

IV. A copper wire of diameter 1.4 mm is stretched within its limit of proportionality by a tensile force of 220 N. The Young modulus of copper is $1.30 \times 10^{11} Pa$. What is the strain in the wire?

(Use $\pi = \frac{22}{7}$)

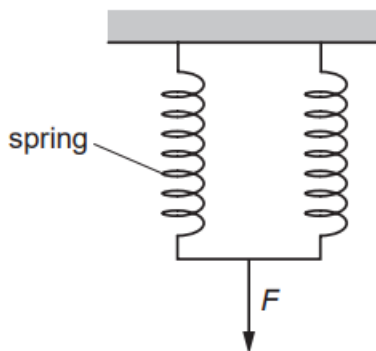
- A. 4.1×10^{-3}
 C. 1.1×10^{-4}

- B. 1.3×10^{-4}
 D. 1.1×10^{-3}

OR

V. A spring has spring constant k . The spring obeys Hooke's law and experiences extension x when a force F is applied to it. The resulting elastic potential energy of the spring is E_P . The diagram shows two of these springs joined together in parallel and hanging from a fixed beam. What is the extension and total elastic potential energy of this arrangement when the same force F is applied?

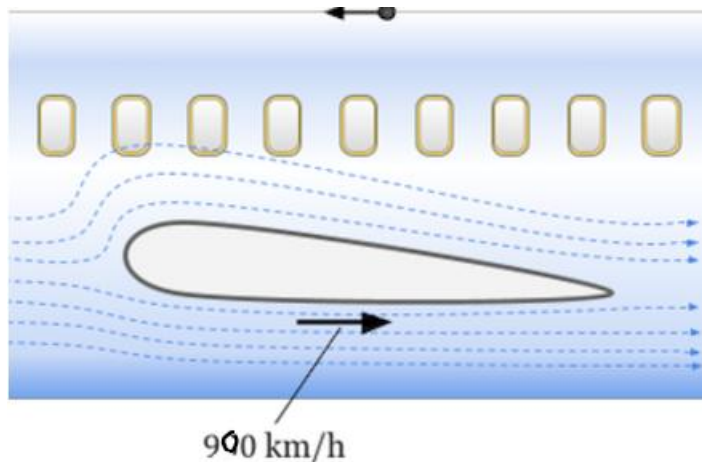
	extension	total elastic potential energy
A	$\frac{1}{2} x$	$\frac{1}{2} E_P$
B	$\frac{1}{2} x$	$\frac{1}{4} E_P$
C	x	$\frac{1}{2} E_P$
D	x	$\frac{1}{4} E_P$



Section - E

In case of internal choices, attempt any one of them.

10. i. State Bernoulli's theorem. Derive an expression for it.



ii. A loaded aircraft has a mass of $6.25 \times 10^5 Kg$ and wing area $125 m^2$. It's in level flight at a high speed. Air moves at $900 km h^{-1}$ past the bottom of the wing during flight. How fast does the air move relative to the top of the wing? (Density of air $\rho = 1.25 kg/m^3$ and take $g = 10 ms^{-2}$)

OR

i. What is capillarity? Derive an expression for the height to which the liquid rises in a capillary tube of radius r .

ii. The lower end of a capillary tube of diameter 2.0 mm is dipped 8.00 cm below the surface of water in a beaker. What is the pressure required in the tube in order to blow a hemispherical bubble at its end in water? The surface tension of water at temperature of the experiments is $7.30 \times 10^{-2} \frac{N}{m}$, 1 atmospheric pressure = $1.01 \times 10^5 Pa$, density of water = $1000 Kg m^{-3}$. Also calculate the excess pressure.



INDIAN SCHOOL SOHAR
UNIT TEST I - 2024-25
PHYSICS (042)
MARKING SCHEME

CLASS: XI

Max Marks: 20

DATE: 19-01-2025

Time: 45 Minutes

Q.No	Value Points	Score
1.	(a) 8 mm	1
2	(b) proportional to $h^{1/2}$	1
3	(c) $2\pi R^2 T$	1
4	(d) 55	1
5	(b)	1
6	(a)	1
7	<p>According to Wien's displacement law</p> $\lambda T = \text{constant}$ $\therefore \frac{T_1}{T_2} = \frac{\lambda_2}{\lambda_1} = \frac{480}{360} = \frac{4}{3}$ <p>Wien's displacement law states that the blackbody radiation curve for different temperatures peaks at a wavelength inversely proportional to the temperature.</p>	1 1
8	<p>Thermodynamic process during which temperature remains constant. Derivation: refer to TB</p>	1 2
9	<p>i. A ii. B iii. C iv. D OR v. A</p>	
10	<p>This states that, in a steady flow, the sum of all forms of energy in a fluid is the same at all points that are free of viscous forces. This requires that the sum of kinetic energy, potential energy and internal energy remains constant.</p> <p>Derivation:</p> $P_1 + \frac{1}{2}\rho v_1^2 = P_2 + \frac{1}{2}\rho v_2^2$ $\Rightarrow P_2 - P_1 = \frac{1}{2}\rho(v_1^2 - v_2^2)$ $\Rightarrow \frac{W}{A} = \frac{1}{2}\rho(v_1^2 - v_2^2)$ $\Rightarrow v_1^2 = \frac{2W}{\rho A} + v_2^2$ <p>Using the known values, we have,</p> $v_1^2 = \frac{2W}{\rho A} + v_2^2$	1 2 1

