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**G. VENKATASWAMY NAIDU COLLEGE (AUTONOMOUS), KOVILPATTI – 628 502.**



**UG DEGREE END SEMESTER EXAMINATIONS - NOVEMBER 2024.**

(For those admitted in June 2023 and later)

**PROGRAMME AND BRANCH: B.Sc., PHYSICS**

SEM	CATEGORY	COMPONENT	COURSE CODE	COURSE TITLE
III	PART - III	CORE-3	U23PH303	MECHANICS

Date & Session: 09.11.2024/AN

Time : 3 hours

Maximum: 75 Marks

Course Outcome	Bloom's K-level	Q. No.	SECTION – A (10 X 1 = 10 Marks) Answer <u>ALL</u> Questions.
CO1	K1	1.	Select the correct statement in the following. Where F = Gravitational Force. r = distance between two mass objects. a) $F \propto r$ b) $F \propto 1/r$ c) $F \propto r^2$ d) $F \propto 1/r^2$
CO1	K2	2.	What is the shape of the orbit of planets? a) square                      b) circle                      c) ellipse                      d) sphere
CO2	K1	3.	Which of the following expression defines linear momentum of a particle? a) mv                      b) $r \times F$ c) dp/dt                      d) $r \times P$
CO2	K2	4.	Choose the expression for location of a Centre of Mass. a) $R = \sum m_i r_i / \sum m_i$ b) $R = \sum m_i r_i$ c) $R = \sum m_i r_i^2 / \sum m_i$ d) $R = \sum m_i / \sum m_i r_i$
CO3	K1	5.	Choose the SI unit of Energy. a) Joule/s                      b) Joule                      c) Watt                      d) Calorie
CO3	K2	6.	Select the expression for work done. a) Force x Distance                      b) Force / Distance c) Energy / Time                      d) Force / Time
CO4	K1	7.	Choose the general expression for moment of inertia. a) mr                      b) $mr^2$ c) $mr^3$ d) $(mr)^{1/2}$
CO4	K2	8.	Select the expression for kinetic energy of rotation. a) $I\omega$ b) $I\omega/2$ c) $I\omega^2$ d) $I\omega^2/2$
CO5	K1	9.	Choose the number of degrees of freedom required to specify position a particle moving freely in a plane. a) 1                      b) 2                      c) 3                      d) 4
CO5	K2	10.	Choose the generalized coordinates required to describe simple pendulum. a) $\theta$ b) 1                      c) $\theta$ & $\phi$ d) m

Course Outcome	Bloom's K-level	Q. No.	<b>SECTION - B (5 X 5 = 25 Marks)</b> <b>Answer ALL Questions choosing either (a) or (b)</b>
CO1	K3	11a.	Write Newton's Laws with real life examples. <b>(OR)</b>
CO1	K3	11b.	Find the Mass and density of the Earth.
CO2	K3	12a.	Build Newton's second law of motion for system of particles. <b>(OR)</b>
CO2	K3	12b.	Develop conservation theorem for angular momentum of a system of particles.
CO3	K4	13a.	Distinguish conservative and non-conservative forces. <b>(OR)</b>
CO3	K4	13b.	Distinguish work, power and energy.
CO4	K4	14a.	Compare the analogy between translatory and rotatory motion <b>(OR)</b>
CO4	K4	14b.	Inspect Moment of inertia of a thin uniform bar.
CO5	K5	15a.	Appraise the principle of virtual work. <b>(OR)</b>
CO5	K5	15b.	Deduce Newton's equation of motion from Lagrange's Equation.

Course Outcome	Bloom's K-level	Q. No.	<b>SECTION - C (5 X 8 = 40 Marks)</b> <b>Answer ALL Questions choosing either (a) or (b)</b>
CO1	K3	16a.	Find gravitation potential at a point (i) outside the sphere (ii) on the surface due to a uniform solid sphere. <b>(OR)</b>
CO1	K3	16b.	Find the expression for escape velocity of an object at earth.
CO2	K4	17a.	Obtain the relation for the velocity of the rocket at any instant of time. <b>(OR)</b>
CO2	K4	17b.	Examine the velocities of two smooth spheres of different masses making elastic direct collision.
CO3	K4	18a.	Correlate conservative force and potential energy. <b>(OR)</b>
CO3	K4	18b.	Examine the work-energy theorem of a particle.
CO4	K5	19a.	Justify perpendicular and parallel axis theorems. <b>(OR)</b>
CO4	K5	19b.	Deduce the expression for acceleration of a body rolling down an inclined plane.
CO5	K5	20a.	Obtain the Lagrange's equation from D' Alembert's principle. <b>(OR)</b>
CO5	K5	20b.	Obtain the Equation of motion of a simple pendulum using Lagrangian method.