U7518

Reg. No.: ……..……...……..

Name:……...……..…...

University of Kerala

First Semester Degree Examination, November 2024

Four Year Under Graduate Programme

Discipline Specific Core Course

PHYSICS

UK1DSCPHY103- INTRODUCTION TO MECHANICS AND ENERGY RESOURCES

Academic Level: 100-199

Time: 1½ hours Max.Marks: 42

Part A.

Answer All Questions, Objective Type. 1 Mark Each.

(Cognitive Level: Remember/Understand) 6 Marks. Time: 6Minutes

Qn. No.	Question	Cognitive Level	Course Outcome (CO)
1.	Name any three renewable energy resources.	Remember	3
2.	Name the process by which energy is generated in a nuclear reactor.	Remember	3
3.	Discuss any law on vector addition.	Understand	1
4.	Explain the representation a two-dimensional vector into its component forms.	Understand	1
5.	Restate Newton's second law of rotation.	Understand	4
6.	Explain rotational inertia of an object.	Understand	4

Part B.

Answer All Questions, Short Answer. 2 Marks Each.

(Cognitive Level: Understand/Apply) 8 Marks. Time: 24 Minutes

Qn. No.	Question	Cognitive Level	Course Outcome (CO)
7.	A vector of 10 Newton is 30° north of east. Determine its components along east and north directions.	Apply	1
8.	A horizontally mounted wheel of radius r is initially at rest, and then begins to accelerate constantly until it has reached an angular velocity ω after 5 complete revolutions. Explain about the angular acceleration of the wheel.	Understand	4
9.	Explain Kepler's law of orbits.	Understand	4
10.	Distinguish between nuclear fission and nuclear fusion.	Understand	3

Part C.

Answer all 4 questions, choosing among options within each question.

Long Answer. 7 Marks Each.

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

Qn. No.	Question	Cognitive Level	Course Outcome (CO)
11.	A. Describe solar energy in brief and explain its applications. **OR** B. Describe biomass and explain how biomass conversion takes place	Understand	3
12.	A. Discuss rotational inertia of continuous body and explain the parallel axis theorem. **OR** B. Discuss Newton's second law for rotation to relate the net torque on a body to the bodies rotational Inertia and rotational acceleration	Understand	4
13.	A. a) Illustrate Significant Figures. Give the rules to determine significant figures. b) Calculate the number of significant figures is there in each of the following numbers? i. 123 g ii. 0.123 m iii. 0.0456 g iv. 1.26×10^3 W v. 2.2315 vi. 50 **OR** B. a)Illustrate cross product and dot product of two vectors $\vec{A} \wedge \vec{B}$. b) Determine the angle between the vectors $3\hat{i}+\hat{j}+2\hat{k} \wedge 5\hat{i}+7\hat{j}+3\hat{k}$. c)If $\vec{A}=4\hat{i}-3\hat{j}+\hat{k} \wedge \vec{B}=5\hat{i}-2\hat{j}-2\hat{k}$, *find* $\vec{C}=\vec{A}\times\vec{B}$. *Determine* whether $\vec{C}$ is perpendicular to $\vec{A} \wedge \vec{B}$.find unit vectors along $\vec{A},\vec{B} \wedge \vec{C}$.	Apply	1
14.	A. A satellite is placed in a circular orbit 300 km above the Earth's surface. Given that the radius of the Earth is 6370 km and the mass of the Earth is 5.98×10^{24} kg and Gravitational constant ($G=6.674 \times 10^{-11} \mathrm{Nm}^2/\mathrm{kg}^2$). Discuss by calculation orbital velocity of the satellite. **OR** B. The mass of the Moon is 7.36×10^{22} *kg* and the escape velocity from the Moon's surface is 2.38 km/s. Interpret by calculation the radius of the Moon.	Understand	2