

# Entrance Examination 2073

## Mathematics

1. Which one is not a logical statement:

- a. If you work hard, you will pass
- b. I am sick.
- c. the sun rises in the west
- d. 30 is a number

2.  $|x - 2| = 5$  then  $x$  is in

- a.  $\{3,5\}$
- b.  $\{2, \infty\}$
- c.  $\{2,5\}$
- d.  $\{-3,7\}$

3.  $A - B =$

- a.  $\{3,5\}$
- b.  $\{2, \infty\}$
- c.  $\{2,5\}$
- d.  $\{-3,7\}$

4. If  $f(x) = 2x - 3$ , then  $f^{-1}(x) =$

- a.  $(x + 3)/2$
- b.  $1/(2x - 3)$
- c.  $1/(3 - 2x)$
- d.  $1/(2x + 3)$

5. The period of the function  $f(x) = \sin(45 + 5)$  is

- a.  $2\pi$
- b.  $\pi/2$
- c.  $\pi$
- d.  $-\pi$

6. The fourth, seventh and tenth terms of a G.P. are  $l, m, n$  respectively, then

- a.  $ln = m^2$
- b.  $l^2 = m^2 + n^2$
- c.  $l^2 = mn$
- d.  $n^2 = lm$

7. The  $n$ th term of the series  $1.3 + 3.5 + 5.7 + \dots$  is

- a.  $(n + 1)(n + 2)$
- b.  $(n + 1)(n + 3)$
- c.  $4n^2 - 1$
- d.  $n(n - 1)$

8. The value of  $\sin(\cos^{-1}x)$  is

- a.  $x$
- b.  $1 - x^2$
- c.  $1 + x^2$
- d.  $\sqrt{1 - x^2}$

9. If  $\csc^2 x - 2 = 0$ , then  $x$  is

- a.  $\pm \pi/6$
- b.  $\pm \pi/4$
- c.  $n\pi \pm \pi/4$
- d.  $n\pi \pm \pi/2$

10. If  $\begin{vmatrix} \lambda & 1 & 0 \\ 2 & 0 & k \\ 0 & 2 & -1 \end{vmatrix} = 0$ , then  $k =$

- a. 1  
b. -1  
c. 0  
d.  $\pm 1$

11. The value of  $x$  for which  $A = \begin{vmatrix} 6 & x-2 \\ 3 & r \end{vmatrix}$  has no inverse is

- a. 0  
b. 1  
c. -2  
d. 2

12. If the system of equation has zero solutions only then the solution is

- a. *non trivial*  
b. *trivial*  
c. *unique*  
d. *particular*

13.  $(1+i)^6 + (1-i)^6 =$

- a. 0  
b.  $i$   
c. 1  
d. -1

14.  $\left(\frac{2i}{1+i}\right)^2 =$

- a.  $-i$   
b.  $1+i$   
c.  $2i$   
d.  $-2i$

15. If one root of  $5x^2 + 2x - k = 0$  is the reciprocal of the other then  $k =$

- a. -5  
b. 5  
c.  $2/5$   
d.  $5/2$

16. The equation  $x^2 - 2xy + y^2 + 3x - 2 = 0$  represents:

- a. *hyperbola*  
b. *parabola*  
c. *ellipse*  
d. *circle*

17. The area of the triangle with vertices  $(1, -1)$ ,  $(-1, 1)$  and  $(-1, -1)$  is

- a.  $1/2$   
b. -2  
c. 2  
d. 0

18.  $\lim_{x \rightarrow 0} f(n) = \frac{1+2+\dots+n}{n^2}$

- a.  $1/2$   
b. 0  
c.  $1/n$   
d.  $n$

19.  $\lim_{x \rightarrow 0} f(x) = \frac{5x^2 - 4 \tan^2 x}{x^2}$

- a. 9  
c. 5

- b. 0  
d. 4

20. If  $y = \sqrt{x + \sqrt{(x) + \sqrt{(x) + \dots}}}$  then  $\frac{dy}{dx} =$

- a.  $2\sqrt{2}$   
c.  $\frac{\sqrt{x}}{2y-1}$

- b.  $\sqrt{x^2}$   
d.  $1(2y - 1)$

21. If  $y = C\sqrt{ax^2+b}$  then  $\frac{dy}{dx} =$

a.  $\frac{axy}{\sqrt{ax^2-b}}$

b.  $\frac{ax}{\sqrt{ax^2+b}} C\sqrt{ax^2+b}$

c.  $\frac{x}{\sqrt{ax^2+b}}$

d.  $\frac{1}{2} 1n \left| \frac{1+2}{1-2} \right| + C$

22.  $\int \frac{dx}{1-x^2} =$

a.  $\cos^{-1} x + c$

b.  $\frac{1}{2} \ln \left| \frac{1-x}{1+x} \right| + C$

c.  $\sin^{-1} x + c$

d.  $\frac{1}{2} \ln \left| \frac{1+x}{1-x} \right| + C$

23.  $\int_1^2 \frac{\sin(\ln t)}{t} dt =$

a.  $1 - \cos(\ln 2)$

b.  $\cos 2$

c.  $\cos(\ln 2)$

d.  $1 + \cos(\ln 2)$

24. The critical points for  $f(x) = x^3 - 3x$  are:

a.  $\pm 3$

b.  $\pm\sqrt{3}$

c.  $\pm 1$

d.  $0, \pm\sqrt{3}$

25. The area bounded by the a-axis and the curve  $y = x^3$  and ordinates of  $x = 2$  and  $x = 4$  is

a. 60 sq. units

b. 256 sq. units

c. 240 sq. units

d. 272 sq. units

## English

**Direction:** Choose appropriate words or phrase/phrasal verb that completes the sentence.

26. **Government has a lot to ..... road accidents.**  
(a) answer back (b) answer for  
(c) answer to (d) answer into
27. **He inherited a fortune and . it in a year.**  
(a) ran into (b) ran over  
(c) ran through (d) ran onto
28. **His father blamed him but his mother and said he had acted sensibly .**  
(a) stand for (b) stand up to  
(c) stand out (d) stand up for
29. **Do you ..... me..... a fool?**  
(a) take, for (b) take, in  
(c) take, to (d) take, after
30. **The captain , not realizing that the icebergs were so close.**  
(a) turn in (b) turn on (c) turn away (d) turn down
31. **After a month's treatment at a hospital my brother is .....**  
(a) As good as good (b) as heavy as lead  
(c) As gay as a lark (d) as fit as a fiddle

**Direction:** Select the word/phrase which is closest to the opposite or similar in meaning of the word.

32. **Squeamish (similar meaning)**  
(a) very dirty (b) gullible (c) easily upset (d) braggart
33. **Bramble (similar meaning)** (a) wild cat (b) wild bush with thorn  
(c) tall plant (d) wild animal
34. **Congruous (similar meaning)** (a) consistent (b) covert (c) Irregular (d) clamorous
35. **savior (opposite meaning)**  
(a) protector (b) destroyer (c) nurturer (d) designer
36. **Scabrous (opposite meaning)** (a) scaly (b) scabby (c) decent (d) zigzag
37. **un-availing (opposite meaning)**  
(a) unavailable (b) re past (c) successful (d) rare

**Direction:** Select the proper prepositions and conjunctions to fill in the blanks in the following questions:

38. **He died ..... cancer but she died.....a train accident**  
(a) out, at (b) off, by (c) for, in (d) of, in
39. **Divide forty. Eight but divide the these apples .....the two children**  
(a) for, among (b) at, between (c) in, among (d) by, between
40. **It is a lovely place to live .**  
(a) in (b) for (c) for, in (d) of, in

41. **Divide forty ... eight but divide these apples ..... the two children.**  
 (a) for, among (b) at, between (c) in, among (d) by, between
42. **It is lovely place to live .....**  
 (a) in (b) for (c) at (d) by
43. **He is angry ..and indifferent.....me.**  
 (a) from, from. (b) by, by (c) with, to (d) during
44. **You alone can relieve me..... This anxiety.**  
 (a) from (1)) of (c) in (d) during
45. **He took the food play with your watch he breaks it.**  
 (a) should (b) in case (c) lest (d) might

**Direction:** Each of the following idioms an phrases is followed by four explanations. Mark the one that best explains its meaning.

46. **On the bottle**  
 (a) teetotaler (b) vegetarian  
 (c) drinking a lot (d) avoid alcohol
47. **On the rocks**  
 (a) in great success (b) in serious trouble  
 (c) heavy star (b) in progress
48. **Call it a night**  
 (a) stop some activity (b) feel lazy  
 (c) enjoy the night (d) belated activity
49. **Bide one's time**  
 (a) to be punctual (b) swearing frequently  
 (c). use rough language (d) act like a soldier
50. **Over the hill**  
 (a) high land (b) mountain area  
 (c) most difficult part (d) rough road

## Physics

**Symbols carry their usual meaning:**

51. **In the gas equation  $(p+a/v^2)(v-b)= RT$  , the dimensions of 'a' are**  
 (a)  $mL^2T^{-2}$  (b)  $mL^5T^{-2}$  (c)  $L^6$  (d)  $L^{-1}$
52. **The number of significant figures in 1400 are** (a) 0 (b) 1 (c) 2 (d) 4
53. **A man walks 8m forwards East and 6m towards North. The magnitude of displacement is**  
 (a) 14m (b) 2m (c) 8m (d)  $(8^2+ 6^2 )m$
54. **If initial velocity of a projectile is 'doubled, the maximum range will by**  
 (a) 2 times (b) 4 times (c) 8 times (d) 16 times
55. **Which of the following friction is maximum?**(a) rolling (b) Kinetic  
 (c) rolling +kinetic (d) static
56. **If the speed of rotation of earth increases, the weight of the body on earth's surface becomes.**  
 (a) smaller (b) zero (c) greater (d) unaffected
57. **A weightless rubber balloon has 100 g of water in it. Its weight in water will be**  
 (a) 100g (b) 50g (c) > 100g (d) zero

58. **The temperature of a substance increase by 270 C. This increase is equal to**  
 (a) 300 k      (b) 0 K      (c) 27K      (d) 273K
59. **Which of the following gases possess maximum rms speed at a given temperature?**  
 (a) H<sub>2</sub>      (b) N<sub>2</sub>      (c) O<sub>2</sub>      (d) He
60. **The black body emits** (a) line spectrum (b) band spectrum  
 (c) continuous spectrum      (d) mixed spectrum
61. **The field of view is maximum for** (a) plane mirror (b) concave mirror  
 (c) convex spectrum      (d) cylindrical mirror
62. **Sky seen from earth appears blue because of** (a) scattering of lights      (b) dispersion of lights  
 (c) reflection      (d) polarization
63. **A person cannot see objects clearly beyond 50 cm. The power of the lens to correct the vision is**  
 (a) +5 D      (b) -5 D      (c) -0.5 D      (d) -2 D
64. **An isolated conducting sphere is given a positive charge. Its mass**  
 (a) increases      (b) decreases  
 (c) remains constant  
 (d) may increase or decrease depending on material
65. **Three capacitors each of capacitance 311. F are connected in series. The net capacitance is**  
 (a) 1 p. F      (b) (1/3)11F      (c) 3μF      (d) 9 IA F
66. **Kirchoff's voltage law is based on the principle of conservation of**  
 (a) charge      (b) energy  
 (c) momentum      (d) mass of charges
67. **A charged particle enters in a strong magnetic field. Then its kinetic energy**  
 (a) increases (b) decreases (c) remains constant  
 (d) increases and becomes constant
68. **The self inductance of a straight wire is**  
 (a) zero      (b) oo      (c) negative      (d) positive
69. **The photoelectric is based on the law of conservation of**  
 (a) energy      (b) mass      (c) momentum  
 (d) angular momentum of photons
70. **When a radioactive element emits a a-particle the mass number of the atom**  
 (a) increase by one      (b) decreases by one  
 (c) remains the same      (d) decreases by four
71. **On increasing the reserve bias to a large value in a p-n junction diode, the current**  
 (a) increases slowly      (b) remains fixed  
 (c) decreases slowly      (d) suddenly increases
72. **The equation of sound wave is  $y = 0.0015 \sin(62.4x + 316t)$  The wave length of sound wave is**  
 (a) 0.2 unit      (b) 0.1 unit      (c) 3.3 unit  
 (d) not known from the given equation
73. **A wave is reflected from a rigid support. The change of phase on reflection will be**

- (a) 0            (b)  $ir/2$             (c)  $ir/4$             (d)

**74. A car at rest is playing 'HORN' . If it start moving towards you, the pitch heard would be**

- (a) higher        (b) less            (c) same            (d) nil

**75. In which region of electromagnetic spectrum does the Lyman series of H atom lie?**

- (a) Ultraviolet (b) visible        (c) infrared        (d) microwave

## Chemistry

**76. The oxidation of Fe in  $K_3[Fe(CN)_6]$  is**

- (a) +2            (b) +3            (c) +4            (d) +5

**77. How many oxygen atoms are present in 8.0 g of oxygen?**

- (a)  $6.023 \times 10^{23}$             (b)  $3.0115 \times 10^{23}$   
(c)  $7.83 \times 10^{23}$             (d)  $5.83 \times 10^{23}$

**78. "Atomic orbitals are filled up in the ground state in order of increasing energy level". This statement is called**

- (a) Pauli's exclusion principle (b) Hund's rule  
(c) Aufbau principle  
(d) Heisenberg's Uncertainty principle

**79. The spectral region for the Lyman series of hydrogen spectrum lies in the**

- (a) infrared region            (b) visible region  
(c) ultra-violet region        (d) microwave region

**80. The crystal structure of sodium chloride is**

- (a) body centered cubic        (b) simple cubic  
(c) hexagonal            (d) face centered cubic

**81. Which of the following halogens has highest electron affinity?**

- (a) fluorine        (b) iodine        (c) bromine        (d) chlorine

**82. Ammonia is manufactured by**

- (a) Haber's process            (b) Contact process  
(c) Down's process            (d) Ostwald's process

**83. An example of acidic oxide is**

- (a)  $SO_2$             (b)  $N_2O$             (c) CO            (d) ZnO

**84. The shape of  $BeF_2$  molecule on the basis of VSEPR theory is :**

- (a) trigonal planar            (b) linear  
(c) tetrahedral            (d) trigonal bipyramidal

**85. Which of the following compound is not a primary standard substance ?**

- (a) oxalic acid            (b) potassium dichromate  
(c) potassium bromate        (d) potassium permanganate

**86. An example of Lewis base is**

- (a)  $BF_3$             (b)  $SnCl_4$             (c)  $FeCl_3$             (d)  $NH_3$

**87. The unit of equivalent conductivity is**

- (a)  $S\ cm^2\ equivalent^{-1}$             (b) Ohm.cm  
(c)  $S\ cm^{-1}$             (d)  $S\ cm^2\ mole^{-1}$

**88. 1 calorie is equal to**

- (a) 4.184 Joules                      (b) 5.174 Joules  
(c) 6.184 Joules                      (d) 3.184 Joules

**89. Gibb's Helmholtz equation is**

- (a)  $\Delta E = Q + W$                       (b)  $\Delta G = \Delta H - T \Delta S$   
(c)  $G = H + TS$                       (d)  $\Delta E = Q - W$

90. **The unit of rate constant for third order reaction is** (a)  $S^{-1}$       (b)  $\text{mol}^2 L^2 s^{-1}$  (b)  
 $\text{mol}^1 L S^{-1}$  (d) mol
91. **The reaction of benzene with alkyl chloride in presence of anhydrous  $AlCl_3$  is**  
(a) Friedel Craft's reaction    (b) Wurtz's reaction  
(c) Reimer Tiemann's reaction (d) Grignard reaction
92. **Primary, secondary and tertiary alcohols are distinguished by**  
(a) Victor Meyer's test      (b) Tollen's reagent  
(c) Hoffinan's test              (d) Beilstein's test
93. **Williamson's synthesis is used for the preparation of**  
(a) alcohol    (b) aldehyde (e) ketone    (d) ether
94. **The catalyst used in Rosenmund's reduction is**  
(a) Pd-CuSO<sub>4</sub> (b) Pd-CaSO<sub>4</sub> (c) Pd-CuCl<sub>2</sub> (d) Pd-BaSO<sub>4</sub>
95. **The reaction of Phenol with concentrated nitric acid and concentrated Sulphuric acid gives:**  
(a) picric acid                      (b) 2-nitrophenol  
(c) 4-nitrophenol                  (d) aniline
96. **When benzamide is treated with aqueous Br<sub>2</sub> in presence of aqueous alkali, the product formed is:**  
(a) aniline      (b) benzene  
(c) toluene      (d) nitrosoamine
97. **Amino acid contains**  
(a) —OH group                      (b) —CHO group  
(c) —NH<sub>2</sub> and —COOH groups    (d) —CO group
98. **Martius yellow is an example of**  
(a) direct dyes                      (b) acid dyes  
(c) basic dyes                      (d) mordant dyes
99. **The molecular formula of green vitriol is**  
(a) FeCl<sub>3</sub>      (b) FeSO<sub>4</sub>, 7H<sub>2</sub>O  
(c) ZnSO<sub>4</sub>, 7H<sub>2</sub>O (d) CuSO<sub>4</sub>, 5H<sub>2</sub>O
100. **Which is the most important ore of Zinc**  
(a) Zincite      (b) Zinc blende  
(c) Framklinite (d) Wilemite