

**ROYAL CIVIL SERVICE COMMISSION  
BHUTAN CIVIL SERVICE EXAMINATION (BCSE) 2020  
EXAMINATION CATEGORY: TECHNICAL**

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

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|---------------------|--------------------------------------|
| <b>Date</b>         | : February 27, 2021                  |
| <b>Total Marks</b>  | : 100                                |
| <b>Writing Time</b> | : 150 minutes (2.5 hours)            |
| <b>Reading Time</b> | : 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 the 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 on 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 desire to maintain a safe laboratory environment for all begins with
  - a) adopting a Preventive measures.
  - b) quality control.
  - c) deploying more staff.
  - d) creating accident free environment .
  
2. When a chemical splashes in the eye, rinse for
  - a) 10 seconds
  - b) 5 minutes
  - c) 30 seconds
  - d) 15 minutes
  
3. Which of the following type(s) of Personal Protective Equipment (PPE) is the least important while performing test in virology laboratory?
  - a) Safety goggles and N95 Mask
  - b) Gloves and gowns
  - c) Boots
  - d) Face Shields
  
4. Chemical, reagents or broth cultures should be pipetted by
  - a) Mouth pipette
  - b) Micropipette
  - c) Graduated pipette
  - d) Pasteur pipetted
  
5. Choose the least relevant GLP from the following:
  - a) Performance of Quality control
  - b) Daily Maintenance of the equipments
  - c) Punctuality and dress code in the laboratory
  - d) Daily calibration of the equipments.
  
6. What is the name of the procedure performed under sterile conditions to eliminate contamination in hope to obtain a pure culture of one type of microorganism?
  - a) Sterilization technique
  - b) Disinfectant technique
  - c) Aseptic technique
  - d) Pathogen technique

7. After a biohazard spill is covered with paper towels and disinfectant solution, it must sit for
  - a) 5 minutes
  - b) 60 minutes
  - c) 30 minutes
  - d) 20 minutes
  
8. Vitamin K antagonist is
  - a) Warfarin
  - b) Heparin-
  - c) Protein c
  - d) Ant thrombin iii
  
9. One of the intrinsic pathway in coagulation cascade is
  - a) Factor XI
  - b) Factor XIII
  - c) Factor I
  - d) Factor VII
  
10. Para hemophilia is the deficiency of
  - a) Factor VIII
  - b) Factor IX
  - c) Factor V
  - d) Factor VII
  
11. Eosinophilia is commonly seen in
  - a) Food sensitivity
  - b) Drug sensitivity
  - c) Atopic dermatitis
  - d) All of the above
  
12. Multiple myeloma is a neoplastic proliferation of
  - a) Lymphocytes
  - b) Granulocytes
  - c) Plasma cells
  - d) Monocytes
  
13. Test for intrinsic pathway:
  - a) Thrombin time
  - b) Prothrombin time
  - c) Bleeding time
  - d) Partial thromboplastin time
  
14. All the following are fat soluble vitamins EXCEPT
  - a) Vitamin A
  - b) Vitamin D
  - c) Vitamin E
  - d) Vitamin C

15. Which of these functions is the least important for Calcium?
- Lactation
  - Synthesis of enzymes
  - Bone formation
  - Brain formation
16. Which of the following pairs of ion is most important for maintenance of Coagulation?
- $K^+ + Na^+$
  - $Na^+ + Fe^+$
  - $K^+ + Cu^+$
  - $K^+ + Mg^+$
17. Molality 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 Fluoride vial in the laboratory sample collection is
- to prevent clotting of blood in the vial.
  - to prevent bacterial growth.
  - to prevent chemical reaction.
  - to inhibit glycolytic enzyme to reduce glucose degradation.
19. The ability of the test to identify individual correctly as not affected is
- Sensitivity of the test
  - Specificity of the test
  - Positive predictive value
  - Negative predictive value
20. A measure of the deviation of the mean from the target value or reference value is
- Standard deviation(SD)
  - Coefficient of variation(CV)
  - Variance
  - Bias
21. Assessment of laboratory performance focusing on certification is termed as
- External quality assessment scheme
  - proficiency testing
  - internal audit
  - performance survey
22. All the following cause systemic errors in analytical process EXCEPT
- Faulty calibration
  - Equipment deterioration
  - Change in laboratory personnel
  - Expiring of reagents

23. All of the following are Performance characteristics of equipment EXCEPT
- Accuracy and precision
  - Precision
  - Carry over and Detection limit
  - QC Reference Range
24. Which type of biological safety cabinet must be used when handling risk group-3 organisms?
- Class I biological safety cabinet
  - Class III biological safety cabinet
  - Class II biological safety cabinet
  - Clean bench (Laminar flow)
25. Which of the following statement is FALSE regarding malignant tumors?
- They cause metastasis
  - Require treatment
  - They may effect body gradually
  - Grows rapidly
26. All the following are Role of Histopathology laboratory Technician EXCEPT
- Equipment preparation
  - Specimen processing
  - Smear staining
  - Grossing
27. All the following are correct description for Histopathology Laboratory EXCEPT
- Biopsy fixation and grossing.
  - H & E staining technique
  - Fluid examination for malignant cells.
  - Detection of malignant tissues
28. 500ml whole blood contains plasma approximately
- 100 to 150ml
  - 200 to 250ml
  - 300 to 350ml
  - 350 to 400ml
29. All of the following are immunological reactions of Blood transfusion EXCEPT
- Allergic
  - Anaphylactic
  - Leak agglutinin
  - Circulatory overload
30. The normal blood clotting time is
- 2 to 8 min
  - 3 to 6 min
  - 4 to 5 min
  - 6 to 8 min

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

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

1. Describe in detail the role of kidneys in acid-base regulation.
2. Name the laboratory tests available in Bhutan for SARS-COV-2 and describe the principle of the tests.
3. Explain Leishman staining technique
4. Explain Blood group system.

**SECTION B: CASE STUDY [50 marks]**

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

**CASE I**

A 35-year-old man visited flu Clinic at one of the district hospitals with history of fever and dry cough since three days ago. All the vital signs were normal. The person had visited Siliguri about 7 days ago. The Doctor at the Flu Clinic found him qualifying the case definition for Covid-19 and sends requisition to carry out the laboratory tests for Rapid Antigen and RT-PCR tests. However, the hospital does not have testing facility for Covid-19. Doctor asks the Technicians to take sample from the patient and send to the nearby referral Hospital.

Answer the following questions:

1. Describe the types of specimen to be used and prerequisite for a patient to take sample.
2. Explain the steps of procedures for collection of nasopharyngeal swab and Throat Swab.
3. Describe the procedure for packing the specimen meant for Covid-19 test.

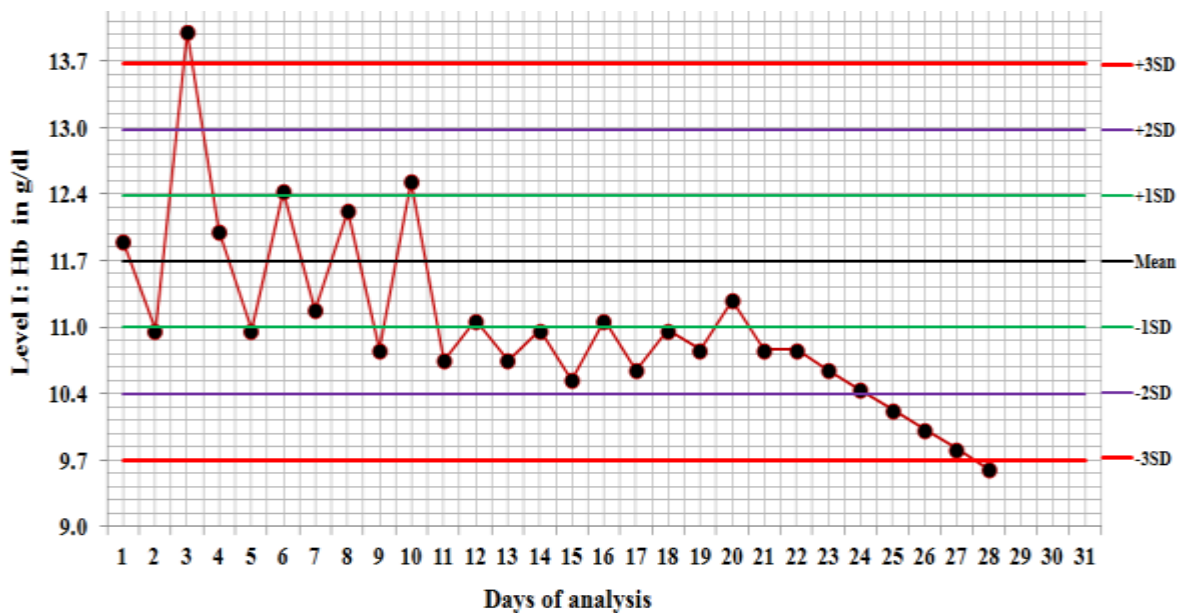
**CASE II**

In the JDWNRH, laboratory In-charge establishes his Internal Quality control for AST I using the control results for 10 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.

1. Complete the following table and calculate:
  - 1.1. Mean
  - 1.2. Standard Deviation (SD)
  - 1.3. Coefficient of variation (CV)
  - 1.4. Mean±2SD
  - 1.5. Mean±3SD

| Days | $X_i$   | $X_i - \bar{X}$         | $(X_i - \bar{X})^2$ |
|------|---------|-------------------------|---------------------|
| 1    | 26 IU/L |                         |                     |
| 2    | 27 IU/L |                         |                     |
| 3    | 28 IU/L |                         |                     |
| 4    | 28 IU/L |                         |                     |
| 5    | 29 IU/L |                         |                     |
| 6    | 28 IU/L |                         |                     |
| 7    | 28 IU/L |                         |                     |
| 8    | 26 IU/L |                         |                     |
| 9    | 26 IU/L |                         |                     |
| 10   | 27 IU/L |                         |                     |
| 11   | 28 IU/L |                         |                     |
|      |         | $\sum(X_i - \bar{X})^2$ |                     |

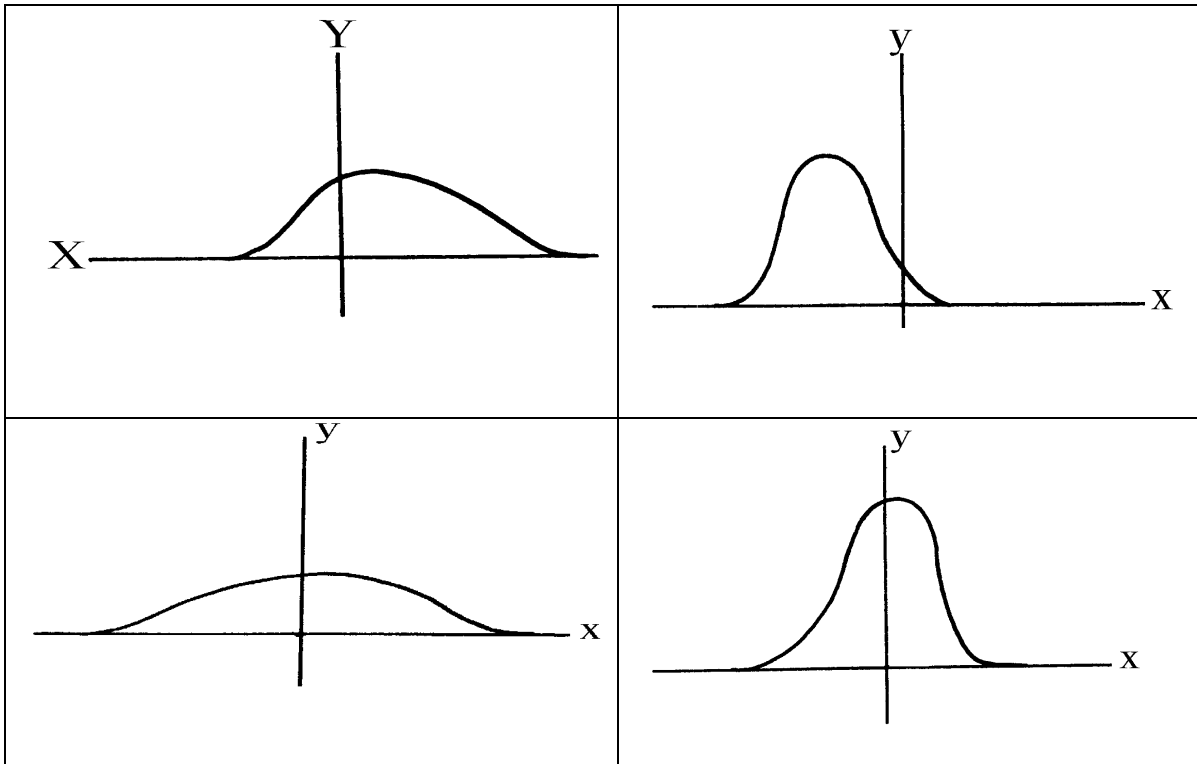
2. In the following control charts, what are the control rule violations seen in the Graph. For each rule violation, state the possible causes and suggest some corrective actions to be taken for each violation.



3. State THREE most important properties of Normal Gaussian Distribution applied in internal quality control system. In the following Gaussian distribution curves, choose the most appropriate interpretation of the curve based on the mean and shape of the curve. Write only letter A-D for each diagram.

- A. Accurate & precise
- B. Inaccurate but precise
- C. Inaccurate & imprecise
- D. Accurate but imprecise

Diagram of the Gaussian distribution Curve



**TASHI DELEK**