

Name: .....

Exam Roll No.: .....

Signature: .....

Tribhuvan University  
Institute of Science and Technology  
B.Sc. Entrance Examination  
Model question

Full marks: 100

Time: 2 hrs

Attempt all questions.

**Group A (Chemistry)**

(25 x 1 = 25)

1. Which of the following elements does not contain neutron?
  - a. H
  - b. He
  - c. Be
  - d. Li
2. The oxidation number of Nitrogen is - 1 in
  - a.  $\text{NH}_3$
  - b.  $\text{NH}_2\text{OH}$
  - c.  $\text{N}_2$
  - d.  $\text{N}_2\text{O}$
3. The number of unpaired electrons in oxygen is
  - a. 2
  - b. 3
  - c. 4
  - d. 6
4. The unit of radioactivity is
  - a. Fajan
  - b. Bohr
  - c. Curie
  - d. Debye
5. Which of the following compounds gives positive  $\text{AgNO}_3$  test?
  - a.  $\text{CCl}_4$
  - b.  $\text{CH}_3\text{Cl}$
  - c.  $\text{CHCl}_3$
  - d.  $\text{NaCl}$
6. 'At same temperature and pressure equal volume of all gases has same number of molecules' this statement belongs to
  - a. Boyle's law
  - b. Avogadro's law
  - c. Charles' law
  - d. Graham's law
7. A gas diffuses 4 times as fast as  $\text{O}_2$ . The molecular weight of the gas is
  - a. 4.2
  - b. 8
  - c. 16
  - d. 2
8. In a solution containing 1 mole alcohol and 4 mole water, the mole fraction of alcohol is
  - a.  $\frac{1}{4}$
  - b.  $\frac{3}{4}$
  - c.  $\frac{4}{5}$
  - d.  $\frac{1}{5}$

9. The oxidation number of Mn in  $\text{MnO}_2$  is
- a. +2
  - b. +4
  - c. +6
  - d. +7
10. Vapour pressure at equilibrium of a liquid in a closed vessel depends only on
- a. Concentration
  - b. Temperature
  - c. Pressure
  - d. Volume
11. Which one is Eka silicon?
- a. Sc
  - b. P
  - c. Ga
  - d. Ge
12. The compound used as refrigerant is
- a.  $\text{CF}_4$
  - b.  $\text{CCl}_4$
  - c.  $\text{COCl}_2$
  - d.  $\text{CCl}_2\text{F}_2$
13. Ethylene reacts with alkaline  $\text{KMnO}_4$  (Bayer's reagent) to form
- a. Oxalic acid
  - b. Acetic acid
  - c. Glycerol
  - d. Glycol
14. The crystalline form of carbon is
- a. Diamond
  - b. Graphene
  - c. Fullerene
  - d. All of the above
15. Froth floatation process is done for
- a. Oxide ore
  - b. Sulphide ore
  - c. Carbonate ore
  - d. Nitrate ore
16. 4 g NaOH in 1 L solution is
- a. 1N
  - b. 0.1N
  - c. 4N
  - d. 0.4N
17. The  $\text{p}^{\text{H}}$  of a solution containing 3.65 g of HCl per litre is
- a. 0.01
  - b. 0.1
  - c. 1.0
  - d. 10.0
18. The rate constant of a reaction depends upon
- a. Temperature
  - b. Initial concentration
  - c. Time of the reaction
  - d. Extent of reaction
19. Which of the following metals is readily corroded in moist air?
- a. Cu
  - b. Ag
  - c. Au
  - d. Fe

20. When a solid is converted into liquid, entropy will
- Remain same
  - Become zero
  - Decrease
  - Increase
21. Lassaigne's test is not used to detect which one of the following elements in organic compounds?
- S
  - N
  - Br
  - C
22.  $\text{CH}_4$  is a/an
- Alcohol
  - Ketone
  - Ether
  - Alkane
23. Ethyne on polymerization gives
- Polythene
  - Benzene
  - Phenol
  - Ethane
24. Toluene on oxidation with alkaline  $\text{KMnO}_4$  gives
- Benzoic acid
  - Phenol
  - Benzaldehyde
  - Aniline
25. Which of the following is a Friedel Craft's catalyst
- $\text{AlCl}_3$
  - $\text{H}_2\text{SO}_4$
  - $\text{PCl}_5$
  - $\text{CH}_3\text{COCl}$

**Group B**

(25 x 1 = 25)

(You are strongly advised to attempt either *Mathematics* or *Biology*)

**Mathematics**

(25 x 1 = 25)

26. For any two sets A and B,  $(A - B) \cup (B - A) =$
- $(A - B) \cup A$
  - $(B - A) \cup B$
  - $(A \cup B) - (A \cap B)$
  - $(A \cup B) \cap (A \cap B)$
27. The interval satisfying  $3 \leq 2x - 1 \leq 5$  is
- [3,5]
  - [4,6]
  - [2,3]
  - (2,3)
28. The value of  $\log \frac{4}{3} \log_4^5 \log_5^6 \log_6^7 \log_7^8 \log_8^9$  is equal to?
- 1
  - 2
  - 3
  - 4
29. Which of the following is incorrect ?
- $\sin \theta = -\frac{1}{5}$
  - $\cos \theta = 1$
  - $\sec \theta = \frac{1}{2}$
  - $\tan \theta = 20$

30. The value of  $\lim_{x \rightarrow 0} \frac{\sin 3x}{\tan 4x}$  is

- a.  $\frac{3}{4}$
- b.  $\frac{4}{3}$

- c.  $-\frac{3}{4}$
- d.  $\frac{8}{3}$

31.  $\lim_{x \rightarrow 0} \frac{\sin x}{x}$  is equal to

- a. 1
- b.  $\pi$

- c.  $x$
- d.  $\frac{\pi}{180}$

32.  $\frac{d}{dx} (\log|x|)$  is equal to

- a.  $\frac{1}{|x|}$
- b.  $\pm \frac{1}{x}$

- c.  $\frac{1}{x}$
- d.  $\frac{1}{x^2}$

33. 20 is divided into two parts so that the product of cube of one quantity and square of the other quantity is maximum. The parts are

- a. 10, 10
- b. 16, 4

- c. 8, 12
- d. 12, 8

34.  $\int \frac{e^{\tan^{-1}x}}{1+x^2} dx$  is equal to

- a.  $\log(1+x^2) + C$
- b.  $\log(e^{\tan^{-1}x}) + C$

- c.  $e^{\tan^{-1}x} + C$
- d.  $\tan^{-1}x + C$

35.  $\int_1^e \log x dx =$

- a. 1
- b.  $e-1$

- c.  $e+1$
- d. 0

36. If  $i$  is imaginary unit, then the value of  $i^{4n+3}$  is

- a.  $-i$
- b.  $i$

- c. 1
- d.  $-1$

37. Determine the value of  $k$  if  $f(x) = x^3 + kx^2 - kx + 10$  is divisible by  $x+3$

- a.  $-3$
- b.  $\frac{10}{17}$

- c.  $\frac{17}{12}$
- d.  $\frac{12}{17}$

38. The value of the determinant  $\begin{vmatrix} 1 & w & w^2 \\ w & w^2 & 1 \\ w^2 & 1 & w \end{vmatrix}$  is equal to
- a. 1  
b.  $w$   
c.  $w^2$   
d. 0
39. The equation of a circle with radius 5 and touching both the coordinates axes is
- a.  $x^2 + y^2 \pm 10y + 5 = 0$   
b.  $x^2 + y^2 \pm 10x \pm 10y = 0$   
c.  $x^2 + y^2 \pm 10x \pm 10y + 25 = 0$   
d.  $x^2 + y^2 \pm 10x \pm 10y + 51 = 0$
40. The sum of first ten odd numbers is
- a. 100  
b. 90  
c. 81  
d. 50
41. How many permutations are there in the word 'madam' ?
- a. 10  
b. 20  
c. 120  
d. 30
42. How many terms are there in the expansion of  $(x + y + z)^6$  ?
- a. 42  
b. 28  
c. 18  
d. 7
43. For what value of K, the points (k,1), (2,1) and (4,5) lie on a line?
- a. 0  
b. 1  
c. 2  
d. 3
44. The polar coordinates of the point  $x = \sqrt{3}, y = 1$  is
- a.  $(2, \pi/6)$   
b.  $(2, \pi/2)$   
c.  $(2, \pi/3)$   
d.  $(2, \pi/4)$
45. The angle between the lines  $2x - y + 3 = 0$  and  $x + 2y + 3 = 0$  is
- a. 900  
b. 600  
c. 450  
d. 300
46. The length of the tangent to the circle  $2x^2 + 2y^2 - 3x + 5y + 9 = 0$  from the point (2,-1) is
- a. 8  
b. 6  
c. 4  
d. 2

47. The focus of the parabola  $y^2 + 12 = 4x + 4y$  is
- $(2, 3)$
  - $(3, 2)$
  - $(-2, 3)$
  - $(-3, 2)$
48. The angle between the tangents at the ends of the latus rectum is
- $\pi/2$
  - $\pi/3$
  - $\pi/4$
  - $\pi/6$
49. What does the equation  $y=0, z=0$  represents?
- x-axis*
  - y-axis*
  - z-axis*
  - yz-plane*
50. If  $\theta$  is the angle between two unit vectors  $\vec{a}$  and  $\vec{b}$ , then  $\sin\theta$  is equal to
- $\vec{a} + \vec{b}$
  - $\vec{a} \cdot \vec{b}$
  - $\vec{a} - \vec{b}$
  - $|\vec{a} \times \vec{b}|$

-----OR-----

**Biology**

(25 x 1 = 25)

51. Study of fossils comes under
- Organic evolution
  - Herpetology
  - Paleontology
  - Paleogeography
52. Amoeba locomotes by
- Pseudopodia
  - Cilia
  - Flagella
  - Tentacles
53. How many pairs of legs do insects have?
- Three
  - Four
  - Five
  - Six
54. Croaking of frog is
- Danger call
  - Sex call for female
  - Hunger call
  - Musical note
55. Which national park in Nepal is designated as a 'world heritage site?'
- Bardia N P
  - Chitwan N P
  - Banke N P
  - Rara N P
56. Where do you find squamous epithelial tissue?
- Heart
  - Bone
  - Blood
  - In the cheek wall

57. Yolk plug is seen in
- Blastula
  - Gastrula
  - Morula
  - Cleavage
58. Movement of food in the intestine is by
- Flowing
  - Osmosis
  - Peristalsis
  - Active motion
59. The amount of air always present in lungs is
- Tidal volume
  - Alveolar capacity
  - Vital capacity
  - Residual volume
60. The difference of blood pressure between systolic and diastolic phase is
- 40 mm Hg
  - 190 mm Hg
  - 120 mm Hg
  - 180 mm Hg
61. Central nervous system consists of
- Brain only
  - Spinal cord only
  - Brain and spinal cord both
  - Brain and autonomous system
62. Typhoid is the disease in which there is infection of
- Kidney
  - Heart
  - Stomach
  - Lung
63. Plant cell only must have
- Mitochondria
  - Lysosome
  - Centriole
  - Cell wall
64. Crossing over occurs in
- Leptotene
  - Zygotene
  - Pachytene
  - Diplotene
65. Eukaryotic unicellular organism belongs to
- Mycota
  - Protista
  - Monera
  - Animalia
66. Venter is a part of
- Sporogonium
  - Antheridium
  - Gemma
  - Archeogonium
67. Vascular cryptogam is
- Algae
  - Fungi
  - Bryophytes
  - Pteridophytes

68. Synecology is the study of
- a. Individuals
  - b. Community
  - c. Environment
  - d. Water
69. Palisade parenchyma is found in
- a. Root
  - b. Stem
  - c. Leaf
  - d. Fruit
70. Hypodermis in dicot stem is
- a. Parenchyma
  - b. Collenchyma
  - c. Sclerenchyma
  - d. Aerenchyma
71. The water is transported up to the leaves through
- a. Xylem
  - b. Phloem
  - c. Cortex
  - d. Parenchyma
72. Light reaction of photosynthesis takes place in
- a. Mitochondria
  - b. Glyoxysome
  - c. Grana
  - d. Stroma
73. Codon is associated with
- a. tRNA
  - b. mRNA
  - c. rRNA
  - d. DNA
74. Tendency of genes to get inherited together is called
- a. Sex linkage
  - b. Recombination
  - c. Linkage
  - d. Co-dominance
75. Function of tapetum is
- a. Protective
  - b. Nutritive
  - c. Respiratory
  - d. Absorptive

**Group C (Physics)**

(25 x 1 = 25)

76. The dimensions of the light-year are
- a. [L]
  - b. [L-1]
  - c. [T]
  - d. [T-1]
77. Which of the following quantities remains constant for a body moving with a constant speed in a horizontal circle?
- a. Time
  - b. Velocity
  - c. Acceleration
  - d. K.E.



78. To stop a rigid body from rotating about an axis, we have to apply
- Momentum
  - Force
  - Torque
  - Pressure
79. Shearing strain is expressed by
- Angle of twist
  - Angle of shear
  - Increase in volume
  - Decrease in volume
80. The water meniscus in contact with air in a capillary tube is
- Concave
  - Convex
  - Plano-concave
  - Plano-convex
81. Which of the following thermometers is used to measure the temperature of the Sun?
- Gas thermometer
  - Pyrometer
  - Mercury thermometer
  - Vapour pressure thermometer
82. Water has a minimum volume at
- 0°C
  - 1°C
  - 4°C
  - 100°C
83. The efficiency of a Carnot's engine working in between 1000K and 300K is
- 0 %
  - 99 %
  - 100 %
  - 70 %
84. The twinkling of stars in the sky is due to
- Reflection
  - Refraction
  - Polarization
  - Diffraction
85. For which of the following colors is the maximum angle of deviation for a prism?
- Red
  - Violet
  - Blue
  - Green
86. The S.I. unit of the universal gas constant is
- JK-1mol-1
  - JK-1
  - J°Cmol<sup>-1</sup>
  - Calg-1
87. A long-sighted person uses spectacles fitted with
- Cylindrical lenses
  - Plano-convex lenses
  - Concave lenses
  - Convex lenses

88. The distance traveled by the light in one year is called?
- Leap year
  - Solar year
  - Light year
  - Yester year
89. Velocity of sound in a vacuum is
- Zero
  - 330 m/s
  - 150 m/s
  - 500 m/s
90. Buzzing of a mosquito is
- Shrill sound
  - Loud sound
  - Pleasant sound
  - Flat sound
91. The credit for the discovery of the thermo-electric effect goes to
- Seebeck
  - Peltier
  - Thomson
  - Maxwell
92. The forces responsible to hold the electrons in an atom are
- Nuclear forces
  - Coulomb forces
  - Gravitational forces
  - Vander Waal's forces
93. The ground state energy of hydrogen atom is
- 13.6 eV
  - 13.6 MeV
  - 13.6 Joule
  - 3.4 eV
94. 1 atomic mass unit is equal to
- 1/12 (mass of one O atom)
  - 1/12 (mass of one H atom)
  - 1/12 (mass of one C atom)
  - 1/12 (mass of one O<sub>2</sub> molecule)
95. The process used in the atom bomb is
- Fusion
  - Fission
  - Ionization
  - Electrolysis
96. The energy stored in a charged capacitor is in the form of
- Kinetic energy
  - Potential energy
  - Magnetic energy
  - Elastic energy
97. The direction of the magnetic field produced by a straight conductor carrying current is given by
- Fleming's left-hand rule
  - Ampere's law
  - Biot and Savart law
  - right-hand thumb rule
98. The most accepted theory about the origin of the Universe is
- Big-band theory
  - Oscillating theory
  - Steady state theory
  - Geocentric theory

99. For wattless current in an a. c. circuit, the phase difference between current and voltage must be
- a.  $\pi$
  - b.  $\pi/2$
  - c.  $2\pi$
  - d.  $\pi/4$
100. Which substance is used to make a permanent magnet?
- a. Ferromagnetic
  - b. Paramagnetic
  - c. Diamagnetic
  - d. Electromagnetic

**Group D (English + Aptitude Test)**

(25 x 1 = 25)

101. Something that causes no harm:
- a. Injurious
  - b. Innocuous
  - c. Panacea
  - d. Secure
102. Something that cannot be grasped by mind:
- a. Inexplicable
  - b. Infallible
  - c. Intangible
  - d. Incredible
103. One who rides in horse races, esp. professionally:
- a. Knight-errant
  - b. Pedestrian
  - c. Jockey
  - d. Equestrian
104. A heavy unnatural slumber:
- a. Insomnia
  - b. Coma
  - c. Intangible
  - d. Stupor
105. To repeat word for word:
- a. Literal
  - b. Verbal
  - c. Verbatim
  - d. Verbose
106. Anything that destroys the effects of poison:
- a. Antidote
  - b. Antibiotic
  - c. Antiseptic
  - d. Antique
107. A person who totally abstains from alcoholic drinks:
- a. Cannibal
  - b. Teetotaler
  - c. Vegetarian
  - d. Hedomist

108. A person in the habit of continuous talking:
- a. Omnivorous
  - b. Graminivorous
  - c. Loquacious
  - d. Tounge-tied
109. A person who is hard to please:
- a. Taciturn
  - b. Stubborn
  - c. Fastidious
  - d. Epicure
110. To atone for one's sins:
- a. Ingratiate
  - b. Propitiate
  - c. Apologise
  - d. Expiate
111. A person who cannot be subdued or conquered:
- a. Inscrutable
  - b. Inflexible
  - c. Indomitable
  - d. Infallible
112. Something that cannot be explained:
- a. Impregnable
  - b. Inexplicable
  - c. Mysterious
  - d. Unthinkable
113. A place where young plants are reared:
- a. Poultry
  - b. Nursery
  - c. Kennel
  - d. Gymnasium
114. A person who mends shoes:
- a. Cobbler
  - b. Plumber
  - c. Mechanic
  - d. Shoeshine
115. A man whose wife is dead:
- a. Widow
  - b. Widower
  - c. Henpecked
  - d. Orphan
116. Book, picture, etc., produced merely to bring in money:
- a. Box-office
  - b. Mercenary
  - c. Pot-boiler
  - d. Heady

117. Forensic examination of a dead body:
- a. Diagnosis
  - b. Post-mortem
  - c. Analysis
  - d. Dialysis
118. Musical or literary medley:
- a. Musical soiree
  - b. Potpourri
  - c. Rendezvous
  - d. Extravaganza
119. A person who changes his religious beliefs:
- a. Rebel
  - b. Renegade
  - c. Iconoclast
  - d. Heretic
120. A person looks at the dark side of things:
- a. Pessimist
  - b. Optimist
  - c. Morose
  - d. Blackguard
121. A place of shelter for ships:
- a. Helipad
  - b. Port
  - c. Harbour
  - d. Barrack
122. A raised place on which offerings for a god are made:
- a. Church
  - b. Altar
  - c. Mound
  - d. Archives
123. A person who sorrows for his sins:
- a. Penitent
  - b. Sadist
  - c. Sorrowful
  - d. Pious
124. Printed notice of somebody's death:
- a. Mourning
  - b. Obituary
  - c. Condolence
  - d. Journey's end
125. The act of taking and passing off as one's the ideas and writings, etc., of another
- a. copyright
  - b. imitation
  - c. plagiarism
  - d. adaptation

----- *END* -----