Physics UEE compiled on Measurement and Practical work (2003-2011)

1. Which of the following experiment errors can be reduced by taking repeated measurements? (UEE:2007)
   A. Parallax errors.
   B. Systematic errors.
   C. random errors
   D. Zero errors
2. A teacher gave a student a book whose thickness is 4.3cm, and instructed him to measure the thickness of the book with vernier calipers. The student took four measurements. The average and standard deviation of the measurements were 4.33cm and 0.04cm, respectively. Which one of the following is the uncertainty in the student's measurement? :(UEE:2007)
   A. 0.03cm. B. 0.04cm C. 0.035cm. D. 0.3cm
3. Which statement is WRONG about units and dimensions? (UEE: 2008).
   A. Two quantities can have the same units but different dimensions.
   B. Two quantities can have the same dimensions but differentunits.
   C. It is always possible to add two numbers that have the same units.
   D. There are quantities that have no unit and dimension.
4. If a precision of surveyor measured a distance of 500 meters (between two points in a village) using a meter that has centimeter division on it, then what is the measurement result?(UEE: 2009). A.500m B. 500.0m C. 500.00. D. 500.000m
5. From the figures given below, which one of them shows precise but NOT accurate measurements? T represents the true value.(UEE:2009)

6. Which of the following statement is correct about errors in measurement?(UEE:2010)
   A. Experimental error is the same as a mistake
   B. Errorsoccur in every scientific investigation.
   C. Errors make measurement values same as accepted value.
   D. Errors can be avoided by using modern measuring instruments.
7. What can be concluded when the number of significant figures increases? (UEE: 2010)
   A. True reading increases.
   B. Uncertainty increases.
   C. Precision increases.
   D. Accuracy increases.
8. A grade 11 physics teacher ordered four of his students to measure the length of a class room. He provided them the following length measuring instruments. The instruments are meter rule with millimeter division, vernier calipers, micrometer screw gauge and meter tape with centimeter scale, but its zero reading is not visible. Which one of these instruments is appropriate for the task? (UEE; 2011).
   A. Meter rule.
   B. Meter tape.
   C. Vernier calipers..
   D. Micrometer screw gauge.
9. Which part of a scientific report discusses the accuracy of measurements taken? (UEE; 2011)
   A. Aim.
   B. Theory.
   C. Methods.
   D. Results

THE END

Physics UEE compiled on Vector quantities (2003-2011)

1. Which of the following is a vector quantity? (UEE:2003)

   A. Power.
   B. Momentum.
   C. Temperature
   D. Electric current

2. Suppose $\hat{A}=3\hat{\imath}-2\hat{\jmath}+\hat{k}$, $\hat{B}=-\hat{\imath}-4\hat{\jmath}+3\hat{k}$,and $\hat{C}$ is a vector lying along x-axis with the property that $\hat{A}.(\hat{B}+\hat{C})=0$.Then vector $\hat{C}$ is given by:(UEE:2003)

   A. $\frac{3}{\sqrt{10}}\hat{\jmath}$. B. $-\frac{11}{3}\hat{\imath}$ C. $\frac{6}{\sqrt{10}}\hat{\jmath}$. D. $-\frac{8}{3}\hat{\imath}$

3. Suppose $\hat{A}=3\hat{\imath}-2\hat{\jmath}$, $\hat{B}=-\hat{\imath}-4\hat{\jmath}$, and $\hat{C}$ are three vectors in xy-plane with the property that $\hat{A}+\hat{B}-\hat{C}=0$.Which of the following is a unit vector along$\hat{C}$? (UEE: 2003).

   A. $2\hat{\imath}-6\hat{\jmath}$. B. $-2\hat{\imath}+6\hat{\jmath}$. C. $-\sqrt{\frac{1}{10}}\hat{\imath}+\frac{6}{\sqrt{10}}\hat{\jmath}$ D. $\sqrt{\frac{1}{10}}\hat{\imath}-\frac{3}{\sqrt{10}}\hat{\jmath}$

4. Which pair of forces **CANNOT** give a resultant of 5N? (UEE:2003)

   A. 1N and 4N. B. 1N and 6N. C. 3N and 4N. D. 1N and 7N.

5. Suppose $\hat{A}=3\hat{\imath}-2\hat{\jmath}$, and $\hat{B}=-\hat{\imath}-a\hat{\jmath}$, are two vectors in xy-plane what is the value of a that $\hat{A}+\hat{B}=2\hat{\imath}$? (UEE: 2004). A. 3. B. 2. C. -2. D. -3

6. The sum and difference of two non-zero vectors $\hat{A}$ and $\hat{B}$ are equal in magnitude. What can you conclude about these two vectors? (UEE:2004)

   A. $\hat{A}$ and $\hat{B}$ have the same direction.
   B. $\hat{A}$ and $\hat{B}$ have opposite direction.
   C. $\hat{A}$ and $\hat{B}$ have the same magnitude.
   D. $\hat{A}$ and $\hat{B}$ are perpendicular to each other.

7. A vector that represents the position of an object in relation to another object is called (UEE: 2005) A. Unit vector. B. position vector. C. Coplanar vector. D. Collinear vectors

8. Two non-vector $\hat{\boldsymbol{A}}$ and $\hat{\boldsymbol{B}}$ are related by $\hat{\boldsymbol{A}}=c\hat{\boldsymbol{B}}$, where c is a scalar. If the two vectors have opposite directions, then one of the following is true about c?(UEE:2005)

   A. c is a positive number.
   B. c is a negative number.
   C. c=1
   D. c=0

9. If $\hat{\boldsymbol{A}}=8\hat{\imath}+\hat{\jmath}-2\hat{k}$ and $\hat{\boldsymbol{B}}=5\hat{\imath}-3\hat{\jmath}+\hat{k}$, then, what is the value of $\hat{\boldsymbol{A}}\times\hat{\boldsymbol{B}}$?(UEE:2005)

   A. $3\hat{\imath}+4\hat{\jmath}-3\hat{k}$.
   B. $-3\hat{\imath}-4\hat{\jmath}+3\hat{k}$.
   C. $\hat{A}=-5\hat{\imath}-18\hat{\jmath}-29\hat{k}$
   D. $\hat{A}=5\hat{\imath}+18\hat{\jmath}+29\hat{k}$

10. Two non-zero vectors D and E have precisely equal magnitudes.Forth4 magnitude of D+E to be 3 times larger than the magnitude of D-E, what must be the angle between D and E?(UEE: 2006). A 30^0. B.37^0. C. 53^0. D.60^0.

11. The vector $2\hat{i}+\hat{j}+\hat{k}$ is perpendiculartо $\hat{i}-4\hat{j}+\lambda\hat{k}$ if λ is equal to (UEE: 2006).

A. 0. B. -1. C. 2. D. 3.

12. What is the angle between vectors $\mathbf{A}= (a\hat{i}+a\sqrt{3}\hat{j})$ units and $\mathbf{B}= (a\sqrt{3}\hat{i}+a\hat{j})$ units?

(UEE: 2007). A. 90°. B. 60^0. C. 37^0 D. 30^0.

13. The magnitude of two vectors **A** and **B** are 12units, respectively. Which one of the following is **NOT** the possible value for the magnitude of the result vector **A**+**B**? (UEE: 2007).

A. 60units. B. 17 units. C. 13 units. D. 7 units

14. What is the vector product $\hat{A}x\hat{B}$ of two vectors $\hat{A}=7\hat{i}+4\hat{j}-2\hat{k}$ and $\hat{B}=3\hat{i}-2\hat{j}+5\hat{k}$? (UEE: 2007).

A. $36\hat{i}+11\hat{j}-2\hat{k}$. B. $4\hat{i}-59\hat{j}-26\hat{k}$. C. $-4\hat{i}+59\hat{j}+26\hat{k}$. D. $-36\hat{i}-11\hat{j}+2\hat{k}$

15. If vector $\hat{p}$ is 6 m in the x- direction and vector $\hat{q}$ is 8 m in the y-direction. Then what is the value of vector $\hat{p}+\hat{q}$? (UEE: 2009).

A. 10 m at 53^0 from x-direction. C. 10 m at 37^0 from x-direction.

B. $\sqrt{136}$m at 45^0 from x-direction. D. $\sqrt{136}$m at 30^0 from x-direction.

16. Given vectors $\hat{A}=\sqrt{3}\hat{i}+\hat{j}$ and $\hat{B}=\sqrt{3}\hat{i}-\hat{j}$. What is the smaller angle between the vectors? (UEE: 2009). A. 60^0. B. 53^0. C. 45^0. D. 30^0

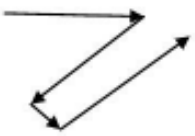
17. If $\hat{A}=\hat{x}$ m/s +3 m/s $\hat{z}$, and $\hat{B}$=2 m/s $\hat{y}$+3 m/s $\hat{z}$, then what is the value of $/\hat{A}x\hat{B}/$? (UEE: 2009).

A. $\sqrt{10}$m/s. B. $\sqrt{13}$ m/s. C. 7m/s. D.$\sqrt{130}$m/s.

18. Two forces $F_1= (8\hat{i} +3\hat{j})$ N and F_2 = (4i +6j) N are acting on an object. What is the magnitude and direction of the resultant force? (UEE:2010)

A. 15N, 37^0. B. 5N, -37^0. C. 5N, 143^0 D. 225N, 143^0.

19. The diagram below shows a path taken by a flying bird.



Which one of the following vector may represent a resultant displacement? (UEE: 2010)

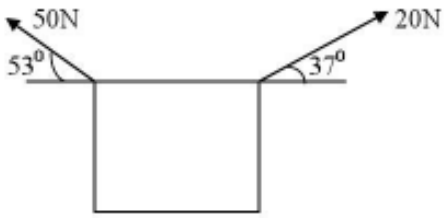
A.  B. C.  D. 

20. Four vectors are listed below. $\vec{A} = \begin{pmatrix} 4 \\ 10 \end{pmatrix}$ $\vec{B} = \begin{pmatrix} 2 \\ -5 \end{pmatrix}$ $\vec{C} = \begin{pmatrix} -6 \\ 15 \end{pmatrix}$ $\vec{D} = \begin{pmatrix} 15 \\ -6 \end{pmatrix}$

Which pair of the vectors is Orthogonal?

A. $\vec{A}$ and $\vec{B}$.
B. $\vec{A}$ and $\vec{D}$
C. $\vec{C}$ and $\vec{D}$
D. $\vec{B}$ and $\vec{C}$

21. Two forces exerted on a block as shown in the figure below. What is the horizontal component of the net force? (UEE:2011)



A. 70N, East.
B. 30N, West.
C. 14N,West
D. 28N,West

22. What is the magnitude of the resultant velocity for a bird flying first at a speed of 10 m/s North East and then flying to South at a speed of 8 m/s? (UEE:2011)

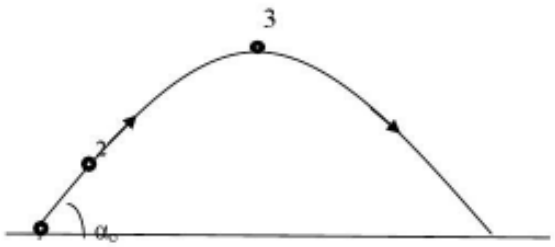
A. 7.13 m/s. B. 16.6 m/s. C. 12.8 m/s. D. 7.07 m/s.

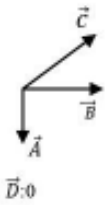
23. Let $\hat{C} = \hat{A} \times \hat{B}$ and $\Theta \neq 90^0$, where Θ is the smaller angle between $\hat{A}$ and $\hat{B}$ when they are drawn with their tails at the same point. Which of the following is **NOT** true? (UEE:2011)

A. $\hat{A}.\hat{B} = 0$.
B. $\hat{A}.\hat{C} = 0$.
C. $|\hat{C}| = |\hat{A}|\,|\hat{B}| \sin\Theta$
D. $-\hat{C} = \hat{B}\times\hat{A}$

THE END

1. Uniform circular motion is a:(UEE:2003)
   A. Motion with constant velocity. C. motion with acceleration of constant magnitude.
   B. Motion in one dimension. D. motion in which net force is constant
2. An object of mass m moving with initial speed of 15m/s got an acceleration of $10m/s^2$ after a constant force **F** is applied to it. How long does it take for the object to reach 90m from its initial position:(UEE:2003)
   A. 3.22 s. B. 0.75 s. C. 3 s. D. 2.5 s
3. A 4 kg block is given an initial speed of 8m/s at the bottom of 30^0 inclined plane. The fictional force that retards its motion is 15 N. If the block directed up the inclined plane, how far will it move before it stops? (UEE: 2003).
   A. 3.35m B. 3.66m. C. 4.40m. D. 4.67m.
4. A ball is thrown downward (not dropped) from the top of a tower. After being released, its downward: (UEE:2003)
   A. Velocity will be uniform. C. Acceleration will be greater than g.
   B. Acceleration will be equal to g. D. Acceleration will be smaller than g.
5. A small car and a bus move with velocities given by $V_c = (3\hat{i}-2\hat{j})$ m/s and $V_b = (-5\hat{i}-4\hat{j})$ m/s respectively according to an observer on the ground. What is the velocity of the bus according to a car driver? (UEE: 2003).
   A. $(-2\hat{i}+6\hat{j})$ m/s. B. $(-2\hat{i}-6\hat{j})$ m/s. C. $(-8\hat{i}+2\hat{j})$ m/s. D. $(-8\hat{i}-2\hat{j})$ m/s.
6. A car initially at rest and at the origin has moved a distance of 5,10,15,20,25,30,40,50,60,70 meters during the 1, 2, 3,…10 seconds periods respectively. What is the average speed during the first 5 second and the second half period from t = 6 seconds to t = 10 second in m/s respectively? (UEE:2003)
   A. 4, 10. B. 4, 9. C. 5, 9. D. 5, 10.
7. A bullet is fired from cannon at point 1 and follows the trajectory shown in the figure below. Air resistance may neglect. Four possible vectors are also shown in the figure; the letter D represents the zero vector. Which vector best represents the bullets acceleration at point 2?(UEE: 2003)
   A. $\hat{A}$. B. $\hat{B}$. C. $\hat{C}$. D. $\hat{D}$





8. As shown below, an ideal massless spring is compressed 1m by a force of 100 N. This same spring is placed at the bottom of a frictionless inclined plane which makes an angle of $\Theta = 30^0$ with the horizontal. A 10 kg mass M is released from rest at the top of the inclined and is

brought to rest momentarily after compressing the spring 2m. Through what distance does the mass slide before coming to rest? (UEE: 2003)

A. 1 m. B. 2 m. C. 4 m. D. 6 m.

9. The x and y coordinates of a particle at any time t is given by $x = 9t + 5t^2$ and $y = 5t + 8$ where x and y are in meters and t in seconds. The acceleration of the particle at t = 5 seconds is :(UEE: 2003) A. zero. B. $10 m/s^2$. C. $14 m/s^2$. D. $20 m/s^2$.

10. A projectile is fired at 600 with the horizontal. At the highest point of its path, the vertical component of its velocity is momentarily zero. What is the magnitude of its acceleration at this point?(UEE:2004)

A. $20 m/s^2$. B. $10 m/s^2$. C. $5 m/s^2$. D. $0 m/s^2$.

11. A cart on an air track is moving at 0.5 m/s when the air is suddenly turned off. The cart comes to rest after traveling 1 m. The experiment is repeated, but now the cart is moving at 1 m/s when the air is turned off. How far does the cart travel before coming to rest?(UEE: 2004). A. 1 m. B. 2 m. C. 3 m. D. 4 m.

12. A car accelerates steadily from 0 m/s to 30 m/s in a distance d and a time t. Another car takes a time 3t to accelerate steadily from stationary to the same final velocity. What distance does the second car cover during the new acceleration?(UEE: 2004).

A. $3d$. B. d. C. $d/3$. D. $d/9$

13. A object moving with uniform acceleration has a velocity of 12 m/s in the positive x direction when its x coordinate is 3 cm. If its x coordinate 2 sec. later is -5 cm, what is its acceleration? (UEE: 2004).

A. $-12 m/s^2$. B. $-13 m/s^2$. C. $-16 m/s^2$. D. $12 m/s^2$.

14. What is the direction to which a fish must push the water with its fins in order to propel eastward? (UEE: 2005).

A. eastward. B. upward. C. westward. D. downward.

15. A woman driving a 2000 kg car along alevel road at 30 m/s takes her foot off the gas to see how far her car will roll before it slows to a stop. She discovers that it takes150 m. What is the average force of friction acting on the car? (UEE: 2005).

A. 9000 N. B. 6000 N. C. 3000 N. D. 400 N.

16. The coordinate of a particle in meters is given by $x(t) = 25t - 3t^3$, where the time t is in seconds. At what value t will the particle become momentarily at rest? (UEE: 2005).

A. 2.87 s. B. 1.67 s. C. 0.6 s. D. 0.36 s.

17. A driver moving at a constant speed of 20 m/s sees an accident up ahead and hits the brakes. If the car accelerates at a constant rate of -5 m/s^2, how far does the car go before it comes to stop? (UEE: 2005). A.120 m. B. 100 m. C. 40 m. D. 20 m.

18. The planet Jupiter is about 318 times as massive as Earth, yet on its surface you would weigh only about 2.4 times your weight on earth. Why is this happened? (UEE: 2005).

A. Your mass is 132.5 times less on Jupiter.

B. You are 132.5 times more weightless there.

C. Jupiter is significantly farther from the sun.

D. Jupiter's radius is about 11.5 times the Earth's radius.

19. A rocket moving in free space has a speed of 3×10^3 m/s relative to the Earth. Its engines are turned on, and fuel is ejected in a direction opposite the rocket's motion at a 5×10^3 m/s relative to therocket. What is the speed of the rocket relative to the Earth once the rocket's mass is reduced to half its mass before ignition? (UEE:2005)

A. 7×10^3 m/s. B. 5×10^3 m/s. C. 4×10^3 m/s. D. 2×10^3 m/s.

20. What does the slop of a velocity-time graph represent? (UEE: 2006)

A. Distance. C. Displacement.

B. Acceleration. D. Speed.

21. Two projectiles are fired from ground level at equal speed but different angles. One is fired at angle of 30 degrees and the other at 60 degrees. The projectile to hit the ground first will be the on fired at (neglect air resistance). (UEE: 2006).

A. 60 degrees.

B. 30 degrees.

C. Both hit at the same time.

D. Cannot be determined from the given information.

22. A placekicker must kick a football from a point which is at a distance of 36.0 m from the goal. When kicked, the ball leaves the ground with a speed of 20.0 m/s at an angle of 53^0 to the horizontal. If the ball hits the crossbar of the goal at a height h and bounces back what will be the height of the crossbar? (UEE:2006)

A. 2.45 m. B. 2.85 m. C. 3.00 m. D. 3.15 m.

23. A body moving with constant acceleration covers the distance between to point 60m apart in 5s. Its velocity as it passes the second point is 15m/s. What is the acceleration? (UEE:2006).

A. 3 m/s^2. B. 2.4 m/s^2. C. 1.8 m/s^2. D. 1.2 m/s^2.

24. If a long distance jumper athlete leaves the ground at an angle of 37^0 above the horizontal surface at a speed of 10 m/s, how far does he jump in the horizontal direction? (UEE:2007)

A. 4.8 m. B. 6 m C. 9.6 m. D.12 m.

25. A woman is rotating a bucket of water in a vertical circle of radius 0.9 m, the mass of bucket and water is 5 kg. What is the bucket's minimum speed at the top of the circle if no water is to spill out? (UEE: 2007). A. 0 B. 1 m/s. C. 3 m/s. D. 9 m/s.

26. A force **F** of magnitude 20 N is applied to a block of mass 2 kg that lies on a rough, horizontal surface as shown in figure below. The coefficient of kinetic friction between the block and surface is 0.4. What is the magnitude of the acceleration of the block?(UEE: 2007)

A. 10 m/s^2.

B. 5.2 m/s^2.

c. 4 m/s^2.

D. 2.8 m/s^2.



27. Which one of the following statements is correct? (UEE: 2007)

A. An object moving toward the east cannot have acceleration toward the west.

B. If the average velocities of an object zero in some time interval, the average speed of the object for that time interval is also zero.

C. The velocity- time graph of an object moving with constant acceleration is parallel to the time axis.

D. An object having zero velocity can have acceleration different from zero.

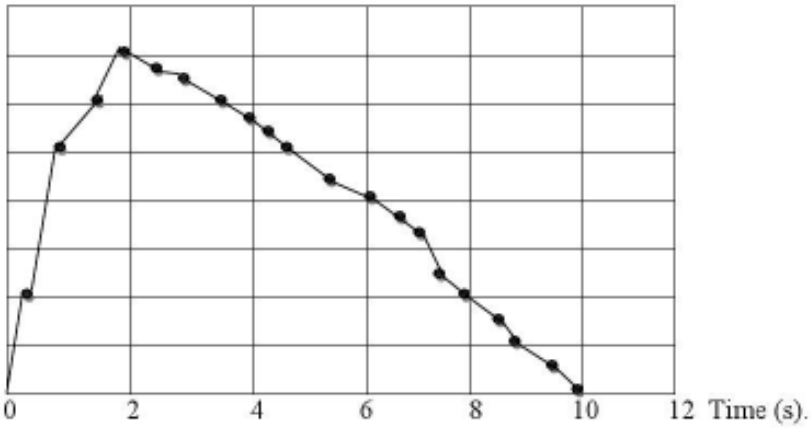
28. A car travels along a straight line at a constant speed of 20 m/s for a distance ***d*** and then another ***d*** in the same direction at a constant speed of 36 km/hr. What is the average speed for the entire trip? (UEE: 2007)

A. 23 km/hr. B. 48 km/hr. C. 54 km/hr. D. 60 km/hr.

29. A highway curve is banked (inclined) in such a way that a car travelling at speed of 13.5 m/s can round the curve without skidding in the absence of friction. If the angle is 300, what is the radius of the cure? (UEE: 2007).

A. 10.5 m. B. 21.0 m. C. 31.7 m. D. 36.7 m.

30. The graph below illustrates the position and time for a cat that runs to catch a rat and then returns with it. The cat caught the rat after 2 seconds. What was the cat's average speed as it returned with the rat? (UEE:2008)



A. Its average return speed was 2 m/s.
C. Its average returns speed was 0.7 m/s.
B. Its average return speed was 2 m/s.
D. Its average return speed was 0.9 m/s.

31. An airplane flies at speed of 720 km/hr at 370 North of West direction. How far does the plane travel to the west in 1 hour? (UEE:2008)

A. 432 km. B. 720 km. C. 560 km. D. 504 km.

32. An airplane travelled from Addis Ababa to Mekele, 780 km, in 45 minutes. What was its average speed? (UEE:2008)

A. 0.28 m/s. B. 1040 km/hr. C. 17.3 m/min. D. 585 km/hr.

33. An example of a body moving with constant speed but still accelerating is:

A. A body moving on a straight road.
C. A body moving in a circular path.
B. A body moving on a straight rail way track.
D. A body falling in a viscous fluid.

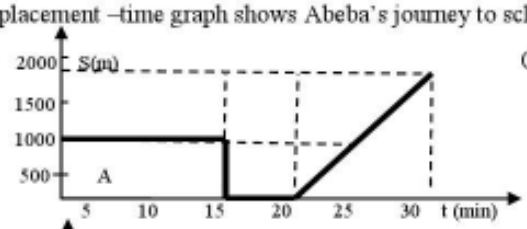
34. A student moves along the boundary of a square field of side 10 m in 40 sec. If he started from one of the corners of the square what will be the magnitude of displacement of the student at the end of 2 minutes and 20 seconds from his initial position?(UEE:2008)

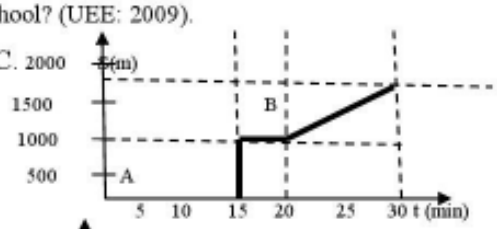
A. 10 m. B. $10\sqrt{2}$ m. C.40 m. D. 30 m.

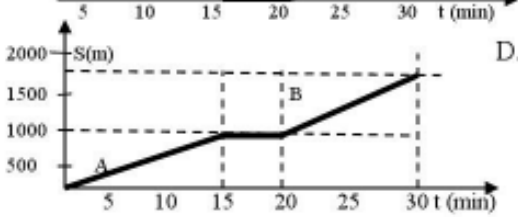
35. A cricketer throws a ball vertically upwards with initial speed of 20 m/s. How long is it in the air before it returns to the cricketer's hands? (UEE: 2009).

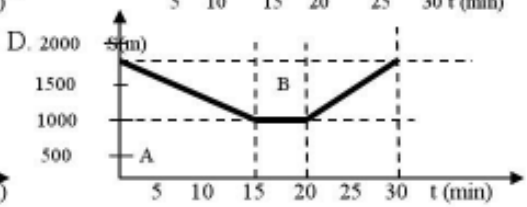
A. 2 s. B. 10 s C. 1.5 s. D. 4 s.

36. Abeba walks to school. She walks 1 km in 15 minutes. She meets her friends Makeda-they talk for 5 minutes and then carry on walking to school. They walk 800 m in 10 minutes. Which of the following displacement –time graph shows Abeba's journey to school? (UEE: 2009).

A.


C.


B.


D.


37. The graph of cannon-ball fired horizontally from a laboratory table is equal to 8/3 times the height of the table. What is the direction of velocity vector of the projectile as it strikes the ground? (UEE: 2009).

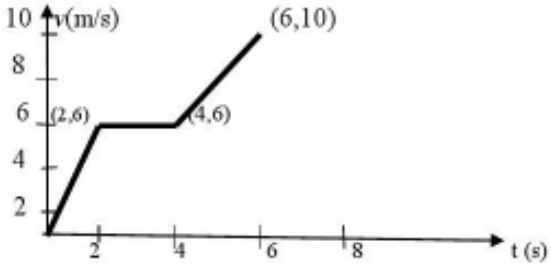
A. 45^0 from the horizontal.
B. 53^0 from the horizontal.
C. 60^0 from the horizontal.
D. 37^0 from the horizontal.

38. A race car moving at a constant speed of 35 m/s. a security car was moving at a speed of 5 m/s as the race car passes by it and was accelerating at constant rate o f 5 m/s^2 .what was the speed of the security car when it took over the race car?(UEE:2010)

A. 35 m/s. B.60m/s. C. 65m/s. D. 5 m/s.

39. A car start moving from rest and its motion on a straight line is shown in the figure below what is the average velocity of the car with in the first 6 second.(UEE:2010)

A. 1.67 m/s.
B. 5.67 m/s.
C. 5 m/s.(2,6)
D. 6 m/s.



40. Which one of the following statement is correct regarding the motion in a plane (UEE:2010)

A. When a body movies in a horizontal circle, its velocity is constant.
B. When a body movies in a vertical circle, its speed is constant.
C. In projectile motion the horizontal component of the motion is uniformly accelerated
D. The centripetal force for a body moving in either vertical or horizontal circle is toward the center.

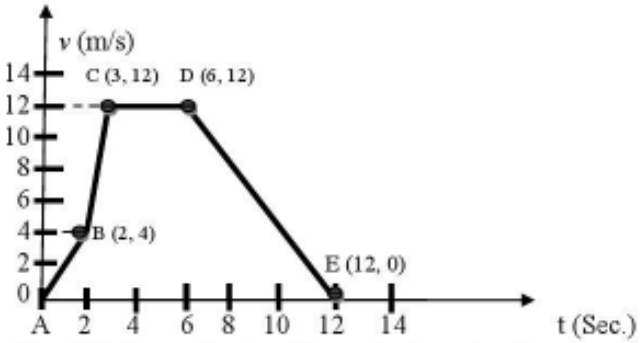
41. A bullet is fired at an angle of 30^0 above the horizontal. If air resistance is neglected, what should be the bullet's horizontal acceleration (ax) and vertical acceleration (ay) when it reaches its maximum height? (UEE:2010)

A. Both $\vec{a}_x$ and $\vec{a}_y$ are zero.
C. $\vec{a}_x$ is 10 m/s^2 downward and $\vec{a}_y$ is zero.
B. $\vec{a}_x$ is zero and $\vec{a}_y$ is 10 m/s^2 downward.
D. Both $\vec{a}_x$ and $\vec{a}_y$ are 10 m/s^2, downward.

42. A driver of an automobile travelling at a constant speed of 20 m/s suddenly applies a brake and the automobile comes to rest in 2 seconds after skidding for a certain distance. What is the length of the skid distance? (UEE: 2011).

A. 400 m. B. 10 m. C. 40 m. D. 20 m.

43. Which of the following is correct about the motion shown in the velocity-time graph below? (UEE: 2011)



A. Between C and D, the motion is with constant acceleration.
B. Between B and C, the acceleration 4 m/s^2.
C. Between D and E, the motion is with constant positive acceleration.
D. Total displacement is 84 m.

44. An object of mass M is set in a vertical circular motion. The tension T from the rope keeps the object in a circular path with speed *v*. Where does the rope experience a maximum tension? (UEE: 2011).

A. At the top of the circle.
C. When the object is at half of the circle.
B. At the bottom of the circle.
D. When it is at 45^0 to the vertical line.

45. A shell is fired from a gun, whose barrel is inclined at an angle to the horizontal during the flight; the shell explodes in air into fragments. The center of mass of different fragments will follow: (UEE: 2011).

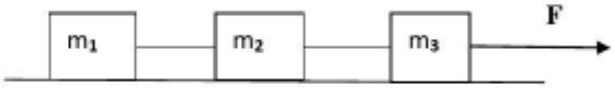
A. A horizontal straight line.
C. A parabola.
B. A vertical straight line.
D. An unpredictable path.

46. A 5 kg mass pushed upward along an inclined plane of inclination 30^0 with constant force F. If the acceleration of the block for this motion is 1 m/s^2 and the plane is assumed to be frictionless, what is the magnitude of the constant force F? (UEE: 2011)

A. 5 N. B. 25 N. C. 20 N. D. 30 N.

THE END

1. Which one of the following statements is true about action and reaction forces referred to in Newton's third law of motion? (UEE:2003)
   A. They act up on the same body.
   B. They are equal in magnitude but need not have the same line of action.
   C. They act up on two different bodies.
   D. They are not equal in magnitude but have the same line of action.
2. Which of the following statements is **NOT** true?(UEE:2003)
   A. The magnitude of average angular velocity is directly proportional to the angular displacement during a given time.
   B. Average angular velocity and instantaneous angular velocity are the same for uniform angular motion.
   C. The direction of the average angular velocity is determined by the right hand rule.
   D. The direction of average angular velocity is parallel to a tangent line along the trajectory of the object.
3. A cart moving at a speed V collides with an identical stationary cart on an air track and the two stick together after collision. What is their velocity after collision? (UEE: 2003).
   A. -0.5 V. B. Zero. C. 0.5 V. D. V.
4. Three blocks of mass m_1, m_2 and m_3 are connected by thread and placed on a smooth horizontal surface as shown in the figure below. A force F is applied on the block of mass m_3 in forward direction as shown. Neglecting friction, find the tension in the thread connecting m_1 and m_2 (UEE:2003)



   A. $\frac{m_1F}{m_1+m_{2+m_3}}$ C. F - $\frac{m_3F}{m_1+m_{2+m_3}}$
   B. $\frac{m_2F}{m_1+m_{2+m_3}}$ D. $\frac{(m_2+m_3)F}{m_1+m_{2+m_3}}$
5. When a small mass m suspended from one end of a vertical string and then whirled in a horizontal circle at a constant speed v, (UEE: 2003).
   A. The string stays vertical.
   B. The string becomes inclined to the vertical.
   C. There is no force on m except its weight.
   D. The angle of inclination to the vertical of the string does not depend on v.

6. A block slides on a rough 45^0 incline. The coefficient of friction between block and incline is μ_k. What is the ratio of acceleration when the block accelerates down the inclined to the acceleration when the block is projected up the incline? (UEE:2003)

   A. $\frac{\mu_k-1}{\mu_k+1}$ B. $\frac{\frac{\mu_k}{\sqrt{2}}-1}{\mu_k+1}$ C. $\frac{1-\mu_k}{1+\mu_k}$ D. $\frac{1+\mu_k}{1-\mu_k}$

7. As a satellite moves in an elliptical orbit around the earth, the gravitational attraction of the earth for the satellite:(UEE:2003)

   A. is greater than the satellite's gravitational attraction for the earth.

   B. is less than the satellite's gravitational attraction for the earth.

   C. varies inversely as the square to the distance between the earth and the satellite.

   D. remains constant.

8. A car (mass m_1) is driving at velocity v, when it smashes into an unmoving car (mass m_2), locking bumpers. Both cars move together at the same velocity. The common velocity will be given by :(UEE: 2004).

   A. $\frac{m_1 v}{m_2}$ B. $\frac{m_2 v}{m_1}$ C. $\frac{m_1 v}{(m_1+m_2)}$ D. $\frac{(m_1+m_2)v}{m_1}$

9. A ladder of length 3 m and mass 20 kg leans against a smooth, vertical wall so that the angle between the wall and the ladder is 30^0. Determine the magnitude of the normal forces at the contact point on the wall (N_w) and at the contact point on the ground (N_g) (UEE: 2004).

   A. $N_w = 57.7$ N, $N_g = 200$ N. C. $N_w = 0$ N, $N_g = 200$ N.

   B. $N_w = 200$ N, $N_g = 57.7$N. D. $N_w = 200$ N, $N_g = 0$ N.

10. A block of mass 0.25 kg is placed on top of a light vertical spring of force constant 5000N/m and pushed downward so that the spring is compressed by 0.10 m. After the block is released from rest, it travels upward and then leaves the spring. To what maximum height above the point of release does it rise? (UEE: 2004).

    A. 10.2 m. B. 9.2 m. C. 8.0 m. D. 9.0 m.

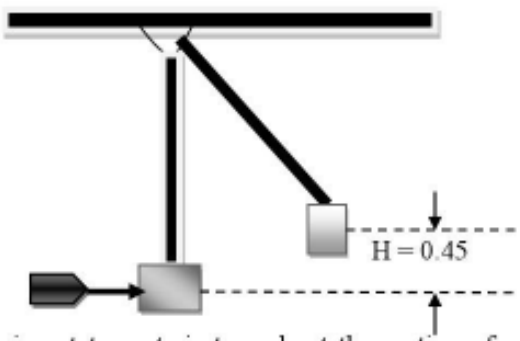
11. A ladder of length 3 m and mass 20 kg leans against a smooth, vertical wall so that the angle between the wall and the ladder is 30^0. What are the magnitudes of the normal forces at the contact point on the wall (N_w) and at the contact point on the ground (N_g) (UEE: 2005).

    A. $N_w = 0$ N, $N_g = 200$ N. C. $N_w = 57.7$ N, $N_g = 200$ N

    B. $N_w = 200$ N, $N_g = 0$ N. D. $N_w = 200$ N, $N_g = 57.7$ N

12. A bullet of mass 10 gm, moving horizontally, strikes and embeds itself in a box of mass 1 kg suspended from a light string as shown in the figure below. If the composite mass rises to a height H = 0.45 m, then what is the speed of the bullet before collision? (UEE: 2005).

A. 303 m/s.
B. 300 m/s.
C. 90.9 m/s.
D. 90 m/s.



13. Which one of the following statements is true about the motion of a particle in a circular path? (UUE: 2006).

A. The centripetal acceleration is constant if the particle's speed is constant.
B. The tangential acceleration can be perpendicular to the velocity vector of the particle.
C. The centripetal acceleration is always in the direction perpendicular to the velocity vector of the particle.
D. The acceleration is always perpendicular to the velocity vector of the particle.

14. Two particles with masses $2m$ and $3m$ are moving toward each other along the x axis with the same initial speeds v. Particle $2m$ is traveling to the left, and particle $3m$ is traveling to the right. They undergo an elastic glancing collision such that particle $2m$ is moving in the negative y direction after the collision. What are the x component of the final velocity of particle $3m$ and the kinetic energy of the particle $2m$, respectively? (UEE: 2006).

A. 0.33 v and 0.7 mv^2.
B. 0.33 v and 1.4 mv^2.
C. 0.67 v and 0.7 mv^2.
D. 0.67 v and 1.4 mv^2.

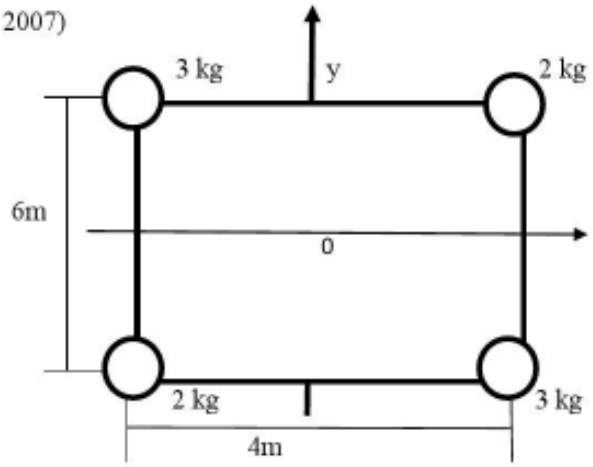
15. A hard ball moving on a horizontal frictionless surface with a speed of 5 m/s in the positive x direction strikes a stationary hard ball of the same mass. After the collision, the first ball moves with a speed of 4 m/s along a direction that makes an angle of 37^0 with its initial direction of motion. What is the struck ball's speed and the smallest angle between its direction of motion and the positive x axis after the collision? (UEE: 2007).

A. 3 m/s and 53^0.
B. 3 m/s and 37^0.
C. 4 m/s and 53^0.
D. 4 m/s and 37^0.

16. A man standing on a frictionless surface continuously fired 120 bullets horizontally in 1 minute using a machine gun. If each bullet has a mass of 10 g and leaves the muzzle of the gun with a speed of 800 m/s, what is the average force exerted by the gun on the man? (UEE:2007) A. 8 N. B.16 N. C. 960 N. D. 16000 N.

17. The particles shown in figure below are connected by rectangular rigid rods of negligible mass. The origin of the *xy* plane is at the centers of the rectangle. The system rotates in the *xy* plane about the z axis with an angular speed of 6 rad/s. What is the rotational kinetic energy of the system? (UEE: 2007)

A. 2574 J.
B. 2340 J.
C. 1287 J.
D. 1170 J.

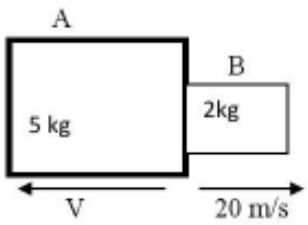


18. What is the necessary and sufficient condition for conservation of linear momentum? (UEE:2008)
    A. The presence of more linear than nonlinear forces in the system.
    B. Net force on the system is zero.
    C. The presence of only non-linear forces.
    D. Internal forces exceed external forces.

19. If the impulse of a rotating disc is non-zero, what can you conclude? (UEE:2008)
    A. The change in linear momentum is zero.
    B. The torque acting on object is constant.
    C. Impulse of the disc equals its moment of inertia.
    D. The change in angular momentum is non zero.

20. A large mass (A) and a small mass (B) are pushing one another apart, as shown in the figure below. The small mass moves away at a velocity of 20 m/s to the right. What is the recoil velocity of the large mass? (UEE:2008)

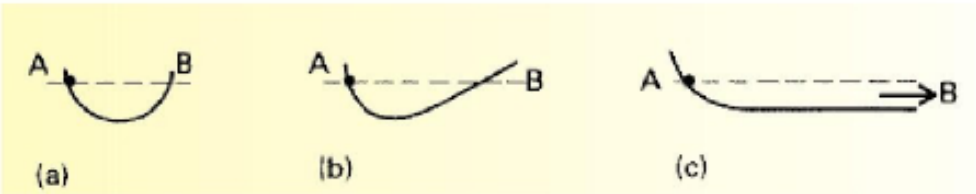
A. -20 m/s.
B. 8 m/s.
C. 20 m/s.
D. -8 m/s.



21. A fun making boy swings a blinking ball tied to the end of a string in a vertical circle. If the radius of the circle is 0.5 m, then what should be the minimum speed of the ball at the bottom of the circle to make a complete circular motion at the top? (UEE:2009).

A. 5 m/s. B. $\sqrt{5}$m/s. C. $\sqrt{15}$ m/s. D. $2\sqrt{5}$ m/s.

22. Galileo carried out a 'thought' experiment on motion. The line between A and B represents a surface and the center of the ball is placed at A. What would happen in each of the three situations shown in the figure below, without friction when the ball is released? (UEE:2009)



A. The ball would never reach point B in all instances.
B. The ball would reach B in all instances even if point B keeps on receding to infinity in (c).
C. The ball would reach point B in (a) and (b) and not in (c).
D. The ball would reach point B only in (a).

23. A Uranium atom initially at rest has amass of 2 units and spontaneously disintegrated in to two fragments. One of the fragments has a mass of 0.8 units and moves at a speed of 24 m/s as shown in figure below. What is the speed of the second fragments? (UEE: 2009)

A. 25.6 m/s.
B. 21.3 m/s.
C. 16 m/s.
D. 14.8 m/s.



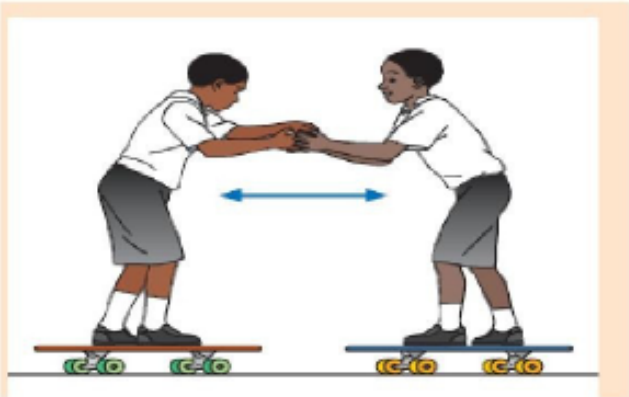
$m_1 = 0.8$ units, $v_1 = 24$ m/s.

24. A 1kg object explodes and breaks up in three pieces. One piece has a mass of 400 g and has a velocity of $(15\hat{i} + 10\hat{j})$ m/s. A second piece has a mass of 250 g and has a velocity of $(25\hat{i} + 10\hat{j})$ m/s. What is the velocity of the third piece? (UEE: 2009).

A. $(-4.3\hat{i} + 35\hat{j})$ m/s. C. $(45\hat{i} - 4.3\hat{j})$ m/s.

B. $(-35\hat{i} - 4.3\hat{j})$ m/s. D. $(-35\hat{i} - 4.3\hat{j})$ m/s.

25. Two students A and B, with masses m_A and m_B respectively, stand on a wheeled trolleys as shown in the figure below. If student A has large mass and push student B, then what can be said about their accelerations? (UEE: 2010)



A. The acceleration of student A is less than that of student B.

B. The acceleration of student B is less than that of student A.

C. Both boys will be accelerated by the same magnitude but in opposite directions.

D. There would be no acceleration because the forces are equal and opposite.

26. For a constant force F, if the impulse imparted to the system is large, then what can you conclude about the collision? (UEE:2010)

A. Linear momentum is conserved. C. The contact or impact time is large.

B. Kinetic energy is conserved. D. The change in velocity is small.

27. An open trolley is rolling on a level surface without friction loss through a vertical downpour of rain, as shown in the figure below.



As the trolley rolls, an appreciable amount of rainwater accumulates in the cart. What will be the speed of the cart? (UEE: 2010)

A. It increases because of conservation of mechanical energy.

B. It decreases because of conservation of momentum.

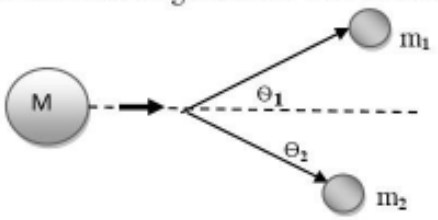
C. It decreases because of conservation of mechanical energy.

D. It remains the same because the raindrops are falling perpendicular to the direction of the cart's motion.

28. A satellite moves at a constant speed in a circular orbit about the center of the Earth at an altitude half the radius of the Earth above its surface. If g is the gravitational acceleration at the Earth and R its radius, then what is the speed of the satellite? (UEE:2010)

A. $\sqrt{3gR/2}$. B. $\sqrt{2gR}$. C. $\sqrt{gR}$. D. $\sqrt{2gR/3}$.

29. A ball of mass M moves with speed V in the + x-direction. It explodes into two pieces that go off at angles θ_1 and θ_2, as shown below. What are the magnitudes of the momenta of the two pieces? (UEE: 2011).



A. $P_1 = \frac{MV\cos\theta_2}{\sin(\theta_1+\theta_2)}, P_2 = \frac{MV\cos\theta_1}{\sin(\theta_1+\theta_2)}$.

B. $P_1 = \frac{MV\sin\theta_2}{\sin(\theta_1+\theta_2)}, P_2 = \frac{MV\sin\theta_1}{\sin(\theta_1+\theta_2)}$.

C. $P_1 = MV\tan\theta_2$, and $P_2 = MV\tan\theta_1$.

D. $P_1 = \frac{MV\cos\theta_2}{\cos(\theta_1+\theta_2)}, P_2 = \frac{MV\cos\theta_1}{\cos(\theta_1+\theta_2)}$.

30. The rate of change of momentum of the raindrop can be given by $F = ma + u\frac{\Delta m}{\Delta t}$. In this expression what does u represent? (UEE: 2011).

A. The velocity of the extra mass added to the raindrop.

B. The velocity of the raindrop.

C. The velocity of the loss in mass of raindrop.

D. The rate of change of the velocity for combined system.

31. A trolley is set to move on a smooth track that is banked at an angle of 300. For a trolley moving with a speed 5 m/s to round the curve. What is the radius of the banked surface? (UEE: 2011). A. 5 m. B. 2.5 m. C. 10 m. D. 3.5 m.

THE END

1. A body has moved from its initial position at origin along x-axis to a final position x=5m under the influence of a force given by $\hat{F} = (4x)\hat{\imath}$ N. What is the work done by the force in moving the body from its initial position to its final position? (UEE:2003)

   A. 100J. B. 50J C. 25J. D. 20J

2. A uniform ladder of length l and weight W = 50 N rests against a smooth, vertical wall. If the coefficient of static friction between ladder and ground is $\mu = 0.5$, find the minimum angle Θ_{min} between the ladder and ground such that the ladder will not slip :(UEE: 2003).

   A. 45^0. B. 53^0. C. 60^0. D. 37^0

3. The speed of a mass is increased by two fold. By what factor does the kinetic energy change? (UEE: 2004). A. 2. B. 4. C. 8. D. 16.

4. A ladder stands on the ground, leaning against a wall. It is safer climbing up the ladder if? (UEE:2004)

   A. The ground is frictionless and the wall is rough.

   B. The ground is rough and wall is frictionless.

   C. The ground is frictionless and the wall is frictionless.

   D. The ladder leans at 45 degree and the ground is frictionless.

5. A 4 kg block is given an initial of 8 m/s at the bottom of 30^0 inclined plane. The frictional force that retards its motion is 15 N. If the block is directed up the inclined plane, how far will it move before it stops? (UEE: 2004).

   A. 3.66 m. B. 4.40 m. C. 3.35 m. D. 4.67 m.

6. A stationary mass explodes into two parts of masses 0.4 kg and 4 kg. If the larger mass has a kinetic energy of 100 J, what is the kinetic energy of the smaller mass? (UEE:2004)

   A. $4\sqrt{50}J$ B. 100 J. C. 1000 J. D. The change in kinetic energy is the same for both particles

7. One person drops a ball from the top of a building while another person at the bottom observers its motion. The two people **DISAGREE** on which of the following? (UEE: 2005)

   A. The value of total energy of the ball.

   B. The change in potential energy of the ball.

   C. The value of the gravitational potential energy of the ball earth system.

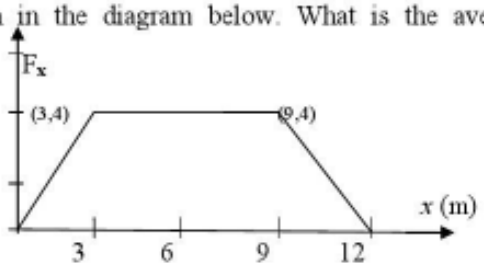
   D. The kinetic energy of the ball at some point in its motion if one of them is walking.

8. A 2 kg object experiences two concurrent forces of 100 Nat 300 above the positive x-axis and 80 N at 600 above the negative x-axis. What is the magnitude of acceleration of the object? (UEE: 2005). A. 68 m/s^2. B. 64 m/s^2. C. 48 m/s^2. D. 46 m/s^2.

9. Two men, A and B, are loading identical boxes onto a truck. A lift his box straight up from the ground to the bed of the truck, whereas B slides his box up a rough ramp to the truck. Which statement is correct about the change in the potential energy on the box-Earth system ?(UEE:2006)
   A. A and B changes the potential energy by the same amount.
   B. A changes more potential energy than B.
   C. B changes more potential energy than A.
   D. None of those statements is necessarily true because the force of friction and the angle of the incline are unknown.
10. A 10 m uniform ladder weighing 200 N rests against a frictionless wall. The ladder makes 53^0 angle with the horizontal. If the ladder is just on the average of slipping when a 600 N firefighter is 6 m along the ladder from the bottom, what is the coefficient of static friction between the ladder and ground? (UEE: 2006).
    A. 0.3240. B. 0.4313. C. 0.5750. D. 0.7667.
11. A car of mass 1500 kg is travelling at a uniform velocity of 30 m/s due east. The driver applies the brakes to slow down the car to a velocity of 10 m/s due east. What is the work done in slowing down the car? (UEE: 2007).
    A. 15 kJ. B. 300kJ. C. 600kJ. D.750 kJ.
12. A block of mass 10 kg is pulled up a rough inclined plane with a force of 100 N parallel to the inclined plane. The inclined plane makes an angle of 37^0 with the horizontal. At the instant when the force is applied the block has a speed of 1.5 m/s. If the coefficient of kinetic friction is 0.4, and the block is pulled up 5 m, what is the change in the kinetic energy of the block? (UEE: 2007). A. 20 J. B. 30 J. C. 40 J. D. 45.5 J
13. The area under a force versus distance graph represents: (UEE: 2008).
    A. Acceleration. C. The change in momentum.
    B. The change in energy. D. Work done
14. A net external non zero force acts on a particle that is moving along a straight line. Which one of the following statements is correct? (UEE: 2008).
    A. The velocity, but not the kinetic energy, of the particle is changing.
    B. Both the velocity and kinetic energy of the particle are changing.
    C. The kinetic energy, but not the velocity, of the particle is changing.
    D. The momentum is conserved.

15. Which statement is correct about conservative and dissipative forces? (UEE: 2008).
    A. The work done by conservative forces is path dependent.
    B. The work done, along a closed path, by non-conservative forces is nonzero.
    C. Gravitational force is an example of non-conservative force.
    D. Friction is an example of conservative force.
16. A spring with a spring constant of 300 N/m is stretched 20 cm in 2 seconds. What is the power applied to stretch the spring? (UEE: 2009).
    A. 3 W. B. 6 W. C. 30 KW. D. 60 KW.
17. A 50 KW machine is used to lift heavy object to the top of building under construction. If this machine is replaced with a new machine of 100 KW power, then which of the following statements is **NOT** true about the new machine? (UEE: 2009).
    A. The new machine can raise object with the same mass at twice the speed of the old machine.
    B. The new machine can raise object with twice as much mass at the same speed as the old machine.
    C. The new machine takes twice as much time to do same work as the old machine.
    D. The new machine can do twice as much work in the same time as the old machine.
18. Which of the following is correct about a work done for dissipative forces? (UEE:2009)
    A. Path dependent.
    B. The same as the loss in kinetic energy.
    C. The same as the gain in potential energy.
    D. The same as the potential energy stored in spring.
19. An object of mass 1 kg moving with a speed of 2 m/s was acted on by a force that produces an acceleration of 2 m/s^2. What is the change in kinetic energy of the object if the force is exerted on the object for 2 seconds in its direction of motion? (UEE: 2010)
    A. 1 J. B. 4 J. C. 8 J. D. 16 J.
20. A body that is released from the top of a tall building reaches the ground after six seconds. What is the ratio of the kinetic energy acquired by it at the end of the first three seconds to the increment in the kinetic energy during the next three seconds? (UEE:2010)
    A. 1/3. B. 1. C. 3/2. D. 2.

21. A boy pushes a block over 12 m distance within 6 seconds. The force applied by the boy varies as shown in the diagram below. What is the average power loss by the boy? (UEE:2010)



A. 7 W.
B. 8 W.
C. 6 W.
D. 4 W.

22. Which of the following is equal to the amount of work required to stop a moving object? (UEE:2011)

A. The mass of the object times its acceleration.
B. The kinetic energy of the object.
C. The square of the velocity of the object.
D. The mass of the object times its velocity.

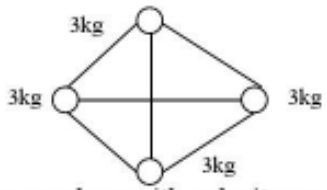
23. A 1 kg roller coaster is acted on by a 4N force over a displacement of 2m in the direction of force and then set free. The roller is moving on a smooth and horizontal surface towards a free end of a spring of constant K, whose other end is fixed on the wall. If the spring is compressed by 20 cm to bring the roller coaster to rest, then what is the value of the spring constant? (UEE: 2011). A.100 N/m. B. 200 N/m. C. 400 N/m. D. 800 N/m.

24. In which of the following case is no work done by dissipative force? (UEE:2011).

A. When a parachute jump from a plane.
B. For a freely falling object.
C. On a racing car that moves in a desert.
D. When someone slides a box on a horizontal rough surface.

THE END

1. The necessary and sufficient condition for a rigid body to be in equilibrium is the sum of:(UEE:2003)
   A. All torques acting on it is zero.
   B. All forces acting on it should be zero.
   C. All forces should be equal in magnitude, but opposite in direction to the sum of all torques acting on it.
   D. All forces and the sum of all torques should be zero
2. The angular momentum of a particle is:(UEE:2003)
   A. Independent of the specific origin of coordinates.
   B. Zero when its position and momentum vectors are parallel.
   C. Zero when its position and momentum vectors are perpendicular.
   D. Not zero for non zero position and momentum vectors.
3. A disk rolls without slipping along a horizontal surface. The center of the disk has a translational speed v. The uppermost point on the disk has a translational speed (UEE: 2003).
   A. Zero. B. V. C. 2v. D. 2Π
4. Two discs of moments of inertia I_1 and I_2 about their respective axes (which are normal to the disc and passing through the center), and rotating with angular speeds ω_1 and ω_2 are brought into contact face-to-face with their axes of rotation coincident take $\omega_1 \neq \omega_2$. What is the angular speed of the two-disc system after contact? (UEE:2003)
   A. $\frac{I_1\omega_1 + 2I_2\omega_2}{I_1 + I_2}$. B. $\frac{I_1\omega_1 + I_2\omega_2}{I_1 + I_2}$. C. $\frac{I_1\omega_1 + 2I_2\omega_2}{I_1 - 2I_2}$. D. $\frac{I_1\omega_1 + I_2\omega_2}{I_1 - I_2}$.
5. A wheel starts from rest and rotates with constant angular acceleration to reach an angular speed of 12 rad/s in 3 s. What is the magnitude of the angular acceleration of the wheel in rad/s^2 and the angle in radians through which it rotates in this time interval respectively? (UEE: 2004). A. 4, 18. B. 3, 18. C. 18, 5. D. 18, 4.
6. The radius of the wheel shown below is 0.75 m. What is its moment of inertia? (UEE:2005)
   A. 2.25 kgm^2.
   B. 3.38 kgm^2.
   C. 6.75 kgm^2.
   D. 9.00 kgm^2.



7. A 1.5 kg particle moves in the xy-plane with velocity $v = (4.4\hat{i} - 3.6\hat{j})$ m/s. What is the angular momentum when it position vector is r = $(1.5\hat{i} + 2.2\hat{j})$ m? (UEE: 2005).
   A. $-22\hat{k}$ kgm^2/s. B. $14.6\hat{k}$ kgm^2/s. C. $-14.6\hat{k}$ kgm^2/s. D. 22k $\hat{k}$gm^2/s.
8. If two particle have equal momenta, then which one of the following statements is TRUE about their kinetic energies?(UEE:2005)
   A. Their kinetic energies are always equal.
   B. Their kinetic energies are never equal.
   C. Their kinetic energies are equal when their masses are the same.
   D. Their kinetic energies are equal when the speed of one of the particle is half the speed of other particle and their masses are the same.

9. A uniform ball of radius r and mass m starts from rest and rolls down a frictionless incline of height h. When the ball reaches the ground, how fast is it going? (UEE:2005)

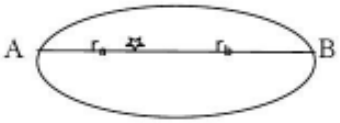
   A. $\sqrt{\frac{10}{7}gh}$. B. $\sqrt{\frac{9}{10}gh}$. C. $\sqrt{\frac{10}{9}gh}$. D. $\sqrt{\frac{7}{10}}$gh.

10. A hoop of mass M and radius R is at rest at the top of an incline plane of height h. The hoop rolls down the plane without slipping. When the hoop reaches bottom, its angular momentum about the center of mass is :(UEE: 2006).

    A. Mgh. B. $MR\sqrt{2gh}$ C. $MR\sqrt{gh}/2$ D. $MR\sqrt{gh}$

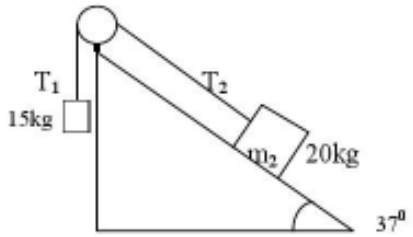
11. A planet of mass m is circling a star in an elliptical orbit as shown below. If its velocity at a point A is 60,000 m/s, and $r_b = 8r_a$ what is its velocity at point B? (UEE: 2006).

    A. 7,500 m/s.
    B. 8,571 m/s.
    C. 60,000 m/s
    D. 488,000 m/s.



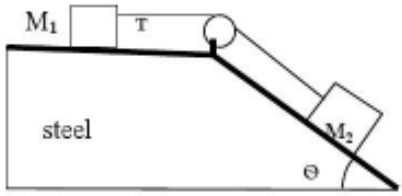
12. As shown in Figure below, two blocks are connected by a string of negligible mass passing over a pulley of radius r = 0.2 m and moment of inertia I. The block on the frictionless incline is moving with a constant acceleration a = 2 m/s2 up along the incline. What is the moment of inertia of the pulley? (UEE: 2006).

    A. 0.8 kg m^2.
    B. 1.25 kg m^2.
    C. 4 kgm^2.
    D. 40 kgm^2.



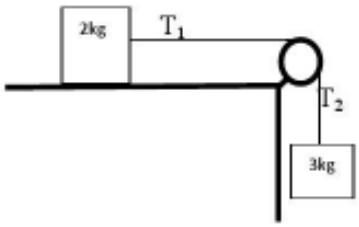
13. An aluminum block of mass m_1 = 3 kg and a copper block of mass m_2 = 5 kg are connected by a light string over a frictionless pulley. They sit on a steel surface as shown in figure below, where Θ = 530. The coefficient of kinetic friction between the steel surface and each block is 0.3. If the blocks are released from rest what is the tension T in the string? (UEE: 2006).

    A. 29.40 N.
    B. 17.25 N.
    C. 12.25 N.
    D. 8.60 N.



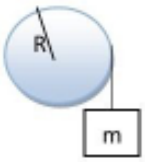
14. Two blocks are connected by a string of negligible mass passing over a pulley of radius r = 0.2 m and moment of inertia I as shown in figure below. The block on the horizontal frictionless surface is moving with a constant acceleration a = 2 m/s^2. If the pulley axis is frictionless, the string is inextensible and does not slip on the pulley, what should be the inertia of the pulley? (UEE: 2007).

A. 0.40 kg m^2.
B. 0.80 kg m^2.
C. 4.00 kg m^2.
D. 8.00 kg m^2.



15. An object with a mass of m = 3.0 kg is attached to the free end of a light string wrapped around a pulley of radius R = 0.50 m and moment of inertia I = 0.75 kg m^2. The pulley if free to rotate in a vertical plane about a fixed frictionless axis passing through its center as shown in figure below. The suspended object is released from rest at 3.60 m above the floor. What is the angular momentum of the pulley at the time when the object strikes the floor? (UEE: 2007).

A. 4.5 kg m^2/s.
B. 9.0 kg m^2/s.
C. 12.3 kg m^2/s.
D. 18 kg m^2/s



16. Determine the torque due to a force $\vec{F} = 2\hat{\imath} - 3\hat{\jmath} + 4\hat{k}$ N acting at appoint $\vec{r} = 3\hat{\imath} + 2\hat{\jmath} + 3\hat{k}$ about the origin? (UEE: 2008).

A. $6\hat{\imath} - 6\hat{\jmath} + 12\hat{k}$.
B. $-6\hat{\imath} + 6\hat{\jmath} + 12\hat{k}$.
C. $17\hat{\imath} + 6\hat{\jmath} - 13\hat{k}$.
D. $-17\hat{\imath} + 6\hat{\jmath} + 13\hat{k}$.

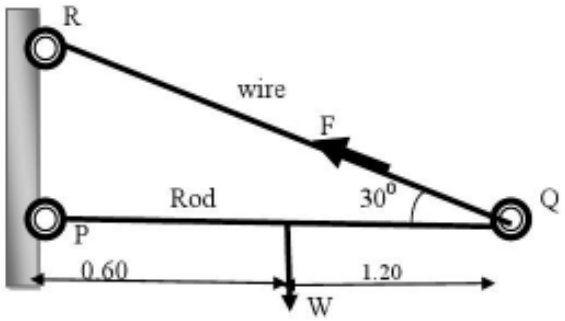
17. A uniform, 6 m long, and 600-N beam, rests on two supports, as shown. The force exerted on the beam by the right support B is closest to: (UEE: 2008).

A. 75 N.
B. 240 N.
C. 400 N.
D. 320 N.



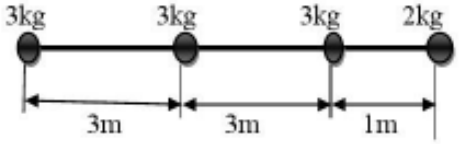
18. A rod PQ is attached at P to a vertical wall, as shown in the Figure below. The length of the rod is 1.80 m. The weight W of the rod acts at 0.60 m from P. The rod is kept horizontal and in equilibrium by a wire attached to Q and to the wall at R. The wire provides a force F on the rod of 50 N at 30^0 to the horizontal. By taking moments about P, determine the weight W of the rod. (UEE:2008)

A. 130.0 N.
B. 150.0 N.
C. 75.0 N.
D. 50.0 N.



19. Find the distance of the center of mass of the system shown in the diagram from point A. The rod is massless.(UEE:2008)

A. 3.73 m.
B. 2.09 m.
C. 2 45 m
D. 5.86 m



20. The rotational analogue of mass is: (UEE:2008)

A. Moment of inertia.
B. Torque.
C. Angular momentum.
D. Angular acceleration.

21. A fly wheel is rotating with an angular velocity of 2 rad/sec and acted by an acceleration of $1/\Pi$ rad/s^2. How long will it take to complete three revolutions? (UEE:2008)

A. 0.5Π s. B. Π s. C. 2Π s. D. 4Π s^2.

22. A disk of radius R with uniform distribution of mass *M*, rotates about axis perpendicular to its plane at the rim with angular speed *w*. the moment of inertia of the disk about the axis through the center is $1/2MR^2$. What is the kinetic energy of the disk?(UEE:2009)

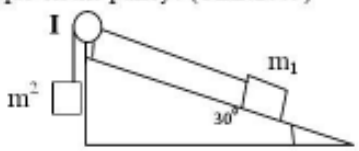
A. $\frac{1}{4}MR^2w^2$. B. $\frac{1}{3}MR^2w^2$. C. $\frac{1}{2}MR^2w^2$. D. $\frac{3}{4}MR^2w^2$.

23. A pulley is rotating at a frequency of 20 rev/min. A motor speeds up the wheel so that 30 s later the frequency of motion is 60 rev/min. How far will points on the pool 0.30 m from its center has travelled during that period? (UEE:2009)

A. 125.7 m. B. 0.13 m. C. 37.68 m. D. 4.2 m.

24. A block of mass $m_1 = 10$kg placed on a frictionless incline plane connected to mass $m_2 = 15$kg using a string of negligible mass passing over a pulley of moment of inertia $I = 0.25$kgm^2 and radius R = 10 cm as shown in the diagram. What is the torque on the pulley? (UEE:2009)

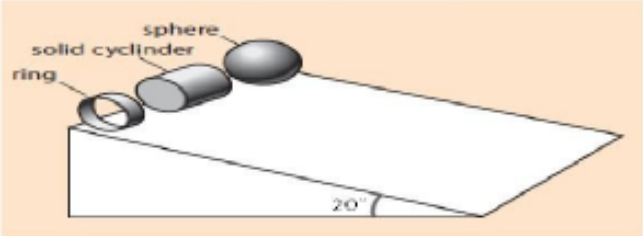
A. 2.5 N m.
B. 4 N m.
C. 5 N m.
D. 12 N m.



25. A thin rod when rotated about an axis at the end of the rod has a moment of inertia $\frac{1}{3}ML^2$. The rod has a mass of 1.5 kg and length 1 m. If the rod initially at rest gains a rotational kinetic energy of 1000J, at what speed does it rotate? (UEE:2010)

A. $10\sqrt{5}$ rad/s. B. $20\sqrt{10}$ rad/s. C. 10 rad/s. D. 18.8 rad/s

26. A ring, a solid cylinder and solid sphere, all having the same mass and the same radius, are held at the top of an inclined plane as shown figure below. If the objects roll without sliping and the plane is 0.3, which one of the following shows the order in which they will get to the bottom of the inclined plane? (UEE:2010)



A. All will reach the bottom at the same time.
B. Sphere, solid cylinder, ring.
C. Ring, solid cylinder, sphere.
D. Solid cylinder, sphere, ring.

27. If in a given rotational system of a body the angular momentum is increased with the time, which one of the following statements is **NOT** correct? (UEE:2010)

A. The radius of rotation may increase.
B. The moment of inertia may increase.
C. There is a torque exerted on the system.
D. There is no torque exerted on the system.

28. Five beads of equal mass are fixed on a rigid light rod that is free to rotate about a frictionless vertical bearing. The arrangement is such that, four of them are placed at 0.25 m and the fifth one is at 0.5 m from the axis of rotation. The rotational kinetic energy is 144J when the beads were rotating with angular speed of 48 rad/s. What is the mass of each bead? (UEE: 2011).

A. 0.25 kg. B. 0.5 kg. C. 0.75 kg. D. 1 kg.

29. A thin circular ring of mass M and radius r and moment of inertia Mr^2 is rotating about its axis with a constant angular velocityω. Two objects each of mass m, are attached gently to the opposite ends of a diameter of the ring. What would be the angular velocity of the wheel? (UEE: 2011).

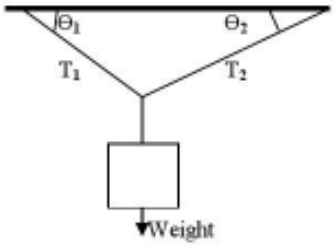
A. $\frac{\omega M}{(M+m)}$. B. $\frac{\omega(M+2m)}{(M+2m)}$. C. $\frac{\omega M}{(M+2m)}$. D. $\frac{\omega(M+2m)}{M}$.

30. In a playing room a turn table of radius 2m has moment of inertia 250 kgm^2 and it is rotating about a frictionless vertical axel. When a boy of mass 50 kg stands near the rim, the system rotates with angular speed 3 rad/s. The boy walks towards the center and stands at 1m from the axel. What is the final angular speed of the system? (UEE: 2011).

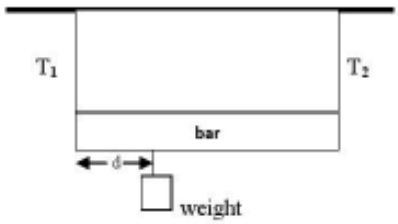
A. 3 rad/s. B. 2.5 rad/s. C. 5.4 rad/s. D. 4.5 rad/s.

THE END

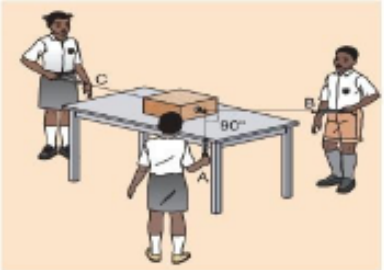
1. A 1 kg mass is attached to a spring of stiffness constant 100 N/m. What is the maximum displacement of the mass from its equilibrium position if its speed is 3 m/s at the equilibrium point? (UEE:2004) A. 0.1 m. B. 0.3 m. C. 3 m. D. 10 m.
2. Which of the following objects has the largest moment of inertia assuming they all have the same mass and radius?(UEE:2004).
   A. A solid disk.
   B. A solid sphere.
   C. A circular loop.
   D. A solid cylinder.
3. An object of mass 3 kg hangs from three light inextensible wires as shown in figure below. Two of the wires make angles $\Theta_1 = 53^0$ and $\Theta_2 = 37^0$ with the horizontal. If the system is in equilibrium, what will be the tensions T_1 and T_2 in the wires? (UEE: 2006).
   A. $T_1 = 18$ N and $T_2 = 24$ N.
   B. $T_1 = T_2 = 18$ N.
   C. $T_1 = T_2 = 24$ N.
   D. $T_1 = 24$ N and $T_2 = 18$ N.



4. Which one of the following statements is **NOT** correct about a particle that is in equilibrium? (UEE:2007)
   A. It can have a velocity different from zero.
   B. Its velocity can be equal to zero.
   C. It can be under the action of more than one force.
   D. It can have an acceleration different from zero.
5. A uniform bar of length 2 m and mass 30 kg is suspended by two massless ropes which are attached to a fixed horizontal bar, as shown in figure below. What are the tensions in each rope when a 700 N weight is suspended at $d = 0.50$ m from the left end of the bar? (UEE: 2007).
   A. $T_1 = 675$ N and $T_2 = 325$ N.
   B. $T_1 = 325$ N and $T_2 = 675$ N.
   C. $T_1 = 500$ N and $T_2 = 500$ N.
   D. $T_1 = 525$ N and $T_2 = 175$ N.

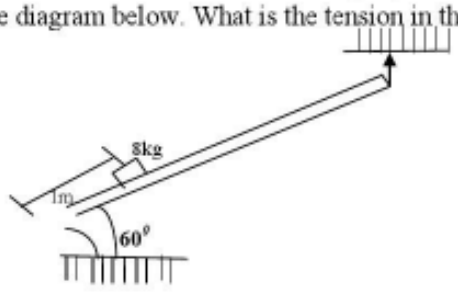


6. Abrehet (A);Bekele (B) and Chaltu (C) are pulling a box horizontally with forces $\vec{F}_A$; $\vec{F}_B$ and $\vec{F}_C$ respectively as shown below. Which statement is correct if the box is in equilibrium? (UEE:2008)



A. $\vec{F}_A = \vec{F}_B \times \vec{F}_C$.
C. $\vec{F}_A = \vec{F}_B . \vec{F}_C$.
B. $-\vec{F}_A = \vec{F}_B + \vec{F}_C$.
D. $\vec{F}_A = \vec{F}_B - \vec{F}_C$

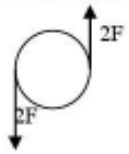
7. Which of the following statements is NOT correct? (UEE: 2009)
   A. Dynamic equilibrium is an equilibrium in which a body is moving at steady velocity without net force or torque acting on it.
   B. Static equilibrium is an equilibrium in which a body is at rest without net force or torque acting on it.
   C. Couples are set of forces with a resultant torque but no net force.
   D. The necessary and sufficient condition for equilibrium of a rigid body is to have the sum of all torques acting on it is zero.
8. Which of the following statements is correct about the first condition of equilibrium?(UEE:2009)
   A. The net force on an object must be zero.
   B. The sum of all torques must be zero.
   C. Clockwise moments should balance counter clockwise moments.
   D. The torque produced by a force should be perpendicular to the forec.
9. A 4 m long uniform board of mass 10 kg hinged on the ground at one end is hanging by a string at the other end. A block of mass 8 kg is placed at 1m from the hinge on the ground as shown in the diagram below. What is the tension in the string?(UEE:2009)
   A. 10 N.
   B. 50 N.
   C. 70 N.
   D. 110 N.

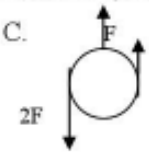


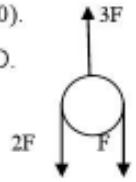
10. Which of the following is a correct statement about the first condition of equilibrium? (UEE: 2010)
    A. The net force on an object must be zero.
    B. The sum of all torque must be zero.
    C. Clockwise moments should balance counter clockwise moments.
    D. The torque produced by a force should be perpendicular to the force.

11. From the figures given below, which one is in equilibrium? (UEE: 2010).

A. 

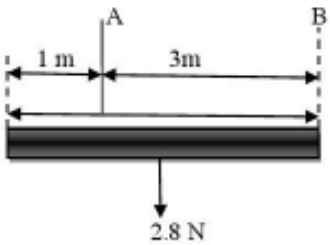
B. 

C. 

D. 

12. Two forces F1 = $3\hat{i}$ N F2 = $4\hat{j}$ N are acting on a particle of mass m. What is the magnitude and direction of a force that balances the two?
    A. $\vec{F}_{eq} = 7$ N at 127^0 counterclockwise from $\vec{F}_1$.
    B. $\vec{F}_{eq} = 5$ N at 143^0 counterclockwise from $\vec{F}_2$.
    C. $\vec{F}_{eq} = 7$ N at 127^0 counterclockwise from $\vec{F}_2$.
    D. $\vec{F}_{eq} = 5$ N at 143^0 counterclockwise from $\vec{F}_1$.

13. The rod shown in the figure below is uniform and its weight is 2.6 N. The length of the rod is 3 m. Two ropes A and B keep the rod in horizontal position. Rope A is 1 m from one end and rope B is at the other end of the rope. What is the calculated value of the tension in rope A? (UEE: 2011).
    A. 2.1 N.
    B. 0.7 N.
    C. 2.8 N.
    D. 1.4 N.

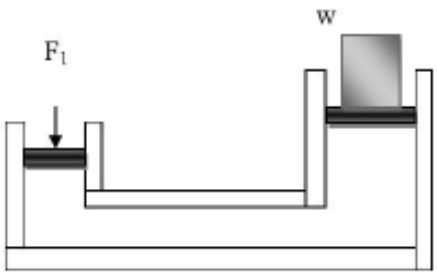


THE END

1. Water flows through a pipe whose cross sectional area is $50cm^2$ into another pipe whose cross-sectional area is $10cm^2$. Both pipes are horizontal. If the velocity of the water in the large pipe is 12m/s, the velocity in the pipe is:(UEE:2003)
   A. 0.24 m/s. B. 1.2 m/s. C. 60 m/s. D. 30 m/s
2. Through a pipe 15 cm in diameter, water is pumped from the river outside of Addis Ababa to one of the sub-cities of Addis Ababa. The river is at an elevation of 564 m and the sub-city is at an elevation of 2096 m. What is the minimum pressure at which the water must be pumped if it is to arrive at the sub-city?(UEE:2003)
   A. 15.32 MPa. B. 15.01 MPa. C. 14.99 MPa. D. 16.03 MPa.
3. What does the valueof Reynolds number signify? (UEE: 2004).
   A. It describes whether the flow is vertical or horizontal.
   B. It describes the magnitude of the velocity of the liquid.
   C. It describes whether the flow is stream lined to turbulent.
   D. It describes the magnitude of the surface tension of the liquid.
4. A table-tennis ball has a diameter of 3.8 cm and average density of $0.084g/cm^3$. What force is required to hold it completely submerged under water? (UEE:2004)
   A. 0.521 N. B. 0.258 N. C. 0.300 N. D. 0.510 N.
5. The pressure at the bottom of a cylindrical tube filled with water was measured to be 5000 Pa. If the water in the tube were replaced with ethyl alcohol, what would be the new pressure at the bottom of the tube? (The density of ethyl alcohol is $0.8\ g/cm^3$) (UEE: 2004).
   A. 4000 Pa. B. 4800 Pa. C. 5000 Pa. D. 6250 Pa.
6. Water flows through a fire hose of diameter 6.35 cm at a rate of $0.012\ m^3/s$. The fire hose ends in a nozzle of inner diameter 2.20 cm. What is the speed with which the water exits the nozzle? (UEE: 2004). A. 23.4 m/s. B. 31.6 m/s. C. 63.2 m/s. D. 46.8 m/s.
7. The length of an aluminum rod at a temperature of 20 ^{0}C is 3m. What will be the ratio of change in the length of the rod to its original length if its temperature is raised to 120 ^{0}C? The coefficient of linear expansion of aluminum is $2.31x10^{-5}\ k^{-1}$. (UEE: 2005)
   A. 23%. B. 3.2%. C. 3%. D. 0.23%.
8. A very large open tank is full of oil density is $800\ kg/m^3$ .if the absolute pressure at the bottom of the tank is $1.81x10^5$Pa,then what I the depth of the oil ? (Note that atmospheric pressure is $1.01x10^5$Pa)?(UEE: 2005).
   A. 1000.0m. B. 75.0 m. C. 10.0m. D. 9.5 m.
9. A container resting on the floor of an elevator contains an incompressible fluid of density ρ. When the elevator has an upward acceleration of magnitude ***a*** then what will be the pressure difference between two points in the fluid separated by the vertical distance Δh?(UEE:2005)
   A. $\rho a\Delta h$. B. $\rho\ (g + a)\ \Delta h$. C. $\rho g\Delta h$. D. $\rho ga\Delta h$.
10. Water flows through a fire hose of diameter 6.35 cm at a rate of $0.012\ m^3/s$. The fire hose ends in a nozzle of inner diameter 2.20 cm. What is the speed with which the water exits the nozzle? (UEE: 2005). A. 63.2 m/s. B. 46.8 m/s. C. 31.6 m/s. D. 23.4 m/s.

11. Which statement is correct about the pressure under a fluid in a container? (UEE: 2006).
    A. It depends on the volume of the fluid.
    B. It depends on the density of the fluid.
    C. It depends on the shape of the container.
    D. It is independent of the depth of the fluid.
12. A cup of coffee at a temperature of 80^0C is placed on a table in a 20^0C room. What happens to the thermal energy and molecular motion of the coffee when it is left on the table? (UEE: 2006).
    A. The thermal energy decrease and the molecules move slowly.
    B. The thermal energy increase and the molecules move slowly.
    C. The thermal energy decrease and the molecules move faster.
    D. The thermal energy increase and the molecules move slowly.
13. A garden hose has an inside diameter of 16 cm. The hose can fill a 10 liter bucket in 20 seconds. If the diameter of the nozzle is reduced to 8 cm, (UEE: 2006).
    A. Water exits with a speed twice the speed inside the hose.
    B. A 10 liter bucked can be filled in 10 second.
    C. A 20 liter bucked can be filled in 40 second.
    D. Water exits with a speed half the speed inside the hose.
14. A table-tennis ball which is spherical in shape has a diameter of 6 cm and average density of 0.4 g/cm^3. What force is required to hold it completely submerged under water? (UEE: 2006).
    A. 0.68 N downward.
    B. 0.68 N upward.
    C. 1.13 N downward
    D. 1.13 N upward.
15. When a load of 500 kg is hanging from a steel wire of length 3 m and cross sectional area 0.20 cm^2, the wire stretches beyond its no-load length. If the Young's modulus for the wire made of steel is $Y = 2 \times 10^{11}$ Pa, what is the change in length of the wire beyond its no-load length? (UEE: 2006).
    A. 3.75 mm. B. 2.75 mm. C. 1.75 mm. D. 0.75 mm.
16. A horizontal pipe of 10 cm in diameter has a smooth reduction to a pipe of 5 cm in diameter. If the pressure of the water in the larger pipe is 80 kPa and the pressure in the smaller pipe is 60 kPa, at what rate does the water flow through the smaller pipe? (UEE: 2006).
    A. 1.63 m/s. B. 6.53 m/s. C. 13.6 m/s. D. 42.67 m/s.
17. Which of the following combination of properties would be most desirable for a heat sink in a machine? (UEE: 2006).
    A. High specific heat and low conductivity.
    B. Low specific heat and high conductivity.
    C. High specific heat and high conductivity.
    D. Low specific heat and low conductivity.
18. A glass flask whose volume is exactly 1000 cm^3 at 0^0C is totally filled with 1000 cm^3 of mercury at this temperature. When flask and mercury are heated to 100^0C, 15.2 cm^3 of mercury overflow. If the coefficient of volume expansion of mercury is 1.82×10^{-4} per Celsius degree, what should be the coefficient of volume expansion of the glass? (UEE:2006)
    A. $1.52 \times 10^{-4}/^0$C.
    B. $1.82 \times 10^{-4}/^0$C.
    C. $3.00 \times 10^{-5}/^0$C
    D. $1.00 \times 10^{-5}/^0$C

19. Two solid spheres made of gold and silver having equal masses are suspended by string and fully submerged in a tank of water. Given that the density of gold is greater than that of silver, which one of the following statement is true?(UEE: 2007)
    A. The buoyant force on each sphere is the same.
    B. The volume of water displaced by the gold sphere is larger than that of the silver sphere.
    C. The tension in the string supporting each sphere is the same.
    D. The buoyant force on the silver sphere is greater than that on the gold sphere.
20. The cross- sectional areas of the small and large pistons of a hydraulic lift shown in figure below are 4 cm^2 and 0.02 cm^2, respectively. What is the magnitude of the force F_1 that must be applied to the small piston to lift a weight w = 15,000 N placed on the larger piston? (UUE: 2007).
    A. 3.0×10^2 N.
    B. 1.5×10^4 N.
    C. 7.5×10^5 N.
    D. 3.0×10^6 N



21. An incompressible fluid flows through a horizontal pipe whose diameter varies along its length. The sum of the kinetic energy per unit volume and pressure of the fluid at different section of the pipe would------- (UEE: 2007).
    A. Depend on the length of the pipe.
    B. Increase as the pipe diameter increases.
    C. Increase as the pipe diameter decreases.
    D. Remains the same as the pipe diameter changes.
22. Which one of the following laws best describes the behavior of elastic materials? (UEE:2007)
    A. Gay Lussac's law.
    B. Hook's law.
    C. Newton's second law
    D. Newton's law of gravitation.
23. The amount of heat required to raise the temperature of an object of mass m = 1 kg by 1 Kelvin is known as---------. (UEE:2007)
    A. Specific heat capacity.
    B. Heat capacity
    C. Expansion coefficient
    D. Internal energy.
24. A man is standing on a spring scale in anelevator. When the elevator is at rest, the scale reads 560 N.When the elevator starts to move, the scale reads 600 N. The elevator has:(UEE:2008)
    A. An upward acceleration.
    B. A constant downward speed.
    C. A constant upward speed.
    D. downward acceleration.
25. The number of joules oh heat energy required to raise the temperature of a body by 1 K is:(UEE: 2008)
    A. Heat capacity.
    B. Specific heat capacity.
    C. Expansion coefficient.
    D. calorific value.

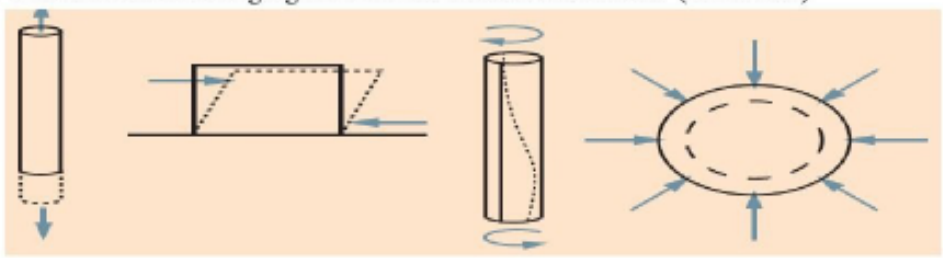
26. Pressure at the bottom of a liquid column is independent of:(UEE: 2008)
    A. Shape of the column.
    B. The density of the fluid.
    C. The depth of the point.
    D. The acceleration due to gravity.
27. The definition of Young's Modulus is given by :(UEE: 2008).
    A. Force per unit area.
    B. Ratio of strain to stress.
    C. Ratio of stress to strain.
    D. force per unit elongation.
28. A water pipe has a diameter of 5 cm in the inlet side and 1.5 cm in outlet side. Water flows at 0.5 m^3per minute at the inlet point. What is the speed of the water at the outlet point? (UEE: 2008) A. 26.67 m/s. B. 13.33 m/s. C. 74.1 m/s. D. 148.1 m/s.
29. A metal ball has a diameter that is slightly greater than the diameter of a hole that has been cut into a metal plate. The coefficient of linear expansion for the metal from which the ball is made is greater than for the metal of the plate. Which one of the following procedures can be used to make the ball pass through the hole?(UEE:2008)
    A. Raise the temperature of the ball and the plate by the same amount.
    B. Heat the ball and cool the plate.
    C. Lower the temperature of the ball and the plate by the same amount.
    D. There is no way of passing the ball through the hole.
30. A billiard ball of radius 4 cm is falling through a liquid of viscosity 0.985 at a velocity of 2.5 m/s. The drag force on the ball is: (UEE: 2008).
    A. 0.591π N B. 0.118π N C. 1.182π N D. 0.059π N
31. Which one of the following statements is correct? (UEE: 2008).
    A. Elastic materials retain their shape after deformation.
    B. Plastic materials can recover the original size or shape after being distorted.
    C. Plastic materials change their shape by pressure.
    D. Elastic materials cannot recover the original size or shape after being distorted.
32. Which of the following refers to the definition of strain as ratio? (UEE: 2009).
    A. Extension to the original length.
    B. Force applied to area of the object normal to the force.
    C. Stress to Young modulus.
    D. Tensile to applied force.
33. Which of the following is the application of Pascal's law? (UEE:2009)
    A. Hydraulic brake in vehicles.
    B. Siphon to remove fluids.
    C. Working of submarines.
    D. Sucking of liquid into syringe.
34. A large (very large in height and cross-section) water tank open at the top has small hole through its side near the bottom. To what height should the water be filled, to double the speed of water that flow out of the hole when it was filled to a height h? (UEE:2009)
    A. h. B. 2h. C. 3h. D. 4h.
35. A block of mass 5kg hanging at the end of spring scale is totally submerged in a beaker of water. The beaker is large enough to avoid overflow of water. If the density of the block is 2.5×10^3 kg/m^3, then what is the reading of the scale? (UEE: 2009)
    A. 3 kg. B. 2 kg. C. 1 kg. D. 0 kg.

36. On an unknown scale X, the ice-point temperature is 50^0X and the steam-point temperature is 200^0X. If the temperature is 60^0C, then what is the reading in ^0X? (UEE:2009)
A. 90^0X. B. 140^0X. C. 15^0X. D. 333^0X.

37. Metal **A** has a coefficient of linear expansion that is three times the coefficient of linear expansion of metal **B**. How does their coefficient of the area expansion, Y, compare? (UEE:2009) A. $Y_A = 2Y_B$. B. $Y_A = 3Y_B$. C. $Y_A = 4Y_B$. D. $Y_A = 6Y_B$.

38. Three metals are in contact and are in thermal equilibrium. The metals have different specific heat capacity. What can be concluded about the temperature of the metals?(UEE:2009)
A. Since they have different specific heat capacity, they must have different temperature at thermal equilibrium.
B. They must have the same temperature at thermal equilibrium.
C. They must have different internal energy.
D. They must have different kinetic energy.

39. Which of the following figure indicates tensile deformation? (UEE:2010)

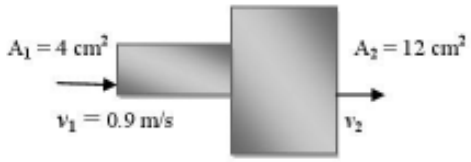


A B C D

40. A beaker with water resting on a scale weight 40 N. A block suspended on a hanging spring weight 20 N. The spring scale reads 15 N when a block is fully submerged in the water. What is the reading of a scale on which the beaker with water rests, while the block is submerged in the water after detached from the hanging spring? (UEE:2010)
A. 25 N. B. 45 N. C. 55 N. D. 60 N.

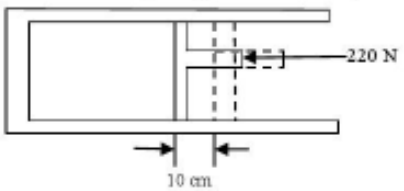
41. An object with a mass of 150 kg and a volume of 0.75 m^3 is floating in a liquid of density 0.8 g/cm^3. What percentage of the object's volume will be submerged below the surface of the fluid?(UEE: 2010)
A. 25 %. B. 50 %. C. 75 %. D. 100 %.

42. In the figure below, what is the speed of water as it leaves A_2? (UEE:2010)
A. 0.3 m/s.
B. 0.9 m/s.
C. 3.3 m/s.
D. 3.6 m/s.



43. An electric immersion water heater is rated at 400 W. How long will it take to heat one kilogram of water from 10 ^{0}Cto 30 ^{0}C? (The specific heat of water is 4.2 J/gK). (UEE:2010)
A. 3.5 min. B. 1 min. C. 15 min. D. 45 min.

44. Which of the following statement is correct about elastic behavior of materials?(UEE: 2011)
    A. For sufficiently small stress, stress is proportional to strain.
    B. In tensile stress the force is parallel to the cross-sectional area, where as in shear stress, the force is proportional to the area.
    C. All materials do not necessarily have elastic limit.
    D. With plastic materials, the body goes to original dimensions after removal of the force that caused deformation.
45. A fluid of unknown density filled in a beaker of 250 cm^3. The pressure due to the fluid at the base of the beaker is 2.30 Pa. The base area of the beaker is 102 cm^2. What is the density of the fluid? (UE: 2011)
    A. 9.2×10^3 kg/m^3.
    B. 9.2×10^1 kg/m^3.
    C. 9.2×10^6 kg/m^3.
    D. 7.9×10^3 kg/m^3.
46. Which of the following statement is correct? (UEE: 2011).
    A. Surface tension is proportional to the length along with the surface tension force acts.
    B. In a given tube, the capillary action is large for a liquid of large density.
    C. The angle between the wall of a container and the liquid surface has no role on the capillary action.
    D. Surface tension pulls the liquid column up until there is sufficient mass of liquid for weight to overcome the intermolecular forces.
47. Water flows at a rate of 0.4 litter per second through garden hose of inside diameter 4 cm. The nozzle of the hose is a circular opening of diameter 2 cm. What is the speed of the water when it emerges? (π= 3.14) (UEE: 2011).
    A. 0.32 m/s. B. 1.27 m/s. C. 3.2 m/s. D. 12.7 m/s.
48. How much heat would be absorbed by 2 g of ice at 0^0C dropped into water at 0^0C, to melt it totally to water of 0^0C? (Latent heat of melting, L = 340,000J/Kg) (UEE: 2011).
    A. 680J. B. 840J. C. 340J. D. 420J.
49. The direction of hat flow is from: (UEE: 2011).
    A. High pressure to low pressure.
    B. High temperature to low temperature.
    C. high density to low density.
    D. A point of higher emissivity to lower one.
50. External force of 220 N applied on a piston of a cylinder containing 1.25g of ammonia gas move 10cm as shown in the diagram below. Assuming adiabatic process, what is the rise in temperature of the gas? (Specific heat capacity of ammonia, c = 2200J/Kg^{0}K) (UEE: 2001).
    A. 4 ^{0}K.
    B. 8 ^{0}K.F =
    C. 0.004 ^{0}K.
    D. 0.008 ^{0}K.



THE END

1. The Zeroth law of thermodynamics states that: (UEE:2003)
   A. Two bodies that are separately in thermal equilibrium with a third body must be in thermal equilibrium with each other.
   B. The increase in internal energy of a system is equal to the sum of the energy entering the system through heating, and the work done on the system.
   C. No process is possible in which there is an overall decrease in the entropy of the universe.
   D. No process or cycle is perfectly reversible and no refrigerator or heat engine can be perfectly efficient.
2. The second law of thermodynamics does **NOT** imply that:(UEE:2003)
   A. There is not any process in which there is an overall decrease in the entropy of the universe.
   B. The complete conversion of energy from a hot source into work is not possible.
   C. Heat flows from colder body to hotter body as in the refrigerator without work done on the system.
   D. Perfectly reversible processes are impossible.
3. Which of the following statement follows from kinetic theory of gases?(UEE:2003)
   A. The pressure of the gas is proportional to the average of square of molecular speed of particles.
   B. The molecules undergo inelastic collisions with each other & with the walls of the container.
   C. The forces between molecules of gas are strong at all times.
   D. Newton laws of motion are a consequence of kinetic theory of gases.
4. A sample of gas is expanded to twice its original volume of $1m^3$ in a quasi-static process for which $p = \alpha V$, with $\alpha = 5 \times 10^{+5} n/m^5$. How much work was done by the expanding gas? (UEE: 2003). A. 0.75 MJ. B. 1 MJ. C. 7.5 MJ. D. 1.5 MJ.
5. Which statement is **NOT** among the assumption made in the kinetic theory of gases?(UEE:2004)
   A. There is no interaction between particles or between particles and the wall except during collision.
   B. Collisionsbetween particles and between particles and the wallsare perfectly elastic.
   C. The volume occupied by the particle is negligible compared to the volume of the gas as a whole.
   D. The distribution of velocities of particles is uniform.
6. The temperature of a gas is due to:(UEE:2004)
   A. The kinetic energy of the molecules. C. The attractive force b/n the molecules.
   B. The potential energy of the molecules. D. The repulsive force b/n the molecules.
7. What does a curve drawn between two points on P-V diagram represent?(UEE:2004)
   A. The state of the system. C. Work done in a cyclic process.
   B. A thermodynamic process. D. Work done on or by the system.
8. In a reversible thermodynamics process, the system:- (UEE: 2005)
   A. Is always close to equilibrium state.
   B. Might never be close to any equilibrium state.
   C. Is close to equilibrium states only at the beginning and end.
   D. Is close to equilibrium states throughout, except at the beginning and end.

9. An ordinary refrigerator is turned on and its door is left open in a thermally insulated kitchen. What is the temperature of the room?(UEE: 2005)
   A. Increase according to the first law of thermodynamics.
   B. Decrease according to the first law of thermodynamics.
   C. Remains constant according to the first law of thermodynamics.
   D. Remains constant according to the second law of thermodynamics.
10. Gas at a pressure P is contained in a vessel. If the masses of all the molecules are doubled and their speeds halved, then what will be the resulting pressure?(UEE: 2005)
    A. 2P B. P/3 C. P/2. D. 3P
11. Suppose two molecules of different mass are kept at the same temperature. Which one of the following statement is NOT true?(UEE: 2005)
    A. Both remains at rest. C. The lighter molecules move faster.
    B. Both move with the same speed. D. The heavier molecules move faster.
12. The change in entropy is zero for:(UEE: 2006)
    A. Reversible isobaric processes. C. Reversible isothermal processes.
    B. Reversible adiabatic processes. D. Reversible processes during which no work is done.
13. ' A heat engine is being designed to have a Carnot efficiency of 65% when operating between two energy reservoirs. If the temperature of the cold reservoir is 20^{o}**c**,what must be the temperature of the hot reservoir?(UEE: 2006)
    A. 57^{o}**c** B.310^{o}**c** C.564^{o}**c** D.807^{o}**c**
14. An ideal gas is at a temperature of 300K. If we wish to double the root mean square (rms) speed of the molecules of the gas, to what value must we raise its temperature?(UEE: 2006)
    A. 450K. B.600K. C.800K. D.1200K.
15. The first law of thermodynamics takes the form dU=dW. This equation is valid if the process is---- (UEE: 2007) A. isobaric. C. isothermal
    B. isochoric. D. adiabatic
16. An ideal gas undergoes an isothermal process starting with a pressure of $2x10^{5}$Pa and a volume of $6cm^{3}$. Which one of the following might be the pressure and volume of the final state? (UEE: 2007) A. $4x10^{5}$Pa and $4cm^{3}$ C. $5x10^{5}$Pa and $3cm^{3}$
    B. $4x10^{5}$Pa and $3cm^{3}$ D.$1x10^{5}$Pa and $10cm^{3}$
17. Which one of the following statement is **NOT** correct?(UEE: 2007)
    A. The entropy of the Universe increases in all natural processes.
    B. No heat engine operating in a cycle can absorb energy from a reservoir and use it entirely to do work.
    C. When a system undergoes a change in state, the change in its internal energy is the difference between the energy transferred to it by a heat and the work done on it.
    D. The entropy of an isolated system reaches its maximum value when the system is in equilibrium.
18. A given weight of a gas has a temperature of 27^{0}C and volume V. Keeping the pressure constant, the volume is increase to 3V by varying the temperature. What is the final temperature of the gas? (UEE: 2007)

A. 81°C. B. 546°C. C. 627°C. D. 900°C.

19. A device for transforming heat energy to mechanical energy is referred to as: (UEE: 2008)
A. transformer. C. generator
B. refrigerant. D. engine

20. Two bodies that are separately in thermal equilibrium with the third body must be in thermal equilibrium with each other. This statement is statement of: (UEE: 2008)
A. The first law of thermodynamics. C. The second law of thermodynamics
B. The zeroth law of thermodynamics. D. The third law of thermodynamics

21. A certain heat engine draws 500 cal/s from a water bath at 27°C and rejects400 calories to a reservoir at a lower temperature. What is the efficiency of this engine?(UEE: 2009)
A. 80 %. B. 75 %. C. 25 %. D. 20 %

22. Which of the following statements is correct?(UEE: 2009)
A. Irreversible process is a process that can be reversed through finite change in the system.
B. Complete conversion of energy from a hot source in to work is possible.
C. There are processes in which there is an overall decrease in entropy.
D. Entropy is a measure of the amount of disorder.

23. If the internal energy of the system decreases, then what can be concluded about the heat and the work done? (UEE: 2010)
A. Heat is added to the system and work is done by system.
B. Heat is removed from the system and work is done on the system.
C. Heat is added to the system and work is done on the system.
D. Heat is removed from the system and work is done by system.

24. If a thermodynamic system undergoes a process in which its internal energy increased by 400J while doing 200Jof work on its surrounding, then what is the energy absorbed in or extracted from it in the form of heat?(UEE: 2010)
A. -600J B. 600J. C. 200J. D. -200J

25. Which of the following statement is **NOT** correct?(UEE: 2010)
A. A system can absorb heat from a hot reservoir and can convert it entirely into work without additional changes in the system and its surroundings.
B. No process is possible in which there is an overall decrease in the entropy of the Universe.
C. The complete conversion of energy from hot source into work is not possible.
D. The spontaneous transfer of energy from a cooler body to hotter body is quite possible.

26. A heat engine operating between 100°C and 700°C has efficiency equal to 40% of the maximum theoretical efficiency. How much energy does this engine extract from the hot reservoir in order to do 5000J of mechanical work?(UEE: 2010)
A. 810.4J. C. 20259.32J.
B. 81.0J. D. 20.3J.

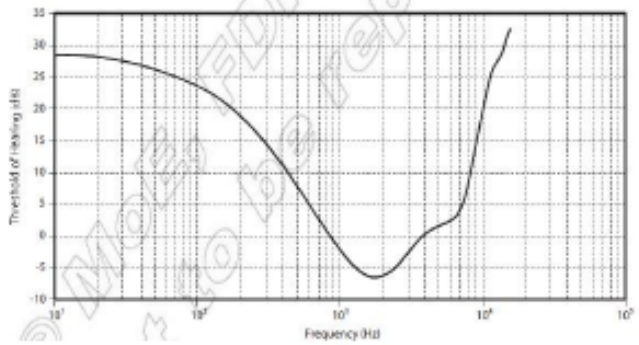
27. Which of the following statement is correct? (Here ρ is the density of the ideal gas, m is the mass of the gas and c is speed of particles) (UEE: 2011)
    A. P (pressure of an ideal gas) $= \frac{1}{2}\rho\,(c^2)$.
    B. For maximum of two gases in equilibrium in a container, $\frac{\rho_2}{\rho_1} = \sqrt{\frac{(c_1^2)}{(c_2^2)}}$
    C. For maximum of two gases in equilibrium in a container, $\frac{\rho_2}{\rho_1} = \sqrt{\frac{(c_2^2)}{(c_1^2)}}$
    D. For a maximum of two different gases with equal partial pressure and equal number of molecules in a container, $\frac{m_2}{m_1} = \frac{(c_1^2)}{(c_2^2)}$
28. Which of the following statement is NOT correct? (UEE: 2011)
    A. No process is possible in which there is an overall decrease in the entropy of the universe.
    B. The spontaneous transfer of energy from a cooler body to a hotter body is not possible.
    C. Spreading out of random kinetic energy through heating does not represent an overall increase in entropy.
    D. The complete conversion of energy from a hot source into work is not possible.

THE END

1. The acceleration of a simple harmonic oscillator:(UEE:2003)
   A. Remains constant during its motion.
   B. Remains non-zero.
   C. Attains its maximum value when its amplitude is zero.
   D. Attains maximum value when its velocity is maximum.
2. A particle that under goes simple harmonic motion has a period of 0.4sec. and an amplitude of 12mm.The maximum velocity of the particle is:(UEE:2003)
   A. 3cm/s. C. 12cm/s.
   B. 9.42cm/s. D. 18.84cm/s
3. A pipe, 68cm long is open at one end and closed at the other. When air is blown across the open end sound is produced at 110Hz. What is the velocity of sound along the pipe? (UEE: 2004). A. 598.4m/s C. 299.2m/s
   B. 334.6m/s D. 149.6m/s
4. The total energy of particle executing Simple Harmonic Motion is: (UEE:2004)
   A. Zero. B. directly proportional to the amplitude
   C. directly proportional to the square of the amplitude.
   D. inversely proportional to the square of the amplitude
5. A point source broadcasts sound in to a uniform medium. If the distance from the source is tripled, how does the intensity change?(UEE:2004)
   A. It remains unchanged. C. It becomes one-third as large.
   B. It becomes three times larger. D. It becomes one-ninth as large.
6. The loudness of sound changes from L_1=30db to L_2=60db. What is the ratio of intensities I_2/I_1 in the two cases? (UEE:2004)
   A. 2. B. 4 C. 600. D. 1000.
7. If the amplitude of sine wave is doubled, the intensity (UEE:2004)
   A. Remains the same. C. Increases by factor 4.
   B. Increases by factor 2. D. Increases by factor 16.
8. A wave has a speed of 50m/s and a wavelength of 25000m.What is the frequency of the wave? (UEE: 2005). A. $2x10^{-3}$Hz. C. $5x10^{2}$Hz.
   B. $6x10^{1}$Hz. D. $1.8x10^{6}$Hz
9. An oscillating system is used to create a succession of waves on a water surface. The rate of wave generation is one every 0.33 seconds. What is the period of these waves? (UEE: 2005).
   A. 0.3 seconds. C. 2.0 second.
   B. 1.0 seconds. D. 3.0 seconds.
10. An alternating current is represented by I (t) = (10A) sin (100πt).What are the amplitude and frequency of the alternating current? (UEE: 2005).
    A. 100*A*, 75Hz. C. 10*A*, 50Hz
    B. 10*A*, 100Hz. D. 5*A*, 25Hz.

11. A transverse sinusoidal wave is travelling on a string. Which statement is correct about a point on the string? (UEE: 2006).
    A. The point moves in the same direction as the waves.
    B. The point moves in **SHM** with a different frequency than that of the wave.
    C. The point moves in **SHM** with the same angular frequency as the wave.
    D. The point moves in uniform circular motion with a different angular speed than the wave
12. A mass suspended from the end of the spring vibrates up and down 24 times in 36sec.What are the frequency and period of the vibration? (UEE: 2006).
    A. 1.5Hz, 0.67sec. C. 0.0012Hz, 864sec.
    B. 0.67Hz, 1.5 sec. D. 864 Hz, 0.0012sec.
13. `An object of mass **m** is hung from a spring and set into oscillation the frequency of the oscillation is measured and recorded as *f*. If the object of mass m is replaced with an object of mass 2**m** and set into oscillation what will be the frequency of the motion?(UEE: 2006).
    A. $\frac{f}{\sqrt{2}}$ B. f C. $\frac{\sqrt{2}}{f}$ D. $2f$
14. A block of mass 1.6kg is attached to a horizontal spring that has force constant of 2000N/m. The spring is compressed 2cm and is then released from rest. At what speed will the block pass through the equilibrium position if a constant friction force of 10N retards its motion from the moment it is released? (UEE: 2006).
    A. 70m/s. B.50m/s. C.70cm/s. D.50cm/s.
15. The sound level at a distance of 4m from a source is 120db.At what distance is the sound level 100db? (UEE: 2006). A. 0.4m. B. 4.8m C. 40m. D. 48m
16. A given minimum point (trough) of a sinusoidal wave is travelling 480cm along a rope in 12sec. If the oscillator that generates the wave completes 48 vibrations in 30sec, what is the wavelength of the wave? (UEE: 2007).
    A. 25m B. 15m C. 0.25m D. 0.15m.
17. The position of a particle moving with SHM is given by an expression $\chi=A\cos(\omega t+\Phi)$, where A is amplitude of the oscillation, is time ω is angular frequency, and Φ is phase constant. If $\Phi=\pi/2$,what will be the sign of the particle's position and velocity at **t=7T/8**.where T is the period of the oscillation?(UEE: 2007)
    A. The position is positive, and the velocity is negative.
    B. The position and velocity are both positive.
    C. The position and velocity are both negative.
    D. The position is negative, and the velocity is positive.
18. If a long rope of uniform linear density is hung from a ceiling and waves are sent up the rope from its lower end, which one of the following is true about the speed of the ascending waves? (UEE: 2007).
    A. The speed decreases as the waves ascend.
    B. The speed increases as the waves ascend.
    C. The waves ascend with a uniform speed.
    D. The speed of the waves is larger around the middle of the rope than around the beginning and end.

19. Which one of the following statement is true a spring-mass system oscillating on a horizontal frictionless surface? (UEE: 2007).
    A. The kinetic and potential energies are equal in all time.
    B. The kinetic and potential energies are both constant.
    C. The maximum potential energy is achieved when the mass passes through its equilibrium position.
    D. The maximum kinetic energy and maximum potential energy are equal.
20. What fundamental frequency can a string vibrate at if it is 30cm long and the velocity of travelling waves along the string is 120m/s? (UEE: 2008)
    A. 400Hz. B. 600Hz. C. 800Hz. D. 200Hz
21. The hearing curve, shown below, indicates the vibration of the threshold of hearing with frequency. The ear is most sensitive at the point indicated by ---------- (UEE: 2008)



    A. A. B. C. C. B. D. D
22. A wave length is: (UEE: 2008)
    A. A line that represents the direction of propagation of light.
    B. The minimum distance between two points that are in phase.
    C. The locus of all points of a traveling wave that are in phase.
    D. The number of waves crossing a given plane in a unit time.
23. A simple pendulum is made using a long, thin metal wire. What happens to the period of the pendulum when the temperature drops? (UEE :2008)
    A. Increase.
    B. Remains the same.
    C. Decrease.
    D. Period of oscillation has random dependence on temperature.
24. Which of the following is **NOT** correct about a simple harmonic motion? (UEE: 2009)
    A. Total mechanical energy is conserved.
    B. The acceleration is directly proportional to and opposite in direction to displacement.

C. The period of small oscillation of a pendulum with string length l, a *bob* mass m attached to its end is $T=2\pi\sqrt{\frac{l}{g}}$

D. The frequency of an oscillating mass attached to a massless spring is independent of the string constant.

25. Which of the following indicates the wavelength of a traveling wave? (UEE: 2009)
    A. The distance between an adjacent trough and peak.
    B. The amplitude of the wave.
    C. The distance between a node and antinodes.
    D. The distance between two adjacent points which are in phase.
26. What makes the oscillatory motion a simple harmonic motion?(UEE: 2010)
    A. The acceleration of the motion is directly proportional in magnitude but opposite in direction to the displacement.
    B. The acceleration of the motion is directly proportional to the velocity.
    C. The velocity of the motion is directly proportional to the displacement.
    D. The velocity of the motion is inversely proportional to the displacement.
27. The two end fixed string of length $0.5m$ has a mass per unit length $2g/m$. If the tension in the string is 80N, what is the second harmonic frequency?(UEE: 2010)
    A. $100\sqrt{2}$Hz. B. 200Hz. C. 400Hz. D. 600Hz.
28. Which one of the following is **NOT** the use of Doppler Effect? (UEE: 2010)
    A. Astronomy. C. Radar
    B. Blood flow measurement. D. Energy transmission.
29. Which one of the following is not an example of simple harmonic motion? (UEE: 2011).
    A. A mass attached to a spring system oscillating in horizontal direction to the surface of the Earth.
    B. Oscillation of simple pendulum.
    C. Rotation of second pointer in hand watch.
    D. A mass attached to a spring system oscillating in vertical direction to the surface of the Earth.
30. Travelling wave is given by the equation $Y = A\cos(kx - \omega t)$, where k is the wave number and ω is the angular frequency. What is the distance that the wave travels in the time t = T/2? (UEE: 2011).
    A. Full wavelength. C. a quarter of the wavelength.
    B. Half the wavelength. D. at the origin.
31. A 50 cm pipe is open at one end and closed at the other end. When air is blow at 150 Hz. What is the velocity of the sound along the pipe? (UEE: 2011).
    A. 150 m/s. B. 100 m/s. C. 330 m/s. D. 300 m/s.

THE END

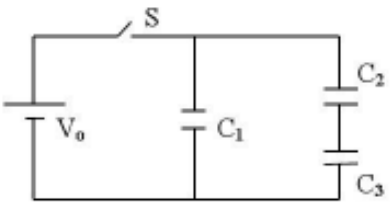
1. A wave front is:(UEE:2003)
   A. A line that represents the direction of propagation of light.
   B. The locus of all points of a travelling wave that are in phase.
   C. The minimum distance between two points that are in phase.
   D. The number of waves crossing a given plane in a unit time
2. Light with frequency of $6x10^5$GHz passes through two narrow slits of width 0.2m apart and forms an interference pattern on a screen 2m away from the slits. What is the distance between the fringes in the interference pattern? (UEE:2003)
   A. 3mm. B. 5mm. C. 4mm. D. 3.5mm
3. Which phenomenon is responsible for the colors seen on a thin oil film on the water surface? (UEE: 2004). A. Diffraction. B. Interference C. Superposition. D. Refraction.
4. When a soap bubble is in air, it exhibits different colors under sunlight. The absence of a particular color in a region is due to :(UEE: 2004).
   A. Double refraction.
   B. Strait line propagation of light.
   C. Destructive interference of light of that color in that region.
   D. Constructive interference of light of that color in that region.
5. What happens if the monochromatic light used in Young's double slit experiment is replaced by the white light?(UEE: 2004).
   A. No fringes are observed.
   B. All bright fringes become white.
   C. All bright fringes have colors between violet and red.
   D. Only the central fringe is white, all other fringes are colored.
6. In Young's double slit experiment both the separation between the slits and the distance between the slits and the screen are halved then what is the fringe width? (UEE: 2005).
   A. Halved. C. zero.
   B. Unchanged. D. doubled.
7. A thin film of oil (n=1.25) is located on a smooth wet floor. When viewed perpendicular to the floor, the film reflects most strongly red light at 640*nm* and reflects no blue light at 512*nm*. How thick is the oil film? (UEE: 2005).
   A. 640*nm*. C. 548*nm*.
   B. 612*nm*. D. 512*nm*.
8. Refraction of a wave does NOT involve change in its (UEE: 2005).
   A. Speed. C. frequency.
   B. Wavelength. D. speed and wavelength.
9. A viewing screen is separated from a double slit by 4.8m. The distance between the two slits is 0.03mm. Monochromatic light is directed toward the double slit and forms an interference pattern on the screen. The first dark fringe is 4.5cm from the center line on the screen. What is the wavelength of the light? (UEE: 2006).
   A. 1250*nm*. B. 1875*nm*. C. 2500*nm*. D. 5625*nm*.

10. Two separate coherent sources produce waves whose wavelengths are 0.1m.Which statement is correct about points that are 3.2m away from one source?(UEE: 2006).
    A. Constructive interference occurs if the points are 3m from the other source.
    B. Constructive interference occurs if the points are 3.05m from the other source.
    C. Constructive interference occurs if the points are 2.95m from the other source.
    D. Destructive interference occurs if the points are 3.2m from the other source.
11. Suppose that the index of refraction of a soap-bubble film is 1.25,what is the minimum thickness of the soap-bubble film that results in constructive interference in the reflected light if the film is illuminated with light whose wavelength in free space is λ=600*nm*? (UEE: 2006).
    A. 120*nm*. B. 150*nm*. C. 300*nm*. D. 450*nm*.
12. A wave travelling from a medium of index of refraction $n_1$toward a medium of index of refraction n_2 undergoes partly transmission and partly reflection. If n_2 is greater than n_1 which one of the following statements is not correct? (UEE: 2007).
    A. The speed of the wave in the medium with refractive index n_1 is smaller than with n_2.
    B. The incident and the reflected waves are in phase.
    C. The angle of reflection is the same as the angle of incidence.
    D. The refraction angle is less than the incidence angle.
13. In Young's double-slit experiment interference pattern which one of the following activities moves the successive bright fringes farther apart?(UEE: 2007).
    A. Decreasing the wavelength of the light.
    B. Decreasing the distance between the viewing screen and the double slit.
    C. Increasing the slit spacing. D. Decreasing the slit spacing
14. When viewed in white light, soap bubbles show color because of :(UEE: 2008).
    A. Interference. B. Dispersion. C. Scattering. D. Diffraction.
15. Which of following statements is correct? (UEE: 2009).
    A. Interference is not superposition of waves.
    B. Constructive interference results in a decrease in the intensity.
    C. Destructive interference results in an increase in the intensity.
    D. Path difference which is integer multiple of wavelength results in constructive interference.
16. A light of wavelength 590nm is incident normally on a grating with a spacing 1.67×10^{-6}m.How many orders of diffraction maxima can be obtained (including the zero order) (UEE: 2009).
    A. 1. B. 2. C. 3. D. 4.
17. In a Young's experiment, there are two slits, rather than one. What do you think the reason? (UEE: 2009).
    A. To increase the intensity.
    B. One slit is for frequency, the other for wavelength.
    C. To create a path length difference.
    D. One slit is for electric fields, and the other is for magnetic fields.
18. A 632.8nm laser light produces an interference pattern on a screen of 4m from a pair of slits. The slit space is equal to0.2mm.Calculate the fringe width. (UEE: 2010).
    A. 12.7mm. B. 25.3mm. C. 6.33mm. D. 15.3cm.

19. Why is an interference pattern **NOT** observed between the light produced from a pair of car headlight? (UEE: 2010).
    A. The light sources are not collimated.
    B. Interference observed only in laboratory conditions.
    C. The spread of light as it travels out of the source.
    D. The light sources are not coherent.
20. In Young's double slit experiment, if the slit separation is 1.2 mm and the average spacing of the bright fringes observed on a screen placed 4 m away from the source is 2 mm. What is the wavelength of the light source? (UEE: 2011)
    A. 550 nm. B. 600 nm. C. 630 nm. D. 750 nm.
21. The colors seen from soap bubbles and oil slicks are a manifestation of thin film interference. What is the cause of this interference? (UEE: 2011)
    A. Interference from refraction of light.
    B. Interference from reflection of light from the two surface of the film.
    C. Interference from diffraction of light.
    D. Interference from superposition of lights that are incident and reflected.

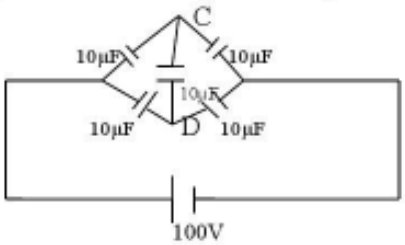
THE END

1. One of the following statements is NOT characteristics of electric field.(UEE:2003)
   A. An electric field is the region around a charged object where another charged object will experience a force.
   B. Lines of electric field have a direction which moves away from negative and towards positive.
   C. The direction of electric filed is the direction of force acting on a small positive test charge.
   D. Lines of electric flux do not cross over each other.
2. A parallel –plate capacitor with a plate separation *d* has a capacitance C in the absence of a dielectric. What is the capacitance when a slab of dielectric material of dielectric constant *k* and thickness 1/3 d is inserted between the plates? (UEE:2003)
   A. $\frac{3K}{2K+1}$ C.
   B. $\frac{2K+1}{3K}$ C.
   C. $\frac{3K}{2K-1}$C.
   D.$\frac{2K-1}{3K}$ C.
3. When switch S is thrown to the left in the figure shown below, the plates of the capacitor C1 acquire a potential difference V_o. C_2 and C_3 are initially uncharged. The switch is now thrown to the right. What are the final charges q_1 on the capacitor C_1? (UEE: 2003)
   A. $(\frac{C_1C_2+C_2C_3}{C_1C_2+C_1C_3+C_2C_3})C_1V_o$.
   B. $(\frac{C_1C_2+C_1C_3}{C_1C_2+C_1C_3+C_2C_3})C_3V_o$.
   C. $(\frac{C_1C_2+C_1C_3}{C_1C_2+C_1C_3+C_2C_3})C_2V_o$.
   D. $(\frac{C_1C_2+C_1C_3}{C_1C_2+C_1C_3+C_2C_3})C_1V_o$.



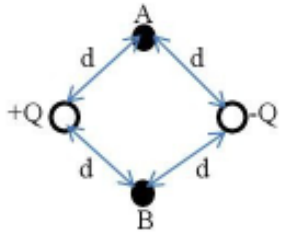
4. What is the SI unit of Electric field? (UEE: 2004)
   A. Am^{-1}.
   B. Vm^{-1}.
   C. Cm.
   D. NC^{-1}.
5. An ion accelerated through a potential difference of 115 V experiences an increase in kinetic energy of 7.37×10^{-17}J. What is the charge on the ion? (UEE:2004)
   A. 6.41×10^{-19} C.
   B. 2.32×10^{-15} C.
   C. 4.51×10^{-15} C.
   D. 2×10^{-21} C.
6. What is the magnitude of the electric force between two protons separated by 2×110^{-15} m? (Charge of proton is 1.6×10^{-19} C) (UEE: 2004)
   A. 67.5N. B.115N. C. 57.5N. D. 83.4N.
7. When a potential difference of 150 V is applied to the plate of a parallel-plate capacitor, the plates carry a surface charge density of 30 n C/cm^2. What is the spacing between the plates? (UEE: 2004)
   A. 2.24μm. B. 5.32μm. C. 12.24μm. D. 4.42μm.
8. A small object of mass *m* carries a *q* and is suspended by a thread between the vertical plates of a parallel-plate capacitor. The plate separation is d. If the thread makes an angle Θ with the vertical, what is the potential difference between the plates? (UEE: 2004)
   A. $\frac{mgd\tan\theta}{q}$. B. $\frac{md\tan\theta}{q}$ C. $\frac{mgd\sin\theta}{q}$ D. $\frac{md\sin\theta}{q}$

9. Five capacitors 10μF capacity each is connected to A, D, and C potential of 100 volt as shown in the next figure. What is the equivalent capacitance between A and B? (UEE: 2004)
   A. 10μF
   B. 20μF
   c. 30μF
   D. 60μF



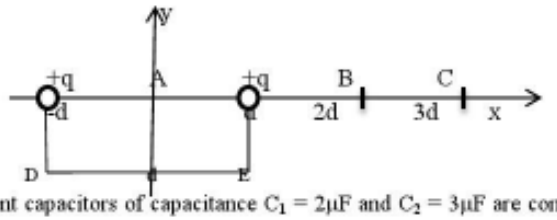
10. Consider a series RC circuit for which R = 1 MΩ, C = 5μF and ε = 30 V. What is the time constant of the circuit and the maximum charge on the capacitor after the switch is closed respectively? (UEE:2005)
    A. 5 seconds, 150 μC.
    B. 7 seconds, 155 μC.
    C. 10 seconds, 160μC.
    D. 9 seconds, 135μC

11. Points A and B are each a distance d from each of two equal and opposite charges as shown below. What will be the work required to move a negative charge q from A to B? (UEE: 2005)
    A. Zero.
    B. $\frac{qQ}{4\pi\varepsilon_0 d^2}$.
    C. $\frac{qQ}{4\pi\varepsilon_0 d}$
    D. $\frac{qQ}{4\pi\varepsilon_{0(}4d^2)}$.



12. An air-filled parallel-plate capacitor has a capacitance of 1pF.The plate separation is then doubled and a wax dielectric is inserted, completely filling the space between the plates. As a result, the capacitance becomes 2pF. What is the dielectric constant of the wax? (UEE: 2005). A. 8. B. 4. C. 2. D. 0.5
13. What is the capacitance of a capacitor that should be connected with 2 other capacitors having capacitance of 4μF and 8μF all in series to produce an effective capacitance of 24/11μF? (UEE: 2005). A. 12μF. B. 10μF. C. 8μF. D. 4μF
14. Which one of the following changes to parallel plate capacitor would not increase energy stored in the capacitor at a fixed voltage across the plates? (UEE: 2005).
    A. Increasing the area of the plates.
    B. Increasing the dielectric constant.
    C. decreasing the charges on the plates.
    D. increasing the distance b/n the plates.
15. Moving $2.5x10^{-6}$ coulomb of charge from point A to point B in an electric field requires $6.3x10^{-4}$J of work. The potential difference between points A and B is approximately (UEE: 2006).
    A. 4×10^{-3} V. B. 2.5×10^{-2} V. C. 1.6×10^{-19} V. D. 1×10^{-14} V.
16. The distance between two point charges is doubled. What will happen to the force of interaction between the charges? (UEE: 2006).
    A. The force will be doubled.
    B. The force will be reduced by half.
    C. The force will be reduced by a factor of ¼.
    D. The force will not be affected.

17. A capacitor made parallel plates is charged by connecting it to a battery. The distance between the plates is much less than the surface area of each plate. After fully charged if the plates are disconnected from the battery and then pulled apart a little, what will happen to the total stored energy, the electric field, and the potential difference between the plates? (UEE: 2006).
    A. The electric field between the plates increases.
    B. The potential difference between the plates decreases.
    C. The total energy stored in the capacitor increases.
    D. The electric field, the potential difference and the stored energy remain the same.
18. A small radio receiver uses a battery that delivers a constant current of 25mA for 3 hours. Calculate the total charge delivered by the battery? (UEE: 2006).
    A. 1080000C. B. 270000C. C. 540C. D. 270C.
19. Two positive charges of magnitude q are each a distance d from the origin A of a coordinate system as shown below. The magnitude of the electric field is minimum at point: (UEE: 2006).
    A. A. B. B. C. C. D.D



20. Two different capacitors of capacitance $C_1 = 2\mu F$ and $C_2 = 3\mu F$ are connected in series across a 120 V supply line. The charged capacitors are disconnected from the line and from each other and reconnected with terminals of like sign together. What will be the final charge on C_1 and C_2, respectively? (UEE: 2006).
    A. 57.6 μC and 86.4 μC. C. 144 μC across each.
    B. 115.2 μC and 127.8 μC. D. 288 μC across each.
21. A parallel plate capacitor has a capacitance of 10μF.If the distance between the plates is doubled, keeping all other quantities constant, what is the new capacitance of the capacitor? (UEE: 2007).
    A. 0.2μF. B. 5μF. C.10μF. D. 20μF.
22. In a certain region of space, a uniform electric field is directed in the positive x direction. If a particle with negative charge carried from x = 20cm to x = 60cm, what can we conclude about the electric potential and the electric potential energy of the charge-field system? (UEE: 2007).
    A. The electric potential at x = 20cm is larger than that at x = 60cm.
    B. The electric potential at x = 20cm is the same as that at x = 60cm.
    C. The electric potential energy decrease.
    D. The electric potential energy increases.
23. Which one of the following statements is correct? (UEE:2007)
    A. The electric field strength due to two point charges of equal magnitude and the same sign is zero only at one point on the line joining the two charges.
    B. If a point charge of mass *m* is released from rest in a uniform electric field, it will move along a line of force with uniform speed.

C. The variation of the strength of the electric field due to an electric dipole is inversely proportional with the square of the distance from its center of mass.

D. An electric dipole moment ***P*** in a uniform external electric field **E** is in stable equilibrium if ***P*** and **E** are in opposite directions.

24. In the sketches below, which best describes the location of the negative charges (electrons) when a negatively charged rod is bought near but not touching the conducting sphere? (UEE: 2008).

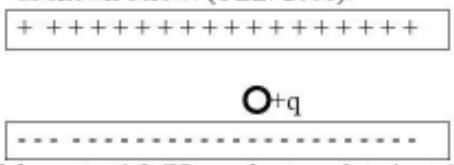
A. C. B. D. C. A. D. B.



25. What is the potential (V) at a distance of 10 m from charge of +5 C? (UEE: 2008).

A. -4.45×10^9 V B. -0.5 V C. $+4.45 \times 10^9$ V D. +0.5 V

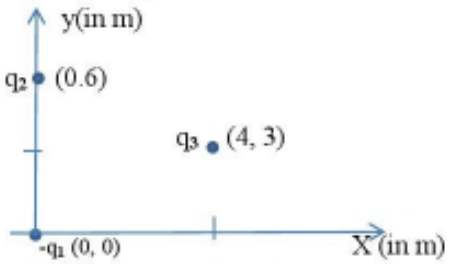
26. A positive charge of 1.0×10^{-4} C is on the negatively charge plate of a parallel plate capacitor as shown below. (UEE: 2008).



If the potential (V) on the top plate is + 10,000 V and that of the bottom plate is – 10,000 V, how much work (W) is required to move charge from the bottom to the plate? (UEE: 2008).

A. 2 J. B. 1 J. C. Zero. D. 2×10^4 J

27. A charge of $q_1 = -10 \times 10^{-9}$ C, $q_2 = +10 \times 10^{-9}$ C and $q_3 = -2.5 \times 10^{-8}$ C are placed on x-y plane as shown in the figure below. What is the electric force on q_3 by q_1 and q_2? (UEE: 2009).



A. 1.08×10^{-7} N in +ve y-direction.

B. 9.00×10^{-7} N in -ve y-direction.

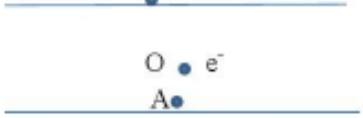
C. 1.42×10^{-7} N in +ve x-direction.

D. 1.42×10^{-7} N in -ve x-direction.

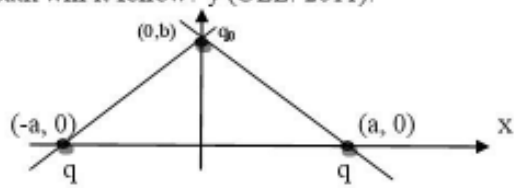
28. Two positive charges of magnitude 2.4×10^{-9} C and 1.6×10^{-9} C are separated in air by a distance of 2cm. how much electrostatic potential is produced by the two charges at midway between them? (UEE: 2009).

A. 3.6 kV. B. 0.72 kV. C. 2.16 kV. D. 1.44 kV.

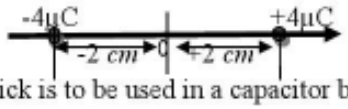
29. The capacitance of a parallel plate capacitor is 10μF. if the distance between the plates is halved, keeping all other quantities constant, and then what is the new capacitance of the capacitor? (UEE: 2009). A. 0.2μF. B. 5μF. C. 10μF. D. 20μF.
30. Suppose that three point charges are placed along a straight line and the electrostatics force exerted on the middle charge is zero. What can we conclude about the charges? (UEE: 2010).
    A. The signs of the three charges should be the same.
    B. The middle charge should be placed at the center between the two charges.
    C. The charges at the ends must have the same sign.
    D. The charge at the middle and at the left end should have the same sign.
31. Two parallel plates are kept at 3 V as shown in the diagram below. If the electron is released at O, then which way will the electron move? (UEE: 2010).
    A. Towards A.
    B. Towards B.
    C. Remains at O.
    D. Parallel to the plates.



32. A capacitor of 12μF capacitance can be fully charged after it is connected between potential differences of 9 V. How much electrical energy is used in charging the capacitor? (UEE: 2010).
    A. 4.86×10^{-4} J. B. 54×10^{-4} J. C. 1×10^{-3} J. D. 9.72×10^{-4} J.
33. Two like charges of value q are fixed at x = a and x = -a as shown in the figure below. If a test charge q_o is released at y = b, which path will it follow? y (UEE: 2011).
    A. It stays at y = b.
    B. Along a line $y = -\frac{b}{a}x + b$.
    C. Along a line $y = \frac{b}{a}x + b$.
    D. A long y-axis.



34. Two equal and opposite charges are located along x-axis at -20 *cm* and +20 *cm* as shown in the figure below. How much would be the electric potential at the origin? (UEE: 2011)
    A. Zero. C. 3.6 MV.
    B. 1.8 MV. D. 4.5 MV.



35. A sheet of polythene ($\varepsilon_r = 2.3$) and 0.25 mm thick is to be used in a capacitor by sandwiching it between two sheets of aluminum foil. What area must the sheets have if the capacitor is to have a capacitance of 0.5 μF? (UEE: 2011)
    A. 12 m^2. B. 6.14 m^2. C. 0.6 m^2. D. 0.12 m^2.

THE END