



**NIRJA SAHAY DAV PUBLIC SCHOOL
GOSHALA COMPLEX, KANKE RANCHI**

HOLIDAY HOMEWORK

STD XI

SUBJECT: ENGLISH

SESSION: 2024-25

Let's be creative during "DEEPAWALI" break:

1. Read any Book of your choice and write book review.
(Suggested reading: The Canterville Ghost/ You Can Win/ The Power of Sub-conscious Mind/Rich Dad Poor Dad)
2. Choose a topic from amongst the following and prepare a research project:
 - (i) Technology & Students
 - (ii) Prevention of Drug Addiction
 - (iii) Decreasing Family Hours & Increasing Online Hours
 - (iv) Impact of Social Media on mental health.
3. Prepare a PPT on any one of the Chapters that you have read in Term II.
4. Update your notebooks with the chapters already dealt with in class for Term II w.r.t the following:
 - (i) Synopsis of the Chapter
 - (ii) Difficult words & meanings
 - (iii) Questions & Answers
5. Make a poster on any of the following topic:
 - (i) Water Conservation
 - (ii) Recycling & Waste Reduction
 - (iii) Social Justice & Equality.



NIRJA SAHAY DAV PUBLIC SCHOOL, KANKE, RANCHI-06

अवकाश गृह कार्य 2024 -25

कक्षा- ग्यारहवीं

विषय- हिंदी

1. बच्चे अपने माता-पिता की आज्ञा प्राप्त कर कोई भी पालतू पक्षी या जानवर जैसे कुत्ता, बिल्ली, तोता आदि पालें और उससे संबंधित जानकारी प्राप्त करें।
2. बच्चे अपने क्षेत्र की लोकगीत सुनें और जो गीत आपको बेहद पसंद आए उसका संग्रह कीजिए।
3. पढ़ाई -लिखाई ,खेलकूद आदि कार्य को पूर्ण कर मोबाइल फोन या इलेक्ट्रॉनिक गैजेट्स आदि से दूरी बनाने के लिए माता-पिता के साथ अधिक से अधिक समय बिताएँ और उनके कार्यों में सहयोग करें।
4. छुट्टियों में अपने पूरे परिवार के साथ कम से कम दो समय का भोजन अवश्य करें और अन्नदाता कृषक के महत्त्व , उनके कठिन परिश्रम के बारे में समझें और अपना खाना बेकार न करें।
5. खाना खाने के बाद अपनी प्लेटें खुद धोएँ ताकि आप इस तरह के कामों से मेहनत की कीमत समझेंगे। इसकी तस्वीर भी साझा करें।



NIRJA SAHAY DAV PUBLIC SCHOOL, KANKE, RANCHI-06

DEEPAWALI HOLIDAY HOMEWORK- 2024-25

CLASS - XI

SUBJECT- MATHEMATICS

1. Solve miscellaneous exercise of Conic Section.
2. Find equation of ellipse whose vertices are at $(\pm 5, 0)$ and foci at $(\pm 4, 0)$.
3. Find the equation of hyperbola such that distance between foci is 16 and eccentricity is $\sqrt{2}$.
4. Find equation of circle whose centre is at $(3, -2)$ and which passes through point of intersection of line $5x+7y=3$ and $2x-3y=7$.
5. Find equation of circle which passes through the point $(2, -2)$ & $(3, 4)$ and has its centre on the line $2x+2y=7$.
6. Evaluate $\lim_{x \rightarrow 0} \frac{\sin 2x + \sin 6x}{\sin 5x - \sin 3x}$.
7. Evaluate $\lim_{x \rightarrow 0} \frac{e^{3x} - e^{2x}}{x}$.
8. Evaluate $\lim_{x \rightarrow 0} \frac{3^{2+x} - 9}{x}$.
9. If $A(1, 4)$; $B(2, -3)$; $C(-1, -2)$ are vertices of ΔABC . Find –
 - (i) Equation of median through vertex B.
 - (ii) Equation of altitude through vertex A.
 - (iii) Perpendicular bisector of AC.



NIRJA SAHAY DAV PUBLIC SCHOOL, KANKE, RANCHI

HOLIDAY HOMEWORK SESSION: 2024-25.

STD XI

SUBJECT:

CHEMISTRY

- 1) Update entire study materials of chemistry
- 2) Update practical Notes book
- 3) Revised and learn all taught topics
- 4) Solve all solved questions of NCERT and unsolved questions of exercise.

Estd 1886

**NIRJA SAHAY DAV
PUBLIC SCHOOL,
KANKE, RANCHI,
JHARKHAND**



NIRJA SAHAY DAV PUBLIC SCHOOL

KANKE, RANCHI - 06

DIWALI HOLIDAY HOMEWORK, 2024-25

CLASS: XI

SUB: COMPUTER SCIENCE

1. Write a code in Python to accept 10 numbers and find the maximum value entered by user. It should display the maximum number after accepting 10 values.
2. Prepare a document file using MS Word on "Intellectual Property". (submit print out only)
3. Write a code in Python to remove vowels from a string.
4. Write a code in Python to input two tuples and swap their values.
5. Prepare a presentation on "List in Python" in Microsoft Powerpoint. Prepare it for Symposium also. (Submit print out and save it in a pen drive)

Note: Keep all above activities in a single file.



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HOLIDAY HOMEWORK

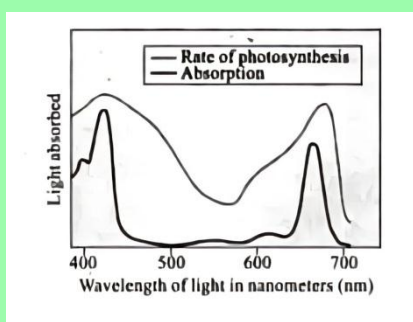
STD : XI

SUBJECT : BIOLOGY

SECTION:2024-25

Competency Based Questions (Topic:Photosynthesis & Respiration in Plant)

- Q.1. Which property of the pigment is responsible for its ability to initiate the process of photosynthesis? Why is the rate of photosynthesis higher in the red and blue regions of the spectrum of light?
- Q.2. In the figure given below, the light line indicates action spectrum for photosynthesis and the black line indicates the absorption spectrum of chlorophyll a, answer the following:



- What does the action spectrum indicate? How can we plot an action spectrum? Explain with an example.
 - How can we derive an absorption spectrum for any substance?
 - If chlorophyll a is responsible for light reaction of photosynthesis, why do the action spectrum and absorption spectrum not overlap?
- Q.3. What are the important events and end products of the light reaction?
- Q.4. What special anatomical features are displayed by leaves of C₄ plants? How do they provide advantage over the structure of C₃ plants?
- Q.5. Why is the RUBISCO enzyme more appropriately called RUBP Carboxylase-oxygenase and what important role does it play in photosynthesis.
- Q.6. Why less energy is produced during anaerobic respiration?
- Q.7. What is the importance of FoF₁ particles in ATP production during aerobic respiration?
- Q.8. Define respiratory quotient and mention the value for the proteins and fats.



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DEEPAWALI HOLIDAY HOMEWORK

STD : XI

SECTION:2024-25

SKILL SUBJECT : AGRICULTURE (808)

Competency Based Questions

Q.1. Prepare a repost on your visit to BAU focusing on dealt topics



(i) Mushroom Culture



(ii) Soil Biology

(iii) Bio Fertilizer



(iv) Horticulture



Q2. Complete write up of given topics in A4 sheets.

DPP - Daily Practice Problems

Chapter-wise Sheets

Date :

Start Time :

End Time :

PHYSICS

CP08

SYLLABUS : Mechanical Properties of Solids

Max. Marks : 180

Marking Scheme : (+4) for correct & (−1) for incorrect answer

Time : 60 min.

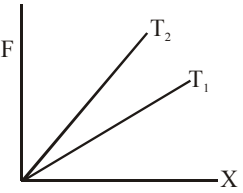
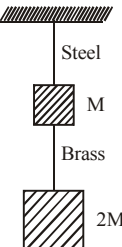
INSTRUCTIONS : This Daily Practice Problem Sheet contains 45 MCQs. For each question only one option is correct. Darken the correct circle/ bubble in the Response Grid provided on each page.

- Two wires A and B are of the same material. Their lengths are in the ratio 1 : 2 and the diameter are in the ratio 2 : 1. If they are pulled by the same force, then increase in length will be in the ratio
(a) 2 : 1 (b) 1 : 4 (c) 1 : 8 (d) 8 : 1
- The load versus elongation graphs for four wires of same length and made of the same material are shown in the figure. The thinnest wire is represented by the line
(a) OA (b) OC (c) OD (d) OB
- A spring of force constant 800 N/m has an extension of 5 cm. The work done in extending it from 5 cm to 15 cm is
(a) 16 J (b) 8 J (c) 32 J (d) 24 J
- A metal wire of length L_1 and area of cross-section A is attached to a rigid support. Another metal wire of length L_2 and of the same cross-sectional area is attached to the free end of the first wire. A body of mass M is then suspended from the free end of the second wire. If Y_1 and Y_2 are the Young's moduli of the wires respectively, the effective force constant of the system of two wires is
(a) $\frac{(Y_1 Y_2) A}{2(Y_1 L_2 + Y_2 L_1)}$ (b) $\frac{(Y_1 Y_2) A}{(L_1 L_2)^{1/2}}$
(c) $\frac{(Y_1 Y_2) A}{Y_1 L_2 + Y_2 L_1}$ (d) $\frac{(Y_1 Y_2)^{1/2} A}{(L_2 L_1)^{1/2}}$
- The approximate depth of an ocean is 2700 m. The compressibility of water is $45.4 \times 10^{-11} \text{ Pa}^{-1}$ and density of water is 10^3 kg/m^3 . What fractional compression of water will be obtained at the bottom of the ocean ?
(a) 1.0×10^{-2} (b) 1.2×10^{-2}
(c) 1.4×10^{-2} (d) 0.8×10^{-2}
- The Young's modulus of steel is twice that of brass. Two wires of same length and of same area of cross section, one of steel and another of brass are suspended from the same roof. If we want the lower ends of the wires to be at the same level, then the weights added to the steel and brass wires must be in the ratio of :
(a) 2 : 1 (b) 4 : 1 (c) 1 : 1 (d) 1 : 2
- Choose the wrong statement.
(a) The bulk modulus for solids is much larger than for liquids.
(b) Gases are least compressible.
(c) The incompressibility of the solids is due to the tight coupling between neighbouring atoms.
(d) The reciprocal of the bulk modulus is called compressibility.

RESPONSE
GRID

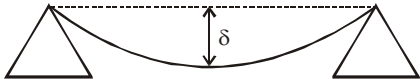
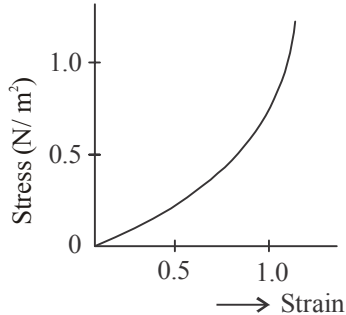
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|--------------------|--------------------|--------------------|--------------------|--------------------|
| 1. (a) (b) (c) (d) | 2. (a) (b) (c) (d) | 3. (a) (b) (c) (d) | 4. (a) (b) (c) (d) | 5. (a) (b) (c) (d) |
| 6. (a) (b) (c) (d) | 7. (a) (b) (c) (d) | | | |

Space for Rough Work

8. A copper wire of length 1.0 m and a steel wire of length 0.5 m having equal cross-sectional areas are joined end to end. The composite wire is stretched by a certain load which stretches the copper wire by 1 mm. If the Young's moduli of copper and steel are respectively $1.0 \times 10^{11} \text{ Nm}^{-2}$ and $2.0 \times 10^{11} \text{ Nm}^{-2}$, the total extension of the composite wire is :
 (a) 1.75 mm (b) 2.0 mm (c) 1.50 mm (d) 1.25 mm
9. A cube at temperature 0°C is compressed equally from all sides by an external pressure P . By what amount should its temperature be raised to bring it back to the size it had before the external pressure was applied. The bulk modulus of the material of the cube is B and the coefficient of linear expansion is α .
 (a) $P/B\alpha$ (b) $P/3B\alpha$ (c) $3\pi\alpha/B$ (d) $3B/P$
10. The diagram below shows the change in the length X of a thin uniform wire caused by the application of stress F at two different temperatures T_1 and T_2 . The variation shown suggests that
 (a) $T_1 > T_2$
 (b) $T_1 < T_2$
 (c) $T_2 > T_1$
 (d) $T_1 \geq T_2$
- 
11. If the ratio of lengths, radii and Young's moduli of steel and brass wires in the figure are a , b and c respectively, then the corresponding ratio of increase in their lengths is :
 (a) $\frac{3c}{2ab^2}$
 (b) $\frac{2a^2c}{b}$
 (c) $\frac{3a}{2b^2c}$
 (d) $\frac{2ac}{b^2}$
- 
12. The Young's modulus of brass and steel are respectively 10^{10} N/m^2 and $2 \times 10^{10} \text{ N/m}^2$. A brass wire and a steel wire of the same length are extended by 1 mm under the same force, the radii of brass and steel wires are R_B and R_S respectively. Then
 (a) $R_S = \sqrt{2} R_B$ (b) $R_S = R_B / \sqrt{2}$
 (c) $R_S = 4R_B$ (d) $R_S = R_B / 4$
13. Steel ruptures when a shear of $3.5 \times 10^8 \text{ N m}^{-2}$ is applied. The force needed to punch a 1 cm diameter hole in a steel sheet 0.3 cm thick is nearly:
 (a) $1.4 \times 10^4 \text{ N}$ (b) $2.7 \times 10^4 \text{ N}$
 (c) $3.3 \times 10^4 \text{ N}$ (d) $1.1 \times 10^4 \text{ N}$
14. A ball falling in a lake of depth 400 m has a decrease of 0.2% in its volume at the bottom. The bulk modulus of the material of the ball is (in N m^{-2})
 (a) 9.8×10^9 (b) 9.8×10^{10}
 (c) 1.96×10^{10} (d) 1.96×10^9
15. A circular tube of mean radius 8 cm and thickness 0.04 cm is melted up and recast into a solid rod of the same length. The ratio of the torsional rigidities of the circular tube and the solid rod is
 (a) $\frac{(8.02)^4 - (7.98)^4}{(0.8)^4}$ (b) $\frac{(8.02)^2 - (7.98)^2}{(0.8)^2}$
 (c) $\frac{(0.8)^2}{(8.02)^4 - (7.98)^4}$ (d) $\frac{(0.8)^2}{(8.02)^3 - (7.98)^2}$
16. Two wires are made of the same material and have the same volume. However wire 1 has cross-sectional area A and wire 2 has cross-sectional area $3A$. If the length of wire 1 increases by Δx on applying force F , how much force is needed to stretch wire 2 by the same amount?
 (a) $4F$ (b) $6F$ (c) $9F$ (d) F
17. In materials like aluminium and copper, the correct order of magnitude of various elastic moduli is:
 (a) Young's modulus < shear modulus < bulk modulus.
 (b) Bulk modulus < shear modulus < Young's modulus
 (c) Shear modulus < Young's modulus < bulk modulus.
 (d) Bulk modulus < Young's modulus < shear modulus.
18. What per cent of length of wire increases by applying a stress of 1 kg weight/ mm^2 on it?
 ($Y = 1 \times 10^{11} \text{ N/m}^2$ and 1 kg weight = 9.8 newton)
 (a) 0.0067% (b) 0.0098%
 (c) 0.0088% (d) 0.0078%
19. An elastic string of unstretched length L and force constant k is stretched by a small length x . It is further stretched by another small length y . The work done in the second stretching is :
 (a) $\frac{1}{2}ky^2$ (b) $\frac{1}{2}k(x^2 + y^2)$
 (c) $\frac{1}{2}k(x+y)^2$ (d) $\frac{1}{2}ky(2x+y)$
20. Two, spring P and Q of force constants k_p and k_Q ($k_Q = \frac{k_p}{2}$) are stretched by applying forces of equal magnitude. If the energy stored in Q is E , then the energy stored in P is
 (a) E (b) $2E$ (c) $E/2$ (d) $E/4$

RESPONSE
GRID

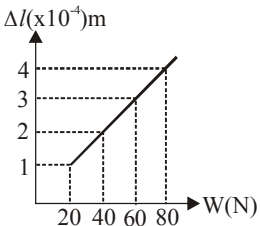
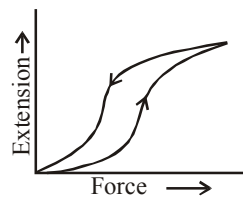
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|---------------------|---------------------|---------------------|---------------------|---------------------|
| 8. (a) (b) (c) (d) | 9. (a) (b) (c) (d) | 10. (a) (b) (c) (d) | 11. (a) (b) (c) (d) | 12. (a) (b) (c) (d) |
| 13. (a) (b) (c) (d) | 14. (a) (b) (c) (d) | 15. (a) (b) (c) (d) | 16. (a) (b) (c) (d) | 17. (a) (b) (c) (d) |
| 18. (a) (b) (c) (d) | 19. (a) (b) (c) (d) | 20. (a) (b) (c) (d) | | |

21. The pressure that has to be applied to the ends of a steel wire of length 10 cm to keep its length constant when its temperature is raised by 100°C is:
(For steel Young's modulus is $2 \times 10^{11} \text{ Nm}^{-2}$ and coefficient of thermal expansion is $1.1 \times 10^{-5} \text{ K}^{-1}$)
(a) $2.2 \times 10^8 \text{ Pa}$ (b) $2.2 \times 10^9 \text{ Pa}$
(c) $2.2 \times 10^7 \text{ Pa}$ (d) $2.2 \times 10^6 \text{ Pa}$
22. A steel ring of radius r and cross sectional area A is fitted onto a wooden disc of radius R ($R > r$). If the Young's modulus of steel is Y , then the force with which the steel ring is expanded is
(a) $AY(R/r)$ (b) $AY(R-r)/r$
(c) $(Y/A)[(R-r)/r]$ (d) Yr/AR
23. Two wires A and B of same material and of equal length with the radii in the ratio $1 : 2$ are subjected to identical loads. If the length of A increases by 8 mm, then the increase in length of B is
(a) 2 mm (b) 4 mm (c) 8 mm (d) 16 mm
24. A material has poisson's ratio 0.50. If a uniform rod of it suffers a longitudinal strain of 2×10^{-3} , then the percentage change in volume is
(a) 0.6 (b) 0.4 (c) 0.2 (d) Zero
25. The upper end of a wire of diameter 12mm and length 1m is clamped and its other end is twisted through an angle of 30° . The angle of shear is
(a) 18° (b) 0.18° (c) 36° (d) 0.36°
26. The pressure on an object of bulk modulus B undergoing hydraulic compression due to a stress exerted by surrounding fluid having volume strain $\left(\frac{\Delta V}{V}\right)^2$ is
(a) $B^2\left(\frac{\Delta V}{V}\right)$ (b) $B\left(\frac{\Delta V}{V}\right)^2$
(c) $\frac{1}{B}\left(\frac{\Delta V}{V}\right)$ (d) $B\left(\frac{\Delta V}{V}\right)$
27. A structural steel rod has a radius of 10 mm and length of 1.0 m. A 100 kN force stretches it along its length. Young's modulus of structural steel is $2 \times 10^{11} \text{ Nm}^{-2}$. The percentage strain is about
(a) 0.16% (b) 0.32% (c) 0.08% (d) 0.24%
28. A beam of metal supported at the two edges is loaded at the centre. The depression at the centre is proportional to

(a) Y^2 (b) Y (c) $1/Y$ (d) $1/Y^2$
29. When a 4 kg mass is hung vertically on a light spring that obeys Hooke's law, the spring stretches by 2 cms. The work required to be done by an external agent in stretching this spring by 5 cms will be ($g = 9.8 \text{ m/sec}^2$)
(a) 4.900 joule (b) 2.450 joule
(c) 0.495 joule (d) 0.245 joule
30. The length of a metal is ℓ_1 when the tension in it is T_1 and is ℓ_2 when the tension is T_2 . The original length of the wire is
(a) $\frac{\ell_1 + \ell_2}{2}$ (b) $\frac{\ell_1 T_2 + \ell_2 T_1}{T_1 + T_2}$
(c) $\frac{\ell_1 T_2 - \ell_2 T_1}{T_2 - T_1}$ (d) $\sqrt{T_1 T_2 \ell_1 \ell_2}$
31. For the same cross-sectional area and for a given load, the ratio of depressions for the beam of a square cross-section and circular cross-section is
(a) $3 : \pi$ (b) $\pi : 3$ (c) $1 : \pi$ (d) $\pi : 1$
32. The bulk moduli of ethanol, mercury and water are given as 0.9, 25 and 2.2 respectively in units of 10^9 Nm^{-2} . For a given value of pressure, the fractional compression in volume is $\frac{\Delta V}{V}$. Which of the following statements about $\frac{\Delta V}{V}$ for these three liquids is correct ?
(a) Ethanol > Water > Mercury
(b) Water > Ethanol > Mercury
(c) Mercury > Ethanol > Water
(d) Ethanol > Mercury > Water
33. The graph given is a stress-strain curve for

(a) elastic objects (b) plastics
(c) elastomers (d) None of these
34. A metal rod of Young's modulus $2 \times 10^{10} \text{ N m}^{-2}$ undergoes an elastic strain of 0.06%. The energy per unit volume stored in J m^{-3} is
(a) 3600 (b) 7200 (c) 10800 (d) 14400
35. Two wires of the same material and same length but diameters in the ratio $1 : 2$ are stretched by the same force. The potential energy per unit volume of the two wires will be in the ratio
(a) $1 : 2$ (b) $4 : 1$ (c) $2 : 1$ (d) $16 : 1$

RESPONSE
GRID

- | | | | | |
|---------------------|---------------------|---------------------|---------------------|---------------------|
| 21. (a) (b) (c) (d) | 22. (a) (b) (c) (d) | 23. (a) (b) (c) (d) | 24. (a) (b) (c) (d) | 25. (a) (b) (c) (d) |
| 26. (a) (b) (c) (d) | 27. (a) (b) (c) (d) | 28. (a) (b) (c) (d) | 29. (a) (b) (c) (d) | 30. (a) (b) (c) (d) |
| 31. (a) (b) (c) (d) | 32. (a) (b) (c) (d) | 33. (a) (b) (c) (d) | 34. (a) (b) (c) (d) | 35. (a) (b) (c) (d) |

Space for Rough Work

36. The length of an elastic string is a metre when the longitudinal tension is 4 N and b metre when the longitudinal tension is 5 N. The length of the string in metre when the longitudinal tension is 9 N is
 (a) $a - b$ (b) $5b - 4a$ (c) $2b - \frac{1}{4}a$ (d) $4a - 3b$
37. A force of 10^3 newton, stretches the length of a hanging wire by 1 millimetre. The force required to stretch a wire of same material and length but having four times the diameter by 1 millimetre is
 (a) 4×10^3 N (b) 16×10^3 N
 (c) $\frac{1}{4} \times 10^3$ N (d) $\frac{1}{16} \times 10^3$ N
38. A steel wire of length l and cross sectional area A is stretched by 1 cm under a given load. When the same load is applied to another steel wire of double its length and half of its cross section area, the amount of stretching (extension) is
 (a) 0.5 cm (b) 2 cm (c) 4 cm (d) 1.5 cm
39. The adjacent graph shows the extension (Δl) of a wire of length 1 m suspended from the top of a roof at one end with a load W connected to the other end. If the cross-sectional area of the wire is 10^{-6} m^2 , calculate the Young's modulus of the material of the wire :
- 
- (a) $2 \times 10^{11} \text{ N/m}^2$ (b) $2 \times 10^{-11} \text{ N/m}^2$
 (c) $3 \times 10^{-12} \text{ N/m}^2$ (d) $2 \times 10^{-13} \text{ N/m}^2$
40. If a rubber ball is taken at the depth of 200 m in a pool, its volume decreases by 0.1%. If the density of the water is $1 \times 10^3 \text{ kg/m}^3$ and $g = 10 \text{ m/s}^2$, then the volume elasticity in N/m^2 will be
 (a) 10^8 (b) 2×10^8 (c) 10^9 (d) 2×10^9
41. A ball is falling in a lake of depth 200 m creates a decrease 0.1 % in its volume at the bottom. The bulk modulus of the material of the ball will be
 (a) $19.6 \times 10^{-8} \text{ N/m}^2$ (b) $19.6 \times 10^{10} \text{ N/m}^2$
 (c) $19.6 \times 10^{-10} \text{ N/m}^2$ (d) $19.6 \times 10^8 \text{ N/m}^2$
42. The diagram shows a force-extension graph for a rubber band. Consider the following statements :
- 
- I. It will be easier to compress this rubber than expand it
 II. Rubber does not return to its original length after it is stretched
 III. The rubber band will get heated if it is stretched and released
- Which of these can be deduced from the graph:
 (a) III only (b) II and III (c) I and III (d) I only
43. The Poisson's ratio of a material is 0.5. If a force is applied to a wire of this material, there is a decrease in the cross-sectional area by 4%. The percentage increase in the length is:
 (a) 1% (b) 2% (c) 2.5% (d) 4%
44. Copper of fixed volume ' V ' is drawn into wire of length ' l '. When this wire is subjected to a constant force ' F ', the extension produced in the wire is ' Δl '. Which of the following graphs is a straight line?
 (a) Δl versus $\frac{1}{l}$ (b) Δl versus l^2
 (c) Δl versus $\frac{1}{l^2}$ (d) Δl versus l
45. When a 4 kg mass is hung vertically on a light spring that obeys Hooke's law, the spring stretches by 2 cms. The work required to be done by an external agent in stretching this spring by 5 cm will be ($g = 9.8 \text{ m/sec}^2$)
 (a) 4.900 joule (b) 2.450 joule
 (c) 0.495 joule (d) 0.245 joule

RESPONSE GRID	36. (a) (b) (c) (d)	37. (a) (b) (c) (d)	38. (a) (b) (c) (d)	39. (a) (b) (c) (d)	40. (a) (b) (c) (d)
	41. (a) (b) (c) (d)	42. (a) (b) (c) (d)	43. (a) (b) (c) (d)	44. (a) (b) (c) (d)	45. (a) (b) (c) (d)

DAILY PRACTICE PROBLEM DPP CHAPTERWISE CP08 - PHYSICS

Total Questions	45	Total Marks	180
Attempted		Correct	
Incorrect		Net Score	
Cut-off Score	50	Qualifying Score	70
Success Gap = Net Score – Qualifying Score			
Net Score = (Correct \times 4) – (Incorrect \times 1)			

Space for Rough Work

1. (c) We know that Young's modulus

$$Y = \frac{F}{\pi r^2} \times \frac{L}{\ell}$$

Since Y, F are same for both the wires, we have,

$$\frac{1}{r_1^2} \frac{L_1}{\ell_1} = \frac{1}{r_2^2} \frac{L_2}{\ell_2}$$

$$\text{or, } \frac{\ell_1}{\ell_2} = \frac{r_2^2 \times L_1}{r_1^2 \times L_2} = \frac{(D_2/2)^2 \times L_1}{(D_1/2)^2 \times L_2}$$

$$\text{or, } \frac{\ell_1}{\ell_2} = \frac{D_2^2 \times L_1}{D_1^2 \times L_2} = \frac{D_2^2}{(2D_2)^2} \times \frac{L_2}{2L_2} = \frac{1}{8}$$

So, $\ell_1 : \ell_2 = 1 : 8$

2. (a) From the graph, it is clear that for the same value of load, elongation is maximum for wire OA. Hence OA is the thinnest wire among the four wires.
3. (b) Small amount of work done in extending the spring by dx is

$$dW = k x dx$$

$$\therefore W = k \int_{0.05}^{0.15} x dx$$

$$= \frac{800}{2} [(0.15)^2 - (0.05)^2]$$

$$= 400 [(0.15 + 0.05)(0.15 - 0.05)]$$

$$= 400 \times 0.2 \times 0.1 = 8 \text{ J}$$

4. (c) Using the usual expression for the Young's modulus, the force constant for the wire can be written as $k = \frac{F}{\Delta l} = \frac{YA}{L}$ where the symbols have their usual meanings. Now the two wires together will have an

effective force constant $\left[\frac{k_1 k_2}{k_1 + k_2} \right]$. Substituting the corresponding lengths and the Young's moduli we get the answer.

5. (b) Compressibility of water,
 $K = 45.4 \times 10^{-11} \text{ Pa}^{-1}$
 density of water $P = 10^3 \text{ kg/m}^3$
 depth of ocean, $h = 2700 \text{ m}$

$$\text{We have to find } \frac{\Delta V}{V} = ?$$

As we know, compressibility,

$$K = \frac{1}{B} = \frac{(\Delta V/V)}{P} \quad (P = \rho gh)$$

$$\text{So, } (\Delta V/V) = K \rho gh$$

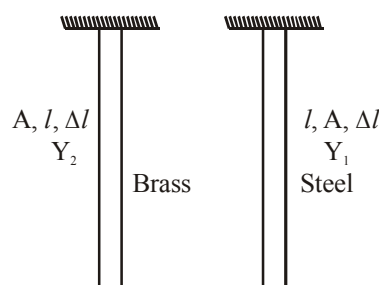
$$= 45.4 \times 10^{-11} \times 10^3 \times 10 \times 2700$$

$$= 1.2258 \times 10^{-2}$$

6. (a) Young's modulus $Y = \frac{W}{A} \cdot \frac{l}{\Delta l}$

$$\frac{W_1}{Y_1} = \frac{W_2}{Y_2}$$

[$\because A, l, \Delta l$ same for both brass and steel]



$$\frac{W_1}{W_2} = \frac{Y_1}{Y_2} = 2 \quad [Y_{\text{steel}}/Y_{\text{brass}} = 2 \text{ given}]$$

7. (b) Solids are least compressible whereas gases are highly compressible.

8. (d) $Y_c \times (\Delta L_c / L_c) = Y_s \times (\Delta L_s / L_s)$

$$\Rightarrow 1 \times 10^{11} \times \left(\frac{1 \times 10^{-3}}{1} \right) = 2 \times 10^{11} \times \left(\frac{\Delta L_s}{0.5} \right)$$

$$\therefore \Delta L_s = \frac{0.5 \times 10^{-3}}{2} = 0.25 \text{ mm}$$

Therefore, total extension of the composite wire =

$$\Delta L_c + \Delta L_s$$

$$= 1 \text{ mm} + 0.25 \text{ mm} = 1.25 \text{ mm}$$

9. (b) Bulk modulus $B = \frac{-P}{(\Delta V/V)} = \frac{-PV}{\Delta V} \quad \dots(1)$

$$\text{and } \Delta V = \gamma V \Delta T = 3\alpha \cdot V \cdot T \quad \text{or } \frac{-V}{\Delta V} = \frac{1}{3\alpha \cdot T} \quad \dots(2)$$

$$\text{From eqs. (1) and (2), } B = P/(3\alpha \cdot T) \quad \text{or } T = \frac{P}{3\alpha B}$$

10. (a) When same stress is applied at two different temperatures, the increase in length is more at higher temperature. Thus $T_1 > T_2$.

11. (c) According to questions,

$$\frac{\ell_s}{\ell_b} = a, \quad \frac{r_s}{r_b} = b, \quad \frac{y_s}{y_b} = c, \quad \frac{\Delta \ell_s}{\Delta \ell_b} = ?$$

$$\text{As, } y = \frac{F\ell}{A\Delta\ell} \Rightarrow \Delta\ell = \frac{F\ell}{Ay}$$

$$\Delta\ell_s = \frac{3mg\ell_s}{\pi r_s^2 \cdot y_s} \quad [\because F_s = (M + 2M)g]$$

$$\Delta \ell_b = \frac{2Mg\ell_b}{\pi r_b^2 \cdot y_b} \quad [\because F_b = 2Mg]$$

$$\frac{\Delta \ell_s}{\Delta \ell_b} = \frac{\frac{3Mg\ell_s}{\pi r_s^2 \cdot y_s}}{\frac{2Mg\ell_b}{\pi r_b^2 \cdot y_b}} = \frac{3a}{2b^2c}$$

12. (b) We know that $Y = FL/\pi r^2 \ell$ or $r^2 = FL/(Y\pi\ell)$

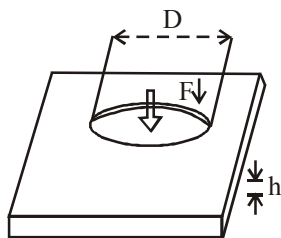
$$\therefore R_B^2 = FL/(Y_B\pi\ell) \text{ and } R_S^2 = FL/(Y_S\pi\ell)$$

$$\text{or } \frac{R_B^2}{R_S^2} = \frac{Y_S}{Y_B} = \frac{2 \times 10^{10}}{10^{10}} = 2$$

$$\text{or } R_B^2 = 2R_S^2 \text{ or } R_B = \sqrt{2} R_S$$

$$\therefore R_S = R_B/\sqrt{2}$$

13. (c)



Shearing strain is created along the side surface of the punched disk. Note that the forces exerted on the disk are exerted along the circumference of the disk, and the total force exerted on its center only.

Let us assume that the shearing stress along the side surface of the disk is uniform, then

$$F = \int_{\text{surface}} dF_{\text{max}} = \int_{\text{surface}} \sigma_{\text{max}} dA = \sigma_{\text{max}} \int_{\text{surface}} dA$$

$$= \int \sigma_{\text{max}} \cdot A = \sigma_{\text{max}} \cdot 2\pi \left(\frac{D}{2} \right) h$$

$$= 3.5 \times 10^8 \times \left(\frac{1}{2} \times 10^{-2} \right) \times 0.3 \times 10^{-2} \times 2\pi$$

$$= 3.297 \times 10^4 \approx 3.3 \times 10^4 \text{ N}$$

14. (d) Bulk modulus is given by, $k = \frac{F/A}{\Delta V/V}$

$$= \frac{mg}{A \left(\frac{\Delta V}{V} \right)} = \frac{h\rho g}{\left(\frac{\Delta V}{V} \right)}, \quad \left(\because \rho = \frac{m}{V}, V = A \times h \right)$$

$$\text{Given, } h = 400 \text{ m, } \frac{\Delta V}{V} = \frac{0.2}{100}$$

$$\text{and } \rho = 1 \times 10^3 \text{ kg/m}^3$$

$$\therefore k = \frac{400 \times 10^3 \times 9.8}{0.2/100} = 196 \times 10^7 \text{ N m}^{-2}$$

$$k = 1.96 \times 10^9 \text{ N m}^{-2}$$

15. (a) $C_1 = \frac{\pi\eta(r_2^4 - r_1^4)}{2\ell}$, $C_2 = \frac{\pi\eta r^4}{2\ell}$

Initial volume = Final volume

$$\therefore \pi[r_2^2 - r_1^2]\ell\rho = \pi r^2 \ell\rho$$

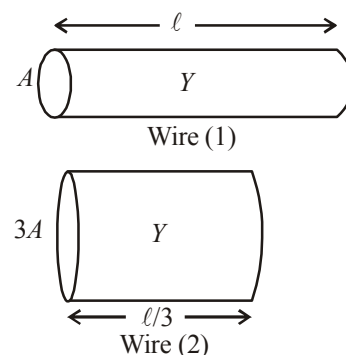
$$\Rightarrow r^2 = r_2^2 - r_1^2 \Rightarrow r^2 = (r_2 + r_1)(r_2 - r_1)$$

$$\Rightarrow r^2 = (8.02 + 7.98)(8.02 - 7.98)$$

$$\Rightarrow r^2 = 16 \times 0.04 = 0.64 \text{ cm} \Rightarrow r = 0.8 \text{ cm}$$

$$\therefore \frac{C_1}{C_2} = \frac{r_2^4 - r_1^4}{r^4} = \frac{[8.02]^4 - [7.98]^4}{[0.8]^4}$$

16. (c)



As shown in the figure, the wires will have the same Young's modulus (same material) and the length of the wire of area of cross-section $3A$ will be $\ell/3$ (same volume as wire 1).

For wire 1,

$$Y = \frac{F/A}{\Delta x/\ell} \quad \dots(i)$$

For wire 2,

$$Y = \frac{F'/3A}{\Delta x/(\ell/3)} \quad \dots(ii)$$

$$\text{From (i) and (ii), } \frac{F}{A} \times \frac{\ell}{\Delta x} = \frac{F'}{3A} \times \frac{\ell}{3\Delta x} \Rightarrow F' = 9F$$

17. (c) Poisson's ratio, $\sigma = \frac{\text{lateral strain } (\beta)}{\text{longitudinal strain } (\alpha)}$

For material like copper, $\sigma = 0.33$

And, $y = 3k(1 - 2\sigma)$

$$\text{Also, } \frac{9}{y} = \frac{1}{k} + \frac{3}{n}$$

$$y = 2n(1 + \sigma)$$

Hence, $n < y < k$

18. (b) Stress = $1 \text{ kg wt/mm}^2 = 9.8 \text{ N/mm}^2$
 $= 9.8 \times 10^6 \text{ N/m}^2$.

$$Y = 1 \times 10^{11} \text{ N/m}^2, \quad \frac{\Delta \ell}{\ell} \times 100 = ?$$

$$Y = \frac{\text{Stress}}{\text{Strain}} = \frac{\text{Stress}}{\Delta \ell / \ell}$$

$$\therefore \frac{\Delta \ell}{\ell} = \frac{\text{Stress}}{Y} = \frac{9.8 \times 10^6}{1 \times 10^{11}}$$

$$\frac{\Delta \ell}{\ell} \times 100 = 9.8 \times 10^{-11} \times 100 \times 10^6$$

$$= 9.8 \times 10^{-3} = 0.0098 \%$$

19. (d) $W_1 = \frac{1}{2} kx^2$

and $W_2 = \frac{1}{2} k(x+y)^2$

$$\therefore W = W_2 - W_1 = \frac{1}{2} k(x+y)^2 - \frac{1}{2} kx^2$$

$$= \frac{1}{2} ky(2x+y)$$

20. (c) Here, $k_Q = \frac{k_p}{2}$

According to Hooke's law

$$\therefore F_p = -k_p x_p$$

$$F_Q = -k_Q x_Q \Rightarrow \frac{F_p}{F_Q} = \frac{k_p x_p}{k_Q x_Q}$$

$$F_p = F_Q \text{ [Given]}$$

$$\therefore \frac{x_p}{x_Q} = \frac{k_Q}{k_p} \dots (i)$$

$$\text{Energy stored in a spring is } U = \frac{1}{2} kx^2$$

$$\therefore \frac{U_p}{U_Q} = \frac{k_p x_p^2}{k_Q x_Q^2} = \frac{k_p}{k_Q} \times \frac{k_Q^2}{k_p^2} = \frac{1}{2} \quad \left[\because k_Q = \frac{k_p}{2} \right]$$

$$\Rightarrow U_p = \frac{U_Q}{2} = \frac{E}{2} \quad [\because U_Q = E]$$

21. (a) Young's modulus $Y = \frac{\text{stress}}{\text{strain}}$

$$\text{stress} = Y \times \text{strain}$$

$$\text{Stress in steel wire} = \text{Applied pressure}$$

$$\text{Pressure} = \text{stress} = Y \times \text{strain}$$

$$\text{Strain} = \frac{\Delta L}{L} = \alpha \Delta T \text{ (As length is constant)}$$

$$= 2 \times 10^{11} \times 1.1 \times 10^{-5} \times 100 = 2.2 \times 10^8 \text{ Pa}$$

22. (b) Let T be the tension in the ring, then

$$Y = \frac{T \cdot 2\pi r}{A \cdot 2\pi(R-r)} = \frac{T r}{A(R-r)} \therefore T = \frac{Y A (R-r)}{r}$$

23. (a) Ratio of radii $r_1 : r_2 = 1 : 2$

$$\text{Ratio of area, } A_1 : A_2 = \pi r_1^2 : \pi r_2^2$$

$$A_1 : A_2 = 1 : 4$$

$$\text{Now, Stress}_1 : \text{Stress}_2 = 4 : 1$$

$$\text{So, Strain}_1 : \text{Strain}_2 = 4 : 1$$

$$\therefore \frac{l_1}{l_2} = \frac{4}{1} \Rightarrow 4l_2 = l_1 = 8$$

$$\therefore l_2 = 2 \text{ mm}$$

Increase in length of B is 2 mm.

24. (b) $\frac{dV}{V} = (1 + 2\sigma) \frac{dL}{L}$

$$\frac{dV}{V} = 2 \times 2 \times 10^{-3} = 4 \times 10^{-3}$$

$$\left[\because \sigma = 0.5 = \frac{1}{2} \right]$$

$$\therefore \text{Percentage change in volume} = 4 \times 10^{-1} = 0.4\%$$

25. (b) $r\theta = \ell\phi \Rightarrow \phi = \frac{r\theta}{\ell} = \frac{6 \text{ mm} \times 30^\circ}{1 \text{ m}} = 0.18^\circ$

26. (d) Bulk modulus $B = \frac{-dp}{\left(\frac{dV}{V}\right)}$

$$\therefore \text{Pressure, } dp = B \left(\frac{\Delta V}{V} \right)$$

27. (a) Given: $F = 100 \text{ kN} = 10^5 \text{ N}$

$$Y = 2 \times 10^{11} \text{ Nm}^{-2}$$

$$\ell_0 = 1.0 \text{ m}$$

$$\text{radius } r = 10 \text{ mm} = 10^{-2} \text{ m}$$

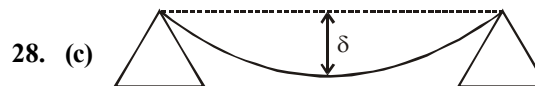
$$\text{From formula, } Y = \frac{\text{Stress}}{\text{Strain}}$$

$$\Rightarrow \text{Strain} = \frac{\text{Stress}}{Y} = \frac{F}{AY}$$

$$= \frac{10^5}{\pi r^2 Y} = \frac{10^5}{3.14 \times 10^{-4} \times 2 \times 10^{11}}$$

$$= \frac{1}{628}$$

$$\text{Therefore \% strain} = \frac{1}{628} \times 100 = 0.16\%$$



For a beam, the depression at the centre is given by,

$$\delta = \left(\frac{f L}{4 Y b d^3} \right)$$

[f, L, b, d are constants for a particular beam]

$$\text{i.e. } \delta \propto \frac{1}{Y}$$

29. (b) $K = \frac{F}{x} = \frac{4 \times 9.8}{2 \times 10^{-2}} = 19.6 \times 10^2$

Work done = $\frac{1}{2} \times 19.6 \times 10^2 \times (0.05)^2 = 2.45 J$

30. (c) If ℓ is the original length of wire, then change in length of first wire, $\Delta \ell_1 = (\ell_1 - \ell)$

change in length of second wire, $\Delta \ell_2 = (\ell_2 - \ell)$

Now, $Y = \frac{T_1}{A} \times \frac{\ell}{\Delta \ell_1} = \frac{T_2}{A} \times \frac{\ell}{\Delta \ell_2}$

or $\frac{T_1}{\Delta \ell_1} = \frac{T_2}{\Delta \ell_2}$ or $\frac{T_1}{\ell_1 - \ell} = \frac{T_2}{\ell_2 - \ell}$

or $T_1 \ell_2 - T_1 \ell = T_2 \ell_1 - \ell T_2$ or $\ell = \frac{T_2 \ell_1 - T_1 \ell_2}{T_2 - T_1}$

31. (a) $\delta = \frac{W \ell^3}{3 Y I}$, where W = load, ℓ = length of beam and I is geometrical moment of inertia for rectangular beam,

$I = \frac{b d^3}{12}$ where b = breadth and d = depth

For square beam $b = d$

$\therefore I_1 = \frac{b^4}{12}$

For a beam of circular cross-section, $I_2 = \left(\frac{\pi r^4}{4} \right)$

$\therefore \delta_1 = \frac{W \ell^3 \times 12}{3 Y b^4} = \frac{4 W \ell^3}{Y b^4}$ (for sq. cross section)

and $\delta_2 = \frac{W \ell^3}{3 Y (\pi r^4 / 4)} = \frac{4 W \ell^3}{3 Y (\pi r^4)}$
(for circular cross-section)

Now $\frac{\delta_1}{\delta_2} = \frac{3 \pi r^4}{b^4} = \frac{3 \pi r^4}{(\pi r^2)^2} = \frac{3}{\pi}$

($\because b^2 = \pi r^2$ i.e., they have same cross-sectional area)

32. (a) Compressibility = $\frac{1}{\text{Bulk modulus}}$

As bulk modulus is least for ethanol (0.9) and maximum for mercury (25) among ethanol, mercury and water.

Hence compression in volume $\frac{\Delta V}{V}$

Ethanol > Water > Mercury

33. (c) The given graph does not obey Hooke's law. and there is no well defined plastic region. So the graph represents elastomers.

34. (a) $U / \text{volume} = \frac{1}{2} Y \times \text{strain}^2 = 3600 J m^{-3}$

[Strain = 0.06×10^{-2}]

35. (d) Potential energy per unit volume of the wire is given by :

$u = \frac{1}{2} \frac{(\text{Stress})^2}{\text{Young's modulus}} = \frac{1}{2} \frac{S^2}{Y}$

As stress, $S = \frac{\text{Force}}{\text{Area}}$

$\therefore \frac{S_1}{S_2} = \left(\frac{F_1}{F_2} \right) \left(\frac{A_2}{A_1} \right)$

As $F_1 = F_2$ (Given)

$\therefore \frac{S_1}{S_2} = \left(\frac{F_1}{F_2} \right) \left(\frac{A_2}{A_1} \right) = \left(\frac{A_2}{A_1} \right) \dots (i)$

The two wires are of the same material, therefore their Young's moduli will be same i.e., $Y_1 = Y_2$

$\therefore \frac{u_1}{u_2} = \left(\frac{S_1}{S_2} \right)^2 = \left(\frac{A_2}{A_1} \right)^2$

$= \left(\frac{\pi \left(\frac{d_2}{2} \right)^2}{\pi \left(\frac{d_1}{2} \right)^2} \right)^2 = \left[\left(\frac{d_2}{d_1} \right)^2 \right]^2$

$= \left(\frac{d_2}{d_1} \right)^4 = \left(\frac{2}{1} \right)^4 = \frac{16}{1} \left(\because \frac{d_1}{d_2} = \frac{1}{2} \text{ (Given)} \right)$

36. (b) Using Hooke's law, $F = kx$ we can write

$4 = k(a - \ell_0) \dots (i)$

and $5 = k(b - \ell_0) \dots (ii)$

If ℓ be the length under tension 9N, then

$9 = k(\ell - \ell_0) \dots (iii)$

After solving above equations, we get

$\ell = (5b - 4a).$

37. (b) $F = Y \times A \times \frac{l}{L} \Rightarrow F \propto r^2$ (Y, l and L are constant)

If diameter is made four times then force required will be 16 times, i.e., $16 \times 10^3 N$

38. (c) Young's modulus of elasticity is

$Y = \frac{F / A}{\Delta L / L}$

$\therefore \Delta L = \frac{FL}{AY}$

So, $\Delta L \propto \frac{L}{A}$

$\therefore \frac{\Delta L_2}{\Delta L_1} = \frac{L_2}{L_1} \times \frac{A_1}{A_2} = \frac{2}{1} \times \frac{2}{1} = 4$

$\Delta L_2 = 4 \times \Delta L_1 = 4 \times 1 = 4 \text{ cm}$

$$39. (a) \quad y = \frac{F/A}{\Delta l/l} = \frac{F}{A} \cdot \frac{l}{\Delta l}$$

$$= \frac{20 \times 1}{10^{-6} \times 10^{-4}} = 2 \times 10^{11} \text{ Nm}^{-2}$$

$$40. (d) \quad K = \frac{\Delta P}{\Delta V/V} = \frac{h\rho g}{\Delta V/V} = \frac{200 \times 10^3 \times 10}{0.1/100} = 2 \times 10^9$$

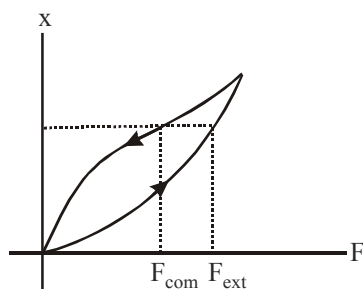
$$41. (d) \quad \text{Bulk Modulus} = \frac{dp}{\frac{dv}{v}}$$

$$dp = h\rho g = 200 \times 10^3 \times 9.8$$

$$\frac{dv}{v} = \frac{0.1}{100}$$

$$\text{Bulk modulus} = \frac{200 \times 10^3 \times 9.8}{0.1/100} = 19.6 \times 10^8 \text{ N/m}^2$$

42. (c)



From the figure, it is clear that

$$F_{\text{com}} < F_{\text{ext.}}$$

$$43. (d) \quad \frac{\Delta r/r}{\Delta l/l} = 0.5 = \frac{1}{2}, \frac{\Delta r}{r} = \frac{1}{2} \frac{\Delta l}{l}$$

$$44. (b) \quad \text{As } Y = \frac{\frac{F}{A}}{\frac{\Delta l}{l}} \Rightarrow \Delta l = \frac{Fl}{AY}$$

$$\text{But } V = Al \text{ so } A = \frac{V}{l}$$

$$\text{Therefore } \Delta l = \frac{Fl^2}{VY} \propto l^2$$

Hence graph of Δl versus l^2 will give a straight line.

$$45. (b) \quad K = \frac{F}{x} = \frac{4 \times 9.8}{2 \times 10^{-2}} = 19.6 \times 10^2$$

$$\text{Work done} = \frac{1}{2} \times 19.6 \times 10^2 \times (0.05)^2 = 2.45 \text{ J}$$