

Tribhuvan University
Institute of Science and Technology
4 Years Bachelor in Computer Science and
Information Technology (BSc. CSIT)

Entrance Examination 2070

Full Marks: 100

Time: 2 hrs.

Attempt all questions:

Mathematics (25 × 1 = 25)

1. If A and B are any two sets, then $A - (A \cap B)$ is equal to
a. $B - A$ b. $A \cap B$ c. $A \cup B$ d. ϕ
2. The range of the function $y = \sqrt{a^2 - x^2}$, $a > 0$ is equal to
a. $[-a, a]$ b. $(-a, a)$ c. $[0, a]$ d. $(0, a)$
3. What is the value of $\log_a \sqrt{a^3 \sqrt{a^2}}$?
a. 4 b. 3 c. 2 d. 1
4. If $A = \begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$, then A^{100} is equal to
a. 1 b. 0 c. -1 d. None
5. If $a^x = b^y = c^z$ and a, b, c are in G.P. then x, y, z are in
a. G.P. b. A.P. c. H.P. d. None
6. $\lim_{x \rightarrow 0} \frac{a^x - b^x}{x}$ is equal to
a. 0 b. $\log(ab)$ c. $\log(a/b)$ d. $\log(b/a)$
7. The derivative of $y = 5^x$ with respect to x is equal to
a. $5^x \log_e 5$ b. 5^x
c. $\log_e 5$ d. $5 \log_e 5$
8. The function $f(x) = x - \frac{1}{x^2}$, $x \in R, x \neq 0$ is
a. $(-\infty, 0) \cup (0, \infty)$ b. $(-\infty, 0] \cup [0, \infty)$
c. $[-1, 1]$ d. $(-\infty, \infty)$
9. The integral $\int \frac{e^x dx}{e^x + 1}$ is equal to
a. $\log(e^x + 1) + C$ b. $\frac{-1}{e^{2x} + 1} + C$
c. $\frac{-1}{2(e^x + e^{-x})} + C$ d. $\frac{-1}{2(e^{2x} + 1)} + C$
10. For what value of k will the equation $5x^2 - kx + 45 = 0$ have equal roots?
a. 0 b. ± 3
c. ± 30 d. ± 33
11. The quadratic equation of whose one root is $(2 + \sqrt{3})$ is
a. $x^2 + 4x + 1 = 0$ b. $x^2 - 4x + 1 = 0$
c. $x^2 - 4x - 1 = 0$ d. $-x^2 - 4x - 1 = 0$
12. The distance between the parallel lines $y - 2x = 4$ and $6x - 3y = 5$ is
a. $\frac{1}{\sqrt{45}}$ b. $\frac{7}{\sqrt{45}}$
c. $\frac{17}{\sqrt{45}}$ d. $\frac{17}{2\sqrt{45}}$
13. Radius of the circle $x^2 + y^2 - 3x + 2y - \frac{3}{4} = 0$ is
a. 2 b. 1 c. 4 d. 3
14. The absolute value of the complex number $(1 + i)^{-1}$ is
a. 1 b. $\sqrt{2}$ c. $\frac{1}{\sqrt{2}}$ d. 2
15. If $z = \cos\theta + i\sin\theta$ then $z^n + \frac{1}{z^n}$ is equal to
a. $-2 \cos n\theta$ b. $2 \cos n\theta$
c. $2 \sin n\theta$ d. $-2 \sin n\theta$
16. The n^{th} term of the series: $2 + 6 + 12 + 20 + \dots$ is
a. $n(n+1)$ b. $(n+1)(n+2)$
c. $n(n-1)$ d. n

17. If $|x| < 1$ and $y = x + x^2 + x^3 + x^4 + \dots + \infty$, then x is equal to

- a. $\frac{y}{1-y}$ b. $\frac{y}{y-1}$
c. $\frac{(y+1)}{y}$ d. $\frac{y}{1+y}$

18. The derivative of $y = \cos(\cos\sqrt{x})$ is

- a. $\frac{(\sin(\cos\sqrt{x}) \cdot \sin\sqrt{x})}{2\sqrt{x}}$ b. $\sin(\cos\sqrt{x})$
c. $\sin(\sin\sqrt{x})$ d. $\frac{\sin(\cos\sqrt{x})}{2\sqrt{x}}$

19. $3\cos^{-1}x$ is equal to

- a. $\cos^{-1}(3x - 4x^2)$ b. $\cos^{-1}(4x^3 - 3x)$
c. $\cos^{-1}(4x - 3x^3)$ d. $\cos^{-1}(3x^3 - 4x)$

20. Solution of $\tan ax = \cot bx$ is

- a. $\frac{2n+1}{a+b} \cdot \frac{\pi}{4}$ b. $\frac{2n-1}{a-b} \cdot \frac{\pi}{2}$
c. $\frac{2n+1}{a+b} \cdot \frac{\pi}{2}$ d. $\frac{\pi}{2}$

21. What is the value of $\begin{vmatrix} 1 & \omega & \omega^2 \\ \omega & \omega^2 & 1 \\ \omega^2 & 1 & \omega \end{vmatrix}$, where ω is an imaginary cube root of unity?

- a. 1 b. 0 c. 3 d. 2

22. The single equation representing the pairs of lines $y = x$ and $y = -x$ is

- a. $y^2 - x^2 = 0$ b. $y - x = 0$
c. $x - y = 0$ d. $x^2 + y^2 = 0$ Ans: $(y+x)(y-x)=0$ or $y^2 - x^2 = 0$

23. Let $A = [-3, 2]$ and $B = [2, 3]$ then $A - B$ is equal to

- a. $[-3, 3]$ b. $[-3, 2]$
c. $(-2, 2)$ d. $(-2, 1)$

24. If $\lim_{x \rightarrow 0} f(x) \neq \lim_{x \rightarrow 0^+} f(x)$, then $f(x)$ is said to be an

- a. infinite discontinuity
b. removable discontinuity
c. jump discontinuity
d. none

25. Which one of the following is the area enclosed by the curve $y = 3x$, the x -axis and the ordinate $x = 0$, $x = 4$?

- a. 12 b. 16 c. 20 d. 24

English (25 × 1 = 25)

26. Inscription on a tomb is called.....

- a. Epitaph b. cemetery
c. Morgue d. demagogue

27. After he finished the exam, he to the teacher.

- a. Handed over it b. handed it over
c. handed it out d. handed out it

28. Every week she her sister in her village to talk to her.

- a. Calls over b. calls on
c. calls out d. calls up

29. He has a coat five pockets.

- a. of b. about
c. with d. in

30. To hit below the belt means:

- a. to use force b. to use unfair means
c. to use energy d. to use leather

31. I disapprovehis cheating on the exam.

- a. of b. at c. in d. off

32. The lights were.....because the room was bright.

- a. Put off b. take off
c. Left off d. switched off

33. Which of the following is a noun?

- a. Thicken b. impoverish
c. Mercantile d. mercy

34. Which of the underlined word is an adjective?

- a. Swimming is good for health.
b. Students are walking on the lawn.
c. Many people like smoking.
d. She is taking knitting classes.

35. Which of the following is an active voice?

- a. This work will be finished.
b. The suspect was seen.
c. I know him.
d. The letter was posted.

36. The memoranda.....approved

- a. have been b. has been
c. was d. is

37. Which of the following takes a singular verb?

- a. police b. furniture
c. families d. committees

38. Neither her nor they.....going to the college.

- a. is b. are c. has d. was

39. Which expression is incorrect?

- a. A pile of books b. A herd of cattle
c. A herd of sheep d. A pack of wolves

40. They daren't go.....?

- a. did they b. do they
c. hasn't they d. dare they

41. I am hungry and

- a. She is too b. they are so
c. so aren't they d. they are too

42. Which word has the stress on the first syllable?

- a. Likelihood b. religious
c. fantastic d. orthography

43. How many syllables does the word "economical" have?

- a. five b. four c. three d. six

44. The pair.....has the same pronunciation.

- a. pot, port b. so, sow
c. pull, pool d. did, dead

45. The word "they" has the same initial consonant sound as the word.....

- a. day b. date c. thief d. that

46. A professional horse rider is called

- a. Jockey b. rider
c. Coach d. horse courser

47. Give the opposite meaning of "appropriate".

- a. Inevitable b. likely
c. unsuitable d. suitable

48. Select the right synonym to the word "sporadic".

- a. Occasional b. frequently
c. continuously d. never ending

49. Which of the following is incorrectly punctuated?

- a. The teacher said, "Honesty is the best policy".
b. He said to me "When did she come to the party?"
c. The man received a gift, the women, a book.
d. The man, whom he met, had excellent speech

50. The word "father" takes the suffix:

- a.is b.some c.ly d.y

Physics (25 × 1 = 25)

51. The dimensional formula for potential difference is
a. $[ML^2T^{-3}I^{-1}]$ b. $[ML^2T^{-3}I]$
c. $[ML^2T^3I^{-1}]$ d. $[ML^2T^{-2}I^{-2}]$
52. A stone is thrown vertically upward with a speed u from the top of a tower reaches the ground with a speed of $3u$. The height of the tower is.....
a. $\frac{3u^2}{g}$ b. $\frac{4u^2}{g}$
c. $\frac{6u^2}{g}$ d. $\frac{9u^2}{g}$
53. The acceleration of a particle in SHM is.....
a. Always zero b. always constant
c. Maximum at extreme position
d. Maximum at the equilibrium position
54. An iron ball is heated. The percentage increase will be largest in.....
a. volume b. density
c. diameter d. surface area
55. Two wires A and B are of the same material. Their lengths are in the ratio of 1:2 and diameters are in the ratio of 2:1. If they are pulled by the same force, their increase in length will be in the ratio.
a. 2 : 1 b. 1 : 4 c. 1 : 8 d. 8 : 1
56. Water is flowing through a tube of non-uniform cross section. If the radius of the tube at the entrance and the exit is 3:2, then the ratio of velocity of liquid entering and leaving the tube is:
a. 8 : 27 b. 4 : 9 c. 9 : 4 d. 1 : 1
57. The thermodynamic process in which the pressure of the system remains constant is called.....
a. isothermal b. adiabatic
c. isochoric d. isobaric
58. 50 g of ice at -6°C is dropped into water at 0°C . how many grams of water freeze? Specific heat capacity of ice = $2000\text{J Kg}^{-1}\text{C}^{-1}$.
a. 1.785 g b. 4.25 g
c. 3.16 g d. 9.33 g
59. The image of an object placed at the focus of a concave mirror is at
a. f b. Infinity c. 2f d. f/2
60. The temperature of source and sink of cannot engine are 400K and 300K respectively. What is its efficiency?
a. 100% b. 75% c. 33.3% d. 25%
61. The refractive index of air with respect to glass is 2/3. The refractive index of diamond with respect to air is 12/5 Then the refractive index of glass with respect to diamond will be.....
a. 5/8 b. 8/9 c. 5/18 d. 18/5
62. The focal length of a double convex lens for which radius of curvature of each surface is R will be.....($\mu = 1.5$)
a. R/2 b. R c. 2R d. 4R
63. Light of wave length 7200 Å in air has a wave length in glass equal to.....(Given refractive index of glass with respect to air = 1.5).
a. 7200 Å b. 4800 Å
c. 1080 Å d. 10800 Å
64. Three capacitors of capacitance 3μF, 9μF and 18μF are connected first in series and then I parallel. The ratio of C equivalent capacitance in two cases (C_s/C_p) will be
a. 1:15 b. 15:1 c. 1:1 d. 1:3
65. Three equal resistors each of resistance r are connected to form a triangle. The equivalent resistance across any two corners of the triangle is....
a. 2r b. r/3 c. 2r/3 d. 3r
66. The resistances of two lamps are in the ratio of 1:2. Their wattage will be in the ratio of
a. 1:2 b. 2:1 c. 4:1 d. 1:4
67. The energy stored in a 50mH inductor carrying a current of 4A is.....
a. 0.1 J b. 0.4 J c. 0.3 J d. 0.01 J
68. The alternating current in an LCR circuit is maximum when
a. $X_L = 0$ b. $X_C = 0$
c. $X_L = X_C$ d. $\sqrt{X_L^2 + X_C^2} = 0$
69. A particle of mass 10^{-31}Kg is moving with a speed of 10^5m/s . The de Broglie wavelength of the particle is.....
a. $6.63 \times 10^{-8}\text{m}$ b. 6.63Å
c. 66.3Å d. $6.63 \times 10^{-7}\text{m}$
70. Two waves of the same wavelength and amplitude interfere to give a minimum when their phase difference is
a. π b. $\pi/2$
c. $3\pi/2$ d. 0
71. Hard X-rays as compared to soft X-rays have
a. Higher intensity b. lower frequency
c. Higher frequency d. higher speed
72. The mass of α -particle is
a. Equal to the mass of four protons
b. Equal to the mass of four neutrons
c. Equal to the masses of 2 protons and 2 neutrons
d. Less than the sum of masses of 2 protons and 2 neutrons
73. A common emitter transistor amplifier has a current gain of 50. If the load resistance is 4 KΩ and the input resistance is 500 Ω. The voltage gain of the amplifier is.....
a. 400 b. 6.2 c. 500 d. 300
74. A tube closed at one end has a length 1 meter. The air column in the pipe can resonate for sound of frequency.....($V = 320\text{ms}^{-1}$)
a. 166 Hz b. 249 Hz
c. 575 Hz d. 80 Hz
75. A displacement wave is represented by $y = 0.25 \sin(500t - 0.0025x)$, where y, t and x are in cm, second and meter respectively. The wave length of wave is.....
a. $20\pi\text{m}$ b. $40\pi\text{m}$
c. $60\pi\text{m}$ d. $80\pi\text{m}$

Chemistry (25 × 1 = 25)

76. The gas obtained by adding water on aluminum carbide is
a. Ethyne b. ethane c. methane d. ethane
Ans: Jump to 2069 old question
77. The mixture of HCl and ZnCl_2 is known as
a. Tollen's reagent b. Baeyer's reagent
c. Lucas reagent d. Nessler's reagent

78. The IUPAC name of n-valeric acid is
 a. Pentanoic acid b. butanoic acid
 c. Propanoic acid d. ethanoic acid
79. A blood red coloration of ferric sulphocyanide obtained by addition of ferric chloride in sodium extract confirms the presence of
 a. Sulphur b. nitrogen
 c. both a and b d. halogens
80. Which of the following compounds has highest boiling point?
 a. CH_4 b. CH_3Cl
 c. CH_3Br d. CH_3OH
81. The compound that undergoes Cannizzaro reaction is
 a. CH_3COOH b. C_2H_5CHO
 c. HCHO d. CH_3OCH_3
82. Benzene is converted to toluene by
 a. Friedel Craft reaction b. Grignard reaction
 c. Wurtz reaction d. Perkin reaction
83. The compound that gives positive carbylamines reaction is
 a. $(CH_3)_2NH$ b. $(CH_3)_3N$
 c. $(CH_3)_4N^+$ d. $(CH_3)NH_2$
84. Hematite is an ore of
 a. Silver b. Iron c. Mercury d. Copper
85. Na_2O is a
 a. Neutral oxide b. acidic oxide
 c. Basic oxide d. amphoteric oxide
86. Which of the following elements has highest electro-negativity?
 a. Bromine b. Iodine
 c. Chlorine d. Fluorine
87. Zinc sulphate ($ZnSO_4 \cdot 7H_2O$) is also called
 a. White vitriol b. Green vitriol
 c. Blue vitriol d. corrosive sublimate
88. Brass is an alloy of
 a. Copper and Zinc b. Copper and Nickel
 c. Copper and Tin d. Copper and Lead
89. The formula of dolomite is
 a. $CaCO_3$ b. $CaCO_3 \cdot MgCO_3$
 c. $CaSO_4 \cdot 2H_2O$ d. CaF_2
90. The general electronic configuration of zinc is
 a. $[Ar]4s^23d^{10}$ b. $[Ar]4s^13d^{10}$
 c. $[Ar]4s^23d^8$ d. $[Ar]4s^23d^7$
91. Equivalent weight of $KMnO_4$ in neutral medium is
 a. 52.6 b. 158.0 c. 31.6 d. 63.0
92. Bohr's model was modified by
 a. Rutherford b. Sommerfeld
 c. Dalton d. Pauli
93. How many Oxygen atoms are there in 8.0g of oxygen atoms?
 a. 3.011×10^{23} atoms b. 3.011×10^{22} atoms
 c. 3.011×10^{20} atoms d. 3.011×10^{19} atoms
94. What is the pH of 0.001 M HCl?
 a. 2.0 b. 3.0 c. 4.0 d. 5.0
95. The rate of reaction is independent of
 a. Temperature b. concentration
 c. Particle size of reactant
 d. Molecularity
96. The CGS unit of specific conductance is
 a. $Siemen\ cm^{-1}$ b. $ohm^{-1}cm^2equiv^{-1}$
 c. Siemen d. ohm^{-1}
97. Hess's law deals with
 a. Total change in heat of reaction
 b. Rate of reaction
 c. Equilibrium constant of reaction
 d. Influence on pressure of volume of gas
98. The degree of dissociation of an electrolyte
 a. Decreases with dilution
 b. Increases with dilution
 c. May increase or decrease with dilution
 d. Is not affected by dilution
99. The weight of 100 ml of NH_3 gas at NTP is
 a. 0.0759 g b. 0.0579 g
 c. 0.0459 g d. 0.0359 g
100. The law of multiple proportions was given by
 a. Richter b. John Dalton
 c. Albert Einstein d. Gay Lussac