



PHYSICS

BOOKS - MODERN PUBLICATION

PHYSICS (KANNADA ENGLISH)

UNIT TEST PAPER NO.4

Mcq

1. In a cyclic process the change in internal energy of a system is :

A. minimum but not zero

B. zero

C. maximum but not infinite

D. infinite

Answer: B



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2. A wave of frequency 500 Hz has a velocity 360 m/s. The distance between two nearest point which are 60° out of phase, is :

A. 0.7 cm

B. 12 cm

C. 70 cm

D. 120 cm

Answer: D



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3. A 5.5 m length of string has a mass of 0.035 kg. If the tension in the string is 77 N, the speed of a wave on the string is :

A. 110 ms^{-1}

B. 165 ms^{-1}

C. 77 ms^{-1}

D. 102^{-1}

Answer: A



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4. Forty one tuning forks are arranged in increasing order of frequencies such that every fork gives 5 beats with the next. The last

fork has a frequency that is double the frequency of the first fork. The frequency of the first fork is

A. 400 Hz

B. 210 Hz

C. 200 Hz

D. 205 Hz.

Answer: C



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5. When an ideal diatomic gas is heated at constant pressure, the fraction of the heat energy supplied which increases the internal energy of the gas is :

A. $\frac{2}{5}$

B. $\frac{3}{5}$

C. $\frac{3}{7}$

D. $\frac{5}{7}$

Answer: D



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6. 70 calories of heat are required to raise the temperature of 2 moles of an ideal gas at constant pressure from 30° to 35° . The amount of heat required in calories to raise the temperature of the same gas through the same range ($30^\circ C$ to $35^\circ C$) at constant volume is :

A. 30

B. 50

C. 70

D. 90

Answer: B



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7. A whistle is whirled in a circle of radius one metre and traverses the circular path twice per second. An observer is situated outside the circle but in its plane. If the velocity of sound is 332 m/s, then the interval between the highest and the lowest observed pitch is :

A. 332: 1

B. 332: 4π

C. 2: 1

D. 1.08: 1

Answer: D



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8. A star is moving away from the earth with a velocity of 100 km/s. If the velocity of light is 3×10^8 m/s then the shift of its spectral line

of wavelength 5700\AA due to Doppler's effect
will be :

A. 0.63\AA

B. 1.90\AA

C. 3.80\AA

D. 5.70\AA

Answer: B



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9. If one mole of a monoatomic gas $\left(\gamma = \frac{5}{3}\right)$ is mixed with one mole of a diatomic gas $\left(\gamma = \frac{7}{5}\right)$ the value of r for the mixture is

A. 1.40

B. 1.50

C. 1.53

D. 3.07

Answer: B



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10. An increase in intensity level of one decibel implies an increase in intensity of

A. 1 %

B. 3.01 %

C. 26 %

D. 1.1 %

Answer: C



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11. One mole of an ideal gas requires 207 J heat to raise the temperature by 10 K when heated at constant pressure. If the same gas is heated at constant volume to raise the temperature by the same 10 K the heat required is

(Given $R = \frac{8.3J}{\text{mole} \times K}$)

A. 198.7 J

B. 29 J

C. 215.3 J

D. 124 J.

Answer: D



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12. The difference between the apparent frequency of a source of sound as perceived by the observer during its approach and recession is 2% of the frequency of the source. If the speed of sound in air is 300 m s^{-1} , the velocity of the source is

A. 12 m/s

B. 6 m/s

C. 1.5 m/s

D. 3 m/s

Answer: D



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13. An electric refrigerator abstracts 2000 calories from ice trays. The coefficient of performance is 5. Then the work done by motor in calories, is :

A. 5

B. 400

C. 2000

D. 10000

Answer: B



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14. A car travelling at 10 ms^{-1} sounds a horn, which has a frequency of 500 Hz, and this is heard in another car which is travelling behind

the first car in the same direction, with a velocity of 20 ms^{-1} . The sound can also be heard in the second car by reflection from a bridge ahead. What frequencies will be driver of the second car hear ?

[Speed of sound in air = 340 ms^{-1}]

A. 514 Hz, 528 Hz

B. 514 Hz, 545 Hz

C. 509 Hz, 545 Hz

D. 528 Hz, 564 Hz.

Answer: B



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15. Two samples A and B of a gas are initially at the same temperature and pressure, are compressed from volume V to $\frac{V}{2}$ (A isothermally and adiabatically), then the final pressure of :

- A. A is greater than that of B
- B. A is equal to that of B
- C. A is less than that of B

D. A is twice that of B.

Answer: C



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16. At $16^{\circ}C$ two open organ pipes when sounded together produce 51 beats in 3 seconds. How many beats/second will be produced, if the temperature rises to $51^{\circ}C$?
(Neglect increase in length of the pipe)

A. 10 beats

B. 18 beats

C. 26 beats

D. cannot be predicted using above data.

Answer: B



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17. If the temperature of a black body is increased by 50% then the amount of radiant energy given out :

A. increases by 50 %

B. increases by 500 %

C. increases by 400 %

D. increases by 125 %

Answer: C



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18. Beats are produced by two waves

$$y_1 = a \sin 2000\pi t, \text{ and } y_2 = a \sin 2008\pi t.$$

The number of beats heard per second is :

A. Zero

B. One

C. Four

D. Eight.

Answer: C



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19. A body cools from $60^{\circ}C$ to $50^{\circ}C$ in 10 minutes, when kept in air at $30^{\circ}C$. In the next 10 minutes, its temperature will be :

A. below $40^{\circ} C$

B. $40^{\circ} C$

C. above $40^{\circ} C$

D. cannot be predicted.

Answer: C



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20. The temperature of hot and cold end of a 20 cm long rod in steady state with no side

losses is $100^{\circ}C$ and $20^{\circ}C$ respectively.

Temperature at the centre of the rod is :

A. $50^{\circ}C$

B. $60^{\circ}C$

C. $40^{\circ}C$

D. $30^{\circ}C$.

Answer: B



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21. Four identical rods of same material are joined end to end to form a square. If the temperature difference between the ends of a diagonal is $100^{\circ}C$, then the temperature difference between the ends of the other diagonal will be :

A. $0^{\circ}C$

B. $100^{\circ}C$

C. $\frac{100}{l}^{\circ}C$, where l is the length of each rod

D. $\frac{100}{2l} \text{ } ^\circ C.$

Answer: A



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22. A uniform rope of length 12 metres and mass 6 kg hangs vertically from a rigid support. A block of mass 2 kg is attached to the free end. A transverse pulse of wavelength 0.06 metre is produced at the lower end of the

rope. What is the wavelength of the pulse when it reaches the top of the rope ?

A. 0.6 metre

B. 0.03 metre

C. 0.12 metre

D. 0.09 metre.

Answer: C



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23. A sphere of radius r , density d and specific heat S is heated to temperature T and is allowed to cool in an enclosure at temperature T_0 . The rate of fall of temperature is proportional to :

A. $\frac{1}{rdS}$

B. $r dS$

C. $\frac{d}{rS}$

D. $\frac{dr}{S}$.

Answer: A



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24. The correct curve showing maximum emissive power E_m and absolute temperature

T is :

A. 

B. 

C. 

D. 

Answer: C



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25. In an adiabatic process wherein pressure is increased by $\frac{2}{3}\%$. If $\frac{C_p}{C_v} = \frac{3}{2}$, then the volume decreases by about :

A. $\frac{4}{9}\%$

B. $\frac{2}{3}\%$

C. 1%

D. $\frac{9}{4}\%$

Answer: A



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26. The (W/Q) of a Carnot - engine is $1/6$. Now the temperature of sink is reduced by $62^\circ C$, then this ratio becomes twice, therefore the initial temperature of the sink and source are respectively :

A. $33^\circ C, 67^\circ C$

B. $37^\circ C, 99^\circ C$

C. $67^{\circ}C$, $33^{\circ}C$

D. $97K$, $37K$.

Answer: B



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27. A gas ($\gamma = 1.5$) is taken through adiabatic process in which volume is changed from 16000 cm^3 to 400 cm^3 . If the initial pressure is 150 kPa , how much work is done by the gas in the process ?

A. 480 J

B. -480 J

C. 560 J

D. 1760 J

Answer: D



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28. Two identical rods of copper and iron are coated with wax uniformly. When water, the length upto which wax melts are 8.4 cm and

4.2 cm respectively. If thermal conductivity of copper is 0.92, then thermal conductivity of iron is :

A. 0.23

B. 0.46

C. 0.115

D. 0.69

Answer: A



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29. The motion of a particle executing simple harmonic motion is given by

$$x = 0.01 \sin 100\pi(t + 0.005)$$

Where x is in metres and t in seconds. The time period in second is :

A. 0.01

B. 0.02

C. 0.1

D. 0.2

Answer: B



30. When the temperature of an ideal gas is increased by 600 K, the velocity of the sound in the gas become $\sqrt{3}$ times the initial velocity in it. The initial temperature of the gas is :

A. $-73^{\circ} C$

B. $27^{\circ} C$

C. $127^{\circ} C$

D. $327^{\circ} C$

Answer: B



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31. In Ingen Hauze's experiment, the wax melts up to lengths 10 and 25 cm on two identical rods of different materials. The ratio of thermal conductivities of the two materials is :

A. 1 : 6.25

B. 6.25 : 1

C. 1 : $\sqrt{2.5}$

D. 1 : 2.5

Answer: A



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