KHYBER PAKHTOON KHWA, PUBLIC SERVICE COMMISSION, PESHAWAR

SUBJECT:- COMPETITIVE EXAMINATION FOR THE POSTS OF PROVINCIAL MANAGEMENT 2(
SERVICE(BPS-17)

PHYSICS PAPER-I

Time Allowed: 03 hours   **Max. Marks:100**

Note: Attempt any five complete questions.

Q.1.(a). Describing the scalar and vector fields, explain the divergence of a vector field and show that the divergence of a vector field is equal to. $\nabla \cdot V$ (6,8)

(b) If **A** is a vector such that $A = xyi + 3x^2yzj + xy^2k$, where i, j, k are unit vectors, then calculate (i) div.**A**. (ii) curl of **A**, at the point (1,0,4)   (6)

Q.2.(a) What is the difference between center of gravity and center of mass of a body? State and explain the laws of conservation of linear momentum and angular momentum   (4,12)

(b) Under what condition both, the angular momentum and angular velocity, can have the same direction?   (4)

Q.3.(a) What is Lorentz transformation? Explain the Einstein's mass-energy equation $E = mc^2$, and give examples of conversion of mass into energy and vice versa.   (5,12)

(b) If the rate of emission of radiation from a body is 2×0^{30} J/s, then calculate the corresponding change in mass of the body. Also, state whether the mass will increase or decrease.   (3)

Q.4.(a) Describe the general characteristics of fluid flow and explain the streamline motion.   (9)

(b) State and explain the law of conservation of mass in a fluid   (7)

(c) If droplets of a liquid are suspended then what shape will they acquire and why?   (4)

Q.5.(a) Describing the simple harmonic motion, explain the damping and its effect on the oscillatory motion of a body.   (5,5)

(b) What are traveling waves? Considering a stretched string, explain the transport of energy due to a traveling wave.   (3,7)

Q.6.(a) Give an account of the total internal reflection and discuss its significance.   (5,2)

(b) What is the difference between interference and diffraction of light?   (3)

(c) Describing the main properties of laser light, explain the basic processes involved in the emission of laser light   (5,5)

Q.7.(a) State and explain the second law of thermodynamics and give a statistical view of entropy.   (6,5)

(b) Give an account of methods of heat transfer and explain thermal expansion. What are the situations where thermal expansion is not desirable?   (6,3)

Q.8.(a) Describing precessional motion, explain the working of a gyroscope.   (4,6)

(b) State and explain Kepler's third law regarding period of revolution of a planet. How do we apply Kepler's laws to satellites?   (6,4)

wavelength of scattered photon.

b) Why Compton Effect cannot be observed with visible light?   4

Q7:

a) What do you understand by the wave function Ψ of a moving particle? Give the   2,2

physical significance of wave function.

b) Derive the Schrodinger wave equation.   10

c) Obtain an expression for the energy levels of the one dimensional harmonic   6
oscillator.

Q8:

a) What is meant by the Binding Energy of a nucleus? Discuss the variation of   3,7
binding energy per nucleon as a function of mass number.

b) Calculate the binding energy of deuteron $_1H^2$ when the mass of $_1H^2$ is 2.01412 u.   7
mass of neutron is 1.008665 u and mass of proton is 1.007825 u.

c) Differentiate between natural and artificial radioactivity. .   3