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<b>ICO</b> INTERNATIONAL CYBER OLYMPIAD	<b>NISO</b> NATIONAL INTERACTIVE SCIENCE OLYMPIAD	<b>NIMO</b> NATIONAL INTERACTIVE MATHS OLYMPIAD	<b>NBTO</b> NATIONAL BIOTECHNOLOGY OLYMPIAD	<b>IEO</b> INTERNATIONAL ENGLISH OLYMPIAD	<b>IGO</b> INTERNATIONAL G.K. OLYMPIAD	<b>BIFO</b> BSE INTERNATIONAL FINANCE OLYMPIAD
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**Level - 1** : All Level-1 successful\* participants will get certificate, aptitude 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 EHF's 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 BIOTECHNOLOGY OLYMPIAD

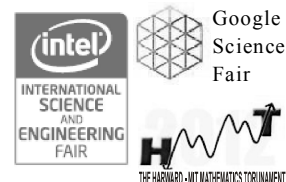
### N B T O

11  
Class

A1  
Paper  
Code

### LEVEL - 1

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## GENERAL KNOWLEDGE

1. Which of the following plants were introduced to India from Africa and can store water in its trunk much like a camel?
  - (1) Cactus
  - (2) Asparagus
  - (3) Baobab
  - (4) None of these
2. An aerobic process that involves the conversion of ammonia to nitrate through biological oxidation.
  - (1) Nitrification
  - (2) Denitrification
  - (3) Ammonification
  - (4) None of these
3. In which of the following states are the one horned Rhinos vulnerable according to IUCN?
  - (1) Orissa
  - (2) Assam
  - (3) Maharashtra
  - (4) None of these.
4. What does 'BOD' stand for?
  - (1) Biochemical Oxygen Demand
  - (2) Basic Oxygen Demand
  - (3) Bacterial Oxygen Deficit
  - (4) None of these
5. The odourless, poisonous gas mixed with smoke that arises from burning coal is
  - (1) Carbon dioxide
  - (2) Methane
  - (3) Carbon monoxide
  - (4) None of these.
6. Which one of the following is not an essential micronutrient for plants?
  - (1) Zinc
  - (2) Sodium
  - (3) Copper
  - (4) None of these
7. Which of the following is an example for a plantation crop?
  - (1) Sugarcane
  - (2) Cotton
  - (3) Coffee
  - (4) None of these
8. The dating of fossil animals and plants by counting the ridges on fossil shells and corals is known as
  - (1) Palaeontology
  - (2) Dendrochronology
  - (3) Serology
  - (4) None of these

9. The Indian Forest Act came into force in  
 (1) 1930 (2) 1928  
 (3) 1927 (4) None of these.
10. Which forests are called 'the world's largest pharmacy' because of the large amount of natural medicines discovered?  
 (1) Tropical rain forests  
 (2) Evergreen forests  
 (3) Moist deciduous forest  
 (4) None of these.

### SECTION B : PHYSICS & CHEMISTRY

11. When an object is placed at a distance of 60 cm from a convex mirror, the magnification produced is  $1/2$ . Where should the object be placed to get a magnification of  $1/3$  ?  
 (1) 120 cm (2) -120 cm  
 (3) 110 cm (4) None of these
12. What is the molecular formula of the alcohol which can be derived from propane?  
 (1)  $C_3H_8$  (2)  $C_3H_6$   
 (3)  $C_4H_7$  (4) None of these.
13. Which functional group always occur at the terminal position of a carbon chain?  
 (1) Aldehydic (2) Carboxyl  
 (3) Alcoholic (4) Both (1) and (2)
14. How many structural isomers can you draw for pentane?  
 (1) 2 (2) 3  
 (3) 4 (4) None of these
15. Saturated hydrocarbons burn with a \_\_\_ flame while unsaturated hydrocarbons burn with a \_\_\_ flame.  
 (1) Blue, Blue (2) Sooty, Blue  
 (3) Blue, Sooty (4) None of these
16. A wire fixed at the upper end stretches by length  $l$  by applying a force  $F$ . The work done by stretching is  
 (1)  $F/2l$  (2)  $F l$   
 (3)  $F l/2$  (4) None of these.
17. In an  $LCR$  series  $ac$  circuit, the voltage across each of the components.  $L$ ,  $C$  and  $R$  is 50 V. The voltage across the  $LC$  combination will be  
 (1) 50 V (2)  $50\sqrt{2}V$   
 (3) 100 V (4) 0 (zero)
18. An  $\alpha$  -particle of energy 5 MeV is scattered through  $180^\circ$  by a fixed uranium nucleus. The distance of the closest approach is of the order of

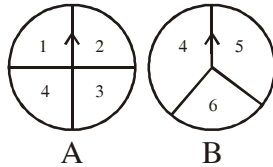
- (1)  $1\text{\AA}$  (2) 10 -10 cm  
 (3) 10 -12 cm (4) 10 -15 cm

19. When the velocity of electron increases, its specific charge  
 (1) Decreases (2) Increases  
 (3) Remain unaffected (4) None of these
20. In the reaction  
 $KMnO_4 + H_2SO_4 + H_2C_2O_4 \rightarrow \text{product}$   
 $Mn^{2+}$  ions act as  
 (1) Positive catalyst (2) Negative catalyst  
 (3) Autocatalyst (4) Enzyme catalyst.

### SECTION C : MATHEMATICS

21. The principal value of  $\sin^{-1} \left( -\frac{\sqrt{3}}{2} \right)$  is  
 (1)  $-2\pi/3$  (2)  $-\pi/3$   
 (3)  $4\pi/3$  (4) None of these
22. When a point is observed, the angle formed by the line of sight with the horizontal level where the point being viewed is above the horizontal plane is known as :  
 (1) Angle of triangle  
 (2) Angle of depression  
 (3) Angle of elevation  
 (4) None of these
23. The tops of two pole of height 10m and 18m are connected with wire. If wire makes an angle of  $30^\circ$  with horizontal, then length of wire is:  
 (1) 10 m (2) 12 m  
 (3) 16 m (4) 18 m
24.  $\sin(60^\circ + \theta) - \cos(30^\circ - \theta)$  is equal to  
 (1)  $2 \cos \theta$  (2)  $2 \sin \theta$   
 (3) 0 (4) None of these.
25. Which of the following are quadratic equations?  
 (i)  $\sqrt{x} - x = 4$  (ii)  $x + \frac{1}{x} = 5$  (iii)  $7v^2 = 49$   
 (1) Only (i)  
 (2) Both (ii) and (iii)  
 (3) Only (ii)  
 (4) None of these
26. Line  $l$  and  $k$  are perpendicular. Line  $l$  has a slope of 3, line  $k$  contains the points (5,8) and (2,y). What is the value of  $y$ ?  
 (1) -8 (2) 7  
 (3) 9 (4) None of these.

27. All four sections on spinner A are of the same size and all 3 sections on spinner B are of the same size. Kirti spins spinner A and spinner B one time each and adds her results. What is the probability of getting a sum of 6?



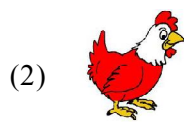
- (1)  $\frac{1}{12}$  (2)  $\frac{1}{6}$   
 (3)  $\frac{1}{4}$  (4) None of these.
28. The derivative of the given expression is  $\frac{\sqrt{1+x}}{\sqrt{1-x}}$
- (1)  $\frac{1}{(x-1)^{3/2}+1}$  (2)  $\frac{1}{(x+1)^{1/2}-(1-x)^{2/3}}$   
 (3)  $\log\left(\frac{1-x}{1+x}\right)^2$  (4) None of these
29. A man from the top of a 100 meter high tower sees a car moving towards the tower at an angle of  $30^\circ$ . After some time, the angle of depression becomes  $60^\circ$ . The distance (in meters) travelled by the car driving this time is
- (1)  $100\sqrt{3}$  (2)  $\frac{100\sqrt{3}}{3}$   
 (3)  $\frac{200\sqrt{3}}{3}$  (4)  $200\sqrt{3}$
30. P and his wife Q appear in an interview for two vacancies at the same post. The probability of P's selection is  $\frac{1}{7}$  and that of his wife is  $\frac{1}{5}$ . What is the probability that only one of them will be selected?
- (1)  $\frac{5}{7}$  (2)  $\frac{1}{5}$   
 (3)  $\frac{2}{7}$  (4) None of these.
31. If  $\lim_{x \rightarrow k} \frac{x^k - 5^k}{x - 5}$
- (1) 3 (2) 4  
 (3) 5 (4) None of these
32.  $X = \{8^n - 7n - 1 : n \in \mathbb{N}\}$  and  $Y = \{49(n-1) : n \in \mathbb{N}\}$  then
- (1)  $X \subset Y$  (2)  $Y \subset X$   
 (3)  $X = Y$  (4) None of these

33. The domain of the function  $f(x) = \sqrt{4x-3} + \sqrt{2x-6}$  is
- (1)  $(0, \infty)$  (2)  $(3/4, \infty)$   
 (3)  $(4/3, \infty)$  (4)  $(3, \infty)$
34. If the base and height of a right angled triangle is 3 times and  $\frac{1}{5}$ th times of another right angled triangle, then what is the ratio of areas of first triangle to second triangle?
- (1) 1:3 (2) 5:2  
 (3) 2:3 (4) 5:3
35. If the  $m^{\text{th}}$  term of an AP is  $2n$  and  $n^{\text{th}}$  term is  $2m$ , then the sum of first  $mn$  terms is
- (1)  $mn(a+1-mn)$  (2)  $\frac{mn+a+2}{2}$   
 (3)  $\frac{mn(-1+a+n+m)}{3}$  (4) None of these
36. The value of the expression  $\sqrt{3} \operatorname{cosec} 20^\circ - \sec 20^\circ$  is equal to
- (1) 2 (2)  $2 \sin 20^\circ / \sin 40^\circ$   
 (3) 4 (4)  $4 \sin 20^\circ / \sin 40^\circ$ .
37. Let  $0 < x < \frac{\pi}{4}$  then  $(\sec 2x - \tan 2x)$  equals?
- (1)  $\tan\left(x - \frac{\pi}{4}\right)$  (2)  $\tan\left(\frac{\pi}{4} - x\right)$   
 (3)  $\tan\left(x + \frac{\pi}{4}\right)$  (4)  $\tan^2\left(x + \frac{\pi}{4}\right)$ .
38. If  $w$  is an imaginary cube root of unity then the value of  $\sin\left\{(\omega^{10} + \omega^{23})\pi - \frac{\pi}{4}\right\}$  is
- (1)  $-\frac{\sqrt{3}}{2}$  (2)  $-\frac{1}{\sqrt{2}}$   
 (3)  $\frac{1}{\sqrt{2}}$  (4)  $\frac{\sqrt{3}}{2}$ .
39.  $3(\sin x - \cos x)^4 + 6(\sin x + \cos x)^2 + 4(\sin^6 x + \cos^6 x) =$
- (1) 11 (2) 12  
 (3) 13 (4) 14.
40. The number of all possible triplets  $(a_1, a_2, a_3)$  such that  $a_1 + a_2(\cos 2x) + a_3 \sin^2 x = 0$  for all  $x$  is
- (1) infinite (2) one  
 (3) three (4) zero

## SECTION C : BIOLOGY

21. During a marathon run, aerobic metabolism predominates over anaerobic metabolism because
- (1) Aerobic metabolism produces lactic acid
  - (2) Fat stores are expanded during the first few minutes of exercise.
  - (3) More power is produced using aerobic metabolism than anaerobic metabolism
  - (4) None of these

22. Which of the following is an example for a ureotelic animal?



(4) None of these.

23. A region of DNA that controls hereditary character is known as

- (1) Chromatin
- (2) Chromosomes
- (3) Gene
- (4) None of these.

24. Which group is not a component of abiotic factors?

- (1) Sun and light
- (2) Soil and water
- (3) Plants and Animals
- (4) None of these

25. Among the following, to which part of our brain is learning related to?

- (1) Medulla Oblongata
- (2) Cerebrum
- (3) Hypothalamus
- (4) None of these

26. The immediate source of the intercellular fluid surrounding all human body cells is

- (1) Lymphatic tissue
- (2) Blood plasma
- (3) Enzymatic secretions
- (4) None of these.

27. Which tissue contributes to the hardness of seed coat?

- (1) Epidermis
- (2) Sclerenchyma
- (3) Collenchyma
- (4) None of these.

28. A first aid manual suggests that baking soda should be used to treat honeybee stings. If there was no baking soda in the house, which other household substance among the following could you use to treat honeybee stings?

- (1) Sugar solution
- (2) Common salt solution

- (3) Washing soda
- (4) None of these

29. Which energy transfer is least likely to be found in nature?

- (1) Predator to prey
- (2) Consumer to consumer
- (3) Host to parasite
- (4) None of these.

30. Which one of the following elements is obtained from sea weeds?

- (1) Argon
- (2) Iodine
- (3) Vanadium
- (4) None of these.

31. Red pigment present in RBCs is :

- (1) Carotene
- (2) Anthocyanin
- (3) Haemoglobin
- (4) None of these

32. DNA found in the nucleus is wrapped around a simple protein which is basic in nature. This protein is also thought to regulate DNA functioning in some way. Name this protein.

- (1) Histones
- (2) Collagen
- (3) Pepsin
- (4) None of these

33. Which one of the following endocrine glands is known as master gland?

- (1) Adrenal
- (2) Thyroid
- (3) Testosterone
- (4) Pituitary gland

34. The process in which loss of water takes place in the form of water vapour

- (1) Transpiration
- (2) Translocation
- (3) Aestivation
- (4) Transportation

35. ATP is a

- (1) Lipid
- (2) Nucleotide
- (3) Protein
- (4) None of these

36. Gas exchange takes place by the physical process of diffusion in

- (1) Insect
- (2) Flat worms
- (3) Fish
- (4) None of these.

37. Which blood group is the universal recipient ?

- (1) B
- (2) AB
- (3) O
- (4) None of these.

38. The immediate response of the spinal cord to a sudden impulse is

- (1) Interaction
- (2) Reflex action
- (3) Response action
- (4) None of these

39. A vital connection between mother and foetus is called

- (1) Placenta
- (2) Uterus
- (3) Embryo sac
- (4) None of these

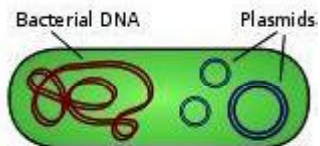
40. Heredity is defined as

- (1) Transmission of characters from one species to another species

- (2) Transmission of characters from parent to offspring
- (3) Transmission of characters from mother to offspring
- (4) None of these.

### INTERACTIVE SECTION

41. Plasmid has been used as a vector because



- (1) It has antibiotic resistance gene
  - (2) It is a circular DNA which has capacity to join to eukaryotic DNA
  - (3) Both ends show replication
  - (4) It can move between prokaryotic and eukaryotic cells
42. In a frog, if a hole is punched in the floor of its buccal cavity, it will not die. This is because
- (1) Pulmonary respiration occurs
  - (2) Respiration other than lungs will continue
  - (3) Buccal respiration does not stop
  - (4) None of these
43. The bacteria generally used for genetic engineering is
- (1) Bacillus
  - (2) Pseudomonas
  - (3) Clostridium
  - (4) Agrobacterium

44. Pomato is somatic
- (1) Poppy and potato
  - (2) Potato and tomato
  - (3) Poppy and tamarind
  - (4) Poppy and tomato
45. Mitochondrial DNA in an individual comes from
- (1) Both parents
  - (2) Female parent
  - (3) Male parent
  - (4) None of these
46. Termination of polypeptide chain is brought about by
- (1) UUG, UAG and UCG
  - (2) UAA, UAG and UGA
  - (3) UUG, UGC and UCA
  - (4) UCG, GCG and ACC
47. The codon for anticodon 3' UUUA-5' is
- (1) 5' AAAU-3'
  - (2) 5' UUUA-3'
  - (3) 3' UAAD-5'
  - (4) 3'-AUUU-5'
48. Streptomycin is prepared from
- (1) Streptokinase
  - (2) Streptomyces nodosus
  - (3) Streptomyces griseus
  - (4) None of these
49. Okazaki segments are formed during
- (1) Transduction
  - (2) Transcription
  - (3) Replication
  - (4) Translation
50. A molecular biologist analyzed a DNA sample and found that it contained the nucleotide bases in the following proportion. What can be concluded from this?
- (1) DNA sample is highly thermolabile
  - (2) DNA sample is from a eukaryotic cell
  - (3) DNA in the sample is single stranded
  - (4) None of these



**END OF THE EXAM**