त्रिभुवन विश्वविद्यालय
सेवा आयोग

सहायक प्रथम, मुख्य स्वास्थ्य सहायक (परफ्युजनिष्ट) पदको खुला प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

लिखित परीक्षा योजना

लिखित परीक्षा : **कुल पूर्णाङ्क :** १००

पत्र/विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली	प्रश्न संख्या × अङ्क	समय
प्रथम	१००	४०	वस्तुगत - बहुवैकल्पिक प्रश्न (MCQs)	५० प्रश्न × १ अङ्क	५० मिनेट
			विषयगत प्रश्न	१० प्रश्न × ५ अङ्क	१ घण्टा ४५ मिनेट

द्रष्टव्य :

1. लिखित परीक्षाको लागि १०० पूर्णाङ्कको एक पत्र हुनेछ ।
2. वस्तुगत बहुवैकल्पिक (Multiple Choice) प्रश्नको विकल्प छनौट गर्दा गलत विकल्प छानेमा ऋणात्मक मूल्याङ्कन (Negative Marking) गरिने छ । अर्थात् यसरी मूल्याङ्कन गर्दा प्रत्येक गलत उत्तरको लागि २० प्रतिशत अङ्ककट्टा गरिनेछ । बहुवैकल्पिक प्रश्नको २० प्रतिशत अङ्क प्राप्ताङ्कबाट घटाइने छ । (उदाहरणका लागि परीक्षार्थीले २० अङ्कको बहुवैकल्पिक प्रश्नमा १५ प्रश्नको सही उत्तर र ५ प्रश्नको गलत उत्तर दिएमा निजको प्राप्ताङ्क (०.२० × ५=१.००) अर्थात् १५–१= १४ अङ्क हुनेछ । तर उत्तर नदिएमा त्यस बापत अङ्क दिइने छैन र अङ्क कट्टा पनि गरिने छैन ।
3. विषयगत प्रश्नको हकमा 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 ।
4. विषयगत प्रश्नमा प्रत्येक खण्डका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरू हुनेछन् । उम्मेदवारले प्रत्येक खण्डका प्रश्नको उत्तर सोही खण्डका उत्तरपुस्तिकामा लेख्नुपर्नेछ ।
5. प्रत्येक पत्रको उत्तीर्णाङ्क पूर्णाङ्कको ४० प्रतिशत हुनेछ ।
6. भाषा विषयबाहेक अन्य विषयका लागि उत्तरको माध्यम अंग्रेजी वा नेपाली हुनेछ ।

पत्र/विषय : सेवा सम्बन्धी

1. **Anatomy**
   - 1.1 Organization of the body; cell – structure and functions; tissue - epithelial tissue, connective tissue, muscular tissue, nervous tissue; body fluid- extracellular fluids and intracellular fluids
   - 1.2 Cardiovascular system (Heart): 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; blood circulation; pulmonary and systemic circulation; structure of artery and vein
   - 1.3 Respiratory system: Lungs - anatomical location, structure, pleura and pleural cavity, organization, interior of the lungs, nerve supply and blood supply of the lungs; Trachea – its position, structure and the functions; Bronchi and small air passages - Bronchi and bronchioles, structure and function of the air passages, function of respiratory bronchioles and alveoli
   - 1.4 Urinary System: (Kidneys) – anatomical gross structure of kidney, microscopic structure of the kidney; ureter, urinary bladder, urethra in brief

2. **Physiology**
   - 2.1 Body fluids : blood- composition and functions of blood; WBC - production, function, lifespan, count, differential count; RBC - erythropoiesis, stages of differentiation function, count, physiological variation; platelets - origin, normal count, morphological functions; plasma protein – production, concentration, types, albumin, fibrinogen, prothrombin function; blood types and groups, cross matching; blood transfusions - indication, universal donor and recipient concept; homeostasis - definition, normal hemostasis, factors and mechanism of clotting
   - 2.2 Cardiovascular system
     - 2.2.1 Heart - physiological anatomy, nerve supply; properties of cardiac muscles
     - 2.2.2 Cardiac cycle - systole, diastole, intraventricular pressure curve; cardiac output; Normal heart sounds
     - 2.2.3 Blood pressure - definition, normal values, clinical measurement of blood pressure, physiological variation, regulation of heart rate, cardiac shock, hypotension, hypertension
     - 2.2.4 Pulse - jugular, radial, triple response
     - 2.2.5 ECG
   - 2.3 Respiratory system
     - 2.3.1 Mechanism of the respiration; gas exchange in the lung; other function of the respiratory system; oxygen transport and the oxygen dissociation curve; carbon dioxide transport
     - 2.3.2 Basics of acid base balance; buffer system and relationship of the acid base balance; role of pCO_2, HCO_3 and pH; regulation of the respiration
   - 2.4 Urinary system; urine formation; GFR; renal functions
   - 2.5 Nervous system : autonomic nervous system; 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: CAD, atherosclerosis, angina, MI

3.1.3 Cardiovascular disease - definition, causes, types, symptoms, pathology, diagnostic features, complication and management of following defects: hypertension, aneurysm, heart failure, endocarditis, pericarditis

3.1.4 Congenital heart disease - definition, causes, types, symptoms, pathology, diagnostic features, complication and management of following defects: ASD, VSD, TOF, COA, TGA, LVOTO/RVOTO, PDA, TAPVC/PAPVC

3.1.5 Neonatal physiology

3.2 Hematology: definition, causes, types, symptoms, pathology, diagnostic features, complication and management of following defects: anaemia, bleeding disorder

3.3 Respiratory system: definition, causes, types, symptoms, pathology, diagnostic features, complication and management of following defects: COPD, pleural effusion, pulmonary congestion and oedema

3.4 Renal system: definition, causes, types, symptoms, pathology, diagnostic features, complication and management of acute renal failure, chronic renal failure, Gomeruonephritis/ pyelonephritis

3.5 Endocrine disorder: diabetic mellitus – definition, types, causes, management, pathology

4. **Biochemistry and Microbiology**

4.1 Biochemistry: Classification and functions of carbohydrates, proteins and lipids; enzymes - definition, classification, factors affecting enzyme activity; cardiac biomarker of MI; Acid – Base

4.2 Microbiology: antibacterial agent, disinfection, sterilization; biomedical waste and its management; hand washing; handling of the sterile equipment

5. **Pharmacology**

5.1 General concept about pharmacodynamics and pharmacokinetics principles

5.2 Cardiovascular drugs - mode of action, side effects, therapeutic uses, doses, contraindication, route of administration of following drugs : anti-hypertension drugs, cardiac glycosides, coronary vasodilator and inotropic agents, antianginal and antifailure agents, lipid lowering and antiatherosclerotic drugs, drugs used in homeostasis, anticoagulants, thrombolytics, antithrombolytics

5.3 Diuretics

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

5.5 Anesthetic agents - definition, classification, mechanism of action, dose, route of administration and adverse effects

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

6. **Perfusion Technology**

6.1 Basics of cardiology: ECG, ECHO, angiography, chest X-ray, laboratory investigation in relation to perfusion technology

6.2 Biomedical Engineering : equipment principles and maintenance

6.3 History of cardiac surgery and cardiopulmonary bypass (CPB) : Specific reference of the Dr John Gibbon, Lillehi, Carrel; Azygous flow principle; Hypothermic/

nonhypothermic non-CPB surgery including gross technique, controlled cross circulation

6.4 Monitoring and instrumentation: hemodynamic monitoring, hemostatic monitoring, hematological monitoring

6.5 Components and physiology of extracorporeal circulation : Heart-lung machine - principle of extracorporeal circulation and gas exchange, ideal oxygenators, material used in EC circuit; Oxygenator – types, mechanism of actions, material and its features; Blood pumps - types and ideal blood pumps

6.6 Haemoconcentrators, Blenders, Tubings. Heater cooler machines - principle and their assessments

6.7 Cannulae used in the cardiac surgery; cannulation techniques during CPB; central and peripheral cannulation

6.8 Conduct and monitoring of the cardiopulmonary bypass including in pediatrics and gravid patients; anticoagulation and its monitoring on CPB

6.9 Partial heart bypass, left heart bypass

6.10 Filters used on CPB; adequacy of the perfusion; termination of CPB; hazards and the accidents on the CPB

6.11 Priming fluids and hemodilution

6.12 Point of care treatment and testing, ACT, TEG, ROTEM

6.13 Myocardial protection, cardioplegia and types

6.14 Blood conservation techniques and dialysis on CPB, cell saver

6.15 Pulsatile perfusion, ultrafiltration, Inflammatory response to CPB

6.16 Hypothermia and types of hypothermia, deep hypothermic circulatory arrest, antegrade cerebral perfusion, retrograde cerebral perfusion

6.17 Intra-Aortic Balloon Pump (IABP): history, physiological considerations, indications, contraindications, placement, alternative access routes, IABP management, risks factors, weaning from IABP support

6.18 Extracorporeal membrane oxygenation (ECMO): history, development, selection criteria, ECMO complications, ECMO for primary cardiac failure, financial considerations, prospects for the future

7. **Cardiac Surgery and Transplantation**

7.1 Introduction to cardiac surgery; congenital heart disease; acyanotic congenital heart disease; cyanotic congenital heart disease

7.2 Acquired heart diseases; valvular heart disease; coronary artery disease; diseases of the aorta; cardiac neoplasms; pericardial diseases

7.3 Minimally invasive cardiac surgery, aortic surgery, hybrid surgery, complex vascular surgery

7.4 Recent advances and updates in cardiopulmonary bypass and perfusion technology; mechanical circulatory assisted devices, LVAD, RVAD, BiVAD, Impella, Artificial Heart

7.5 Transplantation - heart, heart and lung, liver

8. **Biostatistics and Medical Ethics**

8.1 Biostatistics, basis of research and publishing and health care

8.2 Basic principle of medical ethics

9. **त्रि.वि ऐन र नियम सम्बन्धी सामान्य जानकारी**

9.1 त्रि.वि ऐन, २०४९

9.2 त्रि.वि शिक्षक कर्मचारी सेवा सम्बन्धी नियम, २०५०

त्रिभुवन विश्वविद्यालय
सेवा आयोग

प्राविधिक सेवा, स्वास्थ्य समूह, सहायक प्रथम, मुख्य स्वास्थ्य सहायक (परफ्युजनिष्ट) पदको खुला प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

(Specification Chart)

२०८१

वस्तुगत - बहुवैकल्पिक प्रश्न

खण्ड	एकाई	विषय शीर्षक	अङ्क	प्रश्न संख्या	प्रश्न संख्या × अङ्क भार
	1.	Anatomy			
	2.	Physiology			
	3.	Pathology			
	4.	Biochemistry and Microbiology			
	5.	Pharmacology		50	50 प्रश्न × 1 अङ्क
	6.	Perfusion Technology			
	7.	Cardiac Surgery and Transplantation			
	8.	Biostatistics and Medical Ethics			
	9.	त्रि.वि ऐन र नियम सम्बन्धी सामान्य जानकारी			
कुल जम्मा			50	50	

विषयगत प्रश्न

खण्ड	एकाई	विषय शीर्षक	अङ्क	प्रश्न संख्या	प्रश्न संख्या × अङ्क भार
	1.	Anatomy			
	2.	Physiology			
	3.	Pathology			
	4.	Biochemistry and Microbiology			
	5.	Pharmacology		10	10 प्रश्न × 5 अङ्क
	6.	Perfusion Technology			
	7.	Cardiac Surgery and Transplantation			
	8.	Biostatistics and Medical Ethics			
	9.	त्रि.वि ऐन र नियम सम्बन्धी सामान्य जानकारी			
कुल जम्मा			50	10	