शहीद धर्मभक्त राष्ट्रिय प्रत्यारोपण केन्द्र
मानव अङ्ग प्रत्यारोपण विकास समिति, प्रविधिक सेवा, मेडिकल ल्याब टेक्नोलोजी समूह, सातौं तह, ल्याब टेक्नोलोजिष्ट
पदको खुला प्रतियोगितात्मक परीक्षाको पाठ्यक्रम
एवं परीक्षा योजना

यस पाठ्यक्रम योजनालाई दुई चरणमा विभाजन गरिएको छ :

प्रथम चरण :– लिखित परीक्षा (Written Examination) पूर्णाङ्क :– २००

द्वितीय चरण :– अन्तर्वार्ता (Interview) पूर्णाङ्क :– ३०

प्रथम चरण (First Phase) : <u>लिखित परीक्षा योजना (Written Examination Scheme)</u>

पत्र	विषय	पूर्णाङ्क	उतीर्णाङ्क	परीक्षा प्रणाली		प्रश्नसंख्या X अङ्क	समय
प्रथम	Technical Subject (Medical Lab Technologist)	१००	४०	वस्तुगत	बहुवैकल्पिक प्रश्न	१०० प्रश्न x १ अङ्क	१ घण्टा ३० मिनेट
द्वितीय		१००	४०	विषयगत	छोटो उत्तर आउने प्रश्न	४ प्रश्न X ५ अङ्क	३ घण्टा
					लामो उत्तर आउने प्रश्न	८ प्रश्न X १०अङ्क	

द्वितीय चरण (Second Phase): अन्तर्वार्ता (Interview)

विषय	पूर्णाङ्क	परीक्षा प्रणाली
अन्तर्वार्ता	३०	मौखिक

<u>द्रष्टव्य</u> :

१. लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुन सक्नेछ ।
२. प्रथम र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।
३. लिखित परीक्षामा सोधिने **प्रश्नसंख्या र अङ्कभार** यथासम्भव सम्बन्धित पत्र/विषयमा दिईए अनुसार हुनेछ ।
४. वस्तुगत बहुवैकल्पिक (Multiple Choice) प्रश्नहरू को गलत उत्तर दिएमा प्रत्येक गलत उत्तर बापत २० प्रतिशत अङ्क कट्टा गरिनेछ । तर उत्तर नदिएमा त्यस बापत अङ्क दिइने छैन र अङ्क कट्टा पनि गरिने छैन ।
५. वस्तुगत बहुवैकल्पिक हुने परीक्षामा परीक्षार्थीले उत्तर लेख्दा अंग्रेजी ठूलो अक्षर (Capital letter) A,B,C,D मा लेख्नुपर्नेछ । सानो अक्षर (Small letter) a,b,c,d लेखेको वा अन्य कुनै सङ्केत गरेको भए सबै उत्तरपुस्तिका रद्द हुनेछ ।
६. बहुवैकल्पिक प्रश्नहरू हुने परीक्षामा कुनै प्रकारको क्याल्कुलेटर (Calculator) प्रयोग गर्न पाइने छैन ।
७. विषयगत प्रश्नहरू को हकमा एउटा लामो प्रश्न वा एउटै प्रश्नका दुई वा दुई भन्दा बढी भाग (Two or more parts of a single question) वा एउटा प्रश्न अन्तर्गत दुई वा बढी टिप्पणीहरू (Short notes) सोध्न सकिने छ ।
८. विषयगत प्रश्न हुने पत्रमा प्रत्येक खण्डका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरू हुनेछन् । परीक्षार्थीले प्रत्येक खण्डको प्रश्नको उत्तर सोही खण्डको उत्तरपुस्तिकामा लेख्नुपर्नेछ ।
९. यस पाठ्यक्रम योजना अन्तर्गतका पत्र/विषयका विषयवस्तुमा जुन सुकै कुरा लेखिएको भए तापनि पाठ्यक्रममा परेका कानून, ऐन, नियम, विनियम तथा नीतिहरू परीक्षाको मिति भन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाईएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्क्रममा परेको सम्झनु पर्दछ ।
१०. प्रथम चरणको परीक्षाबाट छनौट भएका उम्मेदवारहरू लाई मात्र द्वितीय चरणको परीक्षामा सम्मिलित गराइनेछ ।
११. **पाठ्यक्रम स्वीकृत मिति :- २०८१/०८/०४**

शहीद धर्मभक्त राष्ट्रिय प्रत्यारोपण केन्द्र

मानव अङ्ग प्रत्यारोपण विकास समिति, प्रविधिक सेवा, मेडिकल ल्याब टेक्नोलोजी समूह, सातौं तह, ल्याब टेक्नोलोजिष्ट पदको खुला प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

Paper I

Technical subject

1. **Hematology : 15 Marks**
   - 1.1 Cleaning of glasswares and safety precaution in the laboratory
   - 1.2 Collection and preservation of different samples for the laboratory
   - 1.3 Preparation of chemicals and different stains for the hematological tests
   - 1.4 Quality control in the laboratory
   - 1.5 Formation and development of Erythrocytes, Leucocytes, thrombocytes
   - 1.6 Principle and clinical procedure for
     - 1.6.1 Hemoglobin estimation and it's standard curve calibration
     - 1.6.2 Total count of White Blood Cells, Red Blood Cell, Platelets and reticulocytes
     - 1.6.3 Erythrocyte Sedimentation Rate, Bleeding Time, Clotting Time and Red Blood Cell indices
     - 1.6.4 Fetal haemoglobin estimation
     - 1.6.5 Coomb's tests
     - 1.6.6 Blood banking & Transfusion
     - 1.6.7 Coagulation profile (mechanism, disorder & investigations)
     - 1.6.8 Tissue parasite
   - 1.7 Characteristics of Anemia, Thalassaemia & Haemoglobinopathies
   - 1.8 Principle and procedure of Hemoglobin electrophoresis
   - 1.9 Preparation of reagents for special haematological investigation
   - 1.10 Water Disposal and Total Quality Management

2. **Microbiology : 15 Marks**
   - 2.1 Bacteriology
     - 2.1.1 Classification of medically important bacteria
     - 2.1.2 Characteristics of Microorganism: Prokaryotes, Eukaryotes, Viruses
     - 2.1.3 Bacterial growth and nutritional requirements, uptake of nutrients, growth phages and sporulation
     - 2.1.4 Antimicrobial drugs and their mode of actions with reference to cell wall, cell membrane, Nucleic acid and protein synthesis
     - 2.1.5 Different methods of sterilization and disinfections
     - 2.1.6 Preparation of different media and ingredients uses and interpretation
     - 2.1.7 Preparation of chemicals and stains
     - 2.1.8 Cultural procedure of different samples aerobically and anaerobically
     - 2.1.9 Identification of bacteria and confirmative tests serologically and biochemically
     - 2.1.10 Different staining methods of bacteria and their principles
     - 2.1.11 Tuberculosis Bacteriology and skin scraping for Acid Fast Bacilli
     - 2.1.12 Water bacteriology
     - 2.1.13 Cerebrospinal Fluid and cavity fluids for culture
   - 2.2 Virology
     - 2.2.1 Classification of medically important viruses and mode of infection
     - 2.2.2 Characteristic of viruses, nature of viruses, viral structure and replication
     - 2.2.3 Definition of Ribonucleic acid and Deoxyribonucleic acid viruses
     - 2.2.4 Principle and methods of serological procedure for Hepatitis C virus, Human Immunodeficiency Virus, Hepatitis B Virus and Hepatitis E Virus.
   - 2.3 Parasitology
     - 2.3.1 Classification of medically important
       - 2.3.1.1 Protozoal parasites
       - 2.3.1.2 Helminthic parasites

2.3.1.3 Blood parasites
2.3.1.4 Semen analysis
2.3.2 Methods of identification of different parasites from stool samples by
2.3.2.1 Wet preparation
2.3.2.2 Concentration methods
2.3.2.3 Cultural methods
2.3.3 Method of identification of blood parasites
2.3.4 Routine Examination and special test in Urine
2.4 Mycology
2.4.1 Identification of superficial, deep & systemic mycosis
2.4.2 Opportunistic mycosis
2.4.3 Examination and identification by different method and culture
2.5 Water Disposal and Total Quality Management

3. **Biochemistry: 20 Marks**
3.1 Preparation of normal and molar solution
3.2 Preparation of different reagents required for biochemical test
3.3 Colorimeter and spectrophometer
3.4 Carbohydrate metabolism:
3.4.1 Glycolysis
3.4.2 Glycogenesis
3.4.3 Glycogenolysis
3.4.4 Pentose phosphate pathway
3.4.5 Kreb's cycle
3.4.6 Gluconeogenesis
3.5 Protein metabolism
3.5.1 Transamination
3.5.2 Deamination
3.5.3 Urea cycle
3.5.4 Nitrogen balance
3.5.5 Creatinine and creatinine formation
3.6 Lipid metabolism
3.6.1 Oxidation
3.6.2 beta-oxidation
3.6.3 Ketone bodies formation and their utilization
3.6.4 Ketosis
3.6.5 Cholesterol and triglycerides synthesis
3.7 Hormone
3.7.1 Introduction
3.7.2 Types
3.7.3 Origin
3.7.4 Definition
3.7.5 Classification
3.7.6 Regulation
3.7.7 Measurement by various methods including Radio Immunoassay, Enzyme Immunoassay
3.8 Principle and procedure of different methods for the estimation of biochemical tests
3.8.1 Sugar, Urea, Creatinine, Uric Acid, Bilirubin, Serum Glutamic Pyruvic Transaminase, Serum Glutamic Oxaloacetic Transaminase, Alkaline Phosphatase, Lipid profile,

Cardiac profile, Renal function test, Liver Function Test, Clearance study, Amylase & Electrolytes

3.8.2 Cavity fluids examination
3.8.3 Cerebrospinal Fluid examination
3.8.4 24 hours Urine Protein

4. **Histology/cytology: 10 Marks**
   4.1 Preparation of different types of fixatives and their uses
   4.2 Methods of decalcification
   4.3 Methods of processing of tissues to prepare paraffin block tissue
   4.4 Description of different types of microtomes, their principles and methods of cutting section from the paraffin block tissue
   4.5 Preparation of routine and special histological and cytological stains and staining procedure
   4.6 Principles and methods of staining and mounting the tissue section on the glass slides

5. **Immunology: 10 Marks**
   5.1 Principle and procedure for the estimation of:
      5.1.1 Rapid Plasma Reagin and venereal disease research laboratory Test
      5.1.2 Rheumatoid factor
      5.1.3 C-Reactive Protein
      5.1.4 TORCH Range
      5.1.5 Cancer Marker
      5.1.6 Agglutination Reaction
      5.1.7 Precipitation Reaction
      5.1.8 Flocculation Reaction
      5.1.9 Enzyme Linked Immunosorbent Assay
      5.1.10 Chemiluminescence Immunoassay
6. **Organ donation and transplantation: 20 Marks**
   6.1 Concept of organ donation, transplantation and immunology in organ transplantation
   6.2 Laboratory tests, principle and interpretation of immunological tests for transplantation
      6.2.1 Donor Specific Antibody/ Pannel Reactive Antibody
      6.2.2 Complement Dependent Cytotoxicity (CDC) Cross match
      6.2.3 Human Leucocyte Antigen (HLA) typing
   6.3 Laboratory screening methods for organ donors and recipients
   6.4 Drugs used in transplantation and monitoring the drugs in patients

7. **Human Organ Transplant Act and Regulations : 10 Marks**
   7.1 Human Organ Transplantation (Regulation and Prohibition) Act, 2055 with amendment.
   7.2 Human Organ Transplantation Regulations, 2073
   7.3 Guidelines on medical treatment of deprived citizens program, 2080
   7.4 Human Organ Transplant Development Committee Personnel Administration Rules, 2069 (मानव अंग प्रत्यारोपण विकास समिति कर्मचारी प्रशासन नियमवाली,२०६९)
   7.5 Human Organ Transplant Development Committee Formation Order, 2068 (मानव अंग प्रत्यारोपण विकास समिति गठन आदेश,२०६८)
   7.6 General knowledge about Shahid Dharmabhakta National Transplant Center

शहीद धर्मभक्त राष्ट्रिय प्रत्यारोपण केन्द्र
मानव अङ्ग प्रत्यारोपण विकास समिति, प्रविधिक सेवा, मेडिकल ल्याब टेक्नोलोजी समूह, सातौं तह, ल्याब टेक्नोलोजिष्ट पदको खुला प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

Paper II
Technical subject

Section A

Short Question	2 Question × 5 Marks = 10 Marks	**50 Marks**
Long Question	4 Question × 10 Marks = 40 Marks	

1. Hematology: 15 Marks

1.1 Cleaning of glasswares and safety precaution in the laboratory
1.2 Collection and preservation of different samples for the laboratory
1.3 Preparation of chemicals and different stains for the hematological tests
1.4 Quality control in the laboratory
1.5 Formation and development of Erythrocytes, Leucocytes, thrombocytes
1.6 Principle and clinical procedure for
- 1.6.1 Hemoglobin estimation and it's standard curve calibration
- 1.6.2 Total count of White Blood Cells, Red Blood Cell, Platelets and reticulocytes
- 1.6.3 Erythrocyte Sedimentation Rate, Bleeding Time, Clotting Time and Red Blood indices
- 1.6.4 Fetal haemoglobin estimation
- 1.6.5 Coomb's tests
- 1.6.6 Blood banking & Transfusion
- 1.6.7 Coagulation profile (mechanism, disorder & investigations)
- 1.6.8 Tissue parasite

1.7 Characteristics of Anemia, Thalassaemia & Haemoglobinopathies
1.8 Principle and procedure of Hemoglobin electrophoresis
1.9 Preparation of reagents for special haematological investigation
1.10 Water Disposal and Total Quality Management

2 Microbiology: 15 Marks

2.1 Bacteriology
- 2.1.1 Classification of medically important bacteria
- 2.1.2 Characteristics of Microorganism: Prokaryotes, Eukaryotes, Viruses
- 2.1.3 Bacterial growth and nutritional requirements, uptake of nutrients, growth phages and sporulation
- 2.1.4 Antimicrobial drugs and their mode of actions with reference to cell wall, cell membrane, Nucleic acid and protein synthesis
- 2.1.5 Different methods of sterilization and disinfections
- 2.1.6 Preparation of different media and ingredients uses and interpretation
- 2.1.7 Preparation of chemicals and stains
- 2.1.8 Cultural procedure of different samples aerobically and anaerobically
- 2.1.9 Identification of bacteria and confirmative tests serologically and biochemically
- 2.1.10 Different staining methods of bacteria and their principles
- 2.1.11 Tuberculosis Bacteriology and skin scraping for Acid Fast Bacilli
- 2.1.12 Water bacteriology
- 2.1.13 Cerebrospinal Fluid and cavity fluids for culture

2.2 Virology
- 2.2.1 Classification of medically important viruses and mode of infection
- 2.2.2 Characteristic of viruses, nature of viruses, viral structure and replication

2.2.3 Definition of Ribonucleic acid and Deoxyribonucleic acid viruses
2.2.4 Principle and methods of serological procedure for Hepatitis C virus, Human Immunodeficiency Virus, Hepatitis B Virus and Hepatitis E Virus.

2.3 Parasitology
- 2.3.1 Classification of medically important
  - 2.3.1.1 Protozoal parasites
  - 2.3.1.2 Helminthic parasites
  - 2.3.1.3 Blood parasites
  - 2.3.1.4 Semen analysis
- 2.3.2 Methods of identification of different parasites from stool samples by
  - 2.3.2.1 Wet preparation
  - 2.3.2.2 Concentration methods
  - 2.3.2.3 Cultural methods
- 2.3.3 Method of identification of blood parasites
- 2.3.4 Routine Examination and special test in Urine

2.4 Mycology
- 2.4.1 Identification of superficial, deep & systemic mycosis
- 2.4.2 Opportunistic mycosis
- 2.4.3 Examination and identification by different method and culture

2.5 Water Disposal and Total Quality Management

3 Histology/cytology: 10 Marks

3.1 Preparation of different types of fixatives and their uses
3.2 Methods of decalcification
3.3 Methods of processing of tissues to prepare paraffin block tissue
3.4 Description of different types of microtome, their principles and methods of cutting section from the paraffin block tissue
3.5 Preparation of routine and special histological and cytological stains and staining procedure
3.6 Principles and methods of staining and mounting the tissue section on the glass slides

4 Immunology: 10 Marks

4.1 Principle and procedure for the estimation of:
- 4.1.1 Rapid Plasma Reagin and venereal disease research laboratory Test
- 4.1.2 Rheumatoid factor
- 4.1.3 C-Reactive Protein
- 4.1.4 TORCH Range
- 4.1.5 Cancer Marker
- 4.1.6 Agglutination Reaction
- 4.1.7 Precipitation Reaction
- 4.1.8 Flocculation Reaction
- 4.1.9 Enzyme Linked Immunosorbent Assay
- 4.1.10 Chemiluminescence Immunoassay

4.2. Transplant Pharmacology
- 4.2.1 Immunosuppressants
- 4.2.2 Antimicrobial agent (Antibiotic, Antiviral, Antifungal, Antiprotozoal agent)

Section B

Short Question	2 Question × 5 Marks = 10 Marks	**50 Marks**
Long Question	4 Question × 10 Marks = 40 Marks	

5 Biochemistry: 20 Marks

5.2 Preparation of normal and molar solution
5.3 Preparation of different reagents required for biochemical test
5.4 Colorimeter and spectrophometer
5.5 Carbohydrate metabolism:
- 5.5.1 Glycolysis
- 5.5.2 Glycogenesis
- 5.5.3 Glycogenolysis
- 5.5.4 Pentose phosphate pathway
- 5.5.5 Kreb's cycle
- 5.5.6 Gluconeogenesis

5.6 Protein metabolism
- 5.6.1 Transamination
- 5.6.2 Deamination
- 5.6.3 Urea cycle
- 5.6.4 Nitrogen balance
- 5.6.5 Creatinine and creatinine formation

5.7 Lipid metabolism
- 5.7.1 Oxidation
- 5.7.2 æ-oxidation
- 5.7.3 Ketone bodies formation and their utilization
- 5.7.4 Ketosis
- 5.7.5 Cholesterol and triglycerides synthesis

5.8 Hormone
- 5.8.1 Introduction
- 5.8.2 Types
- 5.8.3 Origin
- 5.8.4 Definition
- 5.8.5 Classification
- 5.8.6 Regulation
- 5.8.7 Measurement by various methods including RIA, EIA

5.9 Principle and procedure of different methods for the estimation of biochemical tests
- 5.9.1 Sugar, Urea, Creatinine, Uric Acid, Bilirubin, Serum Glutamic Pyruvic Transaminase, Serum Glutamic Oxaloacetic Transaminase, Alkaline Phosphatase, Lipid profile, Cardiac profile, Renal function test, Liver Function Test, Clearance study, Amylase & Electrolytes
- 5.9.2 Cavity fluids examination
- 5.9.3 C.S.F. examination
- 5.9.4 24 hours Urine Protein

6 Organ donation and transplantation: 20 Marks

6.2 Concept of organ donation, transplantation and immunology in organ transplantation
6.3 Laboratory tests, principle and interpretation of immunological tests for transplantation

6.3.1 Donor Specific Antibody/ Pannel Reactive Antibody
6.3.2 Complement Dependent Cytotoxicity (CDC) Cross match
6.3.3 Human Leucocyte Antigen typing
6.3.4 Antineutrophil Cytoplasmic Antibody

6.4 Laboratory screening methods for organ donors and recipients
6.5 Drugs used in transplantation and monitoring the drugs in patients

7 Human Organ Transplant Act and Regulations : 10 Marks

7.2 Human Organ Transplantation (Regulation and Prohibition) Act, 2055 with amendment.
7.3 Human Organ Transplantation Regulations, 2073
7.4 Guidelines on medical treatment of deprived citizens program, 2080
7.5 Human Organ Transplant Development Committee Personnel Administration Rules, 2069 (मानव अंग प्रत्यारोपण विकास समिति कर्मचारी प्रशासन नियमवाली,२०६९)
7.6 Human Organ Transplant Development Committee Formation Order, 2068 (मानव अंग प्रत्यारोपण विकास समिति गठन आदेश,२०६८)
7.7 General knowledge about Shahid Dharmabhakta National Transplant Center