Jashore University of Science and Technology
Bachelor of Science Textile Engineering
1st semester of 1st year
Session: 2024–2025
Course code: 053322 PHY1125
Course title: Physics - I

Sample Numerical Questions for Practice
10 November 2025

1. Calculate the velocity of efflux when the height of the liquid in the container is 10 m and the gravitational acceleration is 9.8 m/s^2.

2. A pipe carries a liquid with a viscosity of 0.05 Pa.s. The liquid experiences a velocity gradient of 80 m/s^2 across the pipe. Determine the shear stress (force per unit area) exerted on the liquid.

3. A liquid drop with a radius of 0.02 m forms at the tip of a needle. If the surface tension of the liquid is 0.1 N/m, calculate the force acting on the surface of the drop due to surface tension.

4. A liquid with a surface tension of 0.075 N/m is placed in a capillary tube of radius 0.5 mm. If the contact angle between the liquid and the tube surface is 30°, calculate the height of the liquid column in the tube. Assume the density of the liquid is 1000 kg/m^3.

5. A metal wire of length 2 m and cross-sectional area 1×10^{-6} m^2 is subjected to a stretching force of 500 N. The extension in the length of the wire is 0.002 m. Determine the Young's modulus of the wire's material.

6. A capillary tube with a radius of 0.002 m is dipped vertically into water. If the surface tension of water is 0.072 N/m, calculate the height to which the water rises in the tube. (Assume the contact angle is zero.)

7. In Young's double-slit experiment, monochromatic light with a wavelength of 450 nm passes through two slits separated by a distance of 0.3 mm. The screen is placed 2.5 m away from the slits. Calculate the fringe width, which is the distance between two consecutive maxima, on the screen.

8. A grating with 5000 lines per centimeter is illuminated by monochromatic light of wavelength 500 nm. Calculate the angular position of the third-order diffraction maximum.

9. Calculate the angular separation between the first-order and second-order maxima in the diffraction pattern produced by a grating with 10,000 lines per centimeter for light of wavelength 400 nm.

10. What is the resolving power of a diffraction grating if it has 10,000 lines per centimeter and is used to resolve two wavelengths of light with a difference of 0.2 nm?

11. A plane polarized light of intensity 1000 W.m^{-2} is incident on a polarizer. If the polarizer is rotated so that the angle between the light's plane of polarization and the axis of the polarizer becomes 60°, calculate the intensity of the transmitted light.

12. A beam of light is incident on a water surface at Brewster's angle. If the refractive index of water is 1.33, calculate the Brewster's angle at which the reflected light is fully polarized.