

**ROYAL CIVIL SERVICE COMMISSION
BHUTAN CIVIL SERVICE EXAMINATION (BCSE) 2018
EXAMINATION CATEGORY: TECHNICAL**

PAPER III: SUBJECT SPECIALIZATION PAPER FOR MEDICAL LAB TECHNOLOGY

Date : 7 October 2018
Total Marks : 100
Writing Time : 150 minutes (2.5 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 being provided to check the number of pages, printing error, clarify doubts and to read instructions in Question Paper. You are NOT permitted to write during this time.
3. This paper consists of **TWO Sections, namely Section A and 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 2 case studies. Choose only **ONE** case study and answer the questions under 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 correct 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 are required to hand over the Answer Booklet to the Invigilator before leaving the examination hall.**
10. The Question 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 (c). Each question carries ONE mark. Any double writing, smudgy answers or writing more than one choice shall not be evaluated.

1. All the following tests are advised for monitoring the patients with renal failure EXCEPT:
 - a) Urea/Creatinine
 - b) Electrolytes
 - c) Urine 24 hours
 - d) HbA1C

2. Choose the INCORRECT statement about the bilirubin:
 - a) It is a yellow pigment produced by liver.
 - b) It is increased in patients with liver diseases.
 - c) It is measured using Jendrassic Groff Method.
 - d) It is released by the breakdown of WBCs.

3. HbA1C is called Glycated hemoglobin because:
 - a) Albumin is conjugated with hemoglobin.
 - b) Carbon dioxide is attached to hemoglobin.
 - c) 1 molecule of Amino acid is attached to hemoglobin.
 - d) Glucose is attached with hemoglobin.

4. Molality of the solution is defined as:
 - a) The number of moles of a substance per liter of solution.
 - b) The number of moles of solute per kilogram of solvent.
 - c) Number of grams of substance per liter of solution.
 - d) Number of grams of solute per kilogram of solvent.

5. Function of sodium fluoride in sugar vial is:
 - a) to clot blood in the vial.
 - b) to prevent bacterial action.
 - c) to prevent chemical reaction.
 - d) to inhibit glycolytic enzyme to reduce glucose degradation.

6. Choose the most appropriate description of the 1 ml Micropipette to reconstitute 5 ml of lyophilized QC serum:
 - a) It is the most accurate instrument used for reconstitution.
 - b) It is useful in measuring large quantity of solutions and liquids.
 - c) Micropipette is available in capacity up to 5 ml in Bhutan.
 - d) It is not recommended for multiple dispensing due to possible volume errors.

7. Choose any pair of the following parameters which can be used to calculate CV:
 - a) Variance and mean
 - b) Median and variance
 - c) Standard deviation and the mean
 - d) Variance and reportable range

8. Chemistry laboratory at JDWNRH uses two different quality control sera, Level I and Level II. If their instrument is working perfectly, and results are normally distributed, what is the percentage of probability that their control values will fall within ± 2 SD:
 - a) 68.2%
 - b) 95.5%
 - c) 99.7%
 - d) 100%

9. If the laboratory analyzers are wrongly calibrated due to electronic or reagent drift and the control is outside of ± 2 SD range, what do you expect the result of an immediate repeat of the same control?
 - a) 100% chances that the result will be corrected.
 - b) 50% probability to get the results corrected
 - c) Probably results will remain same at the ± 2 SD
 - d) All the above

10. Lyophilized serum is advantageous as quality control material because
 - a) it is in liquid form which is ready made to be used.
 - b) it can be stored at room temperature.
 - c) it is stable for longer period at 2-8°C.
 - d) it is not effected by light.

11. Haemostatic Process includes:
 - a) Primary hemostasis:
 - b) Coagulation cascade
 - c) Fibrinolysis
 - d) All of the above

12. Normal value of hemoglobin for adult male:
 - a) 14-16g/dl
 - b) 13-15 g/dl
 - c) 14-15 g/dl
 - d) 13-16 g/dl

13. The average volume of blood in adult human is:
 - a) 3 liters of blood
 - b) 10 liters of blood
 - c) 5 liters of blood
 - d) 15 liters of blood

14. 45% of total blood volume is made up of:
 - a) Buffy coat
 - b) Red blood cell
 - c) Plasma
 - d) Formed elements

15. More than 95% of plasma proteins are synthesized by :
 - a) Liver
 - b) Bone marrow
 - c) Kidney
 - d) Any organ

16. The normal average life span of RBC is:
 - a) 110 days
 - b) 80 day
 - c) 120 days
 - d) It depends on individual RBC

17. Normal range of RBC count at birth is:
 - a) 6-7 million/cumm
 - b) 5-6 million/cumm
 - c) 4.5-5.5 million/cumm
 - d) 5-7 million/cumm

18. Which of the following does not kill endospores?
 - a) Autoclave
 - b) Incineration
 - c) Hot air sterilization
 - d) Free flowing steam

19. Which type of biological safety cabinet must be used when handling risk group-3 organisms?
 - a) Class I biological safety cabinet
 - b) Class III biological safety cabinet
 - c) Class II biological safety cabinet
 - d) Clean bench (Laminar flow)

20. All of the following are true with regard to bacteria EXCEPT
 - a) They are single-celled or prokaryotes.
 - b) Most have a rigid cell wall made of cellulose.
 - c) They multiply by binary fission.
 - d) Many have flagella for movement.

21. Example of Chemoautroph bacteria is:
 - a) Thiobacillus
 - b) E.coli
 - c) Klebsiella pneumoniae
 - d) Staphylococcus aureus

22. The usual infective stage of malaria to man is the
- gametocytes
 - sporozoites
 - schizonts
 - merozoites
23. Which of the following animals would be most likely to serve as a source of *Taenia saginata* in humans?
- Cattle
 - Bear
 - Sheep
 - Deer
24. The first IV transfusion was performed
- by Galen in the 3rd century AD in a gladiator.
 - from Calf to Man by Denys in the 1660s.
 - in the battle of Gettysburg in the American Civil War by the Confederates.
 - in the first Battlefield transfusion in the Boulogne Casualty Station 1870 by the French.
25. Choose the correct properties of Cryo precipitate.
- It is rich in Factor IX.
 - It is rich in Fibrinogen and Factor VIII.
 - It is a pasteurized product and not made from UK plasma.
 - It is the preferred treatment for coagulation factor deficiencies.
26. The most likely transfusion transmitted infection in Bhutan is:
- HIV
 - Yersinia Enterocolitica*
 - Hepatitis B
 - Hepatitis C
27. The largest cells are typically found in which of the following?
- Low grade Squamous intraepithelial lesion (LSIL)
 - High grade squamous intraepithelial lesion (HSIL)
 - Squamous cell carcinoma
 - Adenocarcinoma
28. All of following features are helpful in diagnosing dysplasia EXCEPT
- Prominent nucleolus
 - Nuclear enlargement
 - Nuclear hyperchromasia
 - Coarsening and clumping of chromatin

29. Within the cell, DNA is found in the nucleus. Which of the other structures within the cell listed below normally contains DNA as well?
- Peroxisome
 - Mitochondrion
 - Golgi apparatus
 - Smooth ER
30. Steroid synthesis occurs within which of the following structure?
- Peroxisome
 - Mitochondrion
 - Golgi apparatus
 - Smooth ER

PART II – Short Answer Questions (20 marks).

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

- Describe principle, procedure and interpretation of gram stain technique.
- Define coagulation and draw a flow diagram of coagulation cascade.
- Draw a flow chart to show steps of blood processing for transfusion.
- Describe the blood collection procedures (break down the procedures into 15 steps).

SECTION B

Case Study

Choose either Case I OR Case II from this Section. Each Case carries 50 marks.

Case I

In the Biochemistry and Hematology sections at JDWNRH, laboratory Incharges establish their Internal Quality control for glucose level I using the control results for 12 consecutive days as shown in the table. The control results of 12 days are trimmed at $\pm 2SD$ or by using CLIA CV. Daily IQC results are plotted on LJ chart and Westgard's Multi-QC rules are used for detection of the errors.

1. Complete the table and calculate the following parameters using the data given in the table.

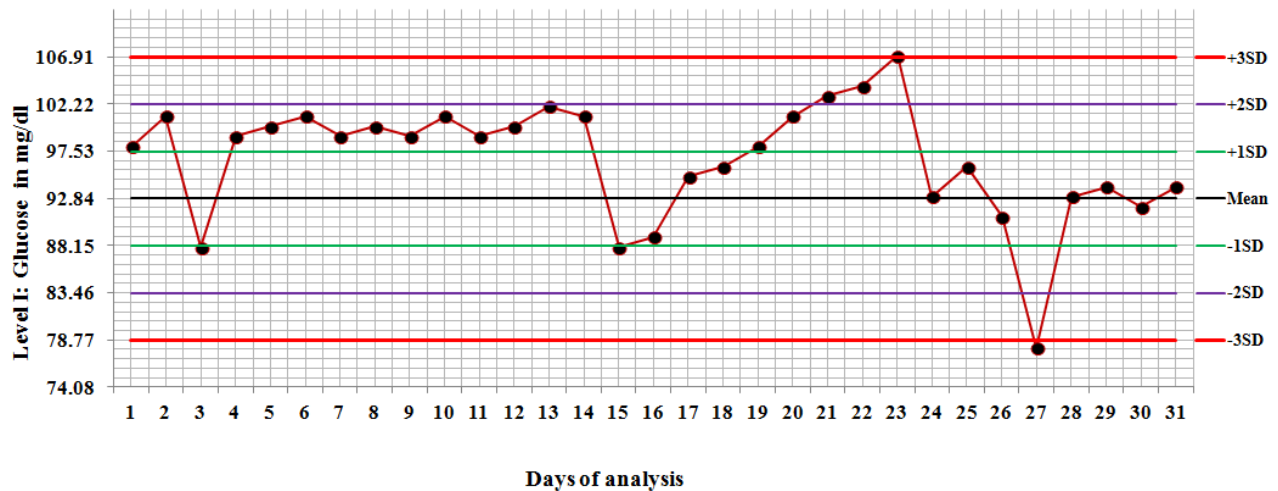
(30 marks)

Correct steps of calculation and unit should be shown for each parameter:

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

Days	Xi (g/dl)	$Xi - \bar{X}$	$(Xi - \bar{X})^2$
1	98		
2	101		
3	88		
4	89		
5	95		
6	87		
7	96		
8	91		
9	96		
10	93		
11	94		
12	86		

2. Following L-J chart has been generated using the quality control level I. Name 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. (20 marks)



Case II

25-year-old man visited Jigme Dorji Wangchuk National Referral Hospital (JDWNRH) with the following complaints:

- Coughing that lasted about 2 weeks.
- Coughing up blood.
- Chest pain or pain with breathing or coughing.
- Unintentional weight loss appetite.
- Fatigue, fever and night sweats with chills.

Doctor suspected pulmonary tuberculosis and advised the patients for sputum examination. Patient is received at your laboratory unit. Describe the laboratory diagnosis of Pulmonary Tuberculosis.

Description should include the following points: (50 marks)

1. Causative agent
2. Mode of transmission
3. Specimen
4. Specimen Collection
5. Methods of diagnosis
6. Materials and reagents
7. Procedure for sputum microscopy
8. Examination of the slides
9. Interpretation
10. List of other methods for confirmation of TB and MDR-TB.

TASHI DELEK