



W7763

Reg. No.:

Name:

University of Kerala
First Semester FYUGP Degree Examination, December 2025
Discipline Specific Core Course
PHYSICS
UK1DSCPHY100 FOUNDATION COURSE IN PHYSICS 1
Academic Level: 100-199
2024 Admission

Time: 1 Hour 30 Minutes**Max. Marks: 42**

Part A.

6 Marks. Time: 6 Minutes. (Cognitive Level: Remember/Understand)
Objective Type. 1 Mark Each. Answer All Questions

Qn. No.	Question	Cognitive Level	Course Outcome (CO)
1.	State Stoke's theorem.	Remember	1
2.	Recall work-energy theorem.	Remember	3
3.	Describe the key characteristics of conservative forces.	Understand	3
4.	Express definition of one kilogram using Newton's second law.	Understand	2
5.	Compare the definitions of work and power	Understand	3
6.	Illustrate the condition in which an object is said to be rolling without slipping.	Understand	4

Part B.

8 Marks. Time: 24 Minutes. (Cognitive Level: Understand/Apply) Short
Answer. 2 Marks Each. Answer All Questions

Qn. No.	Question	Cognitive Level	Course Outcome (CO)
7.	Interpret the meaning of positive and negative work on an object using an example.	Understand	3
8.	A constant horizontal force with magnitude 10N is applied to a box of mass 20 kg, resting on a level surface with negligible friction. Calculate the acceleration of the box.	Apply	5
9.	Estimate a condition for which a non-zero force applied on a rigid body produces zero torque.	Apply	4
10.	Write down equation connecting impulse and momentum.	Understand	2

Part C.

28 Marks. Time: 60 Minutes. (Cognitive Level: Apply/Analyse/Evaluate/Create)

Long Answer. 7 marks each. Answer all 4 Questions, choosing among options* within each question.

Qn. No.	Question	Cognitive Level	Course Outcome (CO)
11.	A. Explain what is curl of a vector and discuss its physical significance. Calculate curl of the vector $\mathbf{v}_a = x^2 \hat{i} + 3xz^2 \hat{j} - 2xz \hat{k}$ OR B. Check the product rule $\nabla \cdot (\mathbf{A} \times \mathbf{B}) = \mathbf{B} \cdot (\nabla \times \mathbf{A}) - \mathbf{A} \cdot (\nabla \times \mathbf{B})$ for the functions $\mathbf{A} = x \hat{i} + 2y \hat{j} + 3z \hat{k}$ and $\mathbf{B} = 3y \hat{i} - 2x \hat{j}$	Apply	1
12.	A. Apply Newton's second law of motion to derive the relationship between net force and the change in momentum of an object. Explain the concept of impulsive force. OR B. A dockworker applies a constant horizontal force of 90 N to a block of ice on a smooth horizontal floor. The frictional force is negligible. The block starts from rest and moves 11m in 5 s. (i) Evaluate the mass of the block of ice? (ii) If the worker stops pushing at the end of 5s, calculate the distance moved by the block, in the next 5s?	Apply	2
13.	A. Explain the work-energy theorem and apply it to derive the relationship between work done on an object and its change in kinetic energy. Use an example of a car accelerating from rest to demonstrate this relationship. OR B. A 5 kg object is dropped from a height of 20 meters. Assume air resistance is negligible. (i) Calculate the potential energy of the object just before it is dropped. (ii) Using the law of conservation of energy, determine the object's speed just before hitting the ground. (iii) Calculate the energy values at 10 m height and thus verify the law of conservation of energy at that point	Apply	3
14.	A. Using the concepts of rotational motion, derive the expressions for both work and power. How are these related to torque and angular displacement or velocity? OR B. The flywheel of an engine has moment of inertia 2.50 kg m^2 about its rotation axis. (i) Calculate the constant torque required to bring the flywheel up to an angular speed of 400 rev/min in 8s, starting from rest . (ii) Discuss the key features of angular momentum of a rigid body	Apply	4