Tribhuvan University
Institute of Science and Technology
4 Years Bachelor in Computer Science and Information Technology (B. Sc. CSIT)
Entrance Examination 2072

Full Marks: 100
Time: 2 hrs.

Attempt all questions:

Mathematics (25 × 1 = 25)

1. If a, b £ R, a/b is indeterminate, if
   a. $a = 0, b \neq 0$ b. $a = 0, b = 0$
   c. $a \neq 0, b \neq 0$ d. $a \neq 0, b = 0$
2. $(-\infty, \infty) =$
   a. $\{x: -\infty \leq x \leq \infty\}$ b. $\{x: -\infty < x < 0\}$
   c. $\{x: -\infty < x < \infty\}$ d. $\{x: x \geq 0\}$
3. The statement is
   a. Bagmati is a River. b. $x > 0$
   c. How old are you? d. $y > 0$
4. If (2x-1, -3) = (3, y+3), then
   a. x = 1, y = 0 b. x= - 1, y = - 3
   c. x = 2, y = - 6 d. x = 0, y = - 1
5. If f: R → R is defined by f(x) = x and g: R → R is defined by g(x) = x then (f o g) (x) is
   a. x b. x^2 c. $\frac{1}{x^2}$ d. 1/x
6. If Sin2x = 1, then x is
   a. π/2 b. ± 1 c. - π/2 d. $n\pi + (-1)^n \frac{\pi}{4}$
7. The value of $Sin(\tan^{-1} x)$ is
   a. x b. $\frac{x}{\sqrt{1+x^2}}$
   c. $\frac{1}{\sqrt{1+x^2}}$ d. $\frac{x}{\sqrt{1-x^2}}$
8. If 2p, p+8, 3p+1 are in A.P., then p is
   a. 5 b. 3 c. 7 d. -5
9. A, G and H are arithmetic mean, geometric mean and harmonic means respectively then
   a. $A^2 = GH$ b. $H^2 = AG$
   c. G= AH d. $G^2 = AH$
10. If $A = (-1\ 0\ 2)$ and $B = \begin{pmatrix} 2 \\ 3 \\ 4 \end{pmatrix}$, then AB is
    a. (6) b. 0 c. (-2 0 8) d. (2 0 - 4)
11. The value of the determinant $\begin{vmatrix} 1 & 2 & 0 \\ 2 & 4 & 1 \\ 3 & 6 & 2 \end{vmatrix}$ is
    a. 1 b. 3 c. 0 d. 4
12. The adjoint of the matrix $\begin{pmatrix} a & b \\ c & d \end{pmatrix}$ is
    a. $\begin{pmatrix} a & d \\ b & c \end{pmatrix}$ b. $\begin{pmatrix} a & b \\ d & c \end{pmatrix}$
    c. $\begin{pmatrix} a & d \\ c & b \end{pmatrix}$ d. $\begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$
13. The real part of is $\frac{(1+i)^2}{2-i}$
    a. -2/5 b. 2/5 c. 1/5 d. 1
14. If ω be the cube roots of unity then $(1 + \omega + \omega^2)(1 + \omega - \omega^2) =$
    a. 0 b. 2 c. 4 d. 3
15. The value of k for which the equation $x^2 + 2(k + 2)x + 9k = 0$ has equal roots are
    a. 4, 1 b. −4, −1 c. −4, 1 d. 4, −1
16. The distance between the point (1, 2) and the line $3x + 4y - 7 = 0$ is
    a. 4 b. 5 c. 4/5 d. -4/5
17. The two lines represented by $ax^2 + 2hxy + by^2 = 0$ are coincident if
    a. $h^2 = ab$ b. $h^2 > ab$
    c. $h^2 < ab$ d. $h^2 > 0$
18. The equation of tangent to the circle $x^2 + y^2 = 5$ at (2, 1) is
    a. x + y = 5 b. x - y = 5
    c. 2 x + y = 5 d. x + 2y = 5
19. $\lim_{x-2} \frac{x-2}{\sqrt{x^2-4}}$
    a. 0/0 b. 0 c. 1 d. 4
20. $\lim_{x-0} \frac{1-\cos ax}{x^2}$
    a. 0 b. $\frac{a^2}{2}$ c. $2a^2$ d. 2
21. The value of x for which the function $y = x^3 - x^2$ has $\frac{dy}{dx} = 0$
    a. 0, 2/3 b. 2/3 c. 0 d. - 2/3
22. The point of inflection for $y = x^2 - 2x$ is
    a. 0 b. does not exist c. 2 d. 1
23. $\int_0^1 \frac{2xdx}{\sqrt{1-x^2}}$
    a. 1/2 b. 1 c. 0 d. 2
    Ans: put $y = 1 - x^2$ *or* $dy = -2x.dx$ or
24. $\int x \sin x\, dx =$
    a. $Sinx - x\,Cosx + C$
    b. $Sinx + x\,Cosx + C$
    c. $Cosx + x\,Sinx + C$
    d. $- Sinx + x\,Cosx + C$
25. Area bounded by the x-axis and the curve $y = 3x^2$ and the ordinate of x = 3 and x = 4 is
    a. 37 b. 8 c. 19 d. 0

English (25 × 1 = 25)

26. Which of the following pair has the same vowel sound?
    a. pair, tear b. hut, but
    c. seat, sit d. salt, mark
27. The sentence "I saw a black bird" has a tone.
    a. rising b. falling
    c. fall-rise d. fall-fall
28. The word "joy" has the same initial consonant sound as the word
    a. zoo b. gig c. gesture d. game
29. How many syllables does the word "pleasurable" have?
    a. Three b. two c. four d. one
30. One who knows everything is.
    a. omnipresent b. omnipotent
    c. Fatalist d. omniscient
31. Select the right synonym to the word "aspiration"
    a. Apathy b. yearning
    c. Haughty d. soothe
32. Give the opposite meaning of "hypocrisy".
    a. Majority b. jolly
    c. Sincerity d. praise
33. He died ..... neglect but she died ..... a train accident.
    a. through, in b. in, through
    c. of, of d. of, in
34. Who did you go..... ?
    a. to b. with c. at d. for

35. Insert the missing vowel in these words : defin_te, po_gnant, exist_nce
    a. e-i-e b. a-i-e c. i-e-a d. e-e-e
36. The plane flew ..... my head.
    a. under b. through c. on d. over
37. You and I ..... working.
    a. are b. is c. am d. has
38. Choose the correct meaning to the underlined expression. He has turned the table on his enemy.
    a. hit b. joy
    c. change the possible defeat into a victory
    d. run
39. Opposed to great or sudden change is called
    a. static b. conservative
    c. evolutionary d. revolutionary
40. Greed is terrible.
    a. sin b. crime c. vice d. mistake
41. The gun ..... by mistake.
    a. went off b. gave off c. gave out d. hit on
42. She has ..... down for a rest.
    a. laid b. lied c. lay d. lain
43. The word "brother" takes the suffix .
    a. - ish b. -ly c. -some d. -y
44. The word "desirable" takes the -prefix.
    a. un- b. mis- c. dis- d. non-
45. English teacher makes her class interesting. It is
    a. Adjunct b. Complement
    c. Direct object d. Indirect object
46. Which is the correct expression?
    a. today afternoon b. this evening
    c. the backside of a building
    d. a worth seeing sight
47. She beckoned to enter the room. It means she
    a. told b. said c. signaled d. advised
48. The fear of blood is called.
    a. chirophobia b. ergophobia
    c. monomania d. hematophobia
49. He has _____friends because of his short temperament.
    a. few b. a few c. lot of d. a lot of
50. Which of the following is a passive sentence?
    a. I like people loving me.
    b. I found him driving my car.
    c. I hate having my hair style criticized.
    d. I don't mind people criticizing my work.

Physics (25 x 1 = 25)

51. A force $F = (2\,i + 3\,j - 4\,k)$ Newton acts on a body. In 5 seconds the force displaces the body through a displacement $s = (3\,i + 2j - 2\,k)$ meter. The power (in watt) of the force is
    a. 4 b. 3 c. 5 d. 6
52. Two simple harmonic waves are represented respectively by y1= A1 Sin wt and $y2 = A_2 Cos\ wt$. The phase difference between the two waves is
    a. $3\pi/2$ b. π c. $\pi/2$ d. $\pi/4$
53. A river is flowing west to east at a speed of 5 m/min. A man on the south bank of the river, capable of swimming at 10m/min in still water, wants to swim across the river by the shortest path. He should swim in the direction
    a. due North b. 30° East of North
    c. 60° East of North d. 30° West of North
54. Dimension of surface energy is
    a. $[M^1L^0T^{-2}]$ b. $[M^1L^2T^{-2}]$
    c. $[M^0L^1T^{-2}]$ d. $[M^2L^0T^{-2}]$
55. The terminal velocity of a small sized spherical body of radius r falling vertically in a viscous liquid is given as one of the following proportionality with radius.
    a. r^{-2} b. r^{-1} c. r d. r^2
56. A constant torque acting on a uniform circular wheel changes its angular momentum from L_0 to $4L_0$ in 4 seconds. The magnitude of this torque is
    a. $\left(\frac{3}{4}\right)L_0$ b. L_0 c. $4L_0$ d. $12L_0$
57. At what temperature the rms velocity of a hydrogen molecule be equal to that of oxygen at 47^0C?
    a. - 273° C b. 273 K c. 20 K d. 20°C
58. Dimension of the change in entropy is
    a. $[M^1L^2T^{-2}K^{-1}]$ b. $[M^1L^1T^2K^{-2}]$
    c. $[M^1L^2T^{-2}]$ d. $[M^0L^2T^{-2}K^{-1}]$
59. A square plate of side 2 units is heated through 10° C. If the linear expansivity of the material is x, increase in the surface area of the plate is
    a. 480 x b. 80 x c. 240 x d. 240 x^2
60. A black body radiates heat energy at the rate of 2 x 10^5 Js m' at a temperature of 127° C. The temperature of the black body at which the rate of heat radiation is $32 \times 10^5\ Js^{-1}\ m^2$ is
    a. 327° C b. 927°C c. 527° C d. 727° C
61. A ray of light in air enters a glass slab. Its
    a. wave length decreases
    b. wave length increases
    c. speed increases
    d. frequency decreases
62. By using white light in double slit interference experiment the central fringe is white. What color of fringe can be seen nearest to the central fringe?
    a. blue b. green c. red d. violet
63. A convex lens is immersed in water. Compared to its power in air, the power in water will
    a. Increase for red and decrease for blue
    b. Decrease for all colors
    c. be same for all colors
    d. Increase for all colors
64. Two vehicles are approaching each other with a speed of 10ms-1. If A emits a note of 1000 vibrations, what will be the frequency of the note as heard by a person sitting in B if the velocity of sound is 330 ms-1?
    a. 950 Hz b. 1000 Hz
    c. 1062.5 Hz d. 1215.5 Hz
65. An open pipe and a closed pipe resonate to the same tuning fork. The ratio of their lengths is
    a. 1:1 b. 2:1 c. 1:2 d. 4:1
66. The radius of a copper wire carrying a current is doubled, the drift velocity of electrons will
    a. Remains same b. increases four times
    c. Decreases four times
    d. Increases first and then decreases

67. A 25 W, 120 V lamp and 100 W, 120 V lamp are connected in series across a 120 V line. Which lamp will burn more brightly?
    a. 25 W, 120 V b. 100W, 120 V
    c. Both will have same brightness.
    d. Alternatively both may be bright, one at a time.
68. A Spherical condenser of 1 Farad will have the dimension of
    a. a small metallic ball of radius 0.04 m
    b. a big metallic ball of radius 100m
    c. radius of earth whose radius is 6.4×10^6 m
    d. a sphere having radius of more than that of earth
69. The ratio of induced emf in a coil having 50 turns and rotating with 50 Hz to that of induced emf in a coil having 100 turns and rotating with 150 Hz in the same magnetic field is
    a. 1:2 b. 2:3 c. 1:6 d. 3:2
70. A galvanometer (0-100) mA of resistance 1 Ω. is to be converted to an ammeter in the range 0-1 A. We have to use a shunt
    a. 1 Ω b. 0.1 Ω c. 0.111 Ω d. 0.055 Ω
71. The ratio of specific charge of a proton to that of an alpha particle is
    a. 1:4 b. 1:2 c. 4:1 d. 2:1
72. The angular momentum of electron in the hydrogen atom in the ground state is
    a. h/2π b. h/4π c. h d. 2h
73. The approximate radius of aluminum nucleus (Al) is
    a. 1.5 Fermi b. 2.5 Fermi
    c. 4.5 Fermi d. 13.5 Fermi
74. The kinetic energy of a particle is doubled, de Broglie wavelength becomes
    a. 2 times b. 4 times
    c. 2 times d. 1/ √2 times
75. Half-life and mean life of a radioactive element are related. Choose correct answer from the following:
    a. half-life is less than the mean life
    b. half-life is more than the mean life
    c. mean life and the half-life are the same
    d. mean life is exactly two times the half life

Chemistry (25×1 = 25)

76. The number of moles present in 90 g of water is
    a. 1.0 b. 90.0 c. 5.0 d. 9.0
77. 1.0 g of HCl reacts with 1.0 g of $CaCO_3$, the volume of CO2 produced at NTP would be equal to
    a. 1.0 liters b. 0.224 liters
    c. 2.24 liters d. 22.4 liters
78. Magnetic quantum number specifies
    a. Orientation of orbitals
    b. size of orbitals
    c. shape of orbitals
    d. magnetic properties of orbitals
79. A cooking gas cylinder can withstand a pressure of 20 atmosphere. At 27^0C the pressure of the containing gas is 10 atmosphere. On raising the temperature, the cylinder will burst when the temperature exceeds
    a. 273° C b. 327° C c. 300° C d. 127° C
80. Which of the following methods of expressing concentration is independent of temperature
    a. Molality b. Molarity
    c. Normality d. Grams per liter
81. An aqueous solution of Na_2C0_3 would be
    a. Acidic b. basic
    c. neutral d. either acidic or basic
82. Which one of the following is not a Lewis base?
    a. H_2O b. NH_3 c. OH^- d. BF_3
83. In alkaline condition $KMnO_4$ reacts as follow $2KMnO_4 + 2KOH \rightarrow 2K_2MnO_4 + H_2O + O$, the Eq. wt. of $KMnO_4$ is
    a. M/1 b. M/2 c. M/5 d. M/6
84. The molecular geometry of which compound cannot be predicted by the application of VSEPR theory.
    a. CH_4 b. PCl_5 c. SF_6 d. $MgCl_2$
85. Which of the following is an amphoteric oxide
    a. ZnO b. MgO c. SiO_2 d. H_2O
86. Ammonia is manufactured by the use of
    a. Down's Process b. Solvay's Process
    c. Haber's Process d. Ostwald's Process
87. Dry ice is
    a. Ice which is dried by treating with dehydrating agent
    b. ice which is super cooled
    c. Solid CO_2
    d. ice mixed with some organic solvents
88. Number of atoms in one molecule of sulfur is
    a. 8 b. 4 c. 2 d. 1
89. Which of the following noble gas is not present in atmosphere?
    a. He b. Ar c. Ne d. Rn
90. Chalcopyrite is an ore of
    a. Fe b. Cu c. Zn d. Hg
    Ans: Study in detail about the ores of different metals
91. The substance used as flux in the extraction of iron from hematite in blast furnace is
    a. Calcium phosphate b. Silica
    c. Limestone d. Calcium silicate
92. The formula of bleaching powder is
    a. Ca(OCl)Cl b. $CaSO_4.2H_2O$
    c. $2CaSO_4.H_2O$ d. $MgSO_4.7H_2O$
93. The members of a homologous series have
    a. different general formula
    b. different molecular weight
    c. different chemical properties
    d. different method of preparation
94. Which of the following reagent cannot be used to distinguish between acetaldehyde and acetone
    a. Tollen's reagent b. Fehling's solution
    c. Schiff s reagent d. Br_2 in CCl_4
95. Reduction of nitrobenzene in acidic medium gives
    a. aniline b. azoxybenzene
    c. azobenzene d. hydrazobenzene
96. When formaldehyde reacts with ammonia, it gives
    a. aldehyde ammonia b. formic acid
    c. urotropine d. methyl amine
97. Dettol is an example of
    a. analgesic drug b. antipyretic drug
    c. antibiotic drug d. antiseptic drug
98. BHC is an example of
    a. Condensation polymer b. addition polymer
    c. azo dye d. pesticide

99. Protein is a compound having
    a. either linkage b. ester linkage
    c. peptide linkage d. amine linkage
100. Which one of the following is present as a sugar unit in DNA?
    a. glucose b. sucrose
    c. deoxyribose d. ribose