



UNIVERSITY OF THE PUNJAB

B.S. 4 Years Program : First Semester – 2020

Paper: Physics-I (Mechanics & Optics)

Course Code: PHY-111

Part – I (Compulsory)

Time: 15Min. Marks: 10

Roll No. in Fig.

Roll No. in Words.

Attempt this Paper on this Question Sheet only.

Division of marks is given in front of each question.

This Paper will be collected back after expiry of time limit mentioned above.

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Signature of Supdt.:

Q.1. Encircle the right answer cutting and overwriting is not allowed. (10x1=10)

1. The divergence of a vector field results into a tensor of rank
a) zero b) one c) two d) three
2. Two bodies of masses $2m$ and $5m$ have same momentum. Their respective kinetic energies k_1 and k_2 are in the ratio
a) 2:5 b) 5:2 c) $2:\sqrt{5}$ d) 4:5
3. In equilibrium, a body must have
a) $\sum F = 0$ b) non zero acceleration c) zero acceleration d) both a & c
4. The reference frames where Newton's laws can be applied are called _____ frames.
a) inertial b) accelerated c) non-inertial d) None
5. When a force of constant magnitude acts perpendicular to the motion of a particle then which of the quantity remains constant
a) velocity b) acceleration c) kinetic energy d) momentum

6. A stone of mass m is moving in a circle of radius r with constant speed v . The work done by the force over half of the circle is
a) $\frac{mv^2}{r} \times \pi r$ b) $\frac{mv^2}{r} \times 2\pi r$ c) $mg \times 2\pi r$ d) zero
7. If the radius of earth were to shrink by one percent, its mass remaining the same, the acceleration due to gravity on the earth's surface would
a) decrease b) increase c) remain constant d) become zero
8. The transverse nature of light was confirmed by
a) Refraction b) Diffraction c) Interference d) Polarization
9. If L and I are the angular momentum and moment of inertia, respectively then $L^2/2I$ represents:
a) Rotational K.E of the particle b) P.E. of the particle
c) Power d) Torque
10. The ratio of phase difference to the path difference of two light waves is
a) $2\pi/\lambda$ b) π/λ c) $\pi/2\lambda$ d) $\pi/4\lambda$



ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED

Q.2. Give short answers of the following:

(10x2=20)

1. If $\mathbf{F} = 3x^3\hat{i} + 5y^2\hat{j} + 3z^4\hat{k}$, find Curl of \mathbf{F} .
2. If $\phi = 5x^4y^2z^3$ then find $\text{grad}\phi$.
3. How could you differentiate a field force from contact force? Give an example of each.
4. What are the limitations of Newton's laws of motion? Please enlist them.
5. For what value of angle of projection, does the range and height of projectile become equal?
6. Is the value of gravitational acceleration 'g' same at pole and at equator of earth?
Give a plausible reason to justify your answer.
7. In light of Bernoulli's equation, what is the relation between height and speed of flowing fluid?
8. Can anybody rotate into circular path without acceleration? Justify your answer.
9. What do you mean by polarization of light?
10. In Young's double slit experiment, if slits are covered with red and green filters, Would they interfere? If yes! What would be the color of interference pattern?

Give brief answers of the followings.

(3x10=30)

- Q. 3 (a) State and prove the Gauss's divergence theorem. (6)
(b) A circular curve of highway is designed for traffic moving at 45 km/h. If the radius of curve is 120 m, What should be the angle of banking of road for save turn? (4)
- Q. 4 (a) State parallel axis theorem. Using this theorem, find the rotational inertia of a hollow cylinder about an axis of symmetry. (6)
(b) A hoop and a sphere are released from the top of an inclined plane, when they reach at bottom which one has greater rotational kinetic energy? (4)
- Q. 5 (a) Define interference of light. Discuss in detail the Young's double slip experiment to explain the interference of light. (6)
(b) Find the slit separation of a double slit experiment that will produce bright interference fringes 2° apart in angular separation. Assume a wavelength of light is 592 nm (4)