SCIM GOVERNMENT COLLEGE TANUKU W.G.Dt-534211

Question Bank for Semester-I (Mechanics, Waves&Oscillations)

UNIT-I

PART-A MECHANICS OF PARTICLES

1. Describe Rutherford's alpha particle scattering cross- section formula(10M)
2. Describe the motion of variable mass system (10M)
3. Explain the motion of a rocket (5M)
4. Write a short note on multistage rocket (5M)
5. Explain the concept of impact parameter and scattering cross-section (5M)
6. State and explain the Newton's laws of motion (5M)

PART-B MECHANICS OF RIGID BODIES

7. Derive rotational kinematic relations (5M)
8. Derive the equation of motion for a rigid rotating body (10M)
9. Explain the concept of angular momentum and inertia tensor (5M)
10. Derive Euler's equations and explain its applications (10M)
11. What is spinning top and derive an expression for its precessional velocity (10M)
12. Write a short note on precession of the equinoxe (5M)

UNIT-II MOTION OF A CENTRAL FORCE FIELD

1. State and explain Kepler's laws of planetary motion(10M)
2. Derive the equation of motion under a central force(10M)
3. Explain the conservative nature of central force(10M)
4. Define central force and explain with examples(5M)
5. What are the characteristics of central force?(5M)
6. Explain the concept of motion of satellites (5M)
7. Write a short note on GPS (5M)
8. What are the physiological effects of astronauts (5M)

UNIT-III RELATIVISTIC MECHANICS

1. What is absolute frame? Describe Michelson –Morley experiment and explain negative result (10M)
2. Derive Lorentz transformation equations (10M)
3. Explain the variation of mass with velocity (5M)
4. Drive Einstein mass-energy equivalence relation(10M) or (5M)
5. Derive Galilean transformation equations (5M)
6. Explain time dilation (5M)
7. Explain length contraction (5M)
8. What are the postulates of special theory of relativity-explain (5M)

UNIT-IV

PART-A UNDAMPED, DAMPED AND FORCED OSCILLATIONS

1. What is damped harmonic oscillator? Derive the differential equation of D.H.O and obtain its solution (10M)
2. What is forced harmonic oscillator? Derive the differential equation of F.H.O and obtain its solution (10M)
3. What is simple harmonic oscillator? Derive the differential equation of S.H.O and obtain its solution (5M)
4. Explain the concept of velocity resonance (5M)
5. Explain the concept of amplitude resonance(5M)
6. Define and explain logarithmic decrement (5M)

7. Define and explain relaxation time and quality factor (5M)

PART-B COUPLED OSCILLATIONS

1. Define coupled oscillator. Explain two coupled oscillators in normal modes and normal coordinates (10M)

UNIT-V

PART-A VIBRATING STRINGS

1. Describe the general solution of wave equation and its significance (5M)
2. Derive an expression for the velocity of a transverse wave along a stretched string (10M) or (5M)
3. Discuss the modes of vibration of a stretched string clamped at both ends and explain overtones, harmonics (10M)
4. What are the laws of transverse wave along a string? (5M)

PART-B ULTRASONICS

1. How to produce ultrasonic waves by magneto striction method
2. How to produce ultrasonic waves by magneto striction method
3. What are the production methods of ultrasonic waves?
4. What are the detection methods of ultrasonic waves?
5. What are the applications of ultrasonic waves?
6. What are the general properties of ultrasonic waves?
7. Write a short note on SONAR