

**ROYAL CIVIL SERVICE COMMISSION  
BHUTAN CIVIL SERVICE EXAMINATION (BCSE) 2022  
EXAMINATION CATEGORY: TECHNICAL**

**PAPER III: SUBJECT SPECIALISATION PAPER FOR MEDICAL LABORATORY TECHNOLOGY**

---

<b>Date</b>	: October 9, 2022
<b>Total Marks</b>	: 100
<b>Writing Time</b>	: 150 minutes (2.5 hours)
<b>Reading Time</b>	: 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 SECTIONS**, namely SECTION A & SECTION B:
  - **SECTION A** has two parts: Part I - 30 Multiple Choice Questions  
Part II - 4 Short Answer Questions  
All questions under SECTION A are **COMPULSORY**.
  - **SECTION B** consists of two Case Studies. Choose only **ONE** case study and answer the questions of your choice.
4. 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.
5. 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 the Section, Part and Question Number will NOT be evaluated and no marks will be awarded.
6. Begin each Section and Part in a fresh page of the Answer Booklet.
7. You are not permitted to tear off any sheet(s) of the Answer Booklet as well as the Question Paper.
8. Use of any other paper including paper for rough work is not permitted.
9. **You must to hand over the Answer Booklet to the Invigilator before leaving the examination hall.**
10. This paper has **8 printed pages**, including this instruction page.

**GOOD LUCK**

**SECTION A**

**PART I: Multiple Choice Questions [30 marks]**

**Choose the correct answer and write down the letter of your chosen answer in the Answer Booklet against the question number e.g. 31 (d). Each question carries ONE mark. Any double writing, smudgy answers or writing more than one choice shall not be evaluated.**

1. The Nairobi Fly, also commonly called a 'Kenyan fly or dragon bug' recently reported from few places in the southern parts of Bhutan causes infection due to
  - a) bites of the insects.
  - b) transmission of parasites.
  - c) toxin present in their saliva.
  - d) chemical called pederin.
  
2. 7.0 is the normal PH value for the:
  - a) Fluid within a typical cell
  - b) Urine
  - c) Blood in the renal artery
  - d) Blood in the portal vein
  
3. Which one of the following organisms is an acid-fast bacilli?
  - a) Coryne bacterium diphtheria
  - b) Mycobacterium leprae
  - c) Salmonella
  - d) Bacillus pertussis
  
4. The most commonly used pipette in Chemistry laboratories for analysis is:
  - a) Volumetric pipette
  - b) Micropipette
  - c) Graduated pipette
  - d) Pasteur pipetted
  
5. All the following are part of GLP required to be performed by laboratory staff **EXCEPT**
  - a) Performance of the quality control
  - b) Calibration of the equipments
  - c) Maintenance of the equipments
  - d) Punctuality and dress code in the laboratory
  
6. The best and safest method of sterilization is:
  - a) Immersion in the chemicals
  - b) Flaming
  - c) Autoclaving
  - d) Boiling
  
7. The right method of sterilization of glassware is:
  - a) Dry heat
  - b) Disinfection
  - c) Moist Heat
  - d) Fumigation

8. Hematology cell counter works under the principle of:
  - a) Measuring the changes in electrical conductance
  - b) Measure the electrical current of the cell solution
  - c) Measure the absorption of the light passing through the cell solution
  - d) Measure the number of cells passing through the orifice.
  
9. Sample used for platelet counting is:
  - a) EDTA blood
  - b) Serum
  - c) Plasma
  - d) Fluoride anti-coagulated sample
  
10. Abnormal proliferation of hematopoietic cells is called:
  - a) Pancytopenia
  - b) Leukemia
  - c) Anemia
  - d) Malignancy
  
11. Which of the following is not an arthropod borne disease?
  - a) Malaria
  - b) Plague
  - c) Filaria
  - d) Hookworm
  
12. Which among the following do the phagocytic action?
  - a) Lymphocytes
  - b) Basophils
  - c) Neutrophil
  - d) Monocytes
  
13. Which of the following is transmitted by rodents?
  - a) Hepatitis A & E virus
  - b) Norwalk virus
  - c) Polio virus
  - d) Monkeypox virus
  
14. Which of the following vitamin is essential for Calcium absorption?
  - a) Vitamin A
  - b) Vitamin C
  - c) Vitamin E
  - d) Vitamin D
  
15. Coloring agent used for antisera AB is:
  - a) Methylene Blue
  - b) Eosin
  - c) Acriflavin
  - d) Safranin

16. Which of the following pairs of ion is most important for maintenance of body homeostasis?
- $K^+ + Na^+$
  - $Na^+ + Fe^+$
  - $K^+ + Cu^+$
  - $K^+ + Mg^+$
17. Normality of the solution is defined as
- the number of moles of a substance per liter of solution.
  - the number of moles of solute per kilogram of solvent.
  - number of grams of substance per liter of solution.
  - number of grams of solute per kilogram of solvent.
18. The purpose of citrate vial in the laboratory sample collection is
- to prevent clotting of blood in the vial.
  - to prevent bacterial growth in the sample.
  - to prevent chemical reaction in the sample.
  - to inhibit glycolytic enzyme to reduce glucose degradation.
19. The proportion of samples that are genuinely positive that give a positive result using the test in question is known as:
- Sensitivity of the test
  - Specificity of the test
  - Positive predictive value
  - Negative predictive value
20. Standard deviation expressed in percentage is termed as:
- Coefficient of variation (CV)
  - Variance
  - Bias
  - Precision
21. Assessment of laboratory performance by external agencies focusing on correction and education is termed as:
- External quality assessment scheme
  - Proficiency testing
  - Internal Audit
  - Performance survey
22. The procedure that may not cause systemic errors in the laboratory is:
- Faulty calibration
  - Equipment deterioration
  - Faulty pipetting
  - Expiring of reagents
23. Choose the pair of parameters used every day to ensure the correct laboratory results:
- Bias and precision
  - Precision and QC reference range
  - Detection limit and reportable range
  - QC Reference Range and bias

24. The group of agents or organisms for which the Biosafety Level 3 is used for protection is:
- Aerosol-transmitted laboratory infections and life-threatening disease-causing organisms.
  - Infectious agents or toxins that may be transmitted through the air and cause lethal infection.
  - Infectious agents or toxins that pose a moderate danger if accidentally inhaled/swallowed.
  - Infectious agents or toxins not known to cause disease in healthy adult.
25. Which of the following statement is **FALSE** regarding the cancer cell?
- Genomic alterations
  - Invasive growth
  - Chemo taxis
  - Gradual effect on organ functions.
26. Chose the Role which is not important for the Histopathology laboratory Technician:
- Equipment preparation
  - Specimen processing
  - Smear staining
  - Grossing
27. Tissue processing in histopathology involves at least six important steps prior to the staining process. Choose the correct tissue processing steps in order from the following:
- Dehydration- Infiltration-Clearing-Embedding-Sectioning-Mounting
  - Clearing- Dehydration-Infiltration-Embedding-Sectioning-Mounting
  - Dehydration-Clearing-Infiltration-Embedding-Sectioning-Mounting
28. What temperature is maintained in a bacterial incubator?
- 20 degrees Celsius
  - 28 degrees Celsius
  - 37 degrees Celsius
  - 45 degrees Celsius
29. Anti-immunoglobulin is also known as:
- Cryo-serum
  - Local serum
  - Buffered serum
  - Coomb's serum
30. All special types of investigation use:
- Type 1 reagents grade water
  - Type 2 reagent grade water
  - Type 3 reagent grade water
  - Distilled water

**PART II – Short Answer Questions [20 marks]**

**This part has 4 Short Answer Questions. Answer ALL the questions. Each question carries 5 marks.**

1. What are Different Sterilization Methods used in Laboratory?
2. Explain the principle, procedure and interpretation of Rapid COVID-19 tests.
3. Write normal reference range with correct conventional unit for the following tests parameters. Provide at least one indication each for increase in the test parameters.
  - a) Blood Glucose
  - b) Creatinine
  - c) Bilirubin
  - d) Total protein
  - e) CK-MB
  - f) Total White Blood cells
  - g) TSH
  - h) Blood clotting time
  - i) Occult blood in stool
  - j) WBCs in Urine
4. Describe application, principle, procedure and interpretation of the direct Coomb's test.

**SECTION B: Case Study [50 marks]**

**Choose either CASE I or CASE II from this section. Each case study carries 50 marks.**

**CASE I**

32-year-old man visited Phuentsholing with complaints of fever, headache, muscle aches, back pain and fatigue. On close examination by the doctor, he had swollen lymph nodes and blister like rash on the face, hands, feet, chest and he complaints of having same rashes around genitals and anus. Other vital signs were found normal. He denied drinking alcohol, use of drugs and smoking. He travelled to Kerala in India to attend his College Convocation and returned back home two days ago.

Answer the following questions

1. What will be the clinical diagnosis of this patient by the doctor on duty based on the symptoms, vital signs and travel history? **(5 marks)**
2. Write down the laboratory tests that doctor would order based on the clinical diagnosis. **(5 marks)**
3. Describe the type of specimen to be used and prerequisite for a patient to take sample. **(20 marks)**
4. Explain the steps of procedures for collection of samples, methods of testing and procedure for packing the samples. **(20 marks)**

**CASE II**

**Question 1**

**(20 marks)**

In JDWNRH, laboratory In-charge establishes his Internal Quality control for glucose Level 1 using the control results for 15 consecutive days as shown in the table. Daily IQC results are plotted on LJ chart and Westgard's Multi-QC rules are used for detection of the errors. Complete the following table and calculate:

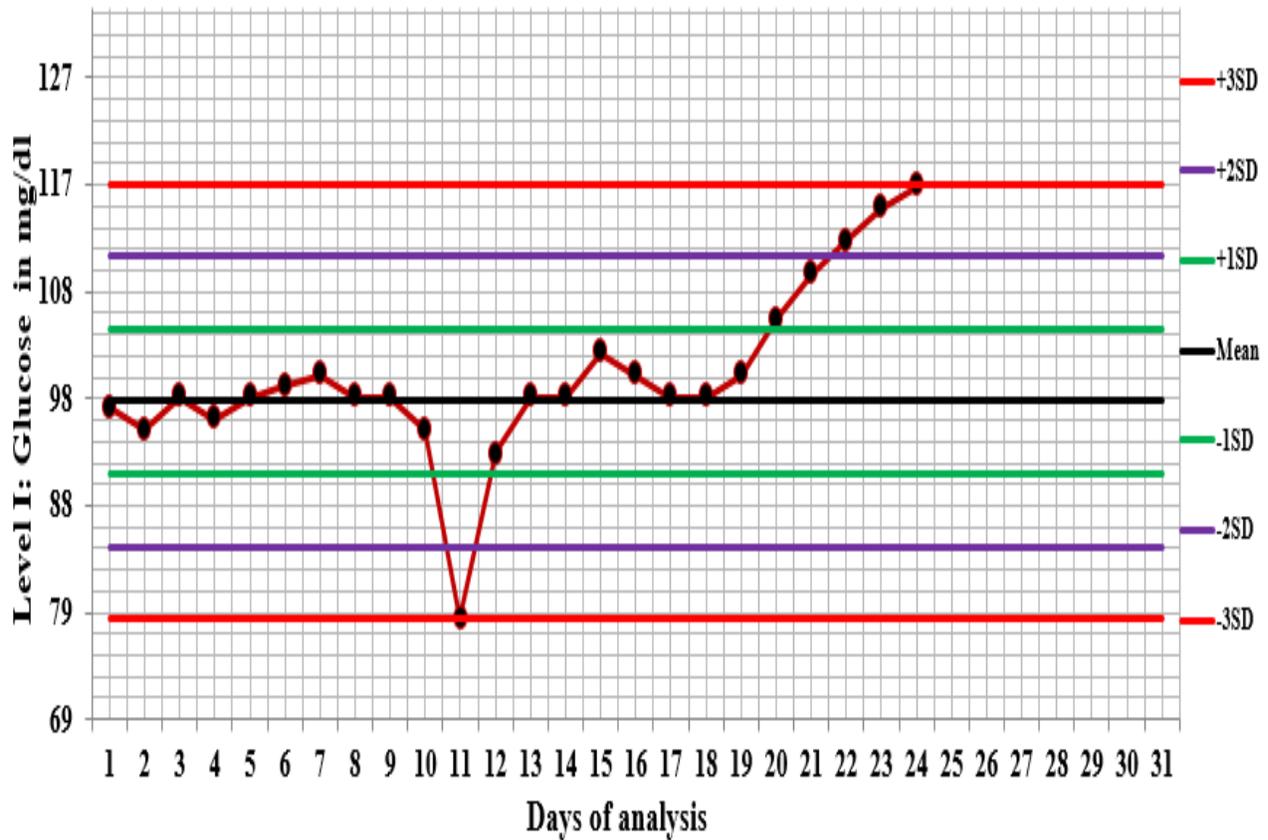
- a) Mean
- b) Standard Deviation (SD)
- c) Coefficient of variation (CV)
- d) Mean $\pm$ 2SD
- e) Mean $\pm$ 3SD

Days	$\bar{X}_i$	$\bar{X}_i - \bar{X}$	$(\bar{X}_i - \bar{X})^2$
1	97		
2	98		
3	98		
4	96		
5	98		
6	98		
7	95		
8	98		
9	98		
10	95		
11	92		
12	93		
13	99		
14	96		
15	96		

**Question 2**

**(20 marks)**

In the following control charts, what are the control rule violations seen in the Graph. For each rule violation, state the possible causes and suggest some corrective actions to be taken for each violation.



**Question 3**

**(10 marks)**

State the THREE most important properties of Normal Gaussian Distribution applied in internal quality control system and draw level the diagram of the Gaussian distribution curve for the following characteristics:

- a) Accurate & precise
- b) Inaccurate but precise
- c) Inaccurate & imprecise
- d) Accurate but imprecise

**TASHI DELEK**