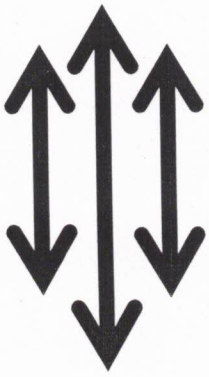
नेपाली सेना

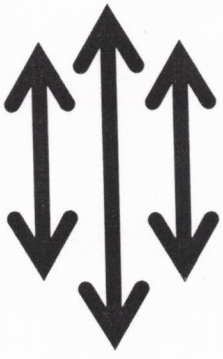
श्री भर्ना छनौट निर्देशनालय, कार्यरथी विभाग,

जंगी अड्डा



प्रा.उ.से बायोमेडिकल (आन्तरिक) पदको

लिखित परीक्षाको पाठ्यक्रम



२०७९

प्रा.उ.से बायोमेडिकल (आन्तरिक) पदको लिखित परीक्षाको पाठ्यक्रम

समयः ४ घण्टा १५ मिनेट

पूर्णाङ्कः १५०
उत्तीर्णाङ्क : ६०

यो पाठ्यक्रम नेपाली सेनाको प्रा.उ.से बायोमेडिकल (आन्तरिक) पदका उम्मेदवार छनौट परीक्षाको लागि निर्धारण गरिएको हो । लिखित परीक्षामा सरिक हुने उम्मेदवारहरुको पेशा सम्बन्धि विषयलाई आधार मानी प्रश्नहरु सोधिने छ ।

(क) लिखित परीक्षाको माध्यम नेपाली/अंग्रेजी वा दुवै भाषा हुनेछ ।

(ख) लिखित परीक्षाबाट छनौट भएका उम्मेदवारहरुलाई मात्र अर्को चरणको परीक्षामा सम्मिलित गराईने छ ।

(ग) प्रश्नपत्र निर्माण गर्दा पाठ्यक्रममा समावेश भएका सबै विषयहरुलाई यथासंभव समेटिनेछ ।

(घ) बस्तुगत र विषयगत संयुक्त रुपमा पूर्णाङ्क र उत्तीर्णाङ्क कायम गरिनेछ ।

(ङ) बस्तुगत र विषयगत परीक्षाको पाठ्यक्रम एउटै हुनेछ ।

(च) बस्तुगत र विषयगत लिखित परीक्षा एकैपटक वा छुट्टाछुट्टै गरी लिन सकिनेछ ।

(छ) यो पाठ्यक्रम मिति २०७९/ ११/ १५ गतेबाट लागू हुनेछ ।

लिखित परीक्षाको योजना र पाठ्यक्रम

विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली		प्रश्नसंख्या x अंक	समय
पेशा सम्बन्धी	७५	६०	वस्तुगत (Objective)	वहुबैकल्पिक प्रश्न (MCQs)	७५ प्रश्न x १ अंक = ७५	१ घण्टा १५ मिनेट
	७५		विषयगत (Subjective)	छोटो उत्तर	२ प्रश्न x २.५ अंक = ५	३ घण्टा
				छोटो उत्तर	१४ प्रश्न x ५ अंक = ७०	

लिखित परीक्षाको पाठ्यक्रम

1. Human Anatomy and Physiology

1.1. Human Stature and Function

1.2. Anatomy Terminology

1.3. Cardiovascular System

1.3.1 Understanding of Anatomy of heart & blood vessels.

1.3.2 Study of blood supply of heart or coronary circulation

1.3.3 Blood circulation from different organs to the heart & from the heart to different organs.

1.3.4 Outline the heart functions

1.3.5 Understanding of cardiac cycle, cardiac output & blood pressure

1.3.6 Learning of conduction system of heart

1.4. Respiratory system

1.4.1 Understanding of Anatomy-physiological relationship of upper respiratory tract

1.4.1 Lungs & its topography. Pleura & pleural cavity

1.4.1 Learning of lung functions

1.4.1 Mechanism of breathing

1.4.1 Composition of air

1.4.1 Understanding of Ventilation & Lung volumes

1.4.1 Gas transfer & diffusion

2. Basic Electronic and Electrical

2.1 Introduction: AC and DC circuits: introduction and analysis

2.2 DC Circuit Analysis for RLC, Properties of AC,RLC circuit

2.3 Atomic Structure and Semiconductor Physics

2.3.1.1 Structure of Insulators and Semiconductors

2.3.1.2 Mechanism of conduction of electrons and holes

2.3.1.3 Donors and Acceptors Impurities

2.3.1.4 P-Type and N-Type semiconductor

2.3.2 Junction diodes

2.3.3 Open PN Junction

2.3.4 Forward and Reverse Bias Characteristic

2.3.5 IV Characteristics

2.3.6 Zener diode

2.4 Transistor

2.4.1 Introduction

2.4.2 Types, Configuration, Application

2.4.3 Transistor biasing and thermal stabilization

2.5 FET

2.5.1 Introduction

2.5.2 Construction

2.5.3 Types

2.6 Special Purpose Diodes and Transistors

2.6.1 Diodes (Optical, LED, Schottky, Tunnel)

2.6.2 Transistors (Photo, Opto Isolators)

2.7 Integrated Circuit

2.7.1 Introduction

2.7.2 2IC Compensation

2.8 Amplifier

2.8.1 BJT and FET

2.8.2 Differential Amplifier

2.8.3 Operational Amplifier

2.8.3.1 Introduction

2.8.3.2 Characteristics

2.8.3.3 Symbol and Type

2.8.4 Voltage Regulator

2.8.4.1 Shunt, Series and feedback type regulator

2.8.4.2 SCR Regulator

2.8.4.3 Switching mode Regulator

2.8.4.4 IC Voltage Regulator

2.8.5 Transformer

2.8.5.1 Introduction

2.8.5.2 Losses in Transformer

2.8.6 Introduction of single phase and 3 phase line

2.8.7 Inverter, Online UPS (Basic Introduction and function)

3. Biomedical Instrumentation and Devices

3.1 Working Tools and Testing Equipments: General Handling Tools, Oscilloscopes and Multimeters

3.2 Electrical Safety Inspections

3.3 General Constraints in Design of Medical Instrumentation Systems

3.4 Regulation of Medical Devices

3.5 General Biomedical Equipments:

3.5.1 Stethoscope and Sphygmomanometer

3.5.1.1 Introduction

3.5.1.2 Preventive measure and Maintenance

3.5.2 Syringe Pump

3.5.2.1 Introduction

3.5.2.2 Block Diagram and Working Principle

3.5.2.3 Preventive measure and Maintenance

3.5.3 Infusion Pump

3.5.3.1 Introduction

3.5.3.2 Block Diagram and Working Principle

3.5.3.3 Preventive measure and Maintenance

3.5.4 Centrifuge

3.5.4.1 Introduction

3.5.4.2 Types of Centrifuge

3.5.4.3 Block Diagram and Working Principle

3.5.4.4 Preventive measure and Maintenance

3.5.5 Colorimeter

3.5.5.1 Introduction

3.5.5.2 Different Component of Colorimeter

3.5.5.3 Block Diagram and Working Principle

3.5.5.4 Preventive measure and Maintenance

3.5.6 Pace Maker

3.5.6.1 Introduction

3.5.6.2 Types and Application

3.5.7 Pulse Oximeter

3.5.7.1 Introduction

3.5.7.2 Block Diagram and Working Principle

3.5.7.3 Preventive measure and Maintenance

3.5.8 Incubator

3.5.8.1 Introduction

3.5.8.2 Block Diagram and Working Principle

3.5.8.3 Types of Incubator

3.5.8.4 Parameters Control in Incubator

3.5.8.5 Preventive measure and Maintenance

3.5.9 Water Bath

3.5.9.1 Introduction

3.5.9.2 Component Of Water Bath

3.5.9.3 Block Diagram and Working Principle

3.5.9.4 Preventive measure and Maintenance

3.5.10 Photo Therapy Machine

3.5.10.1 Introduction

3.5.10.2 Types of Photo therapy Device

3.5.10.3 Types of Light Used

3.5.10.4 Preventive measure and Maintenance

3.5.11 Oxygen Centralized System

3.5.11.1 Introduction (Cryogenic and PSA Plant)

3.5.11.2 Block Diagram and Working Principle

3.5.11.3 Pipe Line System

3.5.11.4 Preventive measure and Maintenance

3.5.12 Nebulizer

3.5.12.1 Introduction

3.5.24.2 Modes of Dialysis

3.5.24.3 Different Component

3.5.24.4 Block Diagram and Working Principle

3.5.24.5 Preventive measure and Maintenance

3.5.25 Ultrasound

3.5.25.1 Introduction

3.5.25.2 Different components and imaging modes

3.5.25.3 Block Diagram and Working Principle

3.5.25.4 Preventive measure and Maintenance

3.5.26 X-ray Machine

3.5.26.1 Introduction; CR system, DR system, Portable Xray, C-arm

3.5.26.2 Different Components

3.5.26.3 Block Diagram and Working Principle

3.5.26.4 Circuit Diagram

3.5.26.5 X-ray Printer

3.5.26.6 Preventive measure and Maintenance

3.5.27 Endoscopy Machine

3.5.27.1 Introduction

3.5.27.2 Different Components

3.5.27.3 Block Diagram and Working Principle

3.5.27.4 Preventive measure and Maintenance

3.5.28 CT Scan Machine

3.5.29.1 Introduction

3.5.29 MRI

3.5.29.2 Introduction

3.5.30 Suction Machine

3.5.30.1 Introduction

3.5.30.2 Block Diagram and Working Principle

3.5.30.3 Preventive measure and Maintenance

3.5.31 Blood Bank Refrigerator

3.5.31.1 Introduction

3.5.31.2 Block Diagram and Working Principle

3.5.31.3 Preventive measure and Maintenance

4. Instrumentation and Measurement

4.1 Introduction

4.2 Instrumentation Theories

4.3 Introduction to control system and Process control

4.4 Introduction to

4.4.1 Transducers and Sensors

4.4.2 Types

4.4.3 Basic Working Principle

5. Digital Electronics

5.1 Fundamental of Digital Electronics

5.1.1 Number System

5.1.2 Logic Gates (OR,AND,NOR,NOT,NAND&EX-OR)

5.1.3 Universal gates and gate conversion

5.2 Arithmetic circuits

5.2.1 Binary addition, subtraction, multiplication and division

5.2.2 2's complement representation

5.3 Flip Flop

5.3.1 SR Flip Flop

5.3.2 T Flip Flop

5.3.3 D Flip Flop

5.3.4 JK Flip Flop

5.3.5 Master slave controlled and edge triggered

5.4 Registers

5.4.1 Shift Registers

5.4.2 Controlled buffer register

5.5 Counters

5.5.1 Ripple counter

5.5.2 Asynchronous counter

5.5.3 Ring counter

5.5.4 up/down counter

5.5.5 decade counter

5.6 Display system and Devices

5.6.1 Nixie tube, LED,LCD & segment display

5.7 Memories

5.7.1 Magnetic core memories

5.7.2 Semiconductor memories (RAM,ROM,PROM,EPROM)

6. Computer Skills

6.1 Introduction to computer

6.2 Input, output and memory devices

6.3 Internet and information resources

6.4 Basic Networking concepts

7. Biomedical Chemistry

7.1 Oxidation and Reduction

7.2 Acid-base chemistry

7.3 Electro Chemistry

7.4 Major group of Organic chemistry and their chemical properties

7.5 Instrumental Methods Used to analyze substance of biological importance

8. Miscellaneous

8.1 Procurement procedures

8.2 Biomedical waste management

8.3 Hospital Management System

8.4 Engineering Professional Practice

8.5 Electrical Hazard and safety

8.6 Earthing

यस पेशा सम्बन्धी विषयको पाठ्यक्रमका एकाईहरुबाट सोधिने प्रश्नहरु निम्नानुसार हुनेछ

S.N	Topics	Objective Question and Marks	Subjective Questions & Marks	
			Short Question and Marks	Long Question and Marks
1	Human Anatomy and Physiology	5 x 1		1 x 5
2	Basic Electronic and Electrical	15 x 1		3 x 5
3	Biomedical Instrumentation and Devices	35 x 1		8 x 5
4	Instrumentation and Measurement	5 x 1		1x5
5	Digital Electronics	5 x1		
6	Computer Skills	3 x 1	2.5 x 1	
7	Biomedical Chemistry	2 x 1	2.5 x 1	
8	Miscellaneous	5 x 1		1 x 5
	Total	**75**	**2x2.5=5**	**14x5=70**

प्रयोगात्मक परीक्षा पाठ्यक्रम

समयः ६० मिनेट

पूर्णाङ्कः ५०

उत्तीर्णाङ्क : २५

S.N.	Topics	Marks	Time(Min)
1	Component Identification	15	10
2	Equipment Identification and its function	15	20
3	Fault finding and Troubleshooting	10	20
4	Viva	10	10
	Total	**50**	**60**

समाप्त