# National Textile University, Faisalabad

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# ENTRY TEST GUIDE BOOK 2026

## For PRE-MEDICAL Group Applicants






## Undergraduate Admissions Preparation Guide

- BS Textile Engineering
- BS Polymer Engineering
- BS Textile Engineering Technology
- BS Garment Engineering Technology
- BS Software Engineering
- BS Computer Engineering
- BS Artificial Intelligence
- BS Computer Engineering Technology

**Prepared by:**
Admissions Office
National Textile University

**Director Admissions:**
Dr. Naseer Ahmad

# NATIONAL TEXTILE UNIVERSITY

**Faisalabad, Pakistan**

https://ntu.edu.pk/

# ENTRY TEST GUIDE BOOK

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**For:**

## PRE-MEDICAL GROUP

**For Admission in Undergraduate Programs:**

**BS Textile Engineering Technology**
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**BS Computer Engineering Technology**
**BS Artificial Intelligence**
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**BS Computer Science**
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# Contents

# PREFACE

This comprehensive guide is specially designed by the **Admissions Office** for candidates seeking admission to undergraduate programs at **National Textile University (NTU), Faisalabad**. The university is a premier institution in Pakistan, renowned for its excellence in textile education, engineering, and computer sciences.

## About NTU

National Textile University, located in Faisalabad, is the only university in Pakistan dedicated to textile education. It offers state-of-the-art facilities, experienced faculty, and strong industry linkages. The university has expanded its programs to include cutting-edge fields like Artificial Intelligence, Software Engineering, and Computer Engineering Technology.

## General Admission Criteria

- For A-Level: Three A-Levels (Biology, Chemistry, Physics) with IBCC equivalence
- DAE in relevant field also eligible for technology programs

## Minimum Eligibility Criteria

| Program | Minimum FSc/ICS (Part-I & II) Marks |
|---|---|
| **Textile Engineering** | 60% |
| **Polymer Engineering** | 60% |
| **Textile Engineering Technology** | 50% |
| **Garment Engineering Technology** | 50% |
| **Software Engineering** | 50% |
| **Computer Science** | 50% |
| **Artificial Intelligence** | 50% |
| **Computer Engineering Technology** | 50% |

## Merit Calculation Details

| Program Group | Matric | Intermediate Part-I | Entry Test |
|---|---|---|---|
| **Textile Related:** | | | |
| Textile Engineering | 15% | 50% | 35% |
| Polymer Engineering | 15% | 50% | 35% |
| Textile Engineering Technology | 15% | 50% | 35% |
| Garment Engineering Technology | 15% | 50% | 35% |
| **Computer Related:** | | | |
| Software Engineering | 10% | 60% | 30% |
| Computer Science | 10% | 60% | 30% |
| Artificial Intelligence | 10% | 60% | 30% |
| Computer Engineering Technology | 10% | 60% | 30% |

## Test Structure

- **Total Questions:** 90 MCQs
- **Total Marks:** 90 (1 mark each)
- **Time:** 120 minutes
- **Sections:**
  - Section I: English (20 Questions)
  - Section II: Analytical Reasoning (20 Questions)
  - Section III: Quantitative Reasoning (20 Questions)
  - Section IV: Subject (Biology, Chemistry, Physics) (30 Questions)

# IMPORTANT NOTE FOR CANDIDATES

## Important Disclaimer

The concepts, topics, and practice questions provided in this guide book are meant to assist candidates in their preparation for the Entry Test. While we have made every effort to cover the most important and frequently tested areas, please note that:

**Majority questions may belong to these contents but are not limited to only these. Candidates are advised not to bound themselves strictly to the mentioned topics only.**

A thorough study of the entire F.Sc/Intermediate curriculum is recommended for comprehensive preparation and better performance in the test.

# 1 ENGLISH

## 1.1 Important Concepts for Entry Test Preparation

### 1.1.1 Vocabulary Building

- **Commonly Confused Words:**
  - **Accept/Except:** Accept = to receive; Except = excluding
  - **Affect/Effect:** Affect = verb (to influence); Effect = noun (result)
  - **Than/Then:** Than = comparison; Then = next in time
  - **Their/There/They're:** Their = possessive; There = location; They're = they are
  - **Your/You're:** Your = possessive; You're = you are
  - **Its/It's:** Its = possessive; It's = it is
  - **Lose/Loose:** Lose = misplace; Loose = not tight
  - **Principal/Principle:** Principal = head of school/main; Principle = rule/belief

- **Commonly Misspelled Words:**
  - Correct: **Accommodation** (not acomodation/accomodation)
  - Correct: **Separate** (not seperate)
  - Correct: **Definitely** (not definately)
  - Correct: **Necessary** (not neccessary)
  - Correct: **Embarrass** (not embarass)
  - Correct: **Occurrence** (not occurance)
  - Correct: **Pronunciation** (not pronounciation)
  - Correct: **Rhythm** (not rythm)
  - Correct: **Consensus** (not concensus)
  - Correct: **Publicly** (not publically)

- **Synonyms (Words with Similar Meanings):**
  - **Reluctant:** hesitant, unwilling, resistant (Antonym: willing, eager)
  - **Benevolent:** kind, generous, charitable (Antonym: cruel, malevolent)
  - **Superficial:** shallow, external, surface-level (Antonym: deep, profound)
  - **Abundant:** plentiful, ample, copious (Antonym: scarce)
  - **Expand:** enlarge, increase, extend (Antonym: contract)
  - **Diligent:** hardworking, industrious, assiduous
  - **Ephemeral:** short-lived, temporary, transient
  - **Ubiquitous:** everywhere, omnipresent, universal

- **Antonyms (Words with Opposite Meanings):**
  - **Curtail:** reduce, shorten (Antonym: prolong, extend)
  - **Elastic:** flexible, stretchy (Antonym: rigid, stiff)
  - **Arrogant:** conceited (Antonym: humble, modest)
  - **Brief:** short (Antonym: lengthy, prolonged)
  - **Ancient:** old (Antonym: modern, new)
  - **Optimist:** positive thinker (Antonym: pessimist)
  - **Transparent:** clear (Antonym: opaque)

### 1.1.2 Grammar Essentials

- **Parts of Speech:**
  - **Noun:** Person, place, thing, idea (Ali, Lahore, table, happiness)
  - **Pronoun:** Replaces noun (he, she, it, they, we)
  - **Verb:** Action or state (run, eat, is, are, was)
  - **Adjective:** Describes noun (beautiful, tall, red)
  - **Adverb:** Describes verb, adjective, or other adverb (quickly, very, quite)
  - **Preposition:** Shows relationship (in, on, at, under, between)
  - **Conjunction:** Connects words/clauses (and, but, or, because)
  - **Interjection:** Expresses emotion (Wow! Oh! Alas!)

- **Tenses - Verb Forms:**
  - **Present Simple:** Habitual actions (I eat, He eats)
  - **Present Continuous:** Actions happening now (I am eating)
  - **Present Perfect:** Past with present relevance (I have eaten)
  - **Past Simple:** Completed past action (I ate)
  - **Past Continuous:** Ongoing past action (I was eating)
  - **Past Perfect:** Action before another past action (I had eaten)
  - **Future Simple:** Will + verb (I will eat)
  - **Future Continuous:** Will be + -ing (I will be eating)

- **Subject-Verb Agreement:**
  - Singular subject → singular verb (She **doesn't like** apples)
  - Plural subject → plural verb (They **like** apples)
  - Each/every/either/neither → singular verb (Each student **has** a book)
  - Collective nouns can be singular or plural (The team **is** winning / The team **are** arguing)

  - With "either...or" / "neither...nor" - verb agrees with closer subject

- **Prepositions - Common Uses:**
  - **Interested in** (not on/at) learning
  - **Confident about/of** (not on/with) success
  - **Good at** (not in) mathematics
  - **Depend on** (not at) parents
  - **Believe in** (not on) God
  - **Arrive at** (place) / **in** (city/country)
  - **Divide into** (parts) / **between** (two) / **among** (many)
  - **Angry with** (person) / **at** (situation)

- **Active and Passive Voice:**
  - **Active:** Subject performs action (Subject + verb + object)
  - **Passive:** Subject receives action (Object + be + past participle + by + subject)
  - Example: "She writes a letter" → "A letter is written by her"
  - Example: "They built the house" → "The house was built by them"
  - Passive is used when: Agent is unknown/unimportant, or we want to emphasize object

- **Direct and Indirect Speech:**
  - Direct: He said, "I am tired."
  - Indirect: He said that he was tired.
  - Tense changes: Present → Past, Past → Past Perfect, Will → Would

### 1.1.3 Idioms and Phrases

- **Common Idioms:**
  - **Elephant in the room:** A major issue that everyone ignores
  - **Couch potato:** A lazy person who watches too much TV
  - **Bite the bullet:** Face a difficult situation bravely
  - **Break the ice:** Start conversation in a social setting
  - **Cost an arm and a leg:** Very expensive
  - **Hit the nail on the head:** Be exactly right
  - **Once in a blue moon:** Very rarely
  - **Piece of cake:** Very easy
  - **Spill the beans:** Reveal a secret
  - **Under the weather:** Feeling ill

### 1.1.4 One Word Substitution

- **Anarchist:** Person who wants to destroy all government
- **Fresco:** A picture painted on wall in water color
- **Epitaph:** Inscription on a tombstone
- **Epicure:** Person who enjoys good food and drink
- **Biped:** Animal with two feet
- **Crank:** Eccentric person with strange ideas
- **Omnipotent:** All-powerful
- **Omniscient:** All-knowing
- **Omnipresent:** Present everywhere
- **Ambidextrous:** Able to use both hands equally well

### 1.1.5 Reading Comprehension Tips

- **Strategies for Comprehension:**
  - Read the questions first to know what to look for
  - Skim the passage for main idea (first and last paragraphs)
  - Scan for specific details (names, dates, keywords)
  - Look for topic sentences (usually first sentence of each paragraph)
  - Pay attention to transition words (however, therefore, moreover)
  - Identify the author's tone (positive, negative, neutral)
  - Distinguish between facts and opinions
  - Make inferences based on evidence in text

# 2 ANALYTICAL REASONING

## 2.1 Overview

Analytical Reasoning tests your logical thinking, problem-solving ability, and capacity to analyze complex situations. This section carries 20 questions and requires systematic approach and practice.

## 2.2 Types of Analytical Reasoning Questions

- **Arrangement Problems:** Seating arrangements, committee formations, orderings
- **Blood Relations:** Family trees, relationships
- **Logical Deductions:** If-then statements, conditional logic
- **Sequence and Series:** Pattern recognition
- **Puzzles:** Grid-based problems, scheduling

## 2.3 Key Tactics for Analytical Reasoning

! **Read the Entire Setup First:** Understand all conditions before attempting questions. Underline key constraints.

! **Draw Diagrams:** For arrangement problems, draw positions. For blood relations, draw family trees. Visual representation saves time.

! **Use Symbols and Abbreviations:** Represent people/items with initials (A, B, C) to save time.

! **Create Tables:** For complex arrangements, use tables to track possibilities.

! **Apply "If" Conditions Systematically:** When a question begins with "If...", apply that condition first and then see what else must be true.

! **Look for Fixed Positions:** Identify elements that have fixed positions based on conditions.

! **Use Elimination Method:** Eliminate options that violate any given condition.

! **Check Boundary Conditions:** Pay attention to words like "exactly one", "at least", "at most", "immediately before/after".

! **Practice Speed:** Analytical questions can be time-consuming. Practice to improve speed without compromising accuracy.

! **Verify Your Answer:** Quickly check if your answer satisfies all given conditions.

## 2.4 Solved Examples with Tactics

### Example 1: Committee Arrangement (with Tactic Application)

**Question:** Nine individuals: Ahmed, Bilal, Danish, Faisal, Haroon, Liaquat, Maryam, Shiza and Zeeshan are to serve on three committees labeled A, B and C.

- Each candidate should serve on exactly one of the committees
- Every committee must have at least one member
- Committee A should consist of exactly one member more than that of committee B
- Among Maryam, Shiza and Zeeshan none can serve on committee A
- Among Faisal, Haroon and Liaquat none can serve on committee B
- Among Ahmed, Bilal and Danish none can serve on committee C

**If Danish and Zeeshan are the individuals serving on committee B, how many of the nine individuals should serve on committee C?**

**Tactic Applied: Draw and Use Variables**

1. Total individuals = 9
2. Committee A = Committee B + 1
3. Given: Danish and Zeeshan on B → B has at least 2 members
4. Let B = x members, then A = x + 1, and C = 9 - (2x + 1) = 8 - 2x
5. For C to be at least 1, x  3.5, so x can be 1, 2, or 3
6. Given B has Danish and Zeeshan (2 members), x = 2
7. Then A = 3, and C = 9 - 5 = 4

**Answer: C. 4**

### Example 2: Blood Relations (with Tactic Application)

**Question:** P, Q, R, S, T and U are six family members. Three are males. There are two married couples. R is father of P and U. T is mother of R. P is granddaughter of Q.

**Find:** How is U related to P?

**Tactic Applied: Draw Family Tree**

T (Female) – Q (Male)
↓parents of
R (Male) – S (Female)
↓father of
P (Female) U (Male)

**Solution:**

- R is father of P and U → R is male, P and U are R's children
- T is mother of R → T is female, R's mother
- P is granddaughter of Q → Q is grandparent of P
- Since T is R's mother and P is R's daughter, T is grandmother of P
- Therefore Q must be grandfather (since three males: R, Q, and one more)
- R and his wife (S) are one married couple
- T and Q are another married couple (parents of R)
- U is sibling of P (brother or sister)

**Answer: D. Brother** (if U is male) or **A. Sister** (if U is female)

## 2.5 Practice Questions

1. In the above family tree, who is the husband of T?

   (A) Q

   (B) R

   (C) U

   (D) None of these

2. If it is true that "streets are wet whenever it is raining," which of the following must be true?

   (A) If streets are wet, it is raining

   (B) If streets are wet but sidewalks not wet, it is not raining

   (C) If not raining, streets are not wet

   (D) I and II only

## 2.6 Answer Key for Practice Questions

| Q. No. | Answer |
|---|---|
| 1 | A |
| 2 | B |

# 3 QUANTITATIVE REASONING

## 3.1 Overview

Quantitative Reasoning tests your mathematical skills, numerical ability, and problem-solving speed. This section carries 20 questions and requires quick calculations and formula recall.

## 3.2 Topics Covered

- Percentages
- Number Theory and Divisibility
- Geometry (Circles, Area, Circumference)
- Exponents and Powers
- Ratios and Proportions
- Fractions and Decimals
- Linear and Simultaneous Equations
- Work and Time Problems
- Algebra

## 3.3 Key Formulas

| **Concept** | **Formula** |
|---|---|
| Percentage | % = (Part/Whole) × 100 |
| Circle Circumference | C = 2r = d |
| Circle Area | $A = r^2$ |
| Exponents | a × a = a |
| Successive Discounts | Single Discount = a + b - (ab/100) |
| Work Formula | 1/T = 1/T + 1/T |
| Quadratic Formula | x = [-b ± ($b^2$ - 4ac)]/2a |
| Distance Formula | d = [$(x-x)^2$ + $(y-y)^2$] |

## 3.4 Key Tactics for Quantitative Reasoning

! **Memorize Key Formulas:** Create a formula sheet and review it regularly. Quick recall saves valuable time.

! **Estimate First:** Before calculating, estimate the answer to eliminate obviously wrong options.

! **Use Back-Solving:** For multiple choice questions, substitute options back into the equation to find the correct one.

! **Look for Patterns:** Many questions follow common patterns (e.g., 10% of something, half of something).

! **Simplify Before Calculating:** Reduce fractions, cancel common factors before performing complex calculations.

! **Check Units:** Ensure all units are consistent (e.g., convert feet to inches, hours to minutes).

! **Use Approximation:** For questions with  or square roots, use approximate values ( 3.14, 2 1.41).

! **Identify Question Type:** Quickly categorize the question (percentage, work, ratio) to recall the appropriate formula.

! **Skip and Return:** If a question seems too time-consuming, mark it and return later. Don't waste precious time.

! **Verify with Common Sense:** After getting an answer, check if it makes logical sense (e.g., probability between 0 and 1).

## 3.5 Solved Examples with Tactics

### Example 1: Percentage (with Tactic Application)

**Question:** 15% of 32 equals?

**Tactic Applied: Estimate First**

15% of 32 10% of 32 (3.2) + 5% of 32 (1.6) = 4.8

**Answer: B. 4.8**

### Example 2: Divisibility (with Tactic Application)

**Question:** A number divisible by both 6 and 8 is also divisible by?

**Tactic Applied: Use LCM**

LCM of 6 and 8 = 24. Any number divisible by both must be divisible by their LCM.

**Answer: D. 24**

### Example 3: Work Problem (with Tactic Application)

**Question:** If Adil can finish a job in 5 hours and Moeed in 10 hours, how many minutes will both take together?

**Tactic Applied: Use Work Formula**

$$\begin{aligned} \text{Adil's rate} &= 1/5 \text{ job/hour} \\ \text{Moeed's rate} &= 1/10 \text{ job/hour} \\ \text{Combined rate} &= 1/5 + 1/10 = 3/10 \text{ job/hour} \\ \text{Time} &= 1(3/10) = 10/3 \text{ hours} \\ &= (10/3)60 = 200 \text{ minutes} \end{aligned}$$

**Answer: C. 200**

### Example 4: Simultaneous Equations (with Tactic Application)

**Question:** If $x + 3y = 7$ and $2x + y = 5$, then $x/y$ is?
**Tactic Applied: Elimination Method**
Multiply second equation by 3: $6x + 3y = 15$
Subtract first equation: $(6x + 3y) - (x + 3y) = 15 - 7$
$5x = 8 \rightarrow x = 8/5$
Substitute: $8/5 + 3y = 7 \rightarrow 3y = 7 - 8/5 = 35/5 - 8/5 = 27/5 \rightarrow y = 9/5$
$x/y = (8/5)/(9/5) = 8/9$
**Answer: A. 8/9**

## 3.6 Practice Questions

1. If $x + 3y = 7$ and $2x + y = 5$, then $x/y$ is?
   (A) 8/9
   (B) 1/2
   (C) 1/3
   (D) 2/5

2. If the radius of a circle is halved, its area becomes:
   (A) Same
   (B) Double
   (C) Half
   (D) Quarter

3. $1250 \div 25 \times 0.5 = ?$
   (A) 100
   (B) 50
   (C) 25
   (D) 2.5

## 3.7 Answer Key for Practice Questions

| Q. No. | Answer |
|---|---|
| 1 | A |
| 2 | D |
| 3 | C |

# 4 BIOLOGY

## 4.1 Important Concepts for Entry Test Preparation

### 4.1.1 Cell Biology - The Foundation of Life

- **Cell Theory:** All living organisms are composed of one or more cells; the cell is the basic unit of life; all cells arise from pre-existing cells.

- **Cell Types:**
  - **Prokaryotic Cells:** No true nucleus, no membrane-bound organelles (e.g., Bacteria, Archaea)
  - **Eukaryotic Cells:** Have true nucleus with nuclear membrane, contain membrane-bound organelles (e.g., Plant cells, Animal cells, Fungi)

- **Cell Organelles and Their Functions:**
  - **Nucleus:** Control center of the cell, contains DNA (genetic material)
  - **Mitochondria:** Power house of the cell, site of cellular respiration (ATP production)
  - **Chloroplasts:** Found in plant cells, site of photosynthesis
  - **Ribosomes:** Site of protein synthesis, found free in cytoplasm or attached to ER
  - **Endoplasmic Reticulum (ER):**
    - Rough ER: Has ribosomes, involved in protein synthesis and transport
    - Smooth ER: No ribosomes, involved in lipid synthesis and detoxification
  - **Golgi Apparatus:** Modifies, sorts, and packages proteins for secretion
  - **Lysosomes:** Digestive system of the cell, contain hydrolytic enzymes
  - **Vacuoles:** Storage of water, ions, and waste materials (large central vacuole in plants)
  - **Cell Wall:** Found in plants, bacteria, and fungi; provides structural support
  - **Plasma Membrane:** Semi-permeable membrane, controls entry and exit of substances

- **Transport Across Cell Membrane:**
  - **Diffusion:** Movement from high to low concentration (no energy required)
  - **Osmosis:** Diffusion of water across semi-permeable membrane
  - **Active Transport:** Movement against concentration gradient, requires energy (ATP)

- **Facilitated Diffusion:** Diffusion through carrier proteins (no energy required)
- **Endocytosis:** Taking in materials by infolding of cell membrane
- **Exocytosis:** Expelling materials by fusion of vesicles with cell membrane

### 4.1.2 Genetics - The Code of Life

- **DNA (Deoxyribonucleic Acid):**
  - Double helix structure discovered by Watson and Crick
  - Composed of nucleotides (sugar + phosphate + nitrogenous base)
  - Nitrogenous bases: Adenine (A), Thymine (T), Guanine (G), Cytosine (C)
  - Base pairing rule: A pairs with T (2 hydrogen bonds), G pairs with C (3 hydrogen bonds)
  - Carries genetic information from parents to offspring

- **RNA (Ribonucleic Acid):**
  - Single-stranded structure
  - Contains Uracil (U) instead of Thymine (T)
  - Types: mRNA (messenger), tRNA (transfer), rRNA (ribosomal)
  - Involved in protein synthesis (transcription and translation)

- **Mendel's Laws of Inheritance:**
  - **Law of Segregation:** Alleles separate during gamete formation, each gamete receives one allele
  - **Law of Independent Assortment:** Genes for different traits assort independently during gamete formation

- **Key Genetic Terms:**
  - **Gene:** Unit of heredity, segment of DNA
  - **Allele:** Alternative form of a gene (dominant or recessive)
  - **Genotype:** Genetic makeup of an organism (e.g., TT, Tt, tt)
  - **Phenotype:** Physical expression of genes (e.g., tall, short)
  - **Homozygous:** Both alleles are identical (TT or tt)
  - **Heterozygous:** Alleles are different (Tt)
  - **Dominant:** Allele that expresses itself in heterozygous condition (T)
  - **Recessive:** Allele that expresses only in homozygous condition (t)

- **Genetic Disorders:**
  - **Autosomal Disorders:** Hemophilia, Sickle cell anemia, Thalassemia
  - **Chromosomal Disorders:** Down syndrome (Trisomy 21), Turner syndrome (XO)

### 4.1.3 Human Physiology - Systems of the Body

- **Digestive System:**
  - **Organs:** Mouth → Esophagus → Stomach → Small Intestine → Large Intestine → Rectum → Anus
  - **Accessory Organs:** Liver (produces bile), Pancreas (produces digestive enzymes), Gallbladder (stores bile)
  - **Digestive Enzymes:** Amylase (starch breakdown), Pepsin (protein breakdown in stomach), Trypsin (protein breakdown in small intestine), Lipase (fat breakdown)
  - **Absorption:** Villi and microvilli in small intestine increase surface area for absorption

- **Respiratory System:**
  - **Organs:** Nasal cavity → Pharynx → Larynx → Trachea → Bronchi → Bronchioles → Alveoli
  - **Gas Exchange:** Occurs in alveoli (oxygen enters blood, carbon dioxide exits)
  - **Breathing Mechanism:** Inhalation (diaphragm contracts, chest volume increases), Exhalation (diaphragm relaxes, chest volume decreases)
  - **Lung Volumes:** Tidal volume, Vital capacity, Residual volume

- **Circulatory System:**
  - **Heart:** Four chambers (Right atrium, Right ventricle, Left atrium, Left ventricle)
  - **Blood Vessels:** Arteries (carry blood away from heart), Veins (carry blood toward heart), Capillaries (site of exchange)
  - **Blood Components:**
    - Red Blood Cells (RBCs): Carry oxygen (hemoglobin), no nucleus
    - White Blood Cells (WBCs): Immune defense
    - Platelets: Blood clotting
    - Plasma: Liquid portion (90% water), carries nutrients, hormones, waste
  - **Blood Groups:** A, B, AB, O (based on antigens on RBCs); Rh factor positive or negative
  - **Heartbeat:** Systole (contraction), Diastole (relaxation); controlled by SA node (pacemaker)

- **Nervous System:**
  - **Neuron:** Basic unit, consists of cell body, dendrites, axon

  - **Brain Parts:** Cerebrum (thinking, memory), Cerebellum (balance, coordination), Medulla oblongata (heartbeat, breathing)
  - **Spinal Cord:** Reflex actions, communication between brain and body
  - **Synapse:** Junction between neurons; neurotransmitters transmit signals

- **Excretory System:**
  - **Organs:** Kidneys → Ureters → Urinary bladder → Urethra
  - **Kidney Function:** Filtration of blood, reabsorption of useful substances, secretion of waste
  - **Nephron:** Functional unit of kidney; glomerulus filters blood, tubules reabsorb
  - **Urine Composition:** Water, urea, uric acid, salts

- **Endocrine System:**
  - **Pituitary Gland:** Master gland, controls other glands
  - **Thyroid Gland:** Produces thyroxine (regulates metabolism)
  - **Pancreas:** Produces insulin and glucagon (regulate blood sugar)
  - **Adrenal Glands:** Produce adrenaline (fight or flight response)
  - **Gonads:** Testes (testosterone), Ovaries (estrogen, progesterone)

#### 4.1.4 Plant Biology

- **Photosynthesis:**
  - Equation: $6CO_2 + 6H_2O \xrightarrow{\text{light, chlorophyll}} C_6H_{12}O_6 + 6O_2$
  - Occurs in chloroplasts (contain chlorophyll)
  - Light reactions: Produce ATP and NADPH
  - Dark reactions (Calvin cycle): Fix CO into glucose
  - Factors affecting photosynthesis: Light intensity, CO concentration, temperature

- **Plant Transport:**
  - **Xylem:** Transports water and minerals from roots upward (unidirectional)
  - **Phloem:** Transports food (sucrose) from leaves to other parts (bidirectional)
  - **Transpiration:** Loss of water vapor from leaves through stomata
  - **Guttation:** Loss of water in liquid form through hydathodes

- **Plant Hormones:**
  - **Auxins:** Cell elongation, phototropism, apical dominance

  - **Gibberellins:** Stem elongation, seed germination
  - **Cytokinins:** Cell division, delay senescence
  - **Abscisic Acid:** Stress hormone, induces dormancy, closes stomata
  - **Ethylene:** Fruit ripening, senescence

- **Plant Reproduction:**
  - **Flower Structure:** Sepals, petals, stamens (male), carpels (female)
  - **Pollination:** Transfer of pollen from anther to stigma (wind, insects, water)
  - **Fertilization:** Fusion of male and female gametes
  - **Seed Dispersal:** Wind, water, animals, explosion

#### 4.1.5 Ecology and Environment

- **Ecosystem Components:**
  - **Abiotic:** Sunlight, temperature, water, soil, minerals
  - **Biotic:** Producers (autotrophs), Consumers (heterotrophs), Decomposers

- **Food Chain and Food Web:**
  - Producer → Primary Consumer → Secondary Consumer → Tertiary Consumer
  - Trophic levels: Each step in food chain
  - Energy flow: Only 10% energy passes to next trophic level (10% law)
  - Ecological pyramids: Pyramid of numbers, biomass, energy

- **Biogeochemical Cycles:**
  - **Carbon Cycle:** Photosynthesis, respiration, combustion, decomposition
  - **Nitrogen Cycle:** Nitrogen fixation, nitrification, assimilation, ammonification, denitrification
  - **Water Cycle:** Evaporation, condensation, precipitation, runoff

- **Biodiversity and Conservation:**
  - **Biodiversity Hotspots:** Areas with high species diversity
  - **Endangered Species:** Species at risk of extinction
  - **Conservation Methods:** National parks, wildlife sanctuaries, biosphere reserves

### 4.1.6 Evolution and Adaptation

- **Darwin's Theory of Evolution:**
  - Variation exists in populations
  - More offspring produced than can survive
  - Competition for resources
  - Survival of the fittest (natural selection)
  - Descent with modification

- **Evidence of Evolution:**
  - **Fossil Record:** Transitional forms show evolutionary change
  - **Homologous Structures:** Same basic structure, different functions (e.g., human arm, whale flipper)
  - **Analogous Structures:** Different structures, similar functions (e.g., bird wing, insect wing)
  - **Vestigial Organs:** Non-functional remnants (e.g., appendix in humans)
  - **Molecular Evidence:** DNA and protein similarities
  - **Embryological Evidence:** Similar embryonic development patterns

- **Mechanisms of Evolution:**
  - Natural Selection
  - Genetic Drift (random changes in small populations)
  - Gene Flow (migration between populations)
  - Mutation (source of new genetic variation)

# 5 CHEMISTRY

## 5.1 Important Concepts for Entry Test Preparation

### 5.1.1 Atomic Structure and Periodic Table

- **Atomic Structure:**
  - **Protons:** Positively charged, in nucleus, atomic number (Z)
  - **Neutrons:** Neutral, in nucleus, mass number (A) = protons + neutrons
  - **Electrons:** Negatively charged, in shells/orbitals around nucleus
  - **Isotopes:** Same number of protons, different number of neutrons (e.g., C-12, C-14)
  - **Ions:** Atoms with charge (cations = positive, anions = negative)

- **Electronic Configuration:**
  - Shells: K (2), L (8), M (18), N (32) - capacity = $2n^2$
  - Subshells: s (2 electrons), p (6 electrons), d (10 electrons), f (14 electrons)
  - Aufbau principle: Electrons fill lowest energy levels first
  - Hund's rule: Electrons occupy orbitals singly before pairing
  - Pauli exclusion principle: No two electrons have same set of quantum numbers

- **Periodic Trends:**
  - **Atomic Radius:** Decreases left to right (increased nuclear charge), increases down a group (new shells added)
  - **Ionization Energy:** Energy required to remove an electron; increases left to right, decreases down a group
  - **Electron Affinity:** Energy released when electron is added; increases left to right
  - **Electronegativity:** Ability to attract electrons; increases left to right, decreases down a group
  - **Metallic Character:** Decreases left to right, increases down a group

- **Periodic Table Groups:**
  - Group 1: Alkali metals (highly reactive, 1 valence electron)
  - Group 2: Alkaline earth metals (reactive, 2 valence electrons)
  - Group 17: Halogens (highly reactive nonmetals, 7 valence electrons)
  - Group 18: Noble gases (inert, full valence shell)
  - Transition Metals: Variable oxidation states, colored compounds

### 5.1.2 Chemical Bonding

- **Ionic Bonding:**
  - Complete transfer of electrons from metal to nonmetal
  - Forms cations (+) and anions (-)
  - Strong electrostatic forces of attraction
  - High melting and boiling points
  - Conduct electricity in molten or aqueous state
  - Examples: NaCl, MgO, CaF

- **Covalent Bonding:**
  - Sharing of electron pairs between nonmetals
  - Single bond: One pair shared (H, Cl)
  - Double bond: Two pairs shared (O, CO)
  - Triple bond: Three pairs shared (N, CH)
  - Polar covalent: Unequal sharing (HO, HCl)
  - Nonpolar covalent: Equal sharing (O, N)
  - Low melting and boiling points
  - Do not conduct electricity

- **Coordinate Covalent Bond:**
  - Both shared electrons come from one atom
  - Also called dative bond
  - Examples: NH, HO

- **Metallic Bonding:**
  - Sea of electrons around positive metal ions
  - Malleable and ductile
  - Good conductors of heat and electricity

- **Intermolecular Forces:**
  - **Hydrogen Bonding:** Strongest IMF; occurs when H is bonded to F, O, or N; responsible for high boiling point of water
  - **Dipole-Dipole Forces:** Between polar molecules
  - **London Dispersion Forces:** Weakest; present in all molecules; increases with molecular size

- **Molecular Shapes (VSEPR Theory):**

- Linear: 2 bond pairs (CO, BeCl)
- Trigonal planar: 3 bond pairs (BF)
- Tetrahedral: 4 bond pairs (CH)
- Trigonal pyramidal: 3 bond pairs + 1 lone pair (NH)
- Bent/V-shaped: 2 bond pairs + 2 lone pairs (HO)

### 5.1.3 Organic Chemistry - The Chemistry of Carbon

- **Hydrocarbons:**
  - **Alkanes:** CH, single bonds, saturated, undergo substitution reactions
  - **Alkenes:** CH, double bond, unsaturated, undergo addition reactions
  - **Alkynes:** CH, triple bond, unsaturated, undergo addition reactions
  - **Aromatic:** Benzene ring structure, special stability

- **Functional Groups:**
  - **Alcohols:** -OH (methanol, ethanol)
  - **Aldehydes:** -CHO (formaldehyde, acetaldehyde)
  - **Ketones:** -CO- (acetone)
  - **Carboxylic Acids:** -COOH (acetic acid, formic acid)
  - **Esters:** -COOR (fruity smell)
  - **Ethers:** -O- (diethyl ether)
  - **Amines:** -NH (aniline)
  - **Halides:** -X (Cl, Br, I)

- **Organic Reactions:**
  - **Substitution:** Alkane + Halogen → Haloalkane (requires UV light)
  - **Addition:** Alkene + Halogen → Dihaloalkane
  - **Elimination:** Alcohol → Alkene (with conc. HSO)
  - **Oxidation:** Primary alcohol → Aldehyde → Carboxylic acid
  - **Esterification:** Carboxylic acid + Alcohol → Ester + Water
  - **Polymerization:** Monomers join to form polymers

- **Petroleum and Fuels:**
  - Fractional distillation separates crude oil into fractions
  - Octane number: Measure of fuel quality
  - Cracking: Breaking larger hydrocarbons into smaller ones
  - Reforming: Converting straight-chain to branched-chain hydrocarbons

### 5.1.4 Biochemistry - Chemistry of Life

- **Carbohydrates:**
  - General formula: C(HO)
  - **Monosaccharides:** Glucose, fructose, galactose (simple sugars)
  - **Disaccharides:** Sucrose (glucose+fructose), Lactose (glucose+galactose), Maltose (glucose+glucose)
  - **Polysaccharides:** Starch (energy storage in plants), Glycogen (energy storage in animals), Cellulose (structural in plants)

- **Proteins:**
  - Polymers of amino acids
  - Amino acids: Contain -NH and -COOH groups
  - Peptide bond: Formed between amino acids (condensation reaction)
  - Structure levels: Primary (sequence), Secondary (-helix, -sheet), Tertiary (3D folding), Quaternary (multiple subunits)
  - Functions: Enzymes, structural, transport, defense

- **Lipids:**
  - Fats, oils, phospholipids, steroids
  - Hydrophobic (insoluble in water)
  - Triglycerides: Glycerol + 3 fatty acids
  - Saturated fats: No double bonds (solid at room temperature)
  - Unsaturated fats: Contain double bonds (liquid at room temperature)
  - Functions: Energy storage, insulation, cell membrane structure

- **Nucleic Acids:**
  - DNA: Double helix, stores genetic information
  - RNA: Single strand, involved in protein synthesis
  - Nucleotides: Sugar + phosphate + nitrogenous base

- **Enzymes:**
  - Biological catalysts (proteins)
  - Lower activation energy
  - Lock and key model: Specific substrate fits active site
  - Induced fit model: Active site changes shape to fit substrate
  - Factors affecting enzyme activity: Temperature, pH, substrate concentration

- Denaturation: Loss of structure due to heat or pH change

- **Vitamins and Minerals:**
  - Fat-soluble vitamins: A, D, E, K
  - Water-soluble vitamins: B complex, C
  - Essential minerals: Calcium, Iron, Potassium, Sodium, Iodine

### 5.1.5 Physical Chemistry Essentials

- **Acids and Bases:**
  - Arrhenius theory: Acids produce H in water; bases produce OH
  - Brønsted-Lowry theory: Acids donate H; bases accept H
  - Lewis theory: Acids accept electron pairs; bases donate electron pairs
  - pH scale: 0-14; pH = -log[H]
  - pH ¡ 7: Acidic; pH = 7: Neutral; pH ¿ 7: Basic
  - Strong acids: HCl, HSO, HNO (fully dissociate)
  - Weak acids: CHCOOH, HCO (partially dissociate)
  - Strong bases: NaOH, KOH (fully dissociate)
  - Weak bases: NH (partially dissociate)

- **Chemical Equilibrium:**
  - Dynamic equilibrium: Forward rate = Reverse rate
  - Le Chatelier's Principle: System at equilibrium responds to stress
  - Factors affecting equilibrium: Concentration, Pressure, Temperature

- **Thermochemistry:**
  - Exothermic reactions: Release heat (H negative) (combustion)
  - Endothermic reactions: Absorb heat (H positive) (photosynthesis)
  - Activation energy: Energy required to start reaction

- **Electrochemistry:**
  - Oxidation: Loss of electrons
  - Reduction: Gain of electrons (OIL RIG)
  - Electrochemical cells: Convert chemical energy to electrical energy
  - Electrolytic cells: Use electrical energy to drive non-spontaneous reactions

# 6 PHYSICS

## 6.1 Important Concepts for Entry Test Preparation

### 6.1.1 Mechanics - The Study of Motion and Forces

- **Kinematics (Motion without Forces):**
  - **Scalars:** Magnitude only (distance, speed, mass, time, energy)
  - **Vectors:** Magnitude and direction (displacement, velocity, acceleration, force)
  - **Equations of Motion (constant acceleration):**

$$v = u + at, \quad s = ut + \frac{1}{2}at^2, \quad v^2 = u^2 + 2as$$

    where u = initial velocity, v = final velocity, a = acceleration, t = time, s = displacement
  - **Acceleration Due to Gravity:** g = 9.8 m/s² downward
  - **Projectile Motion:** Horizontal velocity constant, vertical acceleration = g
  - **Range Formula:** R = ($u^2$ sin 2)/g
  - **Maximum Height:** H = ($u^2$ $\sin^2$)/2g

- **Dynamics (Forces and Motion):**
  - **Newton's First Law:** Object at rest stays at rest; object in motion stays in motion unless acted upon by external force (Law of Inertia)
  - **Newton's Second Law:** F = ma (Force = mass × acceleration)
  - **Newton's Third Law:** Every action has equal and opposite reaction
  - **Momentum:** p = mv (kg·m/s)
  - **Impulse:** F·t = p (change in momentum)
  - **Conservation of Momentum:** Total momentum before = Total momentum after (in isolated system)
  - **Friction:** f = N ( = coefficient of friction, N = normal force)
  - **Tension:** Force in rope or string

- **Work, Energy, and Power:**
  - **Work:** W = Fd cos (Joules)
  - **Kinetic Energy:** KE = $\frac{1}{2}$m$v^2$ (energy of motion)
  - **Potential Energy:** PE = mgh (gravitational potential energy)
  - **Elastic Potential Energy:** PE = $\frac{1}{2}$k$x^2$ (spring)
  - **Law of Conservation of Energy:** Energy cannot be created or destroyed, only transformed

  - **Power:** P = W/t = Fv (Watts)
  - **Efficiency:** Efficiency = (Useful output energy / Input energy) × 100%

- **Circular Motion and Gravitation:**
  - **Centripetal Acceleration:** $a_c = v/r = r$
  - **Centripetal Force:** $F_c = mv/r$
  - **Newton's Law of Gravitation:** $F = G(mm)/r^2$, where $G = 6.67\times10^{11}$ $N\cdot m^2/kg^2$
  - **Orbital Velocity:** v = (GM/r)
  - **Escape Velocity:** $v_e = (2GM/R) = (2gR)$

### 6.1.2 Waves and Optics

- **Wave Properties:**
  - **Wavelength ():** Distance between two consecutive crests/troughs (meters)
  - **Frequency (f):** Number of waves per second (Hertz)
  - **Time Period (T):** T = 1/f (seconds)
  - **Wave Speed:** v = f
  - **Amplitude:** Maximum displacement from equilibrium
  - **Transverse Waves:** Particles vibrate perpendicular to wave direction (light, waves on string)
  - **Longitudinal Waves:** Particles vibrate parallel to wave direction (sound)

- **Sound Waves:**
  - Speed of sound in air: 340 m/s (at room temperature)
  - Speed increases with temperature
  - **Loudness:** Depends on amplitude (measured in decibels)
  - **Pitch:** Depends on frequency
  - **Quality (Timbre):** Depends on waveform
  - **Doppler Effect:** Change in frequency due to relative motion
  - **Beats:** Interference of two slightly different frequencies

- **Light and Optics:**
  - Speed of light in vacuum: c = 3×10 m/s
  - **Reflection:** Angle of incidence = Angle of reflection
  - **Refraction:** Bending of light when entering different medium

- **Snell's Law:** n sin = n sin
- **Refractive Index:** n = c/v (speed in vacuum / speed in medium)
- **Critical Angle:** sin $_c = n/n(fortotalinternalreflection)$
- **Lens Formula:** 1/f = 1/p + 1/q (f = focal length, p = object distance, q = image distance)
- **Magnification:** M = -q/p = hi/ho
- **Convex Lens:** Converging, forms real or virtual images
- **Concave Lens:** Diverging, always forms virtual images

- **Physical Optics:**
  - **Interference:** Young's double-slit experiment
  - **Diffraction:** Bending of light around obstacles
  - **Polarization:** Restriction of light vibrations to one plane
  - **Dispersion:** Splitting of white light into colors (prism)

### 6.1.3 Electricity and Magnetism

- **Electrostatics:**
  - **Coulomb's Law:** F = k(qq)/r², where k = 9×10 N·m²/C²
  - **Electric Field:** E = F/q = kQ/r² (N/C or V/m)
  - **Electric Potential:** V = kQ/r (Volts)
  - **Capacitance:** C = Q/V (Farads)
  - **Capacitor Energy:** E = $\frac{1}{2}$CV²

- **Current Electricity:**
  - **Current:** I = Q/t (Amperes)
  - **Ohm's Law:** V = IR (Voltage = Current × Resistance)
  - **Resistance:** R = L/A ( = resistivity, L = length, A = cross-sectional area)
  - **Resistors in Series:** R$_t otal = R + R + R + ...$
  - **Resistors in Parallel:** 1/R$_t otal = 1/R + 1/R + 1/R + ...$
  - **Electrical Power:** P = VI = I²R = V²/R (Watts)
  - **Electrical Energy:** E = Pt (kWh)

- **Magnetism:**
  - **Magnetic Field:** Around moving charges, current-carrying wires
  - **Force on Moving Charge:** F = qvB sin (Lorentz force)
  - **Force on Current-Carrying Wire:** F = BIL sin

  - **Electromagnetic Induction:** Faraday's Law: emf = -N(/t)
  - **Lenz's Law:** Induced current opposes change in flux
  - **Transformer:** V/V = N/N; P$_i n = P_o ut(ideal)$

- **Electrical Instruments:**
  - **Ammeter:** Measures current, connected in series, low resistance
  - **Voltmeter:** Measures voltage, connected in parallel, high resistance
  - **Galvanometer:** Detects small currents
  - **Potentiometer:** Measures potential difference without drawing current

### 6.1.4 Modern Physics

- **Quantum Theory:**
  - **Photon Energy:** E = hf = hc/, where h = 6.63×10$^3$ J·s (Planck's constant)
  - **Photoelectric Effect:** Einstein's explanation; K.E.$_m ax = hf-(= workfunction)$
  - **de Broglie Wavelength:** = h/p (particle-wave duality)
  - **Heisenberg Uncertainty Principle:** x·p h/4

- **Atomic Physics:**
  - **Bohr's Model:** Electrons in discrete orbits; E$_n = -13.6/neV$
  - **Emission Spectrum:** When electrons jump from higher to lower energy levels
  - **Absorption Spectrum:** When electrons absorb energy and jump to higher levels
  - **X-rays:** Produced when high-speed electrons strike metal target

- **Nuclear Physics:**
  - **Nuclear Structure:** Protons and neutrons in nucleus
  - **Atomic Number (Z):** Number of protons
  - **Mass Number (A):** Number of protons + neutrons
  - **Isotopes:** Same Z, different A
  - **Nuclear Binding Energy:** E = mc$^2$ (mass defect converted to energy)
  - **Radioactivity:** Alpha (), Beta (), Gamma () decay
  - **Half-Life:** Time for half of radioactive sample to decay
  - **Nuclear Fission:** Splitting of heavy nucleus (nuclear reactors)
  - **Nuclear Fusion:** Combining light nuclei (sun, stars)

- **Relativity:**
  - **Mass-Energy Equivalence:** $E = mc^2$
  - **Time Dilation:** Time slows down at high speeds
  - **Length Contraction:** Length decreases at high speeds

# BUBBLE SHEET GUIDE

## How to Mark Your Answers Correctly

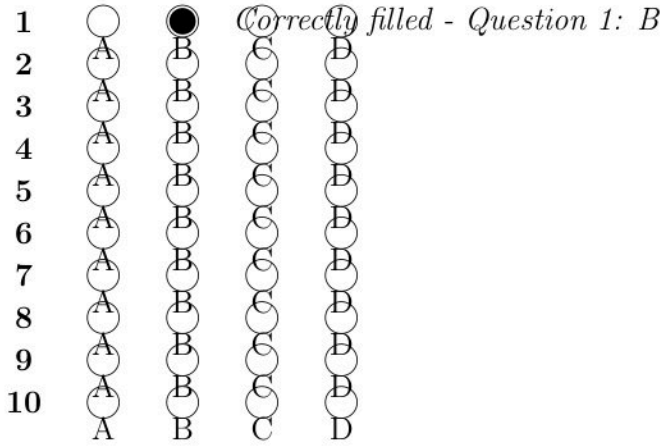
### What is a Bubble Sheet?

A bubble sheet is the answer sheet used in multiple-choice tests where you darken circles corresponding to your chosen answers. It is scanned by a machine, so correct marking is essential.

### Sample Bubble Sheet Format

**SAMPLE BUBBLE SHEET**

(Questions 1-10 shown as example)




### Important Rules for Bubble Sheet Marking

! **Use HB or No. 2 Pencil Only:** Ball pens or ink pens are not accepted. The scanner cannot read ink marks properly.

! **Fill Completely:** Darken the entire circle. Do not use check marks (), crosses (), or ticks.

! **Stay Within the Circle:** Do not mark outside the circle. The scanner reads only the circle area.

! **No Stray Marks:** Avoid any extra marks on the sheet. Even small dots can be misread as answers.

! **Erase Completely:** If you change an answer, erase the first mark completely. Partial erasures may be read as answers.

! **Match Question Numbers:** Ensure you are marking the correct question number. Double-check frequently.

! **One Answer Per Question:** Mark only one circle per question. Multiple marks will be read as incorrect.

! **Keep Sheet Clean:** Do not fold, crumple, or make the sheet dirty. Damaged sheets may not scan properly.

## Do's and Don'ts

| DO's | DON'Ts |
|---|---|
| • Use pencil only | • Use pen or marker |
| • Fill circle completely | • Use ticks or crosses |
| • Erase mistakes fully | • Leave partial erasures |
| • Keep sheet flat | • Fold or crumple sheet |
| • Check question numbers | • Mark wrong numbers |
| • Mark one answer only | • Mark multiple answers |

## Correct vs. Incorrect Marking


## Before Submitting

- Count your answers to ensure you've answered all questions
- Check for any accidental double markings
- Ensure your name and roll number are written correctly
- Verify that your pencil marks are dark enough

# 7 NTU ECAT SAMPLE PAPER

# SAMPLE PAPER

**National Textile University, Faisalabad**
**Undergraduate Admission Test 2026**
**For Pre-Medical Group**

**Name:** _____ **Roll No:** _____ **Date:** _____

**Time Allowed: 120 Minutes** **Total Questions: 90** **Total Marks: 90**

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## PAPER STRUCTURE SUMMARY

| Section | Subject Area | Questions | Marks |
|---|---|---|---|
| Section I | English | 1 - 20 | 20 |
| Section II | Analytical Reasoning | 21 - 40 | 20 |
| Section III | Quantitative Reasoning | 41 - 60 | 20 |
| Section IV | Biology, Chemistry, Physics | 61 - 90 | 30 |
| **GRAND TOTAL** | | | **90** |

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## Section I: English (Questions 1-20)

**1. Antonym of CURTAIL is _____?**

(A) Cramp
(B) Prolong
(C) Chop
(D) Clip

**2. Antonym of Elastic is _____?**

(A) Yielding
(B) Rigid
(C) Mold-able
(D) Supple

**3. Synonym of ARROGANT is _____?**

(A) Conceited

(B) Humble

(C) Progressive

(D) Noble

**4. Synonym of ALERT is _____?**

(A) Intelligent

(B) Energetic

(C) Observant

(D) Watchful

**5. GRAIN: SALT ::**

(A) shard: pottery

(B) shred: wood

(C) blades: grass

(D) chip: glass

**6. LIGHT: BLIND ::**

(A) speech: dumb

(B) language: deaf

(C) tongue: sound

(D) voice: vibration

**7. Ocean currents play a _____ role in setting long-term climate _____.**

(A) vital ... date

(B) important ... variations

(C) major ... patterns

(D) unusual ... changes

**8. I promise to _____ you in all circumstances.**

(A) stand up to

(B) stand with

(C) stand off

(D) stand by

**9. It's difficult _____ reconcile such different points of view.**

(A) With

(B) to

(C) in

(D) on

**10. The speaker did not properly space out his speech but went on _____ one point only.**

(A) stressing

(B) avoiding

(C) devoting

(D) decrying

**11. A picture in water color on wall:**

(A) Epitaph

(B) Epicure

(C) Fatal

(D) Fresco

**12. A person who wants to destroy all government and orders:**

(A) Brail

(B) Anarchist

(C) Biped

(D) Crank

**13. The Phrase/idiom "Elephant in the room" means:**

(A) A major issue

(B) A minor problem

(C) An idiot person

(D) A giant man

**14. My friend is a couch potato. What does the idiom/phrase "couch potato" means?**

(A) active person

(B) busy person

(C) lazy person

(D) angry person

**15. He is walking _____ road.**

(A) By

(B) On

(C) With

(D) In

**16. The boy fell _____ the pond yesterday.**

(A) into

(B) in

(C) from

(D) over

**Directions (Questions 17-20):** Read the passage carefully and answer the questions that follow:

*Unemployment is a key index of economic slack and lost output. But it is not distributed in proportion to people's ability to face it. It affects painfully the young, women, the unskilled as well as semiskilled, the black person, the older people, and underemployed people in rural areas. Unemployment among specific groups means greater costs to society that can be calculated easily in hours of idleness or dollars of income lost. The other costs include disturbance of the careers and increased juvenile delinquency. There is another cost of unemployment. For laborers, continuous unemployment results in "share-the-work" pressures for shorter hours and escalate resistance to technological advances. On the business side, the shortcomings of markets result in attempts to raise prices to cover increased costs and to pressures for protection against buying products from abroad.*

**17. Unemployment is an index of**

(A) the employment rate

(B) economic slack and lost output

(C) diminished resources

(D) over utilization of capacity

**18. According to the passage, the unemployment falls most heavily upon all except the**

(A) unskilled worker

(B) semiskilled worker

(C) black people

(D) white middle class

**19. The cost to society of unemployment can be measured by all except**

(A) disruption of careers

(B) Idleness

(C) the death rate

(D) lost incomes

**20. Serious unemployment results in labor groups to demand**

(A) more jobs with shorter hours

(B) "no fire" policies

(C) higher wages to those employed

(D) cost-cutting solutions

## Section II: Analytical Reasoning (Questions 21-40)

**Directions (Questions 21-27):** Nine individuals: Ahmed, Bilal, Danish, Faisal, Haroon, Liaquat, Maryam, Shiza and Zeeshan are to serve on three committees labeled A, B and C.

- Each candidate should serve on exactly one of the committees
- Every committee must have at least one member
- Committee A should consist of exactly one member more than that of committee B
- Among Maryam, Shiza and Zeeshan none can serve on committee A
- Among Faisal, Haroon and Liaquat none can serve on committee B
- Among Ahmed, Bilal and Danish none can serve on committee C

**21. In case Danish and Zeeshan are the individuals serving on committee B, how many of the nine individuals should serve on committee C?**

(A) 2

(B) 3

(C) 4

(D) 5

**22. Of the nine individuals, the maximum number that can serve together on committee C is**

(A) 5

(B) 6

(C) 7

(D) 8

**23. In case Ahmed is the only individual serving on committee B, which among the following should serve on committee A?**

(A) Bilal and Danish

(B) Bilal and Faisal

(C) Bilal and Liaquat

(D) Faisal and Haroon

**24. In case, any of the nine individuals serves on committee C, which among the following could not be the candidate to serve on committee A?**

(A) Ahmed

(B) Bilal

(C) Danish

(D) Shiza

**25. In case, Bilal, Danish and Maryam are the only individuals serving on committee B, the total membership of committee C should be**

(A) 5

(B) 4

(C) 3

(D) 2

**26. In case, Bilal, Danish and Maryam are the only individuals serving on committee B, then the members of committee C should be**

(A) Haroon and Shiza

(B) Maryam and Zeeshan

(C) Shiza and Zeeshan

(D) Faisal and Shiza

**27. Among the following combinations which could constitute the membership of committee C?**

(A) Danish and Shiza

(B) Faisal and Maryam

(C) Liaquat, Maryam and Shiza

(D) Faisal, Haroon and Liaquat

**Directions (Questions 28-32):** Read the following information carefully and answer the questions based on it:

- P, Q, R, S, T and U are six members of a family. Out of six members three are male members.
- There are two married couples among them
- R is the father of P and U, and T is the mother of R
- P is the granddaughter of Q

**28. How is U related to P?**

(A) Sister

(B) Son

(C) Daughter

(D) Brother

**29. How Q is related to U?**

(A) Brother

(B) Grandfather

(C) Husband

(D) None of these

**30. Which of the following pairs is one of the married couples?**

(A) TU

(B) QS

(C) TQ

(D) None of these

**31. Which of the following is a group of male members?**

(A) Q, S, T

(B) P, U, Q

(C) Q, R, U

(D) None of these

**32. Who is the husband of T?**

(A) Q

(B) R

(C) U

(D) None of these

**33. If it is true that the streets and the sidewalks are wet whenever it is raining, which of the following must also be true?**

I. If the streets and sidewalks are wet, it is raining.
II. If the streets are wet but the sidewalks are not wet, it is not raining.
III. If it is not raining, the streets and sidewalks are not wet.

(A) I only

(B) II only

(C) III only

(D) I and II only

**34. Arrange in appropriate sequence (shoulder to the finger): 1. Shoulder 2. Wrist 3. Elbow 4. Palm 5. Finger**

(A) 1, 4, 2, 3, 1

(B) 3, 4, 5, 2, 1

(C) 3, 1, 4, 2, 5

(D) 1, 3, 2, 4, 5

**35. Adeel: All engineers are intelligent.**
**Bashir: That is not true. I know some bankers who are intelligent too.**
**Bashir's answer demonstrates that he thought Adeel meant that:**

(A) Some engineers are intelligent
(B) bankers are more intelligent than engineers
(C) engineers are more intelligent than bankers
(D) only engineers are intelligent

**36. Kamal is older than Jamal, Jamal is older than Hussain, and Hussain is older than Waqar. Who is the oldest?**

(A) Waqar
(B) Jamal
(C) Kamal
(D) Hussain

**37. Which one of the five words below would come first in a dictionary?**

(A) Eliminate
(B) Dog
(C) Hen
(D) Parrot

**38. A box contains 10 Red balls and 5 Blue balls. If two balls are selected at random without replacement, then what are the chances that both balls are red?**

(A) 1/2
(B) 1/3
(C) 3/8
(D) 3/7

**39. Identify the odd one out:**

(A) Apple
(B) Banana
(C) Carrot
(D) Date

**40. X and Y are two brothers, B is A's brother, but A is the mother of X. What is B to Y?**

(A) Father
(B) Brother
(C) Son
(D) Uncle

## Section III: Quantitative Reasoning (Questions 41-60)

**41. 15% of 32 equals**

(A) 3.8
(B) 4.8
(C) 4
(D) 2.5

**42. A number which is divisible by both 6 and 8 is also divisible by**

(A) 5
(B) 11
(C) 7
(D) 24

**43. The circumference of a circle whose diameter is 6 inches is approximately**

(A) 16 inches
(B) 22 inches
(C) 38 inches
(D) 19 inches

**44. If $2^a \times 2^b = 8^c$, then $(a+b)/c =$**

(A) 2
(B) 3
(C) 4
(D) 5

**45. Successive discounts of 10% and 15% is equivalent to a single discount of**

(A) 22%
(B) 23.5%
(C) 25%
(D) 24%

**46. The ratio from 5 feet to 3 inches is**

(A) 1/20
(B) 3/60
(C) 3/5
(D) 5/3

**47. 3/4 of 432 = ?**

(A) 316

(B) 340

(C) 324

(D) 232

**48. If $x + 3y = 7$ and $2x + y = 5$ then $x/y$ is?**

(A) 8/9

(B) 1/2

(C) 1/3

(D) 2/5

**49. If the radius of the circle is halved, then its area**

(A) Remains same

(B) Becomes double

(C) Becomes half

(D) Becomes quarter

**50. 0.027 ÷ 90 = ?**

(A) 0.03

(B) 0.00003

(C) 0.0003

(D) 0.3

**51. If $3a - 5 = 3 + 2a$, then $a =$**

(A) 10

(B) 6

(C) 9

(D) 8

**52. If $3p + 2 = 12$, then $p - \frac{1}{3}$ equals:**

(A) 12

(B) 10

(C) 4

(D) 3

**53. The value of $\frac{0.54-0.44}{0.52-0.42}$ is?**

(A) 0.9

(B) 0.31

(C) 0.09

(D) 0.19

**54. $1250 \div 25 \times 0.5 = ?$**

(A) 100

(B) 50

(C) 25

(D) 2.5

**55. The area of the circle is $50\pi$. The length of the diameter of the circle is**

(A) 8

(B) 16

(C) 4

(D) 32

**56. The population of a city increased in two years from 25,000 to 30,000; find the percent increase during the time.**

(A) 5%

(B) 10%

(C) 20%

(D) 40%

**57. If Adil can finish a job in 5 hours and Moeed can finish the same job in 10 hours, how many minutes will it take both of them together to finish the job?**

(A) 220

(B) 160

(C) 200

(D) 210

**58. If $2x + y = 11$ and $3x + 2y = 17$ then $y$ is?**

(A) 5

(B) 1

(C) 4

(D) 6

**59. If $p = 2$, then $3^p + (p^3)^2 =$**

(A) 18

(B) 42

(C) 73

(D) 70

**60. What is $1\frac{1}{5}\%$ of 5000?**

(A) 10

(B) 1

(C) 16

(D) 5000

## Section IV: Subject (Questions 61-90)

**Note:** This section contains 10 questions each from Biology (Q.61-70), Chemistry (Q.71-80), and Physics (Q.81-90).

### Biology (Questions 61-70)

**61. Which one of these is a predatory fungus?**

(A) Yeast

(B) Armillaria

(C) Pleurotus ostreatus

(D) Mildews

**62. Second largest family of flowering plants**

(A) Solanaceae

(B) Leguminoceae

(C) Cucurbitaceae

(D) Labiaceae

**63. What are the important features that fungi have which help them in their survival on land?**

(A) Tolerate high osmotic pressure

(B) Tolerate wide range of pH

(C) Tolerate temperature

(D) All above

**64. Thin layer of earth in which all living organism exist is known as**

(A) Biosphere

(B) Ecological niche

(C) Niche

(D) Habitat

**65. The characters of constant nature which are used to define a group are**

(A) Variations

(B) Systematic

(C) Diagnostic

(D) Synthetic

**66. The criteria of the classification are the _____ on which the classification is based.**

(A) Orders

(B) Groups

(C) Characters

(D) Divisions

**67. In fishes, gill pouches develop into**

(A) Eustachian tubes

(B) Gills

(C) Throat & Middle ear

(D) Both A and B

**68. Green color blindness is called**

(A) Parotanopia

(B) Denteranopia

(C) Tritanopia

(D) None of these

**69. The species which is at the threat of danger of extinction is called**

(A) Extinct species

(B) Threatened species

(C) Endangered species

(D) All of these

**70. Apple is a member of family**

(A) Labiaceae

(B) Ranunculaceae

(C) Malvaceae

(D) Rosaceae

**Chemistry (Questions 71-80)**

**71. Vital force theory was rejected by**

(A) Kolbe

(B) Wholer

(C) Lavoisier

(D) Berzelius

**72. An electrolyte**

(A) Gives ions only when dissolved in water

(B) Possesses ions even in solid state

(C) Gives ions only when electricity is passed

(D) Forms complex ions in solution

**73. Hydrogen chloride molecule contains**

(A) Electrovalent bond

(B) Double bond

(C) Co-ordinate bond

(D) Covalent bond

**74. When electrons revolve in stationary orbits,**

(A) There is no change in energy level

(B) They become stationary

(C) There is increase in energy

(D) They are gaining kinetic energy

**75. Which of the following halogens does not form its oxyacids?**

(A) I

(B) Br

(C) Cl

(D) F

**76. The acid used in lead storage cells is**

(A) Phosphoric acid

(B) Nitric acid

(C) Sulphuric acid

(D) Hydrochloric acid

**77. Which one is not a pollutant normally?**

(A) Carbon monoxide

(B) Sulphur dioxide

(C) Hydrocarbons

(D) Carbon dioxide

**78. The last orbit of argon would have electrons**

(A) 6

(B) 18

(C) 8

(D) 2

**79. Which of the following represents elements in order of increasing atomic size?**

(A) Na, Mg, C

(B) C, N, O

(C) I, Br, Cl

(D) Li, Na, K

**80. The number of electrons in the M shell of the element with atomic number 24 is**

(A) 24

(B) 12

(C) 13

(D) 8

**Physics (Questions 81-90)**

**81. When the length of a microscope tube increases, its magnifying power**

(A) Does not change

(B) Increases

(C) Decreases

(D) May increase or decrease

**82. Ball pen functions on the principle of**

(A) Viscosity

(B) Boyle's law

(C) Surface tension

(D) Gravitational force

**83. The henry is the unit for**

(A) Magnetic field

(B) Magnetic flux

(C) Resistance

(D) Inductance

**84. If the metal bob in a simple pendulum is replaced by a wooden bob, then its time period will**

(A) Decreases

(B) Remain the same

(C) First A then B

(D) Increases

**85. If the earth were to rotate faster than its present speed, the weight of an object will**

(A) Remain unchanged at the equator but increase at the poles

(B) Decrease at the equator but remain unchanged at the poles

(C) Increase at the equator but remain unchanged at the poles

(D) Remain unchanged at the equator but decrease at the poles

**86. Bernoulli's equation is based upon law of conservation of**

(A) Momentum

(B) Mass

(C) Energy

(D) None of these

**87. With the increase of temperature, viscosity**

(A) Remains same

(B) Decreases

(C) Increases

(D) Doubles

**88. Which one of the following is a simple harmonic motion?**

(A) Wave moving through a string fixed at both ends

(B) Particle moving in a circle with uniform speed

(C) Earth spinning about its own axis

(D) Ball bouncing between two rigid vertical walls

**89. The volt/meter is the unit of:**

(A) Force

(B) Work

(C) Potential

(D) Electric field Intensity

**90. Choose the correct statement:**

(A) An ammeter should have small resistance and a voltmeter should have large resistance

(B) An ammeter should have large resistance and a voltmeter should have small resistance

(C) Both an ammeter and a voltmeter should have large resistance

(D) Both an ammeter and voltmeter should have small resistance

## ANSWER KEY - SAMPLE PAPER

| Q | A | Q | A | Q | A | Q | A | Q | A |
|---|---|---|---|---|---|---|---|---|---|
| 1 | B | 19 | C | 37 | B | 55 | A | 73 | D |
| 2 | B | 20 | A | 38 | D | 56 | C | 74 | A |
| 3 | A | 21 | C | 39 | D | 57 | C | 75 | D |
| 4 | D | 22 | B | 40 | D | 58 | B | 76 | C |
| 5 | D | 23 | A | 41 | B | 59 | C | 77 | D |
| 6 | A | 24 | D | 42 | D | 60 | A | 78 | C |
| 7 | C | 25 | D | 43 | D | 61 | B | 79 | D |
| 8 | B | 26 | C | 44 | B | 62 | A | 80 | C |
| 9 | B | 27 | B | 45 | B | 63 | D | 81 | C |
| 10 | A | 28 | D | 46 | A | 64 | B | 82 | B |
| 11 | D | 29 | B | 47 | C | 65 | B | 83 | D |
| 12 | B | 30 | C | 48 | A | 66 | C | 84 | A |
| 13 | A | 31 | C | 49 | D | 67 | B | 85 | D |
| 14 | C | 32 | A | 50 | C | 68 | A | 86 | C |
| 15 | B | 33 | B | 51 | D | 69 | D | 87 | B |
| 16 | A | 34 | D | 52 | D | 70 | A | 88 | B |
| 17 | B | 35 | D | 53 | C | 71 | B | 89 | B |
| 18 | D | 36 | C | 54 | C | 72 | B | 90 | D |

**– END OF SAMPLE PAPER –**

# FINAL MESSAGE FROM ADMISSIONS OFFICE

Dear Candidate,

We hope this guide book has provided you with comprehensive preparation material for the Entry Test at National Textile University.

Remember that consistent practice and thorough understanding of concepts are the keys to success. Use this guide to identify your strengths and weaknesses, and focus your preparation accordingly.

National Textile University offers state-of-the-art facilities, experienced faculty, and excellent career opportunities in textile engineering, computer sciences, and emerging technologies. We look forward to receiving your application and welcoming you to our academic community.

**Best Wishes,**

**Admissions Office**
**National Textile University, Faisalabad**

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