

# FUTA Post UTME Past Questions and Answers



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*Technology for Self Reliance*

## Physics Questions

- A boy runs 100 m due north and then 100 m due east. What is his displacement?

A. 200m 45°E                      B. 10,000m 45°E  
C.  $\sqrt{2}$ 00m 45°N                  D. 100 $\sqrt{2}$ m 45°N
- The speed of an air force jet was 400 m/s when it flew past an anti-aircraft gun. Calculate its distance from the gun 4 s later when the gun was fired

A. 100 m                      B. 1600 m  
C                                  D. 1600 km
- A mango fruit dropped to the ground from the top of a tree 40 m tall. Find how long it takes the fruit to reach the ground if acceleration due to gravity  $g = 10 \text{ m/s}^2$

A.  $2\sqrt{2}$  s                      B. 80 s  
C 4 s                              D. 2 s
- A 0.1-m long elastic band extends 5 mm when a load of 80 N is hung from its end Calculate the strain on the band

A. 5    B. 0.5    C. 0.05    D. 16
- Which of the following statements describes what happened when an ice block that floats in a glass of water that is filled to the brim melts?

A. The level of the water remains the same.  
B. There is a drop in the level of water in the glass due to condensation on its outside.  
C. The water in the glass overflows  
D. The water level drops because melted ice occupies less volume.
- A machine with a mass of 4 kg fires a 45 g bullet at a speed of 100 m/s. Find the recoil speed of the machine gun.

A. 1.1 m/s    B. 2 m/s    C. 3.5 m/s    D. 0 m/s
- Which of the following would you use to determine the weight of an object?

A. chemical balance            B. beam balance  
C. spring balance                D. weight balance
- The force that causes an object to move in a circular path is called

A. centrifugal force            B. centripetal force  
C. centre-seeking force        <C> none of the above
- A solid suspended by a piece of string is completely immersed in water. On attempting to lift the solid out of the water, the string breaks when the solid is partly out of the water. This is because

A. the tension in the string decreases as the solid is lifted  
B. the mass of the solid has increase  
C. the solid apparently weighs less when completely immersed in water than when partially immersed  
D. part of the solid still in water is exerting more force on the string
- The following statements were made by some students describing what happened during an experiment to determine the melting point of solids

  - The temperature of the solid was constant until melting started
  - The temperature of the solid rose until melting started
  - During melting, the temperature was rising
  - During melting, the temperature was constant
  - The temperature continued to rise after all the solid had melted
  - temperature stopped rising after the solid had melted

which of the following gives correct statements in the right order?



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- A. 2, 4 and 5                      B. 2, 3 and 6  
C. 1, 3 and 6                      D. 1, 3 and 5
11. When some grains of table salt were put in a cup of cold water, kept at constant temperature and left undisturbed, all the water tasted salty after some time. This is due to  
A. capillarity                      B. surface tension  
C. mixing                          D. diffusion
12. Given that the latent heat of fusion of ice is 80 cal/g, how much heat will change 100 g of ice at 0°C into water at the same temperature?  
A. 8 kcal                      B. 8 cal                      C. 800 cal  
D. 8000 kcal
13. A blacksmith dropped a 1.5 kg iron bead at 300°C into some quantity of water. If the temperature of the water rose from 15°C to 18°C, what is the mass of the water assuming no heat is lost to the surrounding? (Take the specific heat of iron as 0.46 J kg<sup>-1</sup> C<sup>-1</sup> and that of water as 4.2 × 10<sup>3</sup> J kg<sup>-1</sup> C<sup>-1</sup>)  
A. 15.44 kg    B. 194.58 g                      C. 15.44 g  
D. 194.58 kg
14. Which of the following properties are not those of a suitable thermometric liquid?  
I. It should be a good conductor of heat  
II. It should be opaque  
III Its expansion should be regular  
IV. It should wet glass  
V It should have a high melting point and low boiling point  
A. I and II    B. II and III  
C. III and IV    D. IV and V
15. A gas at pressure P<sub>1</sub> N/m<sup>2</sup> and temperature 30°C is heated to 61°C at constant volume. Find its new pressure.  
A. 1.1 N/m<sup>2</sup>    B. 1.2 P<sub>1</sub> N/m<sup>2</sup>  
C. 1.01 P<sub>1</sub> N/m<sup>2</sup>    D. 1.1 P<sub>1</sub> N/m<sup>2</sup>
16. A steel bar has a width of 10 cm at 50°C. At what temperature will it fit exactly into a hole of constant width 10.005 cm if coefficient of linear expansion of steel is 11 × 10<sup>-6</sup> C<sup>-1</sup>?  
A. 75°C    B. 0.005°C    C. 75.5°C    D. -75.5°C
17. The amount of heat that is required to raise the temperature of unit mass of a substance one degree Celsius is called  
A. Heat capacity                      B. thermal capacity  
C. Specific heat                      D. Heat energy
18. Two lamps rated 60 W and 240 V each are connected in series. What is the total power dissipated in both?  
A. 30W    B. 60W    C. 90W    D. 120W
19. Three 3 Ω resistors connected in parallel have a potential difference of 24 V applied across the combination. What is the current in each resistor?  
A. 8A    B. 3A    C. 24A    D. 4A
20. If PHCN charges 25 k per kWh, find the cost of operating for 36 hours a lamp requiring 1.5 A on a 240 V line.  
A. N324    B. N32.4    C. N3.24    D. N0.324
- 21.2 In order to convert a galvanometer to a voltmeter  
1 A. a low resistance shunt is connected in parallel  
· B. a low resistance shunt is connected in series  
C. a high resistance multiplier is connected in parallel  
D. a high resistance multiplier is connected in series



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22. Which of the following is not applicable to an ac generator?  
 A. Armature                      B. Commutator  
 C. Field magnet                D. Sliprings
23. A potential difference of 5 V is used to produce a current of 4 A for 4 hours through a heating coil. What is the heat produced?  
 A. 80 J   B. 4.8 kJ   C. 20 J   D. 4800 kJ
24. Determine the absolute temperature at which the Fahrenheit temperature is twice the Celsius temperature.  
 A. 299.82K    B. 433.15K  
 C. 273.25K    D. 406.35K
25. Which of the following law forms the basis of the thermometry?  
 A. Charles' and Gay-Lussac's law  
 B. First law of thermodynamics  
 C. Boyle's and pressure law  
 D. Zeroth law of thermodynamics
26. A 500m long aluminium chair expands when it was placed in the sun. Its temperature increases from 20°C to 60°C Determine its new length. [ $\alpha = 2.30 \times 10^{-5} \text{K}^{-1}$ ].  
 A. 500.46m    B. 456.65m  
 C. 540.28m    D. 460.32m
27. An electric heater which produces 900 W of power is used to vaporize water. How much water at 100°C can be changed to steam in 3 mins by the heater? [Heat of vaporization =  $2.26 \times 10^6 \text{ J/kg}$ , Specific heat capacity of water =  $4.2 \times 10^3 \text{ J/kg. K}$ ]  
 A. 0.0226 kg                      B. 0.275 kg  
 C. 0.072 kg                        D. 0.167 kg
28. The amount of heat required to produce unit temperature rise in a substance is called:  
 A. Latent heat    B. Heat capacity  
 C. Specific heat capacity  
 D. Specific latent heat
29. An ideal gas has a volume 100 cm<sup>3</sup> at 1x10<sup>5</sup> Pa and 27°C What is its volume at 2x10<sup>5</sup>Pa and 60°C?  
 A. 42.5 cm<sup>3</sup>                      B. 55.5 cm<sup>3</sup>  
 C. 50.2 cm<sup>3</sup>                      D. 40.5 cm<sup>3</sup>
30. Which of the following thermometer can be used to measure high temperature up to 1000°C?  
 A. Electrical thermometer    B. Pyrometer  
 C. Bimetal thermometer  
 D. Thermoelectric thermometer
31. 4000 J of heat is applied to a 1.5 kg silver pendant initially at temperature of 150°C Determine its final temperature [Latent heat =  $336 \text{ Jkg}^{-1}$ , specific heat capacity =  $233 \text{ J/kg. K}$ ].  
 A. 26.4°C                        B. 38.4°C  
 C. 41.5°C                        D. 15.5°C
32. The specific heat capacity of a substance depends on all the following except:  
 A. Mass of the substance  
 B. Change in temperature  
 C. Surface area of the substance  
 D. Energy needed
33. Which of the following quantities is a vector?  
 A. Mass    B. Velocity    C. Distance    D. Speed
34. A hose ejects water at 80 cl/s through a hole 2 mm in diameter. The water impinges on a wall and drops off without rebounding. What is the force on the wall?  
 A. 2.04 N    B. 240.0 N    C. 20.4 N    D. 24.0 N
35. A train travelling at 72 km/h undergoes a uniform retardation of 2 m/s when brakes are applied Find the distance travelled from the place where the brakes were applied



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- A. 10 m    B. 50 m    C. 100 m    D. 250 m
- 36.36. A force of 200 N pulls a sledge of mass 50 kg and overcomes a constant frictional force of 40 N. What is the acceleration of the sledge?  
A. 4.0 m/s    B. 50 m/s    C. 4.5 m/s    D. 3.2 m/s
- 37.37. An object A of mass 2 kg is moving with a velocity of 3 m/s and collides head-on with another object B of mass 1 kg moving in the opposite direction with a velocity of 4 m/s. Assuming the objects move off together after collision, calculate their common velocity.  
A. 0.67 m/s                      B. 0.50 m/s  
C. 0.35 m/s                      D. 0.55 m/s
- 38.38. In elastic collision, which of the following quantities is conserved?  
A. Kinetic energy    B. Potential energy  
C. Activation energy    D. Conservation energy
- 39.39. A weight of 20 N hangs from a fixed point by a light inextensible string. It is pulled aside by a horizontal force with the string inclined at an angle of  $30^\circ$  to the vertical. The tension in the string is  
A. 11 N    B. 40 N    C. 5 N    D. 30 N
- 40.40. A stone of mass 50 kg released from a height of 2 m above the ground. If the stone falls freely to a height of 5 m above the ground, its velocity is  
A. 19.6 m/s    B. 49.0 m/s    C. 17.15 m/s  
D. 39.2 m/s
- 41.41. Calculate the kinetic energy of a trolley of mass 40 kg moving with a velocity 0.5 m/s  
A. 20 J    B. 5 J    C. 15 J    <C> 10 J
- 42.42. A car of mass 500 kg accelerates from rest at  $1 \text{ m/s}^2$ . What is the total distance covered in 1 minute?  
A. 2000 m    B. 3600 m    C. 1800 m    D. 2400 m
43. Niagara falls are 50 m high. Calculate the potential energy of 0.1 cubic meter of water at the top relative to the bottom. Density of water is  $1000 \text{ kg m}^{-3}$ . Take  $g = 10 \text{ m/s}^2$   
A. 48 kJ    B. 50 kJ    C. 51 kJ    D. 61 kJ
44. A bullet of mass 15 g is fired from a rifle with a velocity 100 m/s. If the mass of the rifle is 1 kg. What is the recoil velocity of the rifle?  
A. 1.5 m/s    B. 1.8 m/s    C. 1.2 m/s    D. 2.1 m/s
45. A ball is thrown vertically upwards with a velocity of 30 m/s. Find the greatest height attained  
A. 40 m    B. 50 m    C. 55 m    D. 45 m
46. The tension in a rope pulling a log is 100 N, the mass of the log is 50 kg and the frictional force on the log is 20 N. What is the acceleration of the log?  
A.  $2 \text{ m/s}^2$     B.  $1.6 \text{ m/s}^2$     C.  $1.8 \text{ m/s}^2$     D.  $2.2 \text{ m/s}^2$
47. A body of mass 1 kg falls freely from rest through a height of 150 m. Calculate the velocity of the body when it strikes the floor ( $g = 10 \text{ m/s}^2$ ).  
A. 54.8 m/s    B. 45.2 m/s    C. 38.7 m/s    D. 65.8 m/s
48. A car moving with a velocity of 16 m/s accelerates uniformly at the rate of  $1 \text{ m/s}^2$  to reach a velocity of 20 m/s. Find the distance covered  
A. 85 m    B. 75 m    C. 82 m    D. 72 m
49. An athlete runs 100 m in 12 s. What is his speed in km/h?  
A. 33 km/h                      B. 36 km/h  
C. 30 km/h                      D. 27 km/h
50. Which of the following statements best describes the specific heat capacity of a substance?  
A. The quantity of heat required to produce a unit temperature rise;  
B. The random kinetic energy of the particles composing a system;



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- C. The quantity of heat required to change the temperature of a unit mass of the substance by one degree;  
D. The quantity of heat required to vaporise a unit mass of the substance at constant temperature.
51. Determine the temperature whose Fahrenheit and Kelvin scales have the same reading to the nearest degree.  
A. 273K B. 300K C. 500K D. > 574K
52. The SI unit of specific heat capacity of a substance is:  
A.  $\text{JK}^{-1}$  B.  $\text{Jkg}^{-1}\text{K}^{-1}$  C. Joules D.  $\text{Cal/g}^{\circ}\text{C}$
53. The density of nitrogen at standard temperature and pressure is  $1.251 \text{ kgm}^{-3}$ . Calculate the root mean square velocity of nitrogen molecules.  
A. 240 m/s B.  $1 \times 10^4$  m/s C. 340 m/s D. 493 m/s
54. Amalaria patient has a body temperature of  $98.6^{\circ}\text{F}$ . What is this temperature on the Celsius scale?  
A.  $37^{\circ}\text{C}$  B.  $20^{\circ}\text{C}$  C.  $32^{\circ}\text{C}$  D.  $35^{\circ}\text{C}$
55. Athermos bottle containing 250 g of coffee at  $90^{\circ}\text{C}$  is added with a 20 g of milk at  $5^{\circ}\text{C}$  After thorough mixing, what is the final temperature? c for water, coffee and milk is  $1.00 \text{ Cal/g}^{\circ}\text{C}$   
A.  $84^{\circ}\text{C}$  B.  $84^{\circ}\text{K}$  C.  $84^{\circ}\text{F}$  D.  $55^{\circ}\text{C}$
56. Determine the temperature  $T_f$  that results when 150 g of ice at  $0^{\circ}\text{C}$  is mixed with 300 g of water at  $50^{\circ}\text{C}$   
A.  $67^{\circ}\text{C}$  B.  $6.7^{\circ}\text{C}$  C.  $48^{\circ}\text{C}$  D.  $80^{\circ}\text{C}$
57. The only mode of heat energy transfer that needs no material medium is:  
A. Convection B. Radiation  
C. Conduction D. Thermal conduction
58. When heat energy is added to a system which of the following observations usually occur:  
(I) The internal energy of the system increases;  
(II) Work may be done on the surroundings;  
(III) The volume of system is directly proportional to the temperature.  
A. I and II only B. I, II and III C. III only  
D. None of the above.
59. The transfer of heat energy from one part of a body to another part without the actual movement of any part of the body is called convection.  
A. True B. False C. Neither true nor false  
D. I cannot tell.
60. Which of the following quantities are scalars?  
I. Mass II. Work III. force IV. Magnetic flux  
A. II and III only B. I and II only  
C. IV only D. I and IV only
61. A force  $(15\mathbf{i} - 16\mathbf{j} + 27\mathbf{k})\text{N}$  is added to a force  $(23\mathbf{j} - 40\mathbf{k})\text{N}$ . What is the magnitude of the resultant?  
A. 17N B. 28N C. 63N D. 21N
62. Which of the following statements is/are correct about an object in equilibrium under parallel forces?  
I. The total force in one direction equals the total force in the opposite direction.  
II. The body must not rotate.  
III The resolved components along the x-axis equals the resolved components along the y-axis.  
A. I and II only B. I, II and III  
C. II and III only D. I and III only.
63. A car moving with a speed of 90 km/h was brought to rest in 10 s by the application of the brakes. How far did the car travel after the brakes were applied  
A. 150 m B. 15 m C. 250 m D. 125 m
64. A metre rule is found to balance at the 48 cm mark. When a body of mass 60 g is suspended at the 6 cm mark, the balance point is found to be at the 30 cm



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- mark. Find the mass of the metre rule.  
A. 60 g B. 360 g C. 80 g D. 180 g.
65. A ball of mass 0.1 kg moving with a horizontal velocity of 15 m/s is shot into a wooden block of mass 0.4 kg lying at rest on a smooth horizontal surface. Find their common velocity after impact.  
A 15.0 m/s B. 3.8 m/s C. 7.5 m/s  
D.. 3.0 m/s
66. A body of mass 2 kg moves velocity of 10 m/s. Neglecting air resistance, determine the kinetic energy of the body.  
A. 200 N B. 200 J C. 100 J D. 100 N
67. Three forces of magnitude 15 N, 10 N and 5 N act on a particle in the direction which make  $120^\circ$  with one another. Find the resultant and the angle the resultant makes with the x-axis.  
A. 8.66 N,  $30^\circ$  B. 4.33 N,  $60^\circ$   
C. 7.4 N,  $45^\circ$  D. 2.52 N,  $60^\circ$
68. Which of the following statements best defines a couple?  
A. Two parallel and opposite forces acting on one another.  
B. Two equal forces acting in the same direction.  
C. Two parallel and opposite forces acting on a body whose lines of action do not coincide  
D. None of the above.
69. A force  $F = (5i + 3j)$ N acts on a body and causes a displacement  $r = (7i - j)$ m. Determine the work done.  
A. 53 J B. 32 J C. 35 J D. 21 J.
70. A force of 0.6 N acts on a body of mass 40 g, initially at rest. What is the resulting acceleration?  
A. 35 m/s<sup>2</sup> B. 40 m/s<sup>2</sup> C. 15 m/s<sup>2</sup>  
D. 25 m/s<sup>2</sup>
71. Which of the following statements is not correct about stable equilibrium?  
A. the body returns to its original position when it is slightly displaced and released  
B. a slight displacement raises its centre of gravity.  
C. a slight displacement lowers its centre of gravity.  
D. a slight displacement does not raise or lower its centre of gravity.
72. A body is projected vertically upwards with a velocity of 9.78 m/s. How high does it travel before it comes to rest momentarily at the top of its motion?. ( $g = 9.78$  m/s<sup>2</sup>)  
A. 2.45 m B. 4.89 m C. 6.89 m D. 9.78 m
73. Calculate the time taken for a car to cover a distance of 125 m if the initial speed is 5 m/s and it has a constant acceleration of 1.5 m/s<sup>2</sup>  
A. 8 s B. 10 s C. 15 s D. 12 s
74. Calculate the braking force to bring a body of mass 1 kg to rest from 25 m/s on a level ground in 60 m with uniform retardation.  
A. 5.2 N B. 5.5 N C. 5.6 N D. 5.0 N
75. A drop hammer is lifted to a height of 50 m above the ground and then allowed to fall from rest on to a forging at ground level. Calculate the downward velocity of the hammer when it strikes the forging. ( $g = 10$  m/s<sup>2</sup>)  
A. 10.95 m/s B. 25.8 m/s C. 31.6 m/s  
D. 35.5 m/s
76. A uniform rod of weight 10 N is balanced at a point 75 cm from the end B The pivot is removed to point 30 cm from A What force must be applied at A to balance the rod horizontally?  
A. 25 N B. 10 N C. 30 N D. 15 N
77. An equilateral triangular lamina has each side equal to 50 cm. How far is the centre of gravity



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- from each vertex?  
 A. 34.64 cm    B. 33.3 cm    C. 36.9 cm  
 D. 28.9 cm
78. A man can row a boat at 13 m/s in still water. If he aims at crossing to the opposite bank of a river flowing at 5 m/s, at what angle to the bank of the river must he row the boat?  
 A. 67.4o    B. 21o    C. 56.8o    D. 22.6o
79. The lower and upper fixed points of a thermometer are 30 mm and 180 mm respectively. Calculate the temperature in degrees Celsius when the thermometer reads 45 mm.  
 A. 10.0oC    B. 15.0oC    C. 20.0oC  
 D. 30.0oC
80. An immersion heater rated 400 W, 220 V is used to heat a liquid of mass 0.5 kg. If the temperature of the liquid increases uniformly at the rate of 2.5oC per second, calculate the specific heat capacity of the liquid assuming no heat loss,  
 A. 1100J/kg.K |    B. 320J/kg.K  
 C. 200J/kg.K    D. 176J/kg.K
81. A balloon filled with 1000 cm<sup>3</sup> of gas at 127oC and pressure of 70 cm Hg. If the pressure changes to 28 cm Hg and temperature to -23.3oC, calculate the new volume of the gas.  
 A. 136cm<sup>3</sup>    B. 218 cm<sup>3</sup>    C. 250 cm<sup>3</sup>  
 D. 485 cm<sup>3</sup>
82. A density glass bottle contains 44.25 g of a liquid at 0oC and 42.02 g at 50oC Calculate the real cubic expansivity of the liquid (Linear expansivity of glass =  $1.0 \times 10^{-5} \text{ K}^{-1}$ )  
 A.  $1.09 \times 10^{-3} \text{ K}^{-1}$     B.  $1.06 \times 10^{-3} \text{ K}^{-1}$   
 C.  $3.0 \times 10^{-5} \text{ K}^{-1}$     D.  $1.03 \times 10^{-3} \text{ K}^{-1}$
83. Which of the following properties is not used to measure the temperature of a substance?  
 A. variation of pressure with temperature  
 B. mass of a liquid  
 C. change in resistance of a conductor  
 D. change in colour with temperature
84. The clinical thermometer is characterized by having a  
 A. wide range of temperatures    B. wide bore  
 C. long stem    D. constriction
85. The amount of heat given out or absorbed when a substance changes its state at a constant temperature is know as  
 A. latent heat    B. heat capacity  
 C. specific heat capacity    D. specific latent heat
86. A block of aluminium is heated electrically by a 25 W heater. If the temperature rises by 10oC in 5 minutes, what is the heat capacity of aluminium?  
 A. 850J/K    B. 750J/K    C. 650J/K  
 D. 500J/K
87. In a gas experiment, if the volume of the gas is plotted against the reciprocal of the pressure, the unit of the slope of the resulting curve is:  
 A. power    B. work    C. temperature    D. force
88. Thermal equilibrium between two objects exist when:  
 A. the heat capacity of both objects are the same  
 B. one object loses heat continuously to the other  
 C. temperature of both objects are equal  
 D. the quantity of heat in both objects is the same.
89. A shepherd calling to fellow shepherd heard his voice reflected by a rock 3 s later. Calculate the velocity of sound in air if the rock is 510 m away.  
 A. 510 m/s    B. 1.5 m/s    C. 340 m/s    D. 170 m/s
90. An object 3 cm high placed on the axis of a converging lens form an image 30 cm from the lens.



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- If the focal length of the lens is 15 cm the height of the image is  
A. 3 cm    B. 1 cm    C. 6 cm  
D. none of the above
91. An object is placed between two plane mirrors inclined at  $60^\circ$  to each other. If the object is equidistant from each find the number of images formed  
A. 2    B. 3    C. 4    D. 6
92. Before frying, the volume of  $0.8 \text{ g/cm}^3$  vegetable oil was  $500 \text{ cm}^3$ . If the density of the oil was  $0.5 \text{ g/cm}^3$  after frying and there was no loss of oil due to spilling, what is the new volume of the oil?  
A.  $400 \text{ cm}^3$     B.  $800 \text{ cm}^3$     C.  $600 \text{ cm}^3$     D.  $200 \text{ cm}^3$
93. A 650 kg car that was initially at rest traveled with an acceleration of  $4 \text{ m/s}^2$ . Find its kinetic energy after 4 s.  
A. 5200 J    B. 31200 J    C. 83200 J    D. 832 kJ
94. The temperature at which the water vapour present in the air and begins to condense is called  
A. condensation point    B. dew point  
C. boiling point    D. critical point
95. Which of the following types of waves will travel through vacuum? I. light waves    II. sound waves  
III. Radio waves  
A. I only    B. I and II only    C. II and III only  
D. I and III only
96. In a simple pendulum experiment, a student increased the length of the inextensible string by a factor of 9. By what factor is the period increased?  
A. 3    B.  $1/3$     C. 2    D.  $1/2$
97. A vapour is said to be saturated when:  
A. the vapour of a substance is in equilibrium with its own liquid  
B. the vapour of a substance is in equilibrium with its own gas  
C. the vapour of a substance is in equilibrium with its own solid-liquid phase  
D. none of the above
98. A wave travels with a velocity of 360 m/s. If its wavelength is 120 cm then its period is:  
A. 0.0017 s    B. 0.33 s    C. 33 s    D. 1.7 s
99. The heights of the mercury thread in a mercury-in-glass thermometer when melting ice and then in steam are 2 cm and 22 cm respectively. What would be the height of the mercury thread at  $70^\circ$ ?  
A. 14 cm    B. 12 cm    C. 16 cm    D. 18 cm
100. An object is placed 45 cm in front of a concave mirror of focal length 15 cm. What the linear magnification produced?  
A.  $1/3$     B. 2    C. 3    D.  $1/2$
101. A man has five 40 W electric light bulbs, six 60 W bulbs and two 100 W bulbs in his house. If all the points are on for five hours daily and PHCN charges 12 k per unit, what is his bill for 30 days?  
A. N13.68    B. N0.46    C. N2.74  
D. none of the above
102. In a resonance tube experiment, the first resonance position is 16 cm when the velocity of sound in air is 327.68 m/s. Find the frequency of the tuning fork used  
A. 512 kHz    B. 256 Hz    C. 128 Hz    D. 512 Hz
103. Half-life of a radioactive substance is:  
A. the average life time of the substance  
B. the time it takes the substance to decay to half of its original quantity  
C. the time it takes the activity of the substance to



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- decay to half of its original value  
D. all of the above
104. The headlamp bulb of a motor car is rated 60 W, 12 V. Calculate the resistance of its filament.  
A. 0.2  $\Omega$  B. 5  $\Omega$  C. 2.4  $\Omega$  D. 2 V
105. In an electrolysis experiment, a cathode of mass 4.5 g weighs 4.52 g after a current of 4.5 A flows for 1 hour. The electrochemical equivalent of the deposited substance is:  
A. 0.00444 g/C B. 0.00741 g/C  
C. 0.00074 g/C D. 0.00007 g/C
106. An object falls freely under gravity from a given height. At half way point, its kinetic energy is:  
A. exactly half of its initial potential energy  
B. exactly half of its kinetic energy  
C. exactly half of its final potential energy  
D. zero
- 107.. The silvered walls of a vacuum flask are used to prevent:  
A. heat loss due to opacity  
B. heat loss due to radiation  
C. heat loss due to convection  
D. heat loss due to conduction
108. The law of universal gravitation states that:  
A. All bodies on the surface of the earth are attracted towards the centre of the universe  
B. Any two bodies attract each other with a force which is directly proportional to product of their masses and inversely proportional to the square of the distance between them.  
C. All bodies attract each other with a force which is directly proportional to product of their masses and inversely proportional to the square of the distance between them.
- D. Any two bodies attract each other with a force which is the product of their masses and inversely proportional to the distance between them.
109. The nucleus of an atom consists of:  
A. protons and neutrons B. protons and electrons  
C. electrons and neutrons  
D. electrons, protons and neutrons
111. A certain quantity of heat increases the temperature of 185 g of water from 10°C to 20°C and increases the temperature of an equal volume of 140 g of oil from 7°C to 18°C The ratio of the specific heat of the oil to that of water is:  
A. 0.83 B. 1.26 C. 1.07 D. 0.93
112. The motion of the pendulum bob is:  
A. rotational B. circulatory  
C. oscillatory D. none of the above
113. Which of the following is not one of the factors that affect the capacitance of a capacitor?  
A. temperature B. area of plates  
C. distance between the plate  
D. dielectric between the plates
114. Which of the following statements is true of gamma-rays?  
A. they are deflected by electric field  
B. they ionize intensely  
C. they carry no electric charge  
D. they originate outside the nucleus of the atom
115. The virtual image formed of an object placed 10 cm from a convex lens is 2. Find the focal length of the lens.  
A. 7.5 cm B. 15 cm C. 30 cm  
D. 10 cm
116. A milliammeter of resistance 2.5  $\Omega$  and full scale deflection of 50 mA is to be used to measure a



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- potential difference of 50 V. What is the resistance of the multiplier?  
A. 99.75  $\Omega$     B. 997.5  $\Omega$     C. 9975  $\Omega$     D. 9.98  $\Omega$
117. The ice and steam points of a mercury-in-glass thermometer of centigrade scale and of uniform bore correspond respectively to 3 cm and 23 cm lengths of the mercury thread. What is the temperature when the length of the mercury thread is 12 cm?  
A. 40°C    B. 60°C    C. 75°C    D. 45°C
118. When a ray of light passes from glass to air, it is:  
A. bent towards the normal  
B. away from the normal  
C. not deviated  
D. spread out in a pure spectrum
119. What is the resistance of the filament of an electric lamp rated 220 V, 100 W?  
A. 0.45  $\Omega$     B. 2.2  $\Omega$     C. 484  $\Omega$     D. 440  $\Omega$
120. Pressure cooker cooks faster because  
A. the inside is polished  
B. inside the cooker, the boiling point of water is raised  
C. inside the cooker, the boiling point of water is lowered  
D. inside the cooker, the pressure of water is raised
121. A gasoline generator is used to power ten 40 W lamps, five 60 W lamps and a musician's 1000 W amplifying system. If the generator runs for 5 hours, the energy used is  
A. 1.7 kWh    B. 8.5 kWh    C. 1.0 kWh  
D. none of the above
122. Which of the following statements is not true about sound waves?  
A. Sound waves are longitudinal waves  
B. Sound waves are transverse waves  
C. Sound waves are mechanical waves  
D. Sound waves can not propagate through vacuum
123. Which of the following statements is not true about the human eye?  
A. the focal length of its lens is fixed  
B. the focal length of its lens is variable  
C. image distance is fixed  
D. all of them
124. Hypermetropia can be corrected by using  
A. concave spectacle lenses  
B. convex spectacle lenses  
C. plano-concave spectacle lenses  
D. plano-convex spectacle lenses
125. In the astronomical telescope  
A. there are three convex lenses  
B. the eyepiece has a longer focal length than the objective  
C. the eyepiece has a shorter focal length than the objective  
D. the eyepiece and the objective have the same focal length
126. Which of the following apparatuses is not needed for the production of pure spectrum?  
A. source of light    B. rectangular glass block  
C. slit    D. convex lens
127. The principle of moment states that:  
A. Action and reaction are equal and opposite  
B. If a body is in equilibrium under the action of a number of parallel forces, sum of clockwise moment equals sum of anticlockwise moment  
C. If a body is in equilibrium under the action of a number of parallel forces, sum of clockwise moment about a point equals sum of anticlockwise moment about the same point.  
D. If a body is in equilibrium under the action of a number of parallel forces, all forces cancel out



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128. A uniform metre rule of mass 90 g is pivoted at the 40 cm mark. If the metre rule is in equilibrium with an unknown mass  $M$  placed at the 10 cm mark and a 72 g mass at the 70 cm mark, then  $M$  is  
A. 162 g    B. 30 g    C. 72 g    D. 102 g
129. A pole AB of length 10 m weighs 800 N and has its centre of gravity 4 m from the end A, and lies on horizontal ground. The least vertical force required to lift its end B is  
A. 320 N    B. 80 N    C. 2000 N    D. 20 N
130. A metre rule is found to balance horizontally at the 48 cm mark. When a body of mass 60 g is suspended at the 6 cm mark the balance point shifts to the 30 cm mark. The mass of the metre rule is:  
A. 1.33 g    B. 80 g    C. 3.33 g    D. 45 g
131. The elastic limit of a material is:  
A. the yield point  
B. the limit of stress within which the strain in the material completely disappears when the stress is removed  
C. a point at which a sudden increase in elongation occurs with only a small increase in tension.  
D. none of the above.
132. A 10 g mass placed on the pan of a spring balance causes an extension of 5 cm. If a 15 g mass is placed on the pan of the same spring balance, the extension produced is:  
A. 2.0 cm    B. 30.0 cm    C. 7.5 cm    D. 1.5 cm
133. Which of the following does not reduce surface of a liquid?  
I. addition of impurities like detergent or alum to the liquid  
II. heating the liquid  
III. cooling the liquid  
A. I only    B. II only    C. III only    D. I and II only
134. Which of the following is not an application of capillarity?  
A. sap from the soil rises up plant stem.  
B. kerosene rises up the wick of a lamp  
C. blotting paper absorbs ink  
D. none
135. Which of the following statements is not correct?  
A. electric charges can be produced by friction  
B. electric charges can be produced by induction  
C. electric charges can be produced by conduction  
D. none
136. Which of the following is not simple harmonic motion?  
A. The motion of the prongs of a sounding tuning fork  
B. The motion of an object suspended from the free end of a spiral spring  
C. The motion of the plucked string of a musical instrument  
D. The motion of Earth around the sun
137. The period of a body making simple harmonic motion is defined as:  
A. number of complete oscillation performed in one second  
B. time taken to make one complete oscillation  
C. time taken to make one oscillation  
D. the maximum displacement of the body from its equilibrium position
138. A machine gun fires a bullet with an initial velocity of 200 m/s at an angle of  $60^\circ$  to the horizontal. If  $g = 10 \text{ m/s}^2$ , the total time of flight of the bullet is:  
A. 34.64 s    B. 17.32 s    C. 51.96 s    D. 69.28 s
139. A bullet of mass 20 g is fired horizontally at a stationary wooden block of mass 380 g with a



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- velocity of 200 m/s. If the bullet embeds itself in the block, their common velocity is:  
 A. 10.0 m/s    B. 0.1 m/s    C. 4.0 m/s  
 D. 0.0 m/s
140. The velocity ratio of a simple machine is defined as:  
 A. the ratio of the distance moved by effort to the distance moved by load  
 B. the ratio of the distance moved by load to the distance moved by effort  
 C. the ratio of the useful work output of the machine to the total work input  
 D. none of the above
141. A machine has a velocity ratio of 6 and is 80% efficient. The effort needed to lift a load of 300 N with the aid of the machine is:  
 A. 4.8 N    B. 300 N    C. 62.5 N    D. 63.5 N
142. An open organ pipe has a length of 6 m. If the speed of sound in air is 340 m/s and neglecting the end-corrections, the frequency of its first overtone is  
 A. 56.67 Hz    B. 28.33 Hz    C. 85 Hz    D. 1.3 kHz
143. A piano wire 0.5 m long has a total mass of 0.01 kg and is stretched with a tension of 800 N. The frequency of its fundamental note is:  
 A. 400 Hz    B. 100 Hz    C. 200 Hz    D. 300 Hz
144. Two capacitors of  $8 \mu\text{F}$  and  $10 \mu\text{F}$  are connected in series to a 100 V dc supply. The charge on either plate of each capacitor is:  
 A.  $2.25 \times 10^{-1} \text{C}$     B. 4.4 C  
 C.  $4.4 \times 10^{-3} \text{C}$     D.  $4.4 \times 10^{-4} \text{C}$
145. A conductor of length 5 m carrying a current of 15 A is placed in a uniform magnetic field of flux density 0.25 T. If the conductor is placed at  $60^\circ$  to the field then the force on it is:  
 A. 18.75 N    B. 9 N    C. 16.24 N    D. 35 N
146. When an inclined plane of angle  $\theta$  is used as a simple machine, its velocity ratio is:  
 A.  $1/\cos \theta$     B.  $\cos \theta$     C.  $1/\sin \theta$     D.  $\sin \theta$
147. Which of the following statements is not true of a real image formed by a concave mirror?  
 A. It is inverted    B. It is erect  
 C. It can be observed on a screen    D. None
148. A 8 kg mass rests on an inclined plane. If the limiting frictional force 50 N and  $g = 10 \text{ m/s}^2$ , then the angle of inclination of the plane is:  
 A.  $37.8^\circ$     B.  $38.7^\circ$     C.  $87.3^\circ$     D.  $78.3^\circ$
149. Which of these gives the dimension of torque?  
 A. MLT    B. ML-1T    C. ML-1T-2  
 D. ML<sup>2</sup>T-2
150. An object of mass 80 kg is kicked above the ground and in 20 s it has reached a height of 600 cm. Calculate the power of the object.  
 A. 40 W    B. 240 W    C. 402 W    D. 204 W
151. Which of these statements is true?  
 A. Energy cannot be destroyed and cannot be transformed from one form to another  
 B. Momentum before impact is not necessarily equal to the momentum after impact  
 C. Impulse the product of force and time  
 D. In perfectly elastic collision, there is a small loss of energy.
152. A load of 2 tonnes is raised with 10 N efforts. Calculate the mechanical advantage of the machine with which the load is raised  
 A. 200 N    B. 0.20 N    C. 2000    D. 102
153. An object of mass 4000 g is 60 cm above the ground Calculate its kinetic energy 50 cm above the ground (Take  $g = 10 \text{ m/s}^2$ )  
 A. 4 J    B. 40 J    C. 4 N    D. 40 N



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154. A fast moving object of mass 200 g travels at 100 m/s and hits a block of wood of mass 2 kg. The two bodies moved together after impact. Find the velocity with which they moved together after collision.  
A. 9.09 m/s B. 90.9 m/s C. 0.910 m/s  
D. 1.96m/s.
155. Determine the distance traveled by a particle whose initial velocity is 48 km/h. The particle accelerated uniformly at the rate of 1.8 m/s<sup>2</sup> and attained a velocity of 72 km/h.  
A. 6.167 m B. 61.67 m C. 616.7 m  
D. 6167 m
156. An object floats in a liquid with one third of its volume above the liquid surface. Determine the density of the liquid, if the object density is 7100 kg/m<sup>3</sup> (Take  $g = 10\text{m/s}^2$ )  
A. 1056 kg/m<sup>3</sup> B. 1560 kg/m<sup>3</sup>  
C. 10650 kg/m<sup>3</sup> D. 15.60 kg/m<sup>3</sup>
157. A metal block of mass 2125 g displaces 250 cm<sup>3</sup> of water. What is its density?  
A. 8300 kg/m<sup>3</sup> B. 8800 kg/m<sup>3</sup>  
C. 8500 kg/m<sup>3</sup> D. 8700 kg/m<sup>3</sup>
158. A body starting from rest travels for 100 s with uniform acceleration of 1.5 m/s. What distance does it cover in the last 2 seconds?  
A. 27.0 m B. 26.2 m C. 29.8 m D. 30.8 m
159. A pile driver of mass 125 kg falls through a height of 80 m before striking the pile. What is its momentum at the instance it strikes the pile?  $g = 10\text{m/s}^2$   
A. 40 kg.m/s B. 5000 kg.m/s C. 1600 kg.m/s  
D. 5000 kg.m
160. A gun weighing 1500 kg fires a shot weighing 50 kg with a velocity 360 m/s. What is the recoil velocity of the gun?  
A. 14.0 m/s B. 12.0 m/s C. 11.0 m/s  
D. 13.0 m/s
161. A car of mass 1000 kg travels with a velocity 45 km/h on a rough road and it is brought to a rest after 10s. What is the force exerted on the car?  
A. 1333 N B. 1250 N C. 1282 N D. 1067 N
162. A bridge 100m long weighs 500 kN. A lorry weighing 100 kN is 25 m from one end of it. Find the force exerted at this support.  
A. 350 kN B. 300 kN C. 330 kN D. 325 kN
163. What is the kinetic energy of a rock of mass 220 g after it has fallen freely for 5 seconds?  $g = 10\text{m/s}^2$ .  
A. 350 J B. 225 J C. 275 J D. 250 J
164. When equal masses of iron and water are given equal quantity of heat, the piece of iron becomes much hotter than water after a shorter time because:  
A. the specific heat of iron is higher than that of water  
B. the specific heat of iron is lower than that of water  
C. iron is in solid state while water is in liquid state  
D. heat flows faster in solids
165. The speed of light in air is  $3.0 \times 10^8$  m/s. What is its speed in glass having a refractive index of 1.65?  
A.  $6.0 \times 10^8$  m/s B.  $4.95 \times 10^8$  m/s  
C.  $1.65 \times 10^8$  m/s D.  $1.82 \times 10^8$  m/s
166. Atmospheric pressure is  $1.0 \times 10^5$  N/m<sup>2</sup>. If the barometer liquid has a density of 1250 kg/m<sup>3</sup>, what is the minimum length of the tube required?  $g = 10\text{m/s}^2$ .  
A. 7.8 m B. 0.76m C. 8.0 m D. 10 m
167. Young's modulus for steel is  $2 \times 10^{11}$  N/m<sup>2</sup>. A



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- weight of 100 N hangs from a steel wire of length 3 m and cross-sectional area  $1.5 \times 10^{-6} \text{ m}^2$ . Calculate the extension is 0.25 mm, calculate the extension produced  
A. 1 mm    B. 1.5 mm    C. 0.1 mm    D. 0.15 mm
168. A load of 50 N is attached to one end of a long vertical wire of length 4 m and diameter 2.4 mm whose other end is fixed. If the extension is 0.25 mm, calculate the Young modulus of the material of the wire.  
A. 18 N/m<sup>2</sup>    B. 1800 N/m<sup>2</sup>    C. 180 N/m<sup>2</sup>  
D.  $1.8 \times 10^{11}$  N/m<sup>2</sup>
169. Which of the following statements is not true about friction force is not correct.  
A. The centre of gravity of a body is the point where the resultant force of attraction or weight of the body acts  
B. The lower the centre of gravity of a body the more stable the body is  
C. The higher the centre of gravity of a body the more stable the body is  
D. it is the point at which the weight of the body appears to be acting
170. A car travels with a constant velocity of 45 km/h for 10 s. What is the distance it covers in this time?  
A. 450 m    B. 400 m    C. 125 m    D. 45 m
171. A body is projected vertically upwards with a velocity of 9.78 m/s. How high does it travel before it comes to rest momentarily at the top of its motion?  
A. 4.89 m    B. 500 m    C. 48 m    D. 9.78 m
172. Which of the following statements is not true about the friction force?  
A. Friction always act in such a direction that opposes motion
- B. The limiting frictional force is dependent on the area of contact of the two surfaces  
C. until motion takes place, the frictional force is always equal to the force tending to produce the motion  
C. when motion takes place, the friction force is less than its limiting value.
173. A solid of mass 1 kg suspended by a string, is completely immersed in water. If the tension in the string is 5 N, calculate the upthrust on the solid. Take  $g = 9.78 \text{ m/s}^2$   
A. 8.0 N    B. 4.78 N    C. 47 N    D. 9.78 N
174. The resistance of a piece of wire of length 20 m, cross-sectional area  $8.0 \times 10^{-6} \text{ m}^2$  and resistivity  $4.0 \times 10^{-7} \Omega\text{-m}$  is:  
A. 0.5  $\Omega$     B. 1.0  $\Omega$     C. 5.0  $\Omega$     D. 10.0  $\Omega$
175. A force of 0.6 N acts on a body of mass 40 kg, initially at rest. What is the resulting acceleration?  
A. 24 m/s<sup>2</sup>    B. 0.6 m/s<sup>2</sup>  
C. 40 m/s<sup>2</sup>    D. 15 m/s<sup>2</sup>
176. An object of mass 10 kg is pulled over a rough surface by a 20 N force. The object accelerates at a rate of 1.5 m/s<sup>2</sup>. Determine the frictional force between the object and the surface.  
A. 30 N    B. 20 N    C. 2 N    D. 5 N
177. A body of mass 2 kg, moving with velocity 5 m/s collides with stationary body of mass 0.5 kg if the two bodies move together after impact, calculate their common velocity.  
A. 10 m/s<sup>2</sup>    B. 4 m/s<sup>2</sup>    C. 2.5 m/s    D. 0.5 m/s<sup>2</sup>
178. A body of mass 200 g and specific heat capacity 0.4 J/g.K cools from 37°C to 31°C. Calculate the quantity of heat released by the body.  
A. 4800 J    B. 1200 J    C. 480 J    D. 202 J



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179. The length of mercury thread when it is at  $0^{\circ}\text{C}$ ,  $100^{\circ}\text{C}$  and unknown temperature  $X^{\circ}\text{C}$  is 200 mm, 220 mm and 270 mm respectively. Determine the value of X.  
A.  $350^{\circ}\text{C}$  B.  $57^{\circ}\text{C}$  C.  $133^{\circ}\text{C}$  D.  $300^{\circ}\text{C}$
180. The linear expansivity of a substance is  $1.2 \times 10^{-4}/\text{K}$ . A cube of this substance has a volume of  $8.0 \times 10^3 \text{ cm}^3$  at  $30^{\circ}\text{C}$ . Calculate the increase in its volume at  $80^{\circ}\text{C}$   
A.  $48 \text{ cm}^3$  B.  $24 \text{ cm}^3$  C.  $96 \text{ cm}^3$  D.  $72 \text{ cm}^3$
181. At what temperature will the volume of a given ideal gas be three times its volume at  $0^{\circ}\text{C}$ ?  
A.  $273^{\circ}\text{C}$  B.  $300^{\circ}\text{C}$  C.  $546^{\circ}\text{C}$  D.  $819^{\circ}\text{C}$
182. A rectangular metal block of volume  $10^{-6} \text{ m}^3$  at  $273 \text{ K}$  is heated to  $573 \text{ K}$ . If its coefficient of linear expansion is  $12 \times 10^{-5}/\text{K}$ , what is the percentage change of its volume?  
A. 18 B. 1.8 C. 1.08 D. 1.2
183. Calculate the time taken, in minutes, to heat 2.0 kg of water from  $30^{\circ}\text{C}$  to  $100^{\circ}\text{C}$  in an electric kettle that draws a current of 3.0 A from 240 V supply. (Specific heat capacity is  $4.2 \times 10^3 \text{ J/kg}$ ) neglect heat losses to the surrounding.  
A. 0.2 B. 1.9 C. 3.6 D. 21.2
184. The amount of heat needed to raise the temperature of 10 kg of copper by 1k is its:  
A. internal energy B. Specific heat capacity  
C. Heat capacity D. Molar heat capacity
185. Calculate the heat energy required to vapourise 50 g of water initially at  $80^{\circ}\text{C}$  if the specific heat capacity of water is  $4.2 \text{ J/g.K}$ . (Specific latent heat of vapourisation of water is  $2260 \text{ J/g}$ )  
A. 1533000J B. 1172200J C. 230200J  
D. 113000J
186. A piece of copper mass 200 g is heated to  $100^{\circ}\text{C}$  and is then quickly transferred to a copper calorimeter of mass 10 g, containing 100 g of water whose initial temperature is  $15^{\circ}\text{C}$ . If the specific heat capacity of copper and water are  $400 \text{ J/kg.K}$  and  $4200 \text{ J/kg.K}$ , find the final temperature of the substance.  
A.  $29.1^{\circ}\text{C}$  B.  $30.1^{\circ}\text{C}$  C.  $28.4^{\circ}\text{C}$   
D.  $27.4^{\circ}\text{C}$
187. Which of the following statements is not correct about the assumptions of kinetic theory of gases?  
A. the attraction between the molecules is negligible  
B. the volume of molecules is negligible compared with the volume occupied by the gas  
C. the duration of a collision is negligible compared with the time between collisions  
D. the molecules of the gas behave like perfectly inelastic spheres
188. The ice and steam points of an ungraduated thermometer are 300 mm apart. Calculate the length of thermometric liquid above the ice points which will correspond to a temperature of  $75^{\circ}\text{C}$   
A. 275 mm B. 250 mm C. 225 mm D. 215 mm
189. A piece of copper of mass 0.55 kg is heated from  $57^{\circ}\text{C}$  to  $100^{\circ}\text{C}$ . What is the increase in the internal energy of the copper? ( $c=380 \text{ J/kg.K}$ )  
A.  $8.9 \times 10^3 \text{ J}$  B.  $9.8 \times 10^3 \text{ J}$  C.  $8.987 \times 10^3 \text{ J}$   
D.  $9.879 \times 10^3 \text{ J}$
190. Two metals A and B lose the same quantity of heat when their temperatures drop from  $20^{\circ}\text{C}$  to  $15^{\circ}\text{C}$ . If the specific heat capacity of A is thrice that of B, calculate the ratio of mass of A to that of B  
A. 1:3 B. 1:2 C. 3:1 d. 3:4



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191. Which of the following is/are observed when heat energy is added to a system?
- (i) the internal energy of the system increases
  - (ii)(ii) the volume of the system is directly proportional to the temperature
  - (iii) work may be done in the surroundings.
- A. (i), (ii) and (iii)      B. (iii) only  
C. (i) and (iii)          D. none of the above
192. A constant volume gas thermometer records a pressure of 240 mmHg at 0oC and 300 mmHg at 100oC Calculate the new temperature when the gas pressure is 270 mm of Hg
- A. 99oC    B. 95oC    C. 9oC    D. 90oC
193. In which of the following is expansion of solids a disadvantage?
- A. the balance wheel of a watch
  - B. fire alarms
  - C. the thermostat
  - D. the fitting of wheels in rims.
194. How long does it take a 800 W heater to raise the temperature of 2 kg of water from 20oC to 60oC? (specific heat capacity of water = 4200 J/kg.K)
- A. 280 s    B. 420 s    C. 210 s    D. 120 s
195. A room is heated by means of charcoal fire. A man in the room standing away from the fire is warmed by:
- A. convection    B. radiation    C. conduction
  - D. reflection

