2024
SUMMARY

PHYSICS 105

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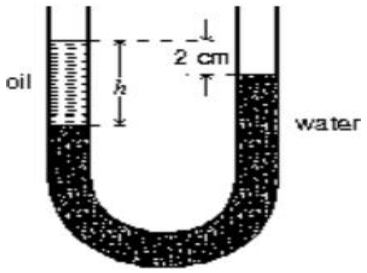
ARKAN
ACADEMY

Test bank

1. **The density of water is 1.0 g/cm3. If h = 20 cm, the density of the oil (in g/cm3) in the left column of the U-tube shown below is:**



   A. 0.20
   B. 0.90
   C. 1.0
   D. 1.3
   E. 5.0

Answer: B

2. **One piston in a hydraulic lift has an area that is twice the area of the other. When the pressure at the smaller piston is increased by Δp the pressure at the larger piston:**
   A. increases by 2Δp
   B. increases byΔp/2
   C. increases by Δp
   D. increases by 4Δp
   E. does not change

Answer: C

3. **Iodine 131 I is widely used in the treatment and diagnosis of the Thyroid gland. The radius (in fm) of this isotope is :**
   A. 131.0
   B. 157.2
   C. 6.1
   D. 5.4
   E. 5.2

Answer: C

4. **A 65-Kg person absorbed a 20-rad dose. How many joules of energy are deposited in his body ?**
   A. 13
   B. 20
   C. 65
   D. 1300
   E. 6.5

Answer: A

5. **The activity of 1 gram of radium (Ra , Atomic number = 88 , Atomic mass=226) is exactly 1 Ci . The half-life of radium (in years) is:**
   A. 226
   B. 1580
   C. 2280
   D. 1170
   E. 1950

Answer: B

6. **A 70-Kg researcher absorbs 4.5 × 108 neutrons in a workday , each of energy 1.2 MeV. The relative biological effectiveness (RBE) for these neutrons is 10 . What is the equivalent dosage of the radiation exposure for this researcher, in mrem ?**
   - **A.** 3.7
   - **B.** 0.39
   - **C.** 0.77
   - **D.** 1.2
   - **E.** 12

   Answer: D

7. **A 3.0-mCi source of 32P is implanted in a tumor to give it a 24-Gy dose. The half-life of 32P is 14.3 days, and 1 mCi delivers 10 mGy/min. How long (in min) should the source remain implanted?**
   - **A.** 143
   - **B.** 300
   - **C.** 240
   - **D.** 720
   - **E.** 800

   Answer: E

8. **Ionizing radiation can be used on meat products to reduce the levels of microbial pathogens. Assume that for refrigerated meat the upper allowed limit is 3.8 kGy . If a beam of electrons, each of energy 1.6 Mev irradiates 3.0 Kg of beef , how many electrons should the mass of beef absorb to reach the upper allowed limit ?**
   - **A.** 4.5×10^{16}
   - **B.** 4.5×10^{10}
   - **C.** 3.8×10^{16}
   - **D.** 3.8×10^{10}
   - **E.** 1.6×10^{10}

   Answer: A

9. **A biological tissue of mass m is exposed to 90 rad of alpha radiation. How many rads of slow neutrons can cause the same biological damage to the same tissue? (For alpha RBE=20, for slow neutrons RBE=5).**
   - **A.** 20
   - **B.** 100
   - **C.** 90
   - **D.** 360
   - **E.** 1800

   Answer: D

10. **A blood vessel of radius r splits into two smaller vessels, each of radius r/2. If the velocity in the larger vessel is V , then the velocity in each of the smaller vessels is :**
   - **A.** V/2
   - **B.** V/4
   - **C.** 2V
   - **D.** 4V
   - **E.** V

   Answer: C

11. Water flows into the top floor of a 16m high building through a pipe of constant 2 cm diameter. At the base of the building (ground level) the water flows into the pipe at a speed of 60 cm/s where the gauge pressure is 3.2 atm . The gauge pressure (in atm) in the pipe in the top floor is :

A. 0
B. 1.54
C. 2.65
D. 0.65
E. 3.2

Answer: D

12. The surface of water in a tank supplying water to a house is 10 m above the faucet حنفية in the house. If the faucet is 2.0 cm diameter, how long (in s) does it take to fill a 0,25 m3 container in the house?

A. 180
B. 57
C. 14
D. 80
E. 114

Answer: B

13. A lawn sprinkler is made of a 1.0 cm diameter garden hose with one end closed and 25 holes, each with a diameter of 0.050 cm, cut near the closed end. If water flows at 2.0 m/s in the hose, the speed (in m/s) of the water leaving a hole is:

A. 2
B. 32
C. 40
D. 600
E. 800

Answer: B

14. Water is streaming downward from a faucet opening with an area of 3.0* 10–5 m2 It leaves the faucet with a speed of 5.0 m/s. The cross sectional area (in 10–5 m2) of the stream 0.50 m below the faucet is:

A. 1.5
B. 2.0
C. 2.5
D. 3.0
E. 3.5

Answer: C

15. Water (density of 1.0 * 103 kg/m3) flows through a horizontal tapered pipe. At the wide end its speed is 4.0 m/s. The difference in pressure between the two ends is 4.5 *103 Pa. The speed (in m/s) of the water at the narrow end is:

A. 2.6
B. 3.2
C. 4.0
D. 4.5
E. 5.0

Answer: E

16. A large tank filled with water has two holes in the bottom, one with twice the radius of the other. In steady flow the speed of water leaving the larger hole is _____ the speed of the water leaving the smaller.

A. twice
B. four times
C. half
D. one-fourth
E. the same as

Answer: E

17. Some species of whales can dive to depths of one kilometer. What is the total pressure (in ATM) they experience at this depth? (ρsea = 1020 kg/m3, and 1 ATM = 1.01 *105 N/m2)

A. 9
B. 90
C. 100
D. 111
E. 130

Answer: C

18. Water is flowing at 4.0 m/s in a circular pipe. If the diameter of the pipe decreases to 1/2 its former value, what is the speed (in m/s) of the water downstream?

A. 1
B. 2
C. 8
D. 16
E. 4

Answer: D

19. What is the net force (in N) inward acting on a spherical bathysphere of diameter 2.00 m at an ocean depth of 1 000 m? (The pressure inside the bathysphere is 1 ATM, andρsea = 1.02 * 103 kg/m3).

A. $1.26 * 10^4$
B. $1.26 *10^5$
C. $1.26 * 10^8$
D. $1.26 * 10^{10}$
E. $1.26 * 10^{12}$

Answer: C

20. One end of a cylindrical pipe has a radius of 1.5 cm. Water (of density 1.0 * 103 kg/m3) streams steadily out at 7.0 m/s. The rate at which mass (in kg/s) is leaving the pipe is:

A. 2.5
B. 4.9
C. 7.0
D. 48
E. $7.0 * 10^3$

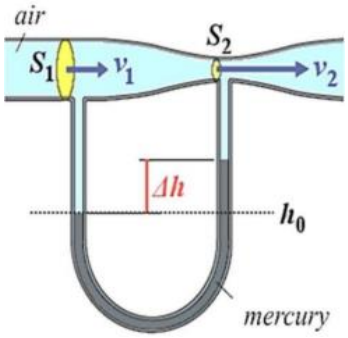
Answer: B

21. The ratio of the radius of a classical electron (2.8 × 10−15 m) to the radius of a 4He nucleus is

A. 2.0
B. 0.68
C. 1.47
D. 0.92
E. 2.4

Answer: C

22. The air of velocity 15 m/s and of density 1.3 kg/m³ is entering the Venturi tube (Placed in the horizontal position) from the left. The radius of the wide part of the tube is 1.0 cm ; the radius of the thin part of the tube is tube is 0.5 cm. The tube of shape U connecting wide and thin part of the main tube (see the picture) is filled with the mercury of the density 13600 kg/m³. Determine the height different Δh that stabilizes between the surface of the mercury in U Tube.



A. 0.6 cm
B. 1.6 cm
C. 2.2 cm
D. 1.1 cm
E. 7.6 cm

Answer: B

23. An object with a height of 2.54 cm is placed 36.3 mm to the left of a lens with a focal length of 35.0 mm. Where is the image located?

A. 977.3 mm
B. 877.3mm
C. 290.7mm
D. 111mm
E. 123.6mm

Answer: A

24. An object with a height of 2.54 cm is placed 36.3 mm to the left of a lens with a focal length of 35.0 mm .What is the height of the image?

A. -683.8mm
B. -798.5mm
C. 230.66mm
D. 356.78mm
E. 123.0mm

Answer: A

25. A 3-cm high object is in front of a thin lens. The object distance is 4 cm and the image distance is –8 cm. The image height (in cm) is:

A. 0.5
B. 1
C. 1.5
D. 6
E. 24

Answer: D

26. Let p denote the object-lens distance and i the image-lens distance. The image produced by a lens of focal length f has a height that can be obtained from the object height by multiplying it by:

A. p/i
B. i/p
C. f/p
D. f/i
E. i/f

Answer: B

27. A camera with a lens of focal length 6.0 cm takes a picture of a 1.4-m boy standing 11 m away. The height of the image (in cm) is about:

A. 0.39
B. 0.77
C. 1.5
D. 3.0
E. 6.0

Answer: B

28. An erect object is 2f in front of a convex lens of focal length f. The image is:

A. real, inverted, magnified
B. real, erect, same size
C. real, inverted, same size
D. virtual, inverted, reduced
E. real, inverted, reduced

Answer: C

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