ZIAUDDIN UNIVERSITY
EXAMINATION BOARD

Secondary School Certificate (SSC)

Examination syllabus
PHYSICS
X

Based on Provincial Revised Curriculum (Sindh)

You can approach us:

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PREFACE

The Ziauddin University Examination Board (ZUEB) was established under **Sindh ACT XLI 2018**, with the primary objective of enhancing the quality of education in Sindh. ZUEB is responsible for administering examinations for the **Secondary School Certificate (SSC)** and **Higher Secondary School Certificate (HSSC)** in alignment with the most recent revisions to the **National Curriculum**, as outlined by the **Directorate of Curriculum Assessment and Research (DCAR), Sindh**. Through its ordinance, ZUEB is mandated to provide examination services for both English, Urdu, and Sindhi medium candidates from private schools across Sindh. This examination syllabus reflects ZUEB's dedication to achieving the educational goals set by the provincial authorities.

In collaboration with subject professors, ZUEB has developed a comprehensive syllabus for each subject. It is important to distinguish between the syllabus and the curriculum. The syllabus serves as a guide for both teachers and students, outlining the key areas of focus within the subject. It provides students with a clear understanding of what is expected of them in their studies and helps them prepare effectively for their exams.

This examination syllabus incorporates all cognitive outcomes derived from the **Provincial Curriculum Statement**, ensuring that assessments are both valid and reliable. While the focus is primarily on the cognitive domain, significant emphasis is placed on the application of knowledge and understanding.

The syllabus is made available to all stakeholders via the ZUEB website to assist affiliated schools in planning their teaching. It is crucial to note that the syllabus, rather than the prescribed textbook, forms the foundation of ZUEB examinations. Additionally, this syllabus supports the development of learning materials for both students and teachers. ZUEB remains committed to supporting students undertaking the SSC and HSSC courses by facilitating their learning outcomes through this detailed syllabus document.

To further assist in the learning process, ZUEB provides a dedicated **e-resource tab** on its website, offering both text-based and video content on various subjects. These 15-20 minute instructional videos, created around key subject concepts, allow students to learn at their own pace and convenience. The videos can be used as a reinforcement tool to revisit lessons already taught or as pre-lesson material. This initiative is an ongoing effort, and new videos will continue to be uploaded.

We encourage all students and educators to make the most of these resources for a more enriched and flexible learning experience.

Sincerely,

Shahbaz Nasim
Head – Measurement & Testing
Ziauddin University Examination Board

Reviewed by Sana Anwer Ali
Manager Sciences
Ziauddin University Examination Board
August 2025

Rationale For The Reviewed Provincial Curriculum

The process of revising the National Curriculum 2006 began in August 2004, when the newly elected government of Pakistan initiated education reforms across the country. These reforms included the introduction of a new National Education Policy, a National Education Census, and a revision of curricula (Ministry of Education, 2009).

In practice, the overhaul of the secondary school curriculum began in 2006, leading to a review of the scheme of studies for classes I to XII and the revision of curricula for 25 compulsory subjects.

The 18th Amendment to the Constitution of Pakistan, enacted in 2010, significantly altered the federal-provincial relationship by abolishing the "concurrent legislative list." This amendment granted provinces greater legislative and financial autonomy in sectors such as education and health. The most notable implication of the 18th Amendment for education was the transfer of responsibility for curriculum development, syllabus planning, policy formation, and educational standards to the provinces, marking a significant step forward for education.

In Sindh, the School Education Department tasked a Curriculum Review Team with revising the National Curriculum 2006 for all subjects. The goal was to create a curriculum better suited to the needs of students and teachers while aligning with the principles of the 18th Amendment. Subject-specific curriculum review committees were established to critically examine and align the curriculum's content, both contextually and textually, ensuring coherence across various subjects. The Bureau of Curriculum (BoC) played a crucial role in organizing workshops and meetings in Hyderabad to facilitate the completion of this task. The support of numerous educationists, researchers, and teachers was invaluable in successfully revising the curriculum.

The revised National Curriculum, along with the original version, is available on the DCAR website at https://dcar.gos.pk/Sindh-Curriculum/Physics%20Grades%20IX-X%202018.pdff or easy access.

The Ziauddin University Examination Board (ZUEB) SSC and HSSC syllabi are developed in accordance with the Sindh Revised Curriculum. To date, textbooks for various subjects have been developed based on the revised curriculum.

AIMS AND OBJECTIVES:

AIMS

The aims of the physics course at secondary school level are to enable student to:

1. Develop interest, motivation and sense of achievement in the study of physics
2. Develop the ability to describe and explain concepts, principles, systems, processes and applications related to physics.
3. Develop the thinking process, imagination, ability to solve problems, data management, investigating and communication skills.
4. Develop an attitude of responsible citizenship, including respect for the environment and commitment to the wise use of resources.
5. Recognize the usefulness and limitations of scientific method and the interaction between science, technology and society

OBJECTIVES

The syllabus is designed to emphasize less on purely factual material, but a much greater emphasis on the understanding and application of physics concepts and principles.
This approach has been adopted in recognition of the need for students to develop Investigation Skills/ Laboratory work that will be of long-term value in an increasingly technological world.
The syllabus framework is based on the standards and benchmarks framed by National Curriculum Council. It comprises of five main themes/sections with overview of each section.
Each section is further divided into "units" showing their conceptual linkages. In order to specify the syllabus as precisely as possible and also to emphasize the importance of higher order abilities and Investigation Skills/ Laboratory work other than recall, learning outcomes have been used throughout. Each unit of the syllabus is specified by content section / major concepts followed by detailed learning outcomes. The intended level and scope of treatment of a content is defined by the stated learning outcomes with easily recognizable domain of

1. Recalling
2. Understanding
3. Applying
4. Analyzing
5. Evaluating and creating,

Under the subhead "Investigation Skills/ Laboratory work" measuring, observing, manipulating, recording and interpreting /analyzing, predicting and communicating abilities/ Investigation Skills are expected to be developed through related investigations, activities and practical work.

EXAMINATION SYLLABUS WITH SCHEME OF ASSESSMENT

Unit - 10 General wave properties

Student Learning Outcomes

Contents	Students should be able to:	Cognitive level
10.1 Waves and nature of waves	10.1.1 Describe wave motion as illustrated by vibrations in rope, slinky spring and by experiments with water waves.	K
	10.1.2 Identify transverse and longitudinal waves in mechanical media, slinky and springs.	U
	10.1.3 Describe that waves are means of energy transfer without transfer of matter.	K
	10.1.4 Distinguish between mechanical and electromagnetic waves.	U
10.2 Properties of Waves	10.2.1 Describe properties of waves such as reflection, refraction and diffraction with the help of ripple tank.	U
	10.2.2 Define the terms speed (v), frequency (f), wavelength (λ), time period (T), amplitude, crest, trough, cycle, wave front, compression and rarefaction.	K
	10.2.3 Solve problems by applying the relation $f = 1/T$ and $v = f\lambda$.	A
10.3 Simple Harmonic Motion(SHM)	10.3.1 State the conditions necessary for an object to oscillate with SHM.	K
10.4 Simple pendulum	10.4.1 Explain SHM with simple pendulum, ball and bowl examples.	U
	10.4.2 Draw forces acting on a displaced pendulum	A
	10.4.3 Solve problems by using the formula $T = 2\pi \sqrt{l}/g$ for simple pendulum.	A
10.5 Damped Oscillation	10.5.1 Understand that damping progressively reduces the amplitude of oscillation.	U

Unit - 11 Sound

Student Learning Outcomes

Contents	Students should be able to:	Cognitive level
11.1 Sound waves	11.1.1 Describe the production of sound by vibrating sources. 11.1.2 Describe the longitudinal nature of sound waves and describe compression and rarefaction. 11.1.3 Explain why a medium is required in order to transmit sound waves and describe an experiment to demonstrate this.	K U U
11.2 Speed of sound	11.2.1 Describe a direct method for the determination of the speed of sound in air and make the necessary calculation. 11.2.2 State the order of magnitude of the speeds of sound in air, liquids and solids. 11.2.3 Describe the factors which affects the speed of sound (temperature, humidity etc).	A K U
11.3 Seeing sounds	11.3.1 Describe how the shape of a sound wave as demonstrated by an oscilloscope is affected by the quality of the sound wave.	U
11.4 Noise pollution	11.4.1 Explain that noise is a nuisance.	U
11.5 Ultrasound	11.5.1 Define ultrasound. 11.5.2 Describe how the reflection of sound may produce an echo. 11.5.3 Describe how ultrasound techniques are used in medical and industry.	K U U

Unit - 12 Electromagnetic Spectrum Student Learning Outcomes		
Contents	**Students should be able to:**	**Cognitive level**
12.1 Dispersion of light	12.1.1 Describe the dispersion of light as illustrated by the action on light of a glass prism. 12.1.2 State the colours of the spectrum and explain how the colours are related to frequency/wavelength. 12.1.3 Describe the behavior of light when passing through water droplets. 12.1.4 State that all electromagnetic waves travel with the same high speed in air and state the magnitude of that speed.	U U U U
12.2 Characteristics of electromagnetic waves	12.2.1 Describe the main components of the electromagnetic spectrum.	K
12.3 Uses of electromagnetic waves	12.3.1 Discuss the role of the following: (i) radio waves – radio and television communications, (ii) microwaves – satellite television and telephone, (iii) infra-red – household electrical appliances, television controllers and intruder alarms, (iv) light – optical fibers in medical uses and telephone, (v) ultra-violet – sunbeds, fluorescent tubes and sterilization, (vi) X -rays – hospital use in medical imaging and killing cancerous cells, and engineering applications such as detecting cracks in metal, (vii) gamma rays – medical treatment in killing cancerous cells, and engineering applications such as detecting cracks in metal.	A

Unit - 13 Geometrical Optics Student Learning Outcomes		
Contents	**Students should be able to:**	**Cognitive level**
13.1Reflection of light	13.1.1 Describe the terms used in reflection including normal, angle of incidence, angle of reflection and state laws of reflection.	U
13.2 Image location by spherical mirror equation	13.2.1 Solve problems of image location by spherical mirrors by using mirror formula. 13.2.2 Describe the use of spherical mirrors for safe driving, blind turns on hilly roads, dentist mirror.	A U
13.3 Refraction of light	13.3.1 Define the terminology for the angle of incidence i and angle of refraction r and describe the passage of light through parallel-sided transparent material. 13.3.2 Solve problems by using the equation sin i /sinr = n (refractive index).	K A
13.4 Total internal reflection	13.4.1 State the conditions for total internal reflection. 13.4.2 Describe how total internal reflection is used in light propagation through optical fibers. 13.4.3 Describe the use of optical fibers in telecommunications and medical field and state the advantages of their use.	K U U
13.5 Refraction through a prism	13.5.1 Describe the passage of light through a glass prism.	U
13.6 Image location by lens equation	13.6.1 Describe how light is refracted through lenses. 13.6.2 Define power of a lens and its unit. 13.6.3 Solve problems of image location by lenses using lens formula. 13.6.4 Describe the use of a single lens as a magnifying glass and in a camera, projector and photographic enlarger and draw ray diagrams to show how each forms an image.	U K A A
13.7 Magnifying power and resolving power	13.7.1 Define the terms resolving power and magnifying power of lens.	K
13.8 Compound microscope	13.8.1 Draw ray diagram of simple microscope and mention its magnifying power. 13.8.2 Draw ray diagram of compound microscope and mention its magnifying power. 13.8.3 Describe the exploration of the world of microorganism by using microscopes and of distant celestial bodies by telescopes.	U U U

13.9 Telescope	13.9.1 Draw ray diagram of a telescope and mention its magnifying power. 13.9.2 Describe the correction of short-sight and long-sight. 13.9.3 Describe the use of lenses/ contact lenses for rectifying vision defects of the human eye.	U U U
13.10 Defects in vision	13.10.1 Draw ray diagrams to show the formation of images in the normal eye, a short- sighted eye and a long-sighted eye.	U

Section 5 Electricity and Magnetism

Unit - 14 Electrostatics **Student Learning Outcomes**		
Contents	**Students should be able to:**	**Cognitive level**
14.1 Electric charge	14.1.1 Describe simple experiments to show the production and detection of electric charge. 14.1.2 Demonstrate the existence of different kind of charges.	U U
14.2 Electrostatic induction	14.2.1 Describe experiments to show electrostatic charging by induction.	U
14.3 Electroscope	14.3.1 State that there are positive and negative charges. 14.3.2 Describe the construction and working principle of electroscope. 14.3.3 Detect the type of charge on a body using an electroscope. 14.3.4 Demonstrate that like charges repel each other and unlike charges attract each other using an electroscope.	K U A A
14.4 Coulomb's law	14.4.1 State Coulomb's law. 14.4.2 Solve problems on electrostatic charges by using formula $F=kq_1q_2/r_2$.	K A
14.5 Electric field and its intensity	14.5.1 Define electric field and electric field intensity. 14.5.2 Sketch the electric field lines for an isolated +ve and –ve point charges. 14.5.3 Solve problems using equation $E=F/q^0$	K U A
14.6 Electrostatic potential	14.6.1 Describe the concept of electrostatic potential. 14.6.2 Define the unit "volt". 14.6.3 Describe potential difference as energy transfer per unit charge. 14.6.4 Describe one situation in which static electricity is dangerous and the precautions taken to ensure that static electricity is discharged safely.	U K U U
14.7 Applications of electrostatic	14.7.1 Describe the use of electrostatic charging (e.g. spraying of paint and dust extraction).	U
14.8 Capacitors and capacitance	14.8.1 Describe that the capacitor is charge storing device. 14.8.2 Define capacitance and its unit. 14.8.3 Explain importance of effective capacitance of number of capacitors connected in series and in parallel. 14.8.4 Apply the formula for the effective capacitance of a number of capacitors connected in series and in parallel to solve related problems.	U K U A

14.9 Different types of capacitors	14.9.1 List the use of capacitors in various electrical appliances.	A

Unit - 15 Current Electricity **Student Learning Outcomes**		
Contents	**Students should be able to:**	**Cognitive level**
15.1 Electric current	15.1.1 Define electric current. 15.1.2 Describe the concept of conventional current.	K U
15.2 Potential difference and emf	15.2.1 Understand the potential difference across a circuit component and name its unit.	U
15.3 Ohm's law	15.3.1 Describe Ohm's law and its limitations.	U
15.4 Resistance	15.4.1 Define resistance and its unit. 15.4.2 Explain the under lying principles in the working of volume controls of radio and T.V	K U
15.5 Series and parallel combinations	15.5.1 Calculate the effective resistance of a number of resistances connected in series and also in parallel.	A
15.6 The I-V Characteristics for ohmic and non ohmic conductors	15.6.1 Describe the factors affecting the resistances of a metallic conductor 15.6.2 Distinguish between conductors and insulators 15.6.3 Sketch and interpret the V-I characteristics graph fora metallic conductor, a filament lamp and a thermistor.	U U A
15.7 Electrical power and Joule's law	15.7.1 Describe how energy is dissipated in a resistance and explain Joule's law. 15.7.2Apply the equation E=I.Vt = I2Rt = V2 t/R to solve numerical problem. 15.7.3 Calculate the cost of energy when given the cost perk Wh.	U A A

15.8 Use of circuit components	15.8.1 Identify circuit components such as switches, resistors batteries transducers, LDRs, Thermistors and capacitors, Relays and diodes, LEDs. 15.8.2 Identify the symbols of circuit components and colour codes on resistors. 15.8.3 Construct simple series (single path) and parallel circuits (multiple paths). 15.8.4 State the functions of the live, neutral and earth wires in the domestic main supply. 15.8.5 Predict the behavior of light bulbs in series and parallel circuits such as for celebration lights.	U U A K A
15.9 Measuring instruments (voltmeter, galvanometer, ammeter)	15.9.1 Describe the use of electrical measuring devices like galvanometer, ammeter and voltmeter (construction and working principles not required).	A
15.10 Alternating current A.C	15.10.1 Explain Alternating Current AC	U
15.11 Safety Measures	15.11.1 Describe hazards of electricity (damage insulation, overheating of cables, damp conditions). 15.11.2 Explain the use of safety measures in household electricity, (fuse, circuit breaker, earth wire). 15.11.3 Describe the damages of an electric shock from appliances on the human body.	U U U

Unit - 16 Electromagnetism Student Learning Outcomes		
Contents	**students should be able to:**	**Cognitive level**
16.1 Magnetic effect of a steady current	16.1.1 Explain by describing an experiment that an electric current in a conductor produces a magnetic field around it. 16.1.2 Define Magnetic field 16.1.3 Sketch the lines of magnetic force	U K A
16.2 Force on a current carrying Conductor in a magnetic field	6.2.1 Describe that a force acts on a current carrying conductor placed in a magnetic field as long as the conductor is not parallel to the magnetic field	U
16.3 Turning effect on a current carrying coil in a magnetic field	16.3.1 State that a current carrying coil in a magnetic field experiences torque.	K
16.4 D.C motor	16.4.1 Relate the turning effect on a coil to the action of a D.C. motor	A
16.5 Electromagnetic induction	16.5.1 Describe an experiment to show that a changing magnetic field can induce e.m.f. in a circuit. 16.5.2 List factors affecting the magnitude of an induced e.m.f. 16.5.3 Explain that the direction of an induced e.m.f opposes the change causing it and relate this phenomenon to conservation of energy.	U A U
16.6 A.C generator	16.6.1 Describe a simple form of A.C generator.	U
16.7 Mutual induction	16.7.1 Describe mutual induction and state its units	U
16.8 Transformer	16.8.1 Identify that a transformer works on the principle of mutual induction between two coils 16.8.2 Describe the purpose of transformers in A.C circuits 16.8.3 Identify the role of transformers in power transmission from power station to your house. 16.8.4 List the use of transformer (step – up and step-down) for various purposes in your home	U U U A

Section 06 Electronics and Communication

Unit - 17 Introductory Electronics **Student Learning Outcomes**		
Contents	**students should be able to:**	**Cognitive level**
17.1 Introduction to electronics	17.1.1 Identify by quoting examples that the modern world is the world of digital electronics. 17.1.2 Identify that the computers are the forefront of electronic technology. 17.1.3 Realize that electronics is shifting from low-tech electrical appliances to high- tech electronic appliances 17.1.4 Differentiate between analogue and digital electronics.	U U U U
17.2 Thermionic emission	17.2.1 Explain the process of thermionic emission emitted from a filament.	U
17.3 Electron gun and cathode rays	17.3.1 Describe the simple construction and use of an electron gun as a source of electron beam.	U
17.4 Deflection of electron by electric field	17.4.1 Describe the effect of electric field on an electron beam.	U
17.5 Deflection of electron by magnetic field	17.5.1 Describe the effect of magnetic field on an electron beam.	U
17.6 Cathode rays oscilloscope(CRO)	17.6.1 Describe the basic principle of CRO and make a list of its uses.	U

17.7 Analogue and digital electronics	17.7.1 State the basic operations of digital electronics.	K
17.8 Logic gates	17.8.1 Identify and draw the symbols for the logic gates (NOT, OR, AND, NOR and NAND). 17.8.2 State the action of the logic gates in truth table form. 17.8.3 Describe the simple uses of logic gates.	U K A

Unit - 18 Information and Communication Technology ICT Student Learning Outcomes		
Contents	**Students should be able to:**	**Cognitive level**
18.1Components of ICT	18.1.1 Describe the components of information technology. 18.1.2 Analyze and describe the energy transformations that occur in cell phone, photo phone and fax machine.	U U
18.2 Flow of Information	18.2.1 Explain briefly the transmission of electric signals through wires, radio waves through air and light signals through optical fibers.	U
18.3 Communication Technology	18.3.1 Describe function and use of fax machine, cell phone, photo phone and computer. 18.3.2 Make a list of the use of E-mail and internet.	U U
18.4 Storing information	18.4.1 Describe the use of information storage devices such as audio cassettes, video cassettes, hard discs, floppy, compact discs and flash drive.	U
18.5 Handling information	18.5.1 Identify the functions of word processing, data managing, monitoring and controlling.	U

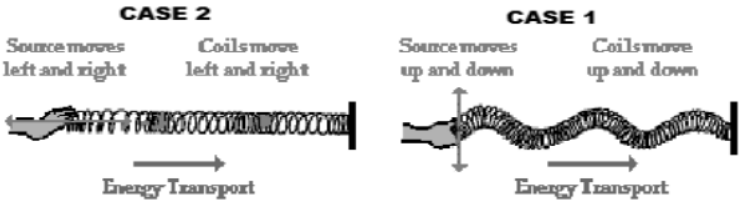
Section 7 Atomic Physics

Unit – 19 Atomic Structure **Student Learning Outcomes**		
Contents	**Students should be able to;**	**Cognitive level**
19.1 Atom and atomic nucleus	19.1.1 Describe the structure of an atom in terms of a nucleus and electrons. 19.1.2 Describe evidence for the nuclear model of the atom.	K U
19.2 Protons, neutrons	19.2.1 Describe the composition of the nucleus in terms protons and neutrons.	K
19.3 Elements	19.3.1 Explain that number of protons in a nucleus distinguishes one element from the other. 19.3.2 Represent various nuclides by using the symbol of proton number Z, nucleon number A and the nuclide notion ${}_{Z}X^{A}$.	U K
19.4 Elements and isotopes	19.4.1 Use the term isotope.	A

Unit - 20 Nuclear Structure **Student Learning Outcomes**		
Contents	**Students should be able to:**	**Cognitive level**
20.1 Natural radioactivity	20.1.1 Explain that some nuclei are unstable, give out radiation to get rid of excess energy and are said to be radioactive. 20.1.2 Describe that the three types of radiation are α, β & γ. 20.1.3 State, for radioactive emissions: (i) their nature (ii) their relative ionizing effects. (iii) their relative penetrating abilities	U K U
20.2 Natural transmutations	20.2.1 Explain that an element may change into another element when radioactivity occurs. 20.2.2 Represent changes in the composition of the nucleus by symbolic equation when alpha or beta particles are emitted.	U U
20.3 Background radiation	20.3.1 Describe sources of background radiations and artificial radiations. 20.3.2 Describe that radioactive emission occur randomly over space and time.	U U
20.4 Half life	20.4.1 Explain the meaning of half-life of a radioactive material. 20.4.2 Make calculation based on half-life which might involve information in tables or shown by decay curves. 20.4.3 Determine the half-life of a sample of radioactive material by using a graph of number of radioactive nuclei or activity versus time. 20.4.4 Make estimation of age of ancient objects by the process of carbon dating.	U A A A
20.5 Radio isotopes	20.5.1 Describe what are radio isotopes. What makes them useful for various applications? 20.5.2 Describe the application of radioisotopes in medical, agriculture and industrial fields.	U U
20.6 Fission and fusion	20.6.1 Describe briefly the process of fission and fusion.	U
20.7 Hazards and safety measures	20.7.1 Describe how radioactive materials are handled, used, stored and disposed of, in a safe way.	U

GRADE 10 PHYSICS
PBA Sample Questions

1. A slinky is stretched.
   Case 1: Vibrated up and down
   Case 2: Vibrated back and forth (along slinky)

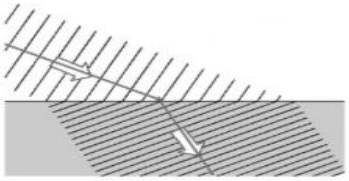


Identify the wave type in each case?

A. Both → Longitudinal
B. Case 1 → Transverse, Case 2 → Longitudinal
C. Both → Transverse
D. Case 2 → Transverse, Case 1 → Longitudinal

Correct answer: B

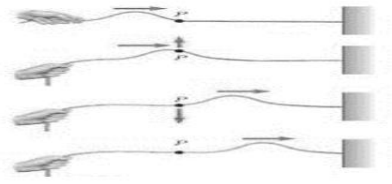
2. Observe the diagram showing water waves moving from deep to shallow water. The wave fronts bend at the boundary. What does this behavior represent?



A. Diffraction B. Reflection C. Refraction D. Absorption

Correct answer: C

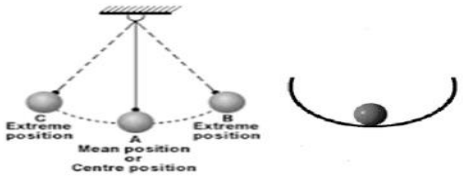
3. Imagine two students are holding the ends of a rope. One student quickly moves their hand up and down once, creating a pulse that travels to the other end of the rope. Based on the motion of the pulse and the rope particles, which of the following best explains why this is considered energy transfer without transfer of matter?



A. The rope is moving to the right along with the pulse, showing matter transfer.
B. Only the shape of the wave moves forward, while each particle of the rope returns to its original position.
C. The particles of the rope permanently shift forward after the pulse passes.
D. The energy and matter are both moving forward together in the wave.

Correct answer: B

4. Which of the following best explains why both a simple pendulum and a ball in a smooth bowl can exhibit simple harmonic motion (SHM) under certain conditions?



A. Both systems move in circular paths with increasing speed.
B. In both cases, restoring force increases with displacement at large angles.
C. The restoring force in both systems is directly proportional to displacement only when the motion is small.
D. Both systems only move due to gravity, so SHM always occurs regardless of displacement.

Correct answer: C

5. You're analyzing two characteristics of sound on an oscilloscope:
Amplitude (height of the wave), which is related to volume (loudness).
Frequency (number of cycles per second), which is related to pitch.
Based on this understanding, which trace most likely represents a sound that is both louder and lower in pitch?

A. Tall waves with fewer cycles
B. Short waves with many cycles
C. Tall waves with many cycles
D. Short waves with fewer cycles

Correct answer: A

6. During a hot summer day, a science class measures how quickly sound travels across a field. They notice it travels faster than on a cold winter morning.
Which factor best explains why sound travels faster in hotter air?

A. Cold air particles move slower, helping sound move faster.
B. Hot air has fewer particles, so sound moves more easily.
C. Hotter temperatures increase particle energy, speeding up sound transmission.
D. Sound only travels fast in a vacuum, and hot air mimics that condition.

Correct answer: C

7. After a rain shower, Sarah notices a rainbow forming in the sky as sunlight hits falling raindrops at a particular angle.
Which physical process in the raindrops most likely causes this colorful arc to appear?

A. Complete reflection of sunlight inside the drop
B. Absorption of ultraviolet rays by water
C. Dispersion of sunlight due to refraction in the drop
D. Internal reflection from tiny mirrors in raindrops

Correct answer: C

8. On a humid summer day, a student claps their hands near a wall and notices the echo returns slightly sooner than it did on a dry winter day.
Which factor is most likely responsible for the change in echo timing, and why?

A. Echoes travel faster in dry air due to lower pressure.
B. Warmer, humid air increases particle energy, increasing sound speed.
C. Echoes slow down due to increased water vapor content.
D. Temperature does not affect the propagation of sound.

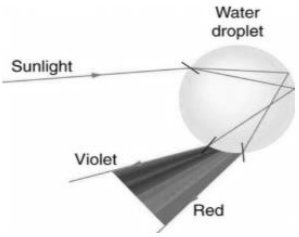
Correct answer: C

9. During a field trip, a student claps near a cliff and hears the echo return after 1.8 seconds. She notes the air is warm and still, and the speed of sound is 340 m/s.
What reasoning best helps her determine how far away the cliff is?

A. The sound traveled 306 m total, so the cliff is half that distance
B. The sound took 1.8 seconds to go and return, so distance = 340 × 1.8 ÷ 2
C. The time taken applies only to the return trip, so distance = 340 × 1.8
D. The echo happens instantly, so the cliff is 170 m away

Correct answer: B

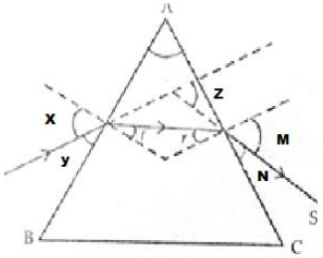
10. After a rainstorm, Ayesha sees a rainbow while sunlight is still shining. Her teacher says it's due to how light behaves in raindrops. What best explains this?



A. Total reflection of light
B. Absorption of UV rays
C. Refraction and dispersion
D. Colored light from raindrops

Correct answer: C

11. The path of a ray of light passing through a glass prism is shown in the given diagram. Which of the following options show the CORRECT labeling of the angles?



	Angle of Incidence	**Angle of Emergence**	**Angle of Deviation**
A	Y	N	Z
B	Y	Z	M
C	X	N	Z
D	X	M	Z

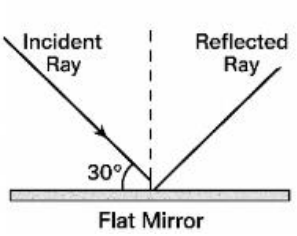
Correct answer: A

12. During a lab, a student shines a laser at a flat mirror. The beam hits the mirror at 30° to the normal. She measures the reflected ray. What should she find, and why?

A. 60°, light bends away
B. 30°, reflection equals incidence
C. 90°, right angle reflection
D. 45°, typical mirror angle

Correct answer: B

13. In a lab, a student shines a light beam from air into a glass block at an angle. She observes the beam bends closer to the normal. What does this tell us about the behavior of light?



A. It speeds up
B. Wavelength increases
C. It slows and bends toward normal
D. It refracts away from normal

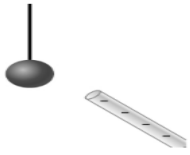
Correct answer: C

14. A student is using a convex lens to project a sharp image of a candle on a screen. The candle is placed 20 cm in front of the lens, and the image appears clearly on the screen 10 cm behind the lens.

What is the focal length of the lens?
A. 5 cm
B. 10 cm
C. 6.67 cm
D. 20 cm

Correct answer: C

15. In a lab, a student brings a negatively charged rod near a small neutral metal ball suspended by a thread. Without touching the ball, it swings slightly toward the rod and later shows a charge. Which process best explains this?



A. Conduction
B. Radiation
C. Induction
D. Convection

Correct answer: C

16. Two identical metal spheres carrying charges of +1 C and +2 C are placed 2 meters apart in a vacuum.
Using Coulomb's Law, what does this setup reveal about the force between them?

A. 4.5×10^9 N
B. 1.8×10^9 N
C. 3.6×10^9 N
D. 9×10^9 N

Correct answer: A

17. A student rubs a plastic rod with a dry cloth and brings it near small pieces of paper. The paper pieces jump toward the rod. What does this demonstrate?

A. Rod is glowing
B. Cloth is heated
C. Rod is charged
D. Paper gains mass

Correct answer: C

18. A student rubs a balloon on her sweater and brings it near her hair. The hair rises and sticks to the balloon. What does this observation show?

A. Balloon is hot
B. Static charge formed
C. Sweater is magnetic
D. Hair gains weight

Correct answer: B

19. Two rods are rubbed with different materials. When brought near each other, they attract. What conclusion can be drawn?

A. Both are neutral
B. Same charge
C. Opposite charges
D. Magnetism involved

Correct answer: C

20. You observe electric field lines around a charge. They are radially inward and densely packed. What does this indicate?

A. Weak positive charge
B. Strong negative charge
C. Weak negative charge
D. Uniform field

Correct answer: B

21. Two regions, A and B, have field strengths of 100 N/C and 200 N/C respectively. A **1C** charge is placed in both. Where will the charge experience greater force and why?

A. Region A, because it's uniform
B. Region B, higher E-field
C. Same in both
D. Depends on mass

Correct answer: B

22. Why does light stay inside an optical fiber?

A. It reflects from outer surface
B. It bends due to lenses inside
C. It travels in straight line
D. It undergoes total internal reflection

Correct answer: D

23. What must be true for total internal reflection to happen?

A. Light goes from air to glass
B. Angle is smaller than critical angle
C. Light goes from dense to less dense and angle is large
D. Light hits the surface directly

Correct answer: C

24. Why are optical fibers better than copper wires for the internet?

A. They are cheaper
B. They are made of glass
C. They carry light with less signal loss
D. They make sound travel faster

Correct answer: C

25. When white light passes through a prism, it spreads into different colors. What does this show about the prism?

A. It reflects light
B. It absorbs light
C. It changes the speed of each color differently
D. It blocks some colors

Correct answer: C

26. Which lens would you use to correct long-sightedness and why?

A. Concave lens, because it spreads light out.
B. Convex lens, because it bends light inward to focus on the retina.
C. Plane glass, because it doesn't bend light.
D. Concave lens, because it focuses light inward.

Correct answer: B

27. A student uses a compound microscope to observe bacteria. Why does this microscope show much more detail than the simple one?

A. It uses mirrors instead of lenses
B. It has two lenses to increase magnification
C. It works only in bright light
D. It reflects light instead of bending it

Correct answer: B

28. Two charged balloons **repel** each other when hung close. What can you conclude?

A. Both have the same type of charge
B. Both are neutral
C. One is hot, one is cold
D. They are attracting each other

Correct answer: A

29. Two charges are placed at a distance. A test charge experiences a force near them. Which statement best explains what this tells us about the region?

A. The region is filled with air
B. There is magnetic attraction between charges
C. An electric field exists that affects the test charge
D. The charges are neutral

Correct answer: C

30. In a closed circuit, the ammeter shows zero current even though a battery is connected. Which of the following could explain this best?

A. The battery is too strong
B. There is no potential difference across the circuit
C. The circuit is parallel, not series
D. There are too many resistors

Correct Answer: B

Ziauddin University Examination Board
Physics
Scheme of Assessment

Maximum marks: 75

Section "A"

Multiple Choice Questions (MCQs) **(12 x 1 = 12)**

- Attempt 12 MCQs. Each MCQ carries equal marks.

Practical based assessments (PBAs) **(15 x 1 = 15)**

- Attempt 15 MCQs. Each MCQ carries equal marks.

Section "B"

Short Answer Questions **(8 x 3 = 24)**

- Attempt any 8 out of 12 questions. Each questions carries equal marks.

Section "C"

Detailed Answer Questions **(4 x 6 = 24)**

- Attempt any 4 out of 6 questions. Each question carries equal marks.

Ziauddin University Examination Board
Physics
Table of Specification [TOS]

S.No	Domains	Weightage in evaluation 100%	MCQs 1 mark each	PBAs 1 mark each	Short Answers 3 marks each	Detailed Answers 6 marks each
1	General Wave Properties	5	2	0	1	0
2	Sound	10	1	0	1	1
3	Electromagnetic Spectrum	14	1	3	1	1
4	Geometrical Optics	10	1	3	2	0
5	Electrostatics	8	2	0	0	1
6	Current Electricity	11	2	3	2	0
7	Electromagnetism	13	1	3	1	1
8	Introductory Electronics	7	1	3	1	0
9	Information and Computer Technology	4	1	0	1	0
10	Atomic Structure	9	0	0	1	1
11	Nuclear Structure	9	0	0	1	1
Total # of Questions asked			**12**	**15**	**12**	**6**
Total # of Questions to be attempted			**12**	**15**	**8**	**4**
Maximum marks attainable			**12 marks**	**15 marks**	**24 marks**	**24 marks**

DEFINITIONS OF COGNITIVE LEVELS

Remember

Remembering is the act of retrieving knowledge and can be used to produce things like definitions or lists. The student must be able to recall or recognise information and concepts. The teacher must present information about a subject to the student, ask questions that require the student to recall that information and provide written or verbal assessment that can be answered by remembering the information learnt.

Question Stems

- Can you name all the …?
- Describe what happens when …?
- How is (are) …?
- How would you define …?
- How would you identify …?
- How would you outline …?
- How would you recognise…?
- List the … in order.
- What do you remember about …?
- What does it mean?
- What happened after?
- What is (are) …?
- What is the best one?
- What would you choose …?
- When did …?
- Where is (are) …?
- Which one …?
- Who spoke to …?
- Who was …?
- Why did …?

Understand

The next level in the taxonomic structure is Understanding, which is defined as the construction of meaning and relationships. Here the student must understand the main idea of material heard, viewed, or read and interpret or summarise the ideas in their own words. The teacher must ask questions that the student can answer in their own words by identifying the main idea.

Question Stems

- Can you clarify…?
- Can you illustrate …?
- Condense this paragraph.
- Contrast …
- Does everyone think in the way that … does?
- Elaborate on …
- Explain why …
- Give an example
- How can you describe...?
- How would you clarify the meaning...?
- How would you compare …?
- How would you differentiate between …?
- How would you describe…?
- How would you generalise…?
- How would you identify …?
- Is it valid that …?
- Is this the same as …?
- Outline …
- Select the best definition...
- State in your own words...
- This represents …
- What are they saying?
- What can you infer from …?
- What can you say about …?
- What could have happened next?
- What did you observe?

	• What does this mean? • What expectations are there? • What information can you infer from…? • What is the main idea of …? • What restrictions would you add? • What seems likely? • What seems to be …? • What would happen if …? • What might happen if …? • Which are the facts? • Which statements support …?
Apply The third level in Bloom's taxonomy, Applying, marks a fundamental shift from the pre-Bloom's learning era because it involves remembering what has been learnt, having a good understanding of the knowledge, and applying it to real-world exercises, challenges or situations. Students must apply an abstract idea in a concrete case to solve a problem or relate it to prior experience. The teacher must provide opportunities for students to use theories and problem-solving techniques in new situations and review and check their work. Assessment questions should be provided that allow students to define and solve problems. **Question Stems** • Can you group by characteristics such as …? • Choose the best statements that apply... • Clarify why … • Do you know of another instance where …? • Draw a story map... • Explain why a character acted in the way that he did... • From the information given, can you develop a set of instructions about …? • How would you develop …? • How would you change …? • How would you demonstrate…?	**Analyse** Analysing is the cognitive level where students can take the knowledge they have remembered, understood and applied, then delve into that knowledge to make associations, discernments or comparisons. Students should break down a concept or idea into parts and show relationships between these parts. Teachers must give students time to examine concepts and their requisite elements. Students are required to explain why they chose a solution. **Question Stems** • Can you distinguish between …? • Can you explain what must have happened when …? • Determine the point of view, bias, values, or intent underlying the presented material... • Discuss the pros and cons of … • How can you classify … according to …? • How can you compare the different parts? • How can you sort the different parts…? • How is … connected to …? • How is … similar to …? • How would you categorise…? • How would you explain...?

• How would you develop? • How would you explain …? • How would you modify …? • How would you present…? • How would you solve … ? • Identify the results of … • Illustrate the … • Judge the effects of … What would result …? • Predict what would happen if … • Tell how much change there would be if … • Tell what would happen if … • What actions would you take to perform …? • What do you think could have happened next? • What examples can you find that ? • What other way would you choose to …? • What questions would you ask of …? • What was the main idea …? • What would the result be if …? • Which factors would you change if …? • Who do you think…? • Why does this work? • Write a brief outline … • Write in your own words …	• What could the ending have been if ... had taken place? • State the point of view of … • What are some of the problems of …? • What assumptions …? • What can you infer about…? • What can you point out about ? • What conclusions …? • What do you see as other possible outcomes? • What does the author assume? • What explanation do you have for …? • What ideas justify the conclusion? • What ideas validate…? • What is the analysis of …? • What is the function of …? • What is the problem with …? • What motive is there? • What persuasive technique is used? • What statement is relevant? • What was the turning point? • What were some of the motives behind …? • What's fact? Opinion? • What's the main idea? • What's the relationship between? • Which events could not have happened? • Why did … changes occur? • Why do you think ?

BLOOM'S TAXONOMY WITH EXAMPLES

Conclusion

If you are a teacher looking for ways to engage your students in learning, this LIST of questions might be interesting for your classroom practice. Bloom's Taxonomy question stems can help elicit higher-order thinking skills and promote critical thinking among learners at different taxonomy levels. These question stems can also encourage students to think about their knowledge through reflection before answering questions.

ACTION WORDS FOR COGNITIVE LEVELS

Knowledge	Understand	Apply	Analyze	Evaluate	Create
					
define	explain	solve	analyze	reframe	design
identify	describe	apply	appraise	criticize	compose
describe	interpret	illustrate	judge	evaluate	create
label	paraphrase	modify	support	order	plan
list	summarize	use	compare	compare	combine
name	classify	calculate	decide	classify	formulate
state	compare	change	discriminate	contrast	invent
match	differentiate	choose	recommend	distinguish	hypothesize
recognize	discuss	demonstrate	summarize	infer	substitute
select	distinguish	discover	assess	separate	write
examine	extend	experiment	choose	explain	compile
locate	predict	relate	convince	select	construct
memorize	associate	show	defend	categorize	develop
quote	contrast	sketch	estimate	connect	generalize
recall	convert	complete	grade	differentiate	integrate
reproduce	demonstrate	construct	measure	divide	modify
tabulate	estimate	dramatize	predict	order	organize
tell	express	interpret	rank	prioritize	prepare
Copy	identify	manipulate	score	survey	produce

discover	indicate	paint	select	calculate	rearrange
duplicate	infer	prepare	test	conclude	rewrite
enumerate	relate	teach	argue	correlate	adapt
listen	restate	act	conclude	deduce	anticipate
observe	select	collect	consider	devise	arrange
omit	translate	compute	critique	diagram	assemble
read	ask	explain	debate	dissect	choose
recite	cite	list	distinguish	estimate	collaborate
record	discover	operate	editorialize	evaluate	facilitate
repeat	generalize	practice	justify	experiment	imagine
retell	group	simulate	persuade	focus	intervene
visualize	illustrate	transfer	rate	illustrate	make
	judge	write	weigh	organize	manage
	observe			outline	originate
	order			plan	propose
	report			question	simulate
	represent			test	solve
	research				support
	review				test
	rewrite				validate
	show				

SSC PART II EXAMINATION
MARKS BREAKUP GRID FOR EXAMINATION 2025

SCIENCE GROUP:

SUBJECT	THEORY	PBA	TOTAL
ENGLISH	100	-	100
URDU EASY / SINDHI EASY	75	-	75
PAKISTAN STUDIES	75	-	75
PHYSICS	60	15	75
CHEMISTRY	60	15	75
BIOLOGY	60	15	75
MATHEMATICS	75	-	75
TOTAL	505	45	550

COMPUTER SCIENCE GROUP:

SUBJECT	THEORY	PBA	TOTAL
ENGLISH	100	-	100
URDU EASY / SINDHI EASY	75	-	75
PAKISTAN STUDIES	75	-	75
PHYSICS	60	15	75
CHEMISTRY	60	15	75
COMPUTER SCIENCE	60	15	75
MATHEMATICS	75	-	75
TOTAL	505	45	550

GENERAL GROUP:

SUBJECT	THEORY	PBA	TOTAL
ENGLISH	100	-	100
URDU EASY / SINDHI EASY	75	-	75
PAKISTAN STUDIES	75	-	75
GENERAL SCIENCE	75	-	75
GENERAL MATH	75	-	75
EDUCATION	75	-	75
ECONOMICS	75	-	75
CIVICS	75	-	75
ISLAMIC STUDIES	75	-	75
TOTAL	550	-	550