

Tribhuvan University
Institute of Science and Technology
B.Sc. Entrance Examination
 Model question 2081

Instructions:

A. The distributions of questions are as follows:

	Group A	Group B	Group C
Subject	<i>Chemistry</i> OR <i>Physics</i>	<i>Biology</i> OR <i>Mathematics</i>	<i>English</i> <i>Aptitude Test</i>
Marks	40	40	20

B. Questions will be asked from 11 & 12 Curriculum of NEB, Nepal

C. Attempt all questions.

Full marks: 100

Time: 2 hrs

Group A

(You are strongly advised to attempt either **Chemistry** or **Physics**)

Chemistry

40 x 1 = 40 Marks

- Which of the following elements does not contain neutron?
 - H
 - He
 - Be
 - Li
- The number of unpaired electrons in oxygen is
 - 2
 - 3
 - 4
 - 6
- The unit of radioactivity is
 - Fajan
 - Bohr
 - Curie
 - Debye
- Which of the following compounds gives positive AgNO_3 test?
 - CCl_4
 - CH_3Cl
 - CHCl_3
 - NaCl
- 'At same temperature and pressure equal volume of all gases has same number of molecules'. This statement belongs to
 - Boyle's law
 - Avogadro's law
 - Charles' law
 - Graham's law
- A gas diffuses 4 times as fast as O_2 . The molecular weight of the gas is
 - 4
 - 8
 - 16
 - 2

Name _____

7. In a solution containing 1 mole alcohol and 4 mole water, the mole fraction of alcohol is
- 1/4
 - 3/4
 - 4/5
 - 1/5
8. The oxidation number of Mn in MnO_2 is
- + 2
 - + 4
 - + 6
 - + 7
9. Vapour pressure at equilibrium of a liquid in a closed vessel depends only on
- Concentration
 - Temperature
 - Pressure
 - Volume
10. Ethylene reacts with alkaline KMnO_4 (Bayer's reagent) to form
- Oxalic acid
 - Acetic acid
 - Glycerol
 - Glycol
11. The crystalline form of carbon is
- Diamond
 - Graphene
 - Fullerene
 - All of the above
12. Froth floatation process is done for
- Oxide ore
 - Sulphide ore
 - Carbonate ore
 - Nitrate ore
13. 4 g NaOH in 1 L solution is
- 1N
 - 0.1N
 - 4N
 - 0.4N
14. The rate constant of a reaction depends upon
- Temperature
 - Initial concentration
 - Time of the reaction
 - Extent of reaction
15. When a solid is converted into liquid, entropy will
- Remain same
 - Become zero
 - Decrease
 - Increase
16. Lassaigne's test is not used to detect which one of the following elements in organic compounds?
- S
 - N
 - Br
 - C
17. CH_4 is a/an
- Alcohol
 - Ketone
 - Ether
 - Alkane

18. Ethyne on polymerization gives
- Polythene
 - Benzene
 - Phenol
 - Ethane
19. Toluene on oxidation with alkaline KMnO_4 gives
- Benzoic acid
 - Phenol
 - Benzaldehyde
 - Aniline
20. Which of the following is a Friedel Craft's catalyst
- AlCl_3
 - H_2SO_4
 - PCl_5
 - CH_3COCl
21. The molecular formula of blue vitriol is
- CuSO_4
 - $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$
 - $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$
 - ZnSO_4
22. Pure water always contains hydrogen and oxygen in 1:8 ratios by mass. This is best explained by
- Law of conservation of mass
 - Law of constant proportions
 - Law of multiple proportions
 - Law of reciprocal proportions
23. How many moles of CO_2 are there in 4.4 g of carbondioxide?
- 44 moles
 - 4.4 moles
 - 1 mole
 - 0.1 mole
24. Which one of the following molecules is expected to have zero dipole moment?
- H_2O
 - CO_2
 - SO_2
 - CaF_2
25. Oxidation number of chlorine varies from
- +1 to -1
 - 0 to +7
 - 1 to +7
 - 7 to +7
26. The real gases show ideal behavior at
- High temperature and low pressure
 - Low temperature and high pressure
 - High temperature and high pressure
 - Low temperature and Low pressure
27. The atomicity of nitrogen and phosphorous respectively are
- 2 and 5
 - 2 and 3
 - 2 and 2
 - 2 and 4
28. Aqueous solution of sodium acetate is
- Neutral
 - Weakly acidic
 - Strongly acidic
 - Alkaline

29. Half-life period of which order reaction is independent of initial concentration of reactant?

30. A well stoppered thermos flask contains some ice cubes. It is an example of

31. Which of the followings is not a typical transitional element?

32. Alumino thermic process is used for the extraction of

33. Anode used in Down's cell is

34. Anomalous electronic configurations in the 3d series are of

35. The chief ore of mercury is

36. Which organic compound was synthesized first in laboratory from its elements?

37. Two consecutive members of a homologous series differ from each other by

38. The IUPAC name of CH_3CHO is

39. Ethyl bromide on treatment with aqueous KOH gives

-
- 4

40. Esterification is the reaction between

- | | |
|---------------------------|----------------------------|
| a) Alcohol/acid chloride | c) Alcohol/aldehyde |
| b) Alcohol/acid anhydride | d) Alcohol/carboxylic acid |

-----OR-----

Physics**40 x 1 = 40 Marks**

1. The S.I. unit of the universal gas constant is
 - a. $\text{JK}^{-1}\text{mol}^{-1}$
 - b. JK^{-1}
 - c. $\text{J}^{\circ}\text{Cmol}^{-1}$
 - d. Calg^{-1}
2. 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.
3. The resultant of two vectors is maximum when angle between them is
 - a) 0°
 - b) 90°
 - c) 180°
 - d) 30°
4. A body of rest may have
 - a) Velocity
 - b) Speed
 - c) Momentum
 - d) Energy
5. Two balls at the same temperature collide. Which quantity is conserved?
 - a) Temperature
 - b) Kinetic energy
 - c) Velocity
 - d) Momentum
6. A particle is moving in a circle with constant speed. It has constant
 - a) Velocity
 - b) Acceleration
 - c) Kinetic energy
 - d) Displacement
7. To stop a rigid body from rotating about an axis, we have to apply
 - a) Momentum
 - b) Force
 - c) Torque
 - d) Pressure
8. Shearing strain is expressed by
 - a) Angle of twist
 - b) Angle of shear
 - c) Increase in volume
 - d) Decrease in volume
9. Which of the following thermometers is used to measure the temperature of the Sun?
 - a) Gas thermometer
 - b) Pyrometer
 - c) Mercury thermometer
 - d) Vapour pressure thermometer

Name

10. The efficiency of a Carnot's engine working in between 1000K and 300K is
 - a) 0 %
 - b) 99 %
 - c) 100 %
 - d) 70 %
11. The twinkling of stars in the sky is due to
 - a) Reflection
 - b) Refraction
 - c) Polarization
 - d) Diffraction
12. For which of the following colors is the maximum angle of deviation for a prism?
 - a) Red
 - b) Violet
 - c) Blue
 - d) Green
13. A long-sighted person uses spectacles fitted with
 - a) Cylindrical lenses
 - b) Plano-convex lenses
 - c) Concave lenses
 - d) Convex lenses
14. Velocity of sound in a vacuum is
 - a) Zero
 - b) 330 m/s
 - c) 150 m/s
 - d) 500 m/s
15. Buzzing of a mosquito is
 - a) Shrill sound
 - b) Loud sound
 - c) Pleasant sound
 - d) Flat sound
16. The forces responsible to hold the electrons in an atom are
 - a) Nuclear forces
 - b) Coulomb forces
 - c) Gravitational forces
 - d) Vander Waal's forces
17. The ground state energy of hydrogen atom is
 - a) 13.6 eV
 - b) 13.6 MeV
 - c) 13.6 Joule
 - d) 3.4 eV
18. 1 atomic mass unit is equal to
 - a) $1/12$ (mass of one O atom)
 - b) $1/12$ (mass of one H atom)
 - c) $1/12$ (mass of one C atom)
 - d) $1/12$ (mass of one O₂ molecule)
19. The process used in the atom bomb is
 - a) Fusion
 - b) Fission
 - c) Ionization
 - d) Electrolysis
20. The energy stored in a charged capacitor is in the form of
 - a) Kinetic energy
 - b) Potential energy
 - c) Magnetic energy
 - d) Elastic energy

21. The direction of the magnetic field produced by a straight conductor carrying current is given by
- a) Fleming's left-hand rule
 - b) Ampere's law
 - c) Biot and Savart law
 - d) Right-hand thumb rule
22. 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) $\pi/4$
23. Which substance is used to make a permanent magnet?
- a) Ferromagnetic
 - b) Paramagnetic
 - c) Diamagnetic
 - d) Electromagnetic
24. The fractional change due to temperature in the volume of a solid body is called
- a) Linear expansion
 - b) Apparent expansion
 - c) Superficial expansion
 - d) Volume expansion
25. An adiabatic process occurs at constant
- a) Temperature
 - b) Pressure
 - c) Heat energy
 - d) Entropy
26. Water is freezing at 0°C and converting to ice. During this process, the specific heat of water is
- a) Zero
 - b) Infinity
 - c) One
 - d) Less than one
27. The note of lowest frequency is called the
- a) Fundamental note
 - b) First overtone
 - c) Beats
 - d) Octave
28. Quality of a sound depends upon
- a) Wavelength
 - b) Frequency
 - c) Amplitude
 - d) Overtones
29. A convex mirror has a radius of curvature 20 cm. If a point source is placed 14 cm away from the mirror, the image is formed at
- a) 10 cm front
 - b) 10 cm behind
 - c) 5.83 cm front
 - d) 5.83 cm behind the mirror
30. The critical angle for a material to air is 30° , the refractive index will be
- a) 1.0
 - b) 1.5
 - c) 2.0
 - d) 3.0
31. The far point of a normal eye is
- a) 25 cm
 - b) 50 cm
 - c) 1 km
 - d) Infinity

Name

32. Velocity of light is maximum in
a) Water c) Diamond
b) Vacuum d) Glass
33. The work done in moving a charge on equipotential surface is
a) Always zero c) Greater than zero
b) Sometimes zero and sometimes less than zero d) Infinity
34. The plates of a parallel plate capacitors exert on each other
a) Repulsive force c) Attractive force
b) No force d) Attractive and repulsive both forces
35. The thermal speed of electrons is of the order of
a) 10^3 m/s c) 10^{-3} m/s
b) 10^6 m/s d) 10^{-6} m/s
36. A moving charge produces
a) No field c) Electric field only
b) Electric and magnetic fields both d) Magnetic field only
37. The resistance of an ideal ammeter is
a) Low c) High
b) Infinite d) Zero
38. The peak voltage of 220 V AC mains is
a) 311 V c) 220 V
b) 155.5 V d) 440 V
39. The ratio of energies of H atom in its first to second excited states is
a) $\frac{1}{4}$ c) $\frac{9}{4}$
b) $\frac{4}{9}$ d) 4
40. The half life (T) and disintegration constant (λ) of a radioactive substance are related as
a) $\lambda T = 1$ c) $T/\lambda = 0.693$
b) $\lambda T = 0.693$ d) $\lambda/T = 0.693$

Group B

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

Biology

40 x 1 = 40

41. Study of fossils comes under
a. Organic evolution c. Paleontology
b. Herpetology d. Paleography

42. Amoeba locomotes by
a. Pseudopodia
b. Cilia
c. Flagella
d. Tentacles
43. Croaking of frog is
a. Danger call
b. Sex call for female
c. Hunger call
d. Musical note
44. Which national park in Nepal is designated as a 'world heritage site?'
a. Bardia N P
b. Chitwan N P
c. Banke N P
d. Rara N P
45. Where do you find squamous epithelial tissue?
a. Heart
b. Bone
c. Blood
d. In the cheek wall
46. Yolk plug is seen in
a. Blastula
b. Gastrula
c. Morula
d. Cleavage
47. Movement of food in the intestine is by
a. Flowing
b. Osmosis
c. Peristalsis
d. Active motion
48. The amount of air always present in lungs is
a. Tidal volume
b. Alveolar capacity
c. Vital capacity
d. Residual volume
49. Central nervous system consists of
a. Brain only
b. Spinal cord only
c. Brain and spinal cord both
d. Brain and autonomous system
50. Typhoid is the disease in which there is infection of
a. Kidney
b. Heart
c. Stomach
d. Lung
51. Crossing over occurs in
a. Leptotene
b. Zygotene
c. Pachytene
d. Diplotene
52. Eukaryotic unicellular organism belongs to
a. Mycota
b. Protista
c. Monera
d. Animalia

Name

53. Venter is a part of
a. Sporogonium
b. Antheridium
c. Gemma
d. Archegonium
54. Vascular cryptogam is
a. Algae
b. Fungi
c. Bryophytes
d. Pteridophytes
55. Synecology is the study of
a. Individuals
b. Community
c. Environment
d. Water
56. Palisade parenchyma is found in
a. Root
b. Stem
c. Leaf
d. Fruit
57. Hypodermis in dicot stem is
a. Parenchyma
b. Collenchyma
c. Sclerenchyma
d. Aerenchyma
58. The water is transported up to the leaves through
a. Xylem
b. Phloem
c. Cortex
d. Parenchyma
59. Codon is associated with
a. tRNA
b. mRNA
c. rRNA
d. DNA
60. Tendency of genes to get inherited together is called
a. Sex linkage
b. Recombination
c. Linkage
d. Co-dominance
61. Study of bird is
a) Ornithology
b) Anthropology
c) Phenology
d) Saurology
62. Ribosome in prokaryotic cell is
a) 50 S type
b) 70 S type
c) 80 S type
d) 40 S type
63. The nearest relatives of man are
a) Lemurs
b) Old world monkey
c) New world monkey
d) Ape

64. Homologous chromosomes separate during
- a) Prophase-I
 - b) Metaphase -I
 - c) Anaphase-I
 - d) Telophase-I
65. Reserve food material in fungi is
- a) Glycogen
 - b) Chitin
 - c) Cellulose
 - d) Peptidoglycan
66. Which is not an arthropod?
- a) Scorpion
 - b) Starfish
 - c) Mosquito
 - d) Grass hopper
67. Which of the following is true a fish?
- a) Devil fish
 - b) Dog fish
 - c) Star fish
 - d) Silver fish
68. Gemma cup is present in
- a) Pteridophyte
 - b) Nostoc
 - c) Moss
 - d) Marchantia
69. Which one is not national park?
- a) Dhorpatan
 - b) Chitwan
 - c) Rara
 - d) Shivapuri
70. Naked seeded plant is
- a) Pinus
 - b) Grass
 - c) Mustard
 - d) Mango
71. Ligaments join
- a) Muscle to muscle
 - b) Bone to bone
 - c) Muscle to bone
 - d) Bone to skin
72. Sperm and ova are
- a) Diploid cells
 - b) Polyploid cells
 - c) Triploid cells
 - d) Haploid cells
73. Sciophytes are
- a) Shade loving
 - b) Sun light loving
 - c) Water loving
 - d) Air loving
74. The vascular bundle of root is
- a) Radial
 - b) Conjoint
 - c) Collateral
 - d) Concentric
75. Mitral valve in mammal guards the opening between
- a) Right atrium and right ventricle
 - b) Left atrium and left ventricle
 - c) Right atrium and left ventricle
 - d) Right atrium and left atrium
76. Light energy is converted in to chemical energy in
- a) Respiration
 - b) Catabolism
 - c) Photosynthesis
 - d) Guttation

Name

77. Which of the following are uricotelic animals?

- a) Rohu and frog
- b) Camel and frog
- c) Earthworm and eagle
- d) Lizard and crow

78. Blood group AB of human being is an example of

- a) Incomplete dominance
- b) Co-dominance
- c) Law of dominance
- d) Polygenic inheritance

79. Central nervous system consists of

- a) Brain and spinal cord
- b) Brain only
- c) Spinal cord only
- d) Brain and autonomous system

80. Which one of the following is a source of biofertilizer?

- a) Spirogyra
- b) Funaria
- c) Marchantia
- d) Nostoc

-----OR-----

Mathematics

40 x 1 = 40

41. For any two sets A and B, $(A - B) \cup (B - A) =$

- a) $(A - B) \cup A$
- b) $(B - A) \cup B$
- c) $(A \cup B) - (A \cap B)$
- d) $(A \cup B) \cap (A \cap B)$

42. The interval satisfying $3 \leq 2x - 1 \leq 5$ is

- a) [3,5]
- b) [4,6]
- c) [2,3]
- d) (2,3)

43. 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?

- a) 1
- b) 2
- c) 3
- d) 4

44. Which of the following is incorrect?

- a) $\sin \theta = -\frac{1}{5}$
- b) $\cos \theta = 1$
- c) $\sec \theta = \frac{1}{2}$
- d) $\tan \theta = 20$

45. 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) $\frac{8}{3}$

- B.Sc. Entrance Examination Model question 2081***

Name

55. How many terms are there in the expansion of $(x + y + z)^6$?
a) 42
b) 28
c) 18
d) 7
56. 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
57. 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) $(2, \pi/4)$
58. The angle between the lines $2x - y + 3 = 0$ and $x + 2y + 3 = 0$ is
a) 900
b) 600
c) 450
d) 300
59. 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
60. The focus of the parabola $y^2 + 12 = 4x + 4y$ is
a) (2,3)
b) (3,2)
c) (-2, 3)
d) (-3, 2)
61. If θ is the angle between two unit vectors $\vec{a}$ and $\vec{b}$, then $\sin\theta$ is equal to
a) $\vec{a} + \vec{b}$
b) $\vec{a} \cdot \vec{b}$
c) $\vec{a} - \vec{b}$
d) $|\vec{a} \times \vec{b}|$
62. The number of non-empty proper subsets of the set $A = \{1,2,3,4\}$ are
a) 16
b) 15
c) 14
d) 12
63. The period of $|\sin x||\cos x|$ is
a) $\frac{\pi}{3}$
b) $\frac{\pi}{2}$
c) π
d) 2π
64. $\log(1 + 2 + 3)$ is equal to
a) $\log 1 + \log 2 + \log 3$
b) $(\log 1)(\log 2)(\log 3)$
c) $\log(1 + 3) + \log 2$
d) $\log 1 + \log 3 - \log 2$

65. The system of equations $4x - 3y = 1$ and $8x - 6y - 9 = 0$ is
 a) Consistent and dependent c) Inconsistent and independent
 b) Consistent and independent d) Inconsistent and dependent
66. If $A = \begin{bmatrix} a & o & o \\ o & a & o \\ o & o & a \end{bmatrix}$, then $|\text{Adj}(A)| =$
 a) a^2 c) a^9
 b) a^6 d) a^{27}
67. If a, b, c are in G.P. and $a^x = b^y = z^3$ then x, y, z are in
 a) A.P. c) H.P.
 b) G.P. d) None of these
68. Both the roots of the equation, $ax^2 + bx + c = 0, a \neq 0$ are zero if
 a) $c = 0, b = 0$ c) $b \neq 0, c = 0$
 b) $b = 0, c \neq 0$ d) $b \neq 0, c \neq 0$
69. The polar form of $\frac{1+i}{1-i}$ is
 a) $\cos \frac{\pi}{2} + i \sin \frac{\pi}{2}$ c) $2 \left(\cos \frac{\pi}{4} + i \sin \frac{\pi}{4} \right)$
 b) $4 \left(\cos \frac{\pi}{3} + i \sin \frac{\pi}{3} \right)$ d) $3 \left(\cos \frac{2\pi}{3} + i \sin \frac{2\pi}{3} \right)$
70. A man has 6 friends. The number of ways he can invite one or more to a party are
 a) $6!$ c) 63
 b) 23 d) 22
71. The value of the series $\frac{2}{1!} + \frac{4}{3!} + \frac{6}{5!} + \dots$ is equal to
 a) e c) $\frac{e}{2}$
 b) $2e$ d) $\frac{e}{3}$
72. If $\text{cosec}^2 x = \text{cosec}^2 \alpha$, then general values of x is
 a) $n\pi + \alpha$ c) $n\pi \pm \alpha$
 b) $2n\pi \pm \alpha$ d) $n\pi + (-1)^n \alpha$
73. The area of the triangle formed by the straight line $2x + 3y = 6$ with the coordinate axes (in sq. units) is
 a) 2 c) 6
 b) 3 d) 1
74. The angle between the line pair represented by $x^2 - 5xy + 4y^2 = 0$ is
 a) $\tan^{-1} \left(\frac{4}{3} \right)$ c) $\tan^{-1} \left(\frac{3}{5} \right)$
 b) $\tan^{-1} \left(\frac{4}{5} \right)$ d) $\tan^{-1} \left(\frac{5}{3} \right)$

Name

75. The length of tangent drawn from the point (6,-7) to the circle $3x^2 + 3y^2 - 7x - 6y = 12$ is

a) $\sqrt{81}$

c) $\sqrt{28}$

b) $\sqrt{85}$

d) $\sqrt{285}$

76. If $y = n^x$, then $\frac{dy}{dx} =$

a) $n^x \cdot \log n$

d) n^{x-1}

b) $n^x \cdot x \cdot \log x$

c) n^x

77. $\int \frac{dx}{5+4\cos x} =$

a) $\frac{3}{2} \tan^{-1} \left(\frac{1}{3} \tan \frac{x}{2} \right) + k$

c) $3 \tan^{-1} \left(\frac{1}{3} \tan \frac{x}{2} \right) + k$

b) $\frac{2}{3} \tan^{-1} \left(\frac{1}{3} \tan \frac{x}{2} \right) + k$

d) $6 \tan^{-1} \left(\frac{1}{2} \tan \frac{x}{2} \right) + k$

78. $\int_0^{\pi/2} \frac{\sin x}{\sin x + \cos x} dx =$

a) $\frac{\pi}{2}$

c) $\frac{\pi}{4}$

b) $\frac{\pi}{3}$

d) π

79. Solution of diff. eqⁿ, $\frac{dy}{dx} = \frac{y}{x} + \tan \frac{y}{x}$ is

a) $\tan \left(\frac{y}{x} \right) = cx$

c) $\cos \left(\frac{y}{x} \right) = cx$

b) $\cot \left(\frac{y}{x} \right) = cx$

d) $\sin \left(\frac{y}{x} \right) = cx$

80. The regression coefficients of y on x from the results $\sigma_x = 20, \sigma_y = 15$ and $r = 0.48$ is

a) 0.36

c) 0.63

b) 0.64

d) 0.46

Group C

This section is **compulsory** for both **Physical & Biological** Groups

English Aptitude Test

20 x 1 = 20

81. Something that causes no harm

a) Injurious

c) Panacea

b) Innocuous

d) Secure

- B.Sc. Entrance Examination Model question 2081***

Name

95. The yearly return of a date
a) Birthday c) Anniversary
b) Centenary d) Jubilee
96. Something that cannot be grasped by mind
a. Inexplicable c. Intangible
b. Infallible d. Incredible
97. One who rides in horse races, esp. professionally
a. Knight-errant c. Jockey
b. Pedestrian d. Equestrian
98. A heavy unnatural slumber
a. Insomnia c. Intangible
b. Coma d. Stupor
99. To repeat word for word
a. Literal c. Verbatim
b. Verbal d. Verbose
100. Anything that destroys the effects of poison
a. Antidote c. Antiseptic
b. Antibiotic d. Antique

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