



त्रिभुवन विश्वविद्यालय
इन्जिनियरिङ्ग अध्ययन संस्थान डीन कार्यालय

सहायक प्रथम, मुख्य प्राविधिक सहायक (प्रयोगशाला) पदको खुल्ला प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम
२०८२

लिखित परीक्षा योजना

लिखित परीक्षा :

पूर्णाङ्क : १००

पत्र/विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली	प्रश्न संख्या × अङ्क	समय
प्रथम	५०	२०	वस्तुगत - बहुवैकल्पिक प्रश्न (MCQs)	५० प्रश्न × १ अङ्क	५० मिनेट
दोस्रो	५०	२०	विषयगत प्रश्न	१० प्रश्न × ५ अङ्क	१ घण्टा ३० मिनेट

द्रष्टव्य :

- लिखित परीक्षाको लागि १०० पूर्णाङ्कको वस्तुगत तथा विषयगत पत्रहरु हुनेछन् ।
- वस्तुगत बहुवैकल्पिक (Multiple Choice) प्रश्नको विकल्प छनौट गर्दा गलत छानेमा ऋणात्मक मूल्याङ्कन (Negative Marking) गरिने छ । अर्थात् यसरी मूल्याङ्कन गर्दा प्रत्येक गलत उत्तरको लागि २० प्रतिशत अङ्क कटौत गरिनेछ । बहुवैकल्पिक प्रश्नको २० प्रतिशत अङ्क प्राप्त्याङ्कबाट घटाइने छ । (उदाहरणका लागि परीक्षाथीले २० अङ्कको बहुवैकल्पिक प्रश्नमा १५को सही उत्तर र ५ प्रश्नको गलत उत्तर दिएमा निजको प्राप्त्याङ्क $(0.20 \times 5 = 1.00)$ अर्थात् $15 - 1 = 14$ अङ्क हुनेछ । तर उत्तर नदिएमा त्यस बापत अङ्क दिने छैन र अङ्क कटौत पनि गरिने छैन ।
- 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 टिप्पणीहरु (Short notes) सोध्न सकिने छ ।
- प्रत्येक पत्रको उत्तीर्णाङ्क पूर्णाङ्कको ४० प्रतिशत हुनेछ ।

1. Force , Motion and Pressure

1. Equations related to linear motion and solving mathematical problems using these equations.
2. Newton's first, second, and third laws of motion and their applications in daily life.
3. Newton's law of gravitation, its equation, and related simple mathematical problems.
4. Motion-time graph.
5. Definition of acceleration due to gravity and its relationship with distance (radius).
6. Relationship between weight, mass, and acceleration due to gravity.
7. Introduction to gravitational force and mathematical problems related to the weight of objects.
8. Concept of free fall and weightlessness.
9. Explanation of the effect of air resistance on an object falling toward the Earth's surface from a high altitude and examples of its applications in daily life.
10. Definition and unit of pressure.
11. The equation describes the interrelationship between pressure, force, and area, along with related mathematical problems.
12. Pascal's law and its applications in daily life.
13. Definition of upthrust, and upthrust generated in liquids and gases.
14. Archimedes' principle: introduction, statement, and applications.
15. The concepts of sinking, floating, and the principle of buoyancy.

2. Heat Energy, Sound and Optics

1. Introduction to heat and temperature, and the difference between them.
2. Thermal energy, Effects of heat on substances (motion of molecules, volume, temperature, solubility, etc.).
3. Introduction to the specific heat capacity of substances, its applications in daily life, and related mathematical problems.
4. Thermometers: Introduction and working principles of different types— ordinary thermometer, clinical thermometer, laboratory thermometer, digital thermometer, and radiation thermometer.
5. Calibration method of an ordinary thermometer.
6. Introduction to waves and types of waves.
7. Sound wave spectrum and reflection of sound.
8. Frequency of waves and the laws of wave frequency.
9. Total internal reflection of waves (sound and light).
10. Examples of total internal reflection of sound and light observed in daily life.
11. Applications of total internal reflection of sound and light.
12. Description of the dispersion of light, examples from daily life, and its applications.
13. Lenses:
 - Introduction to lenses and their types.
 - Parts of a lens (terminologies used in lenses).
 - Ray diagrams showing the formation of images when an object is placed at different positions in front of a lens, along with the nature and characteristics of the images formed.
 - Introduction to magnification and power of a lens, along with related calculations.
14. Differences between real and virtual images.
15. Human Eye:
 - a. Structure and functioning.
 - b. Types of eye defects, their causes, and treatments.
 - c. Effects of injuries to the cornea.

3. Electricity and Magnetism

1. Introduction to electric current and its applications.
2. Heating and lighting effects of electricity.
3. Electrical power and related mathematical problems.
4. Electrical energy consumption and related mathematical problems.
5. Introduction to direct current (DC) and alternating current (AC), and their differences.
6. Average voltage and frequency of electricity used in Nepal.
7. Magnetic effects of electricity:
 - Magnetic field produced in a straight wire, circular wire, and solenoid carrying current.
 - Right-hand grip rule.



8. Introduction to magnetic field lines and magnetic flux.
9. Motor effect, devices based on it, and its applications in daily life.
10. Definition of electromagnetic induction and Faraday's law of electromagnetic induction.
11. Introduction, working mechanism, and importance of hydropower, wind power, and thermal power.
12. Working principle of an AC generator/dynamo.

4. Elements, Compounds and Classification of Elements

1. Atomic structure models (for atomic numbers 1 to 20).
2. Atomic number and atomic mass of elements, and molecular mass of some compounds.
3. Chemical Bonds:
 - Definition of electrovalent (ionic) and covalent bonds.
 - Process of bond formation.
 - Molecular diagrams of some compounds (sodium chloride, hydrochloric acid, water, ammonia).
4. Periodic Table:
 - Reason for the classification of elements.
 - General information about the periodic table.
 - Mendeleev's and modern periodic laws.
 - Comparison of Mendeleev's and modern periodic tables.
5. Positioning of Elements in the Modern Periodic Table:
 - Structure of the periodic table, groups, and periods.
 - Identification and characteristics of s-block, p-block, d-block, and f-block elements.
6. Position and Explanation of Metals, Non-metals, and Metalloids in the Modern Periodic Table.
7. Electronic configuration of elements (up to atomic number 20) based on subshells.
8. Writing molecular formulas of compounds using the crisscross method.

5. Chemical Reactions and Some Gases

1. Chemical Equations:
 - Introduction and types.
 - Writing and balancing chemical equations (using the hit-and-trial method).
2. Chemical Reactions:
 - Types (combination, decomposition, displacement, and acid-base reactions) with examples and explanations.
 - Rate of chemical reactions.
 - Factors affecting the rate of chemical reactions (temperature, pressure, light, surface area, physical state, and catalyst).
3. Carbon Dioxide and Ammonia Gas:
 - Laboratory preparation and industrial production.
 - Physical and chemical properties.
 - Uses.
4. Causes, effects, and mitigation measures of the greenhouse effect.
5. Causes, effects, and mitigation measures of acid rain.

6. Metals, Non-Metals, Carbon and Its Compounds

1. Metals and Non-Metals:
 - Definition.
 - Main properties.
 - Differences between metals and non-metals.
1. Introduction to Minerals and Ores, and Their Differences.



2. Some Metals (Iron, Copper, Aluminum, Silver, and Gold):
 - Natural occurrence.
 - Names of major ores.
1. Reason Why Some Metals (e.g., Gold) Are Found in Free State in Nature.
 - i. Difference Between Organic and Inorganic Compounds.
 - ii. Hydrocarbons:
 5. Introduction and examples.
 6. Definition and difference between saturated and unsaturated hydrocarbons.
 - i. IUPAC Naming and Structural Formula of Hydrocarbons.
 - ii. Molecular Formula, Structural Formula, and Uses of Methane, Ethane, Propane, and n-Butane.
 - iii. General Information About Functional Groups.
 - iv. Alcohols:
 7. Introduction and definition.
 8. Classification of alcohols based on the position and number of hydroxyl (-OH) groups.
 9. Introduction, structural formula, and uses of methyl alcohol, ethyl alcohol, glycol, and glycerol.

7. Chemicals Used in Daily Life and Chemical Pollution

1. Role of Nitrogen, Phosphorus, and Potassium in Plants and Symptoms of Their Deficiency.
2. Introduction to Chemical Fertilizers and Examples of Nitrogen, Phosphorus, and Potassium-Based Fertilizers.
3. Negative Effects of Chemical Fertilizers and Pesticides.
4. Introduction, Importance, and Effects of Food Preservatives, Antioxidants, and Carbides.
5. Introduction, Importance, and Effects of Chemicals Used in Cleaning Products.
6. Toxic Chemicals (Insecticides, Pesticides, Rodenticides, Acids, Chlorine):
 - Their function, storage, and precautions for use.
 - Introduction, causes, and effects.
 - Pollution caused by cement, lead, ceramics, plastics, fibers, soaps, detergents, chemical fertilizers, pesticides, etc., and their management and pollution reduction measures.

8. Classification of Living Organisms and Genetics

1. Binomial System of Nomenclature:
 - Introduction and basis for naming organisms.
1. Classification of Organisms Based on the Five-Kingdom System.
2. Characteristics of Plant Kingdom (Up to Division) and Animal Kingdom (Up to Phylum) According to the Five-Kingdom System.
3. Classification of Subdivision Angiosperms Up to Class and Comparison Between Classes.
4. Classification of Subphylum Vertebrates Up to Class and Comparison Between Classes.
5. Relation of Evolution with the Classification of Organisms.
7. Mitosis and Meiosis Cell Division (Description of Stages, Diagrams, and Characteristics).
8. Introduction to Chromosomes and Genes.
9. Differences Between RNA and DNA Based on Structure, Size, and Function, and the Importance of DNA Testing in Various Research Fields.
10. Sex Chromosomes and Autosomes, Role of Sex Chromosomes in Gender Determination.

9. Human Anatomy and Life Processes, Nature and Environment

1. Introduction to Life Processes and Examples.
2. Circulatory System in Humans:
 - Structure and Function of the Heart and Blood Vessels.
 - Blood Circulation Process in the Human Heart.
1. Introduction, Identification, and Importance of Blood Groups.
2. Testing of Heartbeat and Pulse Rate.
3. Introduction, Normal and Abnormal Symptoms, Control, and Prevention of Blood Pressure, Blood Sugar, and Uric Acid.



4. Heart Attack:
 - Introduction, Causes, Symptoms, and Prevention.
 - Treatment Methods (Bypass Surgery and Angiography).
7. Climate Change:
 - Introduction, Causes, Effects, and Mitigation Measures.

10. Tribhuvan University

- TU Executive Council, Formation, Roles and Responsibilities
- TU Service Commission, Formation, Roles and Responsibilities
- TU Rules & Regulations, Teacher/Staff Services: Roles and Responsibilities of a TU staff, Leave & other facilities for a TU staff



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

(Specification Chart) २०८२
वस्तुगत - बहुवैकल्पिक प्रश्न

खण्ड	एकाई	विषय शीर्षक	अङ्क	प्रश्न संख्या	प्रश्न संख्या × अङ्क भार
	1.	Force , Motion and Pressure	5	50	50 प्रश्न × 1 अङ्क
	2.	Heat Energy, Sound and Optics	5		
	3.	Electricity and Magnetism	5		
	4.	Elements, Compounds and Classification of Elements	5		
	5.	Chemical Reactions and Some Gases	5		
	6.	Metals, Non-Metals, Carbon and Its Compounds	5		
	7.	Chemicals Used in Daily Life and Chemical Pollution	5		
	8.	Classification of Living Organisms and Genetics	5		
	9.	Human Anatomy and Life Processes, Nature and Environment	5		
	10.	त्रि.वि. ऐन र नियम सम्बन्धी सामान्य जानकारी	5		
	कुल जम्मा		50	50	

विषयगत प्रश्न

खण्ड	एकाई	विषय शीर्षक	अङ्क	प्रश्न संख्या	प्रश्न संख्या × अङ्क भार
	1.	Force , Motion and Pressure	5	1	10 प्रश्न × 5 अङ्क
	2.	Heat Energy, Sound and Optics	5	1	
	3.	Electricity and Magnetism	5	1	
	4.	Elements, Compounds and Classification of Elements	5	1	
	5.	Chemical Reactions and Some Gases	5	1	
	6.	Metals, Non-Metals, Carbon and Its Compounds	5	1	
	7.	Chemicals Used in Daily Life and Chemical Pollution	5	1	
	8.	Classification of Living Organisms and Genetics	5	1	
	9.	Human Anatomy and Life Processes, Nature and Environment	5	1	
	10.	त्रि.वि. ऐन र नियम सम्बन्धी सामान्य जानकारी	5	1	
	कुल जम्मा		50	10	

