

# MIZORAM PUBLIC SERVICE COMMISSION

## TECHNICAL COMPETITIVE EXAMINATIONS FOR RECRUITMENT TO THE POST OF JUNIOR SCIENTIFIC OFFICER (FINGER PRINT) (CONTRACT) UNDER HOME (FORENSIC) DEPARTMENT. MAY, 2016.

### PAPER – I

Time Allowed : 2 hours

Full Marks : 150

*All questions carry equal marks of 2 each.*

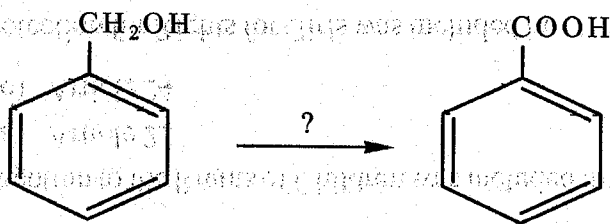
*Attempt all questions.*

1. The statement "all cells come from cells" was advocated by
  - (a) Matthias Schleiden
  - (b) Rudolf Virchow
  - (c) Theodor Schwann
  - (d) Robert Hooke
2. The fluid mosaic model of plasma membrane was introduced by
  - (a) Hugh Davson and James Danielli
  - (b) J. David Robertson
  - (c) Evert Gorter and François Grendel
  - (d) S.J. Singer and G.L. Nicolson
3. Cristae are membrane folds found in
  - (a) mitochondria
  - (b) ribosomes
  - (c) endoplasmic reticulum
  - (d) Golgi complex
4. The smaller subunit of prokaryotic ribosomes is
  - (a) 50S
  - (b) 40S
  - (c) 30S
  - (d) 20S
5. Tube-like structures in endoplasmic reticulum and Golgi complex are called
  - (a) cisternae
  - (b) clathrine
  - (c) tubules
  - (d) vesicles
6. The site of Golgi complex adjacent to endoplasmic reticulum is
  - (a) lumen
  - (b) cis face
  - (c) trans face
  - (d) exit face
7. Phagocytosis can be performed by
  - (a) eosinophil
  - (b) hepatocyte
  - (c) T lymphocyte
  - (d) macrophage
8. Proteins in the nuclear pore are called
  - (a) porins
  - (b) nucleopeptins
  - (c) nucleoporins
  - (d) importins
9. The small arm of human chromosome is called
  - (a) p
  - (b) q
  - (c) r
  - (d) s

10. DNA replication occurs during
- (a) G1 phase
  - (b) S phase
  - (c) G2 phase
  - (d) O phase
11. Phosphoenol pyruvate is converted into pyruvate by
- (a) phosphoglycerate kinase
  - (b) phosphenol mutase
  - (c) pyruvate kinase
  - (d) enolase
12. The substrate for TCA cycle is
- (a) acetyl-CoA
  - (b) succinyl-CoA
  - (c) pyruvate
  - (d) axoaloacetate
13. Complex IV of an electron transport chain is
- (a) cytochrome  $bc_1$  complex
  - (b) NADH-CoQ reductase
  - (c) ubiquinone
  - (d) cytochrome  $c$  oxidase
14. ATP is synthesised by
- (a) ATP oxidase
  - (b) ATP reductase
  - (c) ATP synthase
  - (d) ATP hydrolase
15. Action potential is fired when the voltage reaches approximately
- (a)  $-55$  mV
  - (b)  $-70$  mV
  - (c)  $+55$  mV
  - (d)  $+70$  mV
16. Within a synapse, neurotransmitters are transported in
- (a) synaptic motors
  - (b) synaptic vesicles
  - (c) boutons
  - (d) sodium channels
17. The number of haeme group in a single haemoglobin is
- (a) 2
  - (b) 3
  - (c) 4
  - (d) 5
18. Polymerisation of thrombin on fibrinogen forms
- (a) fibrinogen
  - (b) thrombocyte
  - (c) thromboxane
  - (d) thrombinogen
19. In an immunoglobulin, the antigen binding site is located in
- (a) Fc region
  - (b) hinge region
  - (c) CDR
  - (d) Fab region
20. The most abundant immunoglobulin is
- (a) IgM
  - (b) IgE
  - (c) IgG
  - (d) IgD
21. The helical conformation of B-DNA is
- (a) right-handed double strand
  - (b) left-handed double strand
  - (c) right-handed single strand
  - (d) left-handed single strand
22. Anticodon is present in
- (a) mRNA
  - (b) tRNA
  - (c) rRNA
  - (d) both rRNA and mRNA

23. Okazaki fragments are newly synthesised fragments of
- (a) DNA (b) tRNA  
(c) rRNA (d) mRNA
24. Transcription is initiated by an enzyme called
- (a) DNA polymerase (b) DNA transcriptase  
(c) RNA transcriptase (d) RNA polymerase
25. The start codon in bacteria is
- (a) AUG (b) AGU  
(c) UGA (d) UAG
26. Translation starts when aminoacyl-tRNA enters
- (a) E site (b) P site  
(c) A site (d) T site
27. Restriction enzymes are naturally found in
- (a) animals (b) fungi  
(c) protozoans (d) bacteria
28. The function of DNA ligase is to
- (a) join DNA strands (b) separate DNA strands  
(c) cut DNA strands (d) amplify RNA strands
29. Conventional DNA profiling targets the DNA sequence called
- (a) TATA box (b) short tandem repeats  
(c) genome sequence (d) termination codons
30. cDNA is created from mature
- (a) DNA (b) rRNA  
(c) tRNA (d) mRNA
31. Which set of quantum number is possible for the last electron of  $Mg^+$  ion.
- (a)  $n = 3, l = 2, m = 0, s = +\frac{1}{2}$  (b)  $n = 2, l = 3, m = 0, s = +\frac{1}{2}$   
(c)  $n = 1, l = 0, m = 0, s = +\frac{1}{2}$  (d)  $n = 3, l = 0, m = 0, s = +\frac{1}{2}$
32. If the uncertainty in position of electron is zero, the uncertainty in momentum would be
- (a) zero (b)  $h/2\pi$   
(c)  $h/4\pi$  (d) infinity
33. Nitrogen has the electronic configuration  $1s^2 2s^2 2p_x^1 2p_y^1 2p_z^1$  and not  $1s^2 2s^2 2p_x^2 2p_y^1 2p_z^0$ . It was proposed according to
- (a) Aufbau principle (b) Hund's rule  
(c) Pauli exclusion principle (d) Uncertainty principle
34. In the periodic table, with the increase in atomic number of elements in a period the ionisation energy
- (a) Generally increases (b) Generally decreases  
(c) First increases and then decreases (d) First decreases and then increases
35. The hybridisation of the central atom in  $NH_4^+$  ion is
- (a)  $sp^3d$  (b)  $sp^2d$   
(c)  $sp^3$  (d)  $sp^2$

36. According to VSEPR theory, the geometry of  $\text{ClF}_3$  molecule is  
 (a) Trigonal planar (b) Distorted T-shaped  
 (c) Pyramidal (d) Square planar
37. The electronic configuration of  $\text{O}_2$  molecule according to MO theory is  
 (a)  $\text{KK } \sigma(2s)^2 \sigma^*(2s)^2 \sigma(2p_z)^2 \pi(2p_x)^2 = \pi(2p_y)^2 \pi^*(2p_x)^1 = \pi^*(2p_y)^1$   
 (b)  $\text{KK } \sigma(2s)^2 \sigma^*(2s)^2 \pi(2p_x)^2 = \pi(2p_y)^2 \sigma(2p_z)^2 \pi^*(2p_x)^1 = \pi^*(2p_y)^1$   
 (c)  $\text{KK } \sigma(2s)^2 \sigma^*(2s)^2 \sigma(2p_z)^2 \pi(2p_x)^2 = \pi(2p_y)^2 \sigma^*(2p_z)^2$   
 (d)  $\text{KK } \sigma(2s)^2 \sigma^*(2s)^2 \pi(2p_x)^2 = \pi(2p_y)^2 \sigma(2p_z)^2 \sigma^*(2p_z)^2$
38.  $\text{H}_2\text{O}$  boils at much higher temperature than  $\text{H}_2\text{S}$ . This is because of  
 (a) Intermolecular hydrogen bond in  $\text{H}_2\text{S}$  (b) Intramolecular hydrogen bond in  $\text{H}_2\text{S}$   
 (c) Intermolecular hydrogen bond in  $\text{H}_2\text{O}$  (d) Intramolecular hydrogen bond in  $\text{H}_2\text{O}$
39. Aldehydes and ketones are reduced by  $\text{NaBH}_4$  or  $\text{LiAlH}_4$  to yield \_\_\_\_\_ and \_\_\_\_\_ alcohols.  
 (a)  $1^\circ, 2^\circ$  (b)  $2^\circ, 1^\circ$   
 (c)  $1^\circ, 3^\circ$  (d)  $2^\circ, 3^\circ$
40. Aryl ketones are prepared by the following reaction. This reaction is called  
 (a) Friedel-Crafts Alkylation (b) Friedel-Crafts Acylation  
 (c) Wolff-Kishner reaction (d) Hofmann rearrangement
41. What is the reagent for the following reaction?



- (a)  $\text{LiAlH}_4$  (b)  $\text{CrO}_3/\text{H}_2\text{SO}_4$   
 (c)  $\text{SOCl}_2$  (d)  $\text{PBr}_3$
42. Which of the following group shows  $-I$  effect?  
 (a)  $-\text{CH}_2\text{CH}_3$  (b)  $-\text{C}(\text{CH}_3)_3$   
 (c)  $-\text{C}_6\text{H}_5$  (d)  $-\text{CH}_3$
43. The relative order of stability of the carbocations:  
 $\overset{+}{\text{C}}\text{H}_3$  (I)     $\text{CH}_3\overset{+}{\text{C}}\text{H}_2$  (II)     $(\text{CH}_3)_2\overset{+}{\text{C}}\text{H}$  (III)     $(\text{CH}_3)_3\overset{+}{\text{C}}$  (IV)
- is of the order  
 (a)  $\text{I} > \text{II} > \text{III} > \text{IV}$  (b)  $\text{IV} > \text{III} > \text{II} > \text{I}$   
 (c)  $\text{III} > \text{II} > \text{I} > \text{IV}$  (d)  $\text{IV} > \text{I} > \text{II} > \text{III}$
44. Homolytic fission of C-C bond leads to the formation of  
 (a) Carbanions (b) Carbocations  
 (c) Free radicals (d) Carbenes
45. Tertiary alkyl halides undergo hydrolysis by  
 (a)  $\text{S}_{\text{N}}1$  (b)  $\text{S}_{\text{N}}2$   
 (c) Both  $\text{S}_{\text{N}}1$  and  $\text{S}_{\text{N}}2$  (d) E2

46. The migration of colloidal solute particles in a colloidal solution, when an electric current is applied to the solution is known as
- (a) Brownian movement (b) Electro-osmosis  
(c) Electrophoresis (d) Electro dialysis
47. The protecting power of a lyophilic colloidal is expressed in terms of
- (a) Critical miscelle concentration (b) Flocculation value  
(c) Coagulation value (d) Gold number
48. Which of the following is not a correct assumption with regard to the Langmuir adsorption isotherm model?
- (a) The adsorption takes place in multilayers.  
(b) The adsorption sites are equivalent in their ability to adsorb the molecules.  
(c) There is no lateral interaction between the adsorbate molecules.  
(d) The adsorbed molecules are localized (do not move around on the surface).
49. Unit of molar conductance is
- (a)  $S\ m^2\ mol^{-2}$  (b)  $S\ m^2\ mol^{-1}$   
(c)  $S\ m^{-1}\ mol^{-2}$  (d)  $S\ m^{-2}\ mol^{-1}$
50. If  $\lambda_{\infty}$  and  $\lambda_V$  are the equivalent conductances at infinite dilution and at V dilution respectively, the degree of dissociation,  $\alpha$ , is given by
- (a)  $\alpha = \lambda_{\infty} / \lambda_V$  (b)  $\alpha = \lambda_{\infty} / \lambda_V^2$   
(c)  $\alpha = \lambda_V / \lambda_{\infty}$  (d)  $\alpha = \lambda_{\infty}^2 / \lambda_V$
51. According to Debye-Huckel theory of strong electrolytes, and ion moving in an atmosphere of oppositely charged ions experiences a drag. This effect is known as the:
- (a) Asymmetry effect (b) Electrophoretic effect  
(c) Inter-ionic effect (d) Concentration effect
52. The Ostwald's dilution law when applied to a binary electrolyte gives the expression ( $\alpha$  is degree of dissociation)
- (a)  $K_c = \alpha / (1 - \alpha)V$  (b)  $K_c = \alpha^2 / (1 - \alpha)V$   
(c)  $K_c = \alpha^2 / (1 - \alpha)V^2$  (d)  $K_c = \alpha^2 / (1 - \alpha)^2 V$
53. Evaluating the expression  $11.11\ g + 1.051\ g + 1.3\ g$  and rounding off to appropriate number of significant figures gives
- (a) 13.461 g (b) 13.46 g  
(c) 13.5 g (d) 13.4 g
54. Choose the odd one
- (a) Determinate errors (b) Indeterminate errors  
(c) Personal errors (d) Method errors
55. The degree of agreement between two or more replicate measurements made on a sample in an identical manner is known as
- (a) Accuracy (b) Precision  
(c) Relative error (d) Coefficient of variation

56. Standard deviation is expressed as

(a) 
$$S = \sqrt{\frac{\sum_{i=1}^{i=N} (x_i - \bar{x})^2}{N-1}}$$

(b) 
$$S = \sqrt{\frac{\sum_{i=1}^{i=N} (x_i - \bar{x})^2}{N}}$$

(c) 
$$S = \frac{\sum_{i=1}^{i=N} (x_i - \bar{x})}{N}$$

(d) 
$$S = \frac{\sum_{i=1}^{i=N} (x_i - \bar{x})}{N-1}$$

57. For the preparation of 100 ml of 0.1 M NaOH solution (formula mass of NaOH = 40), the required amount of NaOH is

(a) 40 g

(b) 4 g

(c) 0.4 g

(d) 0.04 g

58. In group separation of basic radicals in the inorganic qualitative analysis, the 'group reagent(s)' of Group II radicals is

(a) HCl

(b) HCl + H<sub>2</sub>S

(c) NH<sub>4</sub>OH + NH<sub>4</sub>Cl

(d) NH<sub>4</sub>OH + NH<sub>4</sub>Cl + H<sub>2</sub>S

59. The effectiveness of a solvent in extraction technique can be measured by the

(a) Distribution coefficients

(b) Selectivity

(c) Diffusivity

(d) Both (a) and (b)

60. Which of the following statements about paper chromatography R<sub>f</sub> and/or gas chromatography R<sub>t</sub> is correct?

(a) The R<sub>f</sub> and R<sub>t</sub> values of a substance are determined solely by the interaction of the substance with the stationary phase.

(b) A substance with a long retention time in gas chromatography is likely to have a high R<sub>f</sub> value in paper chromatography.

(c) A long retention time in gas chromatography is indicative of a substance with a strong adsorption on to the stationary phase.

(d) A high R<sub>f</sub> value is indicative of a substance that adsorbs strongly onto the stationary phase.

61. Who designed the first electronics computer – ENIAC?

(a) Van-Neumann

(b) Joseph M. Jacquard

(c) J. Presper Eckert and John W. Mauchly

(d) None of these

62. Which is responsible for communication between Memory and ALU?

(a) Keyboard

(b) RAM

(c) Control unit

(d) USB

63. Which of the following is not a multitasking operating system?

(a) DOS

(b) Windows

(c) OSX

(d) Linux

64. Whenever you move a directory from one location to another

(a) All files inside the directory are moved

(b) All the subdirectory inside that directory are moved

(c) The directory is moved the source file is not moved

(d) Both (a) and (b)

65. In MS Word, the key F12 opens a
- (a) Save As dialog box
  - (b) Open dialog box
  - (c) Save dialog box
  - (d) Close dialog box
66. Borders can be applied to..... in MS Word.
- (a) Cells
  - (b) Paragraph
  - (c) Text
  - (d) All of these
67. In MS Word, the smallest and largest font size available in Font Size tool on formatting toolbar?
- (a) 8 and 72
  - (b) 8 and 64
  - (c) 12 and 72
  - (d) None of these
68. When a row and a column intersect, what do you call that in MS Excel?
- (a) A box
  - (b) A block
  - (c) A cell
  - (d) A cell box
69. Which of the following Excel formulas is not entered correctly?
- (a) =10+50
  - (b) =B7\*B1
  - (c) =B7+14
  - (d) 10+50
70. Ctrl + D shortcut key in Excel will
- (a) Open the font dialog box
  - (b) Apply double underline for the active cell
  - (c) Fill down in the selection
  - (d) None of these
71. Which of the following is the default page setup orientation for slide in Power Point?
- (a) Vertical
  - (b) Landscape
  - (c) Portrait
  - (d) Tail
72. Which of the following is not one of PowerPoint view ?
- (a) Slide show view
  - (b) Slide view
  - (c) Outline view
  - (d) Presentation view
73. Special effects used in PowerPoint to introduce slides in a presentation are called
- (a) Effects
  - (b) Transitions
  - (c) Custom animations
  - (d) Present animations
74. \_\_\_\_\_ connects web pages.
- (a) Connector
  - (b) Link
  - (c) Hyperlink
  - (d) None of these
75. Which IP address doesn't change everyday?
- (a) Static IP address
  - (b) Dynamic IP address
  - (c) Unique IP address
  - (d) All of these

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