

Tribhuvan University
 Institute of Science and Technology
B. Tech. (Food Technology)
 Model Question

Full marks: 100
 Time: 2 hrs

Answer all questions.

Group A (Mathematical Ability) (20 x 1 = 20)

1. If $n(U) = 125, n(A) = 80, n(B) = 65$, what is the greatest value of $n(A \cup B)$?

a. 125	c. 100
b. 110	d. 80

2. If $A = [-1, 3)$ and $B = [2, 5)$; then $A \cap B$ is equal to:

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

3. If a real function $y = f(x) = \sqrt{x-1}$, then $f(x)$ is defined for:

a. $x \geq 1$	c. $x = -1$
b. $x < 1$	d. $x : x \in (-\infty, 0)$

4. If $g(x) = \frac{2x+1}{3}$, $g(x): \mathbb{R} \rightarrow \mathbb{R}$, then $g^{-1}(7)$ equals

a. 5	c. 10
b. $11/3$	d. $29/3$

5. Which of the following function is **not** an odd function?

a. $f(x) = x^3 - x$	c. $f(x) = x^3 + \sin x$
b. $f(x) = x - \sin x$	d. $f(x) = x^2 - \cos x$

6. If $\log_{10} x = y$, then $\log_{1000} x^2$ equals:

a. $y/3$	c. $3y/2$
b. $2y/3$	d. $3y$

7. If $\tan^{-1} x = \sin^{-1}\left(\frac{1}{2}\right)$, then x is equal to:

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

8. In a triangle ABC, $\angle A = 90^\circ$, $b = 3\text{cm}$ and $c = \sqrt{3}\text{cm}$, then $\angle C = ?$
 a. 60° c. 30°
 b. 45° d. 75°
9. If $\cos\theta = \frac{1}{\sqrt{2}}$, the general solution of the equation is:
 a. $\theta = 2n\pi + \pi/4$ c. $\theta = n\pi \pm \pi/4$
 b. $\theta = n\pi + \pi/4$ d. $\theta = 2n\pi \pm \pi/4$
10. If ω be a cube root of unity, the value of $\left(\frac{1+\omega}{\omega^2}\right)^3$ is
 a. ω c. 1
 b. ω^2 d. -1
11. The distance of the line $3x-4y+3=0$ from a point $(a, 3)$ is 3 then the value of 'a' is:
 a. 8 or -2 c. -8 or 2
 b. 8 or 2 d. -8 or -2
12. The value of k, so that the equation $3x^2 + 7x + 6 - k = 0$ has one root equal to zero, is
 a. 12 c. -12
 b. 6 d. -6
13. The quadratic equation whose roots are $1/2$ and $-1/2$ is:
 a. $4x^2 - 1 = 0$ c. $x^2 + 1 = 0$
 b. $x^2 - 4 = 0$ d. $x^2 = 0$
14. $\lim_{x \rightarrow 1} \frac{x^2 - \sqrt{x}}{\sqrt{x} - 1}$ is equal to:
 a. 1 c. ∞
 b. 0 d. 3
15. Let $g(x) = \cos x^\circ$, then $\frac{d(g(x))}{dx}$ is
 a. $\frac{-\pi}{180} \sin x^\circ$ c. $-\sin x^\circ$
 b. $\frac{\pi}{180} \sin x^\circ$ d. $\sin x^\circ$

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c. wavering

d. rushing

31 He felt ill at ease after receiving the letter from his son:

a. relived

c. sick

b. disturbed

d. embarrassed

32 In many industries, workers together to try to increase their incomes:

a. have had
joined

c. have
joined

b. had been
joined

d. has been joined

33 Ecology is the branch of science relationships living things have to each other and to their environment:

a. that deals the

c. deal on
the

b. that deals with
the

d. which deals the

34 Criticism high standards among artists and to encourage the appreciation of art:

a. attempts to promote

c. attempting to
promote

b. attempt to
promote

d. attempt promoting

35 the printing press, the telephone, the radio, and television are landmarks in the history of communication:

a. the inventions of

c. the invention of

b. inventions of

d. the inventions in

36 French Leave:

a. leave without permission

c. long leave

b. short
level

d. leave in the middle

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37 a lover of the books:

- a. librarian
- b. bibliophile
- c. pedophile
- d. book-keeper

38 hang on:

- a. hangover
- b. to hang
- c. hold on
- d. hang out

39 Father one's own nest:

- a. make money through illegal way
- b. look after father's wealth
- c. make money through charity
- d. earn money through farming

40 With a grain of salt:

- a. with oblige
- b. salt is as small as grain
- c. add salt in grain
- d. with reservations

Group C (Physics)

(20 x 1 = 20)

41 Two bodies of mass 5 kg and 4 kg are tied by a string and the body of mass 4 kg is placed on a smooth table whereas body of mass 5 kg hangs vertically. The acceleration of 5 kg mass will be:

- a. 10m/s^2
- b. 20m/s^2
- c. 5.4m/s^2
- d. 2.7m/s^2

42 The vector sum of two unit vectors is a unit vector then the magnitude of the difference is :

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

43 The power of a water pump is 2 kW. The amount of water can raise in 1 minute to a height of 10 m is:

- a. 2000 lts
- b. 100 lts
- c. 1000 lts
- d. 1200 lts

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- 44 A body of mass 2 kg moving on a horizontal surface with an initial velocity of 4 m/s comes to rest after 2 s. If the body is to be kept moving on the same surface with a velocity of 4 m/s, the force required is:
- a. 2N
b. 4N
c. 8N
d. 16N
- 45 When a spinning system contracts in the absence of an external torque, its rotational speed increases and its angular momentum:
- a. Decreases
b. Remains unchanged
c. Increases
d. May increase or decrease
- 46 The change in temperature of a body is 40°C , the change in temperature on the kelvin scale is:
- a. 40K
b. 313
c. 72 K
d. 50 K
- 47 A cylinder of 0.6 m long and 6 mm radius is heated at 1.5 kW. The temperature of filament if Stefan's constant is $6 \times 10^{-8} \text{ W m}^{-2} \text{ K}^{-4}$:
- a. 920
b. 1320 K
c. 1125 K
d. 1025 K
- 48 A diffraction grating 2 cm wide has 6000 rulings. The angular position of first maxima for light of wavelength 589 nm is:
- a. 10°
b. 42°
c. 32°
d. 62°
- 49 A meter scale is placed along the axis of convex mirror of focal length 25 cm, its nearer end is at 50 cm the size of mirror will be:
- a. 21.4 cm
b. 6.8 cm
c. 14.6 cm
d. 4.8 cm
- 50 A equi-convex lens of power 5D is made by material of refractive index 1.5, the radius of curvature of each surface will be:
- a. 10 cm
b. 30 cm
c. 20 cm
d. 40 cm
- 51 The resistance of a wire is $r \Omega$. The wire is stretched to double its length. Now the resistance of wire becomes:
- a. $r/4 \Omega$
b. $2r \Omega$
c. $r/2 \Omega$
d. $4r \Omega$

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- 52 A 50 volt battery is connected across $10\ \Omega$ resistor the current is 4.5A. the internal resistance of battery is:
- a. $1.1\ \Omega$
 - b. $5.0\ \Omega$
 - c. $0.5\ \Omega$
 - d. 0
- 53 The half life of Ra is 1600 year. In how much time will its $15/16$ fraction disintegrate:
- a. 8000 years
 - b. 3200 years
 - c. 6400 years
 - d. 1600 years
- 54 In a full wave rectifier the least number of diode required is:
- a. 5
 - b. 3
 - c. 4
 - d. 2
- 55 A source of frequency 500 Hz produces waves of wavelength 0.1 m. the waves travel a distance of 300 m in:
- a. 0.6 s
 - b. 6.0 s
 - c. 1.6 s
 - d. 36.0 s
- 56 Light of wavelength 550 nm falls normally on a slit of width 22×10^{-7} m, the angular position of second minima from central maxima will be:
- a. 14.50
 - b. 420
 - c. 300
 - d. 620
- 57 If the forward voltage of a p-n junction is increased, the width of deflection region :
- a. Decreases
 - b. Remains same
 - c. Increases
 - d. Fluctuates
- 58 Stars appears to move from east to west because:
- a. All stars move from east to west
 - b. The earth rotates from west to east
 - c. The earth rotates from east to west
 - d. The background of the stars moves from west to east
- 59 Energy is not transmitted in:
- a. transverse waves
 - b. electromagnetic waves
 - c. stationary waves
 - d. longitudinal progressive waves
- 60 The twinkling of stars in the sky is due to
- a. Reflection
 - b. Refraction
 - c. Polarization
 - d. Diffraction

Group D (Chemistry)

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- 61 "In the ground state of an atom, the electron tends to occupy the available orbitals in the increasing order of energies, the orbital of lower energy filled first". This rule is known as:

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- a. Hund's rule
b. Afbahu principle
- c. Heisenberg uncertainty principle
d. Pauli's exclusion principle
61. Which of the following statement is not correct?
a. covalent bond is weaker than ionic bond
b. σ and π bonds are types of covalent bond
c. σ bond is weaker than π bond
d. σ bond is formed by side by side overlap of orbitals
62. Laughing gas is:
a. N_2O_3
b. N_2O
c. NO
d. N_2C_4
63. Commercial H_2SO_4 acid is 98% by weight and its specific gravity is 1.84. What will be the normality of commercial sulphuric acid?
a. 2.5 N
b. 18.4 N
c. 98.0 N
d. 36.8 N
64. In the titration of oxalic acid using $KMnO_4$ solution in acid medium, the best indicator is:
a. phenolphthalein
b. starch
c. methyl orange
d. $KMnO_4$
65. The concept of pH was introduced by
a. Soresen
b. Arrhenius
c. Lewis
d. Bronsted
66. In a galvanic cell, which of the following statement is not correct?
a. anode is negatively charged
b. cathode is positively charged
c. standard emf of the cell is always zero
d. reduction occurs at anode
67. Which of the following is weakest base?
a. NH_3
b. CH_3NH_2
c. $(CH_3)_2NH$
d. $(CH_3)_3N$
68. The formula of blue vitrol is
a. $CuSO_4$
b. $CuSO_4 \cdot 5H_2O$
c. $CuSO_4 \cdot H_2O$
d. $CuSO_4 \cdot 7H_2O$
69. Temporary hardness of the water is due to the presence of:
a. bicarbonates of Ca
b. bicarbonates of Mg
c. bicarbonates of Ca and Mg
d. all of the above
70. When alcohols are heated with sodium metal and then treated with alkyl halide to give:
a. alkene
b. ether
c. aldehyde
d. ketone

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- 71 Sulphuric acid is a
- a. monobasic acid
 - b. dibasic acid
 - c. tribasic acid
 - d. organic acid
71. Aldehyde and ketone can be distinguished by:
- a. Fehling solution test
 - b. FeCl_3 test
 - c. ceric ammonium nitrate test
 - d. 2,4-DNP test
- 72 Valence bond theory was proposed by:
- a. Rutherford
 - b. Neil's Bohr
 - c. Heitler and London
 - d. Hund and Mulliken
- 73 The atom which have same mass number but different atomic number are called:
- a. isotope
 - b. isobar
 - c. isomer
 - d. isodar
- 74 An ingredient of backing powder is
- a. sodium bicarbonate
 - b. sodium carbonate
 - c. sodium sulphate
 - d. sodium carbide
- 75 Which of the following is not present in RNA?
- a. ribose
 - b. phosphate
 - c. thiamine
 - d. uracil
- 76 Insulin is:
- a. protein
 - b. fats
 - c. carbohydrate
 - d. vitamin
- 77 Ethanol is the isomer of:
- a. Ethoxy ethane
 - b. Methoxy methane
 - c. Ethanal
 - d. Ethanoic acid
- 78 Which of the following enzyme converts sucrose in to glucose?
- a. glycosidase
 - b. sucrose
 - c. invertase
 - d. zymase
79. Ethylene reacts with alkaline KMnO_4 (Bayer's reagent) to form
- a. Oxalic acid
 - b. Acetic acid
 - c. Glycerol
 - d. Glycol
80. The crystalline form of carbon is
- a. Diamond
 - b. Graphene
 - c. Fullerene
 - d. All of the above

Group E (Logical Reasoning, Food Tech Related & GK) (20 x 1 = 20)

- 81 Look at this series: 2,1, (1/2), (1/4), What number should come next ?
- a. (1/3)
 - b. (1/8)

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- c. (2/8) d. (1/6)
82. Find the 'odd one out' among the following four
a. again c. now
b. before d. after
83. If train is called bus, bus is called tractor, tractor is called car, car is called scooter, scooter is called bicycle, bicycle is called moped, which is used to plough a field?
a. train c. tractor
b. bus d. car
84. In a class of some students standing in a straight line, the position of Ajay is 31st from left end and 21st from right end and the position of Bijay is 24th from left end and 28th from right end. How many students are there in the class?
a. 52 c. 104
b. 51 d. 26
85. In the two Statements:
i) $A > B > C$ and ii) $D \geq E \geq B$, if you make two conclusions, viz.
Conclusion I: $C < E$ and Conclusion II: $A \geq E$; then
a. Only conclusion I follows c. both conclusion I and conclusion II follow
b. only conclusion II follows d. neither conclusion I nor conclusion II follow
86. Which vitamin is likely to deficient for vegetarian person ?
a. Vitamin D c. Vitamin B6
b. Vitamin B3 d. Vitamin B12
87. Food spoils most rapidly when stored at:
a. 15°C c. 35°C
b. 25°C d. 45°C
88. Yogurt (yoghurt) is produced using the organism:
a. Bacteria c. Protozoa
b. Mold d. Yeast
89. Choose the correct increasing order of protein content in food:
a. Mushroom > Chicken > Egg > Black gram c. Egg > Mushroom > Black gram > Chicken
b. Chicken > Mushroom > Egg > Black gram d. Black gram > Chicken > Egg > Mushroom
90. Kinema is made from:
a. Wheat c. Soybean
b. Bean d. Blackgram
91. Nepalese *raksi* more closely resembles:
a. Whisky b. Beer

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- c. Wine
d. Rum
92. Deficiency of iodine results in:
a. Goiter
b. Night blindness
c. Scurvy
d. Anemia
93. Which of these is called milk sugar:
a. Maltose
b. Lactose
c. Sucrose
d. Glucose
94. Which cheese is used for making pizza?
a. Kanchan cheese
b. Yak cheese
c. Processed cheese
d. Mozzarella cheese
95. The major source of energy in our food is:
a. Protein
b. Carbohydrate
c. Fat
d. Vitamins
96. The first highway of Nepal (as their ancient name):
a. Tribhuvan Rajpath
b. Mahendra Rajmarg
c. Prithivi Rajmarg
d. Sindhulli Gadhi Marg
97. What is the capital of Maldives?
a. Male
b. Phnom penh
c. Jakarta
d. Manila
98. Number of Tribhuvan University-affiliated colleges running B. Tech. Food Technology:
a. 8
b. 9
c. 10
d. 11
99. Which one is not a BIMSTEC (Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation) member country?
a. Nepal
b. India
c. Maldives
d. Bangladesh
100. Zika virus disease is transmitted by:
a. Bed bug
b. Mosquito
c. Tick
d. Flea