cu > Zn

44. Four group of students were assigned separately the experiment of interaction of iron nails with a solution of copper sulphate. Each group recorded the observations as given below in the table. Which group of students recorded all the observations correctly?

Group of students	**Initial colour of solution**	**Final colour of solution**	**Change in the iron nail**
(A)	Blue	Colourless	Grey coat
(B)	Green	Green	Brown coat

(C)	Blue	Blue	Brown coat
(D)	Blue	Light green	Brown coat

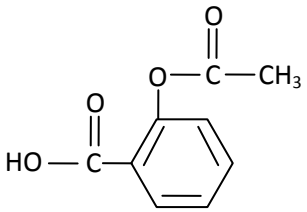
45. Elements A, B and C from a Dobereiner's triad. If the atomic mass of element A is 7 and that of element C is 39, then what is the atomic mass of element B?
(A) 23 (B) 32 (C) 46 (D) 22

46. Which is the limitations of Mendeleeve's classification ?
(A) Position of isotopes
(B) No fixed position can be given to hydrogen is the periodic table.
(C) Both (A) and (B)
(D) None

47. Which of the following is the correct order of relative sizes?
(A) $I^- > I^+ > I$ (B) $I^- > I > I^+$ (C) $I > I^+ > I^-$ (D) $I^+ > I^- > I$

48. Carbon forms a large number of organic compounds due to
(A) catenation (B) tendency to form multiple bonds
(C) tetravalency (D) all the above

49. Functional group present in asprin



are
(A) Ester and aldehyde (B) Ester and ketone
(C) Ester and carboxylic acid (D) carboxylic acid and ether

50. How many number of moles of O_2 (g) is required for complete combustion of 1-mole of butane (g)?
(A) 4-moles (B) 13-moles (C) 6.5-moles (D) 4.5 moles

MATHEMATICS

51. Which of the following rational numbers have terminating decimal expansion?
(A) $\frac{11}{7000}$ (B) $\frac{91}{21000}$
(C) $\frac{343}{2^3 \times 5^3 \times 7^3}$ (D) $\frac{13}{900}$

52. Quadratic polynomial having zeroes 1 and –2 is
(A) $x^2 - x + 2$ (B) $x^2 + x - 2$
(C) $x^2 - x - 2$ (D) $x^2 + x + 5$

53. The pair of equations ($3x + 4y = k$, $9x + 12y = 6$) has infinitely many solutions if
(A) $k = 2$ (B) $k = 6$

(C) $k \neq 6$ (D) $k = 3$

54. If the 5^{th} term of an AP is 12 and 8^{th} term of the AP is 16, then its common difference is

(A) 3 (B) $\frac{4}{3}$

(C) $\frac{2}{3}$ (D) $\frac{3}{4}$

55. In an AP, if common difference d = 3,then $t_5 - t_7$ is equal to

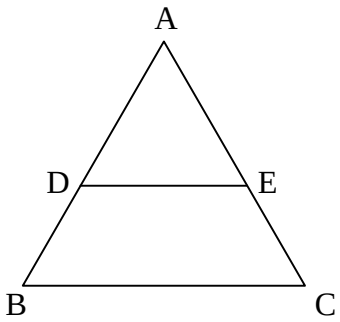
(A) 2 (B) –2

(C) 6 (D) –6

56. In ΔABC, if DE || BC, AD = 6 cm, BD = 9 cm and AE = 8 cm, then AC =

(A) 20 cm (B) 12 cm

(C) 15 cm (D) 18 cm



57. Distance of the point A(0, –3) from the origin is

(A) 3 (B) $\frac{1}{3}$

(C) 0 (D) 5

58. Mid-point of the line-segment joining points (–2, 4) and (6, 10) is

(A) (2, 5) (B) (2, 7)

(C) (3, 7) (D) (3, 8)

59. Point C(2, 3) divides internally the line-segment joining A(3, 5) and B internally in the ratio 1 : 2. The coordinates of B are

(A) (0, –1) (B) (0, 1)

(C) (1, 0) (D) (–1, 0)

60. If $x = 2\sin^2\theta$ and $y = 2\cos^2\theta + 1$ then $x + y =$

(A) 2 (B) 3

(C) 1 (D) $\frac{1}{2}$

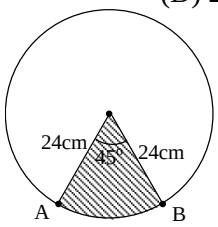
61. If $\sin^4\theta + \cos^4\theta = 1 + 4k\sin^2\theta\cos^2\theta$, then k =

(A) 2 (B) –2

(C) $-\frac{1}{2}$ (D) $\frac{1}{4}$

62. A point P is 25 cm from the center of a circle. The radius of the circle is 7 cm and length of the tangent drawn from P to the circle is x cm. The value of x =
(A) 20 cm (B) 24 cm
(C) 18 cm (D) 12 cm

63. In the figure, the area of the shaded region is
(A) 256 π cm^2 (B) 144π cm^2
(C) 288π cm^2 (D) 221 cm^2



64. If the volume of a cube is 1728 cm^3, the length of its edge is equal to
(A) 12 cm (B) 14 cm
(C) 16 cm (D) 24 cm

65. If E be an event such that P(E) = 3/7, then P(not E) is equal to
(A) $\frac{4}{7}$ (B) $\frac{6}{7}$
(C) $\frac{5}{7}$ (D) $\frac{8}{3}$

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