

Exam Roll No.

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Tribhuvan University
Institute of Science and Technology
B.Sc. Entrance Examination
Model Question 2082

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. 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

- NaCl is not
 - Common salt
 - Rock salt
 - Table salt
 - Epsom salt
- Half mole of water is equal to
 - 18 g
 - 9 g
 - 8 g
 - 0.5 g
- Nitrogen atom contains three unpaired electrons according to
 - Hund's rule
 - Heisenberg's uncertainty principle
 - Aufbau principle
 - Pauli's exclusion principle
- Sr belongs to which period of the periodic table?
 - 4th
 - 5th
 - 6th
 - 3rd
- Sulphur has -2 oxidation state in
 - H₂S
 - SO₂
 - SO₃
 - H₂SO₄
- Which of the following is not hydrated salt?
 - Blue vitriol
 - Epsom salt
 - Gypsum
 - Table salt
- How many protons are there in Tritium?
 - 0
 - 1
 - 2
 - 3

Name

8. Bromine is obtained commercially from sea water by adding
- a) Chlorine
 - b) Carnallite
 - c) Common salt
 - d) Cryolite
9. The tendency to form chain of identical atoms is called
- a) Catenation
 - b) Solvation
 - c) Hydration
 - d) Ionization
10. Washing soda is
- a) $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$
 - b) NaOH
 - c) NaHCO_3
 - d) Na_2CO_3
11. The vital force theory was proved to be wrong by
- a) Berzelius
 - b) Berthelot
 - c) Wohler
 - d) Wolff
12. Which of the following is tribasic acid?
- a) H_3PO_4
 - b) H_3PO_3
 - c) H_3PO_2
 - d) $\text{H}_4\text{P}_2\text{O}_7$
13. Na is extracted by
- a) Solvay - Kellner cell
 - b) Castner - Kellner cell
 - c) Nelson cell
 - d) Down's cell
14. Functional isomers are
- a) Ethanol and methoxy methane
 - b) Ethanol and ethanal
 - c) Methanol and ethanol
 - d) Methanol and methanal
15. Wurtz reaction is used for the preparation of
- a) Ethane
 - b) Propane
 - c) Methane
 - d) Pentane
16. The equivalent weight of NaOH is
- a) 20
 - b) 21
 - c) 40
 - d) 80
17. When 180 g of water and 180 g of glucose are mixed together, what is the mole fraction of water in solution?
- a) 0.1
 - b) 0.3
 - c) 0.5
 - d) 0.9
18. Acidic buffer solution is prepared by mixing CH_3COONa with
- a) HCl
 - b) HNO_3
 - c) H_2SO_4
 - d) CH_3COOH
19. The number of components in ternary solution is
- a) 1
 - b) 2
 - c) 3
 - d) 4
20. The rate constant of a reaction depends on
- a) Temperature
 - b) Mass
 - c) Weight
 - d) Time

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21. For an adiabatic process
- a) $\Delta E = q$
 - b) $\Delta E = W$
 - c) $q = 0$
 - d) $q = P \Delta V$
22. At equilibrium, ΔG is
- a) Positive
 - b) Negative
 - c) Zero
 - d) None of the above
23. The solubility product (K_{sp}) of a sparingly soluble salt of A_2B type having solubility "S" mol L^{-1} is
- a) S^2
 - b) $4S^3$
 - c) $27S^4$
 - d) $8S^3$
24. The number of d electrons retained in Cu^{++} ion is
- a) 2
 - b) 9
 - c) 5
 - d) 7
25. Hydrated ferrous sulphate is
- a) Light green
 - b) Yellow
 - c) Grey white
 - d) Black
26. Which metal is coated over iron during galvanization?
- a) Zn
 - b) Ga
 - c) Ge
 - d) Pb
27. Extraction of Zn from zinc blende is carried out using
- a) Shaft furnace
 - b) Vertical retort furnace
 - c) Blast furnace
 - d) Open Hearth Furnace
28. An alkyl halide can be converted into alkene by
- a) Addition
 - b) Substitution
 - c) Elimination
 - d) Dehydrogenation
29. Chloroform reacts with conc. nitric acid to give
- a) Chloretone
 - b) Ethyl Carbonate
 - c) Chloropicrin
 - d) Methylene Chloride
30. In Williamson's synthesis, sodium alkoxide is heated with
- a) Ether
 - b) PVC
 - c) Alkyl halide
 - d) Ethyl alcohol
31. Which of the following is not a primary amine ?
- a) Dimethyl amine
 - b) Aniline
 - c) Isopropyl amine
 - d) n-propyl amine
32. Which ion is responsible for nitration in benzene ?
- a) Nitrate ion
 - b) Nitrite ion
 - c) Cyanide ion
 - d) Nitronium ion
33. Benzene is obtained by heating Zn dust with
- a) Benzaldehyde
 - b) Phenol
 - c) Benzoic acid
 - d) Cyclohexane

Name

34. Iodoform cannot be obtained by reaction with iodine and alkali with
- a) Ethanol
b) Ethanal
c) 2- propanol
d) 1- propanol
35. Aldehydes are isomeric with
- a) Ethers
b) Esters
c) Alcohols
d) Ketones
36. Reduction of CH_3COOH with LiAlH_4 gives
- a) CH_4
b) $\text{C}_2\text{H}_5\text{OH}$
c) CH_3OH
d) $\text{C}_6\text{H}_5\text{CH}_2\text{OH}$
37. Carbonation of ethyl magnesium bromide followed by hydrolysis gives
- a) Ethane
b) Propanoic acid
c) Acetic acid
d) Propane
38. Coupling of phenol or naphthol with dizonium salts gives
- a) Pesticides
b) Dyes
c) Proteins
d) Vitamins
39. Which of the following elements is not present in cement?
- a) Calcium
b) Aluminium
c) Sulphur
d) Iron
40. The unstable nuclide produced by artificial radioactivity becomes stable by emission of
- a) Electron
b) Positron
c) Alpha particle
d) Beta particle

-----OR-----

Physics

40 x 1 = 40 Marks

1. Which of the following is not the unit of energy?
- a) Joule
b) Calorie
c) Watt
d) Electron volt
2. A particle dropped from a building takes 3 seconds to reach the ground. The height of the building is
- a) 45 m
b) 3 m
c) 90 m
d) 30 m
3. Momentum is closely related to
- a) Kinetic energy
b) Impulse
c) Angular velocity
d) Angular momentum
4. Bernoulli's principle is based on the law of conservation of
- a) Mass
b) Momentum
c) Energy
d) Charge
5. Which of the following is C. G. S. unit of coefficient of viscosity?
- a) Poise
b) Poiseuille
c) Atmosphere
d) N m^{-2}

Name

42. Archaeopteryx shows the origin of
- a) Birds from reptiles
 - b) Mammals from Reptiles
 - c) Reptiles from Amphibians
 - d) Birds from Amphibians
43. Body of paramecium is covered with
- a) Cuticle
 - b) Plasmalemma
 - c) Pellicle
 - d) Cell membrane
44. Which of the following is an Echinoderm?
- a) Cuttle fish
 - b) Jelly fish
 - c) Silver fish
 - d) Star fish
45. Clitellum in an earthworm is present on
- a) 10th-14th segment
 - b) 14th-16th segment
 - c) 16th-18th segment
 - d) 8th-10th segment
46. The teeth in a frog is meant for
- a) Chewing
 - b) Tearing
 - c) Cutting
 - d) Preventing prey from slipping
47. The vocal sac is found
- a) Only in male
 - b) Only in female
 - c) In both sex
 - d) Absent in both sex
48. An area that allows the people for legal hunting of wildlife is
- a) Shivpuri national park
 - b) Bardia national park
 - c) Parsa national park
 - d) Dhorpatan hunting reserve
49. The female genital aperture in earthworms is present ventrally on the segment
- a) 18th
 - b) 14th
 - c) 12th
 - d) 10th
50. Bidder's canal is found
- a) Only in female frog
 - b) Only in male frog
 - c) Both male and female
 - d) Absent in both sex
51. Which cells secrete heparin?
- a) Plasma cell
 - b) Fibroblast
 - c) Osteocytes
 - d) Mast cell
52. The type of egg having moderate amount of yolk is called
- a) Mesolecithal egg
 - b) Telolecithal egg
 - c) Macrolecithal egg
 - d) Microlecithal egg
53. Blastopore is developed during
- a) Morula stage
 - b) Gastrula stage
 - c) Blastula stage
 - d) Neurula stage
54. Islets of Langerhans are found in
- a) Liver
 - b) Kidney
 - c) Stomach
 - d) Pancreas
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55. Duct of Bellini opens on

- a) Ureter
- b) Collecting duct
- c) Renal papilla
- d) Distal convoluted tubule

56. The transmission of nerve impulse across the synapse is carried out by

- a) Na^+
- b) K^+
- c) Ca^{++}
- d) Mg^{++}

57. The size of pupil is controlled by

- a) Cornea
- b) Iris
- c) Suspensory muscles
- d) Ciliary muscle

58. Which gland is called gland of emergency ?

- a) Adrenal gland
- b) Pituitary gland
- c) Thyroid gland
- d) Parathyroid gland

59. Number of mature ova produced at the end of oogenesis

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

60. Which disease directly attack lungs, nose and throat?

- a) Influenza
- b) Tuberculosis
- c) Cholera
- d) Typhoid

61. Nucleic acid is a polymer of

- a) Globulin
- b) Nucleoside
- c) Nucleoprotein
- d) Nucleotide

62. Which of the following is most abundant in middle lamella?

- a) Cutin
- b) Suberin
- c) Cellulose
- d) Pectin

63. Cell undergoes differentiation in

- a) G_0 phase
- b) G_1 Phase
- c) S phase
- d) G_2 phase

64. Eukaryotic unicellular organisms belong to

- a) Mycota
- b) Monera
- c) Protista
- d) Plantae

65. The fungal cell consisting of many nuclei without septa is called

- a) Hypha
- b) Coenocyte
- c) Mycelium
- d) Sporophore

66. Pyrenoids of algae are the centre of formation of

- a) Fat
- b) Protein
- c) Vitamins
- d) Starch

67. Male gamete in fern is

- a) Biflagellate
- b) Multiflagellate
- c) Uniflagellate
- d) Quadri-flagellate

Name

68. Bicarpellary ovary with parietal placentation found in the family of
- a) Liliaceae
 - b) Solanaceae
 - c) Fabaceae
 - d) Brassicaceae
69. Relationship between legume plant and nitrogen fixing bacteria is
- a) Protocooperation
 - b) Symbiosis
 - c) Commensalism
 - d) Parasitism
70. The most essential parts of flower are
- a) Calyx and corolla
 - b) Androecium and corolla
 - c) Gynoecium and corolla
 - d) Androecium and gynoecium
71. When the rings of lignin are deposited on inner side of cell wall, this type of wall thickening is known as
- a) Spiral
 - b) Annular
 - c) Reticulate
 - d) Scalariform
72. Casparian stripe is present in
- a) Epidermis
 - b) Hypodermis
 - c) Endodermis
 - d) Pericycle
73. The water lost during transpiration
- a) Contains minerals
 - b) Contains salt
 - c) Contains water and minerals
 - d) Is pure water
74. Oxygen evolution in photosynthesis is directly associated with
- a) Photosystem-I
 - b) Photosystem-II
 - c) Phytochrome
 - d) Phycocyanin
75. Complete oxidation of one molecule of glucose yields energy sufficient to form
- a) 38 ATP
 - b) 36 ATP
 - c) 40 ATP
 - d) 30 ATP
76. In DNA replication, Okazaki fragments are joined together by
- a) DNA polymerase
 - b) Primase
 - c) DNA ligase
 - d) Helicase
77. How many possible genotypes are produced by blood group ABO of human being?
- a) 3
 - b) 5
 - c) 6
 - d) 7
78. Study of pollen grains is called
- a) Pollenology
 - b) Palynology
 - c) Pomology
 - d) Paleontology
79. Hybridoma technique is related with production of
- a) Antibiotics
 - b) Alcohol
 - c) Lymphocyte
 - d) Antibodies
80. The hormone primarily concerned with cell division is
- a) IAA
 - b) IBA
 - c) Cytokinin
 - d) Gibberellins

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OR

Mathematics

40 x 1 = 40

41. $\lim_{x \rightarrow 0} |\sin x|/x$ is equal to

- a) 1
- b) -1
- c) 0
- d) does not exist

42. The derivative of $x^2 \cos x$ is

- a) $2x \sin x - x^2 \sin x$
- b) $2x \cos x - x^2 \sin x$
- c) $2x \sin x - x^2 \cos x$
- d) $\cos x - x^2 \sin x \cos x$

43.3. If $x = t^2, y = t^3$, then $d^2y/dx^2 =$

- a) $3/2$
- b) $3/4t$
- c) $3/2t$
- d) $3t/2$

44. The $f(x) = |x|$ at $x = 0$ is

- a) Continuous but not differentiable
- b) Discontinuous and differentiable
- c) Discontinuous and non-differentiable
- d) Continuous and differentiable

45. $\lim_{n \rightarrow \infty} (3^n + 4^n)^{\frac{1}{n}} =$

- a) 3
- b) 4
- c) ∞
- d) e

46. $\int \sqrt{x^2 - 4} dx =$

- a) $\frac{x\sqrt{x^2-4}}{2} - 2 \log(x + \sqrt{x^2 - 4}) + c$
- b) $\frac{x\sqrt{x^2-4}}{2} - \frac{\cos^{-1}x}{2} + c$
- c) $\frac{2}{3}(x^2 - 4)^{\frac{3}{2}}$
- d) $\frac{x\sqrt{x^2-4}}{2} - 2\sin^{-1}\frac{x}{2} + c$

47. $\int_1^e \ln x dx =$

- a) e+2
- b) 0
- c) 1
- d) 1/2

48. The solution of the differential equation $\frac{dy}{dx} = \frac{x+2y}{x}$ is

- a) $x + y = c$
- b) $x^2 + y^2 = c$
- c) $x + y = cx$
- d) $x + y = cx^2$

49. If ω is imaginary cube root of unity then, $\sin\{(\omega^{13} + \omega^{20}) + \frac{\pi}{4}\}$ is equal to

- a) $\frac{1}{2}$
- b) 1
- c) $-\frac{1}{\sqrt{2}}$
- d) $\frac{\sqrt{3}}{2}$

50. If the roots of the equation $a(b - c)x^2 + b(c - a)x + c(a - b) = 0$ are equal then a, b, c are in

- a) A.P.
- b) G.P.
- c) H.P.
- d) None

51. The system equation $x + 2y = 7$ and $2x + 4y = 9$ are

- a) Consistent and dependent
- b) Inconsistent and independent
- c) Consistent and independent
- d) Inconsistent and dependent

Name

52. The distance between the parallel lines $5x + 12y + 8 = 0$ and $10x + 24y - 3 = 0$ is

- a) $\frac{3}{5}$
b) $\frac{7}{9}$

- c) $\frac{19}{26}$
d) $\frac{18}{5}$

53. Two lines represented by $9x^2 - 24xy + 16y^2 = 0$ are

- a) parallel
b) perpendicular

- c) coincident
d) none

54. The angle between the tangents from the origin to the curve $(x - 7)^2 + (y + 1)^2 = 25$ is

- a) $\frac{\pi}{3}$
b) $\frac{\pi}{6}$

- c) $\frac{\pi}{2}$
d) $\frac{\pi}{4}$

55. The set $A = \{x \in R, x^2 = 16\}$ and set $B = \{x: 2x = 6\}$ then $(A \cap B) =$

- a) $\{2\}$
b) $\{3\}$

- c) $\{3, 4\}$
d) ϕ

56. $-7 < x < 1$ implies

- a) $|x + 3| < 4$
b) $|2x + 5| \leq 7$

- c) $|3x - 4| < 5$
d) $|x + 1| < 1$

57. If $\log_9 x = y$, then $\log_9 27x =$

- a) $\frac{3y}{2}$
b) $\frac{3}{2} + y$

- c) $\frac{2y}{3}$
d) $\frac{2}{3} + y$

58. If $f(x + 1) + f(x - 1) = 2f(x)$ and $f(0) = 0$ then $f(n), n \in N$ is

- a) n
b) $[f(1)]^n$

- c) $nf(1)$
d) 0

59. Two angle of a triangle are 30° and 60° respectively and the greatest side is 4cm. Then, the other two sides are

- a) $1, \sqrt{3}$
b) $\sqrt{3}, 2$

- c) $2\sqrt{3}, 3$
d) $2, 2\sqrt{3}$

60. If $\sin^{-1} x + \sin^{-1} y = \frac{2\pi}{3}$, then the value of $\cos^{-1} x + \cos^{-1} y =$

- a) $\frac{2\pi}{3}$
b) $\frac{\pi}{3}$

- c) $\frac{\pi}{6}$
d) $\frac{\pi}{2}$

61. If $1 + \cos \alpha + \cos^2 \alpha + \dots + \infty = 2 - \sqrt{2}$, then $(0 < \alpha < \pi)$ is

- a) $\frac{\pi}{4}$
b) $\frac{\pi}{3}$

- c) $\frac{\pi}{6}$
d) $\frac{3\pi}{4}$

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Group C

This section is compulsory for both Physical & Biological Groups

English Aptitude Test

20 x 1 = 20

81. Choose the word that is synonymous in meaning with the word taciturn

- a) Garrulous
- b) Voluble
- c) Loquacious
- d) Reticent

82. The Amazon river has myriads of tributaries. In the context of the sentence, the word "myriad" most likely means

- a) Limited
- b) Variable
- c) Countless
- d) Specific

83. To "turn a blind eye" means to

- a) Look carefully
- b) Ignore something intentionally
- c) Investigate thoroughly
- d) Be vigilant

84. Which of the following words can't be a synonym for "pellucid"?

- a) Crystalline
- b) Limpid
- c) Transparent
- d) Obscure

85. What is the opposite of "exorbitant"?

- a) Reasonable
- b) Extravagant
- c) Excessive
- d) Lavish

86. 'A journey' equals to 'travel' and 'a message' equals to

- a) Information
- b) News
- c) Publicity
- d) Knowledge

87. Which of the following words does not fit in the group?

- a) Boy
- b) Bull
- c) Dog
- d) Witch

88. '100' means a hundred whereas '1,000,000' means

- a) A billion
- b) A million
- c) A trillion
- d) Ten million

89. A peacock danced beautifully. Which of the following words cannot be used with 'A peacock'?

- a) Animate
- b) Singular noun
- c) Neuter gender
- d) Inanimate

90. Which of the following sentence is grammatically correct?

- a) Her and I went to the supermarket
- b) Her and me went to the supermarket
- c) She and I went to the supermarket
- d) Me and her went to the supermarket

Name

91. Identify the sentence with the correct grammar

- a) Neither of the girls are participating in the program
- b) Neither of the girls is participating in the program
- c) Neither of the girls were participating in the program
- d) Neither of the girls were participated in the program

92. Fill in the blank with a suitable word. The party's success was largely due to its president's..... leadership style.

- a) Autocratic
- b) Benevolent
- c) Verbose
- d) Capricious

93. In the sentence "Her attire was elegant and tasteful," what does "attire" mean?

- a) Jewelry
- b) Hairdo
- c) Clothing
- d) Makeup

94. Which of the following words does not contain a prefix?

- a) Discard
- b) Discount
- c) Disco
- d) Disfigure

95. Crime=criminal, fraud=fraudulent and then horror=

- a) Horrify
- b) Horrible
- c) Horroring
- d) Horrified

96. Which of the following words is odd in the group?

- a) Verify
- b) Modernize
- c) Shorten
- d) Peaceful

97. Which of the following words does not fit in the group?

- a) Greenhouse
- b) Superman
- c) Breakfast
- d) Software

98. Geography equals difficulty, photograph equals difficult and then curiosity equals

- a) Democracy
- b) Vocabulary
- c) Responsibility
- d) Education

99. My best friend is a very..... person who loves to write poetry.

- a) Creation
- b) Creative
- c) Creator
- d) Createful

100. If you want to score good marks, you must not make..... mistakes.

- a) Grammatically
- b) Grammar
- c) Grammatical
- d) Grammarian

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