

AGA KHAN UNIVERSITY EXAMINATION BOARD

HIGHER SECONDARY SCHOOL CERTIFICATE

CLASS XII

MODEL EXAMINATION PAPER 2020

Physics Paper II

Time: 2 hours 10 minutes Marks: 50

INSTRUCTIONS

Please read the following instructions carefully.

1. Check your name and school information. Sign if it is accurate.

**I agree that this is my name and school.
Candidate's Signature**

RUBRIC

2. There are FIFTEEN questions. Answer ALL questions. Questions 14 & 15 each offers TWO choices. Attempt any ONE choice from each.
3. When answering the questions:

Read each question carefully.
Use a black pointer to write your answers. DO NOT write your answers in pencil.
Use a black pencil for diagrams. DO NOT use coloured pencils.
DO NOT use staples, paper clips, glue, correcting fluid or ink erasers.
Complete your answer in the allocated space only. DO NOT write outside the answer box.
4. The marks for the questions are shown in brackets ().
5. You may use a scientific calculator if you wish.

Q.1. (Total 3 Marks)

If the electric potential is constant throughout a given region of space, then is it possible that the electrical field intensity becomes zero in this region? Justify your answer with the help of mathematical evidence.

Q.2. (Total 4 Marks)

The given table shows the information about two filament lamps that are connected in an electrical circuit.

Type of Filament Lamps	Power Consumption	Operating Voltage
Filament lamp I	1000 W	220 V
Filament lamp II	100 W	220 V

a. Calculate the resistance of both the filament lamps. (3 Marks)

b. Why the resistance of filament lamp I is different from filament lamp II? (1 Mark)

Q.3.

(Total 2 Marks)

Three particles are projected into a magnetic field. The velocities of these particles are at right angle to the magnetic field. Identify the charge on these particles, if

- a. two of these particles deflect in the opposite direction. (1 Mark)

- b. the third particle does not deflect in any direction. (1 Mark)

Q.4.

(Total 2 Marks)

An ammetre is connected with an electrical circuit in series.

- a. Why is it connected in series? (1 Mark)

- b. Why is it necessary to keep its resistance very low? (1 Mark)

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Q.5. (Total 3 Marks)

Does the induced electromotive force (e.m.f.) always act to decrease the magnetic flux through an electric circuit? Explain your answer in TWO points.

Q.6. (Total 2 Marks)

Write any TWO advantages of using three phase alternating current (A.C.) supply in a house.

1.

 2.

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Q.7.

(Total 2 Marks)

Describe, in any TWO points, the production and propagation of electromagnetic waves from a source.

1. _____

2. _____

Q.8.

(Total 4 Marks)

Describe the formation of any TWO of the following energy bands in solids.

- i. Valence energy band
- ii. Conduction energy band
- iii. Completely filled energy band

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Q.9.

(Total 4 Marks)

How a depletion region is formed in a p-n junction diode?

Q.10.

(Total 3 Marks)

In the special theory of relativity, the Lorentz factor is the factor by which time, length, and mass change for an object moving at speed close to the speed of light.

The Lorentz factor is given as $\frac{1}{\sqrt{1 - \frac{v^2}{c^2}}}$.

Is the quantity $\sqrt{1 - \frac{v^2}{c^2}} < 1$? Justify your answer with the help of mathematical evidence.

Q.11.

(Total 3 Marks)

Describe Planck's assumption to explain the energy distribution of black body radiation for different wavelengths.

Q.12.

(Total 4 Marks)

Is energy conserved when an atom emits a photon of light? Justify your answer.

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Q.13.

(Total 4 Marks)

How does the length and shape of the tracks of a radioactive incident particle in Wilson cloud chamber indicate the nature of particle?

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Q.14.

(Total 5 Marks)

EITHER

a.

- i. State Gauss' law. (1 Mark)
- ii. Is it necessary that electric field intensity \vec{E} remains zero inside a charged spherical rubber balloon? Justify your answer with the help of mathematical evidence. (4 Marks)

(**Note:** Assume that charges are distributed uniformly over the surface.)

OR

b.

A parallel plate capacitor is connected to a battery.

- i. Describe the process taking place at the two terminals of the battery when a capacitor is being fully charged. (3 Marks)
- ii. Each plate of this capacitor receives the same amount of charges during charging. Give a reason for this statement. (1 Mark)
- iii. Write ONE function of a capacitor. (1 Mark)

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Q.15.

(Total 5 Marks)

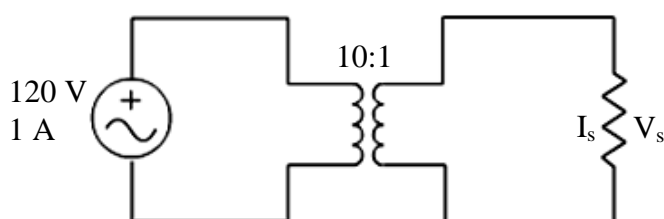
EITHER

- a. A 0.2 m long inductor has 8000 turns per metre and its cross-sectional area is $5.6 \times 10^{-3} \text{ m}^2$. If 10 A current passes through the inductor, then calculate the value of energy stored in it.

(Note: The value of $\mu_0 = 4 \pi \times 10^{-7} \text{ Wb/A.m}$)

OR

- b. In the given circuit diagram, determine the voltage and current at the secondary coil of a transformer.



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END OF PAPER

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