शहीद गंगालाल राष्ट्रिय हृदय केन्द, पदपुर्ति समिति

पद : परफ्युजन सहायक (सेवा -प्राविधिक, समूह - मेडिकल, उप-समूह - कार्डियोभास्कुलर सर्जरी)

रा.प.अनं प्रथम (ख) को खुल्ला /आन्तरिक प्रतियोगितात्मक लिखित 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>**

| Paper | Subject | Full Marks | Pass Marks | No. Questions & Weightage | Time Allowed |
|---|---|---|---|---|---|
| I | Technical Subject | 100 | 40 | (Objective Multiple Choice Questions) 50× 2 = 100 | 1.00 hrs |
| II | | 100 | 40 | (Subjective Descriptive Type) 8 × 5 = 40 (Short answer) 6× 10 = 60 (Long answer) | 3.00 hrs |

**द्वितीय चरण** (Second Phase)

| Subject | Full Marks | Examination |
|---|---|---|
| Interview | 30 | Oral |

**<u>द्रष्टव्य</u> :**

१. लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुनेछ ।

२. प्रथम र द्वितीय पत्रको विषयवस्तु एउटै हुनेछ । तर प्रथम र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।

३. वस्तुगत बहुवैकल्पिक (Multiple Choice) प्रश्नहरुको 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 ।

४. परीक्षार्थीले वस्तुगत बहुवैकल्पिक प्रश्नको 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 ।

५. बहुवैकल्पिकप्रश्नहरु हुने परीक्षामा कुनै प्रकारको क्याल्कुलेटर (Calculator) प्रयोग गर्न पाइने छैन ।

६. विषयगत प्रश्नहरुको हकमा एउटै प्रश्नका दुई वा दुई भन्दा बढी भाग (Two or more parts of a single question) वा एउटा प्रश्न अन्तर्गत दुई वा बढी टिप्पणीहरु (Short notes) सोध्न सकिने छ ।

७. विषयगत प्रश्नमा प्रत्येक पत्र/विषयका प्रत्येक खण्डका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरु हुनेछन् । परिक्षार्थीले प्रत्येक खण्डका प्रश्नहरुको उत्तर सोही खण्डका उत्तरपुस्तिकामा लेख्नुपर्नेछ ।

८. परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुनेछ ।

९. यस पाठ्यक्रम योजना अन्तर्गतका पत्र/विषयका विषयवस्तुमा जेसुकै लेखिएको भएतापनि पाठ्यक्रममा परेका कानून, ऐन, नियम, विनियम तथा नीतिहरु परीक्षाको मितिभन्दा 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 उम्मेदवारहरुलाई मात्र द्वितीय चरणको परीक्षामा सम्मिलित गराइनेछ ।

११. पाठ्यक्रम स्वीकृत मिति : <u>२०८०/०३/०४</u>

**Paper I & II: - Technical Subject**
**Section (A): 50% Marks**
**For Paper I (25 MCQs ×2 marks) &**
**For Paper II (4×5 marks, 3×10 marks)**

1. **ANATOMY**
   - 1.1 Organization of the body
   - 1.2 Cell – structure and functions
   - 1.3 Tissue - Epithelial tissue, Connective tissue, Muscular tissue, Nervous tissue
   - 1.4 Body fluid- Extracellular fluids and Intracellular fluids
   - 1.5 **Cardiovascular System: Heart**
     - 1.5.1 Anatomical Location, coverings, chambers, structure, flow of the blood through the heart, blood supply to the heart (coronary circulation), conduction system of the heart, nerve supply to the heart
     - 1.5.2 Circulation of the blood
     - 1.5.3 Pulmonary circulation
     - 1.5.4 Systemic circulation
     - 1.5.5 Structure of artery and vein
   - 1.6 **Respiratory System**
     - 1.6.1 Lungs - Anatomical location, structure, pleura and pleural cavity, organization, interior of the lungs, nerve supply and blood supply of the lungs
     - 1.6.2 Trachea – its position, structure and the functions
     - 1.6.3 Bronchi and small air passages - Bronchi and bronchioles, structure and function of the air passages, function of respiratory bronchioles and alveoli
   - 1.7 **Urinary System**
     - 1.7.1 Kidneys – Anatomical gross structure of kidney, microscopic structure of the kidney. Ureter, Urinary bladder, Urethra in brief

2. **PHYSIOLOGY**
   - 2.1 **Body fluids**
     - 2.1.1 Blood- composition and functions of blood
     - 2.1.2 White blood cells - production, function, lifespan, count, differential count
     - 2.1.3 Red blood cells- erythropoiesis, stages of differentiation function, count physiological variation
     - 2.1.4 Platelets – origin, normal count, morphological functions
     - 2.1.5 Plasma protein – production, concentration, types, albumin, fibrinogen, prothrombin function
     - 2.1.6 Blood Types and groups, cross matching
     - 2.1.7 Blood transfusions- indication, universal donar and recipient concept.
     - 2.1.8 Haemostasis- definition, normal haemostasis, clotting factors, mechanism of clotting
   - 2.2 **Cardiovascular System**
     - 2.2.1 Heart- Physiological anatomy, nerve supply
     - 2.2.2 Properties of cardiac muscles
     - 2.2.3 Cardiac cycle - systole, diastole, intraventricular pressure curve
     - 2.2.4 Cardiac output
     - 2.2.5 Normal heart sounds

2.2.6 Blood pressure - definition, normal values, clinical measurement of blood pressure, physiological variation, regulation of heart rate, cardiac shock, hypotension, hypertension
2.2.7 Pulse - jugular, radial, triple response
2.2.8 ECG

2.3 **Respiratory System**
2.3.1 Mechanism of the respiration
2.3.2 Gas exchange in the lung
2.3.3 Other function of the respiratory system
2.3.4 Oxygen transport and the oxygen dissociation curve
2.3.5 Carbon dioxide transport
2.3.6 Basics of acid base balance
2.3.7 The buffer system and Relationship of the acid base balance
2.3.8 The role of pCO2, HCO3 and pH
2.3.9 Regulation of the respiration

2.4 **Urinary System**
2.4.1 Urine formation
2.4.2 GFR
2.4.3 Renal functions

2.5 **Nervous System**
2.5.1 The autonomic nervous system in brief
2.5.2 Electrical activity of the brain, EEG

3. **PATHOLOGY**

3.1 **Cardiovascular System**
3.1.1 Rheumatic heart disease/ Valvular heart disease - Definition, causes, types, symptoms, pathology, complication and management of following defects of MVR, DVR, AVR
3.1.2 Ischemic heart disease - Definition, causes, types, symptoms, pathology, complication and management of following defects :
3.1.2.1 CAD
3.1.2.2 Atherosclerosis
3.1.2.3 Angina
3.1.2.4 MI
3.1.3 Cardiovascular disease - Definition, causes, types, symptoms, pathology, diagnostic features, complication and management of following defects :
3.1.3.1 Hypertension
3.1.3.2 Aneurysm
3.1.3.3 Heart failure
3.1.3.4 Endocardities
3.1.3.5 Pericarditis
3.1.4 Congenital heart disease - Definition, causes, types, symptoms, pathology, diagnostic features, complication and management of following defects :
3.1.4.1 ASD
3.1.4.2 VSD
3.1.4.3 TOF
3.1.4.4 COA

3.1.4.5 TGA
3.1.4.6 LVOTO/RVOTO
3.1.4.7 PDA
3.1.4.8 TAPVC/PAPVC

3.2 **Haematology**

3.2.1 Definition, causes, types, symptoms, pathology, diagnostic features, complication and management of following defects :
3.2.1.1 ANAEMIA
3.2.1.2 BLEEDING DISORDER

3.3 **Respiratory System**

3.3.1 Definition, causes, types, symptoms, pathology, diagnostic features, complication and management of following defects:
3.3.1.1 COPD
3.3.1.2 Pleural effusion
3.3.1.3 Pulmonary congestion and oedema

3.4 **Renal System**

3.4.1 Definition, causes, types, symptoms, pathology, diagnostic features, complication and management of acute renal failure, chronic renal failure, Gomeruonephritis/ pyelonephrities

3.5 **ENDOCRINE DISORDER**

3.5.1 Diabetic malletus– Definition, types, causes, management, pathology in brief

4. **BIOCHEMISTRY**

4.1 Classification of carbohydrate and functions
4.2 Classification of proteins and functions
4.3 Classification of lipids and functions
4.4 Enzymes: - Definition, Classification, Factors affecting enzyme activity
4.5 Cardiac biomarker of MI
4.6 Acid –Base

5. **MICROBIOLOGY**

5.1 Antibacterial agent
5.2 Disinfection
5.3 Sterilization
5.4 Biomedical waste and its management
5.5 Handwashing
5.6 Handling of the sterile equipment
5.7 General protocol followed in OR

6. **PHARMACOLOGY**

6.1 General concept about pharmacodynamics and pharmacokinetics principles
6.2 Cardiovascular drugs- Mode of Action, side effects, therapeutic uses, doses, contraindication, route of administration of following drugs :
6.2.1 Antihypertension drugs
6.2.2 Cardiac glycosides
6.2.3 Coronary vasodilator and inotropic agents
6.2.4 Antianginal and antifailure agents
6.2.5 Lipid lowering and antiatherosclerotic drugs

6.2.6 Drugs used in haemostasis, anticoagulants, thrombolytics, antithrombolytics

6.3 Diuretics

6.4 Analgesics – definition, classification, mechanism of action, dose, route of administration and adverse effects

6.5 Anaesthetic agents - definition, classification, mechanism of action, dose, route of administration and adverse effects

6.6 Corticosteroids - definition, classification, mechanism of action, dose, route of administration and adverse effects

**Section (B): 50% Marks**

**For Paper I (25 MCQs ×2 marks) &**

**For Paper II (4×5 marks, 3×10 marks)**

## 7. PERFUSION TECHNOLOGY

7.1 Basics of diagnostic technique
- 7.1.1 Chest X-ray
- 7.1.2 ECG
- 7.1.3 ECHO
- 7.1.4 Angiography
- 7.1.5 Laboratory investigation in relation to perfusion technology

7.2 History of cardiac surgery and cardiopulmonary bypass
- 7.2.1 Specific reference of the Dr John Gibbon, Lillehi, Carrel.
- 7.2.2 Azygous flow principle
- 7.2.3 Hypothermic/ nonhypothermic non CPB surgery including Gross technique
- 7.2.4 Controlled cross circulation

7.3 Monitoring and instrumentation
- 7.3.1 Haemodynamic monitoring
- 7.3.2 Haemostatic monitoring
- 7.3.3 Haematological monitoring

7.4 Components and Physiology of extracorporeal circulation
- 7.4.1 Heart-lung machine- Principle of extracorporeal circulation and gas exchange , Ideal oxygenators, Material used in EC Circuit
- 7.4.2 Oxygenator – Types, Mechanism of actions, Material and its features in detail
- 7.4.3 Blood pumps - Ideal blood pumps, Types of blood pumps

7.5 Haemoconcentrators

7.6 Blenders

7.7 Heatercooler machines, principle and their assessments

7.8 Tubings

7.9 Cannulae used in the cardiac surgery

7.10 Filters used on CPB

7.11 Adequacy of the perfusion.

7.12 Priming fluids and haemodilution

7.13 Cannulation techniques during CPB.

7.14 Conduct and monitoring of the cardiopulmonary bypass.

7.15 Myocardial protection and cardioplegia.

7.16 Termination of the cardiopulmonary bypass.

7.17 Anticoagulation and its monitoring on CPB.

7.18 Blood conservation techniques and dialysis on CPB.
7.19 Pulsatile perfusion in short.
7.20 Ultrafiltration.
7.21 Inflammatory response to CPB.
7.22 Hazards and the accidents on the CPB.
7.23 IABP

8. **CARDIAC SURGERY**
8.1 Introduction to Cardiac Surgery
8.2 Acyanotic Congenital Heart Disease
8.3 Cyanotic Congenital Heart Disease
8.4 Palliative Surgery for Congenital Heart Disease
8.5 Shunts
8.6 Anatomical correction for Congenital Heart Disease

9. **General information related to Shahid Gangalal National Heart Centre**