Final revision PHYS110

1439-1440

Chapter 14

1. **The fluid has constant density throughout**
   Incompressible fluid
2. **The resistance of a fluid to flow**
   Viscosity
3. **When the layer of fluid slide smoothly past each other**
   Laminar flow
4. **The flow is irregular and complex, with mixing and eddies**
   Turbulent flow
5. **When the velocity is high ………………. occurs**
   Turbulent flow
6. **The family of curved lines that are tangential to the velocity vector**
   streamlines
7. **The volume of fluid per unit time**
   Volume flow rate
8. **The unit of volume flow rate is**
   $m^3 \, s^{-1}$
9. **The velocity of the fluid multiplied by cross-sectional area that path through it is**
   Volume flow rate
10. **If the cross sectional area of the pipe increases the volume flow rate**
    Increases
11. **If the velocity of the fluid increases, then the volume flow rate**
    increases
12. **If the cross sectional area of the pipe increases, then the velocity of the fluid**
    decreases
13. **If the radius of the of the pipe increases, then the velocity of the fluid**
    decreases
14. **If the diameter of the pipe increases, then the velocity of the fluid**
    decreases
15. **Calculate the volume flow rate in $m^3 \, s^{-1}$, if the water pipe carries 3000 L of water past a** certain point every Minuit
    $0.05 \, m^3 \, s^{-1}$
16. **Calculate the velocity of the fluid path in a pipe of radius 10 cm, if the fluid pipe carries 30 L of water past a certain point every one minute.**
    $0.016 \, m \, s^{-1}$
17. **Calculate the cross-sectional area of a pipe carries water that move with velocity 0.016 ms^{-1}, if the fluid pipe carries 30 L of water past a certain point every one minute.**
    $0.03125 \, m^2$
18. **Calculate the radius of a pipe carries water that move with velocity 0.016 ms^{-1}, if the fluid pipe carries 30 L of water past a certain point every one minute.**
    0.1 m

19. **Calculate the time required to flow 3000 L of water in a pipe of cross-sectional area 0.03 m², if the water is moving with velocity 15.92 ms⁻¹ in one minute.**
    6.28 s
20. **A water pipe carries 1000 L of water past a certain point every one minute, what is a radius of the pipe if the speed of the water in this pipe is 2 ms⁻¹?**
    5.15 cm
21. **For the incompressible fluid if the volume flow rate is constant along the pipe this is due to**
    The conservation of mass
22. **"The amount of fluid entering one end of the pipe must equal to the amount coming out the other end" this is the definition of the**
    The conservation of mass
23. **"The amount of fluid entering one end of the pipe must equal to the amount coming out the other end" this is the definition of the**
    The continuity equation
24. **If the velocity of the fluid multiplied by cross-sectional area that path through it is constant, this is a definition of**
    The continuity equation
25. **If the inlet pipes are three and the outlet pipes are two, then the following equation represents the continuity equation**
    $A_1v_1+A_2v_2+A_3v_3= A_4v_4+A_5v_5$
26. **Bernoulli's principle is in essence for**
    The law of energy conservation
27. **The equation that relates pressure, speed and elevation for the case of an incompressible fluid is called**
    Bernoulli's equation
28. **Bernoulli's equation neglects the effects of friction**
    true
29. **Bernoulli's equation is written as**
- $P + \frac{1}{2}\rho v^2 + h\rho g = constant$
30. **The force exerted per unit area is the definition of the**
    Pressure
31. **The force multiplied by the distance is the definition of the**
    Work
32. **One of the following is unit of pressure**
    Jm⁻³.
33. **The energy per unit volume is the definition of the**
    Pressure
34. **According to Bernoulli's equation: when there is no change in height, then the change in pressure equals to the change in kinetic energy per unit volume**
    true
35. **According to Bernoulli's equation: if there is no change in height, then**
- The change in pressure equals to the change in kinetic energy per unit volume

36. **The following equation represents Torricelli's theorem**

- $v_o = \sqrt{2g(h_2 - h_1)}$

37. **The relation between the speed of the outflow and the heights of the fluid is known as**
    Torricelli's theorem

38. **The relation between the speed of the efflux and the head height of the fluid is known as**
    Torricelli's theorem

39. **According to equation of continuity, when water falls its speed increases, while its cross sectional area**
    Decreases

40. **If layers of fluid have frictional force between them, then it is known as**
    Viscus fluid

41. **Torricelli's theorem is one of applications of**
    Bernoulli's equation

42. **Water flows through a pipe of area 'A' with a speed 'v'. If the area of pipe increases to '2A', what will be the speed of water now?**
    (a) v/2

43. **Water flows through a pipe of cross-section area 0.05 m² at a velocity of 6.5 ms⁻¹. The water then flows into a smaller pipe at a velocity of 8.0 ms⁻¹. The area of smaller pipe is …**
    (a) 0.04 m²

Chapter 15

1. **A measure of internal friction of the fluid**
   Viscosity
2. **It is a property of particular fluid and it is a measure of a fluid's resistance to flow**
   viscosity
3. **The unit of viscosity is**
   Pa s
4. **The physical quantity that has units of Pa s is**
   Viscosity
5. **One of the following is not unit of Viscosity**
   Pa s , poise , N m^{-2}s, Pa s^{-1}
6. **1 Pas = 10 poise**
   True
7. **When ……………………….. is applied to a fluid it causes it to flow, and to deform continuously**
   Shear stress
8. **The share stress is defined**
   The force applied to an area of a fluid
9. **As shear stress applied to the fluid**
   A great deformation in fluid occurs
10. **The unit of the shear strain is**
    No units
11. **Rate of change of strain is**
    Velocity per unit length
12. **The unit of the shear strain is**
    s^{-1}.
13. **Shear stress is proportional to the shear strain**
    Directly
14. **Viscosity is defined as**
    shear stress of the fluid divided by its shear strain
15. **"A volume flow rate of a viscus fluid along a pipe is directly proportional to the pressure difference and the pipe radius and it is inversely proportional to the coefficient of viscosity and the pipe length" this is a statement of**
    Poiseuill's law
16. **One of the following sentences is true**
a) Blood is a heterogeneous mixture it is non-viscus fluid   *
17. **The viscosity of the blood is not constant**
    true
18. **The volume fraction of the blood composed of red blood cell**

Hematocrit
19. **A higher hematocrit leads to**
Higher viscosity
20. **Men have hematocrit more than women**
true
21. **Higher hematocrit leads to higher viscosity**
True
22. **at high altitude the number of red blood cell**
increases
23. **inadequate supply of Oxygen (hypoxia)**
the number of red blood cell increases
24. **When the number of red blood cell increases because of the inadequate supply of Oxygen (hypoxia) this leads to**
High blood cell
25. **At high blood speed the blood behaves like**
Low viscosity mixture of two liquids
26. **At low blood speed the blood behaves like**
Solid particles suspended in a liquid and give high viscosity
27. **A red blood cell staking causing the blood behave like solid particle, this is due to**
Low blood speed
28. **"The fluid flows in smooth layer without mixing" this is the definition of**
Laminar flow
29. **"The fluid flows is complex, irregular and mixing between layers and eddies" this is the definition of**
Turbulent flow
30. **The speed at which the flow becomes turbulent depends on**
a) The viscosity and the density of the fluid only
31. **Reynold's number is written as**
- $Re = \frac{\rho v L}{\eta}$
32. **According to Poiseullie's law, for a liquid flowing in a pipe the volume flow rate ------------- on increasing the radius of the pipe.**
(a) increases
33. **One of the following is unit of viscosity**
(a) Poise
34. **The value of 1.0 poise equals …**
(a) 0.1 N.s.m^{-2}
35. **According to Poiseuille's law, if the radius of the pipe increases to be 2r the volume flow rate ξ becomes**
(a) 16 ξ
36. **A dimensionless quantity that allows us to distinguish between laminar and turbulent flow**

(a) Reynold's number

37. At high altitude the number of red blood cells

(a) <mark>Increase</mark>

38. The relation between the hematocrit and the blood viscosity for males and females is as follow

(a) <mark>Males have higher hematocrit than females and have higher blood viscosity</mark>

Chapter 22

1. Energy transferred in a form that can perform mechanical wave
Work

2. The statement that the energy is conserved
First law of thermodynamic

3. Energy can be transferred from one form to another, but it can be neither destroyed nor created
First law of thermodynamic

4. ΔU = Q-W-E is
First law of thermodynamic

5. The first law of thermodynamics is based on which of the following principles?
Conservation of energy

6. What law asserts that energy is a thermodynamic property?
First law of Thermodynamics

7. The statement of the first law of thermodynamic is;
<mark>Energy can be transferred from one form to another, but it can be neither destroyed nor created</mark>

8. The series of biochemical reactions which convert stored energy in food molecules to other form
Metabolism

9. One of the ways of the body to gain or lose energy with the surrounding is through the body doing work
<mark>true</mark>

10. A metabolism is defined as;
<mark>series of biochemical reactions which convert the potential energy of food molecules into other forms</mark>

11. The amount of energy transferred to the body by oxidation of food
Metabolic rate

12. Hyperthermia results if the core temperature of the body remains
More than 37o

13. Hyperthermia results if the core temperature of the body remains
less than 37o

14. **The ratio of mechanical work done by the body to the energy used for mechanical work is called**
Efficiency

15. **If the metabolic rate is lower than the rate of heat loss to the environment**
hypothermia

16. **If the metabolic rate of a person is higher than the rate of heat loss, then he can get……….**
hyperthermia

17. **If the metabolic rate is higher than the rate of heat loss to the environment**
hyperthermia

18. **Net rate of energy loss = rate of heat loss - …………….**
metabolic rate

19. **Net rate of energy loss = ------------ - metabolic rate**
rate of heat loss

20. **If the metabolic rate is higher than the rate of heat loss to the environment**
Net rate of energy loss is negative and results hyperthermia

21. **If the metabolic rate is lower than the rate of heat loss to the environment**
Net rate of energy loss is positive and results hypothermia

22. **The work efficiency of the body is defined as;**
The ratio of mechanical work done by the body to the energy used for mechanical work

23. **The ratio of mechanical work done by the body to the energy used for mechanical work is called**
Work efficiency of the body

24. **A 60 kg man has a core temperature of 37 oC . The specific heat capacity of human tissue is 3500 Jkg^{-1}K^{-1}. He loses heat at a rate of 350 W to the surrounding for two hours. If the metabolic rate is 600 W, calculate the temperature? Tell if he is hypothermia or hyperthermia?**
-6.9 hyperthermia

25. **A 70 kg man has a core temperature of 37 oC . The specific heat capacity of human tissue is 3500 Jkg^{-1}K^{-1}. He loses heat at a rate of 350 W to the surrounding for two hours. If he is sitting still and his metabolic rate is 100 W, calculate the temperature? Tell if he is hypothermia or hyperthermia?**
6.9 hypothermia

26. **A 70 kg man has a core temperature of 37 oC . The specific heat capacity of human tissue is 3500 Jkg^{-1}K^{-1}. He loses heat at a rate of 350 W to the surrounding for two hours. If the metabolic rate is 200 W, calculate the temperature? Tell if he is hypothermia or hyperthermia?**
-2.9 hyperthermia

27. **When a body A is in thermal equilibrium with a body B, and also separately with a body C, then B and C will be in thermal equilibrium with each other.**

True
Zeroth law of thermodynamics.

28. **The magnitude of mechanical work is the**
    b) product of the force and distance travelled parallel to the force
29. **The magnitude of mechanical work is the**
    b) product of the force and distance travelled parallel to the force
30. **Energy has different forms which include**
    c) all of the mentioned

Chapter 29

1. **An object physically moves from one place to another**
   Transmission by particle
2. **An energy can be sent as a disturbance from one place to another**
   Transmission by wave
3. **The light is regarded as a stream of particle-like units which have wave property**
   Photon model
4. **Electromagnetic radiation in and around the wavelength visible to Hymans (between 380 nm to 750 nm)**
   light
5. **The term light is applied to the ultra violet and the infrared part of the electromagnetic spectrum**
   true
6. **The angle of incidence is 40 then according to the law of reflection the angle of reflection is**
   400°.
7. **What is frequency of the red light if its wave length is 7.9×10^{14} m (the speed of light is 3×10^8 m/s).**
   380×10^{-9} Hz
8. **What is the wave length of red light if its frequency is 380×10^{-9} Hz (the speed of light is 3×10^8 m/s)?**
   7.9×10^{14} m
9. **What is the speed of red light if its frequency is 380×10^{-9} Hz and its wavelength is 7.9×10^{14} m?**
10. **------ waves are electromagnetic waves**
    Light

11. **Electromagnetic radiation in and around the wavelength range visible to human (380 nm to 750 nm)**
    light
12. **Light is self-propagating combination of oscillating electric and magnetic field**
    Electromagnetic wave
13. **We can separate the electric component of the electromagnetic wave from the magnetic component**
    false
14. **Consider two cars travelling along straight stretch of road (towards each other) with velocity 14 m/s, the drivers of each car will see the other car approaching him with speed of**
    28 m/s
15. **The electromagnetic wave can path through vacuum**
a) True
b) False
16. **The speed of light is unchanged by changing**
a) the velocity of the observer
b) the velocity of the light source
c) both a) and b)
d) nothing true
17. **As a time-varying electric field generates a magnetic field and vice-versa**
    Electromagnetic wave
18. **The range of possible frequencies of electromagnetic waves**
    Electromagnetic spectrum
19. **A discrete packet of electromagnetic radiation**
    photon
20. **The speed of light is**
    300000 km/s
21. **All electromagnetic radiation travels at the same speed in a vacuum**
    speed of light
22. **The distance between two consecutive points on a wave that are in phase**
    Wavelength
23. **Number of repetitions of a complete wave form (cycle) per unit time**
    frequency
24. **A change of the direction of the light when it hits and is turned back from a surface or boundary**
    reflection
25. **"The angle of incident = the angle of reflection" this is the law of**
    Law of reflection
26. **The change in propagation direction of a wave due to the change in the wave speed as the wave passes from one transparent medium into another**
    refraction
27. **The angle between the normal and the incident ray is called**

Incident angle

28. **The angle between the normal and the reflected ray is called**
Reflected angle

29. **When the surface is rough compared to the wavelength of the radiation light come from a single direction**
Diffuse reflection

30. **The incidence angle at which its refracted angle equals to 90°.**
Critical angle

31. **When the angle of incidence (at a boundary from a one medium to a medium with a lower refractive index) is greater than a critical angle**
Total internal reflection

32. **If the rays of light remain parallel after reflection, then it called------**
specular reflection

33. **According to law of reflection, the angle of incidence is always equal to the angle of reflection**
true

34. **Diffuse reflection takes place from……………**
rough surfaces

35. **The change in direction of a light ray at the interface between two media**
Refraction

36. **Materials that are uniform and have the same wave propagation speed everywhere are called**
Isotropic media

37. **The speed of light in vacuum divided by its speed in water gives………. of the medium**
Refractive index

38. **Refractive index is given as**
$n = c/v$
(c and v are the speed of light in vacuum and in medium, respectively)

39. **The unit for refractive index of a material is**
None

40. **A yellow light of wavelength 580 nm passes from air (n=1.00) into water (n=1.33), (the speed of light In vacuum is 3.00×10^8 m/s). Calculate the speed of light in water?**
2.25×10^8 m/s

41. **When yellow light of wavelength 580 nm passes from air (n=1.00) into water (n=1.33), (the speed of light In vacuum is 2.25×10^8 m/s). Calculate the frequency of light in water?**
5.17×10^{14} Hz

42. **Yellow light passes from air (n=1) into glass (n= 1.66). the speed of light in air is 3×10^8 m/s, what is the speed of light in glass?**
1.8×10^8 m/s

43. **The critical angle is given by**
$\sin \theta_c = n_2/n_1$

44. **The critical angle is given by**
$\sin \theta_c = v_1/v_2$

45. **What is the critical angle for total internal reflection when light comes from diamond (n= 2.10) to air (n=1)?**

    Θ_c= 28.43

Chapter 38

1. **The main processes at X-ray and γ-ray energies are**

   Compton scattering and photo electric effect

2. **For low energy (E< 35 KeV) X-ray photons,**

   photo electric effect is the predominant interaction with atom in the target.

3. **As the photon energy increases**

   The probability of the photo electric effect falls rapidly

4. **The attenuation is strong for**

   high effective atomic number Z_{eff}

5. **Z_{eff} of bone is ----------- the Z_{eff} of fats**

   greater than

6. **The attenuation of x-ray of bone is greater than the attenuation of x-ray of fat.**

   At low energy

7. **The probability of the Compton scattering is strongly depending on**

   the electron density

8. **The probability of the Compton scattering is strongly depending on**
   the effective atomic number
9. **To improve the contrast of X-ray imaging**
   We used contrast agents
10. **CT scan stands for**
    Computed tomography.
11. **CAT scan stands for the**
    Computed Axial Tomography.
12. **The patient dose for a CT scan is -------------- that of traditional X-ray**
    higher than
13. **PET tends for**
    positron emission tomography
14. **Positron is the antiparticle of**
    electron
15. **Positron is the**
    positive electron
16. **Positron collides with an electron and both are**
    Annihilating
17. **Tumors collect more of the tagged molecules and show up strongly on the PET scan.**
18. **The biggest limitation of PET is**
    the need of the short-lived radio-isotopes
19. **Gamma Camera is also called**
    scintillation camera
    Anger Camera
    Both of them