All Midterm solved MCQZ (With reference) and related subjective of PHY101.
Solved by Saher
And all 1 to 22 chapters formulas in easy format.

Note:-
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The subjective questions are from past papers and some are for Exercise. Normally the paper of Physics is Conceptual paper So this is not guarantee that material will come from this file or any other past paper.
This is just for exercise and gives you idea to solve numerical and objective.
Anyhow best of luck for Papers.

Question No: 1 (Marks: 1) - Please choose one

The lowest tone produced by a certain organ comes from a 3.0-m pipe with both ends open. If the speed of sound is 340m/s, the frequency of this tone is approximately:

► A. 7Hz

► B. 14 Hz

► C. 28 Hz

► D. 57 Hz page no 53

Reference:-
According to handouts t=wavelength/v
And as we know we want to find frequency
There we made some changes In this equation
1/t=v/wavelength
As 1/t=f so
F=v/wavelength

And we know that wavelength for an open ended pipe is 2L which is now 6 m
F=340/6 = 56.6 which is approximately equal to 57.

Question No: 2 (Marks: 1) - Please choose one

1. To raise the pitch of a certain piano string, the piano tuner:

► A. loosens the string

► B. tightens the string

► C. shortens the string page no 54

► D. lengthens the string

Reference:-

Hnmm look at this line given in handouts on page 54
"So as the observer runs towards the source, she hears a higher frequency (
Higher pitch)"
Means to say jitna hum source k kareeb jate jain gin distance kam hota jay ga
Orr utni hi ziada frequency ya pitch sunai de gi isi tra jitna piano k string ko kam Karin gin utni ziada pitch produce hogi.

Question No: 3 (Marks: 1) - Please choose one

A force of 5000N is applied outwardly to each end of a 5.0-m long rod with a radius of 34.0 cm and a Young's modulus of 125×10^8 N/m^2. The elongation of the rod is:

► 0.0020mm

► 0.0040mm

► 0.14mm

► 0.55mm

Reference:-

Page no :48

The elongation of an object is:

d = FL/AY

Where F is the force, L is the length, A is the cross-sectional area, and L is the modulus of elasticity (Young's modulus). D or del L is obviously the elongation.

Be sure your units are correct for doing this, because they need to cancel out to get a final unit of just meters. You want newtons, meters, square meters, and newtons/m^2.

d = (5000 * 5)/(3.14*0.34^2 * 125*10^8)
d = 5.5*10^-6 m
d = 0.0055 mm

So it will elongate 0.0055 mm. I Since D is closest, but is off by 100 times, I suspect that for the Young's modulus, you meant 1.25*10^8, not 125*10^8. I would choose option D.

Question No: 4 (Marks: 1) - Please choose one

A particle oscillating in simple harmonic motion is:

- ► never in equilibrium because it is in motion
- ► never in equilibrium because there is always a force
- ► in equilibrium at the ends of its path because its velocity is zero there
- ► in equilibrium at the center of its path because the acceleration is zero there

Question No: 5 (Marks: 1) - Please choose one

In simple harmonic motion, the restoring force must be proportional to the:

- ► amplitude
- ► frequency
- ► velocity
- ► displacement page no:44

Reference:-
Now we have a restoring
force that is proportional to the distance away from the equilibrium point

Question No: 6 (Marks: 1) - Please choose one

A 160-N child sits on a light swing and is pulled back and held with a horizontal force of 100 N. The magnitude of the tension force of each of the two supporting ropes is:

- ► 60N
- ► 94N
- ► 120N

► 190N

Question No: 7 (Marks: 1) - Please choose one

An object attached to one end of a spring makes 20 vibrations in 10 s. Its angular frequency is:

► 12.6 rad/s

► 1.57 rad/s

► 2.0 rad/s

► 6.3 rad/s

Refernce:-
Page no 42
V=20 , t=10
Ω=2.pie.v
=2*3.14*20=125.6(1/t)=12.6rad/sec

Question No: 8 (Marks: 1) - Please choose one

For an object in equilibrium the net torque acting on it vanishes only if each torque is calculated about:

► the center of mass

► the center of gravity

► the geometrical center

► the same point

Refernce:-
http://myfizika.ucoz.com/_ld/0/48_Test_Bank_12.pdf

Question No: 9 (Marks: 1) - Please choose one

Ten seconds after an electric fan is turned on, the fan rotates at 300 rev/min. Its average angular acceleration is:

► 3.14 rad/s2
► 30 rad/s2
► 30 rev/s2
► 50 rev/min2

► 1800 rev/s^2

Reference:-
Page no 28
Avg angular acceleration=(final angular velocity-intial angular velocity)/time
=(300-0)/10=30rev/s^2

Question No: 10 (Marks: 1) - Please choose one

A 4.0-N puck is traveling at 3.0m/s. It strikes a 8.0-N puck, which is stationary. The two pucks stick together. Their common final speed is:

► 1.0m/s
► 1.5m/s
► 2.0m/s
► 2.3m/s

Reference:-
The case you're describing is called an inelastic collision.
Two objects collide, stick to each other and continue their motion as one body.
Due to momentum conservation principle, sum of two bodies momenta before collision has to be equal to momentum of the one body after collision.

$p_{before} = p_{first} + p_{second} = m_1v_1 + m_2v_2$
$p_{after} = (m_1 + m_2)v_{common}$

Since $p_{before} = p_{after}$,
$(m_1 + m_2)v_{common} = m_1v_1 + m_2v_2$

We can get v_{common} **from that:**
$v_{common} = (m_1v_1 + m_2v_2) / (m_1 + m_2)$

Question No: 11 (Marks: 1) - Please choose one

An object moving in a circle at constant speed

► must have only one force acting on it
► is not accelerating
► is held to its path by centrifugal force
► has an acceleration of constant magnitude

Reference:-
Page no: 29
Now consider a particle going around a circle at constant speed. You might think that constant speed means no acceleration. Bu this is wrong! It is changing its direction and accelerating. This is called "centripetal acceleration", meaning acceleration directed towards the centre of the circle

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Question No: 12 (Marks: 1) - Please choose one

A plane traveling north at 200m/s turns and then travels south at 200m/s. The change in its velocity is:

- ► 400m/s north
- ► 400m/s south
- ► zero
- ► 200m/s south

Reference:-
400 m/s south because it need 200 to overcome the 200 north then another 200 to get going 200 south.

Question No: 13 (Marks: 1) - Please choose one

At time t = 0 a car has a velocity of 16 m/s. It slows down with an acceleration given by −0.50t, in m/s^2 for t in seconds. It stops at t =

- ► 64 s
- ► 32 s
- ► 16 s
- ► 8.0 s

Reference:-
Vf=vi+at
Vf=16-0.50t(0)
Vf=16
As we know a=final velocity/t
And t=final velocity/a
16/.5 = t
32 = t

Question No: 14 (Marks: 1) - Please choose one

1 mi is equivalent to 1609 m so 55 mph is:

- ► 15 m/s
- ► 25 m/s
- ► 66 m/s
- ► 88 m/s

Refernce:-
1 mile = 1609 meters or 1.609 kilometers

so,

55 miles = 1609x55 = 88495 meters or 88.495 kilometers

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Question No: 1 (Marks: 1) - Please choose one

The number of significant figures in 0.00150 is:

► 5
► 4
► 3
► 2

Question No: 2 (Marks: 1) - Please choose one

One revolution is the same as:

► 1 rad
► 57 rad

► π/2 rad
► π rad
► 2π rad

Question No: 3 (Marks: 1) - Please choose one

For a body to be in equilibrium under the combined action of several forces:

► all the forces must be applied at the same point
all the forces must be applied at the same point

► all of the forces form pairs of equal and opposite forces
► any two of these forces must be balanced by a third force

► the sum of the torques about any point must equal zero

Question No: 1 (Marks: 1) - Please choose one
As a 2.0-kg block travels around a 0.50-m radius circle it has an angular speed of 12 rad/s. The circle is parallel to the xy plane and is centered on the z axis, a distance of 0.75m from the origin. The z component of the angular momentum around the origin is:
► 6.0kg · m2/s
► 6.0kg · m2/s

► 9.0kg · m2/s
► 11 kg · m2/s
► 14 kg · m2/s

Question No: 2 (Marks: 1) - Please choose one
A net torque applied to a rigid object always tends to produce:
► rotational equilibrium
► linear acceleration
► rotational equilibrium
► angular acceleration
► rotational inertia

Question No: 3 (Marks: 1) - Please choose one
An object attached to one end of a spring makes 20 vibrations in 10 s. Its angular
frequency is:
► 2.0 rad/s
► 12.6 rad/s
► 1.57 rad/s
► 2.0 rad/s
► 6.3 rad/s

Question No: 4 (Marks: 1) - Please choose one
In simple harmonic motion, the restoring force must be proportional to the:
► displacement
► amplitude
► frequency
► velocity
► displacement

Question No: 5 (Marks: 1) - Please choose one

Mercury is a convenient liquid to use in a barometer because:
► it has a high density
► it is a metal
► it has a high boiling point
► it expands little with temperature
► it has a high density

Question No: 6 (Marks: 1) - Please choose one

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The units of the electric field are:
► J/m
► J/m
► J/(C·m)
► J/C
► J·C

Question No: 7 (Marks: 1) - Please choose one
A farad is the same as a
► J/V
► J/V
► V/J
► C/V
► V/C

Question No: 9 (Marks: 1) - Please choose one
The wavelength of red light is 700 nm. Its frequency is ___________________.
► 4.30 * 105 Hertz
► 4.30 * 104 Hertz
► 4.30 * 103 Hertz
► 4.30 * 105 Hertz
► 4.30 * 102 Hertz

Question No: 10 (Marks: 1) - Please choose one
Which of the following statements is NOT TRUE about electromagnetic waves?
► The electromagnetic radiation from a burning candle is unpolarized.
► Electromagnetic waves satisfy the Maswell's Equation.
► Electromagnetic waves can not travel through space.
► The receptions of electromagnetic waves require an antenna.
► The electromagnetic radiation from a burning candle is unpolarized.

Question No: 11 (Marks: 1) - Please choose one
Radio waves and light waves are ___________________________.
► Electromagnetic and transverse both
► longitudinal waves
► Transverse waves
► Electromagnetic and transverse both
► Electromagnetic and longitudinal both

Question No: 14 (Marks: 1) - Please choose one

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Fahrenheit and Kelvin scales agree numerically at a reading of:

- ► -40
- ► -40
- ► 0
- ► 273
- ► 574

Question No: 15 (Marks: 1) - Please choose one
According to the theory of relativity:

- ► moving clocks run fast
- ► moving clocks run fast
- ► energy is not conserved in high speed collisions
- ► the speed of light must be measured relative to the ether
- ► none of the above are true

Question No: 16 (Marks: 1) - Please choose one
Light from a stationary spaceship is observed, and then the spaceship moves directly away from the observer at high speed while still emitting the light. As a result, the light seen by the observer has:

- ► lower frequency and a shorter wavelength than before
- ► higher frequency and a longer wavelength than before
- ► lower frequency and a shorter wavelength than before
- ► higher frequency and a shorter wavelength than before
- ► lower frequency and a longer wavelength than before

Question No: 17 (Marks: 1) - Please choose one
How fast should you move away from a 6.0 × 1014 Hz light source to observe waves with a frequency of 4.0 × 1014 Hz?

- ► 38c
- ► 20c
- ► 38c
- ► 45c
- ► 51c

Question No: 18 (Marks: 1) - Please choose one
The quantum number n is most closely associated with what property of the electron in a hydrogen atom?

- ► Energy
- ► Energy
- ► Orbital angular momentum
- ► Spin angular momentum

► Magnetic moment

Question No: 19 (Marks: 1) - Please choose one
The quantum number ms is most closely associated with what property of the
electron in an atom?
► Energy
► Magnitude of the orbital angular momentum
► Energy
► z component of the spin angular momentum
► z component of the orbital angular momentum

Question No: 20 (Marks: 1) - Please choose one
As the wavelength of a wave in a uniform medium increases, its speed will _____.
► Remain the same
► Decrease
► Increase
► Remain the same
► None of these

Chapter 4: MOTION IN TWO AND THREE DIMENSIONS

1. Velocity is defined as:
A. rate of change of position with time
B. position divided by time
C. rate of change of acceleration with time
D. a speeding up or slowing down
E. change of position
ans: A

2. Acceleration is defined as:
A. rate of change of position with time
B. speed divided by time
C. rate of change of velocity with time
D. a speeding up or slowing down
E. change of velocity
ans: C

3. Which of the following is a scalar quantity?
A. Speed
B. Velocity
C. Displacement
D. Acceleration
E. None of these
ans: A

4. Which of the following is a vector quantity?
A. Mass
B. Density

C. Speed
D. Temperature
E. None of these
ans: E
5. Which of the following is NOT an example of accelerated motion?
A. Vertical component of projectile motion
B. Circular motion at constant speed
C. A swinging pendulum
D. Earth's motion about sun
E. Horizontal component of projectile motion
ans: E
36 Chapter 4: MOTION IN TWO AND THREE DIMENSIONS
6. A particle goes from x = −2m, y =3m, z =1mto x =3m, y = −1m, z = 4m. Its displacement is:
A. (1m)ˆi + (2m)ˆj + (5m) ˆk
B. (5m)ˆi −(4m)ˆj + (3m) ˆk
C. −(5m)ˆi + (4m)ˆj −(3m) ˆk
D. −(1m)ˆi −(2m)ˆj −(5m) ˆk
E. −(5m)ˆi −(2m)ˆj + (3m) ˆk
ans: B
7. A jet plane in straight horizontal flight passes over your head. When it is directly above you,
the sound seems to come from a point behind the plane in a direction 30◦ from the vertical.
The speed of the plane is:
A. the same as the speed of sound
B. half the speed of sound
C. three-fifths the speed of sound
D. 0.866 times the speed of sound
E. twice the speed of sound
ans: B
8. A plane traveling north at 200m/s turns and then travels south at 200m/s. The change in its
velocity is:
A. zero
B. 200m/s north
C. 200m/s south
D. 400m/s north
E. 400m/s south
ans: E
9. Two bodies are falling with negligible air resistance, side by side, above a horizontal plane. If
one of the bodies is given an additional horizontal acceleration during its descent, it:
A. strikes the plane at the same time as the other body

B. strikes the plane earlier than the other body
C. has the vertical component of its velocity altered
D. has the vertical component of its acceleration altered
E. follows a straight line path along the resultant acceleration vector
ans: A
10. The velocity of a projectile equals its initial velocity added to:
A. a constant horizontal velocity
B. a constant vertical velocity
C. a constantly increasing horizontal velocity
D. a constantly increasing downward velocity
E. a constant velocity directed at the target
ans: D
Chapter 4: MOTION IN TWO AND THREE DIMENSIONS 37
11. A stone thrown from the top of a tall building follows a path that is:
A. circular
B. made of two straight line segments
C. hyperbolic
D. parabolic
E. a straight line
ans: D
12. Identical guns fire identical bullets horizontally at the same speed from the same height above
level planes, one on the Earth and one on the Moon. Which of the following three statements
is/are true?
I. The horizontal distance traveled by the bullet is greater for the Moon.
II. The flight time is less for the bullet on the Earth.
III. The velocity of the bullets at impact are the same.
A. III only
B. I and II only
C. I and III only
D. II and III only
E. I, II, III
ans: B
13. A stone is thrown horizontally and follows the path XYZ shown. The direction of the acceler-ation of the stone at point Y is:

A. ↓
B. →
C. 9
D. t
E. c
ans: A
38 Chapter 4: MOTION IN TWO AND THREE DIMENSIONS
14. A bullet shot horizontally from a gun:

A. strikes the ground much later than one dropped vertically from the same point at the same
instant
B. never strikes the ground
C. strikes the ground at approximately the same time as one dropped vertically from the same
point at the same instant
D. travels in a straight line
E. strikes the ground much sooner than one dropped from the same point at the same instant
ans: C
15. A bomber flying in level flight with constant velocity releases a bomb before it is over the
target. Neglecting air resistance, which one of the following is NOT true?
A. The bomber is over the target when the bomb strikes
B. The acceleration of the bomb is constant
C. The horizontal velocity of the plane equals the vertical velocity of the bomb when it hits
the target
D. The bomb travels in a curved path
E. The time of flight of the bomb is independent of the horizontal speed of the plane
ans: C

17. An object is shot from the back of a railroad flatcar moving at 40km/h on a straight horizontal
road. The launcher is aimed upward, perpendicular to the bed of the flatcar. The object falls:
A. in front of the flatcar
B. behind the flatcar
C. on the flatcar
D. either behind or in front of the flatcar, depending on the initial speed of the object
E. to the side of the flatcar
ans: C
18. A ball is thrown horizontally from the top of a 20-m high hill. It strikes the ground at an angle
of 45◦. With what speed was it thrown?

A. 14m/s
B. 20m/s
C. 28m/s
D. 32m/s
E. 40m/s
ans: B

19. A stone is thrown outward from the top of a 59.4-m high cliffwith an upward velocity compo-nent of 19.5m/s. How long is stone in the air?
A. 4.00s
B. 5.00s
C. 6.00s
D. 7.00s
E. 8.00s
ans: C
20. A large cannon is fired from ground level over level ground at an angle of 30◦ above the
horizontal. The muzzle speed is 980m/s. Neglecting air resistance, the projectile will travel
what horizontal distance before striking the ground?
A. 4.3km
B. 8.5km
C. 43km
D. 85km
E. 170km
ans: D
40 Chapter 4: MOTION IN TWO AND THREE DIMENSIONS
21. A boy on the edge of a vertical cliff20m high throws a stone horizontally outward with a speed
of 20m/s. It strikes the ground at what horizontal distance from the foot of the cliff? Use
g =10m/s2.
A. 10m
B. 40m
C. 50m
D. 50√5m
E. none of these
ans: B
22. Which of the curves on the graph below best represents the vertical component vy of the
velocity versus the time t for a projectile fired at an angle of 45◦ above the horizontal?
A. OC
B. DE
C. AB
D. AE
E. AF
ans: D
Chapter 4: MOTION IN TWO AND THREE DIMENSIONS 41
23. A cannon fires a projectile as shown. The dashed line shows the trajectory in the absence of
gravity; points MNOP correspond to the position of the projectile at one

second intervals. If
g =10m/s2, the lengths X,Y,Z are:
A. 5m, 10m, 15m
B. 5m, 20m, 45m
C. 10m, 40m, 90m
D. 10m, 20m, 30m
E. 0.2m, 0.8m, 1.8m
ans: B
24. A dart is thrown horizontally toward X at 20m/s as shown. It hits Y 0.1s later. The distance
XY is:
A. 2m
B. 1m
C. 0.5m
D. 0.1m
E. 0.05m
ans: E
42 Chapter 4: MOTION IN TWO AND THREE DIMENSIONS
25. A projectile is fired from ground level over level ground with an initial velocity that has a
vertical component of 20m/s and a horizontal component of 30m/s. Using g =10m/s2, the
distance from launching to landing points is:
A. 40m
B. 60m
C. 80m
D. 120m
E. 180m
ans: D
26. An object, tied to a string, moves in a circle at constant speed on a horizontal surface as shown.
The direction of the displacement of this object, as it travels from W to X is:
A. ←
B. ↓
C. ↑
D. c
E. t
ans: E
27. A toy racing car moves with constant speed around the circle shown below. When it is at point
A its coordinates are x =0, y = 3m and its velocity is (6m/s)ˆi. When it is at point B its
velocity and acceleration are:
A. −(6m/s)ˆj and (12m/s2)ˆi, respectively
B. (6m/s)ˆi and −(12m/s2)ˆi, respectively

C. (6m/s)ˆj and (12m/s2)ˆi, respectively
D. (6m/s)ˆi and (2m/s2)ˆj, respectively
E. (6m/s)ˆj and 0, respectively
ans: C
Chapter 4: MOTION IN TWO AND THREE DIMENSIONS 43
28. An airplane makes a gradual 90◦ turn while flying at a constant speed of 200m/s. The process
takes 20.0 seconds to complete. For this turn the magnitude of the average acceleration of the
plane is:
A. zero
B. 40m/s2
C. 20m/s2
D. 14m/s2
E. 10m/s2
ans: D
29. An airplane is flying north at 500 km/h. It makes a gradual 180◦ turn at constant speed,
changing its direction of travel from north through east to south. The process takes 40s. The
average acceleration of the plane for this turn (in km/h·s) is:
A. 12.5km/h · s, north
B. 12.5km/h · s, east
C. 12.5km/h · s, south
D. 25km/h · s, north
E. 25km/h · s, south
ans: E
30. An object is moving on a circular path of radius π meters at a constant speed of 4.0m/s. The
time required for one revolution is:
A. 2/π2 s
B. π2/2s
C. π/2s
D. π2/4
E. 2/πs
ans: B
31. A particle moves at constant speed in a circular path. The instantaneous velocity and instan-taneous acceleration vectors are:
A. both tangent to the circular path
B. both perpendicular to the circular path
C. perpendicular to each other
D. opposite to each other
E. none of the above
ans: C
32. A stone is tied to a string and whirled at constant speed in a horizontal

circle. The speed
is then doubled without changing the length of the string. Afterward the magnitude of the
acceleration of the stone is:
A. the same
B. twice as great
C. four times as great
D. half as great
E. one-fourth as great
ans: C
44 Chapter 4: MOTION IN TWO AND THREE DIMENSIONS
33. Two objects are traveling around different circular orbits with constant speed. They both have
the same acceleration but object A is traveling twice as fast as object B. The orbit radius for
object A is the orbit radius for object B.
A. one-fourth
B. one-half
C. the same as
D. twice
E. four times
ans: E
34. A stone is tied to a 0.50-m string and whirled at a constant speed of 4.0m/s in a vertical circle.
Its acceleration at the top of the circle is:
A. 9.8m/s2,up
B. 9.8m/s2,down
C. 8.0m/s2,down
D. 32m/s2,up
E. 32m/s2,down
ans: E
35. A stone is tied to a 0.50-m string and whirled at a constant speed of 4.0m/s in a vertical circle.
Its acceleration at the bottom of the circle is:
A. 9.8m/s2,up
B. 9.8m/s2,down
C. 8.0m/s2,up
D. 32m/s2,up
E. 32m/s2,down
ans: D
36. A car rounds a 20-m radius curve at 10m/s. The magnitude of its acceleration is:
A. 0
B. 0.20m/s2
C. 5.0m/s2

D. 40m/s2
E. 400m/s2
ans: C
37. For a biological sample in a 1.0-m radius centrifuge to have a centripetal acceleration of 25g
its speed must be:
A. 11m/s
B. 16m/s
C. 50m/s
D. 122m/s
E. 245m/s
ans: B
Chapter 4: MOTION IN TWO AND THREE DIMENSIONS 45
38. A girl jogs around a horizontal circle with a constant speed. She travels one fourth of a
revolution, a distance of 25m along the circumference of the circle, in 5.0s. The magnitude of
her acceleration is:
A. 0.31m/s2
B. 1.3m/s2
C. 1.6m/s2
D. 3.9m/s2
E. 6.3m/s2
ans: C
39. A stone is tied to the end of a string and is swung with constant speed around a horizontal
circle with a radius of 1.5m. If it makes two complete revolutions each second, the magnitude
of its acceleration is:
A. 0.24m/s2
B. 2.4m/s2
C. 24m/s2
D. 240m/s2
E. 2400m/s2
ans: D
40. A Ferris wheel with a radius of 8.0m makes 1 revolution every 10s. When a passenger is at
the top, essentially a diameter above the ground, he releases a ball. How far from the point on
the ground directly under the release point does the ball land?
A. 0
B. 1.0m
C. 8.0m
D. 9.1m
E. 16m

ans: D
41. A boat is able to move through still water at 20m/s. It makes a round trip to a town 3.0km
upstream. If the river flows at 5 m/s, the time required for this round trip is:
A. 120s
B. 150s
C. 200s
D. 300s
E. 320s
ans: E

42. A boat is traveling upstream at 14km/h with respect to a river that is flowing at 6km/h (with
respect to the ground). A man runs directly across the boat, from one side to the other, at
6km/h (with respect to the boat). The speed of the man with respect to the ground is:
A. 10km/h
B. 14km/h
C. 18.5km/h
D. 21km/h
E. 26km/h
ans: A
43. A ferry boat is sailing at 12km/h30◦ W of N with respect to a river that is flowing at 6.0km/h
E. As observed from the shore, the ferry boat is sailing:
A. 30◦ EofN
B. due N
C. 30◦ WofN
D. 45◦ EofN
E. none of these
ans: B
44. A boy wishes to row across a river in the shortest possible time. He can row at 2m/s in still
water and the river is flowing at 1m/s. At what angle θshould he point the bow (front) of his
boat?
A. 30◦
B. 45◦
C. 60◦
D. 63◦
E. 90◦
ans: E

45. A girl wishes to swim across a river to a point directly opposite as

shown. She can swim at
2m/s in still water and the river is flowing at 1m/s. At what angle θ with respect to the line
joining the starting and finishing points should she swim?
A. 30◦
B. 45◦
C. 60◦
D. 63◦
E. 90◦
ans: A
46. A motor boat can travel at 10 km/h in still water. A river flows at 5 km/h west. A boater
wishes to cross from the south bank to a point directly opposite on the north bank. At what
angle must the boat be headed?
A. 27◦ EofN
B. 30◦ EofN
C. 45◦ EofN
D. 60◦ EofN
E. depends on the width of the river
ans: B
47. Two projectiles are in flight at the same time. The acceleration of one relative to the other:
A. is always 9.8m/s2
B. can be as large as 19.8m/s2
C. can be horizontal
D. is zero
E. none of these
ans: D
48 Chapter 4: MOTION IN TWO AND THREE DIMENSIONS

Question No: 21 (Marks: 3)
Two people are carrying a uniform wooden board that is 3.00 m long and weighs
160 N. If one person applies an upward force equal to 60 N at one end, at what point
does the other person lift? Begin with a free-body diagram of the board.
Solution:-
Forces in x direction = 0
Forces in Y = F1 + F2 - W
Given:
L = 3.00 m F1 = 60 N
W = 160 N F2 = ? and x2 = ?
Sum of forces and torques = 0

All Midterm solved MCQZ (With reference) and related subjective of PHY101.
Solved by Saher
And all 1 to 22 chapters formulas in easy format.

Sum Force = F1 + F2 - W = 0
60N + F2 - 160 N = 0
F2 = 100 N
My pivot point is at F2.
Sum of torques = 0
Torque F1 = F1(L - x2)
Torque F2 = 0 b/c at pivot point
Torque W = W(L/2 - x2)
F1L - F1x2 + (WL)/2 - Wx2 = 0
(60)(3) - 60x2 + (160 * 3)/2 - 160x2 = 0
180-60x2 + 240-160x2 = 0
420-220x2 = 0
x2 = 1.9m

Question No: 22 (Marks: 3)
If a charged particle moves in a straight line through some region of space, can you
say that the magnetic field in that region is zero?
Solution:-
Reference:- http://www.ux1.eiu.edu/~cfadd/1360/29MagFlds/HmwkSol.html
If the charged particle is moving along the magnetic field -- parallel or antiparallel to the magnetic field -- then there would be no force on it.

Question No: 24 (Marks: 3)
A vessel is filled with gas at some equilibrium pressure and temperature. Can all gas
molecules in the vessel have the same speed?
Solution:-
Yes

Question No: 25 (Marks: 3)
What are the properties of wave function?
Solution:-
Wave functions contain all the measurable information about the particles
Wave functions are continuous.
They allow energy calculations via schrodinger equation.
They establish the probability distribution in three dimensions.
They permit calculation of most probable values of given variables.

Question No: 26 (Marks: 5)
A bike accelerates uniformly from rest to a speed of 7.10 m/s over a distance of
35.4 m. Determine the acceleration of the bike.
2as = vf2 – vi2
2a(35.4) = (7.10)2 – (0)2

2a(35.4) = 50.41
A = .71 m/s2
Question No: 27 (Marks: 5)
A flat loop of wire consisting of a single turn of cross-sectional area 8.00 cm2 is
perpendicular to a magnetic field that increases uniformly in magnitude from 0.500 T
to 2.50 T in 1.00 s. What is the resulting induced current if the loop has a resistance
of 2.00 W?

E=(Bf-Bi)*A/t=(2.5-0.5)*8*10-4/1=1.6*10-3 V
I=E/R=1.23 mA

Question No: 28 (Marks: 5)
An ideal gas is contained in a vessel at 300 K. If the temperature is increased to 900
K, by what factor does each one of the following change?
(a) The average kinetic energy of the molecules.
(b) The rms molecular speed.
(c) The average momentum change of one molecule in a collision with a wall.
(d) The rate of collisions of
molecules with walls.
(e) The pressure of the gas.

Question No: 29 (Marks: 5)
Who discover the nucleus? Write the experimental setup that he follows.
Ans:
Lord Rutherford discovered the nucleus. He carried out his famous experiment that
showed the existence of a small but very heavy core of the atom. He arranged for a
beam of alpha particles to strike gold atoms in a thin foil of gold. If the positive and
negative charges in the atom were randomly distributed, all ' would go through
without any deflection. But a lot of backscattering was seen, and some alphas were
even deflected back in the direction of the incident beam. This was possible only
if they were colliding with a very heavy object inside the atom.

Question No: 30 (Marks: 5)

All Midterm solved MCQZ (With reference) and related subjective of PHY101.
Solved by Saher
And all 1 to 22 chapters formulas in easy format.

In an analogy between electric current and automobile traffic flow, what would correspond to charge? What would correspond to current?

Answer:

Consider all of the lanes in one direction on a highway, taken together. Then, individual vehicles correspond to bits of charge. The number of vehicles that pass some designated milepost, divided by the time during which they go past, corresponds to the value of the current.

Question No: 31 (Marks: 10)

(a) When can you expect a body to emit blackbody radiation?

(b) Which law is obeyed by Sun and other stars, briefly explain it.

(a) When can you expect a body to emit blackbody radiation?

Ans:

Waves are emitted when charges accelerate. Blackbody radiation occurs for exactly this reason as well. If a body is heated up, the electrons, atoms, and molecules which it contains undergo violent random motion. Light may emit by electrons in one atom and absorbed in another. Even an empty box will be filled with blackbody radiation because the sides of the box are made up of material that has charged constituents that radiate energy when they undergo acceleration during their random

Question No: 15 (Marks: 1)

If you walk along the top of a fence, why does holding your arms out help you to keep your balance?

Answer:-

Because the arms keeps the movement of weight of body easy your. The Rotational inertia is increased.
holding out your arms gives you leverage.

Question No: 16 (Marks: 2)

Charge is also said to be conserved. What does it mean? Explain.

Answer:-

. Charge is conserved. This means that charge is never created or destroyed. Equivalently, in any possible situation, the total charge at an earlier time is equal to the charge at a

later time. For example, in any of the reactions below the initial charge = final charge:

Question No: 17 (Marks: 2)

When a car drives off a cliff, why does it rotate forward as it falls?

Answer:-

There is a vector component in the direction the car moves and another due to g. The resultant makes the car go that way. Moreover the engine is heavy and the car takes a parabolic path.

Question No: 18 (Marks: 2)

Why does a book sitting on a table never accelerate "spontaneously" in response to the trillions of inter-atomic forces acting within it?

Question No: 19 (Marks: 3)

'Captain Planet' is somewhere between galaxies. When a gong sounds in a neighboring spaceship, Captain reacts to the sound. What is wrong with this scenario?

Answers:-

There is no air in space , sound waves travel through air , no air = no sound

Question No: 20 (Marks: 3)

If you know the position vectors of a particle at two points along its path and also know the time it took to move from one point to the other, can you determine the particle's instantaneous velocity? Its average velocity? Explain

Answer:-

Lets suppose r1 and r2 are the two position vectors of a particle and it takes time To move from one point to the other then the instantaneous velocity can be find
By d=r2-r1 the instantaneous velocity
V(ins)=lim (delt→0)(del d)/(del t)
V(avg)=del v/del t

Question No: 21 (Marks: 5)

Steel will rapture if subjected to a shear stress of more that about $4.2 * 10^8$ N/m2. What sideward force is necessary to shear a steel bolt 1 cm in diameter?

Answer:-

Converting 1 cm to meter =.01m

Shearing stress =F/A

All Midterm solved MCQZ (With reference) and related subjective of PHY101.
Solved by Saher
And all 1 to 22 chapters formulas in easy format.

Shearing stress*A=F
$4.2 * 10^8$ *.01m=F
.042 N/m3=F

Question No: 22 (Marks: 5)

A table-tennis ball is thrown at a stationary bowling ball. The table-tennis ball makes a one-dimensional elastic collision and bounces back along the same line. After the collision, compared to the bowling ball, the table-tennis ball has
a) a larger magnitude of momentum and more kinetic energy
b) a smaller magnitude of momentum and more kinetic energy
c) a larger magnitude of momentum and less kinetic energy
d) a smaller magnitude of momentum and less kinetic energy
e) the same magnitude
Reference:-
The molecular interaction takes place inside the object. And they and all balanced. They have potential energy, not kinetic energy.

Important short questions
.EXTRA MATERIAL.
Ch. 8 Review Questions p. 154

1. What is meant by tangential speed?
Ans. Tangential speed is the linear speed of the object, tangent to the curve.

2. Distinguish between tangential speed and rotational speed.
Ans. Rotational speed, often called angular velocity, is the rate at which an object rotates. The
angular velocity of the crankshaft of an engine is measured in revolutions per minute, RPM. It is
the number of rotations per unit time. The tangential speed is the linear speed of an object,
tangent to the curve.

6. What is rotational inertia, and how does it compare to inertia as studied in previous
chapters?
Ans. Rotational inertia, often called moment of inertia, is the sum of the products of an
object's mass multiplied by their distance to the center of rotation squared. Inertia is the
resistance an object has to a change in its velocity and only depends on the mass of an object.

7. Inertia depends on mass; rotational inertia (better known as moment of inertia) depends
on mass and something else. What?
Ans. Moment of inertia, ‘I’ depends on mass and its distance from the center of rotation.

!
I= mr 2
"

13. What does a torque tend to do to an object.
Ans. Torque will change the angular velocity of on object. If it is not rotating, and unbalanced
torque will make an object start to rotate.

15. How do clockwise and counterclockwise torques compare when a system is balanced?
Ans. They are equal.

23. When you whirl a can at the end of a string in a circular path, what is the direction of the
force that is exerted on the can?
Ans. The force is directed toward the center of the circle.

Ch. 8 Review Questions p. 154 -155

24. Is it an inward force or an outward force that is exerted on the cloths during the spin cycle
of an automatic washer?
Ans. Inward force.

25. If the string breaks that holds a whirling can in its circular path, what kind of force causes
it to move in a straight-line path-centripetal, centrifugal, or no force? What law of physics
supports your answer?
Ans. No force. Newton’s first law of motion.

26. If you are not wearing a seat belt and you slide across your seat and slam against a door

All Midterm solved MCQZ (With reference) and related subjective of PHY101.
Solved by Saher
And all 1 to 22 chapters formulas in easy format.

when the car rounds a curve, what kind of force is responsible-centripetal, centrifugal or no
force?
Ans. No force was applied to you. The car had a centripetal force applied to it which caused
the car to slide out from under you. Ask about this in class please.

29. Distinguish between linear momentum and angular momentum.
Ans. Linear momentum is the product of an object's mass times its velocity. Angular
momentum is the product of an objects moment of inertia and its angular velocity. Angular
momentum depends on the rate at which an object is rotating, its mass and the distance of the
mass from the center of rotation.

31. What does it mean to say that angular momentum is conserved?
Ans. Unless an unbalanced torque is applied to an object, it total angular momentum will not
change. Its moment of inertia and its angular velocity can change but they will change in such
a way that the total angular momentum is constant.

L=Iw where
!
I= mr 2
"
and w is the angular velocity of the object.

Extra In what direction should a force be applied to produce maximum torque?
Ans. At right angles to a line that radiates out from the center of the object.

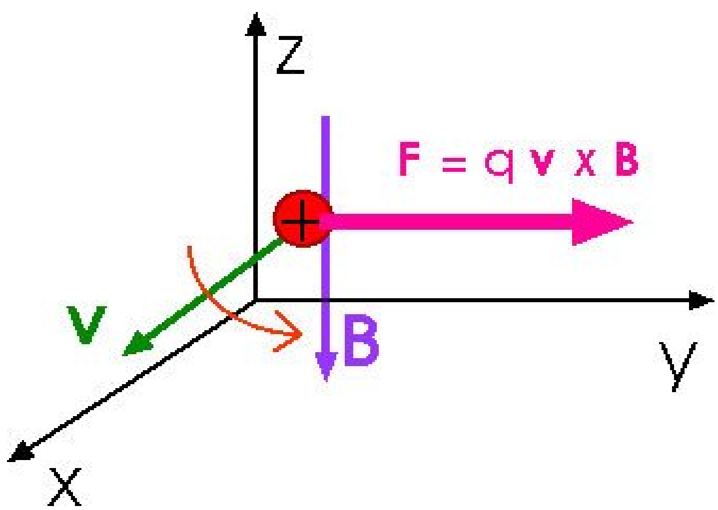
Extra: Why is the linear speed greater for a horse on the outside of a merry-go round than for a
horse closer to the center?
Ans. The horse on the outside of the merry-go-round has to go further in the same amount of
time than the one on the inside.

All Midterm solved MCQZ (With reference) and related subjective of PHY101.
Solved by Saher
And all 1 to 22 chapters formulas in easy format.

Extra: If you walk along the top of a fence, why does holding your arms out help you to
keep your balance?
Ans. Holding your arms out increases your moment of inertia.

18. Is the net torque changed when a partner on a seesaw stands or hangs from her end
instead of sitting?
Ans. Since torque is the product of perpendicular component of the force multiplied by
the distance to the pivot, torque is not effected because neither one of these things changes.

Q1 At a given instant, a **proton** moves in the positive x cirection in a region where there is a magnetic field in the negative z direction. What is the direction of the magnetic force? Does the proton continue to move in the positive x direction?



The vector **v** x **B** points along the positive y-direction. For a proton, q is positive, so the **F**orce vector **F** = q **v** x **B** also points along the positive y-direction. With a force on it in the positive y-direction, the proton will be moved from its initial path. The proton will move in a circle in a plane parallel to the xy-plane.

All Midterm solved MCQZ (With reference) and related subjective of PHY101.
Solved by Saher
And all 1 to 22 chapters formulas in easy format.

Q2 Two charged particles are projected into a region where there is a magnetic field perpendicular to their velocities. If the charges are deflected in opposite directions, what can you say about them?

The two particles have different or opposite charges.

Q3 If a charged particle moves in a straight line through some region of space, can you say that the magnetic field in that region is zero?

If the charged particle is moving along the magnetic field -- parallel or antiparallel to the magnetic field -- then there would be no force on it.

29.8 An electron is projected into a uniform magnetic field **B** = (1.4 **i** + 2.1 **j**) T. Find the vector expression for the force on the electron when its velocity is **v** = 3.7×10^5 **j** m/s.

Solution:-

$$\mathbf{F} = q\,\mathbf{v} \times \mathbf{B}$$

$$\mathbf{v} \times \mathbf{B} = [3.7 \times 10^5\,\mathbf{j}] \times [1.4\,\mathbf{i} + 2.1\,\mathbf{j}]$$

$$\mathbf{v} \times \mathbf{B} = [(3.7 \times 10^5)(1.4)\,(\mathbf{j} \times \mathbf{i})] + [(3.7 \times 10^5)(2.1)(\mathbf{j} \times \mathbf{j})]$$

$$\mathbf{j} \times \mathbf{i} = -\,\mathbf{k}$$

$$\mathbf{j} \times \mathbf{j} = 0$$

$$\mathbf{v} \times \mathbf{B} = (3.7 \times 10^5)(1.4)\,(-\,\mathbf{k})$$

$$\mathbf{F} = q\,\mathbf{v} \times \mathbf{B} = (-\,1.6 \times 10^{-19})\,(3.7 \times 10^5)(1.4)\,(-\,\mathbf{k})$$

$$\mathbf{F} = (1.6 \times 10^{-19})\,(3.7 \times 10^5)(1.4)\,(\mathbf{k})$$

$$\mathbf{F} = 8.29 \times 10^{-14}\ \text{N}\ \mathbf{k}$$

29.11 Show that the work done by the magnetic force on a charged particle moving in a magnetic field is zero for any displacement of the particle.

Solution:-

Since the force is always perpendicular to the velocity, the magnitude of the velocity (the speed) does not change. This means the Kinetic Energy does not change and that means the work is zero.

Or we could say that since the force is perpendicular to the velocity and the direction of the displacement so that means the work is zero.

Solution:-

29.12 A wire 40 cm long carries a current of 20 A. It is bent into a loop and placed with its plane perpendicular to a magnetic field having a flux density of 0.52 T. What is the torque on the loop if it is bent into

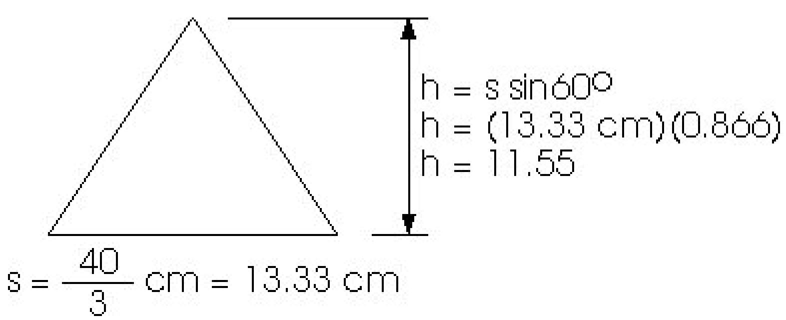
The torque on a current loop depends upon the area of the current loop. When the magnetic field is perpendicular to the plane of the loop the torque has its maximum value,

$$\tau = I\ A\ B$$

We know I and B for all these cases but A depends upon the geometry

(a) an equilateral triangle,

$$\tau = I\ A\ B$$



$$A = (1/2)\ s\ h$$

$$A = (1/2)\ (13.33\ cm)(11.55\ cm)$$

$$A = 76.98\ cm2$$

$$\tau = I\ A\ B$$

$$\tau = (20\ A)(76.98\ cm^2)(0.52\ T)$$

$$\tau = 800\ A\ cm^2\ T\ [1\ m^2/104\ cm^2]$$

$$\tau = 0.0800 \text{ N-m}$$

(b) a square,

$$\tau = I\,A\,B$$

The 40 cm of wire can be bent into a square with sides of 10 cm;

$$A = (10 \text{ cm})^2 = 100 \text{ cm}^2$$

$$\tau = I\,A\,B$$

$$\tau = (20 \text{ A})(100 \text{ cm}^2)(0.52 \text{ T})$$

$$\tau = 1040 \text{ A cm}^2 \text{ T } [1 \text{ m}^2/10^4 \text{ cm}^2]$$

$$\tau = 0.1040 \text{ N-m}$$

(c) a circle.

The 40 cm of wire can become a circumference for a circle. We need the radius of that circle;

$$C = 2\pi r$$

$$40 \text{ cm} = 2\pi r$$

$$r = 40 \text{ cm}/(2\pi)$$

$$r = 6.37 \text{ cm}$$

$$A = \pi r^2$$

$$A = (\pi)(6.37 \text{ cm})^2$$

$$A = 127.5 \text{ cm}^2$$

$$\tau = I\,A\,B$$

$$\tau = (20 \text{ A})(127.5 \text{ cm}^2)(0.52 \text{ T})$$

$$\tau = 1325.7 \text{ A cm}^2 \text{ T } [1 \text{ m}^2/10^4 \text{ cm}^2]$$

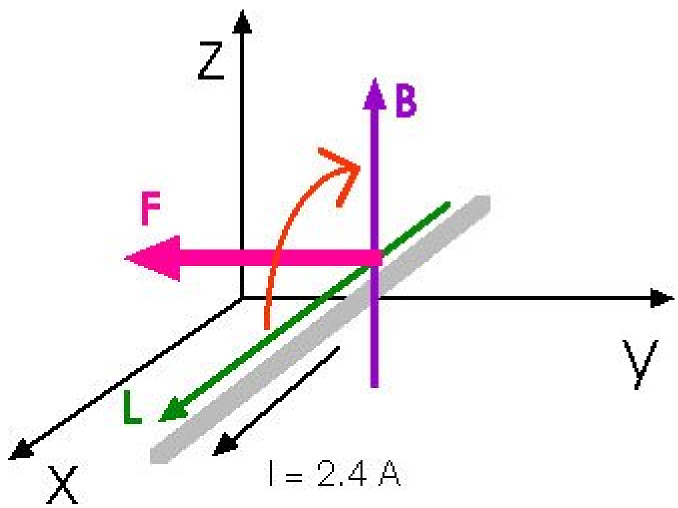
$$\tau = 0.1326 \text{ N-m}$$

(d) Which torque is greatest?

The circle has the greatest area so it should provide the greatest torque.

Solution:-

29.13 A wire carries a steady current of 2.4 A. A straight section of the wire is 0.75 m long and lies along the x axis within a uniform magnetic field, B = (1.6 **k**) T. If the current is in the + x direction, what is the magnetic force on that section of wire?



F = I **L** x **B**

F = I L B

F = (2.4 A)(0.75 m)(1.6 T)

F = 2.88 N

From the diagram, we find that this force acts in the negative y-direction

F = - 2.88 N **j**

29.20 A rod of mass 0.72 kg and radius 6.0 cm rests on two parallel rails (Fig P29.20) that are d = 12 cm apart and L = 45 cm long. The rod carries a current I = 48 A in the direction shown and rolls along the rails without friction. If the rod starts from rest, what is its speed as it leaves the rails if there is a uniform 0.24-T magnetic field directed perpendicular to the rod and the rails?

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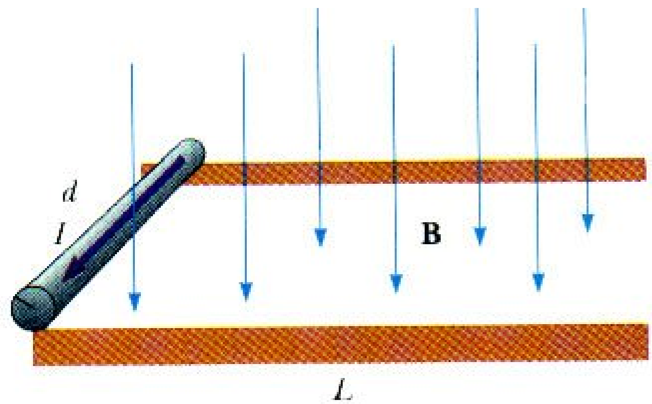
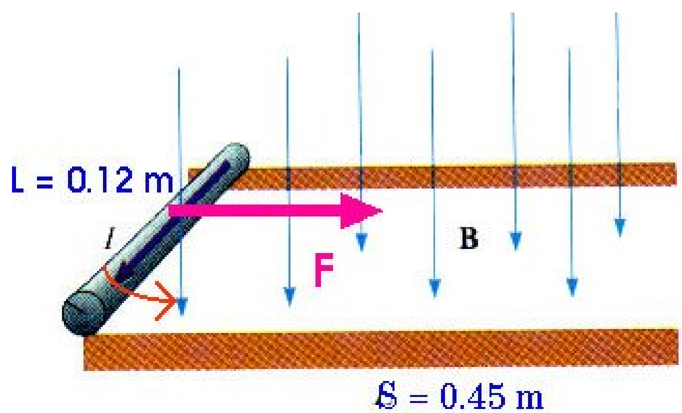


F = I L B

Be careful. This equation uses "L" for the length of the conductor in the magnetic field; and that is just 12 cm or L = 0.12 m. However, this question uses "L" to mean a distance of 45 cm that the rod moves while in contact with the current-carrying rails. I am going to change that to s = 0.45 m



F = (48 A)(0.12 m)(0.24 T) = 1.38 N

F = ma

a = F/m

a = 1.38 N / 0.72 kg = 1.92 m/s2

$v^2 = vo^2 + 2\ a\ S$

$v^2 = 0^2 + 2\ (1.92\ m/s^2)\ (0.45\ m)$

$v^2 = 1.73\ m^2/s^2$

$$v = 1.31 \text{ m/s}$$

Hmmmm, . . . That's not quite right. That is the final velocity if the rod **slides** with no friction. We could also have gotten that result by setting the work equal to the kinetic energy.

$$W = F S = (1.38 \text{ N})(0.45 \text{ m}) = 0.621 \text{ N-m} = 0.621 \text{ J}$$

$$KE = (1/2)\ m\ v^2 = (1/2)(0.72 \text{ kg})\ v^2$$

$$(1/2)(0.72 \text{ kg})\ v^2 = 0.621 \text{ J}$$

$$v^2 = 1.73 \text{ m}^2/\text{s}^2$$

$$v = 1.31 \text{ m/s}$$

But this rod has a radius of 6 cm (0.06 m) so its **rotational kinetic energy** is going to be important.

$$KE_{rot} = (1/2)\ I\ \omega^2$$

where I is now the moment of intertia (the "rotational mass") rather than the current!

$$I = (1/2)\ m\ r^2$$

$$I = (1/2)\ (0.72 \text{ kg})\ (0.06 \text{ m})^2$$

$$I = 0.0013 \text{ kg-m}^2$$

$$KE_{rot} = (1/2)\ I\ \omega^2 = (1/2)\ I\ (v/r)^2 = (1/2)(I/r^2)\ v^2$$

$$KE_{tot} = KE_{tran} + KE_{rot}$$

$$KE_{tot} = (1/2)\ m\ v^2 + (1/2)(I/r^2)\ v^2$$

$$KE_{tot} = (1/2)[m + I/r^2\ ]\ v^2$$

$$I/r^2 = [(1/2)\ m\ r^2\ ]/r^2 = (1/2)\ m$$

$$KE_{tot} = (1/2)[m + (1/2)\ m\ ]\ v^2$$

$$KE_{tot} = (1/2)\ [(3/2)\ m]\ v^2$$

$$KE_{tot} = (3/4)\ m\ v^2 = (3/4)(0.72 \text{ kg})\ v^2 = (0.54 \text{ kg})\ v^2$$

$$(0.54 \text{ kg})\, v^2 = 0.621 \text{ J} = \text{Work}$$

$$v^2 = 0.621 \text{ J} / 0.54 \text{ kg}$$

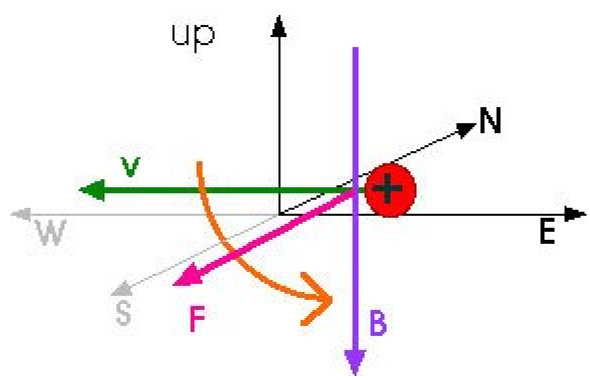
$$v^2 = 1.15 \text{ m}^2/\text{s}^2$$

$$v = 1.07 \text{ m/s}$$

This is considerably different from the value of v = 1.31 m/s we got when we ignored the rotation. So the rotational effects are important for this situation.

29.28 The magnetic field of the Earth at a certain location is directed vertically downward and has a magnitude of 0.5×10^{-4} T. A proton is moving horizontally towards the west in this field with a speed of 6.2×10^{6} m/s.

(a) What are the direction and magnitude of the magnetic force the field exerts on this charge?



From the diagram we see that the force is directed to the **South.** Since **v** and **B** are perpendicular, the magnitude of the force is

$$F = q\, v\, B$$

$$F = (1.6 \times 10^{-19} \text{ C})(6.2 \times 10^{6} \text{ m/s})(0.5 \times 10^{-4} \text{ T})$$

$$F = 4.96 \times 10^{-19} \text{ T}$$

(b) What is the radius of the circular arc followed by this proton?

This force supplies the centripetal force,

$$F_c = m\, v^2/r = F_{mag}$$

$r = m\ v^2/F_{mag}$

$r = [(1.67 \times 10^{-27})(6.2 \times 10^6)^2/4.96 \times 10^{-19}]$ m

$r = 1.29 \times 10^5$ m

r = 129 km

As magnetic fields go, Earth's magnetic field is not esp'ly **strong**. But it does rotate magnets!

29.31 A proton moving in a circular path perpendicular to a constant magnetic field takes 1.00 microseconds to complete one revolution. Determine the magnitude of the field.

$F_c = m\ v^2/r = q\ v\ B = F_{mag}$

m v/r = q B

B = m v / r q

How is the period related to velocity and radius?

v = C/T = 2 pi r/T

T = 2 pi r/v

v/r = 2 pi/T

B = m v / r q

$B = (1.67 \times 10^{-27}$ kg)[2 pi/(1 x 10^{-6} s)]/(1.6 x 10^{-19} C)

$B = 2$ pi (1.67 x 10^{-27} kg)/[(1 x 10^{-6} s)(1.6 x 10^{-19} C)]

B = 0.0656 T

Current midterm solved papers May 2012

Subjective:-

1: Period of wave

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Period of wave:-
T=1/f

2: Number of revolution

$$\phi = \omega_i t + \frac{1}{2}\partial t^2$$

3: Gravitational force :-

$$Gravititional\ force :-$$

$$F = G\frac{Mm}{r^2}$$

$$M = mass\ of\ earth$$

$$m = mass\ of\ object$$

$$G = gravititional\ cons\tan t$$

$$r = radius$$

5:last chapter men se tha question chapter no 21 page 60 pe statlite problem hai us men se aaya tha questions
Page no :60

-FORMULAS-
1 to 22 chapters

Ok
Now fellows I gathered all formulas of 1-22 chapters without including the lengthy and boring equations. Only simple and direct formulas.
Here we go…

$$Displacment :-$$

$$d = r_2 - r_1$$

$$r_2 = second\ po\text{int}$$

$$r_1 = first\ po\text{int}$$

$Velocity :-$

$AverageVelocity :-$

$$V_{avg} = \frac{d}{t}$$

$d = displacment.$

$t = time\ interval$

$Instantaneous\ velocity :-$

$$v_{ins} = \lim_{\Delta t \to 0} \frac{\Delta d}{\Delta t}$$

$\Delta t = very\ small\ value\ or\ approches\ to\ 0$

$*read\ me\ plz :-$

$Instantaneous\ velocity\ \ remains\ constant, and\ the\ body\ called$
$moving\ with\ uniform\ velocity.$

$Acceleration :-$

$$a_{avg} = \frac{v_2 - v_1}{\Delta t} = \frac{\Delta v}{\Delta t}$$

$$Ins\tan\tan eous\ Acceleration :-$$

$$a_{ins} = \lim_{\Delta t \to 0} \frac{\Delta v}{\Delta t}$$

$$\Delta t = very\ small\ value\ or\ approches\ to\ 0$$

$$Equations\ of\ motions :-$$

$$v_f = v_i + at$$

$$a = accelaration$$

$$t = time$$

$$v_f = final\ velocity$$

$$v_i = \text{int}ial\ velocity$$

$$S = v_i + \frac{1}{2}at^2$$

$$S = dis\tan ce$$

$$v_f^2 = v_i^2 + 2as$$

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And all 1 to 22 chapters formulas in easy format.

And

$Now\ Newton\ uncle\ k\ LAW\ of\ motion :-$

$1st\ and\ third\ law\ didn't\ use\ in\ calculations$

$only\ 2nd\ law\ (bechara)\ used\ in\ physical\ calculations$

$That\ is :-$

$F = ma$

$F = force\ applying\ on\ a\ body$

$m = mass$

$a = acceleration$

$Momentum :-$

$P = m \times v$

$m = mass$

$v = velocity$

$P = linear\ momentum$

$Law\ of\ conversion\ of\ momentum :-$

$$(m_1 v_1 + m_2 v_2) = (m_1 v_1' + m_2 v_2')$$

$m_1 v_1 + m_2 v_2 = mass\ and\ velocity\ before\ collusion$

$m_1 v_1' + m_2 v_2' = mass\ and\ velocity\ after\ collusion$

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$Elastic\ and\ inelastic\ collusion:-$

$$v_1' = \frac{m_1v_1 - m_2v_2}{m_1v_1 + m_2v_2} \times v_1$$

$$v_1' = \frac{2m_1}{m_1v_1 + m_2v_2} \times v_1$$

$WORK:-$

$W = fd$

$W = fd \cos$

$read\ me\ plz =$

$i)-work\ is\ scaler\ quantity.$

$ii)-if\ \theta < 90 work\ is\ done\ and\ +ive$

$iii)-if\ \theta > 90 work\ is\ done\ and\ -ive$

$iv)-if\ \theta = 90\ no\ work\ is\ done.$

$v)-SI\ unit\ is\ joule.$

$Work\ done\ by\ gravitional\ field:-$

$W_{ab} = -mgh$

$Power:-$

$$P_{av} = \frac{\Delta w}{\Delta t}$$

$\Delta w = fd\cos\theta$

$or\ w = mgh$

$Power\ of\ velocity:-$

$P = Fv$

$f = force\ applied$

$v = velocity$

$ENergy:-$

$K.E = \frac{1}{2}mv^2 ------Kinetic\ energy$

$P.E = mgh ------Potential\ energy$

$Work + energy\ principle:-$

$$W = fd = \frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2$$

$Gravititional\ force:-$

$$F = G\frac{Mm}{r^2}$$

$M = mass\ of\ earth$

$m = mass\ of\ object$

$G = gravititional\ cons\tan t$

$r = radius$

$Gravititional\ potential\ energy:-$

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$G = gravititional\ cons\tan t$

$r = radius$

$Gravititional\ potential\ energy :-$

$$U = -G\frac{Mm}{r}$$

$Converstion\ of\ K.E\ and\ P.E :-$

$los\sin\ p.E = Gain\ in\ K.E$

$$P.e / mgh = \frac{1}{2}mv^2 + Fh \qquad F = Friction$$

$Total\ energy = K.E + P.E$

$sometimes :-$

$P.E = K.E$

$$mg(h_1 - h_2) = \frac{1}{2}m(v_f^{\ 2} - v_i^{\ 2})$$

$Angular\ DisplAcment :-$

$$\theta = \frac{S}{r} rad$$

$Coversion\ of\ revoultion\ and\ radian :-$

$1rev = 2\pi rad = 360^0$

$$1rad = \frac{360}{2\pi} = 57.3^0$$

$Angular\ velocity :-$

$$\omega = \frac{\Delta\theta}{\Delta t}$$

$\theta = angular\ displacment$

$Angular\ accelaration :-$

$$\partial = \frac{\Delta\omega}{\Delta t}$$

$Equations\ of\ angular\ Motion :-$

$\omega_f = \omega_i + \partial t$

$2\partial\theta = \omega_f^{\ 2} - \omega_i^{\ 2}$

$$\theta = \omega_i t + \frac{1}{2}\partial t^2$$

$Angular\ Momentum :-$

$L = r \times p$

$p = momentum$

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$r = position\,vector$

$Angular\ frequency\ :-$

$$\omega = \frac{2\pi}{t} = 2\pi f$$

$T\ = time\ required\ to\ complete\ one\ vibration$

$f\ = the\ no\ of\ vibration\ complete\ in\ one\ second$

$$f\ = \frac{1}{t}$$

$Mass\ of\ spring\ system\ :-$

$\omega =$

$$T\ = 2\pi / \omega = 2\pi / \sqrt{\frac{m}{k}}$$

$Moment\ of\ inertia\ :-$

$\tau = I\,\partial$

$I\ = moment\ of\ inertia$

$\partial = angular\ accelaration$

Wave Motion:-

it can be said that the speed of a wave is also the wavelength/period.

$$\text{Speed} = \frac{\text{Wavelength}}{\text{Period}}$$

Since the period is the reciprocal of the frequency, the expression 1/f can be substituted into the above equation for period. Rearranging the equation yields a new equation of the form:

Speed = Wavelength • Frequency

The above equation is known as the wave equation. It states the mathematical relationship between the speed (**v**) of a wave and its wavelength (**λ**) and frequency (**f**). Using the symbols **v**, **λ**, and **f**, the equation can be rewritten as

$$v = f \cdot \lambda$$

Speed of sound in a medium is:

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v where

$$v = \sqrt{\frac{B}{\rho}}$$

B= is the bulk modulus and

p= is the density of the medium.

Physics of appliances (Electricity & Magnetism):

Electrostatic Force (Newtons) = $q_1 E$

= $k\, q_1 q_2 / d^2$

Electric field (N/C) = Force/charge

= $k\, q_2 / d^2$

Potential Energy (Joules) = work

= Force * distance

= (-) $q_1 E d$

Potential (voltage) = energy/charge or work/charge

= $k\, q_2 / d$

Charge 1C = 6.3×10^{18} electrons

1e = -1.60×10^{-19} C

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Mass 1 electron = 9.11×10^{31} kg

1 proton = 1.67×10^{-27} kg

Coulomb constant (Nm^2/C^2): k = 8.99×10^{9} Nm^2/C^2

Electric Current Formulas to Use:

Voltage: V = I*R (Voltage = current*resistance)
Power: P = I*V (or V^2/R or I^2*R)
cost: cents= rate (8 cents/kw-hr) * Power (kw) * time (hrs)
1 horsepower = 746 watts (watts is energy per second)

Magnet Formulas to Use:

Emf = #of turns * area * current change/time
transformer: primary voltage/# turns = secondary voltage / # turns

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$Stress :-$

$$Stress = \frac{F}{A}$$

$F = force$

$A = unit\ area$

$Strain :-$

$$\frac{\Delta l}{l}$$

$\Delta l = the\ change\ in\ length$

$l = orignal\ length$

$volume\ strain :-$

$$\frac{\Delta V}{V}$$

$Stearing\ Strain :-$

$$\theta = \tan\theta = \frac{\Delta x}{l}$$

$Hooke\ law :-$

$Stress = E * strain$

$E = \text{mod}oulous\ of\ elasticity$

$Young's\ Modoulous :-$

$$Y = \frac{\frac{F}{A}}{\frac{\Delta l}{l}}$$

$Bulk's\ Modoulous :-$

$$B = \frac{\Delta P}{\frac{\Delta V}{V}}$$

$Shear\ Modulous :-$

$$\eta = \frac{\frac{F}{A}}{\theta} = \frac{Fl}{A\Delta x}$$