

AGA KHAN UNIVERSITY EXAMINATION BOARD
HIGHER SECONDARY SCHOOL CERTIFICATE
CLASS XII
MODEL EXAMINATION PAPER 2023 AND ONWARDS
Physics Paper I
Time: 1 hour 30 minutes Marks: 50

INSTRUCTIONS

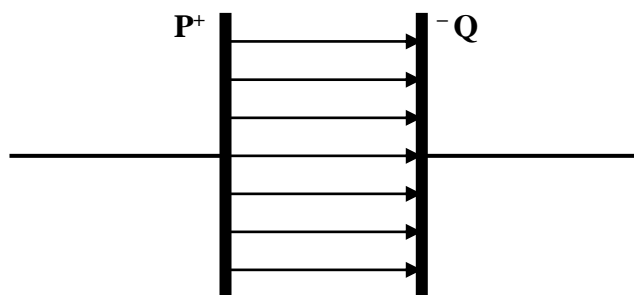
1. Read each question carefully.
2. Answer the questions on the separate answer sheet provided. DO NOT write your answers on the question paper.
3. There are 100 answer numbers on the answer sheet. Use answer numbers 1 to 50 only.
4. In each question, there are four choices A, B, C, D. Choose ONE. On the answer grid, black out the circle for your choice with a pencil as shown below.

Correct Way	Incorrect Ways
1 (A) (B) (●) (D)	1 (A) (B) (✓) (D)
	2 (A) (B) (C) (D)
	3 (A) (B) (X) (D)
	4 (A) (B) (ζ) (D)

Candidate's Signature

5. If you want to change your answer, ERASE the first answer completely with a rubber, before blacking out a new circle.
6. DO NOT write anything in the answer grid. The computer only records what is in the circles.
7. You may use a scientific calculator if you wish.

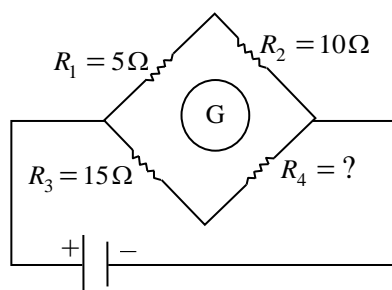
1. In the given figure, electric field lines of forces between two parallel metallic plates are passing from a positive plate **P** to a negative plate **Q**.



Based on the given information, the intensity of the electric field is

- A. zero between the plates.
 - B. stronger near the plate **P**.
 - C. stronger near the plate **Q**.
 - D. uniform between the plates.
2. Suppose a solid metallic sphere contains positive charges **Q**.
According to Gauss's law, the position of charges **Q** is uniformly
- A. concentrated at the centre of the sphere.
 - B. distributed on the outer surface of the sphere.
 - C. distributed on the inner surface of the sphere.
 - D. concentrated inside and outside of the sphere.
3. The total number of electric lines of forces passing through a unit area is called an electric
- A. flux.
 - B. field.
 - C. intensity.
 - D. potential.
4. Which of the following materials has no free charge?
- A. Metals
 - B. Dielectrics
 - C. Conductors
 - D. Semi-conductors
5. Displacement of positive and negative charges in a conductor by an electric field produces
- A. electric flux.
 - B. magnetic flux.
 - C. electric dipole.
 - D. magnetic intensity.

6. If the distance between two identical charges is doubled, then the force of repulsion between them decreases by
- two-third of the previous value.
 - one-third of the previous value.
 - one-fourth of the previous value.
 - three-fourth of the previous value.
7. What is the value of R_4 in the given Wheatstone bridge?



- 10 Ω
 - 15 Ω
 - 30 Ω
 - 60 Ω
8. A battery of electromotive force 18 V delivers a charge of 1.5 C to an external circuit. The total energy dissipated in the circuit is
- 12.0 J.
 - 16.5 J.
 - 19.5 J.
 - 27.0 J.
9. The given table shows information about two wires, **X** and **Y** that are made of the same material.

Wire	X	Y
Diameter	2 cm	4 cm
Length	1 m	4 m

Which of the following options is CORRECT for the resistance and resistivity of both the wires?

	Resistance	Resistivity
A	Same	Same
B	Same	Different
C	Different	Same
D	Different	Different

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10. The reciprocal of the resistivity of a material is called

- A. permittivity.
- B. conductivity.
- C. power dissipation.
- D. internal resistance.

11. A 1000 W lamp operates at 220 V for 60 s.

The electric current passing through the lamp will be

- A. 1.66 A.
- B. 3.57 A.
- C. 4.54 A.
- D. 6.25 A.

12. A current carrying coil is placed in a uniform magnetic field.

The torque produced in this coil will be doubled when the

- A. force in the magnetic field is doubled.
- B. length of the coil is reduced to half.
- C. moment arm is reduced to half.
- D. area of the coil is doubled.

13. A metallic wire of length 1 m is placed perpendicular to a uniform magnetic field of 10 T.

If this wire is carrying current of 100 A, then the force acting on this wire will be

- A. 0 N.
- B. 10 N.
- C. 100 N.
- D. 1000 N.

14. An electrical galvanometre becomes more sensitive when

- A. the area of its coil is made small.
- B. it is converted into voltmeter and ammeter.
- C. a small amount of current produces a larger deflection.
- D. a small amount of current produces a smaller deflection.

15. An electron is travelling with a velocity of 10^6 m/s, perpendicular to a field of strength 1 W/m^2 .

The magnetic force on the electron will be

(Note: Take the charge of an electron as $1.6 \times 10^{-19} \text{ C}$.)

- A. $1.6 \times 10^{-25} \text{ N}$.
- B. $1.6 \times 10^{-13} \text{ N}$.
- C. $1.6 \times 10^{13} \text{ N}$.
- D. $1.6 \times 10^{25} \text{ N}$.

16. When a charged particle moves through a magnetic field, the effect of the field changes the particle's
- A. mass.
 - B. volume.
 - C. direction of motion.
 - D. energy in the system.
17. Due to an induced electromotive force, current passes through a coil. The amount of this current depends on the
- A. magnetic flux.
 - B. area of the coil.
 - C. shape of the coil.
 - D. resistance of the coil.
18. The process in which a change of current in one coil causes an induced electromotive force in another nearby coil is called
- A. self-induction.
 - B. self-inductance.
 - C. mutual induction.
 - D. mutual inductance.
19. A transformer mainly consists of an iron core and two coils of copper.
- If an additional coil is wound on the iron core of the transformer, then the magnetic flux through it will
- A. increase.
 - B. decrease.
 - C. become zero.
 - D. remain the same.
20. Transformers are used to change
- I. current
 - II. voltage
 - III. resistance
 - IV. capacitance
- A. I and II.
 - B. I and IV.
 - C. III or IV.
 - D. II and III.

21. In a direct current (DC) circuit, the current and voltage are controlled by a/an
- I. resistor
 - II. inductor
 - III. capacitor
 - IV. transistor
- A. I and II.
 - B. I and IV.
 - C. II and III.
 - D. III and IV.
22. The ratio between the root mean square (rms) of an applied voltage and the rms resulting from an alternating current is called
- A. resistance.
 - B. impedance.
 - C. capacitance.
 - D. conductance.
23. At a high frequency, as compared to the normal frequency, the value of capacitive reactance in an alternating current circuit becomes
- A. less.
 - B. zero.
 - C. more.
 - D. infinite.
24. At a high frequency, the alternating current through a capacitor in an alternating current circuit will be
- A. zero.
 - B. large.
 - C. small.
 - D. undetermined.
25. In terms of structure, nylon is an example of
- A. glassy solids.
 - B. polymeric solids.
 - C. crystalline solids.
 - D. amorphous solids.
26. In terms of energy bands, semiconductor materials at room temperature do NOT have
- A. a partially filled valence band.
 - B. a partially filled conduction band.
 - C. plenty of free electrons for electrical conduction.
 - D. narrow forbidden energy gaps between conduction and valence band.

27. The material that has the lowest value of Young's modulus is

- A. steel.
- B. glass.
- C. rubber.
- D. copper.

28. The solid material with the highest relative elastic deformation is

- A. iron.
- B. glass.
- C. rubber.
- D. ceramic.

29. Which of the following statements does NOT relate to an insulator?

- A. Complete valence band
- B. Partially filled conduction band
- C. Large energy gap between electrons
- D. Valence electrons are bound very tightly

30. In the given truth table, the values of x and y are

A	B	$\bar{A} + B$
0	0	1
0	1	x
1	0	0
1	1	y

- A. $x = 0, y = 0$
- B. $x = 0, y = 1$
- C. $x = 1, y = 0$
- D. $x = 1, y = 1$

31. Which of the following devices/ instruments uses a reverse biased diode?

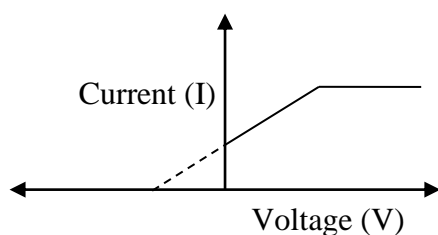
- A. Rectifier
- B. Photocell
- C. Photodiode
- D. Light emitting diode

32. The device through which an electrical current passes in one direction only is a

- A. diode.
- B. buffer.
- C. resistor.
- D. resistor-transistor.

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33. If a p-n junction is reverse biased, then the depletion region of the junction is
- A. zero.
 - B. widened.
 - C. narrowed.
 - D. unchanged.
34. Consider the non-inverting operational amplifiers. If R_1 is infinite and R_2 is 0 ohm, then the gain of amplifier is
- A. -1
 - B. 0
 - C. $+1$
 - D. infinite
35. The given graph depicts the phenomenon of



- A. pair production.
 - B. Compton effect.
 - C. photoelectric effect.
 - D. annihilation of matter.
36. In all of the following situations, photocells are used EXCEPT
- A. for security systems.
 - B. for counting systems.
 - C. in sound track of movies.
 - D. in air-traffic control stations.
37. When the temperature of a black body is raised, it emits radiations.
- With the increase in the temperature of the black body, the wavelength associated with the maximum intensity
- A. becomes zero.
 - B. remains the same.
 - C. shifts towards the longer wavelength.
 - D. shifts towards the shorter wavelength.

38. The phenomena that experimentally proves Einstein's mass-energy relation are

- I. Compton's effect
- II. photoelectric effect
- III. annihilation of matter
- IV. pair production of matter

- A. I and II.
- B. I and IV.
- C. II and III.
- D. III and IV.

39. According to Heisenberg's uncertainty principle, which of the following options is CORRECT for the position and momentum of a particle?

	Position	Momentum
A	Can be determined precisely	Can be determined precisely
B	Cannot be determined precisely	Can be determined precisely
C	Can be determined precisely	Cannot be determined precisely
D	Cannot be determined precisely	Cannot be determined precisely

40. The spectrum obtained by the radiations that emit from a hydrogen filled discharge tube is the

- A. line spectrum.
- B. band spectrum.
- C. absorption spectrum.
- D. continuous spectrum.

41. By emitting X-rays, an atom

- A. attains the ground state.
- B. attains the excited state.
- C. becomes single ionised.
- D. becomes double ionised.

42. Laser can only be produced if an atom is in

- I. normal state
- II. excited state
- III. ionized state

- A. I only.
- B. II only.
- C. I and III.
- D. II and III.

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43. It is the potential through which an electron should be accelerated so that on collision it can lift another electron in the atom from its ground state to a higher state.

The potential described in the given statement is the

- A. electric potential.
 - B. excitation potential.
 - C. ionisation potential.
 - D. single electrode potential.
44. The wavelength of the spectral lines in the hydrogen atom's emission and absorption spectra are predicted by
- A. Bohr's model.
 - B. Dalton's model.
 - C. Maxwell's model.
 - D. Rutherford's model.
45. When a radioactive nucleus emits an alpha particle, its atomic mass drops by
- A. 1 atomic mass unit (u).
 - B. 2 atomic mass unit (u).
 - C. 4 atomic mass unit (u).
 - D. 8 atomic mass unit (u).
46. Which of the following is/ are affected by the electric and magnetic fields?
- I. Alpha particle
 - II. Beta particle
 - III. Gamma rays
- A. I only
 - B. III only
 - C. I and II
 - D. II and III
47. The explosion of an atomic bomb occurs as a result of a/ an
- A. controlled fusion reaction.
 - B. controlled fission reaction.
 - C. uncontrolled fusion reaction.
 - D. uncontrolled fission reaction.
48. In the modern view of the building blocks of matter, the particles experiencing a strong nuclear force is called
- A. leptons.
 - B. mesons.
 - C. baryons.
 - D. hadrons.

49. The missing mass converted into energy in the formation of a nucleus is called
- A. binding energy.
 - B. potential energy.
 - C. excitation energy.
 - D. ionisation energy.
50. The emission of one beta particle from the nucleus of an atom produces a change of
- A. -1 in atomic mass.
 - B. $+1$ in atomic mass.
 - C. -1 in atomic number.
 - D. $+1$ in atomic number.

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