ZIAUDDIN UNIVERSITY
EXAMINATION BOARD

Higher Secondary School Certificate (HSC)

Examination syllabus
&
Model Paper

PHYSICS-XII

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 Currciulum

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, centers 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 Physics at higher secondary level are to enable student to:

- Develop among the students the habit of scientific and rational thinking and an attitude to search for order and symmetry in diverse phenomena of nature and thereby to appreciate the supreme wisdom and creative powers of the creator.
- Become lifelong learner, effective problem solver, responsible and productive citizens in a technological world.
- Strengthen the concepts developed at the secondary level to lay firm foundation for further learning of physics at the tertiary level, in engineering or in other physics dependent and vocational courses.
- Develop process skills and experimental, observational, manipulative, decision making and investigatory skills in the students.
- Understand and interpret scientific information presented in verbal, mathematical or graphical form and to translate such information from one form to another.
- Understand and appreciate the inter relationship and balance that exists in nature, the problems associated with the over exploitation of the environmental resources and disturbance because of the human activities in the ecological balance, thus taking care of the environment.

CURRICULUM DESIGN ON FOLLOWING OBJECTIVES

- The curriculum is designed to emphasize on the understanding and application of physics concepts and principles to prepare the learners for rapidly changing technological as well social scenario of the world and requirements of the market and society.

- This approach has been adopted in recognition of the need for students to develop skills that will be of long-term value in an increasingly technological world.
- The curriculum framework is based on the standards and benchmarks framed by Provincial Curriculum Council. It comprises of eight main themes/sections.
- Each section is further divided into “units” showing their conceptual linkages.
- Each unit is furthermore divided into Students Learning Outcomes which not only covers the fundamental laws/principles of physics but also cutting-edge technological application used in our daily life.

- In order to specify the syllabus as precisely as possible and also to emphasize the importance of higher order abilities and skills 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

(i) Recalling
(ii) Understanding
(iii) Applying
(iv) Analyzing
(v) Evaluating
(vi) And creating, under the subhead "skills" measuring, observing, manipulating, recording and interpreting /analyzing, predicting and communicating

abilities/ skills are expected to be developed through related investigations, activities
And practical work.

ZIAUDDIN UNIVERSITY EXAMINATION BORD

SLOs CATEGORIZATION

XII-PHYSICS

Detailed Syllabus

Chapters	Topics	Student learning outcomes (SLOs)
CH # 11 **HEAT**	• Thermal equilibrium • Heat and work • Internal energy • First law of thermodynamics • Molar specific heats of a gas • Heat engine • Second law of thermodynamics • Carnot's cycle • Refrigerator • Entropy	• Describe that thermal energy is transferred from a region of higher temperature to a region of lower temperature. • Describe that regions of equal temperatures are in thermal equilibrium. • Describe that heat flow and work are two forms of energy transfer between systems and calculate heat being transferred. • Define thermodynamics and various terms associated with it. • Relate a rise in temperature of a body to an increase in its internal energy. • Describe the mechanical equivalent of heat concept, as it was historically developed, and solve problems involving work being done and temperature change. • Explain that internal energy is determined by the state of the system and that it can be expressed as the sum of the random distribution of kinetic and potential energies associated with the molecules of the system. • Calculate work done by a thermodynamic system during a volume change. • Describe the first law of thermodynamics expressed in terms of the change in internal energy, the heating of the system and work done on the system. • Explain that first law of thermodynamics expresses the conservation of energy. • Define the terms, specific heat and molar specific heats of a gas. • Apply first law of thermodynamics to derive Cp – Cv = R. • State the working principle of heat engine. • Describe the concept of reversible and irreversible processes. • State and explain second law of thermodynamics.

		• Explain the working principle of Carnot's engine • Explain that the efficiency of a Carnot engine is independent of the nature of the working substance and depends on the temperatures of hot and cold reservoirs. • Describe that refrigerator is a heat engine operating in reverse as that of an ideal heat engine. • Derive an expression for the coefficient of performance of a refrigerator. • Describe that change in entropy is positive when heat is added and negative when heat is removed from the system. • Explain that increase in temperature increases the disorder of the system. • Explain that increase in entropy means degradation of energy. • Explain that energy is degraded during all natural processes. • Identify that system tend to become less orderly over time.
CH # 12 ELECTROSTATICS	•Force between charges in different media • Electric field • Electric field of various charge configurations • Electric field due to a dipole • Electric flux • Gauss's law and its applications • Electric potential • Capacitors • Energy stored in a capacitor	• state Coulomb's law and explain that force between two-point charges is reduced in a medium other than free space using Coulomb's law. • derive the expression E = l/4πεo q/r2 for the magnitude of the electric field at a distance 'r' from a point charge 'q'. • describe the concept of an electric field as an example of a field of force. • define electric field strength as force per unit positive charge. • solve problems and analyze information using E = F/q. • solve problems involving the use of the expression . • E = l/4πεo q/r2 Conceptual linkage: ²This chapter is built on Electrostatics Physics X 35 • calculate the magnitude and direction of the electric field at a point due to two charges with the same or opposite signs. • sketch the electric field lines for two point charges of equal magnitude with same or opposite signs. • describe the concept of electric dipole. • define and explain electric flux. • describe electric flux through a surface enclosing a charge. • state and explain Gauss's law. • describe and draw the electric field due to an infinite size conducting plate of positive or negative charge. • sketch the electric field produced by a hollow spherical charged conductor.

		• sketch the electric field between and near the edges of two infinite size oppositely charged parallel plates. • define electric potential at a point in terms of the work done in bringing unit positive charge from infinity to that point. • define the unit of potential. • solve problems by using the expression V =W/q. • describe that the electric field at a point is given by the negative of potential gradient at that point. • solve problems by using the expression E = V/d. • derive an expression for electric potential at a point due to a point charge. • calculate the potential in the field of a point charge using the equation V = l/4πεo q/r. • define and become familiar with the use of electron volt. • define capacitance and the farad and solve problems by using C=Q/V. • describe the functions of capacitors in simple circuits. • solve problems using formula for capacitors in series and in parallel. • explain polarization of dielectric of a capacitor.
CH # 13 CURRENT ELECTRICITY	Steady current • Electric potential difference • Resistivity and its dependence upon temperature • Internal resistance • power dissipation in resistance • Thermoelectricity • Kirchhoff's Laws • The potential divider • Balanced potentials (Wheatstone bridge and potentiometer	• describe the concept of steady current. • state Ohm's law. • define resistivity and explain its dependence upon temperature. • define conductance and conductivity of conductor. • state the characteristics of a thermistor and its use to measure low temperatures. • distinguish between e.m.f and p.d. using the energy considerations. • explain the internal resistance of sources and its consequences for external circuits. • describe some sources of e.m.f. • describe the conditions for maximum power transfer. • describe thermocouple and its function. • explain variation of thermoelectric e.m.f. with temperature. • describe the working of rheostat in the potential divider circuit. • describe what is a Wheatstone bridge and how it is used to find unknown resistance. • describe the function of potentiometer to measure and compare potentials without drawing any current from the circuit.
	• Induced Emf • Faraday's law • Lenz's law	• describe the production of electricity by magnetism.

CH # 14 Electromagnetism	• Eddy currents • Mutual inductance • Self-inductance • Energy stored by an inductor • Motional emf,s • A.C. Generator • A.C. motor and Back emf • Transformer	• explain that induced emf's can be generated in two ways. (i) by relative movement (the generator effect). (ii) by changing a magnetic field (the transformer effect). • infer the factors affecting the magnitude of the induced emf. • state Faraday's law of electromagnetic induction. • account for Lenz's law to predict the direction of an induced current and relate to the principle of conservation of energy. • apply Faraday's law of electromagnetic induction and Lenz's law to solve problems. • explain the production of eddy currents and identify their magnetic and heating effects. • explain the need for laminated iron cores in electric motors, generators and transformers. • explain what is meant by motional emf. Given a rod or wire moving through a magnetic field in a simple way, compute the potential difference across its ends. • define mutual inductance (M) and self-inductance (L), and their unit henry. Describe the main components of an A.C generator and explain how it works. • describe the main features of an A.C electric motor and the role of each feature. • explain the production of back emf in electric motors. • describe the construction of a transformer and explain how it works. • identify the relationship between the ratio of the number of turns in the primary and secondary coils and the ratio of primary to secondary voltages. • Describe how set-up and step-down transformers can be used to ensure efficient transfer of electricity along cables.
CH # 15 Measuring Instrument	• Galvanometer • Sensitivity of Galvanometer • Am-meter • Volt-meter • Conversion of galvanometer In to an ammeter.	• Describe the construction working of galvanometer • What is an ammeter. How can we convert galvanometer into an ammeter. • What is voltmeter? How can we convert galvanometer into voltmeter? • Derive the expression of wheat stone bridge.

	• Conversion of galvanometer Into voltmeter. • Wheat stone bridge.	
CH # 16 Electromagnetic waves and Electronics	• Electromagnetic waves • Semi-conductors • Rectifier • Transistor	• Derive the value of speed of light. • Describe the working of semi-conductor diode. • Describe half wave and full wave rectifier. • Describe npn and pnp transistor • Describe the working of transistor.
CH # 17 Advent of modern physics	• Special theory of relativity • Quantum theory of radiation • Photoelectric effect • Compton's effect • Pair production and pair annihilation • Wave nature of particles • Uncertainty Principle	• distinguish between inertial and non-inertial frames of reference. • describe the significance of Einstein's assumption of the constancy of the speed of light. • identify that if c is constant then space and time become relative. • explain qualitatively and quantitatively the consequence of special relativity in relation to: – the relativity of simultaneity – the equivalence between mass and energy – length contraction – time dilation – mass increase • explain the implications of mass increase, time dilation and length contraction for space travel. • describe the concept of black body radiation. • describe how energy is distributed over the wavelength range for several values of source temperature. • describe the Planck's hypothesis that radiation emitted and absorbed by the walls of a black body cavity is quantised. • elaborate the particle nature of electromagnetic radiation. • describe the phenomenon of photoelectric effect. • solve problems and analyse information using: $E = hf$ and $c = f\lambda$. • identify data sources, gather, process and present information to summarise the use of the photoelectric effect in solar cells & photocells • describe the confirmation of de Broglie's proposal by Davisson and Germer experiment in which the diffraction of electrons by the surface layers of a crystal lattice was observed.

		• describe the impact of de Broglie's proposal that any kind of particle has both wave and particle properties. • explain the particle model of light in terms of photons with particular energy and frequency. • describe Compton effect qualitatively. • explain the phenomena of pair production and pair annihilation. • describe uncertainty principle.
CH # 18 **Atomic spectra**	• Atomic spectra • Emission of spectral lines • Ionization and excitation potentials • Inner shell transitions and characteristic X-rays • Laser	• describe and explain the origin of different types of optical spectra. • show an understanding of the existence of discrete electron energy levels in isolated atoms (e.g. atomic hydrogen) and deduce how this leads to spectral lines. • explain how the uniqueness of the spectra of elements can be used to identify an element. • analyse the significance of the hydrogen spectrum in the development of Bohr's model of the atom. • explain hydrogen atom in terms of energy levels on the basis of Bohr Model. • determine the ionization energy and various excitation energies of an atom using an energy level diagram. • Solve problems and analyse information using. • $1/\lambda = R_H [1/p_2 – 1/n_2]$. • understand that inner shell transitions in heavy elements result into emission of characteristic X-rays. • explain the terms spontaneous emission, stimulated emission, meta stable states, population inversion and laser action. • describe the structure and purpose of the main components of a He-Ne gas laser.
	• Composition of atomic nuclei • Isotopes • Mass defect and binding energy • Radioactivity (properties of α, β and γ rays) • Energy from nuclear decay • Half life and rate of decay	• describe a simple model for the atom to include protons, neutrons and electrons. • Determine the number of protons, neutrons and nucleons it contains for the specification of a nucleus in the form $A_z X$. • explain that an element can exist in various isotopic forms each with a different number of neutrons. • define the terms mass defect and calculate binding energy using Einstein's equation. • explain the relevance of binding energy per nucleon to nuclear fusion and to nuclear fission.

CH # 19 The atomic nucleus	• Interaction of radiation with matter • Nuclear reactions • Nuclear fission (fission chain reaction) • Nuclear reactors (types of nuclear reactor) • Nuclear fusion (nuclear reaction in the Sun) • Radiation exposure • Biological and medical uses of radiations (radiation therapy, diagnosis of diseases, tracers techniques) • Basic forces of nature	• identify that some nuclei are unstable, give out radiation to get rid of excess energy and are said to be radioactive. • describe that an element may change into another element when radioactivity occurs. • identify the spontaneous and random nature of nuclear decay. • describe the term half-life and solve problems using the equation $\lambda=0.693/T_{1/2}$. • determine the release of energy from different nuclear reactions. • explain that atomic number and mass number conserve in nuclear reactions. • describe energy and mass conservation in simple reactions and in radioactive decay. • describe the phenomena of nuclear fission and fusion. • describe the fission chain reaction. • describe the function of various components of a nuclear reactor. • describe the interaction of nuclear radiation with matter. • describe the use of Geiger Muller counter and solid state detectors to detect the radiations.
CH # 20 Nuclear radiations	• Radiation detectors (GM counter and solid state detector) •Wilson cloud chamber	• describe the use of Geiger Muller counter and solid state detectors to detect the radiations. •describe the construction working of Wilson cloud chamber.

Ziauddin University Examination Board

Grade XII - PHYSICS

Scheme of Assessment

Maximum marks: 85

Science (Pre-Engineering, Pre-Medical & Science General Groups)

Section 'A': Multiple Choice Questions (20%) 17 marks (1x17=17)

Multiple Choice Question must be covered complete Syllabus of Education

- Each MCQs carry 1 mark
- Given MCQs will be = 17 MCQs
- All MCQs to be answered

Section "B" (Constructed Response questions) (40%) 36 Marks (9x4=36)

- Short Answer Question must be given from the prescribed Syllabus all content is to be followed.
- Fourteen (14) Short Answer Questions may be given. Each Question having (4 Marks). In this Section Student shall attempt (9 Questions).

Section "C" (Extended Response Questions) (40%) 32 Marks (8x4=32)

- Three (03) Questions of (two parts like Question 3.(a)(b), 4.(a)(b) & 5. (a)(b) of 8,8 marks) may be given in this section and (02 Questions) are to be answered and each Question having (16 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 would 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 could you develop …? • How would you change …? • How would you demonstrate…? • How would you develop … to present ? • How would you explain …?	**Analyse** Analyzing 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 ? • If … happened, what might the ending have been? • State the point of view of … • What are some of the problems of …?

• 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 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 ?

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
					
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				

ZIAUDDIN UNIVERSITY
EXAMINATION BOARD

MODEL PAPER 2023

SUBJECT: PHYSICS	GRADE: XII	MAX. MARKS: 85	TIME: 3 HOURS

SECTION 'A' (COMPULSORY) MULTIPLE CHOICE QUESTIONS (MCQ's)

SECTION 'A' (COMPULSORY) MULTIPLE CHOICE QUESTIONS (MCQ'S)

Time: 20minutes **Marks: 17**

Note: (i). Attempt all Questions from this section.
(ii). Shade **ONE** letter for each question. Make sure you put your answer in line with the correct question number.
(iii). Write the code of your question paper in **bold letters** in the beginning of the answer script.

Q1 Choose the correct answer for each from the given options:

1. The sensitivity of a galvanometer can be increased by increasing the:
   a) Magnetic field b) Area of coil c) Number of turns d) All of them
2. One kilowatt hour energy is equal to:
   a) 3.6×10^5 J b) 36×10^5 J c) 746 watt d) 6.3×10^5 J
3. The minimum work done is possible in this process:
   a) Isobaric b) Isochoric c) Isothermal d) Adiabatic
4. The kinetic energy per mole of a gas is:
   a) 3/2 kT b) 2/3 kT c) 3/2 RT d) nRT
5. Two free parallel wires carrying current in the same direction:
   a) Do not affect each other b) Attract each other c) Repel each other d) None of these
6. If the magnitude of the electrostatic force is F and the separation between the charges is half then the electrostatic force would be:
   a) 2F b) ½ F c) 4F d) ¼ F
7. When an AC generator is converted into a DC generator the slip rings are replaced by:
   a) An Inductor b) A field coil c) A split ring d) A dynamo
8. Wein's Law is given by:

a) λ_{max} x T = constant b) α x T = constant c) λ_{max} x $\sqrt{T}$= constant d) none

9. The electric intensity between two dissimilarly charged plane sheets is:

a) $\frac{\sigma}{\in_o}$ b) $\frac{\sigma}{2 \in_o}$ c) $\frac{2\sigma}{\in_o}$ d) Zero

10. The capacitance of a parallel plate capacitor does depend on the:

a) Area of the plates b) Distance between the plates c) Medium between the plates d) All of them

11. As the temperature of the black body is raised, the wavelength corresponding to the maximum intensity shifts towards

a) Shorter wavelength b) longer wavelength c) Similar wavelength d) lower frequency

12. The half-life of radium is 1600 years. After 4800 years the sample of the surviving radium would be its:

a) 1/4 work b) 1/8 c) 1/16 d) ½

13. When the north pole of a bar magnet approaches the face of a closed coil the face becomes:

a) South pole b) First the north pole and then the south pole c) North pole d) No effect is observed

14. A wire of length L and resistance R is cut into four equal pieces. Resistance of each piece would be:

a) R b) R/ 4 c) 2R d) 4R

15. The potential difference applied across pn-junction which results in the reduction in the barrier potential:

a) Reverse Biased b) forward biased c) charging Inductor d) inductor

16. The maximum kinetic energy of a photoelectron emitted from a metal depends upon:

a) The frequency of incident light only b) The wavelength of incident light only c) Work function of the metal only d) All of them

17. When a nucleus emits a **"-β"** particle, its atomic number:

a) Increases b) Decreases c) Remains constant d) None of the these

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EXAMINATION BOARD

MODEL PAPER 2023

SUBJECT: PHYSICS	GRADE: XII	MAX. MARKS: 85	TIME: 3 HOURS

Time: 2 ½ hrs. **Marks: 68**

SECTION 'B' CONSTRUCTED RESPONSE QUESTIONS (CRQ'S) (4x9=36)

Q .2 **Note:** Attempt any **NINE-part** questions from this section. All parts carry equal marks. The use of the scientific calculator is allowed. All notations are used in their usual meanings. Draw diagrams where necessary.

Use these values during the calculations.

($K=9\times10^{9}N.m^2.C^{-2}$) ;($e = 1.6\times10^{-19}C$); ($m_P= 1.67\times10^{-27}kg$); ($m_e= 9.11\times10^{-31}kg$) ;($h =6.63\times10^{-34}J.s$)

($c=3x10^{8}m/s$); (Energy of 1 a.m.u. =931.5Mev) ($1u=1.66x10^{-27}kg$)

i. A Carnot engine whose low-temperature reservoir is at 5°C has an efficiency of 40%. It is desired to increases this efficiency to 50% by what degree should the temperature of a high-temperature reservoir be increased?

ii. How many electrons should be removed from each of two similar spheres each of $10gm$ so that electrostatic repulsion may be balanced by gravitational force? G = 6.67 x 10^{-11} Nm^2/kg^2

iii. Describe the working of the PNP or NPN transistor?

iv. In Compton's scattering process, the fractional change in wavelength of X-ray photon is **1 %** at an angle of **120° (Ɵ=120 °)**; find the wavelength of X-rays used in this experiment.

v. Describe with a diagram how a galvanometer is converted into an ammeter. Derive the equation for the shunt resistance.

vi. Find the binding energy $_{52}Te^{125}$ in MeV if the mass of proton = m_p = 1.0078 U, mass of neutron = m_n = 1.0086 U, mass of Te atom = m_{Te} = 125. 9033 U.

vii. On the basis of kinetic molecular theory of gases, show that the absolute temperature of an ideal gas is directly proportional to the average translational kinetic energy of molecules or $\frac{1}{2}mv^2 = \frac{3}{2}KT$

viii.State the basic postulates of the Special Theory of Relativity. Also write consequences of special theory of relativity along with mathematical expression.

ix. Derive the relation for magnetic force on a current-carrying conductor in a uniform magnetic field?

x. A galvanometer having resistance of 150Ω deflects full scale for a potential difference of 200mV across the terminals. What resistance should be connected to increase its range to 150 $Volts$?

xi. Three equal resistors each of 12 Ω can be connected in four different ways. What is equivalent resistance of each combination?

xii. 1200 J of heat energy are supplied to the system at constant pressure. The internal energy of the system is increased by 750 J and the volume by 4.5 m^3, Find the work done against the piston and the pressure on the piston.

xiii. Find the potential difference across the two ends of 15cm long copper wire 0.35mm in diameter to maintain a steady current of 6 amperes. **(Resistivity of copper= 1.54× 10^{-8} ohm-m).**

xiv. Describe the construction & working of the Geiger counter.

xv. In a hydrogen atom, an electron experiences a transition from a state whose binding energy is 0.54 eV to a state whose excitation energy is 10.2 eV. Calculate:

(i) The Quantum numbers of the two states.
(ii) The wavelength of the photon emitted.

SECTION 'C' (DESCRIPTIVE ANSWER QUESTIONS) (Marks:8 x4= 32)

NOTE: Attempt any **Two-part** question from this section. All parts carry equal marks. The use of the scientific calculator is allowed. All notations are used in their usual meanings. Draw diagrams where necessary.

Q.3 (a). Show that the difference between molar-specific heat capacity at constant pressure and molar-specific heat capacity at constant volume for an ideal gas is equal to the universal gas constant.

OR

State the postulates of Bohr's atomic theory. Using Bohr's theory, derive the expressions for the radii and energy of the orbits of a hydrogen atom.

(b). What is a capacitor? Derive the expression for the capacitance of a parallel plate capacitor when: Air exists between the plates.

Q.4 (a). Describe the relation for determining the ratio of charge to mass (e/m) of an electron. Derive the relevant mathematical expressions.

(b) State and explain the law of radioactive decay..

OR

State Faraday's Law of Electromagnetic Induction. Explain the phenomenon of mutual or self-Induction.

Q5. (a) What is a transformer? Describe its working. Also derive their relevant expression.

(b) What is photoelectric effect? Discuss some of the important results of this theory. Derive Einstein's photoelectric equation.

HSC PART II EXAMINATION
MARKS BREAKUP GRID FOR EXAMINATION 2023

GROUP: PRE-MEDICAL-II

SUBJECT	THEORY	PRACTICAL	TOTAL
ENGLISH	100	-	100
URDU NORMAL / SINDHI NORMAL	100	-	100
PAKISTAN STUDIES	50	-	50
PHYSICS	85	15	100
CHEMISTRY	85	15	100
BOTANY	45	7	52
ZOOLOGY	40	8	48
TOTAL	505	45	550

GROUP: PRE-ENGINEERING-II

SUBJECT	THEORY	PRACTICAL	TOTAL
ENGLISH	100	-	100
URDU NORMAL / SINDHI NORMAL	100	-	100
PAKISTAN STUDIES	50	-	50
PHYSICS	85	15	100
CHEMISTRY	85	15	100
MATHEMATICS	100	--	100
TOTAL	520	30	550

GROUP: COMPUTER SCIENCE/ GENERAL SCIENCE

SUBJECT	THEORY	PRACTICAL	TOTAL
ENGLISH	100	-	100
URDU NORMAL / SINDHI NORMAL	100	-	100
PAKISTAN STUDIES	50	-	50
PHYSICS	85	15	100
COMPUTER SCIENCE	75	25	100
MATHEMATICS	100	--	100
TOTAL	510	40	550

GROUP: COMMERCE-II (Private/Regular)

SUBJECT	THEORY	PRACTICAL	TOTAL
ENGLISH	100	-	100
URDU NORMAL / SINDHI NORMAL	100	-	100
PAKISTAN STUDIES	50	-	50
BANKING	75	-	75
COMMERCIAL GEOGRAPHY	75	-	75
ACCOUNTING	100	--	100
STATISTICS	50		50
TOTAL	550	---	550

GROUP: HUMANITIES-II (Private/Regular)

(Any Three Elective)

SUBJECT	THEORY	PRACTICAL	TOTAL
ENGLISH	100	-	100
URDU NORMAL / SINDHI NORMAL	100	-	100
PAKISTAN STUDIES	50	-	50
COMPUTER STUDIES	75	25	100
CIVICS	100		100
MATHEMATICS	100	-	100
SOCIOLOGY	100	--	100
ECONOMICS	100		100
EDUCATION	100		100
TOTAL	550	---	550

ZIAUDDIN UNIVERSITY
EXAMINATION BOARD

Total Time 3 hours

Class: XII | **MODEL PAPER FOR EXAMINATION 2024** | **Total Marks: 85**

Time Allowed: 20 minutes | **SUBJECT: PHYSICS** | **Marks: 17**

Q1: | **(SECTION "A")**

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

i. When three capacitors are joined in series, the total capacitance:
   A. Less than the value of the minimum capacitance B. Equal to the sum of the capacitance
   C. Greater than the maximum capacitance D. None of the above

ii. The unit of electric intensity is
   A. N C /m B. V m C. N C D. V / m

iii. Kilowatt hour is unit of:
   A. Power B. Conductivity C. Electrical energy D. Receptivity

iv. Total potential difference across the combination of three cells becomes maximum when:
   A. All the three cells are connected in series B. All the three cells are connected in parallel
   C. Two cells are connected in series and the third cell in series with the combination
   D. Two cells are connected in series and the third cell in series with the combination.

v. The terminal potential difference of a battery is equal to its e.m.f when its internal resistance is:
   A. Zero B. Very high C. Very low D. None of above

vi. Ohm's law is obeyed in:
   A. electron tube B. semiconductor C. metallic conductor D. all of above

vii. Which of the following statements is true:
   A. Heat can be converted completely into work B. Work can be converted completely into heat
   C. Both work and heat are inter-convertible D. Neither heat nor work is inter-convertible

viii. A non-inertial frame of reference is the one:
   A. Which moves with some acceleration B. Which is always at rest on earth
   C. Which moves with uniform velocity D. All of the above

ix. Germanium and silicon are the materials used as:
   A. Conductors B. Semi-conductors C. Insulators D. None of these

x. In a Wheatstone Bridge circuit we balance:
   A. Resistance B. Current C. Voltage D. All of these

xi. The maximum magnetic force will act on a current carrying conductor in a magnetic field when: it is placed:
   A. At 60° to field B. Parallel to the field C. Perpendicular to the field D. At an angle of 45° to the field

xii. The motional e.m.f. induced in a coil is independent of:
   A. Change of flux B. Number of turns C. Time D. Resistance

xiii. A moving coil galvanometer can be converted into an ammeter by connecting a:
   A. Low resistance in series B. High resistance in series
   C. Low resistance in parallel D. High resistance in parallel

xiv. Which of the following are not electromagnetic waves?
   A. Light waves B. X-rays C. Heat waves D. Sound waves

xv. The charge carries in P-type substances are:
   A. Protons B. Electrons C. Holes D. Negative ions

xvi. When an electron and a positron are annihilated, then the number of gamma ray photos produced is:
   A. One B. Two C. Three D. Four

xvii. Einstein's theory of relativity suggests that:
   A. The laws of physics are the same in all inertial frames of reference
   B. The speed of light in free space is universal constant
   C. The speed of light is independent of the speed of the observer
   D. All of the above

END OF SECTION A

ZIAUDDIN UNIVERSITY EXAMINATION BOARD

Total Time 3 hours

Class: XII | **MODEL PAPER FOR EXAMINATION 2024** | **Total Marks 68**

Time: 2 hours 40 minutes | **SUBJECT: PHYSICS (SECTION "B" AND SECTION "C")** | **36 Marks**

SECTION "B" SHORT ANSWER QUESTIONS

Q2: Attempt NINE questions from this section each question carries equal marks.

i. Find the potential difference across the two ends of 15m long copper wire 0.5mm in diameter to maintain steady current of 4A (resistivity of copper = 1.54 x 10 -8 Ω.m)

ii. Define potential difference and electromotive force. Both are measured in volts. What is the difference between these concepts.

iii. How many electrons should be removed from each of the two similar Spheres, each of mass 10 g so that electrostatic repulsion is balanced By the gravitational force? (Gravitational constant = G = 6.67 x 10-11 Nm^2/kg^2 and K = 9 x 109 Nm^2/C^2).

iv. Derive an expression for the force experienced by a current-carrying conductor in uniform magnetic field.

v. Describe the function of a PN-junction as a half-wave rectifier.

vi. On the basis of kinetic molecular theory of gases, show that the absolute temperature of an ideal gas is directly proportional to the average translational kinetic energy of molecules

OR

$$\frac{1}{2} m v^2 = \frac{3}{2} K T$$

vii. An electron in a TV picture tube is accelerated by 10000V.What will be it's debroglie wavelength? vii) An ammeter deflects a full scale with a current of 5 amperes and has a total resistance of 0.5 ohms. What shunt resistance must be connected to it to measure 25 ampere full-scale?

viii. Define nuclear fission and fusion reaction. How is it controlled name the process which produce energy in the sun.

ix. Determine the minimum uncertainity in the position of particle of mass $5x10^{-3}$kg moving with the speed of 2m/s. The momentum can be determined to accuracy of one part in a thousand.

x. Calculate the energy of the longest wavelength radiation emitted in the Paschen series in hydrogen atom spectra.

SECTION "C" (DETAILED ANSWER QUESTIONS) **32 Marks**

Note: Attempt any **TWO** questions from these sections.

Q3: a) State the basic postulates of Bohr's Theory of atomic structure. Derive an expression for the radius of nth orbit of Hydrogen atom.

b) Explain the construction & working of Wilson cloud chamber.

Q4: a) Define photoelectric effect, also define stopping potential, threshold frequency, work function, also derive the equations einstein photo electric effect.

b) Describe the construction and working of a moving coil galvanometer.?

Q5: a) Prove that difference between the molar specific heat at constant pressure and volume is equal to general gas constant

b) Describe the discharge tube experiment to determine e/m ratio. Also derive the equations of velocity when magnetic field

c) State Gauss's law. Apply it to determine the electric intensity at a point due to a thin infinite sheet of charges.

END OF PAPER