

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. NH_3
 - b. NH_2OH
 - c. N_2
 - d. N_2O
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 AgNO_3 test?
 - a. CCl_4
 - b. CH_3Cl
 - c. CHCl_3
 - d. 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 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 MnO_2 is
- + 2
 - + 4
 - + 6
 - + 7
10. Vapour pressure at equilibrium of a liquid in a closed vessel depends only on
- Concentration
 - Temperature
 - Pressure
 - Volume
11. Which one is Eka silicon?
- Sc
 - P
 - Ga
 - Ge
12. The compound used as refrigerant is
- CF_4
 - CCl_4
 - COCl_2
 - CCl_2F_2
13. Ethylene reacts with alkaline KMnO_4 (Bayer's reagent) to form
- Oxalic acid
 - Acetic acid
 - Glycerol
 - Glycol
14. The crystalline form of carbon is
- Diamond
 - Graphene
 - Fullerene
 - All of the above
15. Froth floatation process is done for
- Oxide ore
 - Sulphide ore
 - Carbonate ore
 - Nitrate ore
16. 4 g NaOH in 1 L solution is
- 1N
 - 0.1N
 - 4N
 - 0.4N
17. The p^{H} of a solution containing 3.65 g of HCl per litre is
- 0.01
 - 0.1
 - 1.0
 - 10.0
18. The rate constant of a reaction depends upon
- Temperature
 - Initial concentration
 - Time of the reaction
 - Extent of reaction
19. Which of the following metals is readily corroded in moist air?
- Cu
 - Ag
 - Au
 - 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. CH_4 is a/an
- Alcohol
 - Ketone
 - Ether
 - Alkane
23. Ethyne on polymerization gives
- Polythene
 - Benzene
 - Phenol
 - Ethane
24. Toluene on oxidation with alkaline KMnO_4 gives
- Benzoic acid
 - Phenol
 - Benzaldehyde
 - Aniline
25. Which of the following is a Friedel Craft's catalyst
- AlCl_3
 - H_2SO_4
 - PCl_5
 - CH_3COCl

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 $\log_3 4 \log_4 5 \log_5 6 \log_6 7 \log_7 8 \log_8 9$ 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
- $\frac{3}{4}$
 - $\frac{4}{3}$
 - $-\frac{3}{4}$
 - $\frac{8}{3}$
31. $\lim_{x \rightarrow 0} \frac{\sin x^0}{x}$ is equal to
- 1
 - π
 - x
 - $\pi/180$
32. $\frac{d}{dx} (\log|x|)$ is equal to
- $\frac{1}{|x|}$
 - $\pm \frac{1}{x}$
 - $\frac{1}{x}$
 - $\frac{1}{x^2}$
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
- 10, 10
 - 16, 4
 - 8, 12
 - 12, 8
34. $\int \frac{e^{\tan^{-1}x}}{1+x^2} dx$ is equal to
- $\log (1+x^2) + C$
 - $\log (e^{\tan^{-1}x}) + C$
 - $e^{\tan^{-1}x} + C$
 - $\tan^{-1}x + C$
35. $\int_1^e \log x dx =$
- 1
 - $e-1$
 - $e+1$
 - 0
36. If i is imaginary unit, then the value of i^{4n+3} is
- $-i$
 - i
 - 1
 - -1
37. Determine the value of k if $f(x) = x^3 + kx^2 - kx + 10$ is divisible by $x+3$
- 3
 - $\frac{10}{17}$
 - $\frac{17}{12}$
 - $\frac{12}{17}$

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
- 1
 - w
 - w^2
 - 0
39. The equation of a circle with radius 5 and touching both the coordinates axes is
- $x^2 + y^2 \pm 10y + 5 = 0$
 - $x^2 + y^2 \pm 10x \pm 10y = 0$
 - $x^2 + y^2 \pm 10x \pm 10y + 25 = 0$
 - $x^2 + y^2 \pm 10x \pm 10y + 51 = 0$
40. The sum of first ten odd numbers is
- 100
 - 90
 - 81
 - 50
41. How many permutations are there in the word 'madam' ?
- 10
 - 20
 - 120
 - 30
42. How many terms are there in the expansion of $(x + y + z)^6$?
- 42
 - 28
 - 18
 - 7
43. For what value of K, the points (k,1), (2,1) and (4,5) lie on a line?
- 0
 - 1
 - 2
 - 3
44. The polar coordinates of the point $x = \sqrt{3}, y = 1$ is
- $(2, \pi/6)$
 - $(2, \pi/2)$
 - $(2, \pi/3)$
 - $(2, \pi/4)$
45. The angle between the lines $2x - y + 3 = 0$ and $x + 2y + 3 = 0$ is
- 90°
 - 60°
 - 45°
 - 30°
46. The length of the tangent to the circle $2x^2 + 2y^2 - 3x + 5y + 9 = 0$ from the point (2,-1) is
- 8
 - 6
 - 4
 - 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 θ 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
 - Paleography
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
 - Archegonium
67. Vascular cryptogam is
- Algae
 - Fungi
 - Bryophytes
 - Pteridophytes

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

Group C (Physics)

(25 x 1 = 25)

76. The dimensions of the light-year are
- [L]
 - [L-1]
 - [T]
 - [T-1]
77. Which of the following quantities remains constant for a body moving with a constant speed in a horizontal circle?
- Time
 - Velocity
 - Acceleration
 - 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
- $\text{JK}^{-1}\text{mol}^{-1}$
 - JK^{-1}
 - $\text{J}^{\circ}\text{Cmol}^{-1}$
 - 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 O₂ 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. π
 - b. $\pi/2$
 - c. 2π
 - 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. Hedonist

108. A person in the habit of continuous talking:

- | | |
|------------------|----------------|
| a. Omnivorous | c. Loquacious |
| b. Graminivorous | d. Tounge-tied |

109. A person who is hard to please:

- | | |
|-------------|---------------|
| a. Taciturn | c. Fastidious |
| b. Stubborn | d. Epicure |

110. To atone for one's sins:

- | | |
|---------------|--------------|
| a. Ingratiate | c. Apologise |
| b. Propitiate | d. Expiate |

111. A person who cannot be subdued or conquered:

- | | |
|----------------|----------------|
| a. Inscrutable | c. Indomitable |
| b. Inflexible | d. Infallible |

112. Something that cannot be explained:

- | | |
|-----------------|----------------|
| a. Impregnable | c. Mysterious |
| b. Inexplicable | d. Unthinkable |

113. A place where young plants are reared:

- | | |
|------------|--------------|
| a. Poultry | c. Kennel |
| b. Nursery | d. Gymnasium |

114. A person who mends shoes:

- | | |
|------------|--------------|
| a. Cobbler | c. Mechanic |
| b. Plumber | d. Shoeshine |

115. A man whose wife is dead:

- | | |
|------------|--------------|
| a. Widow | c. Henpecked |
| b. Widower | d. Orphan |

116. Book, picture, etc., produced merely to bring in money:

- | | |
|---------------|---------------|
| a. Box-office | c. Pot-boiler |
| b. Mercenary | d. Heady |

117. Forensic examination of a dead body:

- | | |
|----------------|-------------|
| a. Diagnosis | c. Analysis |
| b. Post-mortem | d. Dialysis |

118. Musical or literary medley:

- | | |
|-------------------|-----------------|
| a. Musical soiree | c. Rendezvous |
| b. Potpourri | d. Extravaganza |

119. A person who changes his religious beliefs:

- | | |
|-------------|---------------|
| a. Rebel | c. Iconoclast |
| b. Renegade | d. Heretic |

120. A person looks at the dark side of things:

- | | |
|--------------|---------------|
| a. Pessimist | c. Morose |
| b. Optimist | d. Blackguard |

121. A place of shelter for ships:

- | | |
|------------|------------|
| a. Helipad | c. Harbour |
| b. Port | d. Barrack |

122. A raised place on which offerings for a god are made:

- | | |
|-----------|-------------|
| a. Church | c. Mound |
| b. Altar | d. Archives |

123. A person who sorrows for his sins:

- | | |
|-------------|--------------|
| a. Penitent | c. Sorrowful |
| b. Sadist | d. Pious |

124. Printed notice of somebody's death:

- | | |
|-------------|------------------|
| a. Mourning | c. Condolence |
| b. Obituary | d. Journey's end |

125. The act of taking and passing off as one's the ideas and writings, etc., of another

- | | |
|--------------|---------------|
| a. copyright | c. plagiarism |
| b. imitation | d. adaptation |

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