IMMUNOHAEMATOLOGY

MEDICAL TECHNICIAN SYLLABUS

Effective February 2019 for examinations from August 2020

Contents

IMMUNOHAEMATOLOGY TECHNICIAN - THEORY

SECTION ONE

STATUTORY REGULATIONS

On completion of this section the learner must be able to explain regulatory requirements as defined by:

- Standards for the Practice of Blood Transfusion in South Africa
- Clinical Guidelines
- Occupational Health and Safety Act
- National Health Act
- National Road Act
- International Air Transport Association Requirements
- Health Professions Act

SECTION TWO

ETHICS

On completion of this section the learner must:

2.1 Explain the concepts of:

- Business ethics
- Confidentiality
- Informed consent
- Documentation of Laboratory Results
- Code of Conduct in the Laboratory Environment

2.2 Be able to discuss Medical Ethics

SECTION THREE

CUSTOMER SERVICE

On completion of this section the learner must:

3.1 Be able to discuss the concepts of customer service

SECTION FOUR

SAFETY, HEALTH & ENVIRONMENT

On completion of this section the learner must:

4.1 Be able to explain the principles of Safety, Health and Environment (as pertaining to the Occupational Health and Safety Act)

4.2 Classify, segregate and dispose of waste (Biohazardous, sharps and general)

4.3 Be able to decontaminate equipment on a routine basis and / or after spillage or breakage

4.4 Be able to use appropriate personal protective equipment

4.5 Apply laboratory safety procedures

SECTION FIVE

LABORATORY EQUIPMENT

5.1 On completion of this section the learner must be able to:

Maintain and operate the following equipment:

Centrifuges

Thermometers

Laminar Flow Cabinets

Pipettes

Waterbaths/dry baths

Automated equipment

Refrigerators

Deep freezers

Processing equipment

Scales/Balances

5.2 Explain the importance of equipment and temperature monitoring processes

SECTION SIX

BLOOD COLLECTION

On completion of this section the learner must:

Describe the criteria for donor acceptance as indicated in the Standards for the Practice of Blood Transfusion in South Africa with regard to:

- Allogeneic donations
- Apheresis donations
- Autologous and Designated donations

SECTION SEVEN

DONATION TESTING

On completion of this section the learner must be able to:

Explain the principles of:

- ABO & Rh typing
- Antibody screening
- ABO Titre testing
- Enzyme-Linked Immunosorbent Assay (ELISA)
- Nucleic Acid Testing (NAT)
- Treponema Pallidum Haemagglutination Assay (TPHA)
- Polymerase Chain Reaction (PCR).

SECTION EIGHT

DONATION PROCESSING

On completion of this section, the learner must:
Be able to describe the product preparation methods, storage temperatures, shelf life and clinical indications for:

8.1 Cellular products

- Whole blood
  Standard whole blood
  Leuco-depleted whole blood
- Red cell concentrates
  Standard red cell (buffy-coat poor)
  Leuco-depleted
  Washed red cell
  Frozen red cell
  Paediatric
  Haemoconcentrates

- Platelet concentrates
  Apheresis
  Pooled
  Low titre Anti-T platelets
  Paediatric platelets

8.2 Learners must be able to explain the indications for and the process of irradiation of the above products

8.3 Plasma Products

Fresh frozen plasma
Cryo-poor plasma
Paediatric plasma
Low Anti-T titre plasma
Cryoprecipitate

8.4 Fractionated Blood Products

Immune serum globulin
Normal immunoglobulins
Factor VIII
Factor IX concentrates
Stabilized serum
Albumin
Freeze dried plasma

8.5 The importance of Blood Cold Chain Management

SECTION NINE

IMMUNOLOGY

9.1 On completion of this section the learner must be able to explain:

- Antigens and antibodies, including allo and auto antibodies
- Cellular and humoral response
- Primary and secondary immune response
- Active and passive immunity
- Complement
- Antigen/antibody reactions

SECTION TEN

GENETICS

On completion of this section the learner must be able to:

10.1 Define genetic terminology

10.2 Apply the laws of Mendelian inheritance as they apply to blood group genetics

SECTION ELEVEN

HAEMATOLOGY

On completion of this section the learner must be able to explain:

11.1 Anatomy and physiology of the circulatory system

11.2 The causes and treatments of shock

11.3 The characteristics and function of the principal constituents of blood

11.4 Abnormal levels of erythrocytes, leucocytes and thrombocytes

11.5 Haemostasis

SECTION TWELVE

BLOOD GROUP SYSTEMS

ABO BLOOD GROUP SYSTEM

On completion of this section the learner must be able to explain:

12.1 The inheritance of blood groups genes and antigenic expression
12.2 The Bombay phenotype
12.3 The clinical significance of the ABO blood group antigens and antibodies including subgroups
12.4 The Universal donor/recipient
12.5 Secretor status

Rh BLOOD GROUP SYSTEM

On completion of this section the learner must be able to explain:

12.6 The theories on the inheritance (Fisher-Race, Wiener, modern)
12.7 Rh nomenclatures
12.8 The clinical significance of the Rh blood group antigens and antibodies
12.9 D Variants (weak/partial)
12.10 The interpretation of the Rh phenotypes/genotypes

OTHER BLOOD GROUP SYSTEMS

On completion of this section the learner must be able to explain:

12.11 The clinical significance and characteristics of the antigens and antibodies of the Kell, Duffy, Kidd, I, P, MNSs and Lewis blood group systems.

SECTION THIRTEEN

HAEMOLYTIC DISEASE OF THE FOETUS/NEWBORN (HDFN)

On completion of this section the learner must be able to explain:

13.1 The pathogenesis for HDFN
13.2 Antenatal and postnatal sample receipt
13.3 Investigations and treatment options
13.4 Procedures to determine severity of HDFN
13.5 Prophylaxis

SECTION FOURTEEN

PRINCIPLES OF SEROLOGICAL TESTING

On completion of this section the learner must be able to discuss:

14.1 The nature and grading of agglutination:
Range: tests both manual and automated, including but not limited to: tube techniques (saline, enzyme and antiglobulin techniques), microwell, column agglutination technology, gel and magnetic beads, slide techniques)

14.2 Techniques for titration and antibody identification

14.3 The causes of false positive and false negative serological results.

SECTION FIFTEEN

COMPATIBILITY TESTING

On completion of this section the learner be able to apply the processes/procedures relating to:
15.1 Various types of crossmatch requests (major and minor)
15.2 Sample receipt
15.3 Importance of patient ABO and Rh typing
15.4 **Blood and product selection**
15.5 Interpretation of results
15.6 Causes of incompatibility and resolution
15.7 Labelling and issue of products
15.8 Record keeping
Be able to describe both manual and automated techniques

SECTION SIXTEEN

RISKS ASSOCIATED WITH BLOOD TRANSFUSION

On completion of this section the learner must be able to discuss:

16.1 The causes, nature and clinical significance of:

- Acute and delayed haemolytic transfusion reactions
- Febrile non-haemolytic transfusion reactions
- Allergic reactions
- Transfusion of contaminated blood
- Graft versus host disease (GVHD)
- Transfusion related acute lung injury (TRALI)
- Post Transfusion Purpura (PTP)
- Mechanical reactions
- Metabolic reactions
- Allo-immunization
- Complications associated with incorrect blood warming procedures

16.2 The risks associated with transmission disease:

- HIV
- Hepatitis B
- Hepatitis C
- Syphilis
- As well as those not routinely tested for:
  Creutzveldt Jakob disease (CJD)
  Malaria
  Cytomegalo virus
  Epstein Barr Virus

16.3 How to conduct an investigation following the report of an adverse reaction

16.4 The importance of look-back system

16.5 The haemovigilance programme

SECTION SEVENTEEN

QUALITY

On completion of this section the learner must be able to:

17.1 Explain the principles of QMS (Quality Management System)

17.2 Define and discuss the terms related to quality

IMMUNOHAEMATOLOGY -PRACTICAL

Practical and theoretical aspects must be integrated.

SECTION ONE

SAFETY HEALTH ENVIRONMENT (SHE)

On completion of this section the learner must be able to:

1.1 Classify, handle and dispose of hazardous material

1.2 Decontaminate laboratory equipment

1.3 Manage spillages and breakages

1.4 Demonstrate the correct use of personal protective equipment (PPE)
1.5 Apply safety precautions and procedures

SECTION TWO

LABORATORY EQUIPMENT

On completion of this section the learner must be able to demonstrate:

2.1 The procedures for operation and maintenance of the following equipment where applicable:

- Centrifuges
- Thermometers
- Laminar Flow Cabinets
- Pipettes
- Waterbaths/dry baths
- Automated equipment
- Refrigerators
- Deep freezers
- Processing equipment
- Temperature monitoring equipment
- Scales/balances

2.2 Monitoring of temperature control devices / equipment and procedures to be followed when temperatures are out of range

SECTION THREE

DONATION COLLECTION

The learner must observe:

The practical procedures relating to donor selection and blood collection

SECTION FOUR

DONATION PROCESSING

On completion of this section the learner must have observed or practiced:

The techniques used in the preparation of the components (Range includes but not limited to: Routine techniques for preparation of red cell concentrates, washed, leucocyte-depleted and paediatric concentrates, fresh frozen plasma, cryoprecipitate and random donor platelet concentrates).

SECTION FIVE

DONATION TESTING

Manual Donation Testing

On completion of the section the learner must be able to:

5.1 Manually group blood samples

5.2 Perform tests for weak A and weak D groups

5.3 Screen for irregular antibodies

5.4 Interpret donation testing results

Automated Donation testing

On completion of this section the learner must be able to explain:

5.5 The basic principles of automated donation testing
5.6 How to perform automated donation testing

5.7 How to interpret automated donation testing results

Transmissible disease testing

On completion of this section the learner must be able to describe:
5.8 The principles of tests for transmissible diseases
- HIV
- Hepatitis B
- Hepatitis C
- Syphilis

5.9 The maintenance and operation of automated equipment used in performing the tests
5.10 In**terpret**ation of **test results**

SECTION SIX

COMPATIBILITY TESTING

On completion of this section the learner must be able to:
6.1 Receive and register samples
6.2 Perform group and screen tests
6.3 Perform compatibility tests
6.4 Select blood for crossmatch
6.5 P**erform** problem compatibility tests
6.6 Interpret results

SECTION SEVEN

TRANSFUSION REACTION INVESTIGATION

On completion of this section the learner must be able to:
7.1 Inform medical staff of transfusion reaction protocols
7.2 Request samples and documents from the medical staff
7.3 Perform investigation:
Clerical checks
Visual checks
Perform necessary tests to investigate the transfusion reaction

SECTION EIGHT

ANTENATAL AND POSTNATAL TESTING

Routine testing on antenatal and postnatal samples

On completion of this section the learner must be able to:
8.1 Perform routine antenatal and postnatal tests
8.2 Apply different techniques for antibody identification and titration tests
8.3 Interpret results

SECTION NINE

QUALITY

Compliance to quality protocols must be applied to all procedures

RECOMMENDED REFERENCE MATERIAL

1. Standards for Practice of Blood Transfusion in South Africa - Latest edition

2. Clinical Guidelines for the Use of Blood Products in South Africa - Latest Edition

3. Applied Blood Group Serology
   P Issit Latest edition

4. AABB Technical Manual
   AABB Latest edition5. Modern Blood Banking and Transfusion Practices
   D.M. Harmening Latest Edition

6. Human Blood Groups
   Geoff Daniels Latest Edition

7. Immunohaematology
   Eva Quinley Latest Edition

8. Mollison's Blood Transfusion in Clinical Medicine
   H.G. Klein & D. J. Anstey Latest Edition

9. ISBT series Volume 3
   B. Armstrong, J. Hardwick, L. Raman, E. Smart & E. Wilkinson

10. Practical Transfusion Medicine
    M.F. Murphy & D.H. Pamphillon Latest Edition