

ROYAL CIVIL SERVICE COMMISSION  
BHUTAN CIVIL SERVICE EXAMINATION (BCSE) 2023  
EXAMINATION CATEGORY: TECHNICAL

PAPER II: GENERAL SUBJECT KNOWLEDGE PAPER FOR MEDICAL SCIENCE

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Date	: October 6 2023
Total Marks	: 100
Writing Time	: 90 minutes (1.5 hours)
Reading Time	: 15 Minutes (prior to writing time)

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**GENERAL INSTRUCTIONS:**

1. Write your Registration Number clearly and correctly on the Answer Booklet.
2. The first 15 minutes is to check the number of pages of Question Paper, printing errors, clarify doubts and to read the instructions. You are NOT permitted to write during this time.
3. This paper consists of **TWO Parts: Part I & Part II**  
**Part I** consists of 70 multiple choice questions of 1 (one) mark each, and  
**Part II** consists of 10 short answer questions of 3 (three) marks each.
4. All questions are COMPULSORY.
5. All answers should be written on the Answer Booklet provided to you. Candidates are not allowed to write anything on the question paper. If required, ask for additional Answer Booklet.
6. **All answers should be written with correct numbering of Section, Part and Question Number in the Answer Booklet provided to you. Note that any answer written without indicating any or correct Section, Part and Question Number will NOT be evaluated and no marks would be awarded.**
7. Begin each Part in a fresh page of the Answer Booklet.
8. You are not permitted to tear off any sheet(s) of the Answer Booklet as well as the Question Paper.
9. Use of any other paper including paper for rough work is not permitted.
10. **You must hand over the Answer Booklet/s to the Invigilator before leaving the examination hall.**
11. This paper has **14 printed pages**, including this instruction page.

**GOOD LUCK!**

PART I

Multiple Choice Questions [70 marks]

Choose the correct answer and write down the letter of your chosen answer in the Answer Booklet against the question number e.g. 71 (a). Each question carries ONE mark. Any double writing, smudgy answers or writing more than one choice shall not be evaluated.

1. From the following which contains the highest amount of Vitamin C?
  - a) Apple
  - b) Banana
  - c) Tomato
  - d) Potato
  
2. Example of the edible underground stem is:
  - a) Carrot
  - b) Groundnut
  - c) Tapioca
  - d) Potato
  
3. Choose the one which can last the longest in the environmental pollution:
  - a) Plastic
  - b) Glass
  - c) Metal
  - d) Paper
  
4. Choose the zoonotic diseases caused by virus:
  - a) Anthrax
  - b) Brucella
  - c) Rabies
  - d) Leptospirosis
  
5. Which of the following is the correct statement about the veins?
  - a) Have valves
  - b) Carry blood to an organ
  - c) Usually carry oxygenated blood
  - d) Have narrow lumen compared to arteries
  
6. All of the following are correct differences between bacteria and virus **EXCEPT**
  - a) Bacteria have cell wall but viruses do not have cell wall.
  - b) Viruses are smaller than bacteria.
  - c) Bacteria are visible under compound microscope but viruses are not visible.
  - d) DNA is enclosed inside nucleus in bacteria and in a coat of protein in viruses.
  
7. In the living cells, functions of storage and protein modification is performed by
  - a) Centrosome
  - b) Ribosome
  - c) Golgi bodies

- d) Cellulose
8. All the following are reptiles **EXCEPT**
- a) Snake
  - b) Lizard
  - c) Crocodile
  - d) Earthworm
9. Choose the correct by-products of photosynthesis:
- a) Carbon dioxide-Water-starch
  - b) Oxygen- carbon dioxide-water
  - c) Oxygen-glucose-water
  - d) Water-carbon dioxide-carbohydrate
10. All the following are important for energy production in cells **EXCEPT**
- a) Cellulose
  - b) Starch
  - c) Glycogen
  - d) Fats
11. Choose the haemoparasites from the following.
- a) *Ascaris lumbricoide*
  - b) *Trichiuris trichiuria*
  - c) *Ancylostoma duodenale*
  - d) *Wuchereria bancrofti*
12. The most correct property of mercury that differs from other metal is
- a) Poisonous in nature
  - b) Liquid in nature at room temperature
  - c) Hard in nature
  - d) Ductile and malleable in nature
13. All the following are toxic gases **EXCEPT**
- a) Carbon dioxide
  - b) Ammonia
  - c) Hydrogen sulfide
  - d) Sulphur dioxide
14. During the strenuous exercise, glucose is converted to
- a) Lactic acid
  - b) Pyruvic acid
  - c) Citric acid
  - d) Acetic acid
15. While mixing the oil and water, the oil floats on the water due to
- a) difference in surface tension.
  - b) difference in ionic and polar bonding.
  - c) difference in density.

- d) due to difference in viscosity.
16. From the following, choose the **INCORRECT** function of adipose tissues.
- Insulation for the body
  - Food reserve for the body
  - Shock absorber of various organs
  - Packing tissues for the organs
17. Which one of the following is wrongly matched?
- Squamous epithelium – Buccal cavity
  - Cuboidal epithelium - Glands
  - Ciliated columnar epithelium-Bronchus
  - Stratified Squamous epithelium – esophagus
18. Total number of bones in the human body is
- 204
  - 205
  - 206
  - 207
19. Which part of the human brain is concerned with the body balance?
- Medulla oblongata
  - Cerebellum
  - Cerebrum
  - Hypothalamus
20. Which of the following hormones is responsible for affection & attachment?
- Adrenaline
  - serotonin
  - Oxytocin
  - Rennin
21. The most accurate normal pH range of the human urine is
- 5.00-6.50
  - 4.00-5.00
  - 4.5-8.0
  - 5.5.10-7.5
22. Which of the following is responsible for connecting bone to bone?
- Tendon
  - Fibrous cartilage
  - Hyaline cartilage
  - Ligament.
23. Choose the universal blood recipient.
- Healthy person with O positive blood group.
  - Healthy person with O negative blood group.
  - Healthy person with AB positive blood group.

- d) Healthy person with AB Negative blood group.
24. Function of incisor teeth is
- Grinding
  - Cutting
  - Tearing
  - All of the above
25. Non-citrus fruit among the following is
- Tangerine
  - Lemon
  - Orange
  - Mango
26. A dried grape placed in a container of water gets swell due to
- Osmosis
  - Endosmosis
  - Exosmosis
  - Ultra-filtration
27. Choose the correct formula for the process of photosynthesis is
- $\text{CO}_2 + \text{H}_2\text{O} + \text{light energy} = \text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2$ .
  - $\text{CO}_2 + 6\text{H}_2\text{O} + \text{light energy} = 6 \text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2$ .
  - $6\text{CO}_2 + \text{H}_2\text{O} + \text{light energy} = 6 \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$ .
  - $6\text{CO}_2 + 6\text{H}_2\text{O} + \text{light energy} = \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$ .
28. All of the following are true for fertilization of mammalian ovum **EXCEPT**
- Corpus luteum will degenerate
  - Progesterone secretion rapidly declines
  - Estrogen secretion further decreases
  - Primary follicle starts developing
29. When there is insufficient water supply in the plant cells, the leaves tend to wilt and bend
- due to reduced turgor pressure of a plant cell.
  - due to reduced transpiration pull force.
  - due to reduced osmotic pressure of the soil water.
  - due to increase non-osmotic pressure of the root hairs.
30. Choose the water-soluble vitamins:
- Vitamin A
  - Vitamin D
  - Vitamin C
  - Vitamin E
31. Which of the following is a disaccharide?
- Fructose
  - Glucose
  - Galactose

- d) Sucrose
32. Which tissue cannot store glycogen or lipids for energy?
- Nervous tissues
  - Skeletal muscle
  - Liver
  - Cardiac muscle
33. Which of these functions is the least important for proteins?
- become blood osmotic proteins
  - convert to enzymes
  - utilization for energy
  - component of structures
34. Which of the following markers is an enzyme and indicate the prostate cancer?
- AFP
  - ACP
  - CA-125
  - TFT
35. All the following tests are advised for monitoring the patients with renal failure **EXCEPT**
- Urea/Creatinine
  - Electrolytes
  - Urine 24 hours
  - HbA1c
36. Phosphate is important for
- bone matrix
  - ATP and energy reactions
  - DNA and RNA
  - All the above
37. All the following elements are important for function of brain **EXCEPT**
- $Mn^{2+}$
  - $K^+$
  - $Fe^{2+}$
  - $Na^+$
38. How do parasympathetic neural signals affect the working of the heart?
- Reduce both heart rate and cardiac output
  - Heart rate is increased without affecting the cardiac output
  - Both heart rate and cardiac output increase
  - Heart rate increases but cardiac output decreases
39. Which position does the stimulation of muscle fiber by a motor neuron occurs?
- Neuromuscular junction
  - The transverse tubules
  - The myofibril

- d) The sarcoplasmic reticulum
40. Choose the **INCORRECT** statement about the retina.
- a) Retina is the light absorbing portion of the visual photo pigments
  - b) In retina the rods have the photo pigment rhodopsin while cones have three different photo pigments
  - c) Retina is derivatives of vitamin C
  - d) Rhodopsin is the purplish red protein present in rods only
41. A location with luxuriant growth of lichens on the trees indicates that the
- a) trees are very healthy.
  - b) trees are heavily infested.
  - c) location is highly polluted.
  - d) location is clean without pollution.
42. The zone of atmosphere in which the ozone layer is present is called
- a) Ionosphere
  - b) Mesosphere
  - c) Stratosphere
  - d) Troposphere
43. Choose the white blood cell which doesn't contains granules.
- a) Neutrophils
  - b) Eosinophil
  - c) Basophils
  - d) Lymphocytes
44. Total number of deciduous teeth in humans is
- a) 32
  - b) 20
  - c) 26
  - d) 14
45. Which statement is **CORRECT** with reference to the circulation of blood in mammal?
- a) Venous blood is returned to the left auricle
  - b) Pulmonary vein carries venous blood from the right auricle to the lungs
  - c) Pulmonary artery returns oxygenated blood from the lungs to the left auricle
  - d) Left auricle receives oxygenated blood from the lungs
46. Over secretion of thyroid hormones lead to
- a) Myxedema
  - b) Cretinism
  - c) Exophthalmic goiter
  - d) Simple goiter
47. Which of the following is not derivatives of skin?
- a) Sebaceous gland
  - b) Sweat gland

- c) Bartholin gland
  - d) Mammary gland
48. The noble gases used in the hospitals are
- a) helium and neon
  - b) neon and argon
  - c) Helium, neon and argon
  - d) Helium, neon and krypton
49. The material used as coating material for nonstick pan is
- a) Polystyrene
  - b) Terylene
  - c) Teflon
  - d) PVC
50. Stainless steel contains mainly iron and carbon along with
- a) Co and Mn
  - b) Mn and Ni
  - c) Cr and Co
  - d) Ni and Cr
51. Dental amalgam used for filling teeth consist of
- a) Ag and Hg
  - b) Au and Hg
  - c) Au, Sn and Hg
  - d) Ag, Sn and Hg
52. The most suitable indicator for the titration of a weak acid against a strong base is
- a) Phenolphthalein
  - b) Litmus
  - c) Methyl orange
  - d) Thymol blue
53. Molten sodium chloride conducts electricity due to the presence of
- a) Free electrons
  - b) Free ions
  - c) Free molecules
  - d) Free atoms of sodium and chloride
54. The hardness of water is estimated by
- a) Conductivity method
  - b) EDTA method
  - c) Tityrimetric method
  - d) Distillation method
55. Ozone is
- a) a compound of oxygen.
  - b) an allotrope of oxygen.
  - c) an isotope of oxygen.

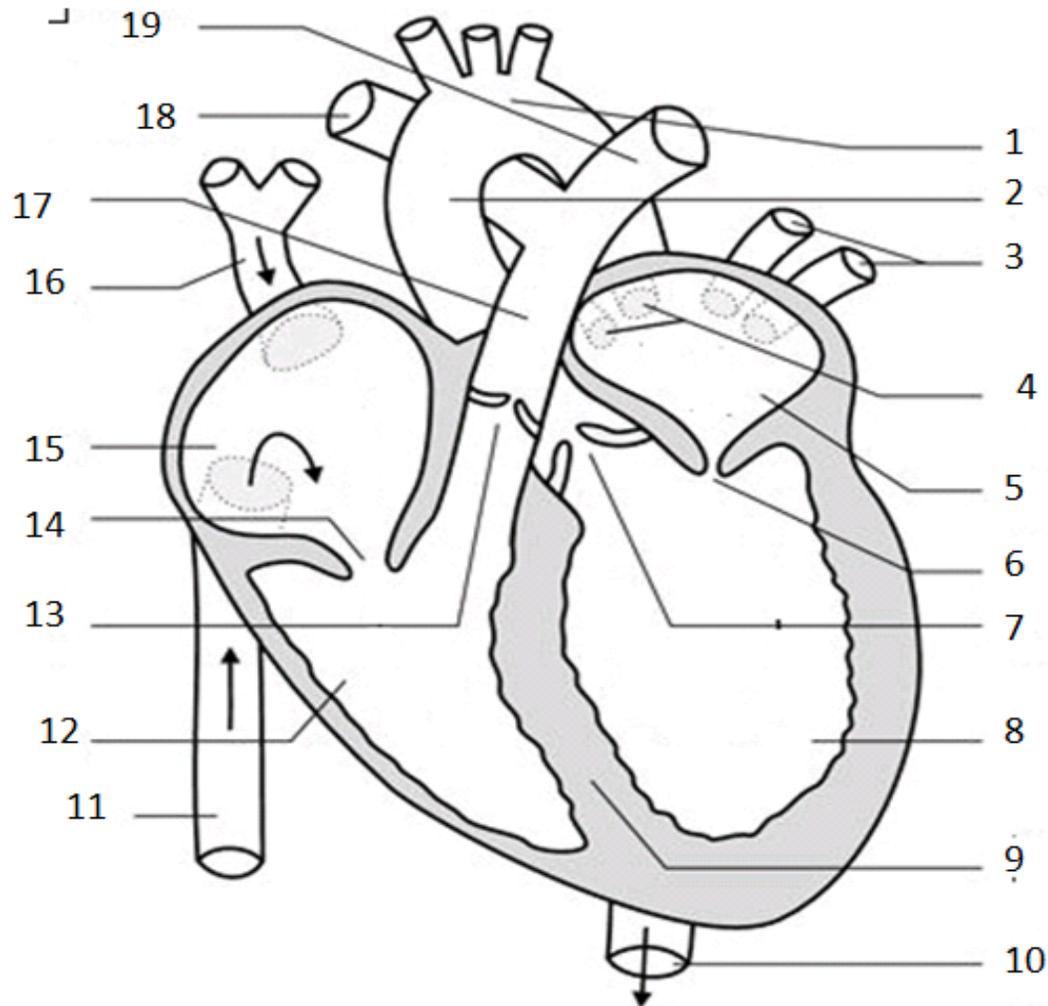
- d) an isobar of oxygen.
56. The force of attraction or repulsion between two charged bodies is directly proportional to the product of their charges and inversely proportional to the square of the distance between them. It is called
- Coulomb's law
  - Faraday's law
  - Law of conservation of charge
  - Ohms Law
57. All the following are false for the effect of following factors for the resistance of a conductor **EXCEPT**
- Inversely proportional to the length of conductor
  - Directly proportional to the cross section of the conductor
  - Inversely proportional to the temperature
  - Directly proportional to the density of electrons in the conductor
58. The unit of potential energy is
- Coulomb
  - Watt
  - Electron volt
  - Ampere
59. The erratic random movement of microscopic particles in a fluid, as a result of continuous bombardment from molecules of the surrounding medium nucleus is known as
- Endosmosis
  - Diffusion
  - Osmosis
  - Brownian Motion
60. The electromagnetic radiation with shortest wavelength is
- Ultraviolet rays
  - X-rays
  - Infra-red rays
  - Gamma rays
61. Two bodies in space pull on each other with a force proportional to their masses and the distance between them:
- Newton's First Law
  - Newton's Second Law
  - Newton's Third Law
  - Newton's law of universal gravitation
62. A 100 kg mass and 50 kg mass are moving with equal kinetic energies. The ratio of the magnitudes of their linear momentum is
- 2:1
  - 1:2
  - 1:1

- d) 4:1
63. The moving fan is an example of energy conversion from
- Mechanical to electrical energy
  - Potential to mechanical energy
  - Potential to electrical energy
  - Electrical to mechanical energy
64. The type of pulleys used raising the water bucket from the well is
- Fixed pulley
  - Movable pulley
  - Compound pulley
  - Combination of all.
65. LED bulb is encouraged to use for lighting home because
- it is energy efficient compared to other bulbs.
  - it doesn't emit UV rays.
  - it doesn't produce heat in the room.
  - it does not emit polluting radiation which is prevents health hazard.
66. Mirage is formed by
- reflection, refraction and dispersions of sunlight by pool of water.
  - reflection of sunlight by water pool.
  - refraction of sunlight by water pool.
  - when light passes through two layers of air with different temperatures.
67. The power consumed by two electric bulbs rated 220 volt and 100 watt and operated on 110 volt is
- 50 W
  - 85 W
  - 90 W
  - 45 W
68. Choose the bulb which has the highest resistance.
- 1000 W
  - 100 W
  - 60 W
  - 26 W
69. Chemical used for cooling in the refrigerator is
- CO<sub>2</sub>
  - Liquid NH<sub>3</sub>
  - NH<sub>4</sub>OH
  - NH<sub>4</sub>CL
70. All of the following properties are correct for Prism **EXCEPT**
- All prisms have two bases that are equal and parallel.
  - Lateral sides of a prism are perpendicular to the base.
  - Prisms can reverse the direction of light by internal reflection
  - Prism is used in binoculars.

PART II – Short Answer Questions [30 marks]

Answer ALL 10 short answer questions. Each question carries 3 marks.

1. What is rabies? Write down its causes, incubation period, host animals, symptoms, mode of transmission and preventive measures for rabies?
2. In the following diagram of the human heart, name the parts of heart numbered 1-19. Diagram need not be drawn but number should be written correctly for each part.



3. Why do you think the Infection control and medical waste management system is important in the healthcare centres? Explain some important infection control and waste management practices you would follow when you work in the hospitals.

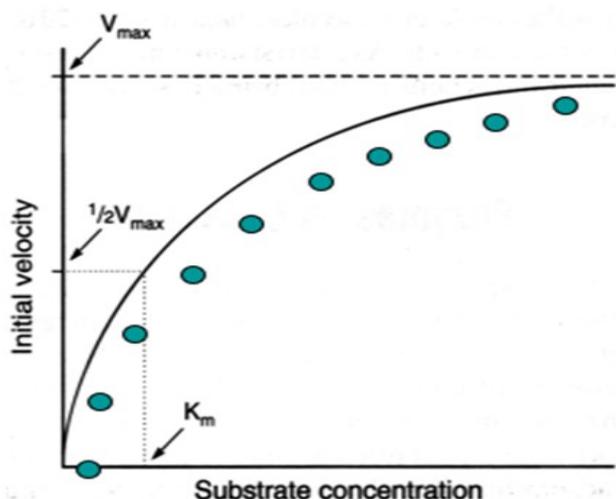
4. Describe the sources and functions of the following vitamins in tabulated form. Draw the table on the answer sheet.

Vitamins	Sources	Functions
Vitamin A		
Vitamin C		
Vitamin D		

5. Every year, Health Bulletin published by Ministry of Health shows high number of death due to Alcoholic Liver Diseases (ALD). Explain the functions of liver. How does alcohol affect the liver? Explain some preventive measures to reduce the ALD in Bhutan.
6. Complete the following table with difference between RNA and DNA? Draw the table on the answer sheet.

Features	DNA	RNA
Nucleic acid		
Sugar		
structure		
Conformation		
Helix Geometry		
Stability		
Function		
Nitrogen base		

7. Using the following diagram on enzyme kinetics, define  $V_{max}$ ,  $\frac{1}{2}V_{max}$  and  $K_m$ .



8. State the specific function of each of the following:
- Loop of Henle
  - Islets of Langerhans
  - Retina
  - Cowper's gland
  - Circle of Willis
  - Pulmonary artery
9. Following slogans actually provide the definition of the four groups of important biomolecules of the human being and animal. For each definition in column A, write down the name of group of biomolecules in column B.

Sl#	A. Slogans	B. Biomolecules
1	“We are polyhydroxyaldehydes or ketones; Classified as mono-, oligo- and polysaccharides; Held together by glycosidic bonds which supply energy and serve as structural constituents of the body”.	
2	“We are the basis of structure of and function of life; Composed of twenty amino acids, the building blocks; organized into primary, secondary, tertiary and quaternary structure; classified as simple, conjugated and derived proteins”.	
3	We are the chemical basis of life and heredity; organized into genes that control every function; composed of repeating units of deoxy-ribonucleotides; arranged in a double helix, held by hydrogen bonds.	
4	“With water, we say, ‘touch me not’; to the tongue, we are tasteful; within limits, we are dutiful; in excess, we are dangerous”.	

10. Complete the following table by writing the name of the menstrual phases in the column B, 'Start Day' in the column C and 'End Day' in the Column D for each definition of the menstruation phases given the column A.

<b>A</b> <b>Definitions of the phases</b>	<b>B</b> <b>Name of phases</b>	<b>C</b> <b>Start Day</b>	<b>D</b> <b>End Day</b>
<ul style="list-style-type: none"> <li>▪ Bleeding occurs</li> <li>▪ Average blood loss= 35 ml (10–80 ml)</li> <li>▪ <u>Plasmin</u> inhibits <u>clotting</u> menstrual fluid.</li> <li>▪ Abdomen, back &amp; thigh cramping occurs</li> </ul>	B (i).....	C (i).....	D (i).....
<ul style="list-style-type: none"> <li>▪ Thickening of the uterus</li> <li>▪ Secretion of <u>Estradiol</u>, an <u>estrogen</u></li> <li>▪ Folliculogenesis, formation of Graafian follicle &amp; ovum</li> </ul>	B (ii).....	C (ii).....	D (ii).....
<ul style="list-style-type: none"> <li>▪ Ovum is released</li> <li>▪ Release of LH by pituitary gland</li> <li>▪ LH matures ovum &amp; weakens the wall of follicle finally releasing ovum</li> </ul>	B (iii).....	C (iii).....	D (iii).....
<ul style="list-style-type: none"> <li>▪ Secret hormones</li> <li>▪ Secretes progesterone by corpus luteum</li> <li>▪ Preparation for implantation</li> </ul>	B (iv).....	C (iv).....	D (iv).....
<ul style="list-style-type: none"> <li>• Sloughing of degenerated uterine lining</li> <li>• Onset of bleeding</li> </ul>	B (v).....	C (v).....	D (v).....

**TASHI DELEK**