

## Entrance Examination 2071

### Mathematics

- If  $(X-3) = 4$  then  $X$  is  
a. 7 and -1    b. 7 and 1    c. 7    d. 1
- If  $\{X-X^2 = 9 \text{ and } 2X = 6\}$   
a. Null set    b.  $\{-1, 1\}$     c.  $\{1, 0\}$     d.  $\{4, 3\}$
- If:  $R \rightarrow R$  defined by  $f(X) = X^2 + 3$  then  $f^{-1}(4)$  is  
a. Null set    b.  $\{-1, 1\}$     c.  $\{1, 0\}$     d.  $\{4, 3\}$
- The value of  $\log_2 \sqrt{2} + \log_3 \sqrt{3} + \log_4 \sqrt{4}$  is  
a. 0    b.  $13/12$     c.  $-13/2$     d.  $\pi/6$
- If  $\cos^2 \theta = \frac{1}{2}$ , then  $\theta$  is  
a.  $n\pi \pm \pi/4$     b.  $n\pi + \pi/4$     c.  $n\pi \pm \pi/3$     d.  $2n\pi$
- $\cos(\sin^{-1} 3/5) =$   
a.  $3/5$     b.  $4/5$     c.  $9/25$     d.  $4/25$
- If  $a^2, b^2, c^2$  are in H.P. then  
a.  $2a^2c^2 = b^2(a^2 + c^2)$     b.  $a^2c^2 = b^2(a^2 + c^2)$     c.  $2b^2c^2 = a^2(b^2 + c^2)$     d.  $c^2a^2 = 2b^2(a^2 + c^2)$
- If  $A = \begin{bmatrix} 1 & 2 \\ 2 & 3 \end{bmatrix}$  and  $A^2 - nA - I = 0$ , then the value of  $n$  is  
a. 0    b. 4    c. 1    d. -4
- If  $A = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \\ 1 & 0 & 0 \end{bmatrix}$ , then  $A$  is  
a. Symmetric    b. skew-symmetric    c. Singular    d. Non singular
- The system of equations  $2x + y = 5$ ;  $4x + 2y = 8$  is  
a. Consistent and dependent  
b. Inconsistent and independent  
c. Inconsistent and dependent  
d. Consistent and independent
- The value of  $i^7 + 1/i^4$  is  
a. 1    b. -1    c.  $-i$     d.  $-i + 1$
- The value of  $\frac{x-xy+w^2z}{y+wz+w^2x}$   $w$  is the cube root of unity, is  
a.  $W$     b.  $x+y+z$     c.  $w^2$     d. 1
- If the roots of  $x^2 + 4x + k = 0$ , are equal then  $k$  is  
a. 0  
b. 4  
c. -4  
d. 16
- The length of the perpendicular from  $(0, 0)$  to the line  $x+y+1 = 0$  is  
a.  $\frac{1}{\sqrt{2}}$     b.  $\sqrt{2}$     c.  $\frac{-1}{\sqrt{2}}$     d.  $-\sqrt{2}$
- The two lines  $2x^2 - 2xy + ky^2 = 0$  are perpendicular to each other if  $k$  is  
a. 2  
b. -2

- c. 0  
d. 1
16. The equation of the circle touching the positive x-axis and y-axis with radius 2 units is
- $X^2 + y^2 - 4x - 4y + 4 = 0$
  - $X^2 + y^2 + 4x + 4y + 4 = 0$
  - $X^2 + y^2 - 4x + 4y + 4 = 0$
  - $X^2 + y^2 - 4x - 4y - 4 = 0$
17. If the line  $4x + 3y = k$  is tangent to the circle  $x^2 + y^2 = 25$  at  $(2, 1)$  then  $k$  is
- 25
  - 25
  - $\pm 25$
  - $\pm 11$
18. The value of  $\lim_{x \rightarrow 2} \frac{x^5 - 2^5}{x - 2}$  is
- 80
  - 40
  - 10
  - 0
19. The value of  $\lim_{x \rightarrow 0} \frac{3x + 4 \tan 2x}{x}$  is
- 7
  - 3
  - 11
  - 4
20. The derivative of  $y = b^x$  is
- $Xb^{x-1}$
  - $b$
  - $x^b \ln |b|$
  - $b^x \ln |b|$
21. The derivative of  $y = \cos(\cos \sqrt{x})$  is
- $\frac{\sin(\cos \sqrt{x}) \sin \sqrt{x}}{2\sqrt{x}}$
  - $\sin(\cos \sqrt{x})$
  - $\sin(\sin \sqrt{x})$
  - $\frac{\sin(\cos \sqrt{x})}{2\sqrt{x}}$
22. The value of  $x$  for which the derivative of  $x^2 + 2x + 2$  is zero is
- 1
  - 2
  - 0
  - 1
23. The point of inflection of the curve  $x^2 + 3x^2 - 9x + 2$  is
- 1
  - 1
  - 6
  - 0

24.  $\int \frac{dx}{1-\cos x} =$
- Tan  $x/2$
  - $-\cot x/2$
  - Cos  $x/2$
  - $-\tan x/2$
25.  $\int_0^{1/2} \frac{\cos x}{1+\sin x} dx =$
- $\infty$
  - $\ln |2|$
  - 0
  - 1

## English

26. The word "education" has the stress on the.....Syllable.
- First
  - Third
  - Second
  - Fourth
27. Select the right synonym to the word "ardous"
- Simple
  - Difficult
  - Easy
  - Strange
28. Give the opposite meaning of "obscure"
- Pedantic
  - Implicit
  - Explicit
  - Obnoxious
29. The initial consonant sound of "chef" is the same as that of.....
- Chute
  - Chess
  - Child
  - Cheap
30. Which of the following pair has the same vowel sound?
- Hut/ hot
  - Sit/ seat
  - Salt/ mark
  - Pair/tear
31. I completely differ ..... You..... This point.
- From: at    b. from: in    c. from: on    d. to: at
32. We feel sympathy .....the poor.
- To
  - With
  - About

- d. For
33. He insisted .....leaving immediately
- a. At
  - b. In
  - c. On
  - d. Over
34. Tick the correct word to the underlined expression. No one knows his hole and corner method of dealing with people.
- a. Strict
  - b. Secret
  - c. Servile
  - d. Suspicious
35. Food that agree to one's taste is .....
- a. Pungent
  - b. Edible
  - c. Palatable
  - d. Sensuous
36. The word " pleased" takes the prefix.....
- a. Un-
  - b. Mis-
  - c. Dis-
  - d. None-
37. One who is resent everywhere is.....
- a. Omnipresent
  - b. Omniscient
  - c. Theist
  - d. Omnipotent
38. Fear of food is called as .....
- a. Sitophobia
  - b. Ergophobia
  - c. Panthophobia
  - d. Hictophobia
39. A funeral bell is called
- a. Call
  - b. Knell
  - c. Replica
  - d. Invitation
40. People..... A large number of computers now, because prices are getting low
- a. Must buy
  - b. Must have bought
  - c. Must be buying
  - d. Must buying
41. Although they are similar, chipmunks are..... most other ground squirrels.
- a. Alike'

- b. Like as
  - c. Like to
  - d. Like
42. She..... The whole day long.
- a. Has been working
  - b. Works
  - c. Had worked
  - d. Worked
43. Now a days Shyam is ..... Busy to take care of his health.
- a. Very
  - b. To
  - c. So
  - d. Extremely
44. She demanded..... her status
- a. Know
  - b. Knowing
  - c. To Know
  - d. To be known
45. The mail comes at ten O' clock everyday.....Saturday.
- a. But also
  - b. And
  - c. Also
  - d. But
46. In my office, salary is paid by ..... Month.
- a. The
  - b. A
  - c. An
  - d. Some
47. Every boy and every girl ..... Very responsible
- a. Are
  - b. Is
  - c. Has
  - d. Have
48. Which of the following is accepted?
- a. Some of rice is still left
  - b. Time and tide wait for none
  - c. She absents herself from the college today
  - d. None of the squares was properly drawn
49. Which of the following is a complex sentence?
- a. However, hard she worked, she failed in the exams
  - b. It rained heavily, however he came to school
  - c. In spite of heavy rain, he come to school
  - d. Neither she nor he will come.
50. Which of the following is an adjective?

- a. Sympathize
- b. Lighten
- c. Perception
- d. Moral

## Physics

51. The dimensions of  $(h/e)$  are same as that of
- a. Magnetic field
  - b. Electric field
  - c. Magnetic flux
  - d. Electric flux
52. The number of significant figures in  $0.0030 \times 10^{11}$  m are
- a. 5
  - b. 4
  - c. 11
  - d. 2
53.  $\mu_s$  and  $\mu_k$  are coefficient of static and kinetic frictions between two bodies. Then
- a.  $\mu_s \geq \mu_k$
  - b.  $\mu_s < \mu_k$
  - c.  $\mu_s = 0$  and  $\mu_k > 0$
  - d.  $\mu_s < 0$  and  $\mu_k < 0$
54. When a torque ( $\tau$ ) acts on a body, the change in angular momentum ( $L$ ) of the body is
- a. Perpendicular to  $\vec{L}$
  - b. Parallel to  $\vec{L}$
  - c. Always zero
  - d.  $180^\circ \vec{L}$
55. The Poisson's ratio of material can't be
- a. 0.10
  - b. 0.20
  - c. 0.40
  - d. 0.65
56. The depth of water at which air-bubble of radius 0.4 mm may remain in equilibrium ( surface tension of water =  $72 \times 10^{-3}$  N/m,  $g = 9.8$  m/ s<sup>2</sup>) is given by
- a. 7.348 cm
  - b. 0.918cm
  - c. 3.674 cm
  - d. 1.837 cm
57. When a cylinder is heated, its length increases by 2%, the area of its base will increase by:
- a. 0.5%
  - b. 1%
  - c. 2%
  - d. 4%
58. In a pressure cooker food is cooked usually at a pressure
- a. One atmosphere

- b. Half atmosphere
  - c. Two atmosphere
  - d. 50 atmosphere
59. The mean free path of a gas varies with absolute temperature (T) as
- a.  $T^4$
  - b.  $1/T^4$
  - c.  $1/T$
  - d. T
60. The efficiency of Carrot engine working between steam point and ice point is:
- a. 16.8%
  - b. 26.81%
  - c. 36.8%
  - d. 46.8%
61. The bending of sound waves through the corners of the obstacle is called
- a. Refraction
  - b. Interference
  - c. Beats
  - d. Diffraction
62. When a turning fork is vibrated its prongs have a phase difference of:
- a. 0
  - b.  $\frac{\pi}{4}$
  - c.  $\pi$
  - d.  $2\pi$
63. The image of an object placed at the focus of convex mirror is at a distance
- a.  $\infty$
  - b. F
  - c. 2f
  - d. f/2
64. If sky is seen from moon's surface, it will appear
- a. Black
  - b. Blue
  - c. White
  - d. Red
65. A double convex air bubble in a glass sheet would behave as a
- a. Convergent lens
  - b. Concave mirror
  - c. Divergent mirror
  - d. Plane mirror
66. When two prisms are combined it gives
- a. Reflection only
  - b. Lateral shift
  - c. Dispersion and deviation both
  - d. Dispersion or deviation
67. Which property of electrons is used in an electron microscope

- a. Negative charge
  - b. Wave nature
  - c. Spin
  - d. Small size
68. A system of three charges may be in equilibrium. If they are placed
- a. On a straight line
  - b. On corners of equilateral triangle
  - c. On three corners of a rectangle
  - d. On the corners of a cube
69. The radius of Earth is 6400 km. The capacitance is
- a. 6400 MF
  - b. 6400 F
  - c. 1 F
  - d. 711  $\mu$ F
70. Two wires of same material have lengths L and 2L and cross reaction areas 4A and A respectively. The ratio of their specific resistances would be
- a. 1:1
  - b. 1:8
  - c. 8:1
  - d. 1:2
71. The magnetic field inside a ling solenoid is
- a. Zero
  - b. 1
  - c.  $\mu_0 ni$
  - d.  $\mu ni$
72. Electrons in the atoms are held due to
- a. Nuclear forces
  - b. Coulomb forces
  - c. Van der Waals force
  - d. Gravitational forces
73. Which series of H atom lies in visible region?
- a. Lyman
  - b. Bracket and Paschen
  - c. Balmer
  - d. Paschen
74. The half- life of a substance is 1600 years. The mean life is
- a. 1600 years
  - b. 3200 years
  - c. 800 years
  - d. 2309 years
75. Rydberg constant is
- a. Same for all elements
  - b. Different for different elements
  - c. A universal constant

- d. Is different for lighter elements but same for heavier elements

### Chemistry

76. How many orbitals are possible for principle quantum number 3?
- 3
  - 4
  - 6
  - 9
77. The number of moles of water present in 18 g of water is
- 18
  - 1
  - 1.8
  - 180
78. The half- life of an radioisotope is 30 minutes. After how much time the amount of radioisotope left is  $1/4^{\text{th}}$  o the original amount.
- 4 minutes
  - 30 minutes
  - 60 minutes
  - 120 minutes
79. What is oxidation of chlorine is HOCL.
- +1
  - 0
  - 1
  - +3
80. Hemoglobin contains 0.33% of iron by weight. Molecular weight of hemoglobin is 97200. The number of iron atoms (At wt of Fe = 55.85) ion one molecule of hemoglobin is
- 2
  - 4
  - 6
  - 9
81. The gas law which deals with the effect of pressure in a given volume of gas constant temperature is known as
- Boyle's Law
  - Charle's Law
  - Graham's Law
  - Dalton's Law
82. Electronic configuration of four elements A, B, C, D are as follow, which will be most metallic?
- A = 2,8,4
  - B= 2,8,8
  - C=2,8,1
  - D=2,8,7
83. In which of the following compound the molecular geometry cannot be predicted by the use of VSEPR theory
- NaCl

- b. H<sub>2</sub>O
  - c. CH<sub>4</sub>
  - d. NH<sub>3</sub>
84. Consider the reaction  $2A+B \rightarrow C+D$ . If the concentration of the reactants are increased by 3 times, the rate of reaction will increase by
- a. 3 times
  - b. 6 times
  - c. 9 times
  - d. 27 times
85. An aqueous solution of NaCl would be
- a. Acidic
  - b. Basic
  - c. Neutral
  - d. Could be acidic or basic depending upon temperature
86. The Ph of pure water at 50° C would be
- a. 7.0
  - b. More than 7.0
  - c. Less than 7.0 cannot be predicted
87. Which of the following metals generate H<sub>2</sub> on treatment with dil. HNO<sub>3</sub>.
- a. Zn
  - b. Mn
  - c. Cu
  - d. Pb
88. 1 M H<sub>2</sub>SO<sub>4</sub> is equal to
- a. 1 N H<sub>2</sub>SO<sub>4</sub>
  - b. 2 N H<sub>2</sub>SO<sub>4</sub>
  - c. 0.5 N H<sub>2</sub>SO<sub>4</sub>
  - d. 4 N H<sub>2</sub>SO<sub>4</sub>
89. Hydrogen molecule which has parallel spin of two nuclei is called
- a. Ortho hydrogen
  - b. Para hydrogen
  - c. Heavy hydrogen
  - d. Nascent hydrogen
90. Ammonia is manufactured by the use of
- a. Solvay's process
  - b. Haber's process
  - c. Ostwald's process
  - d. Down's process
91. Hematite is an ore of
- a. Fe
  - b. Cu
  - c. Zn
  - d. Hg
92. Which of the following is not a nucleophile

- a.  $\text{BF}_3$
  - b.  $\text{NH}_3$
  - c.  $\text{H}_2\text{O}$
  - d.  $\text{OH}$
93. Anti- Markownikoff addition of HBr is not observed in
- a. Propene
  - b. 1- butane
  - c. 2- butane
  - d. Pent-2-one
94. When oxalic acid crystals and glycerol are mixed and heated to about  $110^\circ\text{C}$ , the compound obtained is
- a. Chloroform
  - b. Diethyl ether
  - c. Acetone
  - d. Formic acid
95. Which of the following is a meta directing group?
- a.  $-\text{NH}_2$
  - b.  $-\text{OH}$
  - c.  $-\text{COOH}$
  - d.  $-\text{R}$
96. How many position isomers are possible for dichlorobenzene?
- a. 2
  - b. 3
  - c. 4
  - d. 6
97. Which of the following is a condensation polymer?
- a. Polythene
  - b. Terylene
  - c. PVC
  - d. Teflon
98. Penicillin is an example of
- a. Antiseptic drug
  - b. Antipyretic drug
  - c. Antibiotic drug
  - d. Analgesic drug
99. Enzymes are
- a. Carbohydrates
  - b. Proteins
  - c. Lipids
  - d. Nucleic acids
100. Which base is found only in the nucleotides of RNA?
- a. Adenine
  - b. Guanine
  - c. Uracil

d. cytosine