APOLLO

FBISE Physics Class 11
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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Physical Quantities and Measurements

Domain A: Measurements

FBISE model paper | Section A Q1 | 0.5 marks

1.	Which of the following is the derived unit of density in terms of SI base units?	m^2/kg	m^3/kg	kg/m^3	kg/m^2

FBISE model paper | Section A Q2 | 0.5 marks

2.	Students are dropping a ball from a height close to the ground to calculate the value of g. Students get slightly different values each time under similar conditions. This is because of:	lack of skills	uncertainty in measurements	temperature variation	variation in the value of g

FBISE model paper | Section A Q3 | 0.5 marks

3.	A physical quantity has dimensions $[MLT^{-2}]$. This corresponds to:	energy	force	pressure	power

FBISE model paper | Section A Q5 | 0.5 marks

5.	A student calculates the kinetic energy K of a moving body using $K=\frac{1}{2}mv^2$. If both **m** and **v** contain individual percentage uncertainties of 5% respectively, what is the total percentage uncertainty in the calculated kinetic energy K?	5%	10%	15%	20%

FBISE model paper | Section A Q6 | 0.5 marks

6.	The homogeneity of the equation $s = ut + \frac{1}{2}at^2$ is checked by:	comparing numerical values only	comparing dimensions of variables	Analyzing coefficients of variables	plotting s versus t

FBISE model paper | Section A Q7 | 0.5 marks

7.	A measurement, which on repetition gives same or nearly same results, is called:	accurate reading	average reading	precise reading	estimated reading	○ ○ ○ ○

FBISE model paper | Section A Q8 | 0.5 marks

8.	The fractional uncertainty in the given length $L \pm \Delta L = 2.0\ \text{m} \pm 0.1\ \text{m}$ is:	0.05	0.1	0.15	0.5	○ ○ ○ ○

FBISE model paper | Section A Q12 | 0.5 marks

12.	Rod **A** has a length of $(12.0 \pm 0.2\text{cm})$ and rod **B** has a length of $(8.0 \pm 0.3\text{cm})$. Their combined length is given as:	20.0 ± 0.5 cm	20.0 ± 0.2 cm	20.0 ± 0.3 cm	20.0 ± 0.1 cm	○ ○ ○ ○

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

Q. 2 Answers the following parts briefly.

(i)	Briefly explain 'precision' and 'accuracy' with a diagram.	1x3

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

(xiii)	Use dimensional analysis to prove the equation $P = \rho g h$ is dimensionally homogeneous.	03

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

(i)	Show that the equation $P = \rho gh$ is dimensionally homogeneous.	03
(ii)	Time for 10 vibrations of a simple pendulum is 17.6s.	

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

	homogeneous.	
(ii)	Time for 10 vibrations of a simple pendulum is 17.6s. Least count of stop watch is 0.1s. Find time period of simple pendulum. Also determine uncertainty in it.	03

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

Show that: $\frac{Volt}{meter} = \frac{Newton}{Coulomb}$	03

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

				launch velocity.	
(vi)	The energy of photon is given by E=hf, find the dimensions of Plank's constant h, where f is frequency.	03	OR	A point source of sound emits sound energy at a rate of 15 W. Calculate the intensity of sound at a distance of 4 m from the source.	03
	A ball of mass 120 g is released from a height of 20 m, if				

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

(i)	Deduce the dimensions of k from Coulomb's law $\left(F = k\frac{q_1 q_2}{r^2}\right)$.	03

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

OR	A body of mass $(27.2 \pm 0.1)kg$ has a volume of $(2.0 \pm 0.1)m^3$. Calculate the density of the body? Find uncertainty in the density measurement.	03
	In thermodynamics briefly describe:	

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

The time to come out of the barrel.					
What is meant by precision? Also write the importance of taking multiple readings in an experiment.	1+2	OR	Find the area of the parallelogram whose adjacent sides are given by the vectors: $A=(\hat{i}+6\hat{j}+2\hat{k})m$ and $B=(7\hat{i}+\hat{j}+5\hat{k})m$	03

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

(i)	Deduce the dimensions of universal gravitational constant (G). $\left(F=G\frac{m_1m_2}{r^2}\right)$	03	OR	Describe any three properties of dot product of two vectors.	1x3

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

03	OR	Differentiate between accuracy and precision measurements. (Give a graphical example)

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

	show graphically.	
(viii)	Write any three limitations of dimensional analysis.	03

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

i.	Which of the following quantities are dimensionally similar?	Torque and work	Stress and spring constant	Angle and length	Strain and pressure

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

ix.	What is the base unit of pressure?	$kgms^{-1}$	$kgm^{-1}s^{-1}$	$kgm^{-1}s^{-2}$	$kgm^{2}s^{-2}$

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

(i)	An equation is dimensionally correct. Does it mean that equation is necessary correct?	03

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

(v)	What is effect of radius of cross section of conductor on its resistance?	03	**OR**	Radius of sphere is measured with a screw gauge and is substituted in the formulae of its surface area($A=\pi r^2$) and volume($V=4/3\pi r^3$). Which of the two results will be more accurate?	03

First Annual 2025 | Section A Q1 | 1 mark

	Question	A	B	C	D
1.	Which pair has the same dimension?	Work and power	Force and torque	Torque and power	Work and energy

First Annual 2025 | Section A Q2 | 1 mark

		power	torque	power	energy
2.	The length of body is measured as 3.51m, if the accuracy is 0.01m, then the percentage uncertainty in the measurement is:	3.51%	0.35%	0.28%	28.65%

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

the ball tend to deflect?

If an equation is dimensionally correct, is that equation a right equation?

First Annual 2025 | Section C Q4 | 6 marks

least two examples and four properties.

The length of a pendulum is $(1.5 \pm 0.01)m$ and the acceleration due to gravity is taken into account as $(9.8 \pm 0.01)ms^{-2}$. Calculate the time period of the pendulum with uncertainty in it.

What is Carnot's engine? Explain its working and

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

(i)	Briefly explain the difference between systematic errors (including zero error) and random errors with suitable examples.	03	OR	State New the law o example.
(ii)	Describe the head-to-tail rule for vector addition with			Give any t

Second Annual 2025 | Section C Q3 | 7 marks

Q.3	Check the homogeneity of following equations using dimensional analysis: a. $T = 2\pi\sqrt{\frac{\ell}{g}}$ b. $2aS = V_f^2 - V_i^2$	07

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

(ii)	Show that the equation for liquid pressure is $P = pgh$ dimensionally correct.	03
(iii)	The magnitude of dot and cross product of two vectors	

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

OR	The length of a pendulum is $(100 \pm 0.1)cm$. If acceleration of free fall is $(9.8 \pm 0.1)ms^{-2}$. Calculate percentage in time period of the pendulum.	03
	Does the tension in the string of a swinging pendulum	

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Vectors

Domain B: Mechanics

FBISE model paper | Section A Q4 | 0.5 marks

4.	The direction of the vector $\vec{A} = 3\hat{\imath} + 4\hat{\jmath}$ relative to the x-axis is approximately:	30°	37°	41°	53°

FBISE model paper | Section A Q9 | 0.5 marks

9.	The equation $\|\mathbf{A} \cdot \mathbf{B}\| = \|\mathbf{A} \times \mathbf{B}\|$ is consistent when angle between vectors **A** and **B** is:	30^o	45^o	60^o	90^o	○ ○ ○ ○

FBISE model paper | Section B Q1 | 4 marks

1	Using commutative property, distinguish between scalar product and vector product of two vectors. Give mathematical justifications for both.	2+2

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

Verify that: $(\vec{A}.\vec{B})^2 + (\vec{A} \times \vec{B})^2 = (AB)^2$	03

First Annual 2025 | Section C Q3 | 7 marks

(Use of graph paper is not necessary. Candidates can make t

Q.3	State and explain vector product with an example. Also show that $\vec{A} \times \vec{B} \neq \vec{B} \times \vec{A}$	3+4

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

(iii)	Under what condition the rectangular (perpendicular) components of a vector have same magnitude?	03

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

OR	Find the power delivered by an engine for attaining velocity= $(4\hat{i}+5\hat{j})$ m/s while it exerts a force= $(8\hat{i}-2\hat{j})$ N.	03

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

OR	State the characteristics of vector product.	**03**

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

OR	Find the power delivered by the engine for attaining velocity (2,3) m/s, while it exerts a force (7,-3) N.	**2+1**

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

(ii)	What is meant by dot product of two vectors? Give mathematical expression and one example.	1x3

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

OR	Describe any three properties of cross product of two vectors.	1x3

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

(iii)	Show that: $\vec{A}.\vec{B} = A_x B_x + A_y B_y + A_z B_z$	03

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

OR	Find the area of the parallelogram whose adjacent sides are given by the vectors: $A = (\hat{i} + 6\hat{j} + 2\hat{k})m$ and $B = (7\hat{i} + \hat{j} + 5\hat{k})m$.

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

(i)	Deduce the dimensions of universal gravitational constant (G). $\left(F = G\frac{m_1 m_2}{2}\right)$	03	OR	Describe any three properties of dot product of two vectors.	1x3

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

(iii)	The magnitudes of dot and cross product of two vectors are $6\sqrt{3}$ and 6 respectively. Find the angle between the vectors.	03	OR	How a seismometer uses electromagnetic induction to detect earthquakes? Explain briefly.	03

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

03	OR	Find the power delivered by the engine for attaining velocity (3,4) ms^{-1} while it exerts a force (8, -2) N.

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

xvii.	When Fx = 3 N and F = 5 N then Fy =	6N	8N	2N	4N	○ ○ ○ ○

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

(i)	An equation is dimensionally correct. Does it mean that equation is necessary	03	**OR**	Find cross product of two unit vectors at 0^o and 90^o.	03

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

(iii)	Write the characteristics of scalar product.	03

First Annual 2025 | Section A Q3 | 1 mark

3.	A force of 10 N makes an angle of 30° with x- axis. The magnitude of x- component is:	5 N	8.66 N	10 N	Zero N	◯

First Annual 2025 | Section A Q4 | 1 mark

4.	Resultant of two forces 20N and 50N acting simultaneously on a body **CANNOT** be:	20 N	30 N	40 N	70 N

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

Show that:	$\left\|\vec{A}\times\vec{B}\right\|^2+\left\|\vec{A}.\vec{B}\right\|^2=A^2B^2$	**03**

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

The magnitude of dot and cross product of two vectors are $6\sqrt{3}$ and 6 respectively. Find the angle between two vectors?

Is it possible for a person to distinguish between a

First Annual 2025 | Section C Q3 | 7 marks

Explain scalar or dot product of two vectors with at least two examples and four properties.

The length of a pendulum is (1.5 ± 0.01)m and the

First Annual 2025 | Section C Q3 OR | 7 marks

How can resultant of two or more vectors be obtained by their rectangular components?	
What is Doppler effect? Explain it for the cases when:	

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

	suitable examples.	
(ii)	Describe the head-to-tail rule for vector addition with a simple diagram.	2+1
(iii)	Draw and interpret a velocity–time graph of an object	

Q.4	Explain Scalar or Dot Product with at least four properties and two examples.	06

Second Annual 2025 | Section C Q5 OR | 7 marks

OR	Describe vector addition by rectangular components with the help of a diagram. Determine the relations for magnitude of resultant vector and its direction. How is its final angle calculated?	07

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

A peddler is pushing a trolly on a horizontal road with a force of 50 N making 30° with the road. Find the horizontal and vertical components of force?	1.5 + 1.5

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

OR	Briefly explain vector product of 2 vectors. Give one example.	2+1
	Briefly explain angular velocity and angular	1.5

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Translatory Motion

Domain B: Mechanics

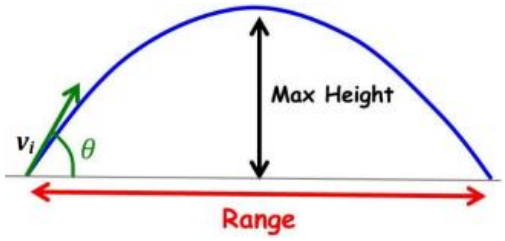
FBISE model paper | Section A Q10 | 0.5 marks

10.	In the presence of **air resistance**, how does the horizontal component of a projectile's velocity change during its flight?	remains constant	continuously decreases	continuously increases	decreases, then increases	○ ○ ○ ○

FBISE model paper | Section A Q11 | 0.5 marks

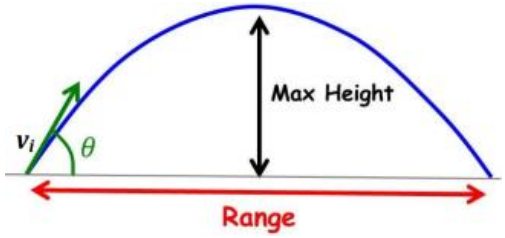
11.	Distance covered by a freely falling body in 2 seconds is:	4.9 m	19.6 m	39.2 m	44.1 m	○ ○ ○ ○

FBISE model paper | Section A Q57 | 0.5 marks

Scenario for MCQs # 57 to 60	**A projectile is launched with an initial speed of 200 m/s at an angle of 30^o with the horizontal.** 

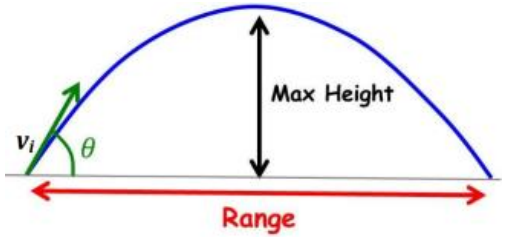
57.	Determine the time of flight of the projectile.	10.41 s	20.41 s	30.52 s	0.41 s	○ ○ ○ ○

FBISE model paper | Section A Q58 | 0.5 marks

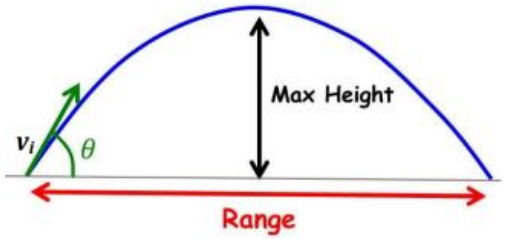
Scenario for MCQs # 57 to 60	**A projectile is launched with an initial speed of 200 m/s at an angle of 30^o with the horizontal.** 

58.	Find the peak height of the projectile.	210.2 m	310.2 m	410.2 m	510.2 m	○ ○ ○ ○

FBISE model paper | Section A Q59 | 0.5 marks

Scenario for MCQs # 57 to 60	**A projectile is launched with an initial speed of 200 m/s at an angle of 30^o with the horizontal.** 					
59.	Calculate the maximum horizontal displacement of the projectile.	2534.7 m	3534.7 m	4534.7 m	5534.7 m	○ ○ ○ ○

FBISE model paper | Section A Q60 | 0.5 marks

Scenario for MCQs # 57 to 60	**A projectile is launched with an initial speed of 200 m/s at an angle of 30^o with the horizontal.** 					
60.	Find the time for projectile to reach its maximum height.	10.20 s	20.41 s	30.52 s	0.41 s	○ ○ ○ ○

FBISE model paper | Section B Q2 | 4 marks

2	An aero plane while flying horizontally drops a bomb when reaches exactly above the target but misses it. Explain why?	04

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

The velocity of a missile traveling at 1500 ms^{-1} increases to 5000 ms^{-1} after moving through a distance of 70 km. Calculate the time for the missile to reach this velocity.	03

First Annual 2025 | Section C Q3 OR | 7 marks

What is meant by projectile? Derive the mathematical expressions of following for projectile motion: i) Time of flight ii) Range and maximum range of projectile	1+2 +4
State work-energy theorem. Explain this theorem for	

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

OR	Discuss the motion of two bodies after collision when $m_1 << m_2$ and $V_2 = 0$.	03

First Annual 2025 | Section C Q3 | 7 marks

(Use of graph paper is not necessary. Candidates can make their own grid on answer book if required)

Q.3	What is meant by projectile? Determine the expressions for velocity and displacement of a projectile thrown horizontally from a certain height.	**1+4 +2**	**OR**	What is meant by electric field strength? Show that: $E = \frac{-\Delta V}{\Delta r}$	**07**

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

OR	A rabbit jumps over an object 0.7 m high: **a.** Considering just its vertical motion, calculate its vertical speed when it leaves the ground. **b.** How long a time it stays in the air?	**1+2**
	Briefly explain the applications of Doppler Effect in	1.5+

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

	radar and astronomy.
OR	A projectile is launched horizontally from the top of a 50 m high cliff and lands at a distance of 20 m from the base of the cliff. Determine the magnitude of the launch velocity.
	A point source of sound emits sound energy at a rate

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

(xi)	Determine the relationship for maximum height of a projectile.	**03**
	An object having a net charge of 24μC is placed in a	

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

(vii)	A 5 kg shell is fired with a muzzle velocity of $700ms^{-1}$ from the gun barrel 2.4m long. Calculate the average value of: The acceleration The time to come out of the barrel	03
(viii)	What is meant by precision? Also write the	

First Annual 2026 | Section C Q3 | 6 marks

Attempt the following questions.

Q.3	Derive expressions for: a. Range of projectile and b. Height of projectile	3+3	OR	a. b. c.

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

	(in context of elastic and plastic deformation)	
(vii)	Evaluate effect of air resistance on projectile motion. Show graphically.	2+1

First Annual 2026 | Section C Q4 | 6 marks

Q.4	Describe elastics collision in one dimension. Derive relation to show the relative velocities before and after collision.	1+5
Q.5	State working principle of Carnot's Engine. With the	

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

iii.	Projectile motion is two-dimensional motion under constant acceleration due to	Air resistance	Gravity	Horizontal distance	Velocity

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

iv.	A turtle travel 45cm in 20 minutes, its average velocity will be:	2.25cm/h	90cm/h	135cm/h	15cm/h

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

(vii)	Find the angle of projection of a projectile for which the maximum height and corresponding range are equal?	03

FBISE model paper | Section C Q3 | 6 marks

Q.3	Explain elastic collision in one dimension and prove that for two bodies colliding elastically, relative speed of approach before collision is equal to relative speed of separation after collision.	02+ 04

First Annual 2025 | Section A Q6 | 1 mark

	of 5.0 N. What will be its acceleration?				
6.	A ball with original momentum $+4.0\ kgms^{-1}$ hits a wall and bounces straight back without losing any kinetic energy. The change in momentum of the ball is:	*+4 Ns*	*–4 Ns*	*+8 Ns*	*–8 Ns*
	Two bodies with kinetic energies in the ratio				

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

Can the velocity of a body reverse the direction when acceleration is constant? If you think so, give an example.

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

tension in the string.

Show that the relation between maximum height and time of flight of projectile is $H = \left(\frac{gT^2}{8}\right)$.

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

Calculate the angle of projection for which kinetic energy at summit is equal to one fourth of its kinetic energy at point of projection.	03

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

light used.
Modern cars are not rigid but are designed to have "crumple zones" (irregular fold) that collapse upon impact. What is the advantage of this design?
A cricket ball moves past an observer from left to

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

A body of mass 2.0 kg is dropped from rest position 5 m above the ground. What is its velocity at height of 3.0 m above the ground?

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

Briefly explain the difference between systematic errors (including zero error) and random errors with suitable examples.	03	OR	State Newton's Third Law of Motion. How it leads to the law of conservation of momentum? Give one example.	1+2
Describe the head-to-tail rule for vector addition with			Give any three drawbacks of conventional sources of	

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

	a simple diagram.	
(iii)	Draw and interpret a velocity–time graph of an object moving with uniform acceleration. How can the slope of this graph be used to find acceleration?	2+1

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

	orbital velocity.	
(ix)	Derive the relation to determine the maximum Range of projectile.	03

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

	between V and D?	
OR	Determine horizontal and vertical component of velocity of a projectile when launched horizontally.	03
	What is relation between Torque and Angular	

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

$v_f = v_i + at$ is dimensionally correct	
Derive a mathematical relation for height of projectile.	03

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

	linear momentum.	
(vii)	If two balls of equal masses have elastic collision in one dimension, calculate velocities after collision.	03
(viii)	A ball of mass 100 g is thrown vertically upward at a	

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

	dimension, calculate velocities after collision.	
(viii)	A ball of mass 100 g is thrown vertically upward at a speed of $25ms^{-1}$. If no energy is lost, determine the height it would reach.	03
(ix)	Write any three characteristics of waves.	

APOLLO

Rotational and Circular Motion

Domain B: Mechanics

FBISE model paper | Section A Q18 | 0.5 marks

18.	In angular motion, the angles are expressed in radians because:	Radians are easier to measure	Radians being a ratio are more natural and consistent	Radians are smaller than degrees	Radians were used in ancient maths

FBISE model paper | Section A Q55 | 0.5 marks

55.	A skater is spinning rapidly on ice with angular speed **(ω_1 = 5rad/s)** having her arms tucked. Her initial moment of inertia is **($I_1 = 2kgm^2$)**. If she suddenly extends her arms outward, her moment of inertia becomes **($I_2 = 5kgm^2$).** What will be her new angular speed ω_2?	0.2 rad/s	5 rad/s	2 rad/s	0.5 rad/s

FBISE model paper | Section A Q56 | 0.5 marks

56.	A centripetal force is a force required to change a body's:	Mass	Speed	K.E.	Direction of motion

FBISE model paper | Section A Q61 | 0.5 marks

Scenario for MCQs # 61 to 64	**A city installs a giant Ferris wheel of 1m radius in a new amusement park. The wheel starts from rest and is uniformly accelerated by an electric motor until it reaches its full operating speed. The time to complete one revolution is 20 seconds.** 

61.	The angular velocity of the wheel will be expressed as:	$\frac{2\pi}{T}$	$\frac{T}{2\pi}$	$\frac{2\pi}{v}$	$\frac{2\pi}{f}$	○ ○ ○ ○

FBISE model paper | Section A Q62 | 0.5 marks

Scenario for MCQs # 61 to 64	**A city installs a giant Ferris wheel of 1m radius in a new amusement park. The wheel starts from rest and is uniformly accelerated by an electric motor until it reaches its full operating speed. The time to complete one revolution is 20 seconds.** 

62.	If the wheel turns through an angle **θ= 2rad,** what is the tangential distance covered by it?	2 m	1 m	0.2 m	0.1m	○ ○ ○ ○

FBISE model paper | Section A Q63 | 0.5 marks

Scenario for MCQs # 61 to 64	**A city installs a giant Ferris wheel of 1m radius in a new amusement park. The wheel starts from rest and is uniformly accelerated by an electric motor until it reaches its full operating speed. The time to complete one revolution is 20 seconds.** 

63.	A boy sitting in the wheel moves at a constant speed along a curved path. What can be concluded about the net force acting on the boy?	it is zero.	it is perpendicular to the direction of motion of boy.	it is parallel to the direction of motion of boy.	it is opposite to direction of motion of boy.	○ ○ ○ ○

Scenario for MCQs # 61 to 64	**A city installs a giant Ferris wheel of 1m radius in a new amusement park. The wheel starts from rest and is uniformly accelerated by an electric motor until it reaches its full operating speed. The time to complete one revolution is 20 seconds.** 

64.	During first **10 seconds** from rest, the wheel covers an angular displacement of **50 radians.** What will be the angular acceleration of the wheel?	0.1 rad/s^2	1.0 rad/s^2	1.7 rad/s^2	1.5 rad/s^2	○ ○ ○ ○

FBISE model paper | Section C Q9 OR | 6 marks

OR	What is moment of inertia? State and explain law of conservation of angular momentum.	2+1 +3

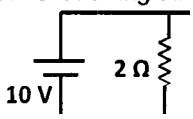
First Annual 2025 | Section B Q2(iv) OR | 3 marks

Earth completes its one rotation about its axis in 24 hours. Calculate angular velocity of earth about its axis in radian per second.	1+2

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

(xiv)	Derive the relation between torque, moment of inertia and angular acceleration.	**1x3**

First Annual 2025 | Section C Q6 | 6 marks

Q.6	Why does an astronaut feel weightless in space? How can artificial gravity be produced in a satellite? For a satellite derive expression for angular velocity, time period and frequency of satellite.	**1+1 +4**	**OR**	Find the current flowing thr circuit. 

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

What is meant by Gyroscope? Explain briefly.	03

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

A space ship has diameter of **8m** rotates about its axis to produce artificial gravity of magnitude **17.47ms^{-2}** in it. Calculate with which angular speed the satellite rotates?	03	OR	Differentiate between conservative and non-conservative forces. Give examples.	03
Derive the relation between torque, moment of			Derive the formula for Kinetic Energy [using the	

First Annual 2025 | Section C Q5 OR | 7 marks

OR	What is centripetal acceleration? Derive an expression for centripetal acceleration in terms of angular velocity "ω".	**1+6**

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

(i)	Derive the relation for centripetal acceleration (a_c) of on a body moving in a circle of radius r with velocity v.	**03**

Second Annual 2025 | Section C Q3 | 7 marks

Q.3	What is meant by angular momentum? Determine the angular momentum of a rigid body.	**2+5**
Q.4	Explain the origin of the forces between current	**4+3**

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

OR	The front wheel of a tractor travels 700 revolutions while the rear wheel 280 in a time interval of 40 seconds. Find their angular velocities.
	Drive a relationship between torque and angular

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

		seconds. Find their angular velocities.	
1.5 +1.5	OR	Drive a relationship between torque and angular acceleration.	03
1.5		What is meant by potential gradient? Derive its	

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

OR	Determine the equivalent value of 1 radian in degrees.	03
	Derive the relation between Torque and angular	

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

		degrees.	
2+1	OR	Derive the relation between Torque and angular acceleration.	03

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

	useful in automatic circuits?			instruments.	
(xiii)	The orbit of an electron revolving around the nucleus of an atoms is considered to be circular of radius 50 pm and the period of motion is 0.2 fs. Find out angular velocity of electron (ω).	03	OR	The electric field at a point due to a point charge is 26 N/C and the electric potential at that point is 13 J/C. Calculate the distance of the point from the charge.

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

xiv.	The force that acts on the body but it does no work is called:	Frictional force	Gravitational force	Centripetal force	Elastic force	○	○	○	○

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

xvi.	Moment of inertia of a spinning body about its axis does not depend on the:	Angular velocity of body	Mass of body	Orientation of the axis	Distribution of the mass around axis	○	○	○	○

(xii)	Two spheres A and B are of the same masses but the radius of A is greater than that of B. Which one will require more torque applied on it to bring into rotation about their axes of rotation?	03

FBISE model paper | Section C Q4 | 6 marks

Q.4	State law of conservation of angular momentum. Show that $\Delta L/\Delta t = 0$ and angular momentum L is conserved for an isolated system.	01+03 +02

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

How many radians account for circumference of a circle? How many steradians account for

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

velocity of $600 ms^{-1}$?

A string 1 m long is used to whirl a 100 g stone in a horizontal circle at a speed of $2\ ms^{-1}$. Find the tension in the string.

Show that the relation between maximum height

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

between two vectors?

Is it possible for a person to distinguish between a raw egg and a hard boiled one by spinning each on a table? Explain briefly.

To what height can a 400 W engine lift a 100 kg

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

Calculate escape velocity at surface of the moon.

Determine orbital speed of International Space Station (ISS), if its orbit is $4 \times 10^2\ km$ above surface of earth.

The moon revolves around the earth in almost a

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

(ISS), if its orbit is $4 \times 10^2\ km$ above surface of earth.

The moon revolves around the earth in almost a circle of radius 382400 km in 27.3 days. What is the centripetal acceleration?

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

(vii)	Derive the expression for centripetal acceleration $a_c = \frac{v^2}{r}$.	03

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

(viii)	What is orbital velocity? Derive the mathematical for orbital velocity.	1+2
(ix)	Derive the relation to determine the maximum Range	

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

OR	Briefly explain the phenomenon of weightlessness experienced by astronauts in orbit.	03
	In a ripple tank 50 waves passes through a certain	

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

	of reference level.	
OR	How the horizontal component of the normal force provides the required centripetal acceleration?	03

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

			of a projectile when launched horizontally.	
What is relation between linear and angular acceleration? Derive a mathematical expression.	03	OR	What is relation between Torque and Angular Momentum? Derive a mathematical expression.	1+2
Deriver the formula for kinetic energy.	03	OR	Explain work-energy theorem in a resistive medium.	1+2

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

			of a projectile when launched ho
What is relation between linear and angular acceleration? Derive a mathematical expression.	03	OR	What is relation between Momentum? Derive a mathemat

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

OR	Derive an expression of velocity of a Disc when it rolls down an inclined plane.	03
	With the help of one daily life example define damped	

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

	example.	
OR	Briefly explain angular velocity and angular acceleration. Also their formulas.	1.5 + 1.5

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

(x)	A body will be weightless when the elevator falls down just like a free falling body. Explain.	03
(xi)	Why the terminal speed of a parachutist after opening a	

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

	with it.	
(xiii)	What is torque? Explain why it is equal to the vector product of force and moment arm.	03
(xiv)	Differentiate between free and forced oscillations with	

	ends. What is the position of point of balance.	
Q.4	Define centripetal force and derive its relation.	06

APOLLO

Physics of Solids

Domain B: Mechanics

FBISE model paper | Section A Q15 | 0.5 marks

15.	A cable has a cross-sectional area of $\mathbf{0.025m^2}$. Calculate the stress it experiences when supporting a load of $\mathbf{5\times 10^5 N}$.	2×10^7 N/m^2	2×10^5 N/m^2	2.5×10^7 N/m^2	2.5×10^5 N/m^2	○ ○ ○ ○

FBISE model paper | Section A Q16 | 0.5 marks

16.	Two wires are identical having same length and same material. Wire A has twice the cross-sectional area of wire B. If same stretching force is applied to both wires, which statement correctly describes the deformation?	Wire A is stretched more	Wire B is stretched more	Both wires are stretched equally	Neither of the wires is stretched	○ ○ ○ ○