APOLLO

FBISE Physics Class 11
Topical workbook - Volume 2 of 3

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

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Physics of Solids

Domain B: Mechanics

FBISE model paper | Section A Q19 | 0.5 marks

19.	Which statement is true about glassy solids?	they have regular geometric shapes	they lack translational symmetry	they are long range ordered materials	they have sharp melting point

FBISE model paper | Section A Q22 | 0.5 marks

22.	A string is stretched by applying a force until it breaks. Which of the following statements justifies what the area under force-extension graph represents?	Stiffness of the string	Potential energy stored during deformation	Young's modulus	Extension in the string

FBISE model paper | Section A Q25 | 0.5 marks

25.	Which of the following correctly pairs **elastic deformation** with **plastic deformation?** (elastic; plastic)	Permanent; Temporary	Irreversible; Reversible	Long range; short range	Reversible; Irreversible

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

(iv)	Differentiate between crystalline solids and amorphous solids. (Give at least three differences.)	**03**

First Annual 2025 | Section C Q5 OR | 7 marks

OR	What is meant by elastic potential energy? Find a relation for the elastic potential energy of a material.	1+6

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

OR	Briefly describe the terms, *stress*, *strain* and *Young's modulus*.	03

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

(v)	What is meant by elastic potential energy? Give its mathematical form.	2+1	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	03

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

	kinetic energy of the ball just before striking the ground.				
(viii)	Briefly describe the elastic deformation and plastic deformation.	03	OR	Calculate the electric field intensity at a distance of 0.5 m from a point charge of 2×10^{-6} C in a vacuum.	03
	A current of 2 A is flowing in a copper conductor with				

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

	0.47 MeV.	
(xiv)	Distinguish between crystalline and amorphous solids.	1.5+ 1.5

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

03	OR	Distinguish between the terms elastic deformation and plastic deformation.	03

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

(vi)	Derive the relationship $P.E = \frac{1}{2}\left[\frac{YA}{L}\right]x^2$	03

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

(ii)	Give Comparison of amorphous and polymeric solids. (Three points)	1x3

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

(vi)	Briefly explain brittle and ductile materials. (In context of elastic and plastic deformation)	1.5 +1.5	OR	State first law of thermodynamics. Discuss its significance.
(vii)	Evaluate effect of air resistance on projectile motion			Briefly explain Magnus effect (an application of

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

(xi)	Briefly describe: a. Unit cell and its types b. Crystal lattice	2+1
(xii)	What is a light dependent resistor (LDR)? Why is LDR	

First Annual 2026 | Section C Q4 OR | 6 marks

	much water flows out in one second?	
OR	Briefly explain Elastic Potential Energy. Derive its mathematical formula.	**2+4**

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

vi.	A wire is stretched to double of its original length, its strain is	0.5	1	zero	2

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

(ii)	Define crystalline and amorphous solid.	03

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

(ix)	Two tuning forks of frequencies 456 Hz and 452 Hz are sounded together. How many beats are produced over a period of 10 second?	03	**OR**	A 40 kg mass is supported by 5 m long aluminium wire ($Y_A=7\times10^{10}$ Pa). To have same elongation in a copper wire of the same length under the same weight, find the diameter of copper wire. ($Y_C=12\times10^{10}$ Pa)	03

(vi)	Explain the stress strain curve for ductile material.	03

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Work and Kinetic Energy

Domain B: Mechanics

FBISE model paper | Section A Q13 | 0.5 marks

13.	Which of the following is the primary reason why friction is a non-conservative force?	It always does negative work	Its work depends on the path taken	It depends on the mass of the object	It acts only on moving objects	○ ○ ○ ○

FBISE model paper | Section A Q14 | 0.5 marks

14.	An object is dropped from a high cliff and experiences a constant air resistance force **(f)** during its fall. After falling through a vertical distance **(h)**, its kinetic energy increases by **(ΔK).** Which equation represents the correct relationship between these variables?	$\Delta K = mgh$	$\Delta K = (mgh + fh)$	$\Delta K = (mgh – fh)$	$\Delta K = (fh – mgh)$	○ ○ ○ ○

FBISE model paper | Section B Q3 OR | 4 marks

OR	What do you mean by conservative and non-conservative forces? Give two examples of each.	2+2

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

	to reach this velocity.	
(iii)	What is meant by 'conservative' and Non–conservative' forces? Give one example each.	03

First Annual 2025 | Section C Q4 OR | 6 marks

	ii) Range and maximum range of projectile	
OR	State work-energy theorem. Explain this theorem for resistive medium.	06

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

OR	What is meant by work? How can work done be calculated graphically by a variable force?	03

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

03	OR	Differentiate between conservative and non-conservative forces. Give examples.

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

OR	Derive the formula for Kinetic Energy [using the equations of motion]	**03**

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

	frequency.	
(vii)	A ball of mass 120 g is released from a height of 30 m. if the ball encounters an air resistance of 0.3 N, find the kinetic energy of the ball just before striking the ground.	**03**
(viii)	Briefly describe the elastic deformation and plastic	

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

	Calculate the distance of the point from the charge.	
OR	Differentiate between conservative and non-conservative forces.	**03**
	A proton is moving in a circular orbit of radius 12 mm	

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

(iv)	Differentiate between conservative and non-conservative forces with examples.	**03**
(v)	Calculate the resistance of wire 10 m long that has	

First Annual 2026 | Section C Q6 | 6 marks

Q.6	**a.** Derive the expression for Kinetic energy. **b.** State work energy theorem in a resistive medium.	**3+3**

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

	between the vectors.				
(iv)	In a science experiment a 3.00 kg water rocket, is launched from ground. The rocket's total energy at the top of its flight is 2352 J. **a.** What was the rocket's launching speed? **b.** What height did the rocket went?	**03**	**OR**	Find the power delivered by the engine for attaining velocity (3,4) ms^{-1} while it exerts a force (8, -2) N.	**03**
(v)	Calculate the resistance of a wire 10 m long that has			Differentiate between accuracy and precision of	

OR	A ball of 100gm is thrown vertically upward at a speed of 25m/s. If no energy is lost, determine the height it would reach. If the ball only rises to 25m, calculate the work done against the air resistance. Also calculate the force of friction.	**06**
	a. State postulates of special theory of relativity	

OR	In an experiment a 3kg water rocket is launched from ground. The rocket total energy at the top of its flight is 2352J. a. What was the rocket launching speed? b. What height did the rocket reach? c. What is the kinetic energy and potential energy of the rocket after 2.5s of its launch?	02+02 +02

momentum of the ball is:

Two bodies with kinetic energies in the ratio of 4 : 1, are moving with equal linear momentum, the ratio of their masses is:	1 : 2	1 : 1	4 : 1	1 : 4

The relation between the escape velocity

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

	momentum? Show mathematically.	
(v)	What is meant by work in Physics? Under what conditions work becomes positive and negative?	03
	Show that the work done by gravity on a body	

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

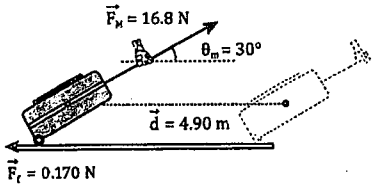
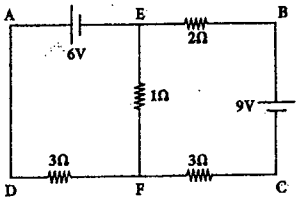
	conditions work becomes positive and negative?	
(vi)	Show that the work done by gravity on a body depends only on the initial and final positions, not on the path followed.	03

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

	Momentum? Derive a mathematical expression.
OR	Explain work-energy theorem in a resistive medium.

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

	acceleration? Derive a mathematical expression.				
(v)	Deriver the formula for kinetic energy.	03	OR	Explain work-energy theorem in a resistive medium.	1+2

				Calculate the distance between the charges.
Q.5	A girl is dragging a suitcase and pulls it a distance of 4.90 m along level ground. She is applying a constant force of 16.8N at 30° with the horizontal. A 0.170 N friction force opposes the suitcase's motion. Find **(a)** work done by Girl **(b)** work done by frictional force and **(c)** net work done by all the forces acting on the suitcase? 	07	OR	**a.** Derive the formula for combined resistance of two or more resistors in series. **b.** Calculate the current that flows in the 1Ω resistor in the following circuit. 
Q.6	Determine f_1, f_2 and f_3 for stationary waves in an open pipe.	2x3	OR	How is artificial gravity created to counter weightlessness. Determine linear velocity angular velocity, time period and frequency of artificial satellite.

- $V = IR$
- $I = \frac{P}{}$
- $F = \frac{kq_1q_2}{}$
- $1eV = 1.6\times10^{-19} J$
- $\vec{A}.\vec{B} = AB\cos\theta$
- $A = \pi r^2$
- $E = \frac{F}{}$

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

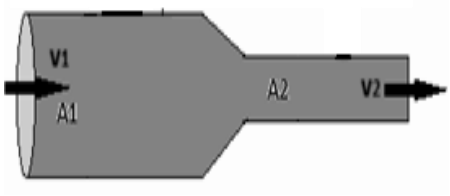
OR	Does the tension in the string of a swinging pendulum do any work? Explain.	03
	Smoke rises in a chimney when a breeze is blowing.	03

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Fluid Mechanics

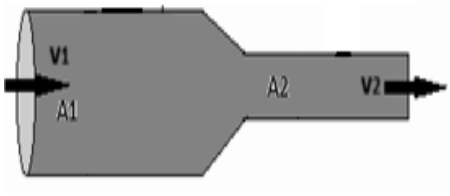
Domain B: Mechanics

FBISE model paper | Section A Q65 | 0.5 marks

Scenario for MCQs # 65 to 68	**A horizontal ventilation duct points smoothly from a wide inlet (A_1= 0.08m^2) to a narrow nozzle (A_2= 0.02m^2). Air flows continuously through the system, behaving as an ideal, incompressible fluid under steady-state conditions.** 

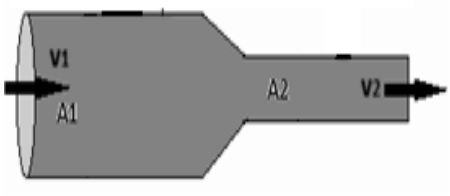
65.	The equation of continuity ($A_1v_1 = A_2v_2$) used to analyze this system is a statement of;	Law of conservation of mass	Law of conservation of energy	Law of conservation of momentum	Law of conservation of charge

FBISE model paper | Section A Q66 | 0.5 marks

Scenario for MCQs # 65 to 68	**A horizontal ventilation duct points smoothly from a wide inlet (A_1= 0.08m^2) to a narrow nozzle (A_2= 0.02m^2). Air flows continuously through the system, behaving as an ideal, incompressible fluid under steady-state conditions.** 

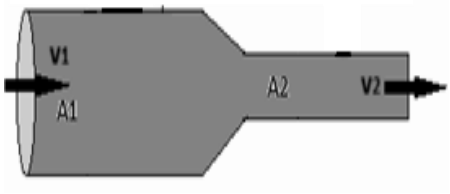
66.	How the flow rate of air passing through the wide inlet **(A_1)** can be compared to that passing through the narrow nozzle **(A_2)**?	It is greater at A_1	It is greater at A_2	It is equal in both parts	It is zero at A_1 and non-zero at A_2

FBISE model paper | Section A Q67 | 0.5 marks

Scenario for MCQs # 65 to 68	**A horizontal ventilation duct points smoothly from a wide inlet (A_1= 0.08m^2) to a narrow nozzle (A_2= 0.02m^2). Air flows continuously through the system, behaving as an ideal, incompressible fluid under steady-state conditions.** 

67.	As air moves from the wide pipe into the narrow nozzle, its internal pressure decreases. This is because:	Nozzle exerts extra force on air	The speed of air increases and its P.E decreases	K.E of molecules decreases due to friction	Density of air increases

FBISE model paper | Section A Q68 | 0.5 marks

Scenario for MCQs # 65 to 68	**A horizontal ventilation duct points smoothly from a wide inlet (A_1= 0.08m^2) to a narrow nozzle (A_2= 0.02m^2). Air flows continuously through the system, behaving as an ideal, incompressible fluid under steady-state conditions.** 

68.	If the air moves at **3 m/s** in the wide inlet (A_1), what will be its speed when it will exit the narrow nozzle (A_2)?	1.2 m/s	120 m/s	0.12 m/s	12 m/s

FBISE model paper | Section B Q3 | 4 marks

	the angle of diffraction. Explain why?	
3	Enlist the assumptions made about an ideal fluid.	04

FBISE model paper | Section B Q7 OR | 4 marks

	bright or dark interference pattern.	
OR	What is drag force? Mention three factors upon which it depends?	1+3

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

	What is meant by Magnus effect? Explain with the help of an example.	03

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

OR	When water falls from a tap, its cross-sectional area decreases as it comes down. Explain why?		03

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

What is meant by Magnus effect? Give its causes and effects.	03

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

OR	What is super fluidity? Give some of its applications.	2+1

First Annual 2025 | Section C Q4 | 6 marks

Q.4	State and explain terminal velocity. Derive its equation by using stoke's law.	**1+2 +3**	**OR**	What is meant by quark? Explain the quark family of particles.	**2+4**

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

03	**OR**	According to which principle ships float on water? Explain briefly.

Second Annual 2025 | Section C Q5 | 7 marks

Q.5	Explain the working of venturi meter. Give its mathematical form. Draw its sketch.	**07**
Q.6	Find Current flowing through each resistor using	**06**

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

OR	Distinguish between turbulent and streamline flow.	**03**

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

	Cyclic process	
	Describe the working of Atomizers in perfume bottles.	
OR		03

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

OR	What is meant by superfluid? How is superfluid made?	1.5 + 1.5

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

	graphically as well.	
(xiii)	Water flows through a 1cm diameter pipe with a speed of $1ms^{-1}$. What should be the diameter of the nozzle if the water is to emerge at $2.1ms^{-1}$?	03

First Annual 2026 | Section C Q4 | 6 marks

Q.4	a. State Bernoulli's equation. b. Derive velocity of efflux using Torricelli's theorem. Draw diagram as well.	1+3 +2
Q.5	a. Discuss working of a refrigerator	

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

	significance.	
OR	Briefly explain Magnus effect (an application of Bernoulli Effect). Draw diagram as well.	2+1
	Briefly discuss any three properties of an ideal fluid.	

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

	Bernoulli Effect). Draw diagram as well.	
OR	Briefly discuss any three properties of an ideal fluid.	1x3

First Annual 2026 | Section C Q3 OR | 6 marks

a. What is meant by polarization. **b.** Discuss one application of polarization. **c.** A polarized light of intensity I_o is passed through another polarizer whose axis makes an angle of $60°$ with the axis of the polaroid filter. What is the intensity of transmitted polarized light from second polaroid filter?	**1+2 +3**	**OR**	**a.** State Archimedes principle. **b.** A water storage tank in a residential area develops a small leak near its lower end. The top of the water in the tank is 10m above the point of the leak. **(i)** With what speed does the water rush from the hole? **(ii)** If the hole has an area of $0.080cm^2$, how much water flows out in one second?	**1+5**
Describe elastics collision in one dimension. Derive			Briefly explain Elastic Potential Energy. Derive its	

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

xi.	The radius at two ends of a pipe is in the ratio of 2:3,then the speed of liquid at the two ends is in the ratio of:	2:3	3:2	4:9	9:4

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

(iv)	Differentiate between conservative and non-conservative forces.	03	**OR**	How a steady flow is different from turbulent flow?	03

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

(vii)	Find the angle of projection of a projectile for which the maximum height and corresponding range are equal?	03	**OR**	An ideal liquid is flowing through a pipe of variable diameter as shown in figure. Where is pressure high (at position A or at B). Justify your answer. A  B	03

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

OR	Write the characteristics of an ideal fluid.	03

First Annual 2025 | Section A Q12 | 1 mark

Water level in a tank is 10m above leak point. Speed with which water emerges from leak is:	$10\ ms^{-1}$	$14.14\ ms^{-1}$	$194.14\ ms^{-1}$	$0.1\ ms^{-1}$

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

impact. What is the advantage of this design?
A cricket ball moves past an observer from left to right, spinning counter clockwise, in which direction the ball tend to deflect?
If an equation is dimensionally correct is that

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

1.9×10^{-5} kgm $^{-1}$ s $^{-1}$. Find settling speed of droplet in air.

From the top of a tall building, two tennis balls are dropped, one filled with air and the other with water. Which ball reaches terminal velocity first and why?

A spider swings in the breeze from a silk thread with

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

Water is flowing smoothly through a closed pipe system. At one point, the speed of water is $3ms^{-1}$, while another point **3m** higher, the speed is $4ms^{-1}$. At lower point the pressure is ***80kPa***. Find the pressure at the upper point.

A source of sound vibrates at 200 Hz and is receding

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

	A garden hose of inner radius 1.1 cm carries water at 2.50 m/s the nozzle at the end has radius 0.25 cm. How fast does the water emerge out through the nozzle?	03

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

(x)	Water is flowing smoothly through a pipe. At one point the pressure is 33.2 kPa and the speed of water 2 m/s. While at another point 2.3 m higher the pressure is 3.7 kPa, at what speed is the water flowing through this point?	03

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

	Simple Harmonic Motion (SHM).	
(xii)	How can a pressure difference arise due to different rates of fluid flow? Explain according to Bernoulli effect.	03
	What is the change in entropy of 50 g of water at 273K	

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

(vi)	Using Archemedes principle, prove that upthrust is equal to weight of the liquid displaced. (Diagram is not required)	03	OR	Discuss the working of aerofoil.	03
(vii)	Calculate the strain energy stored in a 1m long steel wire connected to the roof, holding a weight of 980N.			A copper wire has a length of 50 m and cross-sectional area of 1.5×10^{-6} m^2. The resistivity of copper is	03

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

OR	Discuss the working of aerofoil.	

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

(xii)	Velocity of water in 6 inch diameter pipe is $5 ft\, s^{-1}$. find the velocity in a 3 inch diameter pipe which connects with it.	03

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

	do any work? Explain.	
OR	Smoke rises in a chimney when a breeze is blowing. Use Bernoulli's principle to explain the formula.	03

First Annual 2026 | Section C Q6 | 6 marks

	amount of work done during each cycle.	
	Describe viscous drag. Also derive an expression for terminal velocity.	06

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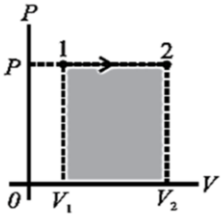
Density and Temperature

Domain C: Heat and Thermodynamics

FBISE model paper | Section A Q20 | 0.5 marks

20.	The temperature of a solid copper block increases from **20^oC to 30^oC.** What happens to the K.E. and P.E. of its particles?	K.E and P.E both increase	P.E decreases but K.E increases	K.E and P.E both decrease	P.E increases but K.E decreases

FBISE model paper | Section A Q21 | 0.5 marks

21.	Which one is true about the work done by an ideal gas at constant pressure as shown by the graph? 	W< 0	W = ∞	W> 0	W= 0

FBISE model paper | Section A Q26 | 0.5 marks

26.	The Boltzmann constant **k** is given by the expression:	$\frac{R}{N_A}$	$\frac{N_A}{N}$	$\frac{N_A}{R}$	$\frac{N}{N_A}$	○ ○ ○ ○

FBISE model paper | Section A Q49 | 0.5 marks

49.	Two systems (placed in contact with each other) are said to be in thermal equilibrium if:	they both have same mass.	no heat transfer between them.	they both have equal volume	they both are isolated from surroundings

FBISE model paper | Section A Q50 | 0.5 marks

50.	An increase in entropy leads to the "Degradation of energy"; This is because:	Energy is lost permanently	Total energy of universe has decreased	Total energy of system has decreased	Less energy is available for useful work

OR	In what ways a refrigerator operates as a heat engine working in reverse? Draw block diagram to show the direction of heat flow and work done.	3+1

8	Draw PV diagram for Carnot cycle. Discuss four processes involved in it using the diagram.	2+ 4	**OR**

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

A body at 200°C undergoes a reversible isothermal process. The heat energy removed in this process is 7300 J. Calculate the entropy change and discuss entropy sign.	03
What is meant by Magnus effect? Explain with the	

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

OR	Write three statements of second law of thermodynamic. (one in terms of entropy)	03

First Annual 2025 | Section C Q4 | 6 marks

Q.4	Explain the working of refrigerator. Also explain the coefficient of performance of refrigerator.	4+2

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

OR	Explain that increase in entropy means degradation of energy.	03

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

OR	Differentiate between reversible and irreversible processes. Also give examples.	03

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

	to use the bridge? (Elastic potential)	
	State three statements of second law of thermodynamics.(one in terms of entropy)	03

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

Calculate entropy change when 800g of ice melts at $0°C$, latent heat of fusion for ice is $3.36\times10^{5} J/kg$. Also discuss sign of entropy.	03

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

OR	Derive PV=kNT for an ideal gas.	03

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

(x)	Find the efficiency of a heat engine operating between 427 °C and 27 °C.	03

Second Annual 2025 | Section C Q3 OR | 7 marks

OR	State and explain the second law of thermodynamics. Also draw diagrams.	3+2 +2
OR	How does the frequency of sound of a source appear	4+2

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

	uncertainty in the density measurement.	
OR	In thermodynamics briefly describe: Reversible process Irreversible process Cyclic process	**1x3**
	Describe the working of Atomizers in perfume bottles	

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

		1.5
(xi)	State first law of thermodynamics. Briefly explain the term internal energy.	**1.5 + 1.5**

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

		1.5			
(xii)	Briefly explain the relationship between pressure and volume of a gas at constant temperature. Show it graphically as well.	2+1	OR	What is meant by superfluid? How is superfluid made?	1.5 + 1.5
(xiii)	Water flows through a 1cm diameter pipe with a speed			A stationary observer hears the sound of a car horn at	

First Annual 2026 | Section C Q5 | 6 marks

	theorem. Draw diagram as well.			discuss the direction of that force.	
Q.5	a. Discuss working of a refrigerator. b. How increase in Entropy means degradation of energy? Explain with an example.	3+3	OR	a. State Kirchoff's laws for current and voltage. b. There is a copper coil having 2000 turns with $0.8mm^2$ cross-section area, the length per turn is 80cm. Calculate the resistance of the coil	3+3

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

	measurements. (Give a graphical example)	
OR	State first law of thermodynamics. Discuss its significance.	**1+2**
	Briefly explain Magnus effect (an application of	

First Annual 2026 | Section C Q5 | 6 marks

	collision.	
Q.5	State working principle of Carnot's Engine. With the help of graph discuss its all four processes in detail.	**1+1 +4**

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

ii.	Maximum work is obtained by the process called:	Isochoric	Isothermal	Isobaric	Adiabatic

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

(vi)	Explain the stress strain curve for ductile material.	03	**OR**	Describe the limitation of first law of thermodynamics.	03

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

OR	State the process in which the internal energy of the system remains constant?	03

FBISE model paper | Section C Q3 OR | 6 marks

OR	Explain Carnot cycle. Derive the relation for the efficiency of Carnot engine.	03+03

First Annual 2025 | Section A Q17 | 1 mark

	are the example of:				
17.	For an ideal gas the internal energy is directly proportional to:	Pressure	Volume	Mass	Temperature

—— 1HA-I 25004 (OLD) ——

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

What happens to the temperature of room in which an air conditioner is left running on a table in the middle of a room?

First Annual 2025 | Section C Q5 | 7 marks

pendulum with uncertainty in it.

What is Carnot's engine? Explain its working and calculate its efficiency. Also state Carnot's theorem.

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

	used.	
	Briefly explain that increase in entropy means degradation of energy.	03

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

	Explain briefly:	
OR	A reversible engine works between two temperatures whose difference is 70°C. If it absorbs 770 J of heat from the source and rejects 570 J to the sink, calculate the temperature of the source and the sink.	03

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

(xiii)	What is the change in entropy of 50 g of water at 273K as it is changed into ice at 273K? Take the latent heat of fusion of ice = 336000 Jkg^{-1}.	1+2

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

(xiv)	25200 J of heat is supplied to the system while the system does 6000 J of work. Calculate the change in internal energy of the system.	03

Second Annual 2025 | Section C Q4 OR | 6 marks

OR	What is a Heat Engine? Discuss it with a diagram and the relation for its efficiency.	06

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

$\Delta L = 0.00059m$.		
Using Ideal Gas equation verify that PV = NkT	1.5 +1.5	OR

First Annual 2026 | Section C Q3 | 7 marks

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

Q.3	Explain Carnot Engine and Carnot Theorem with the help of its graph. Find the relation for its efficiency.	4+3

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

	energy? Explain with an example.	
OR	Briefly explain Isothermal process.	03

APOLLO

Waves

Domain D: Waves

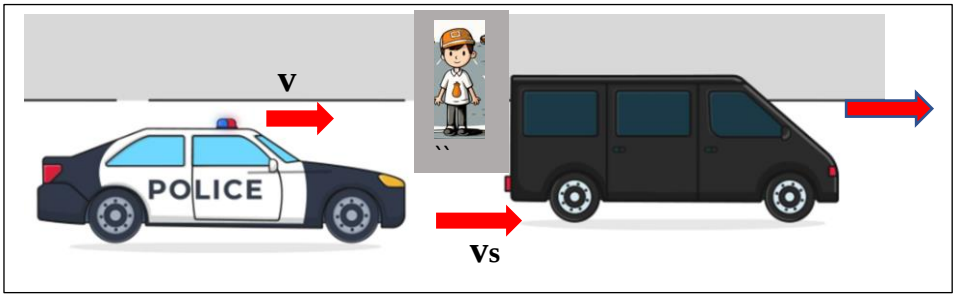
FBISE model paper | Section A Q23 | 0.5 marks

23.	A loud speaker emits sound waves with a power of **0.05 W**. The intensity of sound falling at an area **50.24 m^2** will be:	9.95×10^{-3} W/m^2	9.95×10^{-4} W/m^2	9.95×10^{-5} W/m^2	9.95×10^{-6} W/m^2

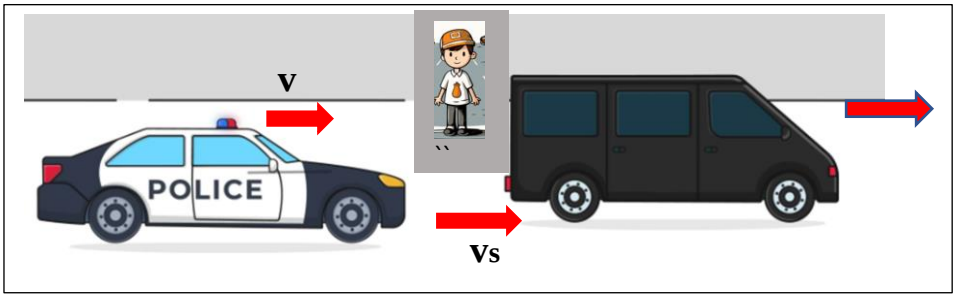
FBISE model paper | Section A Q24 | 0.5 marks

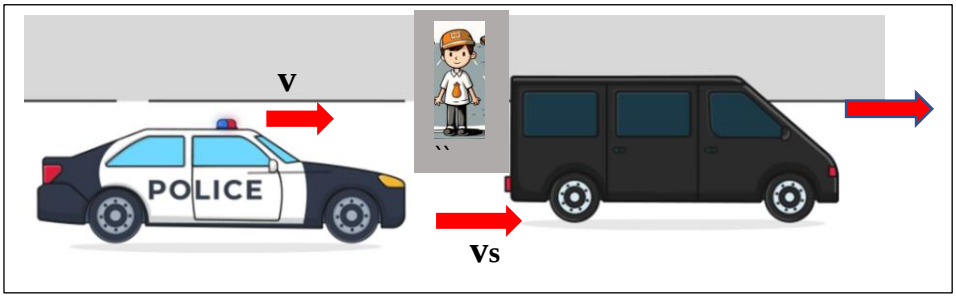
24.	While passing through a larger slit, diffraction of water waves will be:	less	most	more	negligible

FBISE model paper | Section A Q69 | 0.5 marks

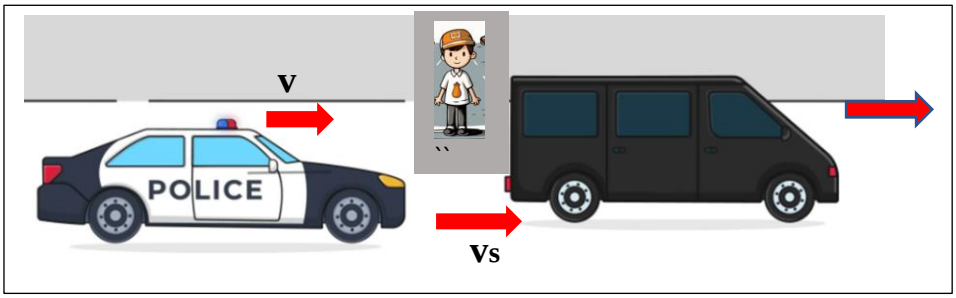
Scenario for MCQs # 69 to 72	**A police car is chasing 40 m/s a speedy car on a straight highway. The siren of police car is blaring at a constant frequency (f) of 600 Hz. The speedy car ahead is moving at a speed of 50 m/s (Speed of sound in air is v= 340 m/s).** 				
69.	The frequency of the siren heard by the speeding car driver will be:	lower	higher	same	medium

FBISE model paper | Section A Q70 | 0.5 marks

Scenario for MCQs # 69 to 72	**A police car is chasing 40 m/s a speedy car on a straight highway. The siren of police car is blaring at a constant frequency (f) of 600 Hz. The speedy car ahead is moving at a speed of 50 m/s (Speed of sound in air is v= 340 m/s).** 				
70.	The frequency of siren heard by the officer in police car is:	Greater than 600 Hz	Lower than 600 Hz	Exactly 600 Hz	Any value from 700 Hz to 1200 Hz

Scenario for MCQs # 69 to 72	**A police car is chasing 40 m/s a speedy car on a straight highway. The siren of police car is blaring at a constant frequency (f) of 600 Hz. The speedy car ahead is moving at a speed of 50 m/s (Speed of sound in air is v= 340 m/s).** 

71.	A person standing stationary by the road side, hears the siren as police car approaches. The frequency **f'** heard by this stationary person will be:	680 Hz	529 Hz	670 Hz	536 Hz

Scenario for MCQs # 69 to 72	**A police car is chasing 40 m/s a speedy car on a straight highway. The siren of police car is blaring at a constant frequency (f) of 600 Hz. The speedy car ahead is moving at a speed of 50 m/s (Speed of sound in air is v= 340 m/s).** 

72.	If the speedy car slows down and matches the police car's speed (both at 40 m/s), the frequency of sound observed by the speedy car's driver will be:	Same as original frequency of sound	Greater than original frequency of sound	Smaller than original frequency of sound	Speed of sound will decrease.

FBISE model paper | Section B Q5 | 4 marks

5	How beats are produced? Why sometimes beats are not heard as distinct sounds by the human ear?	2 + 2

FBISE model paper | Section B Q6 OR | 4 marks

OR	Explain how the path difference between two coherent waves determines whether they produce a bright or dark interference pattern.	2+2

FBISE model paper | Section C Q8 OR | 6 marks

2+ 4	**OR**	Illustrate that frequencies of stationary waves in a stretched string are quantized. Also discuss the physical significance of quantization in this situation.	4+2

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

How can ordinary light be polarized using polarizers?	03

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

(v)	The Doppler's effect is used in radar system. Briefly explain the working of radar system.	03

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

OR	To increase the intensity of wave by a factor of 10, calculate the required increase in amplitude of wave.	03

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

OR	What is meant by interference? Give conditions for interference.	1+2

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

OR	How is Doppler's effect helpful in diagnosis of cardiac diseases? Explain briefly.	03

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

OR	Can sound waves be polarized? Explain briefly.	03

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

	Also discuss sign of entropy.	
(xiii)	To increase intensity of waves by a factor of 25, calculate the required increase in amplitude of wave.	03

First Annual 2025 | Section C Q5 | 7 marks

Q.5	What are stationary waves? Discuss the formation of harmonics in stationary waves in an open organ pipe.	**1+6**
Q.6	Discuss and derive an expression for magnetic force	

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

(iii)	Differentiate between constructive and destructive interference of waves.	**1.5+ 1.5**

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

	b. How long a time it stays in the air?	
OR	Briefly explain the applications of Doppler Effect in radar and astronomy.	1.5+ 1.5
	A projectile is launched horizontally from the top of a	

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

	launch velocity.	
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

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

OR	Briefly describe the phenomenon of polarization in transverse waves.	03

Second Annual 2025 | Section C Q4 OR | 6 marks

	Also draw diagrams.	4+2
OR	How does the frequency of sound of a source appear when it moves: **a.** Towards a stationary observer **b.** Away from a stationary observer	4+2
OR	What is meant by quark? Explain the quark family of	2+5

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

(x)	Compare constructive and destructive interference.	1.5 +1.5	OR

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

OR	A stationary observer hears the sound of a car horn at a frequency that is 15% higher than the horn's actual frequency. If the speed of sound is $343 ms^{-1}$, what is the speed of the car as it approaches the observer?	03

(Marks 24)