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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	<b>NIPO</b> NATIONAL IIT-PMT 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 Art, 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

- 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.
- 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.
- 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.**
- Students can attempt either Maths or Biology as optional.

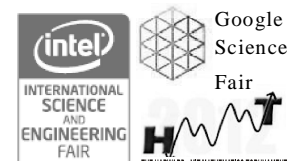
**EHF**  
NATIONAL  
**BIOTECHNOLOGY**  
OLYMPIAD

**N B T O**

**12**  
Class

**A1**  
Paper  
Code

**L E V E L - 1**



## GENERAL KNOWLEDGE

- A researcher identifies a naturally occurring variant possessing characteristics of interest. This plant is selectively bred. This is an example of:
  - Traditional plant breeding
  - Transgenic technology
  - Mutant selection
  - None of these
- The first field tests were of which genetically altered organism?
  - Bt corn
  - FlavrSavr tomato
  - Strawberry seedlings sprayed with ice-minus bacteria
  - None of these
- Which of the given agricultural challenges cannot be solved with transgenic techniques?
  - Crops damaged by frost
  - Public concern about safety of synthetic pesticides
  - Public preference for organic vegetables
  - None of these
- The roots of a plant are converted into drug producing structures by a process called
  - Microcosm establishment
  - Rhizosecretion
  - Bioremediation
  - None of these
- A DNA sequence is given as ATTAAGGC. Which sequence would be used by researchers as an antisense molecule?
  - AUUAAGGC
  - UAAUCCG
  - TAATTCCG
  - None of these
- Bacillus thuringiensis is used to control
  - Insect pests
  - Nematodes
  - Fungal pathogens
  - None of these
- The protein products of Bt toxin genes cryI AC and cryIIAB are responsible for controlling:
  - Round worm
  - Moth
  - Boll worm
  - None of these
- Restriction endonucleases are most widely used in rDNA technology. They are obtained from:
  - Bacteriophages
  - Bacterial cells
  - Plasmids
  - None of these

9. An improved variety of transgenic basmati rice:  
 (1) Gives high yield and is rich in vitamin A  
 (2) Does not require chemical fertilizers and growth hormones  
 (3) Is completely resistant to all insect pests and diseases of paddy  
 (4) None of these
10. Which country is the largest source of global warming pollution?  
 (1) Japan (2) India  
 (3) United States (4) None of these

### SECTION B : PHYSICS & CHEMISTRY

11. Which of the following cannot be deflected by a magnetic field?  
 (1) An alpha particle (2) A beta particle  
 (3) A gamma ray (4) None of these
12. The minimum orbital angular momentum of the electron in hydrogen atom is:  
 (1)  $h$  (2)  $\frac{h}{2\pi}$  (3)  $\frac{h}{\pi}$  (4) None of these
13. Which of the following bonds is the weakest?  
 (1) Ionic bond (2) Vander waal's  
 (3) Covalent bond (4) None of these
14. A piece of copper wire is dipped in a solution of ferrous sulphate. Which of the following statements is correct?  
 (1) Hydrogen gas will be liberated  
 (2) Copper will dissolve and the solution will become blue in colour  
 (3) No reaction will take place  
 (4) None of these
15. When n-p-n transistor is used as an amplifier:  
 (1) Electrons move from base to collector  
 (2) Holes move from base to emitter  
 (3) Electrons move from collector to base  
 (4) None of these
16. A bomb dropped from an aeroplane explodes in mid air, Then:  
 (1) Its total kinetic energy increases  
 (2) Its total kinetic energy decreases  
 (3) Its total momentum increases  
 (4) None of these
17. Lanthanides and Actinides are included in the periodic table as  
 (1) s-block elements (2) d-block elements  
 (3) f-block elements (4) None of these
18. If you are at sea level, at what temperature does water boil on the kelvin scale?  
 (1) 373 K (2) 212 K  
 (3) 0 K (4) None of these
19. Caustic soda is:  
 (1) Efflorescent (2) Deliquescent

- (3) Hygroscopic (4) None of these
20. A sphere of radius  $r$  is placed concentrically inside a hollow sphere of radius  $R$ . The bigger and smaller spheres are given charges  $Q$  and  $q$  respectively and are insulated. The potential difference between the two spheres depends on:  
 (1) Only charge  $q$  (2) Only charge  $Q$   
 (3) Both (1) and (2) (4) None of these

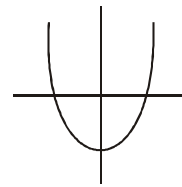
### SECTION C : BIOLOGY

21. Sympathetic nervous system induces:  
 (1) Secretion of digestive juices  
 (2) Heart beat  
 (3) Secretion of saliva  
 (4) None of these
22. 'Law of segregation of gametes' was proposed by:  
 (1) Gregor Mendel (2) Robert Hook and Virchow  
 (3) Huxley and Watson (4) None of these
23. The carotid labyrinth of frog is concerned with the control of:  
 (1) Temperature (2) Blood composition  
 (3) Blood pressure (4) None of these
24. Spindle apparatus is formed during which of the following stage of mitosis?  
 (1) Anaphase (2) Metaphase  
 (3) Telophase (4) None of these
25. pH of gastric juice is:  
 (1) 5.0 to 6.8 (2) 7.0 to 9.0  
 (3) 2.0 to 3.0 (4) None of these
26. Every living cell has a:  
 (1) Cell wall (2) Cell membrane  
 (3) Food vacuole (4) None of these
27. Amoeba stops forming pseudopodia during:  
 (1) Acidic condition (2) Alkaline condition  
 (3) Starvation (4) None of these
28. Bending of shoot tip when light is not available is  
 (1) Emasculation (2) Etiolation  
 (3) Chlorosis (4) None of these
29. Stomata opens and closes due to which of the following ions?  
 (1)  $Ca^{++}$  (2)  $Na^+$   
 (3)  $K^+$  (4) None of these
30. Developing pollen derives its nutrition from the:  
 (1) Epidermis (2) Tapetum  
 (3) Endothesium (4) None of these
31. Sexual reproduction in spirogyra is by:  
 (1) Conjugation (2) Fragmentation  
 (3) Budding (4) None of these
32. A monocotyledenous plant in which pith is absent:  
 (1) Plantain (2) Cyas  
 (3) Sugarcane (4) None of these

33. The amino acid often found in the active sites of enzymes:  
 (1) Histidine (2) Threonine  
 (3) Lysine (4) None of these
34. Pollination by insects is called:  
 (1) Ornithophily (2) Anemophily  
 (3) Entomophily (4) None of these
35. Which of the following prevents food from going into trachea?  
 (1) Glottis (2) Epiglottis  
 (3) Pharynx (4) None of these
36. Which is called the 'antisterility vitamin'?  
 (1) Vitamin E (2) Vitamin D  
 (3) Vitamin A (4) None of these
37. 'One gene - one enzyme hypothesis' was proposed by:  
 (1) Watson and Crick  
 (2) Beadle and Tatum  
 (3) Maurice Frederick Wilkins  
 (4) None of these
38. Disaccharides and polysaccharides are formed from monosaccharides by:  
 (1) Hydrolysis (2) Decarboxylation  
 (3) Condensation (4) None of these
39. Transposons are:  
 (1) Mobile genetic elements between non-homologous chromosomes  
 (2) Mobile genetic elements between homologous chromosomes  
 (3) Recombination genetic elements  
 (4) None of these
40. In tRNA the unusual bases are mostly:  
 (1) Methylated and sulphhydryl derivatives  
 (2) Methylated and nitrated derivatives  
 (3) Methylated and demethylated derivatives  
 (4) None of these

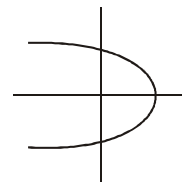
### SECTION C : MATHEMATICS

21. If any two rows (columns) of a determinant are identical, then the value of the determinant is :  
 (1) 1 (2) 0  
 (3) Sum of all elements (4) None of these
22. Find 'p' so that the curve  $y = x^3 + 2x^2 + px + 3$  has one horizontal tangent line only  
 (1)  $4/3$  (2)  $-3/2$   
 (3)  $4/5$  (4) None of these
23.  $\int_0^{\infty} \frac{\cos mx}{x^2 + a^2} dx = ?$   
 (1)  $\pi/2a$  (2)  $\pi/2a e^{ma}$   
 (3)  $\pi/2a e^{-ma}$  (4) None of these
24. Which function is represented by the given graph?



- (1) Affine function (2) Quadratic function  
 (3) Cosine function (4) None of these
25. If for each  $y \in Y$  exist  $x \in X$  such that  $f(x) = y$ , then the function,  $f: X \rightarrow Y$  is :  
 (1) Surjective (2) Injective  
 (3) Bijective (4) None of these
26. On making a can of volume  $200\text{m}^3$  with gold side silver top/bottom. If gold cost  $\`10/\text{m}^2$  and silver cost  $\`1/\text{m}^2$ . What is the minimum cost of such a can?  
 (1)  $\`787.76$  (2)  $\`878.76$  (3)  $\`543.12$  (4) None of these
27. A team of 8 students goes on an excursion, in two cars, of which one can seats 5 and the other only 4. In how many ways can they travel?  
 (1) 26 (2) 3920 (3) 126 (4) None of these
28. Find the value of the given limit  

$$\lim_{x \rightarrow a} \frac{x^m - a^m}{x^n - a^n} =$$
  
 (1)  $ma^{m-n}$  (2)  $\frac{m}{n} a^{m-n}$  (3)  $\frac{n}{m} a^m$  (4) None of these
29. If  $a^x = b^y = ab^{xy}$ , then  $x + y = ?$   
 (1) 0 (2)  $xy$  (3) 1 (4) None of these
30. Is the graph show below that of a function?



- (1) Yes (2) No  
 (3) Can't say (4) None of these
31. The determinant of an odd order skew symmetric matrix is always:  
 (1) Zero (2) One  
 (3) Depends on the matrix (4) None of these
32. What is the number of arbitrary constants in the particular solution of differential equation of third order?  
 (1) Zero (2) Two  
 (3) Three (4) None of these
33. The domain of the given function is:

$$f(x) = \sin^{-1} \left[ \frac{1-2x}{4} \right] + \log(x^2 + x + 4) - \frac{4}{(x+1)(x-2)}$$

- (1)  $x \in \left[ -\frac{3}{2}, \frac{5}{2} \right]$  but  $x \neq -1$  or 2

(2)  $x \in \left[ \frac{3}{2}, \frac{-5}{2} \right]$  but  $x \neq -1$  or  $2$

(3)  $x \in \left[ \frac{-3}{2}, \frac{5}{2} \right]$  (4) None of these

34. The value of  $\int \frac{x^2+1}{x^2-1} dx$  is

(1)  $\log \left( \frac{x+1}{x-1} \right) + c$  (2)  $x - \log \left( \frac{x-1}{x+1} \right)$

(3)  $x + \log \left( \frac{x-1}{x+1} \right)$  (4) None of these

35. The value of  $k$  such that  $3x^2 - 11xy + 10y^2 - 7x + 13y + k = 0$  may represent a pair of straight lines is:

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

36. In a geometric progression consisting of positive terms, each term equals the sum of the next two terms. Then the common ratio of this progression equals:

(1)  $\frac{1}{2}(\sqrt{5}-1)$  (2)  $\frac{1}{2}(1-\sqrt{5})$

(3)  $\frac{1}{2}(\sqrt{5}+1)$  (4) None of these

37. If  $p$  and  $q$  are positive real number such that  $p^2 + q^2 = 1$ , then the maximum value of  $(p+q)$  is

(1) 2 (2)  $\sqrt{2}$  (3)  $1/2$  (4) None of these

38. For the hyperbola  $\frac{x^2}{\cos^2 \alpha} - \frac{y^2}{\sin^2 \alpha} = 1$ , which of the following remains constant when  $\alpha$  varies?

(1) Eccentricity (2) Abscissae of vertices  
(3) Abscissae of foci (4) None of these

39. The sum of the series  $\log_9 3 - \log_{27} 3 + \log_{81} 3 \dots \infty =$

(1)  $1 - \log_e 2$  (2)  $1 + \log_e 2$   
(3)  $e^2$  (4) None of these

40. Find the coordinates of the point  $(3, 1)$  in the new system, when the axes are translated to  $(2, -1)$

(1)  $(-1, 2)$  (2)  $(2, 1)$  (3)  $(1, 2)$  (4) None of these

### INTERACTIVE SECTION

41. Antitranspirants are used for reducing the high rate of transpiration by:

- (1) By reducing the degree of stomatal opening
- (2) By forming ultra thin surface film of silicon emulsion over the leaf surface which is more permeable to gases.
- (3) Both (1) and (2)
- (4) None of these

42. Root nodules are not found in non-leguminous plants because

- (1) They grow in nitrogen deficient soil
- (2) They have bacteria in soil for the conversion of  $N_2$  into usable form
- (3) They grow in nitrogen rich soil
- (4) None of these

43.  $G_1$ , S and  $G_2$  are the stages of

- (1) Prophase
- (2) Interphase
- (3) Metaphase
- (4) None of these

44. Colour blindness is due to

- (1) Recessive female chromosome
- (2) Recessive male chromosome
- (3) Dominant male chromosome
- (4) None of these

45. RNA molecules are more susceptible to alkaline and enzymatic dehydration compared to DNA molecules because

- (1) RNA has uracil instead of thymine
- (2) Presence of hydroxyl group at second carbon of deoxyribose sugar
- (3) Presence of hydroxyl group at second carbon of ribose sugar
- (4) None of these

46. Alkylating agents generally cause mutation because they

- (1) Alkylate the phosphates of DNA
- (2) Alkylate the nitrogenous bases of DNA
- (3) Both (1) and (2)
- (4) None of these

47. Biosensors are

- (1) Simple enzyme like substances
- (2) Devices that can convert biological or biochemical signal or response into a quantifiable electrical signal
- (3) Biological substances that can check pollution
- (4) None of these

48. Which of the following is not the function of RNA polymerase?

- (1) They are involved in the synthesis of a single transcript
- (2) It detects termination signals that specify where a transcript ends
- (3) It searches DNA for initiation sites
- (4) None of these

49. The pigment leghaemoglobin is present in the roots of

- (1) Maize
- (2) Potato
- (3) Soyabean
- (4) None of these

50. Queen Victoria was a carrier of haemophilia. Which of the following is true regarding her disease?

- (1) All her daughters would have been carriers
- (2) All of her sons would have had haemophilia
- (3) Haemophilia would have occurred more in her male than female descendants
- (4) None of these



END OF THE EXAM

