

MIZORAM PUBLIC SERVICE COMMISSION

TECHNICAL COMPETITIVE EXAMINATIONS FOR LABORATORY ASSISTANT UNDER COMMERCE AND INDUSTRIES DEPARTMENT, GOVERNMENT OF MIZORAM, MARCH, 2019.

TECHNICAL PAPER - I

Time Allowed : 2 hours

FM : 150

*All questions carry equal marks of two (2) each.
Attempt all questions.*

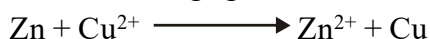
- The unit of solid angle is:
(a) Radian (b) Steradian
(c) Degree (d) Minute
- The dimension of angular momentum is:
(a) $[M^1L^2T^{-3}]$ (b) $[M^{-1}L^0T^0]$
(c) $[M^0L^{-1}T^0]$ (d) $[M^1L^2T^{-1}]$
- A bomb is released by a horizontally flying aeroplane. The trajectory of the bomb is a:
(a) Straight line (b) Circle
(c) Hyperbola (d) Parabola
- A force of 5 N acts on a body of weight 9.8 N. What is the acceleration produced (in m/sec^2)?
(a) 49.0 (b) 5.0
(c) 1.96 (d) 0.51
- A particle of mass m has momentum p . Its kinetic energy will be:
(a) mp (b) $\frac{2p^2}{m}$
(c) $\frac{p^2}{m}$ (d) $\frac{p^2}{2m}$
- A light and a heavy body have equal kinetic energy. Which has greater momentum?
(a) The heavy body (b) The light body
(c) Both have equal momentum (d) None of these
- Moment of inertia of a sphere about an axis tangential to its surface is:
(a) $\frac{2}{3}MR^2$ (b) $\frac{2}{5}MR^2$
(c) $\frac{7}{5}MR^2$ (d) $\frac{5}{3}MR^2$
- A small satellite is revolving near earth's surface. Its orbital velocity will be nearly:
(a) 8 Km. Sec^{-1} (b) 11.2 Km. Sec^{-1}
(c) 4 Km. Sec^{-1} (d) 6 Km. Sec^{-1}

9. Sudden fall of atmospheric pressure by a large amount indicates:
- (a) Storm (b) Rain
(c) Heat wave (d) Cold wave
10. With increase of temperature, the viscosity of liquids and gases:
- (a) Increases for both
(b) Decreases for both
(c) Increases for liquids and decreases for gases
(d) Decreases for liquids and increases for gases
11. A simple harmonic oscillator has an amplitude r and time period T . The time required by it to travel from $x=r$ to $x=r/2$ is:
- (a) $T/6$ (b) $T/4$
(c) $T/3$ (d) $T/2$
12. A particle performing simple harmonic motion passes through mean position has:
- (a) Maximum potential energy (b) Maximum kinetic energy
(c) Minimum kinetic energy (d) Maximum acceleration
13. The velocity of sound in air is independent of change in:
- (a) Pressure (b) Density
(c) Temperature (d) Humidity
14. An object producing a pitch of 400 Hz is moving towards a stationary person with a speed of 200 $\text{m}\cdot\text{sec}^{-1}$. The speed of sound is 300 $\text{m}\cdot\text{sec}^{-1}$. The frequency of sound as heard by a stationary listener is:
- (a) 240 Hz (b) 96 Hz
(c) 1200 Hz (d) 960 Hz
15. A stone is released from an elevator going up with an acceleration a . The acceleration of the stone after the release is:
- (a) a upward (b) $(g-a)$ upward
(c) $(g-a)$ downward (d) g downward
16. The range of a projectile fired at an angle of 15° is 50 m. If it is fired with the same speed at an angle of 45° , its range will be:
- (a) 25 m (b) 37 m
(c) 50 m (d) 100 m
17. Two objects A and B are thrown upward simultaneously with the same speed. The mass of A is greater than the mass of B. Suppose the air exerts a constant and equal force of resistance on the two bodies. Which of the following is the correct answer?
- (a) The two bodies will reach the same height (b) A will go higher than B
(c) B will go higher than A (d) Any of the three may happen
18. Internal forces can change:
- (a) The linear momentum but not the kinetic energy
(b) The kinetic energy but not the linear momentum
(c) The linear momentum as well as the kinetic energy
(d) Neither the linear momentum nor the kinetic energy
19. The time period of an earth-satellite in circular orbit is independent of:
- (a) The mass of the satellite (b) Radius of the orbit
(c) None of them (d) Both of them

20. The distance moved by a particle in simple harmonic motion in One time period is:
(a) A (b) 2A
(c) 4A (d) Zero
21. Bernoulli's theorem is based on conservation of:
(a) Momentum (b) Mass
(c) Energy (d) Angular momentum
22. A wire can sustain the weight of 20 kg without breaking. If the wire is cut into two equal parts, then each part can sustain a weight of:
(a) 10 kg (b) 20 kg
(c) 40 kg (d) 80 kg
23. Which of the following equations represents a wave travelling along Y-axis:
(a) $x = A \sin (ky - \omega t)$ (b) $y = A \sin (kx - \omega t)$
(c) $y = A \sin ky \cos \omega t$ (d) $y = A \cos ky \sin \omega t$
24. When the sound wave is refracted from air to water, which of the following quantities will remain unchanged?
(a) Wave number (b) Wavelength
(c) Wave velocity (d) Frequency
25. Newton's law of cooling is a special case of:
(a) Wien's displacement law (b) Kirchoff's law
(c) Stefan's law (d) Planck's law
26. To which category does a hot ionized matter with equal number of positively and negatively charged ions belong to?
(a) Plasma (b) Solid
(c) Liquid (d) Gas
27. The overall atomic mass of an atom is contributed by
(a) Electrons (b) Protons
(c) Neutrons (d) Protons and neutrons
28. Which of the following is a homogenous mixture?
(a) Blood (b) Vodka
(c) Soil (d) Ice in soda
29. 1 mole is equivalent to a volume of
(a) 1 gram of atom (b) 22.4 litre of gas at NTP/molar volume
(c) 6×10^{23} (d) None of these
30. What happens when pressure increases upon heating water?
(a) The boiling point increases (b) The boiling point decreases
(c) The boiling point remains the same (d) It increases the freezing point rapidly
31. The ionization energy of elements in a periodic table generally decreases down a group because of
(a) The decrease in electron affinity (b) The increase in electro-negativity
(c) Electron de-shielding (d) Electron shielding
32. What kind of a solution is water mixing with NaCl?
(a) True solution (b) Mixture of solution
(c) Colloidal solution (d) Heterogeneous solution

33. The scattering of a visible light by colloidal solution is called
- (a) Dust particles (b) Suspension of true solution
(c) Tyndall effect (d) Brownian motion
34. The Hardy-Schulz law states that
- (a) Flocculating ions do not affect the coagulating power.
(b) Valency of active ions is directly proportional to the coagulation power of the electrolyte.
(c) Ions carrying charge opposite to the sol particles are not the cause of coagulating sol.
(d) Smaller the flocculating ions greater will be its coagulating power.
35. Elements having the same number of neutrons are;
- (a) Isotones (b) Isotopes
(c) Isobars (d) None of these
36. If the gold number of hemoglobin is 0.03 mg, how much of hemoglobin should be added in 10cm standard gold sol (0.0053 % - 0.0058%) to prevent it turning to blue from red, upon the addition of 1cm of 10% solution of NaCl?
- (a) 0.0053mg (b) 0.10mg
(c) 0.03mg (d) 0.0058mg
37. What is the basic essence to the cause of radioactivity of an element?
- (a) When there are no repulsion to hold the forces between the neutron and proton.
(b) When the forces between the neutron and proton are equal.
(c) When the ratio of the forces acting upon the neutron and proton are too high or too low.
(d) When the attractive forces of neutron and proton are too high.
38. Which radioactive ray increases its atomic nucleus by 1, by emitting a particle?
- (a) Alpha-beta (b) Beta
(c) Alpha (d) Gamma
39. What type of a bond is involved in the following?
- $$\text{NH}_3 + \text{HCl} \longrightarrow \text{NH}_4^+ + \text{Cl}^-$$
- (a) Co-ordinate (b) Covalent
(c) Ionic (d) Hydrogen bond
40. Fill the Gap.
- ‘Metallic bonding is a strong _____ force of attraction between metal cations/atoms and delocalized electrons in the metallic lattice of a metallic substance’.
- (a) Electronegative (b) Electrostatic
(c) Ionic (d) Co-ordinate
41. What is the Vanderwaal’s force that acts on an HCl molecule?
- (a) Dispersion force (b) Hydrogen bonding
(c) Dipole-dipole forces (d) None of these
42. Which of the reaction given is endothermic?
- A. $\text{NH}_4\text{NO}_3(\text{s}) \xrightarrow{\text{heat}} \text{NH}_4^+(\text{aq}) + \text{NO}_3^-(\text{aq})$
B. $\text{CaCl}_2(\text{s}) + 2\text{H}_2\text{O} \longrightarrow \text{Ca}(\text{OH})_2(\text{aq}) + 2\text{HCl}(\text{g}) + \text{heat}$
- (a) A+B (b) A
(c) B (d) None of these

43. Which is an oxidizing agent from the following reaction?



- (a) Cu^{2+} (b) Zn^{2+}
(c) Cu (d) Zn

44. An acidic buffer has pH,

- (a) More than 7 (b) More than 8
(c) More than 10 (d) Less than 7

45. What is the chemical formula for Plaster of Paris?

- (a) $\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$ (b) $\text{CaSO}_4 \cdot \text{H}_2\text{O}$
(c) $2 \text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$ (d) $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$

46. What are the two elemental component of brass?

- (a) Cu & Al (b) Cu & Zn
(c) Zn & Al (d) Cu & Mn

47. Identify renewable energy source from the following,

- (a) Geothermal (b) Nuclear
(c) Coal (d) Natural gas

48. What is the chemical formula for petroleum?

- (a) C_nH_n (b) C_{n+1}H_n
(c) $\text{C}_2\text{H}_{2n+1}$ (d) $\text{C}_n\text{H}_{2n+2}$

49. Find out the conjugate acid from the following reaction,



- (a) $\text{H}_2\text{O}(\text{l})$ (b) $\text{NH}_3(\text{aq})$
(c) $\text{OH}^-(\text{aq})$ (d) $\text{NH}_4^+(\text{aq})$

50. How many numbers of neutrons and protons does the isotope of Hydrogen (^1H) have?

- (a) 1 proton and 2 neutrons (b) 2 protons and 1 neutron
(c) 1 proton and 0 neutron (d) 1 proton and 1 neutron

51. The basic structure of a virus contains

- (a) a nucleic acid (b) a cell wall
(c) a protein coat (d) both (a) & (c)

52. A bacterial cell having multiple flagella found at several locations around the cell is known as:

- (a) Peritrichous (b) Lophotrichous
(c) Amphitrichous (d) None of these

53. The group of bacteria that grows well at high temperature is known as:

- (a) Thermophiles (b) Halophiles
(c) Acidophilic (d) Both (a) & (b)

54. How many mitotic division a cell need to make total 64 cells

- (a) 2 (b) 4
(c) 6 (d) 7

55. The basic property of monosaccharide's is that
(a) they cannot be hydrolysed further
(b) they can be hydrolyzed to yield less than 2 molecules
(c) they can hydrolyzed to more than 2 molecules
(d) None of these
56. In cell division when did the DNA synthesis ends
(a) Prophase
(b) Pre-mitotic gap phase
(c) Post-mitotic gap phase
(d) S-phase
57. Cofactors are always
(a) Inorganic substances
(b) Organic substances
(c) Enzymes
(d) None of these
58. Which of the following has chitin in their cell wall
(a) Bacteria
(b) Agaricus
(c) Virus
(d) Both (a) & (c)
59. The most abundant content of an cell is
(a) Proteins
(b) Water
(c) Carbohydrates
(d) Lipids
60. Where did glycolysis takes place in prokaryotic organisms
(a) In mitochondrial matrix
(b) In cytoplasm
(c) In mitochondrial membranous space
(d) None of these
61. Water has a ability to protect cells from thermal shock because of its
(a) High dielectric constant
(b) High Latent heat
(c) Thermal conductivity
(d) All of these
62. Low value of BOD (Biochemical Oxygen Demand) of water indicates that
(a) the water is very pure
(b) the water in polluted
(c) the water is not safe to drink
(d) None of these
63. The process of nitrogen fixation leads to the conversion of
(a) Nitrogen – Ammonia
(b) Nitrogen – Nitrate
(c) Nitrogen- amino acids
(d) Both (a) & (b)
64. The causative agent for the leaf blight of rice is
(a) Protozoa
(b) Virus
(c) Bacteria
(d) Fungi
65. Male anopheles mosquito spreads
(a) Rubella
(b) Dengue
(c) Malaria
(d) None of these
66. In the persons suffering from high blood pressure, two hormones which shows synergistic effect are:
(a) cortisol and corticosterone
(b) cortico-steroids and agdrogenic hormones
(c) adrenaline and non-adrenaline
(d) aldosterone and androgenic hormones
67. _____ is present in the chlorophyll 'a' and 'b'
(a) Iron
(b) Copper
(c) Magnesium
(d) Calcium

- 68.** Mitochondria function is to
- (a) To protect the cell
 - (b) To make energy
 - (c) To hold genetic information
 - (d) To allow certain molecules into the cells
- 69.** Which of the following statements about hormones is incorrect?
- (a) They are produced by endocrine glands
 - (b) They are modified amino acids, peptides, or steroid molecules
 - (c) They are carried by the circulatory system
 - (d) They are used to communicate between different organisms
- 70.** Normal pH of the blood is
- (a) 4.0
 - (b) 5.2
 - (c) 7.4
 - (d) 10.4
- 71.** Two of the respiratory gases present in blood plasma are
- (a) Oxygen and helium
 - (b) Nitrogen and oxygen
 - (c) Oxygen and carbon dioxide
 - (d) Both (b) & (c)
- 72.** Select the correct statement about the leydig cells
- (a) They synthesize and secrete testicular hormone called androgens
 - (b) They are found adjacent to seminiferous tubules in the testicles
 - (c) Both sentences are wrong
 - (d) Both sentences are correct
- 73.** Prenatal diagnosis technique involved to detect congenital disorders in developing foetus
- (a) Ultrasound
 - (b) Amniocentasis
 - (c) ELISA screening test
 - (d) MRI
- 74.** Double fertilization involves
- (a) One sperm fertilizes with two egg
 - (b) Two sperm fertilizes with one egg
 - (c) One sperm fertilizes with one egg cell and second sperm with two polar nuclei
 - (d) None of these
- 75.** Select the correct statement about G1 phase
- (a) Cell is metabolically inactive
 - (b) DNA in the cell does not replicate
 - (c) It is not a phase of synthesis of macromolecules
 - (d) Cell stops growing