



ZIAUDDIN UNIVERSITY
EXAMINATION BOARD

Secondary School Certificate (SSC)

Examination syllabus PHYSICS X

**Based on Provincial revised
curriculum (Sindh)**

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PREFACE

Ziauddin University Examination Board (ZUEB) was established by the Sindh ACT XLI 2018, with the aim of improving the quality of education. The Board administers examinations for the Secondary School Certificate (SSC) and Higher Secondary School Certificate (HSSC) based on the latest Reviewed National Curriculum by Directorate Curriculum Assessment and Research (DCAR) Sindh. ZUEB has a mandate by Ordinance to offer such examination services to English /Urdu and Sindhi medium candidates for SSC and HSSC from private schools in Sindh. This examination syllabus exemplifies ZUEB's commitment to provincial educational goals

The Examination Board has prepared with the help of subject professors, subject wise syllabus. It is important to make the difference between syllabus and curriculum. The syllabus of a subject is considered as a guide for the subject teacher as well as the students. It helps the students understand the subject in detail. It also helps students to anticipate what is expected from them while preparing for the exams.

This examination syllabus brings together all those cognitive outcomes of the Provincial Curriculum statement which can be reliably and validly assessed. While the focus is on the cognitive domain, particular emphasis is given to the application of knowledge and understanding.

The examination syllabus is uploaded on the ZUEB website. This is done to help affiliated schools in planning their teaching. It is the syllabus, not the prescribed textbook which is the basis of the ZUEB examinations. In addition, the ZUEB examination syllabus is used to develop learning support materials for students and teachers. The examination board stand committed to all students who have embarked upon the SSC, and HSSC courses in facilitating their learning outcomes. Our examination syllabus document ensures all possible support.

On the Ziauddin University Examination Board website a tab e –resource is made available which provides resource material in all subjects both in text form in line with the curriculum and also videos on topics to give students access to learn at their own pace and own time. These 15 to 20 minutes videos are prepared around subject concept / topics. These videos are available to the students for revisiting a lesson taught by their teacher or watch it prior to the lesson and as a reinforcement strategy. The work on videos is in progress and new titles will be uploaded.

Please look out for the videos on the given website



Humbly Yours;

Shahbaz Nasim
Academic Head

RATIONALE FOR THE REVIEWED PROVINCIAL CURRICULUM

The process of revising the National Curriculum 2006 was initiated in August 2004 when newly elected government of Pakistan decided to introduce education reform in the country. The education reform process included the announcement of new National Education Policy. National Education Census and changing the curricula (Ministry of Education, 2009)

In reality, change in secondary school curriculum was initiated in 2006 and as result, scheme of studies for classes I to XII was reviewed and curriculum of 25 compulsory subjects.

The 18th Amendment to the constitution of Pakistan has reconfigured the federal and provincial relationship by abolishing the “concurrent legislative list”. The Act (2010) provides the provinces with strong legislative and financial autonomy in education, health, and other social sectors. Major implication of the 18th Amendment for education is that the curriculum, syllabus, planning, policy, centres of excellence and standards of education will fall under the purview of the provinces. This was a big step forward for education.

In Sindh the Curriculum review team was assigned a task by the School Education Department, Government of Sindh to review the National Curriculum 2006 for all subjects and prepare a revised version that best suits the needs of the students teachers and meets the spirit of the 18th amendment.

Subject wise curriculum review committees were formed. Curriculum review team critically examined the contextual and textual parts and aligned the different sections horizontally and vertically of the Curriculum. The Bureau of Curriculum (BOC) played vital role in organizing the workshops and meetings at Hyderabad for the completion of task. The positive support from a number of educationists, researchers and teachers helped in completing the mammoth task of curriculum revision.

On the DCAR website http://dcar.gos.pk/BoC_Other_Pages/curriculum_dev.html the national curriculum as well as the revised curriculums are all placed for easy reference.

The Ziauddin University Examination Board Examination syllabi for SSC and HSSC are prepared with the Sindh Revised curriculum. Up till now following subject text books have been developed as per the revised curriculum.

AIMS AND OBJECTIVES:

VISION STATEMENT

Promotion of process skills, problem solving abilities and application of concepts, useful in real life situation for making physics learning more relevant, meaningful and stimulating.

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
- 6.

SYLLABUS DESIGN ON FOLLOWING 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			TOS		
Student Learning Outcomes					
Contents	Students should be able to:	Cognitive level	MCQS	CRQS	ERQS
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 10.1.2 Identify transverse and longitudinal waves in mechanical media, slinky and springs 10.1.3 Describe that waves are means of energy transfer without transfer of matter 10.1.4 Distinguish between mechanical and electromagnetic waves	K U K U	2	2	1
10.2 Properties of Waves	10.2.1 Describe properties of waves such as reflection, refraction and diffraction with the help of ripple tank 10.2.2 Define the terms speed (v), frequency (f), wavelength (λ), time period (T), amplitude, crest, trough, cycle, wave front, compression and rarefaction 10.2.3 Solve problems by applying the relation $f = 1/T$ and $v = f\lambda$	U K 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. 10.4.2 Draw forces acting on a displaced pendulum 10.4.3 Solve problems by using the	U U A			

	<p style="text-align: center;">formula $T = 2\pi$ $\sqrt{l/g}$ for simple pendulum</p>				
10.5 Damped Oscillation	<p>10.5.1 Understand that damping progressively reduces the amplitude of oscillation</p>	U			

Unit - 11 Sound			TOS		
Student Learning Outcomes					
Contents	Students should be able to:	Cognitive level	MCQS	CRQS	ERQS
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 K U	1	1	1
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 (timbre) of the sound wave	K			
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 K			

Unit - 12 Electromagnetic spectrum Student Learning Outcomes			TOS		
Contents	Students should be able to:	Cognitive level	MCQS	CRQS	ERQS
12.1 Dispersion of light	12.1.1 Describe the dispersion of light as illustrated by the action on light of a glass prism.	U	1	1	1
	12.1.2 State the colours of the spectrum and explain how the colours are related to frequency/wavelength.	U			
	12.1.3 Describe the behavior of light when passing through water droplets.	K			
	12.1.4 State that all electromagnetic waves travel with the same high speed in air and state the magnitude of that speed.	K			
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	U			

Unit - 13 Geometrical Optics Student Learning Outcomes			TOS		
Contents	Students should be able to:	Cognitive level	MCQS	CRQS	ERQS
13.1 Reflection 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	1	2	1
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 $\sin i / \sin r = n$ (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-fibres 13.4.3 Describe the use of optical fibers in telecommunications and medical field and state the advantages of their use.	K U K			
13.5 Refraction through a prism	12.5.1 Describe the passage of light through a glass prism.	U			

13.6 Image location by lens equation	<p>13.6.1 Describe how light is refracted through lenses.</p> <p>13.6.2 Define power of a lens and its unit.</p> <p>13.6.3 Solve problems of image location by lenses using lens formula.</p> <p>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.</p>	U K A K			
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	<p>13.8.1 Draw ray diagram of simple microscope and mention its magnifying power.</p> <p>13.8.2 Draw ray diagram of compound microscope and mention its magnifying power.</p> <p>Describe the exploration of the world of microorganism by using microscopes and of distant celestial bodies by telescopes</p>	U U K			
13.9 Telescope	<p>13.9.1 Draw ray diagram of a telescope and mention its magnifying power</p> <p>13.9.2 Describe the correction of short-sight and long-sight</p> <p>13.8.3 Describe the use of lenses/contact lenses for rectifying vision defects of the human eye.</p>	U U U			
13.10 Defects in vision	13.9.3 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			TOS		
Contents	Students should be able to:	Cognitive level	MCQs	CRQs	ERQs
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.	K U	2	2	1
14.2 Electrostatic induction	14.2.1 Describe experiments to show electrostatic charging by induction.	K			
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 K 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 precaution taken to ensure that static electricity is	U K U K			

	discharged safely				
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 a number of capacitors connected in series and in parallel. 14.6.5 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			TOS		
Contents	Students should be able to:	Cognitive level	MCQs	CRQs	ERQs
15.1 Electric current	15.1.1 Define electric current. 15.1.2 Describe the concept of conventional current	K U	2	2	2
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 underlying 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			

<p>15.6 The I-V characteristics for ohmic and non ohmic conductors</p>	<p>15.6.1 Describe the factors affecting the resistances of a metallic conductor</p> <p>15.6.2 Distinguish between conductors and insulators</p> <p>15.6.3 Sketch and interpret the V-I characteristics graph for a metallic conductor, a filament lamp and a thermistor</p>	<p>U</p> <p>U</p> <p>A</p>			
<p>15.7 Electrical power and Joule's law</p>	<p>15.7.1 Describe how energy is dissipated in a resistance and explain Joule's law.</p> <p>15.7.2 Apply the equation $E = I \cdot V \cdot t = I^2 R t = V^2 t / R$ to solve numerical problem.</p> <p>15.7.3 Calculate the cost of energy when given the cost per kWh.</p>	<p>U</p> <p>A</p> <p>A</p>			
<p>15.8 Use of circuit components</p>	<p>15.8.1 Identify circuit components such as switches, resistors, batteries, transducers, LDRs, Thermistors and capacitors, Relays and diodes, LEDs.</p> <p>15.8.2 Identify the symbols of circuit components and colour codes on resistors</p> <p>15.8.3 Construct simple series (single path) and parallel circuits (multiple paths).</p> <p>15.8.4 State the functions of the live, neutral and earth wires in the domestic main supply.</p> <p>15.8.5 Predict the behavior of light bulbs in series</p>	<p>U</p> <p>U</p> <p>U</p> <p>K</p> <p>A</p>			
<p>15.9 Measuring instruments (voltmeter, galvanometer, ammeter)</p>	<p>15.8.6 Describe the use of electrical measuring devices like galvanometer, ammeter and voltmeter (construction and working principles not required).</p>	<p>A</p>			
<p>15.10 Alternating current A.C</p>	<p>15.10.1 Explain Alternating Current AC</p>	<p>U</p>			
<p>15.11 Safety Measures</p>	<p>15.11.1 Describe hazards of electricity (damage insulation, overheating of cables, damp conditions).</p> <p>15.11.2 Explain the use of safety</p>	<p>U</p> <p>U</p>			

	measures in household electricity, (fuse, circuit breaker, earth wire). 15.8.7 Describe the damages of an electric shock from appliances on the human body.	K			
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Unit - 16 Electromagnetism			TOS		
Student Learning Outcomes					
Contents	students should be able to:	Cognitive level	MCQs	CRQs	ERQs
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	1	1	1
16.2 Force on a current carrying Conductor in a magnetic field	16.2.1 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	K			

16.8 Transformer	16.8.1	Identify that a transformer works on the principle of mutual induction between two coils	U			
	16.8.2	Describe the purpose of transformers in A.C circuits	U			
	16.8.3	Identify the role of transformers in power transmission from power station to your house.	U			
	16.8.4	List the use of transformer (step – up and step-down) for various purposes in your home	A			

Section 06 Electronics and Communication

Unit - 17 Introductory Electronics Student Learning Outcomes			TOS			
Contents	Students should be able to:		Cognitive level	MCQs	CRQs	ERQs
17.1 Introduction to electronics	17.1.1	Identify by quoting examples that the modern world is the world of digital electronics.	U	1	1	-
	17.1.2	Identify that the computers are the forefront of electronic technology.	U			
	17.1.3	Realize that electronics is shifting from low-tech electrical appliances to high-tech electronic appliances	U			
	17.1.4	Differentiate between analogue and digital electronics.	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). State the action of the logic gates in truth table form.	U			
	17.8.2	Describe the simple uses of logic gates.	K			
	17.8.3		A			

Unit - 18 Information and Communication Technology ICT			TOS			
Student Learning Outcomes						
Contents	Students should be able to:		Cognitive level	MCQs	CRQs	ERQs
18.1 Components of ICT	18.1.1	Describe the components of information technology. Analyze and describe the energy transformations that occur in cell phone, photo phone and fax machine	U	1	1	-
	18.1.2		U			
18.2 Flow of Information	18.2.1	Explain briefly the transmission of electric signals through wires radio waves through air light signals through optical fibres	U			
18.3 Communication Technology	18.3.1	Describe function and use of fax machine, cell phone, photo phone and computer. Make a list of the use of E-mail and internet.	U			
	18.3.2		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			TOS		
Student Learning Outcomes					
Contents	Students should be able to;	Cognitive level	MCQs	CRQs	ERQs
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		1	1
19.2 Protons, neutrons	19.2.1 Describe the composition of the nucleus in terms of 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 notation X	U K			
19.4 Elements and isotopes	19.4.1 Use the term isotope	A			

Unit - 20 Nuclear Structure			TOS		
Student Learning Outcomes					
Contents	Students should be able to:	Cognitive level	MCQs	CRQs	ERQs
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	-	1	1

20.2 Natural transmutations	<p>20.2.1 Explain that an element may change into another element when radioactivity occurs.</p> <p>20.2.2 Represent changes in the composition of the nucleus by symbolic equation when alpha or beta particles are emitted.</p>	U U			
20.3 Background radiation	<p>20.3.1 Describe sources of background radiations and artificial radiations.</p> <p>20.3.2 Describe that radioactive emission occur randomly over space and time.</p>	U U			
20.4 Half life	<p>20.4.1 Explain the meaning of half-life of a radioactive material.</p> <p>20.4.2 Make calculation based on half-life which might involve information in tables or shown by decay curves.</p> <p>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.</p> <p>20.4.4 Make estimation of age of ancient objects by the process of carbon dating.</p>	U A A A			
20.5 Radio isotopes	<p>20.5.1 Describe what are radio isotopes. What make them useful for various applications?</p> <p>20.5.2 Describe the application of radioisotopes in medical, agriculture and industrial fields.</p>	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			

1PART-II				
10.	General Wave Properties	10%	9	6
11.	Sound	10%	9	6
12.	Electromagnetic Spectrum	5%	6	4
13.	Geometrical optics	10%	19	8
14.	Electrostatics	12%	17	6
15.	Current electricity	14%	21	6
16.	Electromagnetism	14%	15	5
17.	Introductory electronics	10%	15	6
18.	Information & communication Technology	5%	9	4
19.	Atomic Physics	5%	7	5
18.	Radioactivity	5%	13	4
		100%	140	60

DEFINITIONS OF COGNITIVE LEVELS

<p>Remember</p> <p>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.</p> <p>Question Stems</p> <ul style="list-style-type: none"> • 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 ...? 	<p>Understand</p> <p>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.</p> <p>Question Stems</p> <ul style="list-style-type: none"> • 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? <ul style="list-style-type: none"> • What does this mean? • What expectations are there?
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	<ul style="list-style-type: none"> • 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 would happen if ...? • Which are the facts? • Which statements support ...?
<p>Apply</p> <p>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.</p> <p>Question Stems</p> <ul style="list-style-type: none"> • 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 could you develop ...? • How would you change ...? • How would you demonstrate...? • How would you develop ... to present ? • How would you explain ...? • How would you modify ...? • How would you present...? • How would you solve ... ? 	<p>Analyse</p> <p>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.</p> <p>Question Stems</p> <ul style="list-style-type: none"> • 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 ? • If ... happened, what might the ending have been? • 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 ?

<ul style="list-style-type: none"> • 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 ... 	<ul style="list-style-type: none"> • 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 ?
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BLOOMS 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
	 <small>UNDERSTAND</small>				
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 2023**

SCIENCE GROUP:

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

GENERAL GROUP:

SUBJECT	THEORY	PRACTICAL	TOTAL
ENGLISH	100	-	100
URDU NORMAL / SINDHI NORMAL	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



Class: X

MODAL PAPER FOR EXAMINATION 2024

Time Allowed: 20minutes

SUBJECT: PHYSICS

Q1:

(SECTION "A")

Marks: 12

Note: Attempt all questions from section 'A'. Each question carries ONE mark.

- i. The cause of the echo is:

A. Absorption	B. Reflection	C. Dispersion	D. Refraction
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- ii. A magnifying glass is also known as:

A. Endoscope	B. Compound microscope	C. Simple microscope	D. Telescope
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- iii. Lenses form image through:

A. Dispersion	B. Refraction	C. Diffraction	D. Reflection
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- iv. The colour that is least deviated by a prism:

A. Red ray	B. Violet ray	C. Green ray	D. Yellow
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- v. The velocity of light in air is:

A. 3×10^{-8} m/s	B. 3×10^8 m/s	C. 3×10^8 km/s	D. 3×10^8 m/s
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- vi. The range of wave length of UV-B is:

A. 315 – 399m	B. 280 – 314 nm	C. 100 – 279 nm	D. None of them
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- vii. Which is not a characteristic:

A. Amplitude	B. Period	C. Mass	D. Velocity
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- viii. The device which is used in air traffic control and vehicle speed detection is:

A. Sonar	B. Radar	C. Lidar	D. All of them
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- ix. S.H.M has maximum speed when object is at:

A. Highest point	B. Lowest point	C. Equilibrium point	D. Extreme point
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- x. In an oscillating pendulum, the K.E at extreme position is:

A. Maximum	B. Minimum	C. Zero	D. Both a and b
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- xi. Formula of oscillation is $F = kx^n$, where "n" should be:

A. Even	B. Odd	C. Prime	D. Natural
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- xii. Two capacitor of $8\mu\text{F}$ are connected in series, The Re is:

A. $1/4 \mu\text{F}$	B. $2 \mu\text{F}$	C. $3 \mu\text{F}$	D. $6 \mu\text{F}$
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END OF SECTION A



Class: X

MODEL PAPER FOR EXAMINATION 2024

Time: 2 hours 40 minutes

SUBJECT: PHYSICS (SECTION "B" AND SECTION "C")
SECTION "B" (SHORT ANSWER QUESTIONS)
Total Marks 48
24 Marks

Note: Attempt any **EIGHT** questions from this section.

- Q2. State and explain ohms law.
- Q3. State Snell's law.
- Q4. Write down any three daily life applications of transformer.
- Q5. What are radio waves and microwaves and how are they produced? Write one use of each.
- Q6. What is a capacitor? Write down the capacitance of a capacitor.
- Q7. Write difference between analogue electronics and digital electronics.
- Q8. Rude fine atomic mass. also find number of protons and neutrons in Latium (${}_{3}\text{Li}^7$).
- Q9. A boy clapped his hands near a wall and heard the echo after 1.6s. What is the distance of the wall from the boy? If the speed of sound is taken as 340 m/s?
- Q10. A concave mirror forms a real image at 25cm from the mirror surface along the principal axis. If the corresponding object is at a distance of 10cm, what is the focal length of the mirror?
- Q11. A sample of Ac-225 originally contained 8×10^{24} nuclei. After 960 hours, how much of the original sample remains un-decayed. The half life of the isotopes is few days.
- Q12. How much voltage will be dropped across a 50Ω resistance whose current is $300 \mu\text{Amp}$?
- Q13. Write the difference between mechanical wave and electromagnetic wave.

SECTION "C" (DETAILED ANSWER QUESTIONS)
24 Marks

Note: Attempt any **FOUR** questions from this section.

- Q14. Derive the equation of mirror
- Q15. Describe Rutherford's experiment for the separation of Radioactive rays.
- Q16. What are electromagnetic waves? Write down the characteristics of electromagnetic waves.
- Q17. What is an electric power? Drive & explain power dissipation in a resistor Drive $P = \frac{v^2}{R}$.
- Q18. With the help of ray diagram, give the magnifying power of the following:
 (i) Simple microscope (ii) compound microscope
- Q19. State and explain columns law.

END OF PAPER