

# **POLICY GUIDELINES FOR SCIENCE SUBJECTS PAPERS**

Paper Pattern and Distribution of Marks

## **Physics HSSC-I**

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 27 August 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-I 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)
- Show that one radian =  $57.3^\circ$ .
  - How are uncertainties measured in final result of power factor and volume?
  - Prove that if the vectors  $\vec{A}$  &  $\vec{B}$  are parallel to each other, then  $\vec{A} \cdot \vec{B} = \pm AB$ .
  - If  $(\vec{A} \times \vec{B}) = 0$ , then either of the two vectors is a null vector or vector  $\vec{A}$  and  $\vec{B}$  are parallel to each other. Prove it.
  - Why is it helpful to wear a helmet while riding?
  - Does a moving object have impulse? Explain.
  - Name the various non-conventional sources of energy and write down their characteristics.
  - Why are energy savers used instead of normal bulbs?
  - Prove that  $r_o = \left[ \frac{GM_e T^2}{4\pi^2} \right]^{1/2}$  of geostationary satellite.
  - Why does the coasting rotating system slowdown as water drops into the beaker?

### SECTION – C (Marks 21)

(Chapters 6 to 10)

- Q.3 Attempt any SEVEN parts. All parts carry equal marks. (7 × 3 = 21)
- What is an aerofoil? Explain its working in accordance with Bernoulli's equation.
  - When water falls from a tap, why does the cross-sectional area of droplet decrease as it comes down?
  - What is meant by damped Oscillation? Show it graphically.
  - In relation to SHM, explain the equations:  
a.  $Y = A \sin(\omega t + \phi)$       b.  $a = -\omega^2 x$
  - Write down the applications of Doppler Effect.
  - How can you generate ultrasonic waves and how can you detect them?
  - What do you know about grating spectrometer?
  - Why is ordinary light not polarized?
  - Two blocks of ice are pressed together in order to form a single piece. Explain how this happens.
  - What is the function of spark plug in a petrol engine?

## SECTION – D (Marks 26)

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

- Q.4 a. Derive a relation for the time period of a simple pendulum using dimensional analysis. The various possible factors on which the time period 'T' may depend are: (8)
- (i) length of the pendulum
  - (ii) mass of the bob
  - (iii) angle  $\Theta$  which the thread makes with the vertical
  - (iv) acceleration due to gravity
- b. Consider a ladder weighing 20N resting against a smooth wall such that it makes an angle of  $60^\circ$  with the horizontal. Find the reaction on the ladder due to the wall and ground. (5)
- Q.5 a. What is Bernoulli's equation? Show that how it is based on law of conservation of energy and name the three applications of Bernoulli's equation. (8)
- b. Find the amplitude, frequency and time period of an object oscillating at the end of a spring, if the equation for its position at any instant  $t$  is given by  $x = 0.25 \cos\left(\frac{\pi}{8}\right)t$ . Find the displacement of the object after 2 second. (5)
- Q.6 a. State Carnot theorem and the characteristics of a Carnot engine. Explain Carnot cycle and Carnot engine. (8)
- b. Find the polarizing angle for a glass of refractive index of 1.55. (5)

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