

ACHARYA NAGARJUNA UNIVERSITY

UG Revised CBCS Model papers (As per Revised syllabus of A.Y 2020-21)

Section: Core Group Paper

Paper Title: **Mechanics, Waves and Oscillations**

Max.Marks: 75

Max.Time: 3 hours

SECTION- A

Answer any FIVE of the following questions. Each carries TEN marks 5x10=50 Marks

1. (a) What is a rocket ? Describe the principle of a rocket? Why multistage rocket is necessary? OR
(b) Define Rigid body and Derive Euler`s equations.
2. (a) State and prove Kepler`s laws of planetary motion. OR
(b) What are conservative force? Prove the conservative nature of central force.
3. (a) Explain Michelson –Morley experiment with the help of neat diagram and Discuss its negative results.
OR
(b) Derive Lorentz transformation equations of special relativity
4. (a) Define damped harmonic oscillator? Discuss energy consideration in damped harmonic motion. OR
(b) Define coupled oscillators? Derive an expression for the equation of motion of a coupled oscillator.
- 5.(a) Discuss the modes of vibrations of a stretched string at both ends. OR
(b) Describe how ultrasonics are produced by method of magnetostriction

PART- B

Answer any FIVE the questions. Each carries FIVE marks 5 X 5 = 25 Marks

6. Discuss the motion of variable mass system
7. Explain the principle and working of gyroscope.
8. What is central forces? Give their characteristics.
9. Write a short notes on Geo-stationary satellite.
10. Derive an expression for variation of mass with velocity.
11. How fast would a rocket have to go relative to an observer for its length to be contracted to 90% of its length at rest ?
12. What is logarithmic decrement and Quality factor ?
13. Explain about coupled oscillators ?
14. A steel wire 50cm long has mass of 5 g. It is stretched with a tension of 400N. Find the frequency of the wire in fundamental mode of vibration.
15. Write the any five applications of ultrasonics?