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.<br>**OR**<br>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.<br>**OR**<br>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.<br>b) Calculate the number of significant figures is there in each of the following numbers?<br>i. 123 g<br>ii. 0.123 m<br>iii. 0.0456 g<br>iv. $1.26 \times 10^3$ W<br>v. 2.2315<br>vi. 50<br>**OR**<br>B. a)Illustrate cross product and dot product of two vectors $\vec{A} \wedge \vec{B}$.<br>b) Determine the angle between the vectors $3\hat{i}+\hat{j}+2\hat{k} \wedge 5\hat{i}+7\hat{j}+3\hat{k}$.<br>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 $5.98 \times 10^{24}$ kg and Gravitational constant ($G=6.674 \times 10^{-11} \mathrm{Nm^2/kg^2}$). Discuss by calculation orbital velocity of the satellite.<br>**OR**<br>B. The mass of the Moon is $7.36 \times 10^{22}$ *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 |