FWC

G.C.E. A/L Examination November - 2015

Conducted by Field Work Centre, Thondaimanaru
In Collaboration with
Zonal Department of Education Jaffna.

Grade :- 13 (2016)	Physics - I	Time :- Two hours

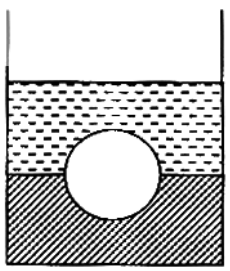
1. Dimension of heat conductivity is
   (1) $MLT^{-2}\theta^{-1}$ (2) $MLT^{-3}\theta^{-2}$ (3) $MLT^{-1}\theta^{-1}$ (4) $MLT^{-3}\theta^{-1}$ (5) $MLT^{-2}\theta^{-2}$

2. The physical quantities related to ampere hour and kilowatt hour are respectively
   (1) current, power
   (2) electric field strength, energy
   (3) electric charge, energy
   (4) electric charge, power
   (4) voltage, energy

3. Wrong statement in the following statements about laser
   (1) have same wavelength
   (2) these are high intense rays
   (3) they travel as a narrow beam
   (4) they are reflective, refractive, diffractive
   (5) each single wave have different phase

4. A stretched string vibrates in four loops. What will be the number of loops when the vibrating frequency is increased to three times?
   (1) 3 (2) 6 (3) 8 (4) 12 (5) 24

5. A beaker contains two immiscible liquids with the density of 900kgm^{-3}, 3400kgm^{-3}. A solid metal ball is fully immersed into the beaker such that same amount of volume is immersed in each liquid. What is the density of the metal ball in kgm^{-3}?
   (1) 1100 (2) 1800 (3) 2500
   (4) 2150 (5) 4300



6. In a measuring instrument $(n-1)$ main scale divisions is divided into n mail scale divisions. Find the least count of the instrument.
   (1) 1 (2) $\frac{1}{n}$ (3) $\frac{n}{n-1}$ (4) $\frac{n-1}{n}$ (5) $\frac{1}{n-1}$

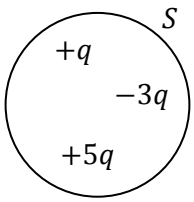
7. The difference between the distances travelled by a free falling body in t_2 and t_1 is 55m. $t_1:t_2 = 5:6$ Find the distance travelled by the body in t_2 second.
   (1) 125m (2) 180m (3) 720m (4) 1125m (5) 1620m

8. An astronomical telescope have a convex lens of focal length 6cm. Separation between two lens in normal adjustment is 102cm. Find the angular magnification of the telescope at this adjustment.

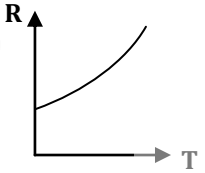
(1) 112 (2) 96 (3) 118 (4) 6 (5) 16

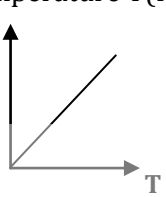
9. The lower fixed point and a upper fixed point of a false thermometer is marked as -10^{0}C and 90^{0}C respectively. What will be the real temperature when this thermometer reads 40^{0}C
(1) 30^{0}C (2) 40^{0}C (3) 50^{0}C (4) 55^{0}C (5) 60^{0}C

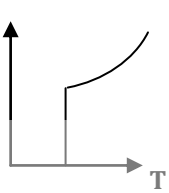
10. To reverse the net electric flux through the closed surface S shown in the figure
(1) change charge +q as charge +3q
(2) change charge +5q as charge +3q
(3) change charge -3q as charge -5q
(4) change charge -3q as charge –q
(5) change charge +q as charge -5q

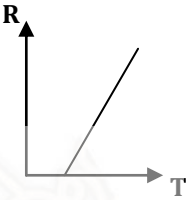


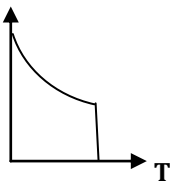
11. Which of the following graph correctly represents the variation of resistance R of a superconductor with temperature T(K)

(1) 

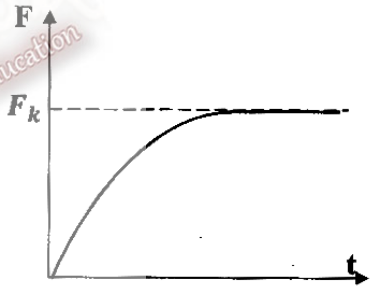
(2) 

(3) 

(4) 

(5) 

12. A horizontal force P is applied on a body on a rough surface. The figure shows the variation of frictional force F acting on the body with time. Out of the following statements which is / are true.

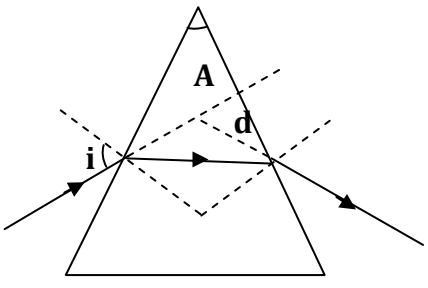


(A) initially a force P is applied to the body
(B) the kinetic frictional force acting between the body and surface is F_k
(C) the box doesn't move due to the force P
(1) A only (2) B Only (3) C only (4) A, B only (5) A, C only

13. A balloon is moving upwards with a constant speed of 30m/s. An object is released from the balloon when the balloon is at a height of 800m from ground. Find the time taken by the object to reach the ground. (neglect air resistance)
(1) $4\sqrt{10}\ Sec$ (2) $8\ Sec$ (3) $10\ Sec$ (4) $16\ Sec$ (5) $22\ Sec$

14. The distance between an eye lens and retina is 2cm. The least distance of distinct vision of the eye is 25cm. The maximum and the minimum power of the lens when the eye see objects from least distance of distinct vision upto infinity
(1) $+50D\ , +46D$ (2) $-54D\ , -50D$ (3) $+54D\ , +50D$
(4) $+54D\ , 25D$ (5) $-27D\ , -25D$

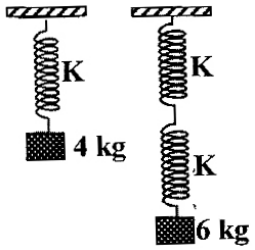
15. A laser ray shown in the figure emerges from a prism of prism angle A. which of the statement(s) is/ are true?



(A) at minimum deviation position ray will travel parallel to the base of the prism
(B) the value of d will pass through a minimum when incident angle i increases from zero
(C) when the light disperses red ray will deviate lesser

(1) A only (2) B Only (3) A, B only (4) B, C only (5) A, B, C all

16. When a spring of spring constant k is loaded with a weight of 4kg, it extends by 1cm. now two springs with spring constant k is connected in series and a weight of 6kg is loaded at the end of the combined string. What will be the extension?

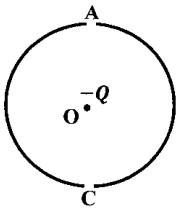


(1) 1.5 cm (2) 3 cm (3) 4.5 cm
(4) 6 cm (5) 7.5 cm

17. Which of the following statement(s) about absolute zero is / are true
(A) absolute zero temperature is -273.15^{0}C
(B) at this temperature the molecules of substance doesn't vibrate
(C) at this temperature semi-conductors doesn't conduct electrictity
(1) A only (2) C Only (3) A, B only (4) B, C only (5) A, B, C all

18. Parallel plate capacitor in air has a capacitance of 1X10^{-12}F. when the separation between the plates is tripled, area of the plates is halved and a medium A is inserted, the capacitance doesn't change. Find the dielectric constant of A.
(1) 2 (2) 4 (3) 6 (4) 5 (5) 12

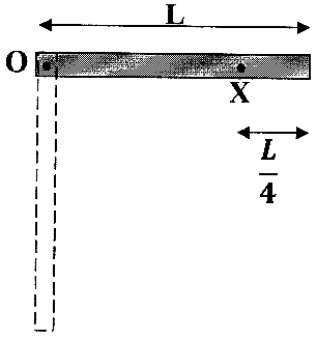
19. Charge +q is distributed uniformly on an insulator ring of radius R, a charge –Q is placed at the centre of the ring. Now as shown in figure a small charge Δq is removed from A and C. find the force acting on –Q at the centre.



(1) O (2) Along OA $\frac{Q(q-2\Delta q)}{4\pi\varepsilon_o R^2}$ (3) Along OC $\frac{Q(q-2\Delta q)}{4\pi\varepsilon_o R^2}$
(4) Along OA $\frac{Q.(2\Delta q)}{4\pi\varepsilon_o R^2}$ (5) Along OC $\frac{Q.(2\Delta q)}{4\pi\varepsilon_o R^2}$

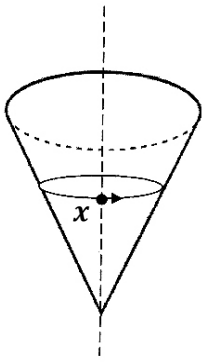
20. Mass of A is three times that of B. specific heat capacity of A is two times that of B. two times of heat that is supplied to A is supplied to B. if the temperature change in A is Δt what will be the temperature change in B
(1) $\frac{\Delta T}{6}$ (2) $\frac{\Delta T}{12}$ (3) 6 ΔT (4) 8 ΔT (5) 12 ΔT

21. A rod of mass M and length L is drilled at one end and fixed to frictionless pin. Rod can rotate about O on the horizontal axis. The rod is held horizontally and released. What will be the velocity of point X when the rod comes to its lower position?



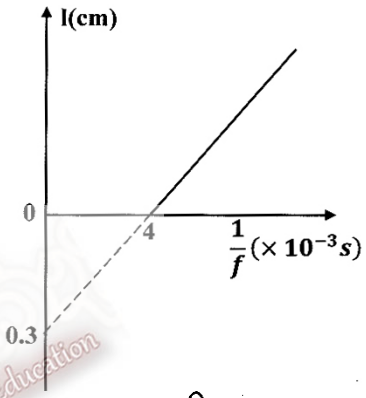
(1) $\sqrt{\frac{3g}{L}}$ (2) $\frac{3\sqrt{3gL}}{4}$ (3) $\frac{\sqrt{3gl}}{2}$
(4) $\frac{3L}{4}\sqrt{\frac{L}{3g}}$ (5) $\frac{L}{2}\sqrt{\frac{L}{3g}}$

22. An object moves on the smooth inner surface of a cone shaped vessel as shown in the figure. The forces acting on the object according to a non-moving observer



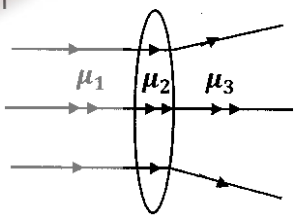
(1) only its weight
(2) object's weight and centripetal force only
(3) reaction force acting normal to the surface and centripetal force only
(4) centripetal force only
(5) reaction force acting normal to the surface and the weight of the object only

23. The figure shows the variation of 1/f with length l for the resonance tube experiment of fundamental mode f is the frequency of resonance tube . Speed of sound in air and end correction are respectively.



(1) $330ms^{-1}$, $4\ cm$ (2) $330ms^{-1}$, $0.3\ cm$
(3) $300ms^{-1}$, $4\ cm$ (4) $300ms^{-1}$, $0.2\ cm$
(5) $300ms^{-1}$, $0.3\ cm$

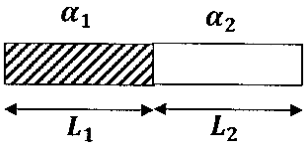
24. Correct relation between the refractive indices of the medium on the basis of the given diagram is



(1) $\mu_1 > \mu_2 > \mu_3$ (2) $\mu_1 < \mu_2 < \mu_3$
(3) $\mu_1 = \mu_2 = \mu_3$ (4) $\mu_1 = \mu_2 < \mu_3$
(5) $\mu_1 = \mu_2 > \mu_3$

25. Consider the following statements about thermistor. Which of the following is / are correct
(A) thermistor is made out of the oxides of semiconductors
(B) resistance of thermistor reduces with the increase of temperature
(C) heat capacity of thermistor is very small
(1) A only (2) B Only (3) C only (4) A, B only (5) A, B, C all

26. Two rod of length L_1, L_2 and coefficient linear expansion α_1, α_2 are combined as shown in the figure. What will be the coefficient of linear expansion of the combined rod?

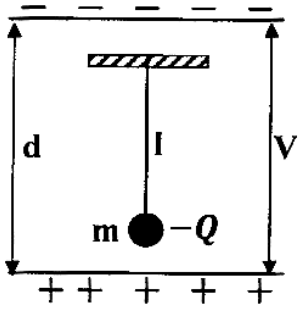


(1) $\frac{\alpha_1+\alpha_2}{2}$ (2) $\alpha_1+\alpha_2$ (3) $L_1\,\alpha_1+L_2\,\alpha_2$
(4) $\frac{L_1\alpha_1+L_2\alpha_2}{L_1+L_2}$ (5) $\frac{L_2\alpha_1+L_1\alpha_2}{L_1+L_2}$

27. Three spherical drops made out of same liquid have capacitance C_1, C_2, C_3 respectively. If the three drops makes another drop by combining them into one, what will be the capacitance of the drop formed?
(1) $C_1 + C_2 + C_3$ (2) $\frac{C_1C_2C_3}{C_1+C_2+C_3}$ (3) $(C_1^3 + C_2^3 + C_3^3)^{1/3}$

(4) $(C_1^2 + C_2^2 + C_3^2)^{1/3}$ (5) $(C_1 C_2 C_3)^{1/3}$

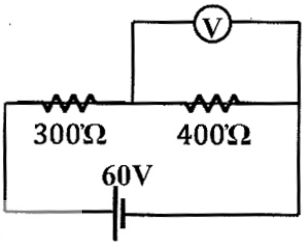
28. The conducting sphere of mass m shown in the figure has a charge –Q. The sphere is hung between two plates with V voltage difference and at a separation d, by using an insulator string of length R. What is the period of oscillation of this S.H.M?



(1) $T = 2\pi\sqrt{\frac{\ell}{g}}$ (2) $T = 2\pi\sqrt{\frac{\ell}{g+\frac{V}{d}}}$ (3) $T = 2\pi\sqrt{\frac{\ell}{g+\frac{QV}{d}}}$

(4) $T = 2\pi\sqrt{\frac{\ell}{g-\frac{QV}{d}}}$ (5) $T = 2\pi\sqrt{\frac{\ell}{g+\frac{QV}{md}}}$

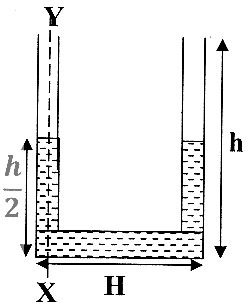
29. 300Ω, 400Ω resistance are connect in series to a cell of 60V and negligible internal resistance. When voltmeter connect across 400Ω resistance as shown in figure, the voltmeter reads30V. Find the resistance of voltmeter.



(1) 300 Ω *(2)* 400 Ω *(3)* 600 Ω

(4) 1200 Ω *(5)* 2400 Ω

30. Water is filled upto half of the arms of a u tube held vertically as shown in the figure. What will be the least height h of tube such that water doesn't spill out when the tube is rotated about xy axis at an angular velocity 15rads^{-1}? Consider H = 10cm, density of water = 1000kgm^{-3}.



(1) 2.25 *cm* *(2)* 10 *cm* *(3)* 22.5 *cm*

(4) 25 *cm* *(5)* 30 *cm*

31. Which of the following is / are correct

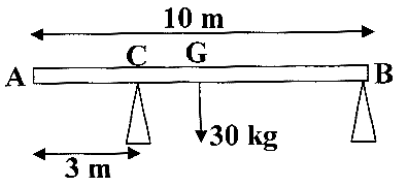
(A) if the momentum of an object is constant with time, then kinetic energy of that body must be constant with time

(B) if the momentum of an object changes uniformly with time then kinetic energy must also linear changes with time

(C) if the kinetic energy of an object is constant with time, then momentum of that body change uniformly with time

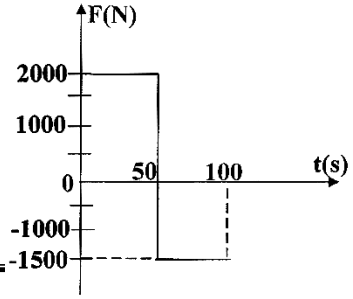
(1) A only (2) B Only (3) C only (4) A, B only (5) A, C only

32. A uniform rod of length 10m and mass 30kg is placed at two supports B, C such that AC = 3m. What is the maximum load that can be placed at A without disturbing the equilibrium of the rod?



(1) 10 kg (2) 15 kg (3) 20 kg (4) 30 kg (5) 22.5 kg

33. A force changing with time according the graph is acted upon a vehicle of mass 1000kg placed on a smooth surface. What will be the speed of the vehicle after 100s in m/s?



(1) 25 (2) 50 (3) 75

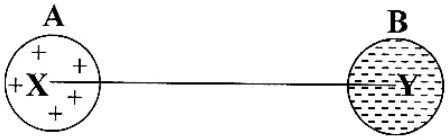
(4) 100 (5) 175

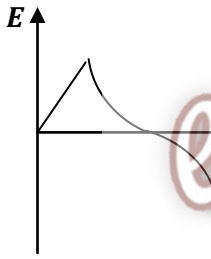
34. In a one end closed tube the difference of frequency between two consecutive overtones is 300Hz. What is the length of an open end tube having the same fundamental frequency with the one end closed tube? Consider the speed of sound in air is 300m/s.
(1) 10 cm (2) 25 cm (3) 50 cm (4) 75 cm (5) 100 cm

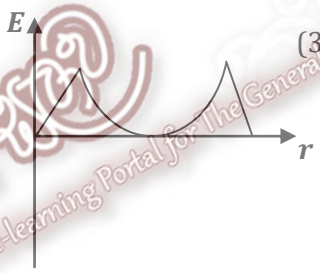
35. At what temperature the of oxygen will be equal to the speed of hydrogen H_2 at 200 K
(1) 400 K (2) 800 K (3) 1000 K (4) 3200 K (5) 6400 K

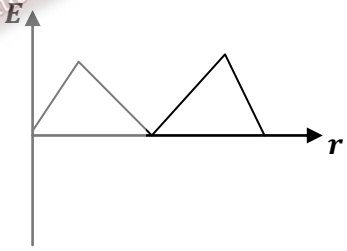
36. For a planet of radius R, there is satellite of mass m at its surface. What will be the increase in the potential energy of the satellite when it is moved to a distance of 4R? along radially
(1) 4 mgR (2) 3 mgR (3) $\frac{3}{4}mgR$ (4) mgR (5) $\frac{4}{5}mgR$

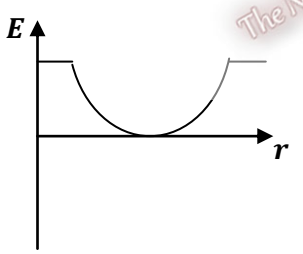
37. A, B are two similar non-conducting spheres with same amount of positive charge uniformly distributed in one and same amount of negative charge uniformly distributed in the other. The distance between them is much greater than their radius. Which of the following graph correctly represent the variation of electric field intensity(E) with r. r is the distance from x to y along xy

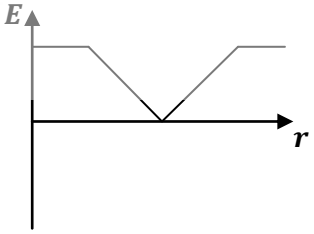


(1) 

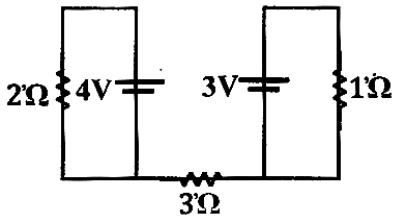
(2) 

(3) 

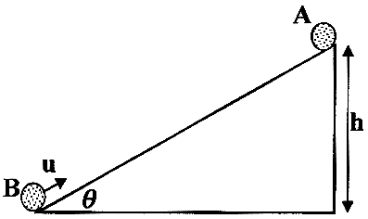
(4) 

(5) 

38. In the figure shown the cell have negligible internal resistance. What is the voltage difference across 3Ω resistance?
(1) 0 (2) 1 V (3) 2 V
(3) 3.5 V (5) 7 V

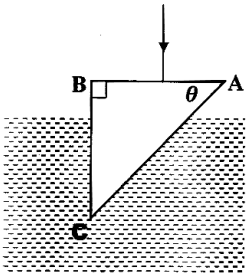


39. An object A is released from the top of a smooth inclined plane of height h. At the same time another particle B is thrown from the bottom of the inclined plane along the inclined plane. If the both particles meet at the middle of the inclined plane what will be the initial velocity of B. l is the distance between A and B initially.



(1) $2g\ell \sin\theta$ (2) $\frac{g\ell \sin\theta}{2}$ (3) $\sqrt{\frac{gh}{2}}$ (4) $\sqrt{gh}$ (5) $g\ell \cos\theta$

40. A glass prism ABC is immersed in water as shown in figure. What will be the correct statement if a ray incident normal to AB on AB is totally reflected on face AC. Refractive index of water and glass are 3/2, 4/3 respectively.



(1) $Sin\,\theta \geq {}^{8}/_{9}$ (2) $Sin\,\theta \geq {}^{2}/_{3}$

(3) $Sin\,\theta = {}^{\sqrt{3}}/_{2}$ (4) $Sin\,\theta = {}^{2}/_{\sqrt{3}}$

(5) ${}^{2}/_{3} < Sin\,\theta < {}^{8}/_{3}$

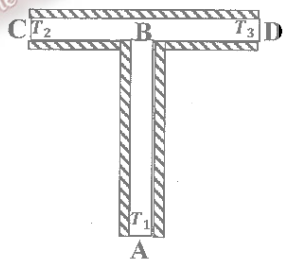
41. A person standing 1m from a source hears a sound of 90dB. The person move 99m away from the source. What is the new intensity level of the sound he hears?

(1) 10 dB (2) 30 dB (3) 50 dB (4) 70 dB (5) 130 dB

42. A van emitting a signal of frequency 700Hz, is moving at a speed of 2m/s towards a rock that can reflect signals back. How many beats per second will be observed by the driver? Speed of sound in air is 350m/s.

(1) 1 Hz (2) 4 Hz (4) 5 Hz (4) 8 Hz (5) 10 Hz

43. As shown in figure two identical rods are connected symmetrically. The combination is fully lagged except the faces A, C and D. faces A, C and D are placed at constant temperatures T_1, T_2 and T_3.(T_1<T_2= T_3). Temperature at junction B



(1) $\frac{T_1+T_2+T_3}{3}$ (2) $\frac{T_1+2T_2+2T_3}{5}$

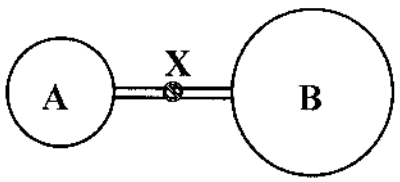
(3) $\frac{2T_1+T_2+T_3}{5}$ (4) $\frac{2T_2+2T_3-T_1}{5}$

(5) $\frac{T_2+T_3-2T_1}{5}$

44. A satellite situated 4r distance from center of a planet revolves around it with a speed of 3v. What will be the speed of a satellite revolving at a distance of r from the center of same planet?

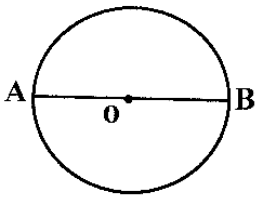
(1) V (2) 2 V (3) 3 V (4) 6 V (5) 12 V

45. Bulb A consist of an ideal gas at pressure $5X10^5$Pa and temperature 300K. Bulb B consist the same ideal gas at temperature 400K and pressure $1X10^5$Pa. screw x is opened and the gas system is allowed to attain equilibrium by keeping the initial temperature of bulbs constant. If the volume of B is four times that of A find the final pressure in Pa.



(1) 1×10^5 (2) 1.8×10^5 (3) 2×10^5 (4) 2.6×10^5 (5) 3.2×10^5

46. The structure shown in figure, the circle with radius R and the diameter AB is made of substance having $\propto$ as the resistance per unit length. Equivalent Resistance across A and O is.



(1) $\left(\frac{\pi+2}{2\pi}\right)R \propto$ (2) $\left(\frac{\pi+4}{\pi-2}\right)R \propto$ (3) $\left(\frac{\pi+4}{2\pi}\right)R \propto$

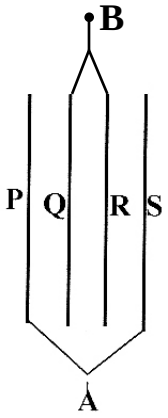
(4) $\left(\frac{\pi+2}{\pi+4}\right)R \propto$ (5) $\left(\frac{\pi+4}{\pi+2}\right)R \propto$

47. The initial temperature and initial relative humidity of a room is θ_1 and $x_1\%$ respectively. When the temperature of the room is reduced by using an air conditioner to θ_2, the relative humidity of the room is observed to be $x_2\%$. At dew points θ_1 and θ_2 the absolute humidity of air is y_1 and y_2 respectively. Find the mass per unit volume of water vapour removed by the air conditioner from the room.

(1) $\frac{x_1y_1-x_2y_2}{100}$ (2) $100(x_1y_1 - x_2y_2)$ (3) $\left(\frac{x_1}{y_1} - \frac{x_2}{y_2}\right)\frac{1}{100}$

(4) $\left(\frac{x_1}{y_1} - \frac{x_2}{y_2}\right) \times 100$ (5) $\left(\frac{y_1}{x_1} - \frac{y_2}{x_2}\right) \times 100$

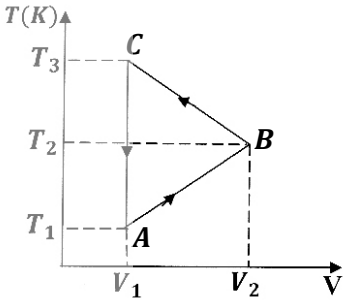
48. P, Q, R and S are identical rectangular metal pieces. They placed parallel to each other such that distance between two consecutive plates is d. area of each plate is A. P is joined with S and Q is joined with R using a thin metal wire as shown in the figure. What is the capacitance between A and B?



(1) $\frac{A\varepsilon_o}{d}$ (2) $\frac{2A\varepsilon_o}{d}$ (3) $\frac{3A\varepsilon_o}{d}$

(4) $\frac{2A\varepsilon_o}{3d}$ (5) $\frac{A\varepsilon_o}{3d}$

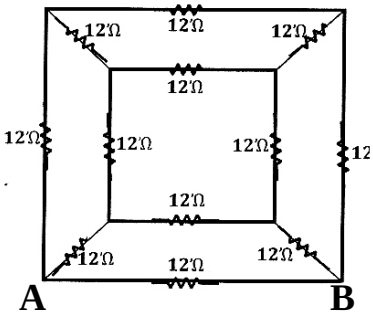
49. One mole ideal gas loses 70J of energy when undergone through a cyclic process ABCA. T_1=100K, T_2=200K R = 8.3Jmol^{1}K^{-1}. During process BC the work done by the gas is



(1) $305\ J$ (2) $760\ J$ (3) $830\ J$

(4) $-900\ J$ (5) $900\ J$

50. In the electric network structure shown in the figure all the resistance are 12Ω. Find the equivalent resistance between A and B.



(1) 4Ω (2) 6Ω (3) 7Ω

(4) 9Ω (5) 14Ω