

POLICY GUIDELINES FOR SCIENCE SUBJECTS PAPERS

Paper Pattern and Distribution of Marks

Biology, **Physics**, Chemistry HSSC-II

The question paper is organized into **FOUR** sections, namely: "Section A, B, C & D". Questions posed may be text based or derived/unseen but in similar pretext and difficulty level as per the lessons taught in the course. Distribution of the questions with respect to cognitive domain within each section shall roughly be around 30 percent Knowledge (K), 50 percent Understanding (U) and 20 percent Application (A).

The Questions in these subjects will be designed in such a manner that no pet-definitions are required from the candidates to be reproduced. Moreover the questions will be designed keeping in consideration the time for thought-process (particularly in U and A Cognitive Domain questions) and the length of the subsequent text (if any) to be produced by the candidates.

SECTION — A

This section consists of 17 compulsory structured part questions - Multiple Choice Questions (MCQs) of one mark each. These MCQs will preferably be designed in such a way to cover the whole course taught. These MCQs objectively test the knowledge, understanding and comprehension of the concepts of the candidates in these subjects.

SECTION — B

This section consists of question number two (02) with preferably **TEN** part questions – Short Response Questions (SRQs) of three (03) marks each. The candidates are required to attempt (respond to) any **SEVEN** SRQs for a maximum total of 21 marks in this section.

SECTION — C

This section consists of question number three (03) with preferably **TEN** part questions – Short Response Questions (SRQs) of three (03) marks each. The candidates are required to attempt (respond to) any **SEVEN** SRQs for a maximum total of 21 marks in this section.

SECTION — D

This section consists of three (03) Extended Response Question (ERQs). Candidates are required to attempt (respond to) any two of these ERQs as per their choice and convenience. These questions may comprise of two part questions each if deemed necessary by paper setter in order to balance out the distribution various concepts and knowledge areas from different Cognitive Domains taught in course. However none of the part questions shall be of less than 5 Marks.

Annexure for Policy Guidelines for Paper Setting

Definitions and Disclaimer

Policy guidelines for paper setting vide Notification No.6-8/FBISE/RES/CC/918 dated 27August 2019 have been conveyed for general information. Definitions of some terminologies and disclaimers are given in this annexure.

1. Definitions

I. Cognitive Domains

Cognitive domain refers to development of mental skill and acquisition of knowledge.

In the questions papers developed by Federal Board of Intermediate & Secondary Education, Islamabad from hereon will be intended to test the following cognitive domains of the candidates:

- Knowledge: Approximately 30% Question in each section
- Understanding: Approximately 50% Question in each section
- Application: Approximately 20% Question in each section

i. Knowledge (K)

Knowledge refers to the ability of the candidates to recall the learned or memorized information or data.

Examples

- A child reciting the alphabets of English
- Memorization and reproducing the dates and other facts etc.
e.g. Pakistan came into being on 27th Night of Ramadan-ul-Mubarak.

Related Verbs (Command Words)

Arrange, define, duplicate, label, list, memorize, name, order, recognize, relate, recall, repeat, reproduce, state etc.

ii. Understanding (U)

Understand (also called Comprehension) refers to ability of the candidates to comprehend (a set of) information and/or situation and provide his/her response to it accordingly.

Examples

- Performing analyses and illustrating the observations
- Comprehending the concepts of Social, Natural and Physical Sciences
e.g. Discuss different types of noise and their impact on human health briefly.

Related Verbs (Command Words)

Classify, describe, discuss, explain, express, identify, indicate, locate, recognize, report, restate, review, select, translate, rephrase, differentiate, compare etc.

iii. Application (A)

Application refers to the ability to use learned material in new and concrete situation to solve problems and/or to design a schedule or task.

Examples

- Performing analyses and illustrating the observations
- Comprehending the concepts of Social, Natural and Physical Sciences
e.g. Illustrate the similes and metaphors given in the poem Daffodils.

Related Verbs (Command Words)

Apply, choose, demonstrate, dramatize, employ, illustrate, interpret, operate, practice, schedule, sketch, solve, use, write etc.

II. Sections of Paper

There are three or four (03 or 04) sections in each question paper:

i. Section-A

Contains Multiple Choice Questions (MCQs). All questions are compulsory without any external or internal choice. Usually comprises of 20% of total marks of the (theory if applicable) paper.

ii. Section B

Contains Short Response Questions (SRQ). Candidates may have external choice up to 33%. In addition to that internal choice may also be offered based upon model, content and/or nature of the subject.

- This section may contain approximately 50% of total marks in some of subjects of the (theory if applicable) paper.

iii. Section C

This section usually contains Extended Response Questions (ERQ). Candidates may have external choice in the questions. In addition to that internal choice may also be offered based upon model, content and/or nature of the subject. For ERQs it may contain approximately 30% of total marks in some subjects of the (theory if applicable) paper.

III. Choice

Sometimes the candidates are required to attempt a certain number of questions from a given pool or group of questions, it is commonly known as choice in questions.

There are two types of choices

i. External Choice

Whenever the candidates are required to solve (respond to) a certain number of questions from a given pool it is called external choice. This choice may be around 33% in a section.

- e.g.
1. Answer any six parts in about 30-40 words each.
(Out of eight questions)
 2. Attempt any eight questions from the following.
(Out of eleven questions)

ii. Internal Choice

Whenever the candidates have to solve (respond to) a question mandatorily but they have an option within the question it is called internal choice.

2. Disclaimers

- I.** The cognitive levels and categories written in sample model paper are for explanation purpose only. In the actual question papers administered during examination shall not contain description of these cognitive domains.
- II.** Association of the cognitive domains is solely based on subject expert's judgment and may be subject to errors and/or omissions.
- III.** In the class rooms and during teaching the candidates (students) need to be taught about the time management in accordance with allocation of marks to the questions.



Federal Board HSSC-II Examination Physics Model Question Paper

Time allowed: 2.35 hours

Total Marks: 68

Note: Sections 'B' 'C' and 'D' comprise pages 1-2 and questions therein are to be answered on the separately provided Answer Book. Use supplementary answer sheet i.e., sheet B if required. Write your answers neatly and legibly.

SECTION – B (Marks 21)

(Chapters 1 to 5)

Q.2 Attempt any SEVEN parts. All parts carry equal marks. (7 × 3 = 21)

- i. What is the electric potential energy of a 7 nC charge that is 2 cm away from a 20 nC charge?
- ii. Why is it safe to stay inside an automobile during a light storm?
- iii. Two wires, when connected in series have an equivalent resistance of 18 Ω and when connected in parallel have an equivalent resistance of 4 Ω . Find their resistances?
- iv. Differentiate between potential difference and e.m.f?
- v. A long straight wire carries a current of 1 A. Find the magnitude of magnetic field at a distance of 1 m from it.
- vi. An electron does not suffer any deflection while passing through a region. Are you sure that there is no magnetic field? Justify your response.
- vii. What is the magnitude of the force acting on a charge 'q' moving with a velocity 'v' in a magnetic field 'B'?
- viii. A suspended magnet is oscillating freely in a horizontal plane. The oscillations are strongly damped when a metal plate is placed under the magnet. Explain why this occurs?
- ix. A pure inductive coil allows a current of 20 A to flow from a 220 V, 50 Hz supply. Find the inductive reactance and inductance of the coil.
- x. How does doubling the frequency affect the reactance of an inductor and a capacitor?

SECTION – C (Marks 21)

(Chapters 6 to 10)

Q.3 Attempt any SEVEN parts. All parts carry equal marks. (7 × 3 = 21)

- i. Suppose that you are given two materials A and B respectively. A has large hysteresis loop area while B has small hysteresis loop area. Which material A or B is suitable to use as core of transformer?
- ii. How does magnetism arise in a substance? What is meant by paramagnetic and diamagnetic substances?
- iii. In a certain circuit, the transistor has a collector current of 10 mA and a base current of 40 μ A. What is the current gain of the transistor?
- iv. What is the effect of forward and reverse biasing of a diode on the width of depletion region?

- v. “It is impossible to perform an experiment within an inertial frame of reference to detect the motion of the frame of reference”. Justify.
- vi. An electron is placed in a box about the size of an atom that is about 1×10^{-10} m. What is the velocity of electron?
- vii. Calculate the shortest wavelength of Bracket series.
- viii. What is meant by braking radiation or Bremsstrahlung?
- ix. What is nuclear fusion reaction? What are the factors which make it difficult to achieve nuclear fusion reaction?
- x. The mass of a Nucleus ${}_{92}^{235}\text{U}$ is 234.99333 u. The mass of proton is 1.00728 u and mass of neutron is 1.00867 u. Calculate the binding energy per nucleons of a ${}_{92}^{235}\text{U}$ nucleus?

SECTION – D (Marks 26)

Note: Attempt any **TWO** questions. All questions carry equal marks. (2 × 13 = 26)

- Q.4 a. What is photoelectric effect? Explain results of photoelectric effect. Also write its quantum explanation. (7)
- b. What is LASER? Explain working of Helium-Neon laser. (6)
- Q.5 a. What is an alternating current generator? How an e.m.f is induced in a generator? Derive a relation for e.m.f induced in a generator. (7)
- b. What is a series resonance circuit? Derive a formula for resonance frequency. (6)
- Q.6 a. State Gauss’s law. Find electric field intensity at a point due to an infinite sheet of charge and between two oppositely charged parallel plates. (8)
- b. A heating coil has a resistance of 30Ω . It is designed to operate on 220 V. What electric energy in joules is supplied to the heater in 20 s? (5)

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