

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

PAPER III: SUBJECT SPECIALISATION PAPER FOR OT TECHNOLOGY

Date	: October 7, 2023
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 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 - 50 Multiple Choice Questions
Part II - 4 Short Answer Questions
All questions under SECTION A are COMPULSORY.
 - **SECTION B** consists of two Case Studies of 30 marks each. 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 hand over the Answer Booklet to the Invigilator before leaving the examination hall.**
10. This paper has **10 printed pages**, including this instruction page.

GOOD LUCK

SECTION A

PART I: Multiple Choice Questions [50 marks]

Choose the correct answer and write down the letter of your chosen answer in the Answer Booklet against the question number e.g. 51 (d). Each question carries ONE mark. Any double writing, smudgy answers or writing more than one choice shall not be evaluated.

1. Identify the device



- a) Modification of Mapleson A circuit
 - b) Modification of Mapleson B circuit
 - c) Modification of Mapleson D circuit
 - d) Modification of Mapleson C circuit
2. The main function of spirometer or respirometer is to
- a) measure the exhaled tidal volume.
 - b) measure the efficiency.
 - c) monitor how effective of the breathing circuit is.
 - d) All of the above
3. From Essential Features Low oxygen pressure alarm causes
- a) Prevent oxygen delivery of less than 21%
 - b) Rapidly refill or flush the breathing circuit
 - c) Detect oxygen supply failure at the common gas outlet
 - d) Prevent hypoxia in the event of proximal gas leak
4. Which among the following is correct with respect to the composition of soda lime?
- a) Ca(OH)_2 94 %
 - b) B Na(OH)_2 94%
 - c) C K(OH)_2 94%
 - d) D All of the above

5. What is the pressure of a gaseous mixture finally delivered to the patient through machine outlet?
 - a) 5-7 PSI
 - b) 6-7 PSI
 - c) 5-6 PSI
 - d) 4-5 PSI

6. Which among the following circuits is also called as Jackson and Rees circuit?
 - a) Circuit D
 - b) Circuit C
 - c) Circuit E
 - d) Circuit F

7. MRI compatible cylinders are made up of
 - a) Molybdenum Steel
 - b) Chromium
 - c) Aluminium
 - d) All of the above

8. Half-life of a drug is defined as
 - a) half way to the expiration date for a drug.
 - b) the time it takes the body to eliminate 50% of a drug.
 - c) the dose of drug that is effective in 50% of patients.
 - d) None of the above

9. What is pharmacodynamics?
 - a) The effect of the drug on the body
 - b) Drugs acting on a cell
 - c) Drugs acting on a molecular level
 - d) All of the above

10. Which of the following is **TRUE** about how blood flows through the heart?
 - a) RV to RA to pulmonary artery to LV to LA to aorta
 - b) RA to RV to pulmonary artery to LA to LV to aorta
 - c) RA to LV to pulmonary artery to LA to LV
 - d) None of the above

11. Which of the following factors DO NOT affect the force of contraction of the heart?
 - a) The AV node
 - b) Preload
 - c) Contractility
 - d) Drugs

12. Beta-blockers can be used to treat
 - a) Tachycardia
 - b) Low blood pressure
 - c) Severe heart failure
 - d) All of the above

13. What is the main muscle of respiration?
- a) Diaphragm
 - b) External intercostal muscle
 - c) Internal intercostal muscle
 - d) Sternocleidomastoid
14. Which monitor is **NOT** used to monitor ventilation?
- a) End-tidal carbon dioxide
 - b) Esophageal stethoscope
 - c) Arterial blood gas
 - d) Central venous pressure
15. When providing moderate sedation for a patient, the anesthesia provider is
- a) limited to using only oral medications.
 - b) expecting the patient to be able to maintain his/her own airway.
 - c) not required to record frequent vital signs.
 - d) not required to perform a physical exam prior to the case.
16. The indications for tracheal intubation include all of the following **EXCEPT**
- a) A full stomach
 - b) External compression from a mass or bleeding
 - c) Inadequate spontaneous ventilation
 - d) General anesthesia for prolonged surgical procedures
17. Which is the primary reason to pad peripheral nerves when positioning patients?
- a) The pad improves blood flow.
 - b) The pad limits stretch of the nerve.
 - c) The pad increases strain on the nerve.
 - d) The pad distributes point pressure.
18. You are paged to the operating room and asked to assist in performing Sellick's maneuver for a rapid sequence induction. This involves
- a) applying pressure over the cricoid cartilage.
 - b) applying pressure over the thyroid cartilage.
 - c) applying pressure over the hyoid bone.
 - d) applying pressure over the sternum.
19. You are asked to assist in transporting a critically ill, intubated patient to the ICU. Which of the following will not be required to be taken during transportation?
- a) Transport monitor
 - b) Full oxygen cylinder
 - c) Full nitrous cylinder
 - d) Ambu bag
20. The Mallampati score is an assessment of the patient's
- a) Risk of aspiration
 - b) Risk of anesthesia
 - c) Ease of intubation
 - d) None of the above

21. ASA standard monitors include all **EXCEPT**
- Pulse oximeter
 - Blood pressure
 - Electrocardiogram
 - Radial arterial line
22. Which of the following would **NOT** be required to be available during placement of a routine peripheral nerve block?
- Ultrasound machine with gel
 - Sterile prep
 - X-ray equipment (e.g., fluoroscopy)
 - Basic monitoring equipment
23. Why are O-negative patients considered universal donors?
- They have a lower hematocrit.
 - They lack Rh (D) antigen.
 - They lack antigens on their cell surfaces.
 - They provide extra factor VII.
24. Which of the following are health care–related infections?
- Community-acquired pneumonia
 - Contrast-induced nephropathy
 - Central line–associated sepsis
 - All of the above
25. What is the best definition of a pathogen?
- A microscopic organism that lives in mutual symbiosis with its host
 - Any bacteria, virus, or fungus that is capable of living in the environment without any host
 - A microorganism capable of causing disease
 - Human stem cells that can infect another human
26. Which of the following is the process that kills all bacterial life forms, including spores?
- Disinfection
 - Sterilization
 - Decontamination
 - Sanitation
27. Which one of the following is an example of a critical item, according to the Spaulding classification system?
- Laryngoscope blade
 - Pulse oximeter
 - IV catheter
 - Nasopharyngeal airway
28. The use of special filters and single-use breathing circuits are always indicated in patients with
- Known spongiform encephalopathy infection
 - Proven HIV
 - Both (a) and (b)
 - Both (a) and (c)

29. You are scheduled to work at your hospital's ambulatory surgery center on Monday morning. As you start setting up equipment for the first case, you notice that the anesthesia machine is on and the oxygen is flowing at 10 L/min. You note that the operating room had not been in use since the previous Thursday when the surgery center was last open. What should you do?
- Turn off the oxygen. Finish setting out equipment for this room and then continue setting up the rest of the rooms for the day.
 - Turn off the machine and the oxygen. Finish setting out equipment for this room and then continue setting up the rest of the rooms for the day.
 - Do not touch the machine. Finish setting out equipment for this room and then continue setting up the rest of the rooms for the day.
 - Replace the CO₂ canister. Finish setting out equipment for this room and then continue setting up the rest of the rooms for the day.
30. The Pin Index Safety System is designed for which of the following purpose?
- To prevent the gas hose from one gas to be connected to another
 - To prevent the backflow of gas from one cylinder to another
 - To prevent the placement of gas cylinder onto the wrong yoke
 - To allow the quick release/connection of gas hoses to the machine
31. Piped gas pressure should be
- 20–25 psig
 - 30–35 psig
 - 40–45 psig
 - 50–55 psig
32. Which of the following statements about filling an isoflurane vaporizer with sevoflurane are **TRUE**?
- Agent monitors cannot detect different anesthetic agents.
 - The output of the vaporizer would be unchanged.
 - The output of the vaporizer would change.
 - The vaporizer would not output any vapor.
33. The majority of modern vaporizers have the following characteristics **EXCEPT**
- Agent-specific
 - Variable bypass
 - Temperature compensated
 - In-circuit
34. To be an effective anesthesia breathing system, a device must have
- A large reservoir
 - Low resistance
 - Low dead space
 - All of the above
35. Which item is **NOT** an indication of exhausted CO₂ absorbent?
- Change in color of granules
 - Increase in temperature of absorber
 - Moisture in the circuit
 - Increased inspired CO₂

36. Which of the following would correctly identify a leak in an oxygen flow tube?
- Positive-pressure leak check
 - Oxygen analyzer
 - Negative-pressure leak test
 - None of the above
37. You are called into a room because of problems with the end-tidal carbon dioxide tracing not going back to a baseline of “0.” Which of the following could cause this?
- Incompetent expiratory valve
 - Incompetent inspiratory valve
 - Exhausted soda lime granules
 - All of the above
38. Which of the following is **NOT** a feature of ALL common laryngeal airways?
- Inserted with a blind insertion technique
 - Allows passage of an endotracheal tube through the ventilation channel
 - Has a pharyngeal cuff or balloon to seal the pharynx
 - Intended for semiconscious, unconscious, or anesthetized patients
39. To adjust the brightness of the US image, which of the following controls on the US machine should be adjusted?
- Frequency
 - Focus depth
 - Depth
 - Gain
40. At the end of a long operation, a new anesthetist calls you into the operating room. The anesthetist tells you that he is trying to switch volatile anesthetic agents from sevoflurane to Isoflurane but is unable to turn the dial on the isoflurane vaporizer to turn it on. He currently has the sevoflurane vaporizer on. Both vaporizers are noted to be full of medication. The anesthetist wants to know if he needs a new vaporizer. What should you tell the anesthetist?
- Yes, the anesthetist needs a new vaporizer. You should be able to turn on both vaporizers at the same time to switch medications.
 - Yes, the anesthetist needs a new vaporizer. There must be a leak in the vaporizer as the anesthesia machine has a safety mechanism that prevents the vaporizer from turning on if there is a leak.
 - No, the vaporizer does not need to be replaced. You explain that there is a safety feature on the anesthesia machine that will not let him or her switch volatile anesthetics during an operation.
 - No, the vaporizer does not need to be replaced. You explain that there is a safety feature on the anesthesia machine that will not let more than one vaporizer from being open at a time.
41. US image formation at its most fundamental level involves a visual representation of the
- Direct measurement of the natural resonant frequencies of varying tissue compositions averaged over time
 - Indirect measurement of electromagnetic waves emitted by movement of ions across cellular membranes
 - Generation of sound waves by a piezoelectric element, the reflections of which are measured by the element and processed by a computer
 - Direct measurement of microscopic oscillations of molecules, filtered through a white noise generator

42. How does an AED differ from a manual external defibrillator?
- a) User is provided guidance about whether the cardiac rhythm should be treated with defibrillation.
 - b) External pacing is automatically started without any user input.
 - c) Shock is applied without any user input.
 - d) All of the above.
43. Prior to the delivery of a defibrillating shock with a manual defibrillator, the device must first be
- a) Charged
 - b) Synced
 - c) Paced
 - d) Analyzed
44. If a vaporizer accidentally gets knocked over and then used, would the concentration to the patient read differently than dialed?
- a) The patient only receives what is dialed.
 - b) The patient concentration would be greater.
 - c) The patient concentration would be less.
 - d) The patient will not receive any inhalational agent.
45. Head tilt, chin lift and jaw thrust maneuver in opening airway is also called as _____.
- a) A1:Triple maneuver
 - b) Heimlich maneuver
 - c) Brain maneuver
 - d) Magill's maneuver
46. Procedure 'crackling' of cylinder valve denotes
- a) a high pressure in cylinder.
 - b) escape of extra gases.
 - c) presence of crack in the cylinder valve.
 - d) momentarily opening of valve to clear dust in the outlet.
47. Reserve (emergency) oxygen cylinders on anesthesia machines are of which size?
- a) Size E
 - b) Size B
 - c) Size C
 - d) Size A
48. Use of "Bodock" in anesthesia machine is
- a) To seal between machine outlet and breathing circuit attachment
 - b) As a seal between small Cylinder and yoke assembly
 - c) As a seal or sealing washer of gas bottle in Goldman Halothane vaporizer
 - d) To seal leakage in Tubing
49. Hydraulic test of cylinders should be done after
- a) 20 months
 - b) 5 months
 - c) 60 months
 - d) 10 years

50. Glutaraldehyde is effective against which class of organisms?
- spores
 - viruses
 - Fungi
 - All of the above

PART II – Short Answer Questions [20 marks]

This part has 4 Short Answer Questions and all are compulsory. Each question carries 5 marks.

1. Explain any of the five patient positions and describe its advantages of application and injuries caused by impractical positioning during the surgeries in operation theatre. **(5 marks)**
2. Discuss the importance of conduct of Pre-Anesthesia Assessment checkup and include all necessary medical investigation required to carry out for assessment. **(5 marks)**
3. The concept of patient safety is primary focus for health care professionals both in terms of diagnostic or therapeutic treatment. Elaborate the concept using a principal word “Sterilization of all anesthetic equipment and devices used for the procedures. **(5 marks)**
4. Operation room number one has scheduled Pneumonectomy on fine Tuesday Morning. Discuss preparation of all necessary procedural requirement to carry out the surgery. **(5 marks)**

SECTION B: Case Study [30 marks]

Choose either CASE I OR CASE II from this section. Each case study carries 30 marks. Mark for each sub-question is indicated in the brackets.

CASE I

An obese male of 55-year-old, physically observed as pale appearance with Hb10mg and suspected internal abdominal bleeding is scheduled for routine laparotomy surgery. The pre-induction vital signs on operation table reads BP-130/90, Pulse-75, Arterial oxygen saturation- 97% with normal EKG reading. Blood transfusion and Invasive Blood Pressure monitor are planned procedure for managing and monitoring intra-operative blood lose.

1. Describe your plan of preparation including all anesthetic equipment and drugs required to setup and proceed the case. **(10 marks)**
2. How do you undertake the procedure for blood administration and mentions adverse reactions and complication related to blood products? **(5 marks)**
3. What are the necessary equipment and devices required to setup invasive blood pressure monitoring. And why it is recommended for the above procedure? **(10 marks)**
4. Describe post-operative care management and monitoring required and standard protocol to be followed while transferring from post-operative care unit to the respective ward. **(5 marks)**

CASE II

As a focal, you are assigned to setup functional operation theatre for upcoming Jetsun Pema Mother and Child Hospital under Jigme Dorji Wangchuk National Referral Hospital, Thimphu.

1. Describe 10 essential approaches for standard layout of operation room settings. **(10 marks)**
2. Explain in details the differences between the standard and modular operation room. **(5 marks)**
3. Anesthetic waste gas and explosive agents in the operation room are the concerned topic for both the patient and staff. List methods and measures used to reduce the side effects. **(5 marks)**
4. Describe the sterile technique and measures to maintain minimum load of micro-organism in operation room. **(5 marks)**
5. What are the common occupational hazards encountered in operation room. **(5 marks)**

TASHI DELEK