

**ROYAL CIVIL SERVICE COMMISSION
BHUTAN CIVIL SERVICE EXAMINATION (BCSE) 2025
EXAMINATION CATEGORY: TECHNICAL**

Date	:	October 10, 2025
Total Marks	:	100
Writing Time	:	90 minutes (1.5 hours)
Reading Time	:	15 Minutes (prior to writing time)

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. The wings of a dragonfly, eagle, bat and Pterodactyl is an example of
 - a) Homologous organ
 - b) Vestigial organs
 - c) Analogous organs
 - d) None of the above

2. Emulsification of fats is a
 - a) Mechanical digestion
 - b) Catalytic digestion
 - c) Chemical digestion
 - d) Non-catalytic digestion

3. What is the pathway taken by a protein that has been made and is to be secreted from a cell?
 - a) Ribosome vesicle → Golgi apparatus → cytoplasm
 - b) Ribosome vesicle → rough ER -vesicle → SER → vesicle → plasma membrane
 - c) Rough ER → vesicle → SER → vesicle → Golgi apparatus → vesicle → plasma membrane
 - d) Rough ER → vesicle → Golgi apparatus → vesicle → plasma membrane

4. In an experiment, a student cuts a transverse section of a young stem of a plant which he has taken from his school garden. After observing it under the microscope how would he ascertain whether it is a monocot stem or a dicot stem?
 - a) With the help of vascular bundles
 - b) With the help of bulliform cells
 - c) With the help of caesarean strips
 - d) With the help of stomatal apparatus

5. When the semi-digested food from the stomach enters the duodenum, secretin is released which stimulates the salt secretion of
 - a) Mucus
 - b) Gastric juice
 - c) Intestinal juice
 - d) Pancreatic juice

6. Conventional gene therapy technique mostly depends on the following except
 - a) Gene augmentation therapy
 - b) Gene inhibition therapy
 - c) Killing Specific Cells
 - d) CRISPR

7. A 30-year-old male patient with acute pancreatitis has been found to have a disorder of cavitory protein digestion. The reason for such condition can be the hyposynthesis and hyposecretion of the following enzyme:
- Pepsin
 - Dipeptidase
 - Amylase
 - Trypsin
8. Which statement best compares the energy transformations of photosynthesis and cellular respiration?
- Only photosynthesis uses oxygen to create energy
 - Only photosynthesis causes an increase in kinetic energy
 - Photosynthesis and cellular respiration both require chemical energy to make food
 - Photosynthesis and cellular respiration both store energy in chemical bonds
9. Which of the following statements about the endosperm is INCORRECT?
- It is a nutritive tissue for the developing embryo
 - It is typically triploid in angiosperms
 - It develops from the fusion of a sperm with two polar nuclei
 - It is present in all seeds
10. What constituent of the neuron is responsible for briefly increasing the Na⁺ permeability of the membrane during the rising phase of the nerve impulse?
- The sodium-potassium pump
 - The delayed rectifier potassium channel
 - The voltage-gated sodium channel
 - The omniscient consciousness of the neuron
11. Which characteristic is shared by both RNA polymerase and DNA pol III in *E. coli*?
- Both function as holoenzymes that have polymerase and helicase activities
 - Both use promoters to locate and bind to the starting point of genes
 - Both produce nucleic acid molecules that become permanent cellular components
 - Both use templates to synthesize an anti-parallel, complementary nucleic acid chain
12. Pema suffers from haemophilia, a condition that prevents blood clotting. If you were a doctor, which of the following treatments would you suggest?
- Chemotherapy
 - Homeotherapy
 - Gene therapy
 - Physiotherapy
13. All the factors listed below affect the opening and closing of stomata EXCEPT
- Light
 - Water
 - Oxygen
 - Minerals

14. An individual with low blood sodium levels might experience which of the following hormonal responses?
- Increased ADH, decreased aldosterone
 - Decreased ADH, increased aldosterone
 - Increased ADH, increased aldosterone
 - Decreased ADH, decreased aldosterone
15. Which of the following statement about parenchyma cell is INCORRECT?
- They are living cells
 - They are non-living cells
 - They have thin cell wall
 - They from simple permanent tissues
16. The vasa recta is closely associated with which part of the nephron?
- Proximal convoluted tubule
 - Distal convoluted tubule
 - Loop of Henle
 - Bowman's capsule
17. The matching pairs given below are the parts of a nephron and its functions. Which pair is INCORRECT?
- Bowman's capsule → ultrafiltration
 - Proximal convoluted tubule → releases urea
 - Loop of Henle → counter current mechanism
 - Distal convoluted tubule → reabsorption of water
18. The enzymes involved in DNA replication are correctly matched with their functions EXCEPT
- DNA polymerase-I proofreading
 - Helicase wind DNA strands.
 - Primase synthesis RNA primer
 - Ligase joins DNA strands
19. Which of the following is an example of an autoimmune disease?
- Cancer
 - Rheumatoid arthritis
 - Diabetes mellitus (Type 1)
 - Both B and C
20. The conduction of nerve impulse through myelinated neuron is faster than non-myelinated neuron because
- Nerve impulses need not travel through the entire length of axon
 - Non-myelinated neurons have less neurotransmitter
 - Myelinated neurons have less neurotransmitter
 - Node of Ranvier provides insulation

21. A 5-year-old child has hypoplasia of primary teeth limited to the incisal or occlusal one-third. This is likely due to:
- Fluoride ingestion during tooth development
 - Trauma to the primary tooth buds
 - Systemic illness during the primary tooth calcification period
 - Local infection of the primary tooth buds
22. Plants offer a viable solution for addressing global warming. The mechanism within plants that supports this claim is the
- Krebs cycle
 - Calvin cycle
 - Fruiting cycle
 - Photoperiodic cycle
23. During inspiration, the volume of thoracic cavity increases because of
- Contraction of diaphragm and external intercostal muscles
 - Relaxation of diaphragm and external intercostal muscles
 - Contraction of diaphragm and relaxation of external intercostal muscles
 - Relaxation of diaphragm and external intercostal muscles
24. The heart sound 'dub' is produced when
- Tricuspid and bicuspid valve closes
 - Tricuspid and semilunar valves closes
 - Semilunar and bicuspid closes
 - Semilunar valves closes sharply
25. Bhutan has implemented routine HPV vaccination to prevent cervical cancer. What type of immunity is developed after receiving this vaccine?
- Innate immunity
 - Passive artificial immunity
 - Passive natural immunity
 - Active artificial immunity
26. The causative agent of leptospirosis belongs to which of the following bacterial types?
- Spirochete
 - Gram-positive cocci
 - Acid-fast bacilli
 - Gram- negative cocci
27. Which of the following diseases is not typically classified as a vector-borne disease?
- Yellow fever
 - Leptospirosis
 - Zika virus infection
 - Chikungunya

28. Which of the following diseases is *not* classified as zoonotic?
- Rabies
 - Leptospirosis
 - COVID-19
 - Tetanus
29. In the human male reproductive system, which structure is responsible for sperm maturation and storage?
- Vas deferens
 - Seminiferous tubules
 - Prostate gland
 - Epididymis
30. Which hormone is produced in response to low blood calcium levels?
- Calcitriol
 - Thyroxine
 - Parathyroid hormone (PTH)
 - Calcitonin
31. Which of the following is NOT a component of the innate immune system?
- Skin barrier
 - Macrophages
 - Antibodies
 - Natural killer cells
32. A patient is found to have a deficiency of intrinsic factor. Which biological process will be most directly affected?
- Digestion of proteins in the stomach
 - Absorption of vitamin B12 in the small intestine
 - Production of bile by the liver
 - Absorption of iron in the large intestine
33. A well stoppered thermos flask contains some ice cubes. This is an example of
- Closed system
 - Open system
 - Isolated system
 - Non thermodynamics system
34. According to Lewis concept, an acid is:
- Proton donor
 - Electron pair donor
 - Electron pair acceptor
 - Proton acceptor

35. The most electronegative element in the periodic table is _____
- Nitrogen
 - Oxygen
 - Chlorine
 - Fluorine
36. Isotopes of an element have _____
- Different chemical and physical properties
 - Similar chemical and physical properties
 - Similar chemical but different physical properties
 - Similar physical but different chemical properties
37. A fundamental concept in physics often described as measure of disorders, randomness, or uncertainty within a system is termed as
- Entropy
 - Heat
 - Work
 - None of the mentioned
38. What are the transition elements characteristics?
- Metallic
 - Non-metallic
 - Metalloid
 - Varies from element to element
39. What is the oxidation state of manganese in KMnO_4 ?
- +2
 - +5
 - +7
 - 1
40. Which of the following statements are correct for depression in freezing point?
- The solution has a lower vapor pressure than pure solvent.
 - The solution has a higher vapor pressure than pure solvent.
 - At the freezing point, only solvent molecules solidify.
 - At the freezing point, only solute molecules solidify.
- I and II
 - I and III
 - I and IV
 - II and III
41. Which of the following salt has highest pH?
- CH_3COOK
 - Na_2CO_3
 - NH_4Cl
 - NaNO_3

42. Waxes are esters of
- Glycerol and fatty acid
 - Long chain alcohols and long chain fatty acids
 - Glycerol
 - Long chain of alcohols
43. When silver nitrate solution is stored in copper vessel, silver gets precipitated out because:
- Both silver and copper have positive reduction potential.
 - Reduction potential of silver is higher than that of copper
 - Reduction potential of copper is higher than that of silver
 - Both silver and copper has negative oxidation potential
44. What is the unit of molality?
- mol/L
 - mol/kg
 - g/L
 - kg/mol
45. When acetamide is treated with an alkali and bromine, the product obtained is
- Primary amine
 - Secondary amine
 - Tertiary amine
 - Quaternary ammonium salt
46. The conductivity of electrolytic conductors is due to _____
- Flow of free mobile electrons
 - B. Movement of ions
 - Either movement of electrons or ions
 - None of the above
47. The rate constant of a reaction depends upon
- Temperature
 - Initial concentration of the reactants
 - Time of reaction
 - Extent of reaction
48. The IUPAC name of the complex $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]\text{Cl}$ is
- dichlorotetraamminecobalt (III) chloride
 - tetraamminedichlorocobalt (III) chloride
 - tetraamminedichlorocobalt (II) chloride
 - tetraamminedichlorocobalt (IV) chloride
49. The reaction of vegetables oils or fats with methanol in the presence of NaOH is called:
- Cannizaro reaction
 - Aldol condensation
 - Esterification
 - Transesterification

50. Identify the correct order of boiling points of the following compounds:
CH₃CH₂CH₂OH (1), CH₃CH₂CH₂CHO (2), CH₃CH₂CH₂COOH (3)
- 1 > 2 > 3
 - 3 > 1 > 2
 - 1 > 3 > 2
 - 3 > 2 > 1
51. An acid reacts with an alcohol to form ester in the presence of concentrated acid; the esterification reaction is fastest in:
- CH₃COOH
 - HCOOH
 - C₂H₅COOH
 - (CH₃)₂CHCOOH
52. The following reaction is called
- Hydrolysis
 - Transesterification
 - Saponification
 - Esterification
53. Which one of the following compounds is the most basic?
- CH₃NH₂
 - (C₂H₅)₂NH
 - (CH₃)₃N
 - C₆H₅NH₂
54. Radioactive iodine is used to diagnose the disease of
- pituitary
 - kidney
 - thyroid
 - bones
55. In an isochoric process, the increase in internal energy is:
- equals to the heat absorbed
 - equals to the heat evolved
 - equals to work done
 - equals to the sum of the heat absorbed and work done
56. When a copper wire is dipped into silver nitrate solution, silver is precipitated because
- both silver and copper have positive reduction potentials
 - reduction potential of silver is higher than that of copper
 - reduction potential of copper is higher than that of silver
 - both silver and copper have negative reduction potentials

57. Most of the energy from the sun is emitted as
- Visible wavelength
 - Infrared wavelength
 - EUV wavelength
 - UV wavelength
58. The SI unit of resistivity is _____.
- Ohm
 - Joule
 - Ohm- meter
 - Ohm-1 m-1
59. Oil spreads over the surface of water whereas water does not spread over the surface of the oil because
- Surface tension of oil is higher than that of water
 - Surface tension of water is higher than that of oil
 - They have almost equal surface tension
 - Surface tension of water is very low.
60. One end of a towel dips into a bucket full of water and the other end hangs over the bucket. After sometime the towel becomes fully wet. It happens because of
- Viscosity of water is high
 - Capillary action of cotton threads
 - Gravitational force
 - Evaporation of water
61. A light bulb is connected to a 12V battery and draws a current of 2 A. What is the power dissipated by the bulb?
- 6 Watts
 - 12 Watts
 - 24 Watts
 - 1/6 Watts
62. Which of the following waves have a maximum frequency?
- infrared waves
 - gamma rays
 - microwaves
 - radio waves
63. Karma met with an Ophthalmologist and was asked to wear spectacles to enable him to see clearly up to 90 meters. Which of the following lenses would best suit his eyesight?
- convex
 - concave
 - plano-convex
 - convexo concave

64. A gas behaves as an ideal gas at
- low pressure and high temperature
 - low pressure and low temperature
 - high pressure and low temperature
 - high pressure and high temperature
65. Jigme took two identical metallic spheres of exactly equal masses. One is given a positive charge and the other an equal negative charge through friction. What are their masses after charging?
- The masses of the positively and the negatively charged spheres are equal
 - The masses of the positively and the negatively charged spheres remain the same
 - The mass of the negatively charged sphere is more than the positively charged sphere
 - The mass of the positively charged sphere is more than the negatively charged sphere
66. Which one of the following statements accurately describes the significance of the nanotechnology in medicine and healthcare?
- It has completely eliminated the need for surgeries and medications
 - It has minimal impact in the field of medicine and healthcare
 - It focuses on the development of nanoscale devices in the field of telecommunication
 - It enables the precise drug delivery to specific cells or tissues, improving effectiveness of the treatment
67. The direction of induced current is given by:
- Fleming's left-hand rule
 - Right-hand thumb rule
 - Lenz's Law
 - Faraday's Law
68. Dawa bought a makeup mirror. Which of the following characteristics of an image should be considered to buy such a mirror?
- upright and enlarged image
 - inverted and enlarged image
 - upright and diminished image
 - inverted and diminished image
69. Which of the following is an example of a transverse wave?
- Sound wave
 - Light wave
 - Water wave
 - Both b and c
70. Electric field inside a hollow conductor is:
- Maximum at center
 - Zero
 - Uniform non-zero
 - Inversely proportional to radius

PART II

SHORT ANSWER QUESTIONS [30 MARKS]

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

Question 1

Laya, a place which is located over 3,800 meters above sea level, is known for its thin air and harsh climate. A health assistant posted there observes that new staff often develop breathlessness, headache, and fatigue within the first few days of arrival. However, local residents (Layaps) seem unaffected and carry out physically demanding tasks with ease.

- a. What is the cause of high-altitude sickness? Describe two immediate physiological responses to this condition.
- b. Mention one chemical adaptation that helps the body adjust to high altitude over time, and explain how it improves oxygen delivery.

Question 2

In July, 2025, the Ministry of Health (MoH) of Bhutan has confirmed a cluster of acute respiratory distress syndrome (ARDS) cases among the 69th batch of Desuup trainees in Dewathang. Laboratory tests and epidemiological investigations identified leptospirosis as the cause. Tragically, 3 Desuups have died from the infection.

- a. Describe the causative agent of leptospirosis and explain how it is commonly transmitted to humans?
- b. As a healthcare professional, list five preventive measures you would implement to control the spread of leptospirosis in the community.

Question 3

Mr. Dopfu, a 47-year-old man, has been experiencing difficulty seeing nearby objects clearly, while distant objects appear normal. After a vision test, he is diagnosed with presbyopia, a common age-related condition.

- a. What type of lens would be recommended to correct Mr. Dopfu's vision problem?
- b. Explain the principle behind how this lens helps improve near vision. Support your explanation with a ray diagram.

Question 4

Define buffer system and explain its importance in maintaining blood pH.

Question 5

Explain the principle of blood pressure measurement using a sphygmomanometer.

Question 6

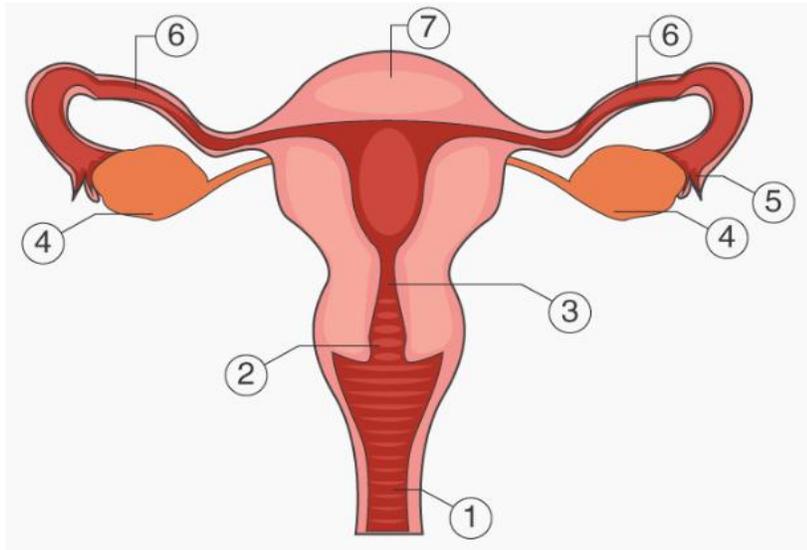
State Newton's laws of motion and give one example of each law on how they are applied by health care professionals while providing care to patients.

Question 7

Describe the changes that occur in the uterine lining throughout the menstrual cycle.

Question 8

Name the parts labelled 1–7 of the female reproductive system and state one function of each part (No need to draw the diagram).



Question 9

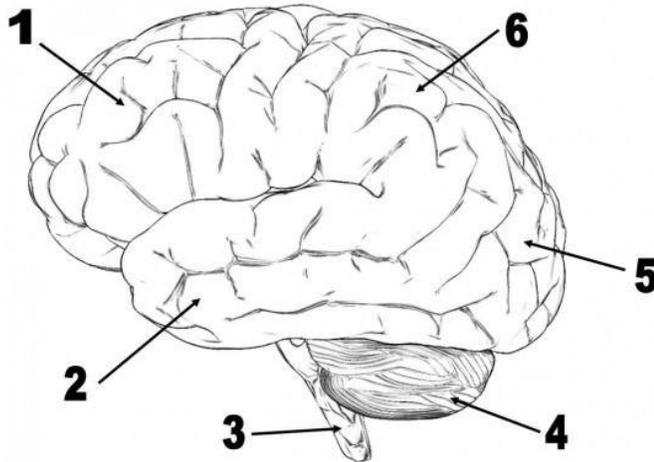
You are working in the surgical ward and have just assisted in a minor surgical procedure (wound debridement). Following the procedure, several types of waste have been generated and you are responsible for segregating the generated waste. The wastes include:

- *Blood-stained gauze and cotton*
- *Used gloves and surgical mask*
- *Used syringe with needle*
- *Empty plastic IV fluid bottle*
- *Broken glass ampoule of medication*
- *Used Scalpel blade*
- *Leftover food and a tissue paper from the patient's bedside*

Identify the type of biomedical waste that each waste represents and state the appropriate color-coded bin for disposing of each waste according to biomedical waste management guidelines.

Question 10

From the diagram given below, write down the name of the parts of the human brain with correct sequence of the number 1-6 (diagram need not be drawn) and state one function of each part.



TASHI DELEK