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FBISE Physics Class 12
Topical workbook - Volume 1 of 3

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

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Gravitaional Potential

Domain B: Mechanics

FBISE model paper | Section A Q1 | 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	○	○

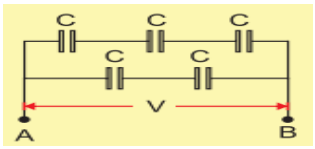
FBISE model paper | Section A Q2 | 1 mark

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.	○	○

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

Q. 2	Questions	Marks
(i)	Calculate the orbital speed of satellite orbiting the Earth at an altitude equal to Earth's radius.	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

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
(xii)	Explain why g is approximately constant for small changes in height near the earth's surface.	03

FBISE model paper | Section C Q3 | 6 marks

Q.3	Define the term gravitational potential. Also derive the expression for calculating gravitational potential in the field due to a point mass.	01+ 05

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

Answer the following parts briefly:

When a satellite is put into a higher orbit what will be the effect on its orbital velocity? Explain mathematically	1+2

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

Find field strength 'g' at a height of 1500 km above surface of Earth.	03

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

What factors determine the strength of gravitational field 'g' around a planet?	1.5 + 1.5

Briefly describe gravitational potential and derive the expression $\varphi = -\frac{GM}{r}$ at a distance r from the centre of Earth. Make a sketch.	2+4 +1
Explain the working of Young's double slit	

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

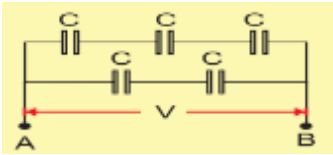
Q. 2 Answer the following parts briefly. **(14x3=42)**

(i)	How will the orbital velocity of a satellite be affected when it is put into a lower orbit (closer to the Earth)? Explain mathematically.	1+2	OR	A body with mass 800g attached to a spring executes SHM. The restoring force is 60N when the displacement is 0.3m. a. Find out its angular frequency	1+1 1

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

OR	What will be the value of gravitational field strength 'g' at 35,700 km, where a satellite is orbiting the earth?	03

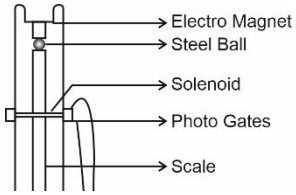
	poles affect earth climate?			the temperature of a star? Also write its formula.	
(xi)	Why the value of 'g' does not change significantly near the Earth's surface? (Show mathematically)	03	OR	Briefly explain the function of control rods and moderators in nuclear reactor.	1.5+ 1.5
(xii)	Calculate the average translational kinetic energy			What is meant by free oscillations? Also give its two	

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

SECTION-B (16 Marks)

Investigate the value of 'g' by free fall method using electronic timer.

With the help of electronic timer, students measure the distance and time of free fall by repeating procedures with same steel ball for different heights and recorded readings given in following table.



Q.4 Investigate the value of 'g' by free fall method using electronic timer.

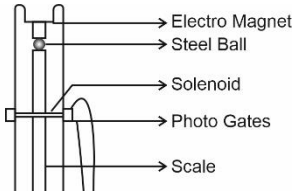
With the help of electronic timer, students measure the distance and time of free fa by repeating procedures with same steel ball for different heights and recorded readings given in following table.

i. Copy and complete the table. (03)

No. of obs.	Height h (cm)	Time (s)		Average time t (s)	t^2 (s^2)	$g = 2h/t^2$ (cms^{-2})
		t_1	t_2			
1	30	0.25	0.25			
2	45	0.28	0.29			
3	65	0.34	0.36			

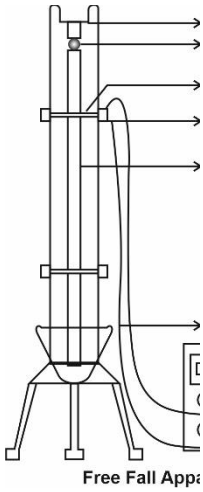
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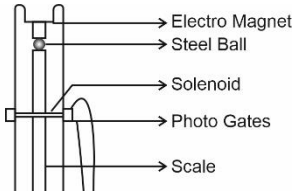
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No. of obs.	Height h (cm)	Time (s)		Average time t (s)	t^2 (s^2)	$g = 2h/t^2$ (cms^{-2})
		t_1	t_2			
1	30	0.25	0.25			
2	45	0.28	0.29			
3	65	0.34	0.36			

ii. Calculate the mean value of g. (01)

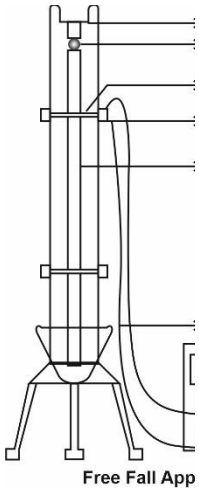
SECTION-B (16 Marks)

Investigate the value of 'g' by free fall method using electronic timer.



With the help of electronic timer, students measure the distance and time of free fall by repeating procedures with same steel ball for different heights and recorded readings given in following table.

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i. Copy and complete the table. (03)

No. of obs.	Height h (cm)	Time (s)		Average time t (s)	t^2 (s^2)	$g = 2h/t^2$ (cms^{-2})
		t_1	t_2			
1	30	0.25	0.25			
2	45	0.28	0.29			
3	65	0.34	0.36			

ii. Calculate the mean value of g. (01)

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

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

FBISE PBA model | Section B Q4(i) | 2 marks

Q.4. Investigate the value of 'g' by free fall method using electronic timer.

With the help of electronic timer, students measure the distance and time of free fall by repeating procedures with same steel ball for different heights and recorded readings given in following table.

i. Copy and complete the table. (02)

No. of obs.	Height (h) (cm)	Time (s)		Average (t) (s)	g = ------ (----)
		t_1	t_2		
1	28	0.24	0.22		
2	47	0.31	0.29		
3	67	0.37	0.38		
4	72	0.39	0.40		
5	76	0.40	0.42		
6	80	0.44	0.41		

FBISE PBA model | Section B Q4(ii) | 1 mark

ii. Calculate the mean value of g and percentage error in g. (01)

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Statistical Mechanics and Thermodynamics

Domain C: Heat and Thermodynamics

FBISE model paper | Section A Q4 | 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	$cd.m^2$	○	○
4.	Real gases deviate from ideal behavior because gas molecules:	are colorless	are spherical	have intermolecular forces of attraction	have high speeds	○	○

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

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

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
(xii)	Explain why g is approximately constant for small changes in height near the earth's surface.	03
(xiii)	How pressure is related to average translational kinetic energy of a gas? Discuss	03

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

mathematically.	
What happens to pressure when temperature and molecular speed of gas molecules increase?	03

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

the factors upon which it depends.	
Derive the relation between absolute temperature and average kinetic energy of gas molecules.	03
Briefly explain the significance of wind pattern on	

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

energy than polar regions?				
Calculate root mean square speed of oxygen molecule at standard temperature and pressure.	03	OR	Briefly explain the terms: a. Mass Defect b. Binding Energy	1.5 + 1.5

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

(ii)	How is the pressure related to the density of the gas? Also give its mathematical expression.	2+1
(iii)	How does resonance play an important role in	

	near the Earth's surface? (Show mathematically)			moderators in nuclear reactor.	1.5
(xii)	Calculate the average translational kinetic energy of a gas molecule at a temperature 47°C.	03	OR	What is meant by free oscillations? Also give its two examples.	1+2
(xiii)	How does increasing the number of slits per unit			Distinguish between peak value and root mean square	1.5

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
(xi)	Explain briefly that how global climate is determined by energy transfer from the Sun?	03
(xii)	Explain why g is approximately constant for small changes in height near the earth's surface.	03
(xiii)	How pressure is related to average translational kinetic energy of a gas?	03

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Simple Harmonic Motion

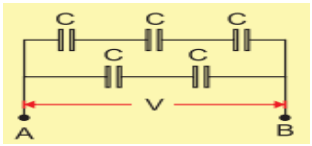
Domain D: Waves

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	$cd.m^2$	○	○
4.	Real gases deviate from ideal behavior because gas molecules:	are colorless	are spherical	have intermolecular forces of attraction	have high speeds	○	○
5.	If A is the amplitude of an oscillating system, the total distance covered during its time period is:	A/2	A	2A	4A	○	○

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

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

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
(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
(xiii)	How pressure is related to average translational kinetic energy of a	03	**OR**	Differentiate between free and forced oscillations. Give one example of each.	02 +01

OR	Discuss how kinetic and potential energy vary and transform into each other during simple harmonic motion, highlighting when each form of energy is maximum and minimum.	03+03

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

Answer the following parts briefly. (14x3=42)

When a satellite is put into a higher orbit what will be the effect on its orbital velocity? Explain mathematically.	1+2	OR	Time period of a mass attached at the end of a spring is 0.4s. Find out the magnitude of acceleration when the displacement is 4cm.	03
What happens to pressure when temperature and			Briefly explain constructive and destructive	1.5

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

Justify qualitatively the factors which determine the frequency response and sharpness of resonance.	03
What is self-inductance? Also write its SI unit and	

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

		b. Binding Energy	
1.5 + 1.5	OR	What is meant by light damping and heavy damping? Show these graphically. (Displacement-time graph)	1x3
		Distinguish graphically between half-wave and full-	1.5+

First Annual 2026 | Section C Q3 OR | 7 marks

What is meant by simple harmonic motion (SHM)? Show that mass attached to a spring executes SHM. Derive the expressions for frequency 'f' and time period 'T'. Draw diagram as well.	1+3 +2+1

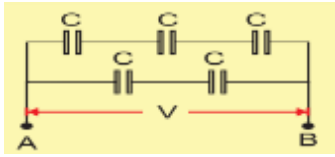
First Annual 2026 | Section B Q2(i) OR | 3 marks

OR	A body with mass 800g attached to a spring executes SHM. The restoring force is 60N when the displacement is 0.3m. **a.** Find out its angular frequency **b.** Also find the magnitude of acceleration when the displacement is 12cm.	1+1+1
	State the conditions necessary for observing interference	

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

	gas? Also give its mathematical expression.			fringes.	
(iii)	How does resonance play an important role in tuning of radio station?	03	OR	Briefly explain the use of capacitors in any three household appliances.	1x3
(iv)	What is mutual inductance? Also write its SI unit			What will be the value of gravitational field strength 'g' at	

	moderators in nuclear reactor.	
OR	What is meant by free oscillations? Also give its two examples.	1+2
	Distinguish between peak value and root mean square	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 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

OR	Analyze the interchange between kinetic and potential energy during simple harmonic motion	05+02

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Diffraction and Interference

Domain D: Waves

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

Sr #	Question	(A)	(B)	(C)	(D)	(A)	(B
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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	$cd.m^2$	○	○
4.	Real gases deviate from ideal behavior because gas molecules:	are colorless	are spherical	have intermolecular forces of attraction	have high speeds	○	○
5.	If A is the amplitude of an oscillating system, the total distance covered during its time period is:	A/2	A	2A	4A	○	○
6.	The phenomenon of diffraction is more prominent when the size of the obstacle is:	larger than the wavelength of incident light	smaller than the wavelength of incident light	comparable to the wavelength of incident light	independent of the wavelength of incident light	○	○

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

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

Q.4	Define the interference of waves. What conditions are required for interference to be observable? Also state the conditions for constructive and destructive interference in terms of the path difference between the interacting waves.	01+ 03 +02

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

acceleration when the displacement is 4cm.	
Briefly explain constructive and destructive interference of light. Give mathematical expression for both in terms of path difference.	1.5 + 1.5
Explain the function of capacitor in bridge rectifier	

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

	1.5		time graph)	
What is meant by grating element of a diffraction grating? Also write its formula.	2+1	OR	Distinguish graphically between half-wave and full-wave rectification.	1.5+ 1.5
How does increasing slit separation affect fringe			Four capacitors of C C	

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

	grating? Also write its formula.	
(xiv)	How does increasing slit separation affect fringe spacing? Discuss with mathematical relation.	2+1

First Annual 2026 | Section C Q4 | 7 marks

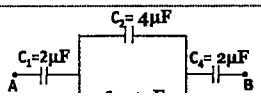
centre of Earth. Make a sketch.	
Explain the working of Young's double slit experiment. Make diagram. Also derive the expression for fringe spacing.	4+1 +2
In an RL series circuit, will the current lag or lead	

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

	displacement is 12cm.	
OR	State the conditions necessary for observing interference fringes.	1x3
	Briefly explain the use of capacitors in any three	

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

	of a gas molecule at a temperature 47° C.			examples.	
(xiii)	How does increasing the number of slits per unit length affect the diffraction pattern? Make a sketch.	2+1	OR	Distinguish between peak value and root mean square (rms) values of alternating voltage.	1.5 + 1.5
(xiv)	How can one increase the fringe spacing in			Deduce the equivalent C=4μF	

(xiv)	How can one increase the fringe spacing in Young's double slit experiment? Also write its mathematical calculation.	2+1	OR	Deduce the equivalent capacitance between A and B for the given circuit.		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.	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
(xi)	Explain briefly that how global climate is determined by energy transfer from the Sun?	03
(xii)	Explain why g is approximately constant for small changes in height near the earth's surface.	03
(xiii)	How pressure is related to average translational kinetic energy of a gas?	03
(xiv)	What is diffraction grating?	03

	a point mass?	
Q.4	Define interference, discuss the conditions for observing interference. Give expression for the path difference of constructive and destructive interference.	01+ 03 +02

APOLLO

Electrostatics

Domain E: Electricity and Magnetism

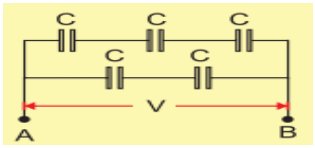
Q1. Fill the relevant bubble against each question according to curriculum. Each part carries one mark.

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	$cd.m^2$	○	○
4.	Real gases deviate from ideal behavior because gas molecules:	are colorless	are spherical	have intermolecular forces of attraction	have high speeds	○	○
5.	If A is the amplitude of an oscillating system, the total distance covered during its time period is:	A/2	A	2A	4A	○	○
6.	The phenomenon of diffraction is more prominent when the size of the obstacle is:	larger than the wavelength of incident light	smaller than the wavelength of incident light	comparable to the wavelength of incident light	independent of the wavelength of incident light	○	○
7.	Which of the following is equivalent to 1.0 volt.	newton per second	joule per second	joule per coulomb	coulomb per joule	○	○

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	○	○
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5.	If A is the amplitude of an oscillating system, the total distance covered during its time period is:	A/2	A	2A	4A	○	○
6.	The phenomenon of diffraction is more prominent when the size of the obstacle is:	larger than the wavelength of incident light	smaller than the wavelength of incident light	comparable to the wavelength of incident light	independent of the wavelength of incident light	○	○
7.	Which of the following is equivalent to 1.0 volt.	newton per second	joule per second	joule per coulomb	coulomb per joule	○	○
8.	Capacitor is a device used to:	store electrical energy	vary the resistance	store magnetic energy	dissipate energy	○	○

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

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

OR	Explain the process of charging a capacitor through a resistor. In your explanation, describe the concept of the time constant and its significance in the charging process.	03 + 03

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

(i)	By coulomb's law prove that the force between two-point charges is reduced in a medium other than free space.	**03**
(ii)	Write three postulates of Bohr's atomic model	

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

A metal sphere of radius **15cm** has a positive charge of **+3.0μC** at its centre. Find the electric field strength at a distance of **27cm** from the centre of sphere.	**03**
A **200kg** load produces an extension **0.2cm** in a steel	

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

as 0.4A. Determine the value of its inductance.	
In which combination of capacitors the energy stored is maximum, parallel or series? Justify.	1+2

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

Distinguish between emf and potential difference. (Any three points)	03

First Annual 2025 | Section C Q5 | 6 marks

Q.5	Demonstrate **charging** and **discharging** of a capacitor through a resistance. Elaborate your answer with the help of Q-t graphs.	**3+3**

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

What is the resistance of fourth arm?	
Which capacitor stores more amount of charge, a $100\mu F$ capacitor charged to $200V$ or a $200\mu F$ capacitor charged to $100V$?	**03**

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

(xii)	A metal sphere of radius 20cm has a positive charge of **+2.0μC** at its centre. Find the electric field strength at a distance of **25cm** from the centre of sphere?	**03**

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

OR	Show that the electric field at a point is given by the negative of potential gradient at that point.	**1+2**

First Annual 2025 | Section C Q3 | 7 marks

Q.3	State Gauss's law. Draw and find Electric field due to a conducting plate of infinite size having positive charge.	**2+5**

Second Annual 2025 | Section A Q3 | 1 mark

3.	The electric diploe moment is the product of:	Charge and force	Charge and electric field	Charge and voltage	Charge and displacement

Second Annual 2025 | Section A Q4 | 1 mark

4.	The SI unit of electric flux is:	V/m	C/N	N/C	$N \cdot m^2/C$

Second Annual 2025 | Section A Q5 | 1 mark

5.	According to Gauss's law, the electric field inside a hollow conductor is:	Decreasing	Zero	Constant	Increasing

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

(i)	Find electric field at a distance of 30cm from a 3μC point charge.	03

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

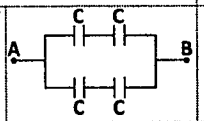
(vi)	Apply Gauss's law to explain electric field intensity inside a hollow conductor.	03	OR	Briefly explain the phenomenon of photoelectric effect with Einstein's equation.	03

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

What is meant by electric potential at a point? Write its unit.	2+1

Second Annual 2025 | Section C Q3 | 7 marks

Q.3	Derive the expression for capacitance of a parallel plate capacitor With and Without dielectric.	07	OR	W di

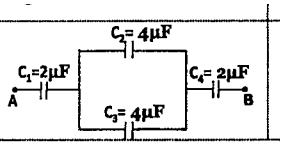
OR	achieving high resolution of electron microscope?	
OR	Draw labelled wave form and phasor diagram between applied voltage and current for pure inductor A.C.	2+1
OR	To which idea does a red-shift exhibited by a star leads and why?	1+2
OR	Briefly explain the terms: **a.** Mass Defect **b.** Binding Energy	1.5 + 1.5
OR	What is meant by light damping and heavy damping? Show these graphically. (Displacement-time graph)	1x3
OR	Distinguish graphically between half-wave and full-wave rectification.	1.5+ 1.5
OR	Four capacitors of capacitance 'C' are connected as shown. Calculate their equivalent capacitance. 	03

First Annual 2026 | Section C Q4 OR | 7 marks

What is meant by electric potential? Derive an expression for electric potential in the field due to a point charge. Make sketch.	1+5 +1
What is meant by photo electric effect? Why no	

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

	fringes.	
OR	Briefly explain the use of capacitors in any three household appliances.	1x3
	What will be the value of gravitational field strength 'g' at	

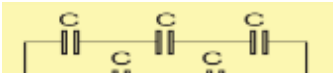
OR	Deduce the equivalent capacitance between A and B for the given circuit.	

C (Marks 26)

OR	Derive expressions for Kinetic and Potential energies of a mass attached to a spring executing SHM. Show that total energy of the spring system remains constant. Also make neat sketch.
OR	**a.** Determine the electrical potential energy stored in a capacitor by using graph. **b.** Calculate the energy stored, in a capacitor having 5C of charge and potential different of 15V.
	What is photoelectric effect? Explain work function of metal and Einstein photo electric equation. What is the

	of Earth. Make a sketch.				
Q.4	**Explain the working of Young's double slit experiment. Make diagram. Also derive the expression for fringe spacing.**	**4+1 +2**	**OR**	**a. Determine the electrical potential energy stored in a capacitor by using graph.** **b. Calculate the energy stored, in a capacitor having 5C of charge and potential different of 15V.**	**(3+1) +3**
Q.5	Explain the working of a bridge rectifier using four			What is photoelectric effect? Explain work function of	

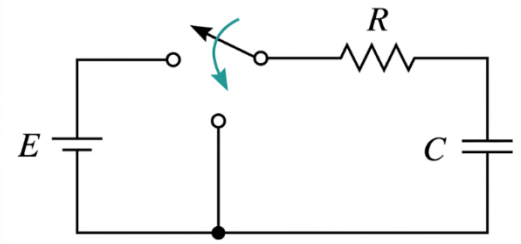
Q. 2	Questions	Marks	Questions		Marks
(i)	Calculate the orbital speed of satellite orbiting the Earth at an altitude equal to Earth's radius.	03	**OR**	A body with mass 800 g attached to a spring, vibrates with amplitude 30 cm. The restoring force is 60 N when the displacement is 0.30 m. Find out its (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

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

	~~Harmonic motion~~	
OR	Explain the process of charging of a capacitor through a resistor (Also discuss the term time constant in the explanation).	04 + 02
	~~Mention the applications of~~	~~04 + 02~~

Q.3 This question is about studying the both charging and discharging of a capacitor through a resistor and calculating the time constant."

A student records the voltage across the capacitor (V_c) during both its charging and discharging at fixed time intervals (t). The observation data is tabulated below:



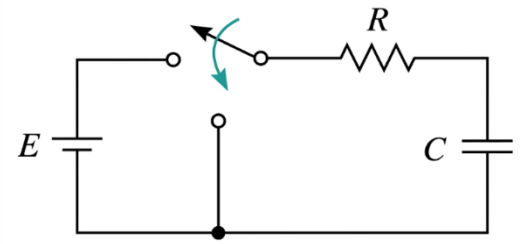
Observations of this experiment are given below:
Resistance= R= 33kΩ
Capacitance= C= 47µF

No. of observations	Time t (s)	Voltage across the Capacitor V_c (V)	
		During Charging	During Discharging
1.	0	0	6.0
2.	1	2.85	3.15
3.	2	4.34	1.66
4.	3	5.13	0.87
5.	4	5.54	0.46
6.	5	5.76	0.24
7.	6	5.87	0.13

i. Plot a neat, properly scaled graph of capacitor voltage (V_c) against time (t) for both the charging and discharging cycles on the same graph sheet provided. Label both curves clearly. (01+01+01)

Q.3 This question is about studying the both charging and discharging of a capacitor through a resistor and calculating the time constant."

A student records the voltage across the capacitor (V_c) during both its charging and discharging at fixed time intervals (t). The observation data is tabulated below:



Observations of this experiment are given below:
Resistance= R= 33kΩ
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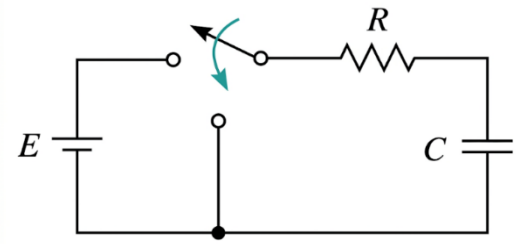
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4.	3	5.13	0.87
5.	4	5.54	0.46
6.	5	5.76	0.24
7.	6	5.87	0.13

discharging cycles on the same graph sheet provided. Label both curves clearly. (01)

ii. Calculate the theoretical time constant (τ_{th}) of the circuit using the given values of resistance (R) and capacitance (C). Show complete calculation with units. (01)

Q.3 This question is about studying the both charging and discharging of a capacitor through a resistor and calculating the time constant."

A student records the voltage across the capacitor (V_c) during both its charging and discharging at fixed time intervals (t). The observation data is tabulated below:



Observations of this experiment are given below:
Resistance= R= 33kΩ
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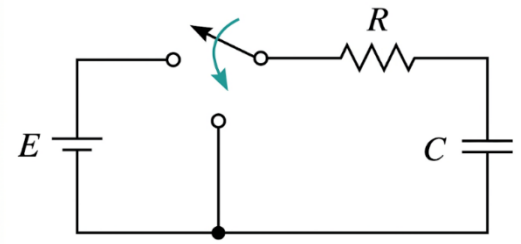
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6.	5	5.76	0.24
7.	6	5.87	0.13

capacitance (C). Show complete calculation with units. (01)

iii. Determine the experimental time constant (τ_{exp}) directly from your plotted graph and show extrapolation lines on your graph for it. (01+01)

Q.3 This question is about studying the both charging and discharging of a capacitor through a resistor and calculating the time constant."

A student records the voltage across the capacitor (V_c) during both its charging and discharging at fixed time intervals (t). The observation data is tabulated below:



Observations of this experiment are given below:
Resistance= R= 33kΩ
Capacitance= C= 47µF

No. of observations	Time t (s)	Voltage across the Capacitor V_c (V)	
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4.	3	5.13	0.87
5.	4	5.54	0.46
6.	5	5.76	0.24
7.	6	5.87	0.13

iv. Compute the percentage error between your graphical value (τ_{exp}) and theoretical value (τ_{th}). (02)

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

	SI unit of energy.			photoelectrons?	
(ii)	Find electric field at a distance of 30 cm from a $3\mu c$ point charge.	03	OR	What is Wein's displacement law? Explain briefly.	0
(iii)	Describe a circuit which will give continuously			Calculate ionization energy and ionization	

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

	law of conservation of energy.
OR	How can one increase the capacitance of a capacitor?
	Differentiate between emf and potential difference.

FBISE model paper | Section A Q1(2) | 1 mark

Q.1 Fill the relevant bubble for each part. Each part carries one mark.

(1) Two charges q_1 and q_2 are placed in vacuum at a distance d and force between them is F. If a medium of relative permittivity 4 is introduced between them then new force will be:

A. $\frac{F}{4}$ ◯ B. $\frac{F}{2}$ ◯

C. 2F ◯ D. 4F ◯

(2) Three capacitors of 4μF each are connected in such a way that net capacitance of their combination is 6μF. It is possible if:

A. All the three in series ◯
B. All the three in parallel ◯
C. Two in series and one in parallel ◯
D. Two in parallel and one in series ◯

FBISE model paper | Section C Q3 | 7 marks

Q.3 Define electric potential. Find an expression for electric potential energy and electric potential. (1+3+3)

OR

Q.3. Study the charging and discharging of a capacitor through a resistor and calculate the time constant.

A student aims to calculate the time constant for a capacitor which is marked as 4**00 µF**. He connects a 20 **KΩ** resistor and a battery of 12 **V** in series with the capacitor. He also connects a voltmeter in parallel with the capacitor and a two-way switch to charge and discharge the capacitor.

Table below shows the values obtained when the capacitor was discharged from its peak voltage.

Time (s)	3	6	9	11	15	18	22	25
Voltage (V)	14	7	4	2	0.8	0.6	0.3	0.3

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Voltage (V)	14	7	4	2	0.8	0.6	0.3	0.3

i. Draw the circuit diagram of the experimental arrangement. (01)

Q.3. Study the charging and discharging of a capacitor through a resistor and calculate the time constant.

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Voltage (V)	14	7	4	2	0.8	0.6	0.3	0.3

i. Draw the circuit diagram of the experimental arrangement. (01)

ii. Draw a graph from the given values and also determine the time constant from this graph. (03)

Q.3. Study the charging and discharging of a capacitor through a resistor and calculate the time constant.

A student aims to calculate the time constant for a capacitor which is marked as 4**00 µF**. He connects a 20 **KΩ** resistor and a battery of 12 **V** in series with the capacitor. He also connects a voltmeter in parallel with the capacitor and a two-way switch to charge and discharge the capacitor.

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Voltage (V)	14	7	4	2	0.8	0.6	0.3	0.3

i. Draw the circuit diagram of the experimental arrangement. (01)
ii. Draw a graph from the given values and also determine the time constant from this graph. (03
iii. What is the actual value of the time constant? Also calculate the percentage error in your calculated time constant. (02)

APOLLO

Alternating Current

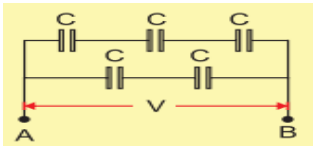
Domain E: Electricity and Magnetism

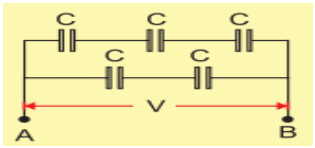
FBISE model paper | Section A Q10 | 1 mark

10.	Sinusoidal waveform is generated in AC system because:	it can be easily drawn	it produces least disturbance in electrical circuits	it is natural standard	other waves cannot be produced easily.	○ ○ ○ ○

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

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 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
(v)	Define mutual inductance. Write its formula. Also define its unit.	01+01 +01

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.	03	**OR**	AC voltage across a 0.5 μF capacitor is $16\sin(2\times10^3 t)$ V. Find its capacitive reactance.	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	03	**OR**	Explain the role of a single capacitor in output of full wave rectifier circuit.	03

FBISE model paper | Section C Q5 | 6 marks

Q.5	What is rectification? Explain the operation of a bridge rectifier as full wave rectifier.	01+ 05

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

Differentiate 'statically induced emf' and 'dynamically induced emf'. Illustrate your answer with example.	**03**

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

(v)	How can a galvanometer be converted into ammeter? Draw diagram as well.	**2+1**

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

(vi)	What are the causes of power losses in Transformer? Write any three.	**03**

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

	a). Stress **b).** Strain **c).** Young's Modulus for Steel (Y)	
	A pure inductor is connected across a **10V**, **200Hz** AC Supply and the current flowing through it is measured as **0.4A**. Determine the value of its inductance.	**03**
	In which combination of capacitors the energy stored	

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

	magnetic field.	
(xiii)	In RL series circuit, will the current Lag or Lead the voltage? Illustrate your answer by drawing waveforms and phasor diagrams.	**1+2**
(xiv)	Deduce the expression for maximum output power	

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

Write any three factors affecting the magnitude of the induced emf.	03

First Annual 2025 | Section C Q3 OR | 7 marks

What is AC generator? How is an AC generator used to produce an alternating current? Explain with the help of graph between instantaneous emf and time.	2+3 +2

Q.4	Construct phasor diagrams and impedance diagrams of an R-L-C series circuit. Determine formula for impedance, phase angle and power factor.	**2+5**

First Annual 2025 | Section C Q6 OR | 6 marks

What is rectification? Describe the use of diodes for half and full wave rectification with circuit diagrams.	2+2 +2

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

(iii)	Write impedance equation for RLC Series circuit. What can be stated about impedance and current in a circuit at resonance condition?	03

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

OR	Briefly describe a circuit which will give continuously varying potential.	**03**
	Write any three results of special theory of relativity	

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

(ix)	The value in Amperes of an alternating current is given by an equation $I=2Sin(50\pi t)$. What is the peak value of current? What is the frequency(f) of AC supply?	**03**
(x)	If a person swallows an α-particle and a β-particle	

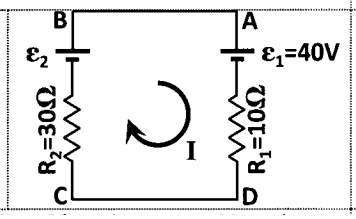
First Annual 2025 | Section B Q2(vii) | 3 marks

	Paschen series.	
(vii)	What is self-inductance? Write its SI unit. Enlist two factors affecting the inductance of a coil.	03

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

	body when its absolute temperature is doubled?	
OR	In an RC-Circuit, will the current lag or lead the voltage? Illustrate by drawing waveform and phasor diagram.	03
	Differentiate between conductors and semi	

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

Calculate the voltage ε_2 in the circuit by using Kirchoff's Voltage Law (KVL) when $I=0.2$A.		03

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

OR	If a transformer is connected to a steady (DC) supply, no emf is induced across the secondary coil. Why?	03

	schematic diagram.	
OR	A coil having a resistance of **7Ω** and an inductance of **31.8mH** is connected to **220V, 50Hz** AC supply. Calculate: **a)** The circuit current **b)** Phase angle **c)** Power factor	**06**
	How is charge to mass ratio of electron determined	

First Annual 2025 | Section C Q5 | 6 marks

	diagram.	
Q.5	What is meant by motional emf? Compute emf across the ends of a conductor of length L that moves at a steady speed of 'v' at right angle to a uniform magnetic field.	**1+5**

Second Annual 2025 | Section A Q6 | 1 mark

6.	Which physical law relates current through a conductor to voltage and resistance?	Ampere's law	Faraday's law	Kirchhoff's law	Ohm's law
	The force on a current carrying conductor				

Second Annual 2025 | Section A Q8 | 1 mark

the conductor is:				
According to Faraday's law, the induced emf is proportional to the:	Rate of change of magnetic flux	Inverse of magnetic flux	Square of magnetic flux	Magnetic flux
In an AC circuit, the voltage and current are				

Second Annual 2025 | Section A Q9 | 1 mark

magnetic flux				
In an AC circuit, the voltage and current are out of phase by 90° when the circuit is purely:	Inductive	Conductive	Resistive	Capacitive

Second Annual 2025 | Section A Q15 | 1 mark

15.	Conversion of A.C into D.C is called:	Oscillation	Rectification	Modulation	Amplification
	Which				

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

(ii)	State Faraday's law of electromagnetic induction and give one practical application.	2+1	OR

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

A 60V resistor is connected across A.C supply of 220V. Calculate the current drawn from the supply and the power consumed by the heating element.

Briefly explain the working of potentiometer with circuit

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

How are eddy currents produced? Explain briefly.	03

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

(viii)	Differentiate between self-induction and mutual induction. Draw also their circuit diagrams.	1.5 + 1.5	OR	Differentiate between nuclear fission and nuclear fusion reactions with examples.	1.5 + 1.5
(ix)	Distinguish between soft and hard ferromagnetic	1.5		What is meant by 'Conductance' and 'Conductivity' of	

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

		1.5	
	Briefly explain the construction and working of a transformer.	1+2	

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

		1.5	
(x)	What is meant by rectification? Draw circuit diagram of a half wave rectifier using diode.	1+2	OR

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

1+1+1	OR	What is meant by impedance? Draw phasor diagram of RL series circuit.	1+2

Second Annual 2025 | Section C Q4 | 7 marks

Q.4	Explain with derivation the behaviour of a pure inductive AC circuit and draw its phasor diagram.	5+2	OR

Second Annual 2025 | Section C Q5 | 6 marks

Q.5	Describe a PN junction and discuss its forward and reverse biasing with diagrams.	2+2+2	OR	Explain the implication of mass increase, time dilation and length contraction for space travel.	2+2+2

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

for both in terms of path difference.	
Explain the function of capacitor in bridge rectifier circuit.	03

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

resonance.	
What is self-inductance? Also write its SI unit and the factors upon which it depends.	1+2
Derive the relation between absolute temperature	

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

		describing high resolution of [illegible]
1.5 + 1.5	OR	Draw labelled wave form and phasor diagram between applied voltage and current for pure inductor A.C.
		To which idea does a red shift exhibited by a star

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

	surface of Earth.	
	How does doubling the frequency affect the capacitive reactance? Show mathematically.	03
	How are X-rays used in imaging internal body	

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

	time graph)	
OR	Distinguish graphically between half-wave and full-wave rectification.	1.5+ 1.5
	Four capacitors of C C	

First Annual 2026 | Section C Q5 | 6 marks

	expression for fringe spacing.	
	In an RL series circuit, will the current lag or lead the applied alternating voltage? Explain the answer with phasor diagram. Also find an expression for the impedance of RL series circuit.	2+2 +2
a	What is meant by Radiant Flux Intensity? How it	

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

	tuning of radio station?	
(iv)	What is mutual inductance? Also write its SI unit and the factors upon which it depends.	1+2

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

	than optical microscope? (Compare both)	
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.	
	How can Wien's displacement law be used to determine	

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

	examples.	
OR	Distinguish between peak value and root mean square (rms) values of alternating voltage.	1.5 + 1.5
	Deduce the equivalent C= 4uF	