APOLLO

FBISE Physics Class 12
Topical workbook - Volume 2 of 3

140 questions arranged by official framework topic.
National Curriculum 2022-23; supported examinations from 2027.

APOLLO

Alternating Current

Domain E: Electricity and Magnetism

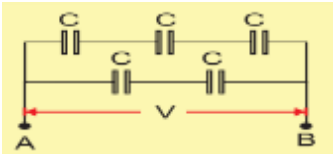
First Annual 2026 | Section C Q5 | 6 marks

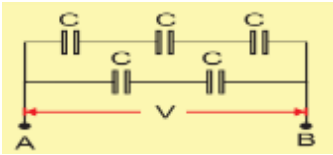
				3C of charge and potential different of 15V.	
Q.5	Explain the working of a bridge rectifier using four diodes. Also draw the circuit diagram.	4+2	OR	What is photoelectric effect? Explain work function of metal and Einstein photo electric equation. What is the effect of frequency of radiation on K.E of photoelectrons?	1+3 +2

FBISE model paper | Section A Q9 | 1 mark

9.	In a full wave bridge rectifier, how many diode(s) conduct during each half cycle of AC input?	1	2	3	4

Q. 2	Questions	Marks
(i)	Calculate the orbital speed of satellite orbiting the Earth at an altitude equal to Earth's radius.	03
(ii)	Explain how pressure is exerted by the movement of gas molecules?	03
(iii)	Write three examples of resonance from everyday life.	03
(iv)	The fringe spacing between the central maxima and 1^{st} minima is 2 mm. If a light of 500 mm is used then find the separation between the slits. The distance between the slit and screen is 1 m.	03
(v)	Define mutual inductance. Also write its unit.	03

Q. 2	Questions	Marks		Questions	Marks
(i)	Calculate the orbital speed of satellite orbiting the Earth at an altitude equal to Earth's radius.	03	**OR**	A body with mass 800 g attached to a spring, vibrates with amplitude 30 cm. The restoring force is 60 N when the displacement is 0.30 m. Find out its (a) angular frequency (b) velocity and acceleration at x = 12 cm.	03
(ii)	Explain how pressure is exerted by the movement of gas molecules?	03	**OR**	Write any three conditions for observing interference fringes?	03
(iii)	Write three examples of resonance from everyday life.	03	**OR**	List the use of capacitors in various household appliances.	03
(iv)	The fringe spacing between the central maxima and 1st minima is 2 mm. If a light of 500 mm is used then find the separation between the slits. The distance between the slit and screen is 1 m.	03	**OR**	A network of five capacitors of capacitance C is connected to a 100 V supply, as shown in below figure. Determine the equivalent capacitance of the network. 	03
(v)	Define mutual inductance. Also write its unit.	03	**OR**	Define gravitational field strength. Also write its formula and unit.	03
(vi)	When electrons are accelerated through a potential difference of 10^5 volts in an X–ray tube. Calculate the	03	**OR**	A.C voltage across a 0.5 μF capacitor is $16\sin(2\times10^3 t)$ V. Find the capacitive reactance.	03

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(vi)	When electrons are accelerated through a potential difference of 10^5 volts in an X–ray tube. Calculate the minimum wavelength produced.	03	**OR**	A.C voltage across a 0.5 μF capacitor is $16\sin(2\times10^3 t)$ V. Find the capacitive reactance.	03
(vii)	Define (a) cryosphere (b) lithosphere.	03	**OR**	What is the main purpose of X-rays?	03
(viii)	What are the conditions required for pair production to occur?	03	**OR**	What is climate inertia?	03
(ix)	What is the application of piezo-electric effect in medical science?	03	**OR**	Explain how electron microscopes achieve very high resolution?	03
(x)	Sketch the variation of binding energy per nucleon with nucleon number.	03	**OR**	Explain the role of a single capacitor in output of full wave rectifier circuit.	03
(xi)	Explain briefly that how global climate is determined by energy transfer from the Sun?	03	**OR**	What is Stefan-Boltzmann law? Explain briefly.	03
(xii)	Explain why g is approximately constant for small changes in height near the earth's surface.	03	**OR**	Describe the function of the control rods in reactor.	03
(xiii)	How pressure is related to average translational kinetic energy of a gas?	03	**OR**	Describe the practical examples of free and forced oscillations.	03
(xiv)	What is diffraction grating?	03	**OR**	Distinguish between root-mean-square (r.m.s.) and peak values for a sinusoidal alternating current.	03

Q.5	What is rectification? Explain the operation of a bridge rectifier, with the help of a diagram.	01+ 06

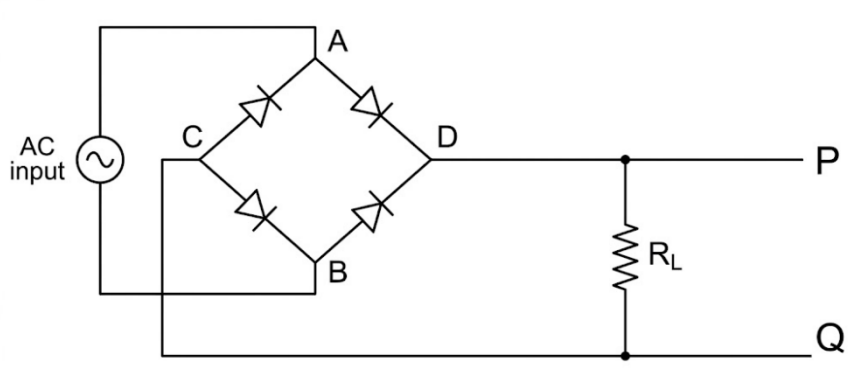
Calculate the mean value of g. (01)

. How do we magnetize steel ball in this experiment? (01)

. How does air resistance affect the result? (01)

A circuit shows a bridge rectifier connected to an AC supply. The terminals P and Q are connected to CRO circuit.

Q.5 A circuit shows a bridge rectifier connected to an AC supply. The terminals P and Q are connected to CRO circuit.



i. Draw the shape of input and output waveform displayed on CRO. (02)

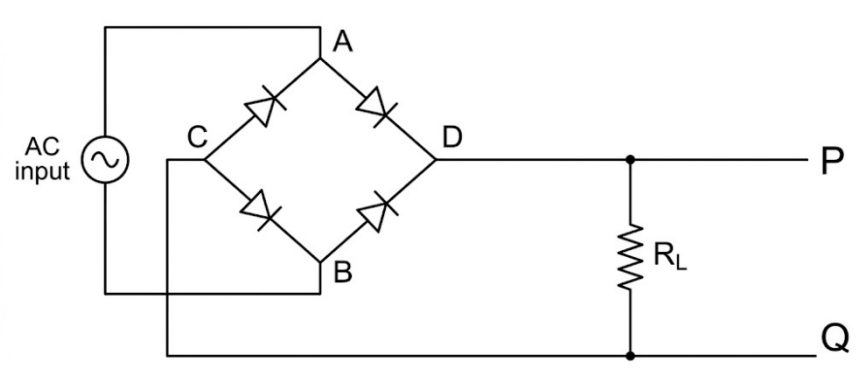
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i. Draw the shape of input and output waveform displayed on CRO. (02)

ii. At output PQ (from CRO) peak value of voltage 'V_o' is 8V. What is its V_{rms} value? (01)

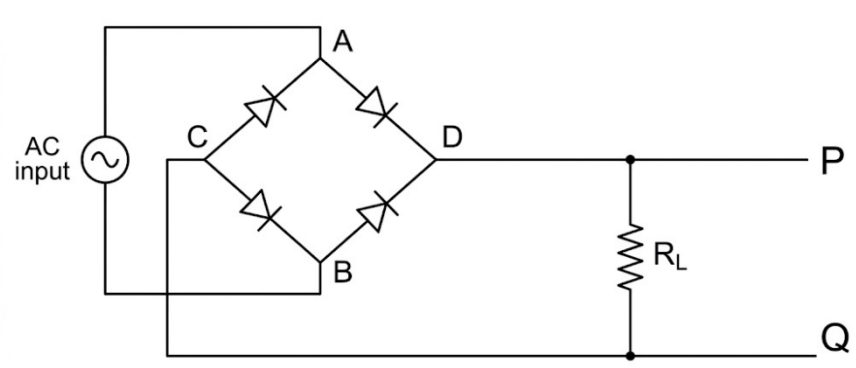
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ii. At output PQ (from CRO) peak value of voltage 'V_o' is 8V. What is its V_{rms} value? (01)

iii. What is the ripple frequency of a full-wave rectifier compared to the input AC supply? (01)

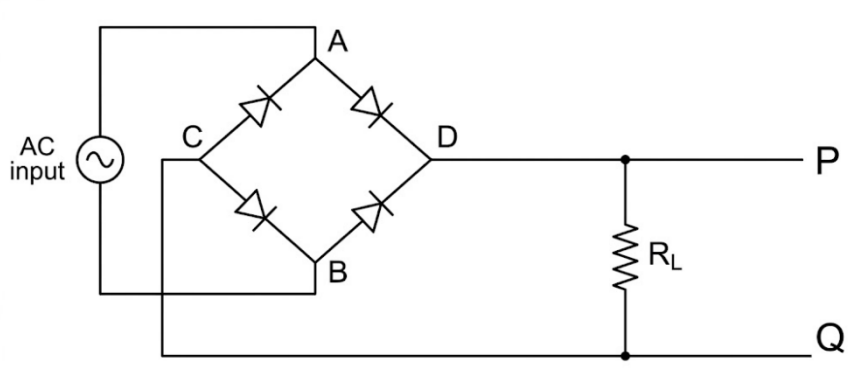
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iv. If the mains input time period is 0.02 s, what is the time period of output waveform after full-wave rectification? (01)

First Annual 2026 | Section B Q2(vii) | 3 marks

	low?			reaction?	
(vii)	State the factors which affect the inductance of a coil.	1+1 +1	OR	Find the relation of cyclotron frequency of charged particle in uniform magnetic field.	0
(viii)	How Geiger-Muller counter detects and counts			Briefly explain the principle of metal detector with	

First Annual 2026 | Section B Q2(x) | 3 marks

	instead of solid one?			law of conservation of energy.	
(x)	Briefly explain impedance in RLC series circuit of AC.	03	OR	How can one increase the capacitance of a capacitor?	0
(xi)	Differentiate between conductors and insulators in	1.5		Differentiate between emf and potential difference.	1

First Annual 2026 | Section B Q2(xiii) OR | 3 marks

OR	How does doubling the frequency affect the reactance of an inductor and a capacitor?

First Annual 2026 | Section C Q4 OR | 7 marks

OR	A 220V, 50Hz A.C. supply is applied to series combination of a 2.5Ω resistor, 6mH inductor and a 6.5 μF capacitor. Calculate (i) reactance of inductor (ii) reactance of capacitor (iii) impedance of circuit (iv) current in the circuit
	What is meant by 'half-life' of a radio active element?

OR	Explain the phenomes of self-inductance of a coil. What is its unit? On what factors it depends?

(7) A steady current is passing through a coil, magnitude of self- induced emf in it, will be:

A. zero ◯ B. maximum ◯

C. $\varepsilon = L\frac{\Delta I}{\Delta t}$ ◯ D. $\varepsilon = -L\frac{\Delta I}{\Delta t}$ ◯

(8) At high frequency in a capacitive circuit, the current will be:

A. Large ◯ B. Small ◯

C. Zero ◯ D. Infinite ◯

(9) The peak value of A.C source is 20 A, its rms value will be:

A. 14.1 A ◯ B. 10 A ◯

C. 20 A ◯ D. 28.2 A ◯

(10) The materials in which disordered structure of liquid is frozen are:

A. Amorphous ◯ B. Crystalline ◯

C. Polycrystalline ◯ D. Quartz ◯

(11) The temperature below which the resistivity of a superconductor falls to zero is called:

A. Absolute temperature ◯ B. Kelvin temperature ◯

C. Limiting temperature ◯ D. Critical temperature ◯

(12) In a half wave rectifier, the diode conducts:

A. Only positive half of input cycle ◯

B. Only negative half of input cycle ◯

C. Both halves of input cycle ◯

D. Any one half of input cycle ◯

(13) The maximum kinetic energy of emitted photoelectrons, from different metal surfaces, depends upon:

A. Intensity of incident light only ◯

B. Frequency of the incident light only ◯

C. Nature of metal surface ◯

D. Both frequency of incident light and nature of metal surface ◯

(14) The rest mass of photon is:

A. Infinite ◯ B. Zero ◯

C. 1.6×10^{-27} kg ◯ D. 3×10^{8} kg ◯

(15) The type of spectra produced by atoms is:

A. Continuous spectra ◯ B. Band spectra ◯

C. Line spectra ◯ D. Braking radiation spectra ◯

(16) Strong nuclear force exists between:

A. Hadrons ◯ B. Photons ◯

B. Leptons ◯ D. Muons ◯

(17) The half-life of a radioactive element which has only $\frac{1}{32}$ of its original mass left

FBISE model paper | Section A Q8 | 1 mark

(8) At high frequency in a capacitive circuit, the current will be:

A. Large ◯ B. Small

C. Zero ◯ D. Infinite

FBISE model paper | Section A Q9 | 1 mark

(9) The peak value of A.C source is 20 A, its rms value will be:

A. 14.1 A ◯ B. 10 A

C. 20 A ◯ D. 28.2 A

FBISE model paper | Section A Q12 | 1 mark

(12) In a half wave rectifier, the diode conducts:

A. Only positive half of input cycle

B. Only negative half of input cycle

C. Both halves of input cycle

D. Any one half of input cycle

FBISE model paper | Section B Q2(v) | 3 marks

v. Define the mutual-inductance of two coils. Write its formula. Also define its SI unit.

FBISE model paper | Section B Q2(vii) | 3 marks

How does stator help rotor to rotate in AC motor?

vii. What is power dissipation value in capacitor and inductor in AC circuits? Elaborate your answer

OR

FBISE model paper | Section B Q2(vii) OR | 3 marks

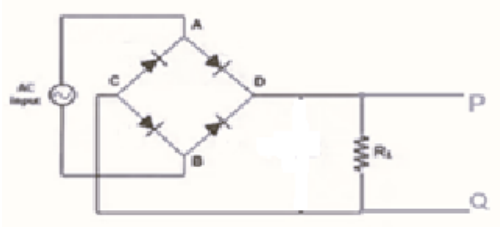
Elaborate your answer

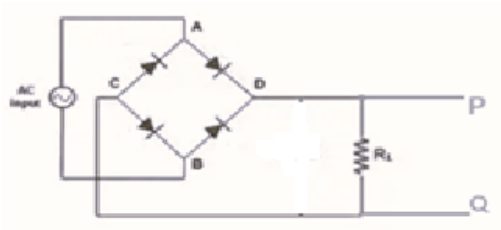
OR

A 220V, 50Hz A.C. supply is applied to series combination of a 2.5Ω, 6mH inductor and a 6.5μF capacitor. Calculate (i) reactance of inductor (ii) reactance ofcapacitor (iii) impedance of circuit.

What is the role of soil material? Do you agree or differ in

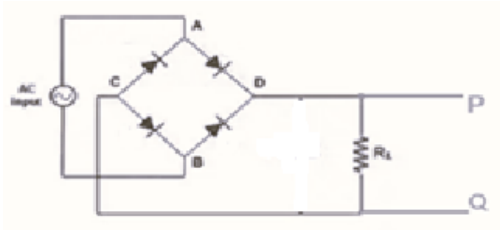
Q.5. A circuit shows a rectifier bridge connected to an AC supply. The terminals P and Q are connected to CRO circuit.

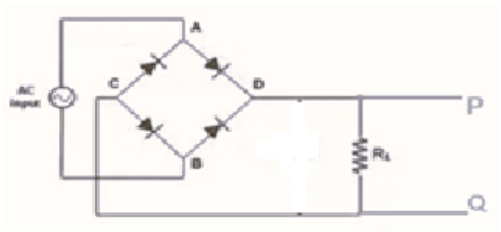




i. Draw the waveform obtained at output PQ. (01)

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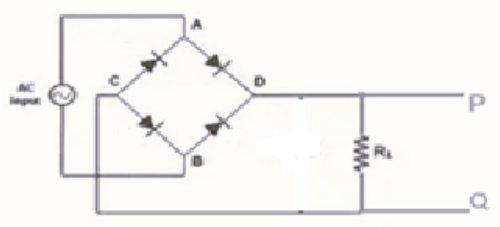


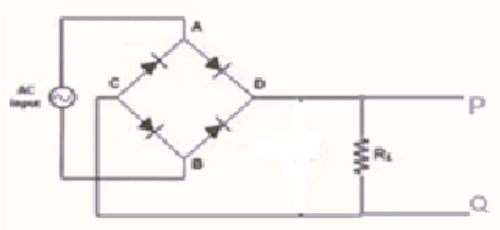


i. Draw the waveform obtained at output PQ. (01)

ii. At output PQ (from CRO) peak value of voltage ‘V’ is 8V. What is its r.m.s value? (02)

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i. Draw the waveform obtained at output PQ. (01)

ii. At output PQ (from CRO) peak value of voltage ‘V’ is 8V. What is its r.m.s value? (02)

iii. Calculate the power dissipated in resistor if resistance ‘R’ is 4Ω. (01)

APOLLO

Quantum Physics

Domain F: Modern Physics

FBISE model paper | Section A Q11 | 1 mark

11.	A photoelectric cell is a device which:	converts electricity into light energy.	converts light energy into electricity.	stores light energy.	stores electricity	○ ❍ ❍ ❍

FBISE model paper | Section A Q12 | 1 mark

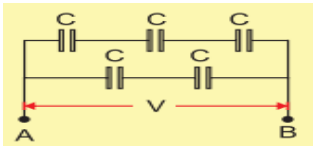
12.	If uncertainty in the position of an electron is zero, the uncertainty in its momentum will be	less than h/4	greater than h/4	zero	infinite	○ ❍ ❍ ❍

FBISE model paper | Section A Q15 | 1 mark

15.	Which of the following statements is true about a photon?	A photon has zero mass and zero momentum.	A photon has finite mass and a finite value of momentum.	A photon has zero mass but finite value of momentum.	A photon has finite mass but zero momentum.	○ ❍ ❍ ❍

FBISE model paper | Section A Q17 | 1 mark

17.	Energy of gamma photon having a wavelength of $1A^{o}$ is:	$12.4x10^{3}$ eV	$12.4x10^{4}$ eV	$12.4x10^{-3}$ eV	$12.4x10^{-4}$ eV	○ ❍ ❍ ❍

Q. 2	Questions	Marks		Questions	Mark
(i)	Calculate the orbital speed of satellite orbiting the Earth at an altitude equal to Earth's radius.	03	**OR**	A body with mass 800 g attached to a spring, vibrates with amplitude 30 cm. The restoring force is 60 N when the displacement is 0.30 m. Find out its (a) angular frequency (b) velocity and acceleration at x = 12 cm.	1.5 +1.5
(ii)	Explain how pressure is exerted by the movement of gas molecules?	03	**OR**	Write any three conditions for observing interference fringes?	01+01 +01
(iii)	Write three examples of resonance from everyday life.	01+01 +01	**OR**	List three uses of capacitors in household appliances.	01+01 +01
(iv)	The fringe spacing between the central maxima and 1st minima is 2 mm. If a light of 500 mm is used then find the separation between the slits. (The distance between the slit and screen is 1 m).	03	**OR**	A network of five capacitors, each of capacitance C is connected to a 100 V supply, as shown in below figure. Determine the equivalent capacitance of the network. 	03
(v)	Define mutual inductance. Write its formula. Also define its unit.	01+01 +01	**OR**	Define gravitational field strength. Also write its formula and define its unit.	01+01 +01
(vi)	When electrons are accelerated through a potential difference of 10^5 volts in an X–ray tube. Calculate the minimum wavelength produced.	03	**OR**	AC voltage across a 0.5 μF capacitor is $16\sin(2\times10^3 t)$ V. Find its capacitive reactance.	03
(vii)	Define (a) cryosphere (b) lithosphere.	1.5 +1.5	**OR**	Give three uses of X-rays.	01+01 +01
(viii)	What are the conditions required for pair production to occur?	03	**OR**	What is climate inertia? Give an example of climate inertia in the Earth's climate system.	01 +0
(ix)	What is the application of piezo-electric effect in medical science?	03	**OR**	Explain how electron microscopes achieve very high resolution?	03

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(i)	Calculate the orbital speed of satellite orbiting the Earth at an altitude equal to Earth's radius.	03
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(vii)	Define (a) cryosphere (b) lithosphere.	1.5 +1.5
(viii)	What are the conditions required for pair production to occur?	03

	process.	
OR	What is the photoelectric effect? How did Einstein explain it using the quantum theory of electromagnetic radiation? Derive Einstein's photoelectric equation.	01+02 +03
	Describe the function of the	

First Annual 2025 | Section B Q2(ii) | 3 marks

	space.	
(ii)	Write three postulates of Bohr's atomic model.	03

First Annual 2025 | Section B Q2(iii) OR | 3 marks

If an electron and a proton have the same de-Broglie wavelength, which particle has greater speed? Justify.	1+2

First Annual 2025 | Section B Q2(iv) | 3 marks

(iv)	When is Compton shift maximum? Prove it.	**03**

First Annual 2025 | Section B Q2(viii) | 3 marks

(viii)	Calculate the longest and the shortest wavelengths for Paschen series.	**03**

First Annual 2025 | Section C Q5 OR | 6 marks

	What are X-rays? How inner shell transitions in heavy elements result into emission of characteristic X-rays? Explain and draw diagrams.	1+3 +2

First Annual 2025 | Section B Q2(iv) | 3 marks

	at resonance condition?	
(iv)	Will higher frequency light eject a higher number of electrons than low frequency light? Justify.	1+2
(v)	An electron and a proton are projected with same	

First Annual 2025 | Section B Q2(ix) OR | 3 marks

OR	Differentiate between conductors and semi-conductors on the basis of energy band theory.	03

First Annual 2025 | Section B Q2(vi) | 3 marks

(vi)	Calculate longest and shortest wavelengths for Paschen series.	1.5+ 1.5
(vii)	What is self-inductance? Write its SI unit. Enlist two	

First Annual 2025 | Section B Q2(x) OR | 3 marks

OR	Differentiate between **N-type semi-conductors** and **P-type semi-conductors**.	03

First Annual 2025 | Section B Q2(xiii) | 3 marks

	at a distance of **25cm** from the centre of sphere?	
(xiii)	What is population inversion? Why can LASER action **NOT** occur without population inversion between atomic levels?	**1.5+ 1.5**
(xiv)	Briefly explain the magnetic force acting on a	

Q.4	Differentiate spontaneous emission and stimulated emission. Describe the working of He-Ne Laser with diagram.	**3+3 +1**	**OR**	Draw symbol diagra Describe the operatic schematic diagram.
Q.5	What is meant by motional emf? Compute emf			A coil having a resis

First Annual 2025 | Section C Q6 | 6 marks

Q.6	What is meant by photoelectric effect? How did Einstein explain photoelectric effect on the basis of Plank's quantum theory?	**2+4**

2HAJ 25

Second Annual 2025 | Section A Q13 | 1 mark

The photoelectric effect provides evidence for:	Dual nature of light	Diffraction of light	Particle nature of light	Wave nature of light

According to Einstein's equation of

Second Annual 2025 | Section A Q14 | 1 mark

14.	According to Einstein's equation of photoelectric effect, the maximum kinetic energy of emitted electrons depends upon:	Number of photons	Velocity of light	Frequency of light	Intensity of light

Second Annual 2025 | Section A Q16 | 1 mark

16.	Which of the following series of hydrogen spectra lies in the visible region of the spectrum?	Paschen series	Brackett series	Lyman series	Balmer series

Second Annual 2025 | Section B Q2(iii) OR | 3 marks

OR	In the Rydberg formula $\frac{1}{\lambda_R} = R_H\left[\frac{1}{p^2} - \frac{1}{n^2}\right]$ Determine the values of 'p' and 'n' for Lyman and Paschen series for Hydrogen atom.	1.5 + 1.5

Second Annual 2025 | Section B Q2(vi) OR | 3 marks

Briefly explain the phenomenon of photoelectric effect with Einstein's equation.

Second Annual 2025 | Section B Q2(xiii) OR | 3 marks

Discuss de Broglie's hypothesis of matter waves.	

Second Annual 2025 | Section C Q4 OR | 7 marks

magnetic field in a simple way.	
Using Bohr's postulates, derive the expression for energy levels of hydrogen atom.	07

First Annual 2026 | Section B Q2(vii) | 3 marks

climate system.			structure? Explain briefly.	
What is meant by pair production? Also calculate the minimum energy required in this process.	1+2	OR	Briefly explain the two types of climate inertia.	1.5 + 1.5
What is meant by Piezoelectric effect? Enlist its			What is the role of electron wavelength in	

First Annual 2026 | Section C Q5 OR | 6 marks

	point charge. Make sketch.	
OR	What is meant by photo electric effect? Why no emission of electrons occurs below threshold frequency? Discuss the effects of intensity of light on photoelectric current with graph.	1+2 +3
	a What is meant by enrichment? Why Uranium fuel	

First Annual 2026 | Section C Q5 OR | 6 marks

				3C of charge and potential different of 10V.	
Q.5	Explain the working of a bridge rectifier using four diodes. Also draw the circuit diagram.	**4+2**	**OR**	What is photoelectric effect? Explain work function of metal and Einstein photo electric equation. What is the effect of frequency of radiation on K.E of photoelectrons?	**1+3 +2**
Q.6	a What is meant by luminosity of a star? Write the			a Derive and show that the decay of nucleus is	

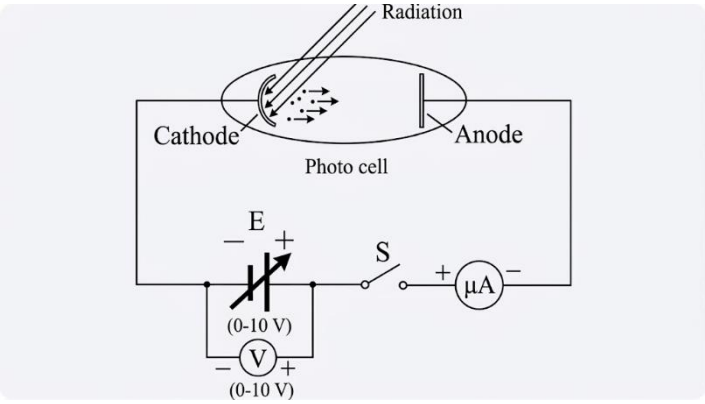
FBISE model paper | Section A Q17 | 1 mark

				treatment.	
17.	Energy of gamma photon having a wavelength of 1A^o is:	$12.4x10^3$ eV	$12.4x10^4$ eV	$12.4x10^{-3}$ eV	$12.4x10^{-4}$ eV

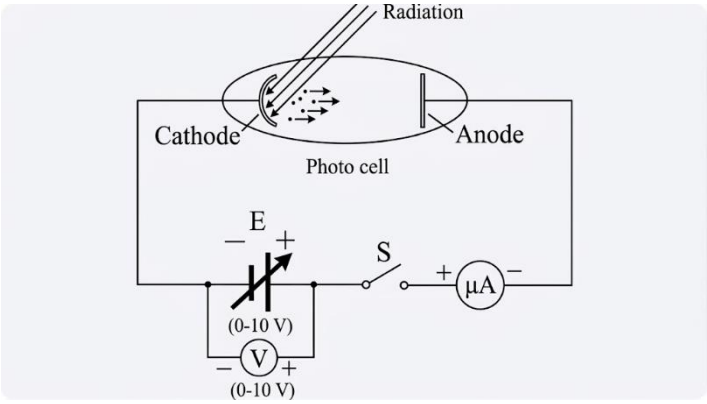
	in the explanation).	
OR	What is photoelectric effect? Explain in detail.	01+06

6 To study variation of electric current with intensity of light using photoelectric apparatus.

A schematic diagram is shown below to study the variation in electric current with the intensity of light using photocell. Data is recorded and mentioned in the table where "d" is the distance of a light source from the photocell and "I" is the current flowing in the



circuit.



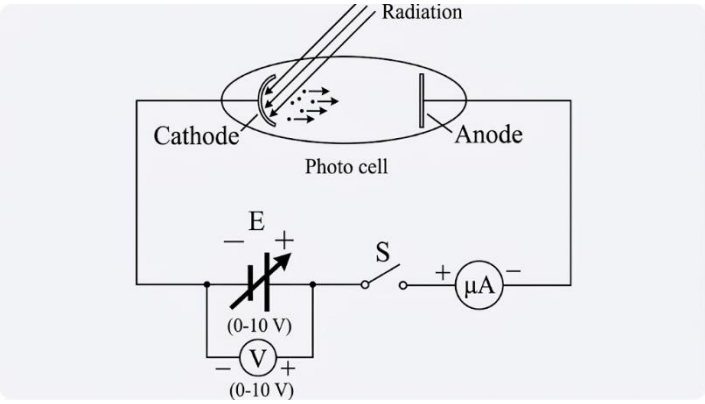
rcuit.

i. Copy and complete the table (02)

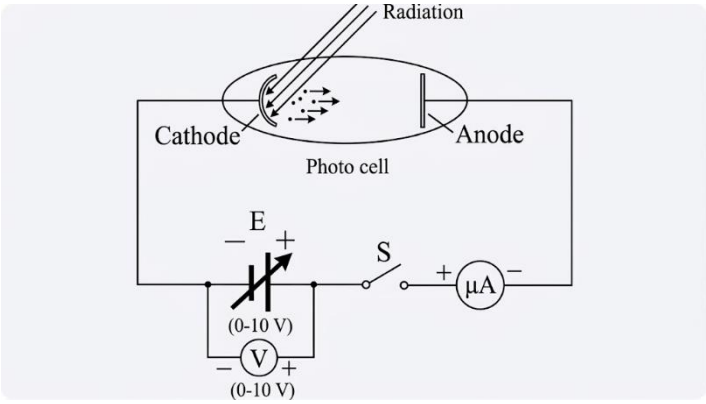
No. of observations	Distance d (cm)	Current I (μA)	Intensity of light $I \alpha \frac{1}{d^2}$ (cm^{-2})
1	60	15	
2	50	25	
3	40	45	

6 To study variation of electric current with intensity of light using photoelectric apparatus.

A schematic diagram is shown below to study the variation in electric current with the intensity of light using photocell. Data is recorded and mentioned in the table where "d" is the distance of a light source from the photocell and "I" is the current flowing in the



circuit.



cuit.

i. Copy and complete the table (02)

No. of observations	Distance d (cm)	Current I (μA)	Intensity of light $I \alpha \frac{1}{d^2}$ (cm^{-2})
1	60	15	
2	50	25	
3	40	45	
4	30	70	

ii. Plot the graph between current and intensity of light according to data provided. (03)

First Annual 2026 | Section B Q2(i) | 3 marks

(i)	What is electron volt (eV)? Derive its relation with SI unit of energy.	1+2
(ii)	Find electric field at a distance of 30 cm from a	

First Annual 2026 | Section B Q2(i) OR | 3 marks

OR	How can we calculate kinetic energy of photoelectrons?
	What is Wein's displacement law? Explain briefly.

First Annual 2026 | Section C Q4 | 7 marks

Q.4	What is photoelectric effect? Why classical Physics fails to explain photoelectric effect? Derive Einstein photoelectric equation.	2+2 +3

FBISE model paper | Section A Q13 | 1 mark

(13) The maximum kinetic energy of emitted photoelectrons, from different metal surfaces, depends upon:

A. Intensity of incident light only ◯
B. Frequency of the incident light only ◯
C. Nature of metal surface ◯
D. Both frequency of incident light and nature of metal surface ◯

FBISE model paper | Section A Q14 | 1 mark

(14) The rest mass of photon is:

A. Infinite ◯ B. Zero
C. 1.6×10^{-27} kg ◯ D. 3×10^{8} kg

(15) The type of spectra produced by atoms is:

FBISE model paper | Section A Q15 | 1 mark

(15) The type of spectra produced by atoms is:

A. Continuous spectra ◯ B. Band spectra

C. Line spectra ◯ D. Braking radiation spectra

(16) Strong nuclear force exists between:

FBISE model paper | Section B Q2(i) | 3 marks

Q.2 Attempt all parts from the following. All parts carry equal marks.

i. Define electron volt (eV). Derive its relation with SI unit of energy?

FBISE model paper | Section B Q2(xi) | 3 marks

A beam of orange light and a beam of green light have same energies. Which of these light beams contains greater number of photons?

FBISE model paper | Section B Q2(xi) OR | 3 marks

OR

Under what condition Compton shift in wavelength is maximum? Elaborate your answer.

FBISE model paper | Section B Q2(xii) OR | 3 marks

OR

What is the wavelength of the second line of Paschen series? Calculate it.

FBISE model paper | Section B Q2(xii) | 3 marks

answer:

What is the de-Broglie wave-length of an electron with 1200keV kinetic energy?

OR

FBISE model paper | Section C Q3 OR | 7 marks

OR

Using the Bohr's atomic model, show that energy of the orbit in H-atom is quantized.

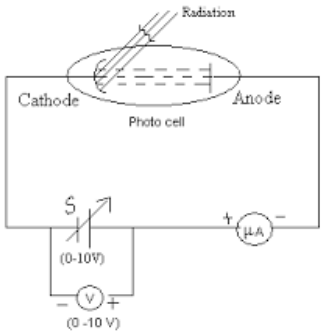
properties. (1+1+4)

Q.6 What is photoelectric effect? What were its main features which could not be explained by classical physics? Derive photoelectric effect equation using Einstein photon theory. (1+2+3)

OR

Q.6. To study variation of electric current with intensity of light using photoelectric apparatus.

A schematic diagram is shown below to study the variation in electric current with the intensity of light using photocell. Data is recorded and mentioned in the table where "d" is the distance of a light source from the photocell and "I" is the current flowing in the circuit.

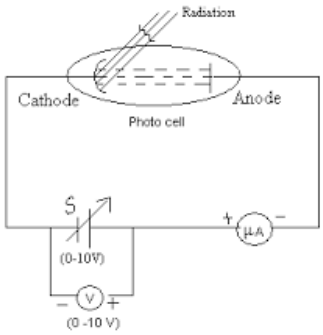


i. Copy and complete the table (02)

No. of obs	Distance (d) (cm)	Current (I) (μA)	Intensity of light (---)
1	60	15	
2	50	25	
3	40	55	
4	30	70	
5	20	115	
6	10	240	

Q.6. To study variation of electric current with intensity of light using photoelectric apparatus.

A schematic diagram is shown below to study the variation in electric current with the intensity of light using photocell. Data is recorded and mentioned in the table where "d" is the distance of a light source from the photocell and "I" is the current flowing in the circuit.



No. of obs	Distance (d) (cm)	Current (I) (μA)	Intensity of light (---)
1	60	15	
2	50	25	
3	40	55	
4	30	70	
5	20	115	
6	10	240	

ii. Plot the graph between current and intensity of light. (02)

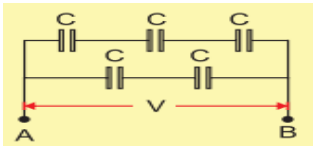
APOLLO

Nuclear Physics

Domain F: Modern Physics

13.	The process by which a heavy nucleus splits into two smaller nuclei is called:	Fission	Fusion	Alpha decay	Beta decay	○ ○ ○ ○

Q. 2	Questions	Marks
(i)	Calculate the orbital speed of satellite orbiting the Earth at an altitude equal to Earth's radius.	03
(ii)	Explain how pressure is exerted by the movement of gas molecules?	03
(iii)	Write three examples of resonance from everyday life.	01+01 +01
(iv)	The fringe spacing between the central maxima and 1^{st} minima is 2 mm. If a light of 500 mm is used then find the separation between the slits. (The distance between the slit and screen is 1 m).	03
(v)	Define mutual inductance. Write its formula. Also define its unit.	01+01 +01
(vi)	When electrons are accelerated through a potential difference of 10^5 volts in an X–ray tube. Calculate the minimum wavelength produced.	03
(vii)	Define (a) cryosphere (b) lithosphere.	1.5 +1.5
(viii)	What are the conditions required for pair production to occur?	03
(ix)	What is the application of piezo-electric effect in medical science? Briefly explain	03
(x)	Why is the binding energy per nucleon higher in nuclear fusion than in nuclear fission?	03

Q. 2	Questions	Marks		Questions	Mark
(i)	Calculate the orbital speed of satellite orbiting the Earth at an altitude equal to Earth's radius.	03	**OR**	A body with mass 800 g attached to a spring, vibrates with amplitude 30 cm. The restoring force is 60 N when the displacement is 0.30 m. Find out its (a) angular frequency (b) velocity and acceleration at x = 12 cm.	1.5 +1.5
(ii)	Explain how pressure is exerted by the movement of gas molecules?	03	**OR**	Write any three conditions for observing interference fringes?	01+01 +01
(iii)	Write three examples of resonance from everyday life.	01+01 +01	**OR**	List three uses of capacitors in household appliances.	01+01 +01
(iv)	The fringe spacing between the central maxima and 1st minima is 2 mm. If a light of 500 mm is used then find the separation between the slits. (The distance between the slit and screen is 1 m).	03	**OR**	A network of five capacitors, each of capacitance C is connected to a 100 V supply, as shown in below figure. Determine the equivalent capacitance of the network. 	03
(v)	Define mutual inductance. Write its formula. Also define its unit.	01+01 +01	**OR**	Define gravitational field strength. Also write its formula and define its unit.	01+01 +01
(vi)	When electrons are accelerated through a potential difference of 10^5 volts in an X–ray tube. Calculate the minimum wavelength produced.	03	**OR**	AC voltage across a 0.5 μF capacitor is $16\sin(2\times10^3 t)$ V. Find its capacitive reactance.	03
(vii)	Define (a) cryosphere (b) lithosphere.	1.5 +1.5	**OR**	Give three uses of X-rays.	01+01 +01
(viii)	What are the conditions required for pair production to occur?	03	**OR**	What is climate inertia? Give an example of climate inertia in the Earth's climate system.	01 +0
(ix)	What is the application of piezo-electric effect in medical science? Briefly explain	03	**OR**	Explain how electron microscopes achieve very high resolution?	03
(x)	Why is the binding energy per nucleon higher in nuclear fusion than in nuclear fission?	03	**OR**	Explain the role of a single capacitor in output of full wave rectifier circuit.	03
(xi)	Explain briefly that how global climate is determined by energy transfer from the Sun?	03	**OR**	What is Stefan-Boltzmann law? Explain briefly.	03
(xii)	Explain why g is approximately constant for small changes in height near the earth's surface.	03	**OR**	The half-life of a radioactive element is 1200 years. Explain why it still exists on Earth after billions of years.	03

		photochemical equation.	
03 + 03	**OR**	Describe the function of the following main components of a water moderated nuclear power reactor a. core, b. fuel rods c. moderator d. heat exchange	1.5 + 1.5 + 1.5 + 1.5

FBISE model paper | Section C Q6 | 6 marks

Q.6	What is the annihilation of matter? Give an example. Explain how annihilation reactions satisfy the conservation of mass–energy, charge, and momentum.	03 + 03	**OR**	Describe the function of the following main components c a water moderated nuclear power reactor a. core,

First Annual 2025 | Section B Q2(i) OR | 3 marks

Briefly illustrate the variation of binding energy per nucleon with the mass number. Also draw the graph.	**1+2**

First Annual 2025 | Section B Q2(xi) | 3 marks

(xi)	Briefly explain the role of moderators and control rods in nuclear reactor.	**1.5+ 1.5**

First Annual 2025 | Section B Q2(xiii) OR | 3 marks

What is Geiger-Muller counter? Briefly describe its working.	**1+2**

First Annual 2025 | Section B Q2(vi) OR | 3 marks

OR	What happens to the atomic number and mass number of a nucleus that emits γ–ray photons?	**03**
	According to Stephen Boltzmann law what will be the	

First Annual 2025 | Section B Q2(x) | 3 marks

	current? What is the frequency(f) of AC supply?	
(x)	If a person swallows an α-particle and a β-particle, which would be more dangerous? Justify.	**03**

First Annual 2025 | Section C Q3 OR | 7 marks

OR	What is mass spectrograph? Show that the radius of circular path of isotopes depends on its mass by using labelled diagram.	**2+5**

Second Annual 2025 | Section A Q1 | 1 mark

Which nuclear reaction is the source of energy in stars?	Chain reaction	Radioactivity	Fusion	Fission

Second Annual 2025 | Section A Q2 | 1 mark

The energy released in nuclear reactions is given by:	$Q = mC\Delta T$	$E = \Delta mc^2$	$F = ma$	$V = IR$

Second Annual 2025 | Section A Q17 | 1 mark

The time required for half of a radioactive sample to decay is called:	Half-life	Decay constant	Mean life	Average life

Second Annual 2025 | Section B Q2(v) | 3 marks

(v)	Briefly explain the role of moderators and control rods in nuclear reactors.	1.5 + 1.5

Second Annual 2025 | Section B Q2(viii) OR | 3 marks

1.5 + 1.5	OR	Differentiate between nuclear fission and nuclear fusion reactions with examples.	1.5 + 1.5

Second Annual 2025 | Section B Q2(xiv) | 3 marks

	(Any three)				
(xiv)	Briefly explain Einstein's mass–energy relation and its nuclear applications.	2+1	OR	Briefly describe the following: a. Tensile stress b. Young's modulus	1.5 + 1.5

Second Annual 2025 | Section C Q6 OR | 6 marks

Explain the construction and working of a Geiger-muller counter.	06

First Annual 2026 | Section B Q2(ix) | 3 marks

How do control rods and moderator play an important role in the action of nuclear reactor?	1.5 + 1.5	OR	Draw labelled wave form and phasor diagram between applied voltage and current for pure inductor A.C.	2+1

First Annual 2026 | Section B Q2(xi) OR | 3 marks

	leads and why?	
OR	Briefly explain the terms: **a.** Mass Defect **b.** Binding Energy	1.5 + 1.5
	What is meant by light damping and heavy	

First Annual 2026 | Section C Q6(ab) OR | 6 marks

	photoelectric current with graph.
OR	a. What is meant by enrichment? Why Uranium fuel needs to enriched before use? b. Find decay constant and activity of an element if its 100 out of 700 nuclei decay in 5 min.

First Annual 2026 | Section B Q2(ix) | 3 marks

	medical technology.			than optical microscope? (Compare both.)	
(ix)	How is the variation of binding energy per nucleon an important factor in nuclear physics? (Discuss both high binding energy and low binding energy)	1.5 + 1.5	OR	An AC circuit consists of pure resistance of 20 Ω and is connected across AC supply of 220V, 50Hz. Calculate: a. Peak value of voltage. b. Peak value of current.	03
(x)	How does energy imbalance between equator and			How can Wien's displacement law be used to determine	

First Annual 2026 | Section B Q2(vii) | 3 marks

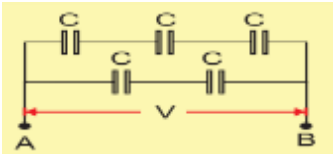
	climate balance.				
(vii)	Briefly describe pair annihilation. Also justify the conservation of energy and momentum in this process.	1+2	OR	How does ocean play a main role in climate inertia?	03
(viii)	Briefly discuss two applications of ultrasound in medical technology.	03	OR	Why does electron microscope have higher resolution than optical microscope? (Compare both.)	1.5 +1.5

First Annual 2026 | Section B Q2(xi) OR | 3 marks

	the temperature of a star? Also write its formula.	
OR	Briefly explain the function of control rods and moderators in nuclear reactor.	1.5+ 1.5
	What is meant by free oscillations? Also give its two	

				photoelectrons?
Q.6	**a.** What is meant by luminosity of a star? Write the relation between luminosity, radius and temperature. **b.** What are the relative luminosities of the objects A and B if T_A=100K, T_B = 200K, R_A = 10m and	**3+3**	**OR**	**a.** Derive and show that the decay of nucleus is exponential with time. **b.** If half-life of strontium (Sr. 91) is 9.70 hours. Find its decay constant.

Q. 2	Questions	Marks
(i)	Calculate the orbital speed of satellite orbiting the Earth at an altitude equal to Earth's radius.	03
(ii)	Explain how pressure is exerted by the movement of gas molecules?	03
(iii)	Write three examples of resonance from everyday life.	03
(iv)	The fringe spacing between the central maxima and 1^{st} minima is 2 mm. If a light of 500 mm is used then find the separation between the slits. The distance between the slit and screen is 1 m.	03
(v)	Define mutual inductance. Also write its unit.	03
(vi)	When electrons are accelerated through a potential difference of 10^5 volts in an X–ray tube. Calculate the minimum wavelength produced.	03
(vii)	Define (a) cryosphere (b) lithosphere.	03
(viii)	What are the conditions required for pair production to occur?	03
(ix)	What is the application of piezo-electric effect in medical science?	03
(x)	Sketch the variation of binding energy per nucleon with nucleon number.	03

Q. 2	Questions	Marks		Questions	Mark
(i)	Calculate the orbital speed of satellite orbiting the Earth at an altitude equal to Earth's radius.	03	**OR**	A body with mass 800 g attached to a spring, vibrates with amplitude 30 cm. The restoring force is 60 N when the displacement is 0.30 m. Find out its (a) angular frequency (b) velocity and acceleration at x = 12 cm.	03
(ii)	Explain how pressure is exerted by the movement of gas molecules?	03	**OR**	Write any three conditions for observing interference fringes?	03
(iii)	Write three examples of resonance from everyday life.	03	**OR**	List the use of capacitors in various household appliances.	03
(iv)	The fringe spacing between the central maxima and 1st minima is 2 mm. If a light of 500 mm is used then find the separation between the slits. The distance between the slit and screen is 1 m.	03	**OR**	A network of five capacitors of capacitance C is connected to a 100 V supply, as shown in below figure. Determine the equivalent capacitance of the network. 	03
(v)	Define mutual inductance. Also write its unit.	03	**OR**	Define gravitational field strength. Also write its formula and unit.	03
(vi)	When electrons are accelerated through a potential difference of 10^5 volts in an X–ray tube. Calculate the minimum wavelength produced.	03	**OR**	A.C voltage across a 0.5 μF capacitor is $16\sin(2\times10^3 t)$ V. Find the capacitive reactance.	03
(vii)	Define (a) cryosphere (b) lithosphere.	03	**OR**	What is the main purpose of X-rays?	03
(viii)	What are the conditions required for pair production to occur?	03	**OR**	What is climate inertia?	03
(ix)	What is the application of piezo-electric effect in medical science?	03	**OR**	Explain how electron microscopes achieve very high resolution?	03
(x)	Sketch the variation of binding energy per nucleon with nucleon number.	03	**OR**	Explain the role of a single capacitor in output of full wave rectifier circuit.	03
(xi)	Explain briefly that how global climate is determined by energy transfer from the Sun?	03	**OR**	What is Stefan-Boltzmann law? Explain briefly.	03
(xii)	Explain why g is approximately constant for small changes in height	03	**OR**	Describe the function of the control rods in reactor.	03

FBISE model paper | Section C Q6 OR | 6 marks

03 + 03	**OR**	Explain half-life with examples.	06

First Annual 2026 | Section B Q2(vi) OR | 3 marks

OR	How can nuclear reactor initiate a controlled fission reaction?
	Find the relation of cyclotron frequency of charged

FBISE model paper | Section A Q17 | 1 mark

(17) The half-life of a radioactive element which has only $\frac{1}{32}$ of its original mass left after elapsed of 60 days is:

A. 30 days ◯ B. 20 days ◯

C. 15 days ◯ D. 12 days ◯

FBISE model paper | Section B Q2(iii) OR | 3 marks

OR

What will be the change in atomic number and atomic mass of an element X_z^A, when two alpha particles are emitted from its nucleus?

FBISE model paper | Section B Q2(xiv) | 3 marks

Find the Binding energy of α particle. (Mass of proton = 1.007276 u; Mass ofneutron = 1.008665 u; Mass of α particle = 4.002603 u).

APOLLO

Cosmology

Domain F: Modern Physics

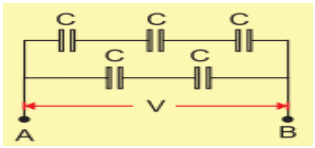
FBISE model paper | Section A Q3 | 1 mark

Q1. Fill the relevant bubble against each question according to curriculum. Each part carries one mark.

Sr #	Question	(A)	(B)	(C)	(D)	(A)	(B
1.	The distance between the two identical balls is R. If the distance is reduced to half of R then the gravitational force will become:	half	quarter	double	four time	○	○
2.	As we go further away from the surface of the Earth, the value of 'g':	remains same	increases	decreases	may increase or decrease depending on mass.	○	○
3.	SI unit of Luminosity is	watts	cd/m^2	joules	$cd.m^2$	○	○

FBISE model paper | Section A Q14 | 1 mark

14.	Which law gives the relationship between brightness and distance from the source	Law of brightness	Direct Square Law of brightness	Inverse Square Law of brightness	Inverse Square Law of light	○	○	○	○

Q. 2	Questions	Marks		Questions	Mark
(i)	Calculate the orbital speed of satellite orbiting the Earth at an altitude equal to Earth's radius.	03	**OR**	A body with mass 800 g attached to a spring, vibrates with amplitude 30 cm. The restoring force is 60 N when the displacement is 0.30 m. Find out its (a) angular frequency (b) velocity and acceleration at x = 12 cm.	1.5 +1.5
(ii)	Explain how pressure is exerted by the movement of gas molecules?	03	**OR**	Write any three conditions for observing interference fringes?	01+01 +01
(iii)	Write three examples of resonance from everyday life.	01+01 +01	**OR**	List three uses of capacitors in household appliances.	01+01 +01
(iv)	The fringe spacing between the central maxima and 1st minima is 2 mm. If a light of 500 mm is used then find the separation between the slits. (The distance between the slit and screen is 1 m).	03	**OR**	A network of five capacitors, each of capacitance C is connected to a 100 V supply, as shown in below figure. Determine the equivalent capacitance of the network. 	03
(v)	Define mutual inductance. Write its formula. Also define its unit.	01+01 +01	**OR**	Define gravitational field strength. Also write its formula and define its unit.	01+01 +01
(vi)	When electrons are accelerated through a potential difference of 10^5 volts in an X–ray tube. Calculate the minimum wavelength produced.	03	**OR**	AC voltage across a 0.5 μF capacitor is $16\sin(2\times10^3 t)$ V. Find its capacitive reactance.	03
(vii)	Define (a) cryosphere (b) lithosphere.	1.5 +1.5	**OR**	Give three uses of X-rays.	01+01 +01
(viii)	What are the conditions required for pair production to occur?	03	**OR**	What is climate inertia? Give an example of climate inertia in the Earth's climate system.	01 +0
(ix)	What is the application of piezo-electric effect in medical science? Briefly explain	03	**OR**	Explain how electron microscopes achieve very high resolution?	03
(x)	Why is the binding energy per nucleon higher in nuclear fusion than in nuclear fission?	03	**OR**	Explain the role of a single capacitor in output of full wave rectifier circuit.	03
(xi)	Explain briefly that how global climate is determined by energy	03	**OR**	What is Stefan-Boltzmann law? Explain briefly.	03

First Annual 2025 | Section C Q3 | 7 marks

Q.3	Explain the concept of Black body radiation with the help of examples. Describe how energy is distributed over the wavelength range for different values of source temperature. Also draw its curves.	**2+4 +1**

First Annual 2025 | Section B Q2(vii) OR | 3 marks

	of a nucleus that emits γ–ray photons?	
OR	According to Stephen-Boltmann law what will be the effect on the intensity of radiation emitted by black body when its absolute temperature is doubled?	**03**
	In an RC Circuit, will the current lag or lead the	

	Inductor A.C.
OR	To which idea does a red-shift exhibited by a star leads and why?
	Dr. Saeed Ahmad

	expression for the impedance of RL series circuit.			photoelectric current with graph.	
Q.6	a. What is meant by Radiant Flux Intensity? How it follows inverse square law? b. A star has a known luminosity of $9.7\times10^{27}W$. Observations of the star show that the radiant flux intensity of light received on Earth from the star is $114nWm^{-2}$. Determine the distance of the star from Earth.	3+3	OR	a. What is meant by enrichment? Why Uranium fuel needs to enriched before use? b. Find decay constant and activity of an element if its 100 out of 700 nuclei decay in 5 min.	(2+1) +3

		b. Peak value of current.
03	OR	How can Wien's displacement law be used to determine the temperature of a star? Also write its formula.
03	OR	Briefly explain the function of control rods and moderators in nuclear reactor.

Q.6	a. What is meant by luminosity of a star? Write the relation between luminosity, radius and temperature. b. What are the relative luminosities of the objects A and B if T_A=100K, T_B = 200K, R_A = 10m and R_B=5m	3+3	OR	a. b.

FBISE model paper | Section C Q6 | 6 marks

	~~sketch of a diagram.~~			
Q.6	Define and explain the following terms: (a) luminosity (b) Annihilation reaction	03 + 03	**OR**	Explain half-life with examples.

First Annual 2026 | Section B Q2(ii) OR | 3 marks

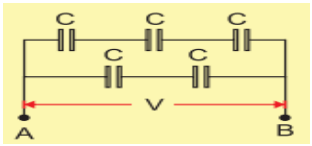
	photoelectrons?
OR	What is Wein's displacement law? Explain briefly.

APOLLO

Earth Climate

Domain F: Modern Physics

Q. 2	Questions	Marks
(i)	Calculate the orbital speed of satellite orbiting the Earth at an altitude equal to Earth's radius.	03
(ii)	Explain how pressure is exerted by the movement of gas molecules?	03
(iii)	Write three examples of resonance from everyday life.	01+01 +01
(iv)	The fringe spacing between the central maxima and 1^{st} minima is 2 mm. If a light of 500 mm is used then find the separation between the slits. (The distance between the slit and screen is 1 m).	03
(v)	Define mutual inductance. Write its formula. Also define its unit.	01+01 +01
(vi)	When electrons are accelerated through a potential difference of 10^5 volts in an X–ray tube. Calculate the minimum wavelength produced.	03
(vii)	Define (a) cryosphere (b) lithosphere.	1.5 +1.5

Q. 2	Questions	Marks		Questions	Marks
(i)	Calculate the orbital speed of satellite orbiting the Earth at an altitude equal to Earth's radius.	03	**OR**	A body with mass 800 g attached to a spring, vibrates with amplitude 30 cm. The restoring force is 60 N when the displacement is 0.30 m. Find out its (a) angular frequency (b) velocity and acceleration at x = 12 cm.	1.5 +1.5
(ii)	Explain how pressure is exerted by the movement of gas molecules?	03	**OR**	Write any three conditions for observing interference fringes?	01+01 +01
(iii)	Write three examples of resonance from everyday life.	01+01 +01	**OR**	List three uses of capacitors in household appliances.	01+01 +01
(iv)	The fringe spacing between the central maxima and 1st minima is 2 mm. If a light of 500 mm is used then find the separation between the slits. (The distance between the slit and screen is 1 m).	03	**OR**	A network of five capacitors, each of capacitance C is connected to a 100 V supply, as shown in below figure. Determine the equivalent capacitance of the network. 	03
(v)	Define mutual inductance. Write its formula. Also define its unit.	01+01 +01	**OR**	Define gravitational field strength. Also write its formula and define its unit.	01+01 +01
(vi)	When electrons are accelerated through a potential difference of 10^5 volts in an X–ray tube. Calculate the minimum wavelength produced.	03	**OR**	AC voltage across a 0.5 μF capacitor is $16\sin(2\times10^3 t)$ V. Find its capacitive reactance.	03
(vii)	Define (a) cryosphere (b) lithosphere.	1.5 +1.5	**OR**	Give three uses of X-rays.	01+01 +01
(viii)	What are the conditions required for pair production to occur?	03	**OR**	What is climate inertia? Give an example of climate inertia in the Earth's climate system.	01 +02

Q. 2	Questions	Mark
(i)	Calculate the orbital speed of satellite orbiting the Earth at an altitude equal to Earth's radius.	03
(ii)	Explain how pressure is exerted by the movement of gas molecules?	03
(iii)	Write three examples of resonance from everyday life.	01+01 +01
(iv)	The fringe spacing between the central maxima and 1^{st} minima is 2 mm. If a light of 500 mm is used then find the separation between the slits. (The distance between the slit and screen is 1 m).	03
(v)	Define mutual inductance. Write its formula. Also define its unit.	01+01 +01
(vi)	When electrons are accelerated through a potential difference of 10^5 volts in an X–ray tube. Calculate the minimum wavelength produced.	03
(vii)	Define (a) cryosphere (b) lithosphere.	1.5 +1.5
(viii)	What are the conditions required for pair production to occur?	03
(ix)	What is the application of piezo-electric effect in medical science? Briefly explain	03
(x)	Why is the binding energy per nucleon higher in nuclear fusion than in nuclear fission?	03
(xi)	Explain briefly that how global climate is determined by energy transfer from the Sun?	03

First Annual 2026 | Section B Q2(vi) | 3 marks

Briefly explain the significance of wind pattern on climate system.	1x3	OR	How are X-rays used in imaging internal body structure? Explain briefly.	03
What is meant by pair production? Also calculate			Briefly explain the two types of climate inertia	1.5

First Annual 2026 | Section B Q2(vii) OR | 3 marks

Briefly explain the two types of climate inertia.	1.5 +

First Annual 2026 | Section B Q2(x) | 3 marks

Why does the equatorial region receive more energy than polar regions?	03	OR	To which idea does a red-shift exhibited by a star leads and why?	1+2
Calculate root mean square speed of oxygen			Briefly explain the terms:	1.5

First Annual 2026 | Section B Q2(vi) | 3 marks

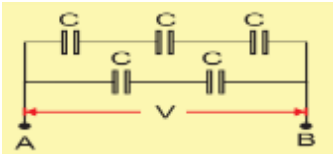
(vi)	Explain the role of atmosphere in maintaining climate balance.	03	OR	What is meant by contrast in X-ray imaging?	03
(vii)	Briefly describe pair annihilation. Also justify the			How does ocean play a main role in climate inertia?	

First Annual 2026 | Section B Q2(vii) OR | 3 marks

1+2	OR	How does ocean play a main role in climate inertia?	03
03	OR	Why does electron microscope have higher resolution than optical microscope? (Compare both.)	1.5 +1.5

First Annual 2026 | Section B Q2(x) | 3 marks

	energy)			b. Peak value of current.	
(x)	How does energy imbalance between equator and poles affect earth climate?	03	OR	How can Wien's displacement law be used to determine the temperature of a star? Also write its formula.	2+1
(xi)	Why the value of 'g' does not change significantly near the Earth's surface? (Show mathematically)	03	OR	Briefly explain the function of control rods and moderators in nuclear reactor.	1.5+ 1.5

Q. 2	Questions	Marks		Questions	Marks
(i)	Calculate the orbital speed of satellite orbiting the Earth at an altitude equal to Earth's radius.	03	**OR**	A body with mass 800 g attached to a spring, vibrates with amplitude 30 cm. The restoring force is 60 N when the displacement is 0.30 m. Find out its (a) angular frequency (b) velocity and acceleration at x = 12 cm.	03
(ii)	Explain how pressure is exerted by the movement of gas molecules?	03	**OR**	Write any three conditions for observing interference fringes?	03
(iii)	Write three examples of resonance from everyday life.	03	**OR**	List the use of capacitors in various household appliances.	03
(iv)	The fringe spacing between the central maxima and 1st minima is 2 mm. If a light of 500 mm is used then find the separation between the slits. The distance between the slit and screen is 1 m.	03	**OR**	A network of five capacitors of capacitance C is connected to a 100 V supply, as shown in below figure. Determine the equivalent capacitance of the network. 	03
(v)	Define mutual inductance. Also write its unit.	03	**OR**	Define gravitational field strength. Also write its formula and unit.	03
(vi)	When electrons are accelerated through a potential difference of 10^5 volts in an X–ray tube. Calculate the minimum wavelength produced.	03	**OR**	A.C voltage across a 0.5 μF capacitor is $16\sin(2\times10^3 t)$ V. Find the capacitive reactance.	03
(vii)	Define (a) cryosphere (b) lithosphere.	03	**OR**	What is the main purpose of X-rays?	03
(viii)	What are the conditions required for	03	**OR**	What is climate inertia?	03

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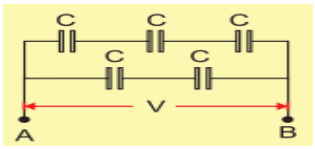
Medical Imaging

Domain F: Modern Physics

16.	The drawback of conducting a medical imaging test is:	Early detection of problem.	Accurate diagnosis.	Contribution to choose of effective treatment.	Exposure to radiation.	○ ○ ○ ○

Q. 2	Questions	Mark
(i)	Calculate the orbital speed of satellite orbiting the Earth at an altitude equal to Earth's radius.	03
(ii)	Explain how pressure is exerted by the movement of gas molecules?	03
(iii)	Write three examples of resonance from everyday life.	01+01 +01
(iv)	The fringe spacing between the central maxima and 1^{st} minima is 2 mm. If a light of 500 mm is used then find the separation between the slits. (The distance between the slit and screen is 1 m).	03
(v)	Define mutual inductance. Write its formula. Also define its unit.	01+01 +01
(vi)	When electrons are accelerated through a potential difference of 10^5 volts in an X–ray tube. Calculate the minimum wavelength produced.	03
(vii)	Define (a) cryosphere (b) lithosphere.	1.5 +1.5
(viii)	What are the conditions required for pair production to occur?	03
(ix)	What is the application of piezo-electric effect in medical science? Briefly explain	03

Q. 2	Questions	Mark
(i)	Calculate the orbital speed of satellite orbiting the Earth at an altitude equal to Earth's radius.	03
(ii)	Explain how pressure is exerted by the movement of gas molecules?	03
(iii)	Write three examples of resonance from everyday life.	01+01 +01
(iv)	The fringe spacing between the central maxima and 1^{st} minima is 2 mm. If a light of 500 mm is used then find the separation between the slits. (The distance between the slit and screen is 1 m).	03
(v)	Define mutual inductance. Write its formula. Also define its unit.	01+01 +01
(vi)	When electrons are accelerated through a potential difference of 10^5 volts in an X–ray tube. Calculate the minimum wavelength produced.	03

Q. 2	Questions	Marks		Questions	Marks
(i)	Calculate the orbital speed of satellite orbiting the Earth at an altitude equal to Earth's radius.	03	**OR**	A body with mass 800 g attached to a spring, vibrates with amplitude 30 cm. The restoring force is 60 N when the displacement is 0.30 m. Find out its (a) angular frequency (b) velocity and acceleration at x = 12 cm.	1.5 +1.5
(ii)	Explain how pressure is exerted by the movement of gas molecules?	03	**OR**	Write any three conditions for observing interference fringes?	01+01 +01
(iii)	Write three examples of resonance from everyday life.	01+01 +01	**OR**	List three uses of capacitors in household appliances.	01+01 +01
(iv)	The fringe spacing between the central maxima and 1st minima is 2 mm. If a light of 500 mm is used then find the separation between the slits. (The distance between the slit and screen is 1 m).	03	**OR**	A network of five capacitors, each of capacitance C is connected to a 100 V supply, as shown in below figure. Determine the equivalent capacitance of the network. 	03
(v)	Define mutual inductance. Write its formula. Also define its unit.	01+01 +01	**OR**	Define gravitational field strength. Also write its formula and define its unit.	01+01 +01
(vi)	When electrons are accelerated through a potential difference of 10^5 volts in an X–ray tube. Calculate the minimum wavelength produced.	03	**OR**	AC voltage across a 0.5 μF capacitor is $16\sin(2\times10^3 t)$ V. Find its capacitive reactance.	03
(vii)	Define (a) cryosphere (b) lithosphere.	1.5 +1.5	**OR**	Give three uses of X-rays.	01+01 +01

First Annual 2026 | Section B Q2(vi) OR | 3 marks

	capacitive reactance? Show mathematically.				
	How are X-rays used in imaging internal body structure? Explain briefly.				
	Briefly explain the two types of climate inertia.				

First Annual 2026 | Section B Q2(viii) | 3 marks

(vii)	What is meant by pair production? Also calculate the minimum energy required in this process.	1+2	OR	Briefly explain the two types of climate inertia.	1.5 + 1.5
(viii)	What is meant by Piezoelectric effect? Enlist its two applications.	1+2	OR	What is the role of electron wavelength in achieving high resolution of electron microscope?	03
(ix)	How do control rods and moderator play an important role in the action of nuclear reactor?	1.5 +	OR	Draw labelled wave form and phasor diagram between applied voltage and current for pure	2+1

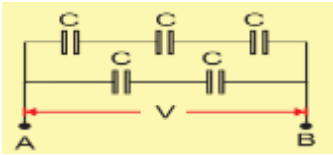
First Annual 2026 | Section B Q2(vi) OR | 3 marks

OR	What is meant by contrast in X-ray imaging?	03

FBISE model paper | Section A Q16 | 1 mark

16.	The drawback of conducting a medical imaging test is:	Early detection of problem.	Accurate diagnosis.	Contribution to choose of effective treatment.	Exposure to radiation.

Q. 2	Questions	Marks
(i)	Calculate the orbital speed of satellite orbiting the Earth at an altitude equal to Earth's radius.	03
(ii)	Explain how pressure is exerted by the movement of gas molecules?	03
(iii)	Write three examples of resonance from everyday life.	03
(iv)	The fringe spacing between the central maxima and 1^{st} minima is 2 mm. If a light of 500 mm is used then find the separation between the slits. The distance between the slit and screen is 1 m.	03
(v)	Define mutual inductance. Also write its unit.	03
(vi)	When electrons are accelerated through a potential difference of 10^5 volts in an X–ray tube. Calculate the minimum wavelength produced.	03
(vii)	Define (a) cryosphere (b) lithosphere.	03
(viii)	What are the conditions required for pair production to occur?	03
(ix)	What is the application of piezo-electric effect in medical science?	03

Q. 2	Questions	Marks	Questions		Marks
(i)	Calculate the orbital speed of satellite orbiting the Earth at an altitude equal to Earth's radius.	03	**OR**	A body with mass 800 g attached to a spring, vibrates with amplitude 30 cm. The restoring force is 60 N when the displacement is 0.30 m. Find out its (a) angular frequency (b) velocity and acceleration at x = 12 cm.	03
(ii)	Explain how pressure is exerted by the movement of gas molecules?	03	**OR**	Write any three conditions for observing interference fringes?	03
(iii)	Write three examples of resonance from everyday life.	03	**OR**	List the use of capacitors in various household appliances.	03
(iv)	The fringe spacing between the central maxima and 1st minima is 2 mm. If a light of 500 mm is used then find the separation between the slits. The distance between the slit and screen is 1 m.	03	**OR**	A network of five capacitors of capacitance C is connected to a 100 V supply, as shown in below figure. Determine the equivalent capacitance of the network. 	03
(v)	Define mutual inductance. Also write its unit.	03	**OR**	Define gravitational field strength. Also write its formula and unit.	03
(vi)	When electrons are accelerated through a potential difference of 10^5 volts in an X–ray tube. Calculate the minimum wavelength produced.	03	**OR**	A.C voltage across a 0.5 μF capacitor is $16\sin(2\times10^3 t)$ V. Find the capacitive reactance.	03
(vii)	Define (a) cryosphere (b)	03	**OR**	What is the main purpose of X-rays?	03

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Experimentation Skills

Domain N: Experimentation Skills

FBISE PBA model | Section A Q1(i) | 3 marks

This question is about the experiment "Compare the emf of cells using potentiometer.".

Q.1 This question is about the experiment "Compare the emf of cells using potentiometer.".

i. Draw circuit diagram to compare emfs of two cells by using potentiometer and label the components of circuit? (01+02)

FBISE PBA model | Section A Q1(ii) | 2 marks

This question is about the experiment "Compare the emf of cells using potentiometer.".

Q.1 This question is about the experiment "Compare the emf of cells using potentiometer.".

i. Draw circuit diagram to compare emfs of two cells by using potentiometer and label the components of circuit? (01+02)

ii. Table below shows some values obtained using the null deflection method. Copy and complete the missing entries in the given table. (02)

No. of Observations	Balancing Length For 1st Cell of emf E_1 l_1(cm)	balancing Length For 2nd Cell of emf E_2 l_2(cm)	$\frac{E_1}{E_2} = \frac{l_1}{l_2}$
1.	271	275	
2.	280	283	
3.	285	289	
4.	289	292	

iii. Write a precaution that should be kept in mind while performing above experiment (01)

This question is about the experiment "Compare the emf of cells using potentiometer.".

Q.1 This question is about the experiment "Compare the emf of cells using potentiometer.".

i. Draw circuit diagram to compare emfs of two cells by using potentiometer and label the components of circuit? (01+02)

ii. Table below shows some values obtained using the null deflection method. Copy and compl the missing entries in the given table. (02)

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1.	271	275	
2.	280	283	
3.	285	289	
4.	289	292	

iii. Write a precaution that should be kept in mind while performing above experiment. (01)

This question is about the experiment "Compare the emf of cells using potentiometer.".

Q.1 This question is about the experiment "Compare the emf of cells using potentiometer.".

i. Draw circuit diagram to compare emfs of two cells by using potentiometer and label the components of circuit? (01+02)

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1.	271	275	
2.	280	283	
3.	285	289	
4.	289	292	

iii. Write a precaution that should be kept in mind while performing above experiment. (01)

iv. The potentiometer wire must be long and have uniform thickness, why? (02)