EDUHEAL FOUNDATION

EDUHEAL FOUNDATION CONDUCTS 8 OLYMPIADS ANNUALLY REACHING OUT TO 3,500 + SCHOOLS
● 5 LAKH + STUDENTS ● 50,000 TEACHERS AND HAVING 500 RESOURCE PERSONS
IN ENGLISH / MATHS / SCIENCE / BIOTECH / COMPUTER / G.K. / ARTS / CRICKET / FINANCE & 300 REGIONAL COORDINATORS.

WEBSITE : WWW.EDUHEALFOUNDATION.ORG ● E-MAIL : INFO@EDUHEALFOUNDATION.ORG

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

Level - 1 : All Level-1 successful* participants will get certificate, apititude report and online subscription, and school toppers will be eligible for school hero medals.

Level - 2 : School toppers* will be selected for level-2-National level - online computer based interactive test held at exam centres all over India. Besides selection for level-3, winner will get merit certificate, medals, educational CDs, laptop, scholarship and other prizes. There is no level 2 in G.K. and Biotech.

Level - 3 : Toppers will qualify# for level 3-International level-where you will compete with students globally. Get selected for EHFs International Olympiad training camp. Only Indian organization giving students exposure to global competitions. Represent India & win laurels. Guidance by top scientists. Prizes ranges from cash (millions of $), gadgets, foreign trips, publicity, fame, scholarships, Internships, conference participation and more. Level 3 is in Maths, Science & Cyber only.

* # See prospectus/website for details

1. You are allowed additional 10 minutes to fill the required details in the **RESPONSE SHEET (OMR). STUDENTS OF CLASS 1 & 2 HAVE TO UNDERLINE** THE CORRECT ANSWER IN THE QUESTION PAPER ITSELF. THEY ARE NOT REQUIRED TO USE THE RESPONSE SHEET (OMR). THEY HAVE TO FILL THEIR NAME, ROLL NUMBER, CLASS, SCHOOL NAME IN THE SPACE PROVIDED IN THE QUESTION PAPER.

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 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 except for classes 1 and 2.

NATIONAL IIT PMT OLYMPIAD

N I M O

10 Class **A1 Paper Code**

L E V E L - 1

PHYSICS

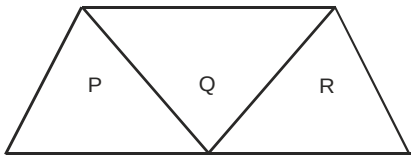
1. The number of images formed, when an object is placed between two parallel mirrors will be
(1) four (2) three
(3) seven (4) infinite

2. The optical instrument used for looking objects which cannot be seen directly due to obstruction is known as
(1) periscope (2) kaleidoscope
(3) microscope (4) telescope

3. Imagine a body whose refractive index is unity, then
(1) the body becomes clearest
(2) the body becomes partly clear
(3) the body becomes invisible
(4) the body sometimes shines and sometimes does not shine

4. The sum of the focal lengths of the objective and the eye piece in case of an astronomical telescope is equal to
(1) the length of the telescope
(2) half the length of the telescope
(3) double the length of telescope
(4) three times the length of telescope

5. A given ray of light suffers minimum deviation in an equilateral prism P. Additional prisms Q and R of identical shape and of the same material as P are now added as shown in the given figure. The ray will now suffer



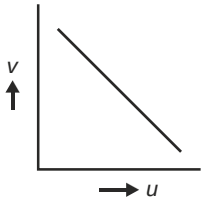
(1) greater deviation
(2) no deviation
(3) same deviation as before
(4) total internal reflection

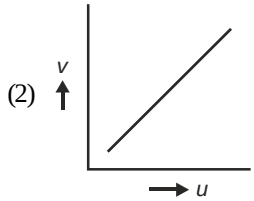
6. Rainbow is formed due to a combination of
(1) refraction and absorption
(2) dispersion and focussing
(3) refraction and scattering
(4) dispersion and total internal reflection

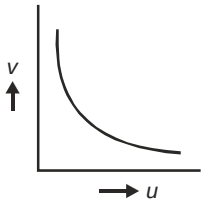
7. The objective of a compound microscope is essentially
(1) a concave lens of small focal length and small aperture
(2) convex lens of small focal length and large aperture

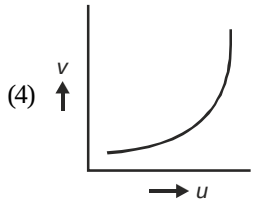
(3) convex lens of large focal length and large aperture
(4) convex lens of small focal length and small aperture

8. In an experiment to find focal length of a concave mirror, a graph is drawn between the magnitude of *u* and *v*. The graph looks like

(1) 

(2) 

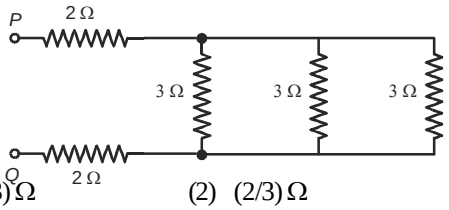
(3) 

(4) 

9. If the length of the wire is doubled and its cross-section is also doubled, then
(1) the resistance will decrease four times
(2) the resistance will increase four times
(3) the resistance will increase two times
(4) the resistance will remain unchanged

10. Two copper spheres of same radii one hollow and other solid are charged to the same potential then
(1) both will hold same charge
(2) solid will hold more charge
(3) hollow will hold more charge
(4) hollow cannot be charged

11. What will be the resistance between *P* and *Q* in the following circuit ?



(1) (1/3) Ω (2) (2/3) Ω
(3) 2 Ω (4) 5 Ω

12. When a conductor gets charged due to mere presence of another charged body, the phenomenon is called
(1) induction (2) conduction
(3) friction (4) convection

13. The length of a conductor is doubled and its radius is halved, its resistance is
(1) unchanged (2) eight times its value
(3) doubled (4) quadrupled

14. The coil of a sensitive moving coil galvanometer swings too far on both sides. This movement can be quickly stopped by
(1) earthing the case of galvanometer (2) holding the magnet near the coil
(3) connecting a short length of copper wire across the ends of the coil
(4) connecting large resistance across the ends of the coil

15. When a straight conductor is carrying an electric current
(1) there are circular magnetic lines of force around it
(2) there are no magnetic lines of force near it
(3) there are magnetic lines of force parallel to conductor along the direction of current
(4) there are magnetic lines of force parallel to conductor opposite to the direction of current

CHEMISTRY

16. The pH of a solution is 6. It is diluted ten times. The resulting solution will be
(1) neutral (2) acidic
(3) basic (4) unaffected

17. Which one of the following elements is extracted commercially by the electrolysis of an aqueous solution of one of its compounds ?
(1) Na (2) Al
(3) Br (4) Cl

18. A sample of water, drawn from a well, became milky after boiling. It most probably contains
(1) dissolved magnesium carbonate
(2) dissolved calcium hydrogen carbonate
(3) dissolved sodium chloride
(4) dissolved calcium carbonate

19. The most abundant element in the universe is
(1) hydrogen (2) oxygen
(3) helium (4) silicon

20. Solvay's process is used for preparing washing soda. It cannot be used for the preparation of K_2CO_3 because
(1) K_2CO_3 is not stable under ordinary conditions
(2) $KHCO_3$ is highly soluble in water and hence, it cannot be filtered out
(3) potassium is the most reactive metal
(4) none of the above

21. An atom or a group of atoms present in an organic compound that shows nearly the same behaviour in chemical reactions, is known as
(1) a functional group (2) a free radical
(3) a reactive radical (4) none of these

22. When a few drops of bromine water are added to acetylene, its brown colour is decolorised due to formation of
(1) ethyl chloride
(2) propyl bromide
(3) acetylene dibromide
(4) ethyl bromide

23. In order to sustain the human and biological lives on the planet, we should
(1) conserve fossil fuels
(2) use non-conventional fuels

(3) reduce the number of vehicles that pollute the air
(4) only (1) and (2)

24. Ethylene, on ozonolysis, gives ozonide, which, on hydrolysis, gives
(1) acetaldehyde (2) glycol
(3) formaldehyde (4) glyoxal

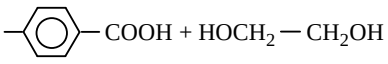
25. How does a detergent remove dirt?
(1) it forms weak hydrogen bonds with washing clothes dirt during the process of washing clothes
(2) it detaches dirt molecules through a peaceful action of the washing machine
(3) it softens dirt so that it can be carried away by water
(4) none of the above

26. High alumina cement can be prepared by heating a mixture of bauxite and
(1) tri-calcium aluminate
(2) dicalcium silicate
(3) limestone
(4) gypsum

27. If selenium is added to the basic raw material for manufacture of glass, the resultant colour of the glass sheet would be
(1) green (2) blue
(3) orange red (4) yellow

28. The difference between baking powder and baking soda is that
(1) baking powder has tartaric acid in addition to baking soda
(2) baking soda is absent in baking powder
(3) baking powder is a liquid but baking soda is not
(4) there is no difference

29. Why is carbon the hardest substance in the world when it is found as a diamond?
(1) the C – C bonds are strongest due to heat and pressure during the formation
(2) the C – H bonds are strongest in diamond
(3) the structure is a tetrahedron which has a stable configuration
(4) carbon is pure and hence, the hardest

30. Which compound/set of compounds is used in the manufacture of Nylon-66?
(1) $HOOC(CH_2)_4\,COOH + H_2N(CH_2)_6NH_2$
(2) $CH_2 = CH - C(CH_3) = CH_2$
(3) $CH_2 = CH_2$
(4) 

MATHEMATICS

31. A man on the bank of a river observes that the angle subtended by a tree on the opposite bank is 60°. While moving backward to a point in a straight line with the tree's foot and moving to a position of 100 m from his former position, he finds that angle to be 30°. What is the height of the tree and the breadth of the river ?
(1) $50, 25\,m$ (2) $50\sqrt{3}, 50\,m$
(3) $50, 50\sqrt{3}\,m$ (4) $52, 50\sqrt{3}\,m$

32. If $x\sin 30°\cos^2 45° = \frac{\cot^2 30°\sec 60°\tan 45°}{\text{cosec}^2 45°\text{cosec}^2 30°}$, then the value of x is
(1) 1 (2) 0
(3) 6 (4) $\frac{\sqrt{3}}{4}$

33. If $7\sin\alpha = 24\cos\alpha$ and $0 < \alpha < \frac{\pi}{2}$, then the value of $14\tan\alpha - 75\cos\alpha - 7\sec\alpha$ is equal to
(1) 2 (2) 6
(3) 3 (4) 0

34. If β is acute angle and and $\beta = \frac{4}{5}$, then the value of $\frac{\sin\alpha\,(3\cos\beta + 4\sin\beta) + \cos\alpha\,(3\sin\beta - 3\cos\beta)}{\sqrt{3}\sin\alpha}$ is equal to
(1) $\frac{5}{\sqrt{3}}$ (2) $\sqrt{3}\,(\cot\alpha)$
(3) $\frac{\sqrt{3}}{5}\sin\alpha$ (4) $\frac{12}{7}\sin\alpha$

35. Three pipes *A, B* and *C* can fill a cistern in 4, 8 and 12 hours respectively, while another pipe *D* can alone empty it in 10 hours. Which one of the following arrangements will fill the cistern in the least possible time ?
(1) *A, C* and *D* are opened
(2) *B, C* and *D* are opened
(3) *A* and *D* are opened
(4) *B* alone is opened

36. The milk to water ratio in a 16 litre mixture is 5 : 3. How much milk should be added to make this ratio as 2 : 1?
(1) 6 litres (2) 8 litres
(3) 5 litres (4) 2 litres

37. A garrison of 2000 men have provisions for 54 days. At the end of 15 days, a reinforcement arrives and it is found that now, the provisions would last for 20 more days. What is the strength of the enforcement ?
(1) 1100 men (2) 1800 men
(3) 1900 men (4) 2100 men

38. A dishonest dealer professes to sell his goods at CP but he uses a weight of 960 gms for the one kg weight. Find his gain percent.
(1) 4% (2) $4\frac{1}{6}\%$
(3) 40% (4) 10%

39. If $f(x)=\log\left(\frac{1+x}{1-x}\right)$, then $f\left(\frac{2x}{1+x^2}\right)$ is equal to

(1) $f(x)$ (2) $2f(-x)$

(3) $f(2x)$ (4) $2f(x)$

40. The value of k by which, the roots of the equation is $(x-1)(x-5)+k=0$, *i.e.* differ by 2, is

(1) 3 (2) 6

(3) -3 (4) $\frac{1}{2}$

41 A man walks for 5 kms in North, then 2 kms in East, then 1 km in North and finally, 6 km in East. How far is he from his starting point ?

(1) 10 kms (2) 18 kms

(3) 16 kms (4) 9 kms

42. Inside a circle, whose radius is 13 cms, there is a point *M* at a distance of 5 cm from the centre of the circle. A chord *AB*, whose length is 25 cm, is drawn through the point *M*. The lengths of the segments into which the chord is divided, by point *M*, are

(1) 12 cm 13 cm (2) 11 cm, 14 cm

(3) 16 cm, 9 cm (4) 17 cm, 8 cm

43. *P* and *Q* are the mid-points of sides *AB* and *BC*, respectively of ΔABC. The triangle is right angled at *B*. Which of the following is correct ?

(1) $AQ^2+CP^2=\frac{1}{4}AC^2$

(2) $AQ^2+CP^2=AC^2$

(3) $AQ^2+CP^2=\frac{5}{4}AC^2$

(4) $AQ^2+CP^2=\frac{3}{4}AC^2$

44. The sides of a right-angled triangular field containing the right angle are x metres and $(x+20)$ metres. Its area is 44000 m^2. The equation for calculating the value of x is

(1) $x(x+20)=44,000$

(2) $x(x+20)=22,000$

(3) $x(x+20)=88,000$

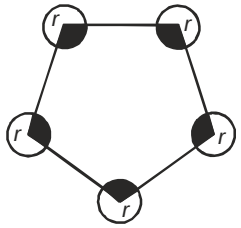
(4) $x(x+20)=\sqrt{44,000}$

45. A sphere of radius r is inscribed inside a cube. The volume enclosed between the cube and the sphere is

(1) $\left(16-\frac{2\pi}{3}\right)r^3$ (2) $\left(22-\frac{2\pi}{3}\right)r^3$

(3) $\left(8-\frac{4\pi}{3}\right)r^3$ (4) $\left(12-\frac{4\pi}{3}\right)r^3$

46. *ABCDE* is any pentagon. In the given figure, all the circles have the centres as the vertices and all the circles have radius r. The sum of all the shaded section is



(1) $\frac{3}{2}\pi r$ (2) $\frac{3}{2}\pi r^2$

(3) $3\pi r^2$ (4) πr^3

47. A cross-section of a canal is a trapezium in shape. If the canal is 8 m wide at the top and 6 m wide at the bottom, the area of cross-section being 644 m^2, then the height of the canal is

(1) 108 m (2) 96 m

(3) 104 m (4) 92 m

48. A closed vessel inside of which, is a circular cone of height h, contains some water in it. When the cone is vertical with its vertex downwards, the water stands to a height of $h/2$. To what height will it stand when the vessel is inverted ?

(1) $\frac{h}{2}$ (2) $\left(\frac{h}{2}\right)^{1/3}$

(3) $h\left(1-\frac{(7)^{1/3}}{2}\right)$ (4) $\left(\frac{h}{7}\right)^{1/3}$

49. The average grade of 15 students of a class is 68. The average grade of 20 students of another class is 65. Find the combined average of both the classes ?

(1) 66.9 (2) 66.3

(3) 66.2 (4) 66.0

50. The mean of age of 30 students is 14 years. 5 students with mean age of 15 years leave the class. The mean of age of the remaining students will be

(1) 12.8 years (2) 13.4 years

(3) 12.6 years (4) 13.8 years

END OF THE EXAM