त्रिभुवन विश्वविद्यालय
सेवा आयोग

स्वास्थ्य समूह, अधिकृत तृतीय श्रेणी, प्राविधिक अधिकृत (परफ्युजनिष्ट) पदको खुला प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम
२०८१

लिखित परीक्षा योजना

लिखित परीक्षा : **कुल पूर्णाङ्क :** २००

पत्र/विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली	प्रश्न संख्या × अङ्क	समय
प्रथम	१००	४०	वस्तुगत - बहुवैकल्पिक प्रश्न (MCQs)	१०० प्रश्न × १ अङ्क	१ घण्टा ३० मिनेट
द्वितीय	१००	४०	विषयगत प्रश्न	८ प्रश्न × १० अङ्क	३ घण्टा
				४ प्रश्न × ५ अङ्क	

द्रष्टव्य :

1. लिखित परीक्षाका लागि १००/१०० पूर्णाङ्कका दुई पत्रहरु हुनेछन् ।
2. प्रथमपत्र र द्वितीय पत्रको लिखित परीक्षा पाठ्यक्रमको विषयवस्तु एउटै हुनेछ ।
3. प्रथमपत्र र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।
4. 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 बहुबैकल्पिक 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 ।
5. 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 ।
6. विषयगत प्रश्नमा प्रत्येक खण्डका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरू हुनेछन् । उम्मेदवारले प्रत्येक खण्डका प्रश्नको उत्तर सोही खण्डका उत्तरपुस्तिकामा लेख्नुपर्नेछ ।
7. प्रत्येक पत्रको उत्तीर्णाङ्क पूर्णाङ्कको ४० प्रतिशत हुनेछ ।
8. भाषा विषयबाहेक अन्य विषयका लागि उत्तरको माध्यम अंग्रेजी वा नेपाली हुनेछ ।

प्रथम र द्वितीय पत्र :

Section (A) : 50 Marks

1. **Anatomy**
   - 1.1 Introduction to anatomy and basic anatomical terms
   - 1.2 Chest wall – inter-costal space, pleura, bony thoracic cage, ribs sternum and thoracic vertebrae; lungs – trachea, bronchial tree; heart – surface anatomy of heart, chambers of the heart, valves of the heart, major blood vessels of heart, pericardium, coronary arteries and cardiac veins; surface anatomy of the chest
   - 1.3 Abdominal cavity : introduction and salient features; excretory system – kidneys, ureters, bladder; anatomy of liver, biliary system and gut
   - 1.4 Vascular system : introduction; arrangement of the vascular system, landmark for vascular access
   - 1.5 Radiology, X-ray chest PA view

2. **Physiology**
   - 2.1 Cell : cell structure and functions of the varies organelles; endocytosis and exocytosis; acid base balance and disturbances of acid base balances (alkalosis, acidosis)
   - 2.2 Blood : composition of blood, functions of the blood and plasma proteins, classification and protein; pathological and physiological variation of the RBC; function of hemoglobin; erythrocyte sedimentation rate; WBC – total count (TC), differential count (DC) and functions; platelets- formation and normal level and functions; blood groups and RH factor; clotting cascade- physiology of hemostasis
   - 2.3 Cardio- vascular system : physiology of the heart, heart sounds, cardiac cycle, cardiac output, auscultatory areas, arterial pressures, blood pressure, hypertension, electrocardiogram ((ECG)
   - 2.4 Respiratory system : respiratory movement, definitions and normal values of lung volumes and capacities
   - 2.5 Excretory system : formation of urine, normal urinary output, renal function tests and renal disorders
   - 2.6 Central nervous system : introduction to CNS, arrangement of the nervous system, action potential, thermoregulation system, Glasgow coma scale
   - 2.7 Endocrine system: basis of endocrine system

3. **Biochemistry**
   - 3.1 Glucose and glycogen metabolism; classification of proteins and functions; classification of lipids and functions
   - 3.2 Enzymes: definition, nomenclature, classification, factors affecting enzyme activity, active sites, co-enzyme, enzyme inhibition, units of enzyme, isoenzymes, enzyme patterns in disease
   - 3.3 Acid Base: Henderson-Hasselbach, buffers, indicators, normality, molarity, molality
   - 3.4 Serum Electrolytes

4. **Pathology**
   - 4.1 Cellular adaptation, cell injury and cell death - introduction to pathology; cellular response to stress and noxious stimuli; cellular adaptations of growth and differentiation; cell injury

and death; causes of cell injury; mechanism of cell injury'; reversible and irreversible cell injury; examples of cell injury and necrosis

4.2 Inflammation: general features of inflammation; acute inflammation; chemical mediators of inflammation; outcomes of inflammation; morphologic patterns of acute inflammation; summary of acute inflammation; chronic inflammation

4.3 Immunity disorders: general features and disorders of immune system

4.4 Infectious diseases: general principles of microbial pathogenesis; viral infections; bacterial infections; parasitic infections

4.5 Systemic

4.5.1 Heart : congenital heart disease; acquired heart disease - coronary artery disease, degenerative heart valve disease, rheumatic heart disease, neoplasms of the heart, pericardial diseases, aortic diseases

4.5.2 Lungs: infections of the lungs, neoplasms of the lungs, chronic obstructive airway diseases

4.5.3 Kidneys: acute renal failure and chronic renal failure

4.5.4 Blood : coagulation cascade; disorders of coagulation; inflammatory pathway; component therapy

4.5.5 Brain: ischemic injury to brain; intra- cranial bleed

5. **Pharmacology**

5.1 Drugs affecting blood and respiratory system; hormones of pituitary and thyroid; insulin and oral hypoglycemic drugs; anti-inflammatory drugs; drug interactions; inotropes, vasoactive agents including calcium

5.2 Diuretics; anti-coagulants; antiplatelet medications and NOACs; anti-fibrinolytic drugs; coagulants; anti-arrhythmic drugs, anesthetic drugs, parasympathetic system; alpha-blockers; beta-blockers

5.3 Cardioplegia solutions and potassium homeostasis; management of Acid-Base dysbalance; crystalloid and colloid solutions

6. **Clinical Microbiology - Pathology**

6.1 Introduction, morphology of bacteria, stains used in identifying bacteria

6.2 Sterilization techniques : decontamination; dry and moist heat; sterilization - chemical method, gas sterilization, filtration

6.3 Bacterial drug resistance; basic principles in immunology; antibody reactions; wound infections; gram negative infections; gram positive infections; viral infections - HIV; hepatitis

6.4 Blood stream infections : nosocomial infections and preventions

Section (B) : 50 Marks

7. **Central Sterile Supply Department (CSSD)**

7.1 Development of CSSD; aim and objectives of CSSD; CSSD work practice; return of equipment and initial processing; assembly and packaging

7.2 Sterilization Process : moist heat sterilization; dry heat sterilization; gas sterilization - ethylene oxide; H_2O_2 plasma vapour - absorption by natural and synthetic materials, toxicity; mechanism of biocidal activity; testing efficiency of sterilization; ionizing radiation; septic filtration of liquids and gases

7.3 Chemical disinfection: mechanism of microbicidal action; factors affecting in use effectiveness; number of organisms present; conditions of grown; concentration of disinfectant, temperature; temperature contact time, presence of organic matter, surface of contact, cellulous and synthetic materials; contaminated disinfectants in the test; evaluation of disinfectants, expressions of disinfectant concentration; bactericidate test; test organisms policy for disinfection in hospitals; disinfection of hospital equipment; disinfection of hospital environment; disinfection of skin and mucous membrane; administration of disinfection policy; selection of disinfectants; types of products ; infection control

7.4 Responsibility of CSSD for equipment used, for collection and issue

8. **Principles of Perfusion Technology**

8.1 Physiology of extra-corporeal circulations; heart lung machine basics; principles of extra-corporeal circulation

8.2 History of evolution of blood pump; principles of extra-corporeal gas exchange; various types of oxygenators: - bubble, membrane/micro hollow fiber, specifications of various proprietary oxygenators

8.3 Theory of blood pump: pulsatile flow and continuous flow

8.4 Occlussive and non- occlussive pumps

8.5 Types of pumps : rotary pumps; roller pumps; centrifugal pumps; and others - bellow pumps, compression pumps, diaphragm pumps, ventricle pumps

8.6 Elements of extra-corporeal circulation and its hazards

8.7 Blood filters; blood trap; flow meter; temperature probes; heat exchanger; regulating devices

8.8 Connections of vascular system and extra-corporeal circulation: venous drainage; suction pump; hemodynamics of arterial re-entry, arterial infusion

8.9 Cardiotomy blood return

9. **Cardio-Pulmonary Bypass (CPB) and Perfusion Technology**

9.1 Hemodynamic aspects of total heart-lung bypass : perfusion flow pressure and resistant distribution of blood flow among various vascular beds; metabolic aspects of total heart and lung bypass; oxygen need and perfusion flow requirements; perfusion flow and oxygen uptake; electrolyte and water balance in reference to extra-corporeal bypass; oxygen toxicity

9.2 Effects of perfusion on organs: brain, heart, lungs, kidneys, liver and spleen

9.3 Control of adequacy of perfusion : ideal perfusion; monitoring devices (pressure, cardiac output, brain protection, temperature, in line monitoring); technique of control

9.4 Hematologic problems: blood prime; priming solutions; control of hematologic problems during CPB; effects of various priming solutions on RBC trauma

9.5 Induced cardiac arrest and myocardial protection : physiological principles of inducing cardiac arrest, morphology, function and metabolism of the arrested heart

9.6 Cardiplegia : principles, composition, modification; types of cardioplegias

9.7 Hypothermia : blood stream cooling versus peripheral cooling; effect of cooling on the circulation and organ metabolism

9.8 Assisted circulation : circulatory and metabolic support by partial heart lung bypass and its effect on various organs

9.9 Centrifugal pump: principal, effect, advantages and disadvantages

9.10 Pulsatile versus non-pulsatile circulatory support

9.11 Circulatory arrest and organ protection

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

9.13 Cardiac arrest devices: LVAD, RVAD, BiVAD

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

9.15 Auto-transfusion; cell saver; blood conservation in open heart surgery

9.16 Blood component therapy

9.17 Complications and management of cardio-pulmonary bypass: complications while initiating during and at termination of CPB; hemolysis during CPB; air lock and air embolism; re-warming and cooling; loss of electrical power and running the pump with hand crack

9.18 Recent advances in perfusion technology and cardio pulmonary support : advances in - Oxygenators; CPB circuits; Heart Lung Machine design; pharmacotherapy during CPB; myocardial protection; brain protection; other organ protection; artificial life support

10. **Cardiac Surgery and Transplantation**

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

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

10.3 Palliative surgery for congenital heart disease; shunts; physiological corrections; anatomical correction for congenital heart disease; off pump CABG

10.4 Transplantation - heart, heart and lung, liver

11. **सेवा सम्बन्धी ऐन र नियम सम्बन्धी सामान्य जानकारी**

11.1 त्रि.वि ऐन, २०४९

11.2 त्रि.वि शिक्षक कर्मचारी सेवा सम्बन्धी नियम, २०५०

11.3 नेपाल स्वास्थ्य सेवा ऐन, २०५३

11.4 नेपाल स्वास्थ्य नियमावली २०५५

त्रिभुवन विश्वविद्यालय
सेवा आयोग

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(Specification Chart)

२०८१

प्रथम पत्र : वस्तुगत - बहुवैकल्पिक प्रश्न

पूर्णाङ्क: १०० **समय: १ घण्टा ३० मिनेट**

खण्ड	एकाई	विषय शीर्षक	अङ्क	प्रश्न संख्या	प्रश्न संख्या × अङ्क भार
A	1.	Anatomy	50	100	100 प्रश्न × 1 अङ्क
	2.	Physiology			
	3.	Biochemistry			
	4.	Pathology			
	5.	Pharmacology			
	6.	Clinical Microbiology - Pathology			
B	7.	Central Sterile Supply Department (CSSD)	50		
	8.	Principles of Perfusion Technology			
	9.	Cardio-Pulmonary Bypass (CPB) and Perfusion Technology			
	10.	Cardiac Surgery and Transplantation			
	11.	सेवासम्बन्धी ऐन र नियम सम्बन्धी सामान्य जानकारी			
कुल जम्मा			100	100	

द्वितीय पत्र : विषयगत

पूर्णाङ्क: १०० **समय: ३ घण्टा**

खण्ड	एकाई	विषय शीर्षक	अङ्क	प्रश्न संख्या	प्रश्न संख्या × अङ्क भार
A	1.	Anatomy (5)	50	8 + 4	एकाई १, ५, ९ र ११ बाट ५ अंकको १/१ प्रश्न र एकाई २, ३, ४, ६, ७, ८, ९ र १० बाट १० अंकको १/१ प्रश्न
	2.	Physiology (10)			
	3.	Biochemistry (10)			
	4.	Pathology (10)			
	5.	Pharmacology (5)			
	6.	Clinical Microbiology – Pathology (10)			
B	7.	Central Sterile Supply Department (CSSD) (10)	50		
	8.	Principles of Perfusion Technology (10)			
	9.	Cardio-Pulmonary Bypass (CPB) and Perfusion Technology (10+5)			
		Cardiac Surgery and Transplantation (10)			

	10.	सेवासम्बन्धी ऐन र नियम सम्बन्धी सामान्य जानकारी (5)			
कुल जम्मा			100	12	