

Name :

Roll no.....

B.Sc. CSIT Entrance 2074

Tribhuvan University
Institute of Science and Technology
4 Years Bachelor in Computer Science and Information Technology (B.Sc.CSIT)
Entrance Examination
2074

Full Marks: 100
Time: 2.00 hrs.

Attempt all question:

Mathematics

(25 × 1 = 25)

1. p/q $p, q \in \mathbf{R}$, is undefined if

- (a) $p \neq 0, q = 0$ (b) $p = 0, q = 0$
(c) $p \neq 0, q \neq 0$ (d) $p = 0, q \neq 0$

2. $[a, b] =$

- (a) $\{x : a \leq x \leq b\}$ (b) $\{x : a < x < b\}$
(c) $\{x : a < x \leq b\}$ (d) $\{x : a \leq x < b\}$

3. If $f: \mathbf{R} \rightarrow \mathbf{R}$ defined by $f(x) = \sqrt{4 - x^2}$ then $f(-3)$ is

- (a) undefined (b) $\sqrt{13}$
(c) $i\sqrt{5}$ (d) $-\sqrt{13}$

4. If $|x| = 1$ then x is

- (a) $\{1\}$ (b) $\{-1\}$ (c) $\{-1, 1\}$ (d) $\{-1, -1\}$

5. If $\log_2(x - 7) = 1$, then x is

- (a) not known (b) 8 (c) 6 (d) 9

6. The value of $\sin(\cos^{-1} 4/5)$ is

- (a) $4/5$ (b) $3/5$ (c) $5/4$ (d) $5/3$

7. If $\tan^2 x = 3$ then x is

- (a) $n\pi + \pi/3$ (b) $n\pi - \pi/3$
(c) $n\pi \pm \pi/3$ (d) $n\pi$

8. If $K + 2, 4K - 6, 3K - 2$ are in A.P. then K is

- (a) -6 (b) 0 (c) 3 (d) -3

9. The sum to infinity of $1 - \frac{1}{2} + \frac{1}{4} - \frac{1}{8} + \dots$, is

- (a) 0 (b) $2/3$ (c) $1/3$ (d) 1

10. If $A = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$ and $B = (1 \ 2 \ 3)$ then AB is

- (a) (14) (b) (1 4 9)
(c) 0 (d) $\begin{pmatrix} 1 & 2 & 3 \\ 2 & 4 & 6 \\ 3 & 6 & 9 \end{pmatrix}$

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11. The value of $\begin{bmatrix} 0 & 2 & 3 \\ 1 & 2 & 3 \\ 4 & 8 & 12 \end{bmatrix}$ is

- (a) 10 (b) 1 (c) 0 (d) -1

12. The matrix $\begin{pmatrix} 1 & 2 & 3 \\ -2 & 0 & 4 \\ -3 & -4 & 5 \end{pmatrix}$ is

- (a) Diagonal (b) Symmetric
(c) Skew symmetric (d) Unit

13. $[2(\cos 15^\circ + i \sin 15^\circ)]^6 =$

- (a) 64 i (b) 64 (c) 0 (d) -64 i

14. $(1 + \omega - \omega^2)^3 + (1 + \omega - \omega^2)^3 =$

- (a) 16 (b) 16 ω (c) -16 (d) 16 ω^2

15. The quadratic equation whose roots are -3 and 2 is

- (a) $x^2 + x - 6 = 0$ (b) $x^2 + x + 6 = 0$
(c) $x^2 - x - 6 = 0$ (d) $x^2 - x + 6 = 0$

16. The line $kx + 3y + 5 = 0$ and $5x - 2y - 6 = 0$ are perpendicular to each other for K =

- (a) 6/5 (b) -6/5 (c) 3/5 (d) -3/5

17. The lines represented by $5x^2 + 3xy + ky^2 = 0$ are perpendicular to each other for k =

- (a) 5 (b) 3 (c) 0 (d) -5

18. The equation of tangent to the circle $x^2 + y^2 = 9$ at (1, 1) is

- (a) $x + y = 9$ (b) $x - y = 9$
(c) $2x + 2y = 9$ (d) $-x - y = 9$

19. $\lim_{x \rightarrow \infty} \frac{3x^2 + 2x - 5}{6x^2 + 4x - 7} =$

- (a) 2 (b) 3 (c) 5/7 (d) 1/2

20. $\lim_{x \rightarrow 0} \frac{1 - \cos ax}{x^2} =$

- (a) $a^2/2$ (b) a^2 (c) $2a^2$ (d) $4a^2$

21. If $x = t + \sin t$, $y = 1 - \cos t$ then $\frac{dy}{dx}$ is

- (a) $\tan t$ (b) $\tan t/2$
(c) $-\tan t$ (d) $-\tan t/2$

22. The derivative of $\cos x$ w. r. t. $\sin x$ is

- (a) $-\tan x$ (b) $\tan x$ (c) $\cot x$ (d) $-\cot x$

23. The point of inflection of $y = x^3 - 12x^2 = 0$ is

- (a) 12 (b) -12 (c) 4 (d) 0

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40. Choose the right grammatical category of the underlined phrase. Ram handed a book to his sister.

- (a) Complement (b) Direct object
(c) Adjunct (d) Indirect object

41. The car needs hood repaired.

- (a) its (b) it's (c) itself (d) their

42. These two photographers are same.

- (a) a (b) an (c) the (d) same

43. The girl is versatile, means

- (a) bad (b) gifted (c) clumsy (d) unlucky

44. The word "aggression" takes the prefix

- (a) non (b) un (c) in (d) il

45. Fear of fire is called.....

- (a) sitophobia (b) pyrophobia
(c) trichophobia (d) monomania

46. Which of the following is a noun?

- (a) real (b) readable
(c) readable (d) reality

47. We waited of the bus stop the bus came.

- (a) fill (b) until (c) while (d) unless

48. One who travels from place to place.

- (a) itinerant (b) mendicant
(c) tramp (d) tourist

49. You're coming to the party ?

- (a) aren't you (b) can't you
(c) won't you (d) isn't you

50. Are you my friend or enemy? has a tone.

- (a) rising and rising (b) rising and falling
(c) rising (d) falling and falling

Physics

(25×1=25)

51. The order of magnitude of radius of an atom is

- (a) 10^{-7} m (b) 10^{-10} m (c) 10^{-12} m (d) 10^{-15} m

52. A projectile goes farthest away from the Earth, when the angle of projection is

- (a) 0° (b) 45° (c) 90° (d) 120°

53. A simple pendulum when set into vibration comes to rest after sometimes because of

- (a) friction of air (b) tension in the thread
(c) gravity (d) its mass

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54. Powder clings to the skin because of
(a) Compression (b) Cohesion
(c) Adhesion (d) Capillarity
55. Viscosity is the inherent property of liquids and gases and is more closely related to
(a) Inertia (b) Shearing strain
(c) Transfer of momentum (d) Surface tension
56. A bridge of steel has length 700m. the temperature varies from 243 K to 313 K. The change in length of the bridge for above seasonal variation in temperature is ($\alpha_{\text{steel}} = 11 \times 10^{-6}/\text{K}$)
(a) 15.4 cm (b) 15.4 mm (c) 15.8 cm (d) 10 cm
57. The internal energy of a perfect gas does not change during
(a) adiabatic process (b) isothermal process
(c) isobaric process (d) isochoric process
58. The efficiency of a steam engine is of the order of
(a) 10% (b) 20% (c) 60% (d) 100%
59. A gas performs maximum work when it expands
(a) Isothermally (b) Isobarically
(c) adiabatically (d) isochorically
60. When two waves overlap the result is larger disturbance means
(a) The interference is constructive
(b) The interference is destructive
(c) The interference depends on the type of waves
(d) all of the above
61. While standing still, an observer measures the frequency of a tuning fork to be 524 Hz. What frequency does he measure as he approaches the fork at 5 m/s? (speed of sound in air = 340 m/s).
(a) 500 Hz (b) 420 Hz (c) 520 Hz (d) 532 Hz
62. In longitudinal wave the displacement of the particles of the medium is
(a) parallel to the wave velocity
(b) antiparallel to the wave velocity
(c) perpendicular to the wave velocity
(d) parallel or antiparallel to the wave velocity
63. The illuminance at a distance of 2m from a 100 candela lamp is
(a) 10 lux (b) 15 lux (c) 25 lux (d) 100 lux
64. When light beam is incident on a prism, it causes
(a) lateral shift (b) dispersion only
(c) deviation only (d) dispersion and deviation both
65. If critical angle for a material placed in air is 30° , the refractive index will be
(a) 2.0 (b) 0.5 (c) 1.5 (d) 2.5
66. A body has 1 C of negative charge. How many excess electrons it has as compared to its neutral state?
(a) 6.25×10^{18} (b) 6.25×10^{-19}
(c) 1.6×10^{-19} (d) 1.6×10^{18}

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67. On heating a liquid, the refractive index generally
- (a) does not change
 - (b) decreases
 - (c) increases
 - (d) May increase or decrease depending on the rate of heating

68. The torque on an electric dipole of moment \vec{p} when placed in an electric field \vec{E} is proportional to
- (a) P/E
 - (b) E/P
 - (c) P.E
 - (d) PE Tan θ

69. Wheatstone bridge is used to measure
- (a) e.m.f.
 - (b) potential
 - (c) current
 - (d) resistance

70. Magnetism of a magnet
- (a) is zero at absolute zero temperature
 - (b) increases with temperature
 - (c) is maximum at curie temperature
 - (d) becomes practically zero above curie temperature

71. The self inductance of coil is 10 mH. If a current of 2A is flown. What is the magnetic flux through the coil?
- (a) 0.02 Wb
 - (b) 0.01 Wb
 - (c) 0.05 Wb
 - (d) 10 Wb

72. The positive rays are
- (a) electromagnetic waves
 - (b) positrons
 - (c) ions
 - (d) protons

73. Wavelength of a photon is 4000 Å. Its energy will be
- (a) 3 KeV
 - (b) 4000 eV
 - (c) 3.1 J
 - (d) 3.1 eV

74. According to Bohr's model of the H atom, the radius of the stationary orbit characterized by the principal quantum number n is proportional to
- (a) 1/n
 - (b) n^2
 - (c) n
 - (d) $1/n^2$

75. In some substances, charge can flow at ordinary temperature but not at very low temperature. These are
- (a) Semiconductors
 - (b) Conductors
 - (c) Insulators
 - (d) dielectrics

Chemistry

(25×1=25)

76. The number of atoms of carbon present in 25.0 g of CaCO_3 is
- (a) 1.505×10^{23}
 - (b) 1.005×10^{23}
 - (c) 1.205×10^{23}
 - (d) 1.303×10^{23}

77. The electronic configuration of chromium is
- (a) $[\text{Ar}] 3d^5 4s^1$
 - (b) $[\text{Ar}] 3d^6 4s^2$
 - (c) $[\text{Ar}] 3d^7 4s^2$
 - (d) $[\text{Ar}] 3d^4 4s^2$

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78. The structure of CO₂ molecule is

- (a) linear (b) tetrahedral
(c) angular (d) pyramidal

79. Which of the following elements has highest electron affinity?

- (a) chlorine (b) bromine
(c) iodine (d) fluorine

80. The oxidation number of Fe in the compound Fe₃O₄ is

- (a) +4/3 (b) +2/3 (c) +5/3 (d) +8/3

81. MgO is an example of

- (a) basic oxide (b) amphoteric oxide
(c) neutral oxide (d) acidic oxide

82. Down's process is used for the extraction of

- (a) sodium (b) sodium hydroxide
(c) sodium carbonate (d) ammonia

83. The IUPAC name of $\begin{array}{c} \text{CH}_3 \\ | \\ \text{H}_3\text{C} - \text{C} - \text{CH}_3 \\ | \\ \text{CH}_3 \end{array}$ is

- (a) 2, 2-dimethyl propane (b) 2-methyl butane
(c) 2-methyl propane (d) pentane

84. Al₄C₃ reacts with water to give

- (a) CH₄ (b) C₂H₂ (c) H₂ (d) C₂H₄

85. Protein is a polymer of

- (a) glycol (b) glucose
(c) α-amino acid (d) phthalic acid

86. Which of the following carbohydrate gives Tollen's test?

- (a) glucose (b) fructose
(c) galactose (d) maltose

87. DDT is an example of

- (a) insecticide (b) herbicide
(c) fungicide (d) rodenticide

88. Tranquilizers are substances used for the treatment of

- (a) cancer (b) mental anxiety
(c) physical disorder (d) malaria

89. Each carbon atom in benzene is

- (a) sp² hybridized (b) sp hybridized
(c) sp³ hybridized (d) sp³d hybridized

90. Primary, secondary and tertiary alcohols are distinguished by

- (a) Hoffman's test (b) Fehling's solution
(c) Victor Meyer's test (d) Beilstein's test

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91. The reduction of aldehydes or ketones by amalgamated zinc and concentrated HCl to corresponding alkane is called as

- (a) Clemmensen reduction (b) Wolff-Kishner reduction
(c) Cannizaro's reaction (d) Perkin's reaction

92. Which of the following compound is most basic?

- (a) NH_3 (b) CH_3NH_2 (c) $(\text{CH}_3)_2\text{NH}$ (d) $(\text{CH}_3)_3\text{N}$

93. The molecular formula of white vitriol is

- (a) $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$ (b) $\text{Zn}(\text{OH})_2$ (c) ZnCO_3 (d) ZnO

94. Cinnabar is an ore of

- (a) zinc (b) copper (c) mercury (d) iron

95. The pH of 0.04M HNO_3 is

- (a) 1.4 (b) 2.0 (c) 3.0 (d) 4.0

96. The unit of cell constant is

- (a) Sm^{-1} (b) cm^{-1} (c) $\text{ohm}^{-1} \text{cm}^{-1}$ (d) ohm

97. The unit of rate constant for first order reaction is

- (a) mol s^{-1} (b) $\text{L mol}^{-1} \text{s}^{-1}$
(c) s^{-1} (d) $\text{mol L}^{-1} \text{s}^{-1}$

98. Which of the following is an intensive property?

- (a) volume (b) mass
(c) area (d) concentration

99. The unit of radioactivity is

- (a) Curie (b) nik/L (c) Gauss (d) g/L

100. The compound $\text{Na}_2[\text{Fe}(\text{CN})_5\text{NO}]$ is known as

- (a) sodium nitroprusside (b) Prussian blue
(c) Tollen's reagent (d) Bayer's reagent