EDUHEAL FOUNDATION

INTERACTIVE OLYMPIADS

EDUHEAL FOUNDATION CONDUCTS 6 OLYMPIADS ANNUALLY REACHING OUT TO 3,500 + SCHOOLS
• 4 LAKH + STUDENTS • 50,000 COORDINATING TEACHERS AND HAVING 500 RESOURCE PERSONS
IN ENGLISH / MATHS / SCIENCE / BIOTECH / COMPUTER / G.K. & 300 REGIONAL COORDINATORS.

WEBSITE : WWW.EDUHEALFOUNDATION.ORG ● E-MAIL : EDUHEALFOUNDATION@GMAIL.COM

ICO	NISO	NIMO	NBTO	IEO	IGO
INTERNATIONAL CYBER OLYMPIAD	NATIONAL INTERACTIVE SCIENCE OLYMPIAD	NATIONAL INTERACTIVE MATHS OLYMPIAD	NATIONAL BIOTECHNOLOGY OLYMPIAD	INTERNATIONAL ENGLISH OLYMPIAD	INTERNATIONAL G.K. OLYMPIAD

Academic Partner — WWW.EDUSYS.IN

ETG BOOKS — A Unit of EDUSYS LEARNING MEDIA — Creating SUCCESS Stories

AIEEE • IIT • PMT • OLYMPIADS

NATIONAL INTERACTIVE SCIENCE OLYMPIAD

NISO

10 Class — **B1 Paper Code**

IMPORTANT INFORMATION

1. You are allowed additional 10 minutes to fill the required details in the **RESPONSE SHEET.**
2. The question paper is made as per syllabus guidelines & pattern given in the information Booklet. The Question Paper for Classes 1 to 6 contains 25 Questions each to be answered in 40 minutes. The Question paper for classes 7 to 12 contains 50 Questions each to be answered in 60 minutes. All questions are compulsory. Further instructions are given in the instruction letter to the coordinator teacher.
3. Use the response sheet to mark your responses by darkening the required circle. The response sheet has to be returned to the foundation, duly filled in. The student can retain the Question Paper.

SECTION-A : GENERAL I. Q.

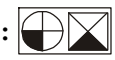
1. A gardener wants to plant 17956 trees and arrange them in such a way that there are as many rows as there are trees in a row. The number of trees in a row is:
(1) 144 (2) 134
(3) 154 (4) None of these

2. 30 quintals is what per cent of 2 metric tonnes:
(1) 15% (2) 1.5%
(3) 150% (4) None of these

3. If a : b = 2 : 3 and b : c = 5 : 7, find a : b : c.
(1) 8 : 16 : 22 (2) 9 : 14 : 20
(3) 10 : 15 : 21 (4) None of these

4. **Statements:** No book is a pen.
Some pens are pencils.
No pencil is an inkpot.
Conclusion: I. Some books are pencils.
II. Some inkpots are pens.
III. Some inkpots are not pencils.
(1) Only II, III and IV follow.
(2) All follow.
(3) Either I or IV and either II or III follow.
(4) None of the above.

5. In the following question, two Problem Figures are given. These are followed by four Answer Figures (1), (2) and (3). The two Problem Figures have some common characteristics/features. Out of the three Answer Figures, you have to find out that figure which has the same commonality. The number of that figure is your answer.

Problem Figure: 

(1)  (2) 

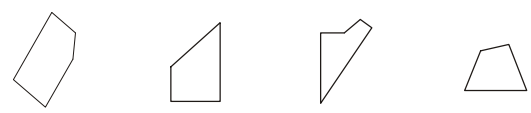
(3)  (4) None of these

6. A man can row 6 km/hr in still water. It takes him twice as long to row up as to row down the river. Find the rate of stream.
(1) 2 km/hr (2) 3 km/hr
(3) 2.5 km/hr (4) None of these

7. If A : B = 5 : 7 and B : C = 6 : 11, then A : B : C is :
(1) 55 : 77 : 66 (2) 30 : 42 : 77
(3) 35 : 49 : 42 (4) None of these

8. How many times do the hands of a clock point towards each other in a day?
(1) 24 (2) 20
(3) 22 (4) None of these

9. Select the alternative which represents the combination of figures which if fitted together, will form a complete square.



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

(1) ABC (2) BCD
(3) ACD (4) None of these

10. A class has 175 students. The following data shows the number of students obtaining one or more subjects Mathematics 100, Physics 70, Chemistry 40, Mathematics and Physics 30, Mathematics and Chemistry 28, Physics and Chemistry 23; Mathematics, Physics and Chemistry 18. How many students have offered Mathematics alone?
(1) 48 (2) 35
(3) 60 (4) None of these

SECTION-B : PHYSICS & CHEMISTRY

11. Sensitivity of measuring equipment is
(1) the closeness with which a measurement can be read directly from a measuring instrument
(2) a measure of how close the reading is to the true size
(3) the smallest change in measurand that can be measured
(4) None of these

12. Stress concentration in static loading is more serious in
(1) ductile materials
(2) brittle materials
(3) equally serious in both cases
(4) None of these

13. A thin circular disc is rolling with a uniform linear speed, along a straight path on a plane surface. Consider the following statements in this regard:
1. All points of the disc have the same velocity
2. The centre of the disc has zero acceleration
3. The centre of the disc has centrifugal acceleration
4. The point on the disc making contact with the plane surface has zero acceleration.
(1) 1 and 4 are correct (2) 2 alone is correct
(3) 3 alone is correct (4) None of these

14. Two bodies M and N of equal mass are suspended from two separate massless springs of spring constant k_1 and k_2 respectively. If the two bodies oscillate vertically such that their maximum velocities are equal, the ratio of the amplitude of vibration of M to that of N is

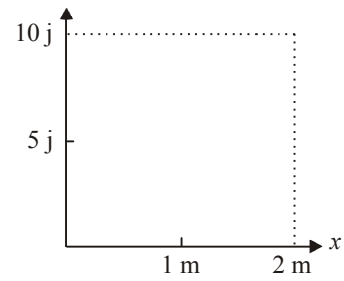
(1) $\frac{k_1}{k_2}$ (2) $\sqrt{\frac{k_1}{k_2}}$

(3) $\sqrt{\frac{k_2}{k_1}}$ (4) None of these

15. A person standing on a uniformly rotating turn table has his arms held close to his chest. If he outstretches his arms
(1) the moment of inertia will decrease
(2) the angular momentum will increase
(3) the speed of rotation will decrease
(4) None of these

16. A circular disc is rotating with angular velocity ω. A man sitting at the edge walks towards the centre of disc, then the angular velocity ω
(1) decreases (2) no change
(3) increases (4) None of these

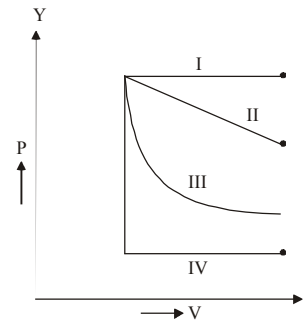
17. The kinetic energy of a body of mass 2 kg varies with its position along the x-axis as shown in the figure. The force acting on the body is



(1) 2 N (2) 6 N
(3) 5 N (4) None of these

18. According to kinetic theory of gases, molecules of a gas behave like
(1) inelastic spheres
(2) perfectly elastic rigid sphere
(3) perfectly elastic non-rigid spheres
(4) None of these

19. Figure below shows four indicator diagrams. In which case the work done is more?



(1) I (2) II
(3) III (4) None of these

20. Number of atoms in 558.5 g Fe (at.wt. 55.85) is:
(1) Twice that in 60 g carbon
(2) 6.023×10^{22}
(3) Half in 8 g He
(4) None of these

21. Sulphur molecule exists under various condition as S_g, S6, S_4, S_2 and S. Which of the following statement is correct?
(1) Mass of one mole of each of these is same
(2) Number of molecules in one mole of each of these is same
(3) Number of atoms in one mole of each of these is same
(4) None of these

22. When an aluminium atom is bombarded with α-particles, phosphorous may be formed according to the following equation.

$^{27}_{13}Al + ^{4}_{2}He \rightarrow ^{30}_{15}P + X$. In this process the particle X emitted is a

(1) β-particle (2) neutron
(3) γ-ray (4) None of these

23. The compound formed by elements X and Y crystalizes in cubic structure in which X atoms are at the corners of the cube and Y atoms are at the face centre. The formula of the compound is:
(1) XY_2 (2) XY
(3) XY_3 (4) None of these

24. An increasing order (lowest first) for the values of *e/m* for electron (e), proton (p), neutron (n) and (α) particle is:
(1) *e, p, n, α* (2) *n, α, p, e*
(3) *n, p, e, α* (4) None of these

25. Two ice cubes are pressed over each other and unite to form one cube. Which force is responsible for holding them together?
(1) van der Waals' forces
(2) Covalent attraction
(3) Hydrogen bond formation
(4) None of these

26. In a given process on an ideal gas, $dw = 0$ and dQ is negative, then for the gas:
(1) The temperature will decrease
(2) The volume will increase
(3) The pressure will remain constant
(4) None of these

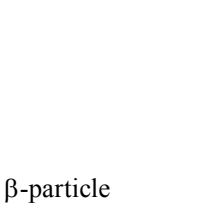
27. Which of the following graphs are correct for the given reaction;

$$H_{2(g)} + CO_{2(g)} \rightleftharpoons H_2O_{(g)} + CO_{(g)}$$

Assume initially only H_2 and CO_2 are present:

(1)

(2)

(3) 

(4) None of these

28. When there is more deviation in the behaviour of a gas from the ideal gas equation $PV = nRT$:
(1) At high temperature and low pressure
(2) At low temperature and high pressure
(3) All molecules of the gas move with same speed
(4) None of these

29. The unstable isotope $_{82}Pb^{212}$ decays with the emission a β^- particle to form
(1) an atom with a mass number of 211
(2) an atom with an atomic number of 81
(3) an atom with an atomic number of 83
(4) None of these

30. The condition of STP refers to:
(1) 25°C and 2 atm (2) 0°C and 1 atm
(3) 0°C and 2 atm (4) None of these

SECTION-C : MATHEMATICS

31. $\left(\frac{1-i}{1+i}\right)^{20}$ is equal to
(1) 1 (2) $-1/2$
(3) $1/\sqrt{2}$ (4) None of these

32. Number of solutions of $\tan^2\theta + \cot^2\theta = 2$ in the interval $[0, 2\pi]$ is
(1) 2 (2) 4
(3) 6 (4) None of these

33. The number of values of k for which the equation $x^2 - 3x + k = 0$ has two distinct roots lying in the interval (0, 1) are
(1) three
(2) two
(3) no value of k satisfies the requirement
(4) None of these

34. The number of diagonals that can be formed by a polygon of 100 sides is
(1) 4,950 (2) 4,850
(3) 5,000 (4) None of these

35. If the numbers *a, b, c, d, e* form an A.P., then the value of $a - 4b + 6c - 4d + e$ is
(1) 1 (2) 2
(3) 0 (4) None of these

36. If every element of a third order determinant of value Δ is multiplied by 5 then the value of the new determinant is:
(1) Δ (2) 125Δ
(3) 25Δ (4) None of these

37. If sin α and cos α are the roots of the equation $ax^2 + bx + c = 0$, then *a, b, c* satisfy the relation:
(1) $a^2 + b^2 + 2ac = 0$ (2) $a^2 - b^2 - 2ac = 0$
(3) $a^2 + b^2 - 2ac = 0$ (4) None of these

38. If θ and ϕ are acute angles such that $\sin\theta = \frac{1}{2}$ and $\cos\phi = \frac{1}{3}$, then $\theta + \phi$ lies in :
(1) $\left(\frac{\pi}{3}, \frac{\pi}{2}\right)$ (2) $\left(\frac{\pi}{2}, \frac{2\pi}{3}\right)$
(3) $\left(\frac{2\pi}{3}, \frac{5\pi}{3}\right)$ (4) None of these

39. The trigonometric equation $\sin^{-1}x = 2\sin^{-1}a$ has a solution for :
(1) all real values of a (2) $|a| < \frac{1}{2}$
(3) $|a| \le \frac{1}{\sqrt{2}}$ (4) None of these

40. The value of $\sum_{r=1}^{10} r \cdot {}^rP_r$ is :
(1) $^{11}P_{11}$ (2) $^{11}P_{11} - 1$
(3) $^{11}P_{11} + 1$ (4) None of these

SECTION-C : BIOLOGY

31. The largest amount of freshwater on our planet is available in
(1) rain (2) river
(3) drought (4) None of these

32. The first product of biotechnology was
(1) interferon (2) alcohol
(3) antibiotic (4) None of these

33. Who among the following scientists received Nobel prize for the discovery of jumping genes?
(1) Beadle and Tatum (2) Hargovind Khorana
(3) Barbara Mc Clintock (4) None of these

34. It is possible to make exact copies of DNA because of
(1) base pairing rule (2) all of these
(3) complementary strand (4) antiparallel strands

35. Mushroom is
(1) bacterium (2) algae
(3) fungus (4) None of these

36. When a flower is brightly coloured, scented and secretes nectar, it is most probably
(1) Pollinated by wind (2) pollinated by insects
(3) an insectivorous plant (4) None of these

37. Human population always show
(1) J shaped growth curve (2) S shaped growth curve
(3) U shaped growth curve (4) None of these

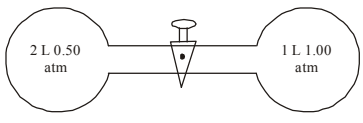
38. The best way to control population is
(1) family planning (2) education
(3) better living conditions (4) None of these

39. The organ which is most affected by alcohol is
(1) cerebellum (2) cerebrum
(3) liver (4) None of these

40. This disease is of recent origin
(1) dengue (2) all of these
(3) leptospirosis (4) chickungunya

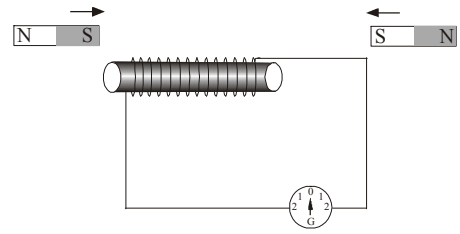
INTERACTIVE SECTION

41. Hydrogen gas is contained in two vessels connected by a closed stopcock as shown in the diagram. The volumes and pressures are also shown. When the stopcock is opened and the gases allowed to mix at constant temperature. What will be the final pressure? (neglecting the volume of the tube between the bulbs.)



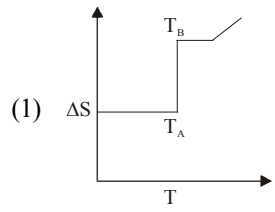
(1) 0.50 atm (2) 0.75 atm
(3) 0.67 atm (4) None of these

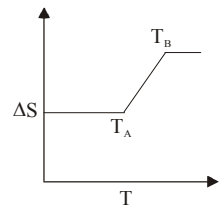
42. The given figure shows a coil of insulated wire having a large number of turns. It is wrapped around a hollow cylindrical object. The free ends of the coil are connected to a galvanometer. Two identical magnets are brought close to the hollow cylinder with the same speed but from the opposite directions.

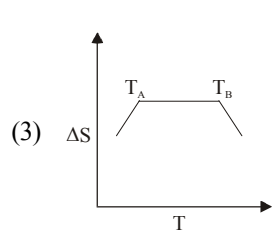


If the like poles of the magnets are brought towards the cylinder, then
(1) the galvanometer will show a momentary deflection
(2) a continuous current will be induced in the circuit
(3) the pointer of the galvanometer will remain at zero
(4) None of these

43. If for a given substance, melting point is T_B and freezing point is T_A then correct variation of entropy by graph between entropy change and temperature is:

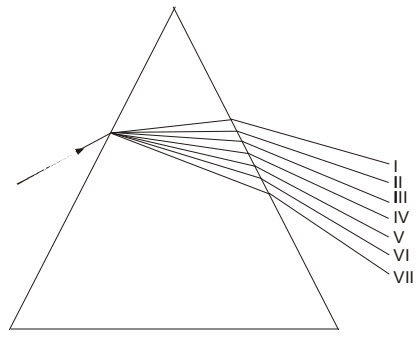
(1) 

(2) 

(3) 

(4) None of these

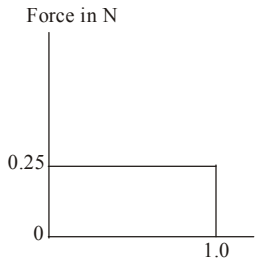
44. A ray of white light is incident on a glass prism at an angle. This ray of light is dispersed into its seven constituent colours, as shown in the given figure.



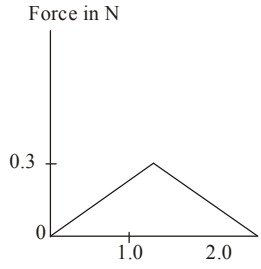
Glass prism

In the figure II and VI respectively denote
(1) red and violet (2) orange & indigo
(3) orange and blue (4) None of these

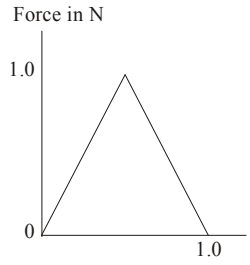
45. Figures I, II, III and IV depict variation of force with time



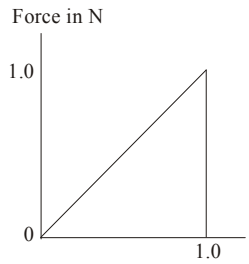
Time in milliseconds
Fig. (I)



Time in milliseconds
Fig. (II)



Time in milliseconds
Fig. (III)



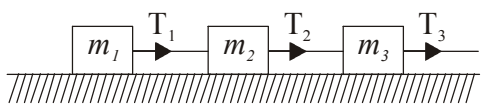
Time in milliseconds
Fig. (IV)

The impulse is highest in the case of situations depicted in figure (*s*)

(1) I and II (2) III and I

(3) III and IV (4) None of these

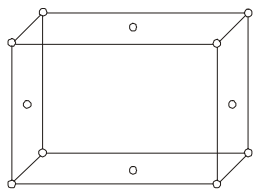
46. Three blocks of masses m_1, m_2 and m_3 are connected by massless strings as shown on a frictionless table. They are pulled with a force $T_3 = 40$ N. If $m_1 = 10$ kg, $m_2 = 6$ kg and $m_3 = 4$ kg, the tension T_2 will be



(1) 20 N (2) 32 N

(3) 10 N (4) None of these

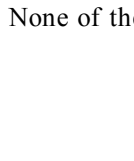
47. For the structure of solid given below if the lattice points represent A^+ ions and the B^- ions occupy the tetrahedral voids then co-ordination number of A is:



(1) 2 (2) 4

(3) 6 (4) None of these

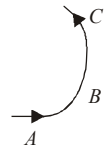
48. Which *p*-orbitals overlapping would give the strongest bond:

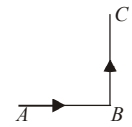
(1)  (2)

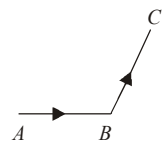
(3) (4) None of these

49. Figure shows a rocket coasting in space in the direction of the arrowed line. Between points A and B, no outside forces act on the rocket. When it reaches point B, the rocket engine fires as shown at a constant rate until the rocket reaches another point C in space.

Which of the paths below will the rocket follow from point B to point C?

(1) 

(2) 

(3) 

(4) None of these

50. A force F acts on the topmost point of a disc. Assume that the disc is kept on a very rough surface. What will be the direction of the friction?

(1) the direction of friction is forward

(2) the direction of friction is backward

(3) the direction of friction cannot be determined

(4) None of these

END OF THE EXAM

ROUGH PAGE