Nepal College of Information Technology

BE Entrance Model Question 2023

Model Question

Entrance Roll _____ Date _____

Time: 2 Hrs

General Guidelines to Examinees

1. Occupy your own seat.
2. Write your Entrance Roll Number clearly, both on the Entrance test question booklet and on the entrance test answer sheet.
3. During exam period, you will not be allowed to leave the exam hall without submitting the question/answer sheet.
4. You will not be allowed to disturb other examinees by asking for calculators, pencils, rulers, etc.
5. You are provided with a separate Answer Sheet in which you are required to darken (using a pencil) the appropriate answer lettered choice box against the question number.
   For example, if the proper answer to question number 5 is choice D, then in the answer sheet provided darken the lettered choice box D against number 5 in the answer sheet.

5. [A] [B] [C] [D]

6. *For correction of a wrong answer choice, cross–mark the already darkened wrong answer lettered choice box, and then re-darken the appropriate answer lettered choice box against the question number.*

For example, later on, if you feel that the proper answers to question number 5 is choice D, not B, then in the answer sheet provided, cross-mark the previously darkened lettered choice box B and then darken the lettered choice box D against number 5 in the answer sheet.

5. [A] [B] [C] [D]

7. For your rough use, use back side (blank portion) of the answer sheet. You will not be given any extra papers.
8. Subject wise marks distribution are as follows:

Name of Subject	Marks
English	10
Mathematics	40
Chemistry	20
Physics	30
Total Marks	**100**

Entrance Roll No. _____ Programme _____

Applicant's Name _____

Address _____

Phone Number _____

Attempt all Questions

Choose the correct answer and blacken the appropriate bubble using gel pen on answer sheet.

Full Marks: 100

Time: 2 hours

Select the best alternatives:

1. They had their breakfast, ……..?

   A. hadn't they B. wasn't they C. doesn't they D. didn't they

2. Which one of the following is the correct sentence?

   A. Nobody are to be blamed.

   B. He regrets investing his money in the stock market.

   C. The number of participants were very few yesterday.

   D. One of his friends are the doctor of this hospital.

3. The information about the classes…… not appropriately circulated to the students.

   A. was B. were C. have D. has

4. I look forward to……. From you soon.

   A. hear B. hearing C. heard D. be hearing

5. Why do you laugh at me? Why am I……..?

   A. laughed by you B. laughed at C. being laughed at D. to laugh at me

6. She……my birthday party if she……...about it.

   A. has known, would attend B. knew, may attend

   C. could have attended, had known D. had knew, would have attended

7. I have to be there in ten minutes. I had better……now or I'll be late.

   A. left B. leave C. to leave D. been leaving

Questions 8-10 are based on the following passage:

As science progresses, superstition ought to grow less. On the whole, that is true. But it is surprising how superstitions linger on. If we are tempted to look down on savage tribes and other nations for holding such ideas, we should remember that even today, among the civilized nations, a great many equally stupid superstitions exist and are believed in by a great many people.

8. The existence of superstitions implies that…..

   A. superstitions are more helpful than science. B. science is also based on the superstitions.

   C. people lack the perspectives of scientists D. people love their superstitions.

9. What is the basic difference between science and superstitions?

A. Science relies on sensory perceptions and superstitions rely on extraordinary perceptions.

B. Science is meant for scientists and superstitions are meant for savage tribes.

C. Savages love superstitions and non-savages love science.

D. Science never causes harm and superstitions never cause benefits.

10. The writer seems to suggest that....

A. superstitions are unpopular.

B. superstitions are popular

C. science cannot progress.

D. science can progress.

11. The number of elements in power set of {1, 2, 3} are

A. 5 B. 6 C. 7 D. 8

12. The logically equivalent statement of $\sim(p \Rightarrow q)$ is

A. $\sim p \Rightarrow \sim q$ B. $\sim q \Rightarrow \sim p$ C. $p \wedge \sim q$ D. $p \vee \sim q$

13. The solution set of inequality $x^2 + 3x < 0$ is

A. $\left(-3, -\frac{2}{3}\right)$ B. $\left(-\frac{2}{3}, \frac{1}{2}\right)$ C. $R - \left(-\frac{2}{3}, \frac{1}{2}\right)$ D. None

14. Which one of the following function is invertible?

A. $f(x) = 3^x$ B. $f(x) = x^3 - x$ C. $f(x) = x^2$ D. $f(x) = 5$

15. If $\log_2(x^2 + 7) = 3$ then the value of x is

A. 4 B. $\sqrt{7}$ C. 2 D. 1

16. The graph of the function $f(x) = x^3 - x$ is symmetric about

A. x-axis B. y-axis C. origin D. y = x

17. If A is any matrix such that $A\begin{pmatrix} 1 & 4 \\ 2 & 3 \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \\ 2 & 1 \end{pmatrix}$, then order of matrix A is

A 3×2 B. 2×3 C. 2×2 D. 3×3

18. If A is any square matrix then A(adjA) is equal to

A. $|A| . I$ B. A^{-1} C. $\frac{adj(A)}{|A|}$ D. $|A|^{n-1}$

19. In an A.P., the m^{th} term is $\frac{1}{n}$ and n^{th} term is $\frac{1}{m}$, then mn^{th} term is

A. 0 B. 1 C. $m+n$ D. $\frac{1}{m+n}$

20. Sum of infinite G.P is $\frac{5}{4}$ times the sum of all odd terms. The common ratio of the series is

A. $\frac{1}{3}$ B. $\frac{1}{5}$ C. $\frac{3}{2}$ D. $\frac{1}{4}$

21. The reflection of complex number $z=\frac{1-i}{1+i}$ about x-axis is

A. i B. – i C. – i D. 1 – i

22. The principal value of $\sin^{-1}\left[\tan\left(-\frac{5\pi}{4}\right)\right]$ is

A. $\frac{\pi}{4}$ B. $-\frac{\pi}{2}$ C. $-\frac{\pi}{4}$ D. $\frac{\pi}{2}$

23. In triangle ABC, if $a=2, A=30°$, then radius of the circumcircle is:

A. 1 B. 2 C.3 D. 4

24. Out of 6 books, in how many ways can a set of one or more books be chosen?

A. 65 B. 62 C. 63 D. 64

25. Which one of the following is the positive value of n for which the coefficient of x^2 in the expansion of $(1 + x)^n$ is 6?

A. 3 B. 4 C. 6 D. 2

26. Value of $\sum_{n=1}^{\infty}\frac{1}{(2n-1)!}=$

A. e B. $\frac{1}{e}$ C. $\frac{e+e^{-1}}{2}$ D. $\frac{e-e^{-1}}{2}$

27. If $|\vec{a}|=4, |\vec{b}|=2$, and angle between $\vec{a}$ and $\vec{b}$ is $\frac{\pi}{6}$, then $(\vec{a}\times\vec{b})^2$ is equal to

A. 8 B. 48 C. 16 D. 32

28. If the vectors $\vec{a}$ and $\vec{b}$ have parallel line supports, the $\vec{a}.\vec{b}$ is equal to

A. $|\vec{a}||\vec{b}|$ B. $-|\vec{a}||\vec{b}|$ C. $\pm|\vec{a}||\vec{b}|$ D. 0

29. The length of latus rectum of the parabola $y=ax^2 + cx + b$, $b\neq 0$ is

A. $4b$ B. $\frac{4}{b}$ C. b D. $\frac{1}{b}$

30. The sum of the distances of any point on the ellipse $4x^2 + y^2 = 1$ from foci is equal to

A. 2 B. 1 C. $\frac{1}{4}$ D. $\frac{1}{2}$

31. Parallelogram OPQR lies in xy-plane and the coordinate of P and Q are (2, 4) and (8, 6) respectively. What is the coordinate of R?

A. (2, 5) B. (2, 6) C. (8, 2) D. (6, 2)

32. If the pair of lines $ax^2 + 2hxy + by^2 = 0$ and $a'x^2 + 2h'xy + by^2 = 0$ have same bisector then

A. $\frac{a}{a'}=\frac{h}{h'}=\frac{b}{b'}$ B. $\frac{h}{h'}=\frac{a-b}{a'-b'}$ C. $\frac{h}{h'}=\frac{a'-b'}{a-b}$ D. $a-b=a'-b'$

33. The equation of tangent to the circle $x^2+y^2+4x-4y+4=0$ which makes equal intercepts on the positive coordinate axes is

A. $x+y=2$ B. $x-y=8$ C. $x+y=2\sqrt{2}$ D. $2x-y=4$

34. If the line $lx+my+n=0$ is tangent to the circle $x^2+y^2=a^2$ then

A. $n^2(l^2+m^2)=a^2$ B. $a^2(l^2+m^2)=n^2$ C. $n(l+m)=a$ D. $(l+m)=n$

35. Which one of the following is the distance between two directrices of the ellipse $3x^2+4y^2-48=0$?

A. 4 B. 8 C. 12 D. 16

36. The direction cosine of the line perpendicular to the plane $ax+by+cz=d$ is proportional to

A. a, b, c B. $\frac{1}{a},\frac{1}{b},\frac{1}{c}$ C. $\frac{a}{d},\frac{b}{d},\frac{c}{d}$ D. none

37. $\lim_{n\to\infty}\left[\frac{1}{5}+\frac{1}{5^2}+\frac{1}{5^3}+...+\frac{1}{5^n}\right]=$

A. $\frac{1}{5}$ B. 5 C. $\frac{1}{4}$ D. -4

38. $\lim_{x\to 0}\frac{(1+x)^7-1}{(1+x)^3-1}=$

A. $\frac{1}{3}$ B. $\frac{7}{3}$ C. $\frac{1}{7}$ D. 21

39. The differential coefficient of $\tan^{-1}(\sinh x)$ with respect to x is

A.2 B. sech$x$ C. $\frac{1+\tanh^2 x}{1-\tanh^2 x}$ D. coth$x$

40. If y = logx then y_n =

A. $(-1)^{n-1}\frac{1}{x^n}$ B. $(-1)^{n-1}\frac{n!}{x^n}$ C. $(-1)^{n}\frac{n!}{x^{n-1}}$ D. $(-1)^{n-1}\frac{(n-1)!}{x^n}$

41. A function $f(x)=\frac{\sin ax}{x}$ is continuous at $x=0$ if $f(0)$ is equal to

A. a B. $\frac{1}{a}$ C. 1 D. 0

42. If normal to the curve $y^2 = 5x - 1$ at (1, - 2) is of the form $ax - 5y + b = 0$ then the value of a and b are

A. - 4, 14 B. – 4, - 14 C. 4, 14 D. 4, - 14

43. If $x=a(t+\sin t)$ and $y=a(1-\cos t)$, then $\frac{dy}{dx}$ is equal to

A. cost B. sin2t C. $\tan\frac{t}{2}$ D. $-\tan t$

44. The diameter of circle is increasing at the rate of 1 cm/sec. What is the rate of increase of its area, when its radius is π cm?

A. $\pi^2\ cm^2$ / sec B. $\pi\ cm$ / sec C. $1 cm^2$ / sec D. $\pi\ cm^2$ / sec

45. $\int \frac{dx}{x \log x} =$

A. $\log x + c$ B. $\log(\log x) + c$ C. $\frac{1}{x} + c$ D. $\frac{1}{\log x} + c$

46. $\int_0^{2/3} \frac{dx}{4 + 9x^2} =$

A. $\frac{\pi}{6}$ B. $\frac{\pi}{12}$ C. $\frac{\pi}{24}$ D. $\frac{\pi}{4}$

47. Area bounded by $y = -x^2 + 2x + 3$ and y = 0 is

A. 32 B. $\frac{1}{3}$ C. $\frac{1}{32}$ D. $\frac{32}{3}$

48. Which one of the following is the general solution of homogeneous differential equation $\frac{dy}{dx} = f\left(\frac{y}{x}\right)$ when y = vx?

A. $\int \frac{dy}{y} = \int \frac{dv}{v}$ B. $\int \frac{dy}{x} = \int \frac{dv}{f(v)}$

C. $\int \frac{dy}{y} = \int \frac{dv}{f(v) + v}$ D. $\int \frac{dx}{x} = \int \frac{dv}{f(v) - v}$

49. The frequency distribution of an observation will negatively skewed if

A. $Q_3 - Q_2 > Q_2 \_ Q_1$ B. $Q_3 - Q_2 < Q_2 \_ Q_1$

C. $Q_3 + Q_2 > Q_2 + Q_1$ D. $Q_3 - Q_2 \approx Q_2 \_ Q_1$

50. The probability that at least one events A and B occur is 0.6. If A and B occur simultaneously with probability 0.2, then $P(\overline{A}) + P(\overline{B})$ is

A. 0. B. 0.8 C. 1.2 D. 1.6

51. Oxides of Nitrogen follow:

A. Law of constant proportions B. Law of multiple proportions

C. Law of reciprocal proportions D. Law of conservation of mass

52. "When electrons fill up in sub-shells having more than one orbitals, each orbital is filled up first by single electron with same spin followed by pairing with opposite spins". This statement is of:

A. Aufbau's principle B. Hund's rule of maximum multiplicity

C. Pauli's exclusion principle D. None of above

53. On moving left to right in a periodic table, which of the following variable decreases?

A. Electron affinity B. Electronegativity C. Ionization potential D. Atomic size

54. Which of the following bond will have highest ionic character?

A. H–I B. H–F C. H–Cl D. H–Br

55. The oxidation number of chromium in potassium dichromate is

A. a. + 6 B. – 5 C. – 2 D. + 2

56. In which of the following systems, there is no effect of increase in pressure?

A. $H_2 + Cl_2 \rightleftharpoons 2HCl$ B. $2CO + O_2 \rightleftharpoons CO_2$ C. $2SO_2 + O_2 \rightleftharpoons 2SO_3$ D. $PCl_5 \rightleftharpoons PCl_3 + Cl_2$

57. 1 Molar solution of H_3PO_4 is

A. 1N B. 2N C. 3N D. 4N

58. The amount of water that is to be added to change the strength of a 100mL HCI solution from 0.5 N to 0.2 N is :

A. 150 mL B. 400 mL C. 300 mL D. 500 Ml

59. The pH of a solution is 5.0. To this solution sufficient acid is added to decrease the pH to 2.0. The increase in hydrogen ion concentration is

A. 100 times B. 1000 times C. 2.5 times D. 10 times

60. An aqueous solution of $CuSO_4$ is

A. Acidic B. Basic C. Neutral D. Amphoteric

61. Oxygen molecule exhibits

A. Para magnetism B. Diamagnetism C. Ferromagnetism D. Ferrimagnetism

62. Which cannot act as a ligand to transition metal ion?

A. CO B. CO_2 C. NH_3 D. H_2O

63. Which element is alloyed with Copper to form Bronze and brass respectively?

A. Sn and Zn B. Zn and Sn C. Sn and Pt D. Zn and Ni

64. The formula of corrosive sublimate is

A. Hg_2Cl_2 B. $HgCl_2$ C. Hg_2O D. HgCl

65. Octane number of fuel can be increased by;

A. Isomerization B. Reforming C. Alkylation D. All process

66. The IUPAC name of carboxylic acid is obtained by replacing terminal 'e' from the name of alkane with;

A. al B. ol C. one D. oic acid

67. Which of the following statement is not true for homologous series?

A. Each successive members differ by $-CH_2$ unit

B. Each members can be represented by same formula

C. All member have same physical properties

D. All member have same chemical properties

68. The aromaticity of benzene is due to;

A. Unsaturation in the molecule B. Presence of delocalized π-electrons

C. High heat of combustion D. Presence of cyclic ring

69. Which of the following group is ortho-para directing in nature?

A. $-NO_2$ B. –CHO C. $-COCH_3$ D. $-OCH_3$

70. The stability order of different carbocations is;

A. $CH_3^+ > CH_3CH_2^+ > (CH_3)_2CH^+ > (CH_3)_3C^+$

B. $(CH_3)_3C^+ > (CH_3)_2CH^+ > CH_3CH_2^+ > CH_3^+$

C. $(CH_3)_2CH^+ > CH_3^+ > CH_3CH_2^+ > (CH_3)_3C^+$

D. $CH_3CH_2^+ > CH_3^+ > (CH_3)_2CH^+ > (CH_3)_3C^+$

71. The number of significant figures in a pure number 41.0 is

A. Two B. Three C. One D. Infinite

72. Two bodies of masses 2 Kg and 7 Kg are moving with velocities of 2 m/s and 7 m/s respectively. What is the total momentum of the system in Kg-m/s?

A. 50 B. 53 C. 28 D. 0

73. What will be the formula of mass of earth in terms of g, R and G?

A. $g^2\frac{R}{G}$ B. $G\frac{R}{g^2}$ C. $G\frac{R}{g}$ D. $g\frac{R^2}{G}$

74. A simple pendulum has some time period T. What will be the percentage change in its time period if its amplitudes is decreased by 5 %?

A. 6 % B. 3 % C. 1.5 % D. 0 %

75. An aeroplane of mass $3 \times 10^4 kg$ and total wing area 120 m^2 level flight at some height. The difference in pressure between upper and lower surfaces of its wings in kilopascal is ($g = 10\ m/s^2$)

A. 2.5 B. 5.0 C. 10.0 D. 12.5

76. An aluminum sphere is dipped into water at 10^0 C. If the temperature is increased, the force of buoyancy

A. will increase

B. will decrease

C. will remain same

D. may increase or decrease depending on the radius of the sphere

77. Heat required to convert 1 g of ice at 0^0C into steam at 100^0C is

A. 100 cal B. 0.01 Kcal C. 716 cal D. 1 Kcal

78. If the temperature of the black body is increased by 50%, the percentage increase in emitted radiation is

A. 50 B. 100 C. 400 D. 500

79. All gas at the same temperature have the same

A. density B. K.E C. rms speed D. none of above

80. Which of the following is not a statement of law of thermodynamics?

A. Enegy can neither be created nor be destroy

B. The total energy of the universe remains constant

C. Enthalpy change depends only upon initial and final state

D. It is impossible to construct a perpetual motion machine.

81. An object is placed at 2f from the pole of convex mirror. The magnification will be …….

A. -1/3 B. -1 C. -2/3 D. 3/2

82. The angular separation for a lens is 0.0178 and deviation for yellow light is 0.5170,then dispersive power is

A. 0.031 B. 0.344 C. 0.034 D. 0.036

83. Diffraction effects are easier to notice in the case of sound waves than in the case of light waves because

A. Sound waves are longitudinal. B. Sound is perceived by the air.

C. Sound waves are mechanical. D. Sound waves are of longer wavelength.

84. How much work is done in moving a charge of 2 coulomb across two points having a p.d. of 5V ?

A. 0.4 J B. 2.5 J C. 10 J D. 20 J

85. The specific resistance of a wire 1.1 m long, 0.4mm in diameter and having a total resistance of 4.2Ω will be

A. $4.97 \times 10^5\ \Omega m$ B. $48 \times 10^{-8}\ \Omega m$ C. $48 \times 10^4\ \Omega m$ D. none of these

86. In a potentiometer, null points were obtained at 140cm and 180cm with cells of emf 1.1V and one of the unknown value respectively. The unknown emf is

A. 1.1V B. 1.8V C. 1.5V D. 1.4V

87. In a stationary wave_____

A. the displacement at the antinodes is minimum

B. the displacement at the nodes is maximum

C. the displacement at the nodes is zero and that at the antinode is maximum

D. the displacement is maximum at both nodes and antinodes

88. A string fixed at both the ends forms standing waves with node separation of 5 cm. If the velocity of waves travelling time string is 4 m/s, then the frequency or vibration of the string will be_____

A. 20 Hz B. 30 Hz C. 40 Hz D. 50 Hz

89. Doppler shift in frequency is independent of

A. the frequency of waves produced B. the speed of source

C. the speed of observer D. distance from source to observer

90. In a pure inductive circuit, the current

A. lags behind the applied emf by an angle π B. lags behind the applied emf by an angle $\pi/2$

C. leads the applied emf by an angle $\pi/2$ D. and applied emf are in same phase.

91. When the number of turns per unit length of a coil of solenoid is halved, the self-inductance of solenoid

A. Remains unchanged B. Will be one fourth of its previous value

C. will Be doubled D. Becomes four times

92. The penetrating power in the decreasing order is

A. $\alpha < \beta < \gamma$ B. $\alpha > \beta > \gamma$ C. $\alpha < \gamma < \beta$ D. $\alpha < \beta > \gamma$

93. If an electron and a proton having same momenta enter perpendicular to a magnetic field, then

A. Curved path of electron and proton will be same

B. They will move undeflected

C. Curved path of electron is more curved than that of the proton

D. Path of proton is more curved

94. The emission of electrons does not occurs in

A. thermionic emission. B. X-ray emission. C. secondary emission. D. photoelectric emission

95. The first law of thermodynamics fails to decide_____

A. the direction of the the process

B. the extent of conversion of one form of energy to another

C. both these

D. none of these

96. A hot body will radiate heat most rapidly if its surface is

A. white and polished B. white and rough C. black and rough D. black and polished

97. The angle of incidence at which reflected light is totally polarized for reflection from air to glass (μ) is

A. $\sin^{-1}\mu$ B. $\sin^{-1}\left(\frac{1}{\mu}\right)$ C. $\tan^{-1}\left(\frac{1}{\mu}\right)$ D. $\tan^{-1}\mu$

98. Amount of energy absorbed or evolved when 1 A of current passes for one second through a junction of two metals is called

A. Peltier's coefficient B. Thermo emf

C. Thomson coefficient D. Thermoelectric power

99. A passenger is sitting on a fast moving train. The engine of the train blows a whistle of frequency n. If the apparent frequency of sound heard by the passenger is n′, then

A. $n' < n$ B. $n' > n$ C. $n' = n$ D. $n' \geq n$

100. The decay constant of a radioactive element radium is 4.28×10^{-4} per year. Its half life is

A. 2000 years B. 1240 years C. 63 years D. 1620 years