



PHYSICS

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(ASSAMESE ENGLISH)

PROPERTIES OF SOLID

Example

1. What is elasticity ?



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2. what is stress ?



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3. What is longitudinal stress?



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4. what is normal stress ?



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5. what is hydraulic stress ?



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6. what is shearing strain ?



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7. Discuss about stress-strain curve .



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8. What is rigidity modulus ?



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9. What Is the potential energy of a stretched wire ?



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10. What is bulk modulus ?



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11. What is breaking point ?



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Exercise

1. What is inter - atomic force ?



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2. what is inter - molecular force ?



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3. what is the basic difference between the crystalline and amorphous materials?



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4. what are ductile and brittle substances ?



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5. what is elastomer?



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6. what is stress ?



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7. what is meant by elastic fatigue ?



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8. Define yield point and breaking stress ?



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9. what is poisson's ratio ?



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10. What is the unit of Young's modulus ?



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11. What is the SI unit of stress ?



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12. What is Hooke's law ?



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13. what do you mean by compressibility factor ?



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14. what is SI unit of compressibility ?



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15. Name the factors that decide the state of matter .



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16. State the behaviour of a wire under a varying load .



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17. What Is the potential energy of a stretched wire ?



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18. Discuss the important applications of elasticity .



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19. Define the terms stress and strain .



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20. 'steel is more elastic than rubber" - explain

.



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21. Explain the three states of matter in terms of inter - molecule forces . Explain the elastic property on the basis of inter - molecule forces .



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22. Define the terms stress and strain .



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23. State hooke's law and define the various moduli of elasticity .



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24. Define young's modulus and describe a method of measuring its value .



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25. The work done per unit volume in stretching a wire is equal to



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26. What is inter - atomic force ?



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27. If the inter - molecule potential energy is minimum at separation R_0 what prevents the

molecules of a substance from collapsing to the condensed state ?



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28. Does the nature of forces differ in solids and liquids ?



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29. Amorphous solids are not true solids .
Explain .



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30. In stretching a wire , work has to be done . What happens to this work ?



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31. What is more elastic - water or air ?



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32. The elasticity of glass is more than that of rubber - Explain .



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33. Springs are generally made of steel but not of copper and aluminium - explain the reason .



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34. For what stress will the strain be 1% of 0.1?

$$(\gamma = 12.4 \cdot 10^{11} \text{ Nm}^{-2})$$



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35. Two metallic wires of same length and same cross - section but different Young modulus are pulled by same force . Which wire will be elongated more ?



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36. Why are the bridges declared unsafe after long use ?



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37. Why do spring balances show wrong reading after long use ?



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38. The breaking force of a wire is F . What will be the breaking force for (i) Two parallel wires of same size and (ii) for a single wire of double thickness ?



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39. A steel wire 4 m in length and $2.4 \cdot 10^{-7} m^2$ in cross - section is stretched by a force of 36N . Calculate the stress and strain .





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40. The breaking stress of a material is $9.8 \cdot 10^6$ dynes /sq.cm. find the greatest length of the wire that could hang vertically without breaking (density = 10g/cc)



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41. A uniform steel wire of density 7.8 g/cc weighs 8 g and is 125 cm long . It lengthens by

0.6 mm when stretched by a force of 8 kg-wt .

Calculate young's modulus for steel .



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42. A rubber cord of radius 2 mm is loaded with a weight of 13 kg . Length of 50 cm is found to be extended to 51 cm . Calculate the young's modulus of rubber .



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43. A steel wire of diameter 2 mm is pulled to increase its length by 1% what is the restoring force developed in it if young's modulus for steel $2 \cdot 10^{12}$ dynes/ cm ² .



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44. Calculate the force required to increase by 1% length of a rod of cross -sectional area 10^{-3} m [Y = $1.2 \cdot 10^{12}$ Nm²]



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45. Two wires of same radius and length are subjected to the same load . One wire is of steel and the other is of copper . If the young modulus of steel is twice that of copper find the ratio of elastic energy stored per unit volume in steel to that of copper .



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46. A wire length L and cross sectional area A is made of material of Young's modulus Y . It is

stretched by an amount X . The work done is

A. $(YXA/2L)$

B. $(YX^2A)/L$

C. $\frac{1}{2} \frac{YX^2A}{L}$

D. $\frac{2YX^2A}{L}$

Answer: C



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47. The following four wires are made of same material and same tension is applied to them . Which one will have maximum increase in length ?

A. Length $L = 30$ cm and diameter $D = 1$ mm

B. $L = 50$ cm and $D = 0.5$ mm

C. $L = 200$ cm and $D = 2$ mm

D. $L = 300$ cm and $D = 3$ mm

Answer: B



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48. If S is the stress and Y is young's modulus of the material of a wire , then the energy stored in the wire per unit volume is

A. $\frac{1}{2} \frac{S^2}{Y}$

B. $2 \frac{Y}{S^2}$

C. $\frac{S}{2} Y$

D. $2S^2Y$

Answer: A





49. A wire suspended vertically from one end is stressed by attaching a weight of 200N to lower end the weight stretched the wire by 1 mm. the elastic energy stored the wire is

A. 20J

B. 0.1J

C. 0.2J

D. 10J

Answer: B



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50. what percentage of length of a wire will increase by applying the stress of 1 kg.wt/mm^2 on it ? ($Y = 10^{11} \text{ N/m}^2$), $1 \text{ Kg Wt} = 9.8 \text{ N}$

A. 0.0078%

B. 0.0088%

C. 0.0098%

D. 0.0067 %

Answer: C



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51. K is the force constant of a spring . The work done in extending it from l_1 to l_2 is

A. $K(l_2 - l_1)$

B. $k\{(l_1 + l_2)/2\}$

C. $k(l_2^2 - l_1^2)$

D. $\frac{k}{2}(l_2^2 - l_1^2)$

Answer: D



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52. The difference in properties of a substance in three states of matter depends on

- A. difference in molecular shape
- B. difference in inter - molecular forces
- C. binding energy atoms

D. none of these

Answer: B



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53. Inter - molecular forces are

A. short range

B. long range

C. attractive only

D. repulsive only

Answer: A



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54. The breaking stress for a wire of unit cross-sectional area is called its

- A. yield points
- B. tensile strength
- C. elastic fatigue
- D. elastic limit

Answer: B



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55. Bulk modulus is sometimes referred to as

- A. compressibility
- B. incompressibility
- C. ductility
- D. porosity

Answer: B



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56. A flat spiral spring is stretched by means of a small weight. The spring undergoes

- A. longitudinal strain and shear strain
- B. volume strain
- C. shearing strain
- D. none of these

Answer: C



57. The following four wires are made of same material and same tension is applied to them . Which one will have maximum increase in length ?

- A. Length $L = 0.5$ mm and diameter $D = 0.5$ mm
- B. $L = 1$ mm and $D = 1$ mm
- C. $L = 2$ m and $D = 2$ mm
- D. $L = 3$ mm and $D = 3$ mm

Answer: A



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58. The work done per unit volume in stretching a wire is equal to

A. stress*strain

B. $\frac{1}{2}$ stress * strain

C. stress /strain

D. strain/stress

Answer: A



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59. What Is the potential energy of a stretched wire ?

A. $\frac{1}{2}$ load * extension

B. load*strain

C. $\frac{1}{2}$ stress *strain

D. stress*strain

Answer: A



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60. A wire length L and cross sectional area A is made of material of Young's modulus Y . It is stretched by an amount X . The work done is

A. $YAX^2/2L$

B. YAX^2/L

C. $YAX/2L$

D. $2YAX^2/L$

Answer: A



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61. Two springs of spring constant 1500 Nm^{-1} and 3000 Nm^{-1} respectively are stretched with the same force that will have potential energy in the ratio

A. 1 : 2

B. 2 : 1

C. 1 : 4

D. 4: 1

Answer: B



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62. When a force is applied on a wire of uniform cross-sectional area $3 \times 10^{-6} \text{ m}^2$ and length 4m, the increase in length is 1 mm. Energy stored in it will be ($Y=2 \times 10^{11} \text{ N/m}^2$)

A. 6250J

B. 0.075J

C. 0.177J

D. 0.150J

Answer: B



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63. An iron bar of length L cross sectional A and young modulus Y is pulled by a force from ends so as to produce an elongation l . Which of the following statements is correct ?

A. $l \propto \left(\frac{l}{L}\right)$

B. $l \propto A$

C. $l \propto \left(\frac{1}{A}\right)$

D. $l \propto Y$

Answer: C



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64. A wire of length L and radius r is fixed at one end and a force F applied to the other end produces an extension l . the extension

produced in another wire of same material of length $2L$ and radius $2r$ by a force $2F$ is

A. l

B. $2l$

C. $l/2$

D. $4l$

Answer: A



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65. The breaking stress of wire depends on

- A. material of the wire
- B. length of the wire
- C. radius of the wire
- D. shape of cross section

Answer: A



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